

TECHNICAL MANAGEMENT TEAM

BOR: Tony Norris / John Roache

BPA: Scott Bettin / John Wellschlager

NMFS: Paul Wagner / Chris Ross

USFWS: David Wills / Howard Schaller

OR: Ron Boyce

WA:

ID: Russ Kiefer

MT: Jim Litchfield

COE: Cindy Henriksen / Rudd Turner / Cathy Hlebechuk

TMT MEETING

7 January 2004 0900-1200 hours

Custom House Room 118
Portland, Oregon
Conference call line: 503-808-5190

*All members are encouraged to call Donna Silverberg with any issues or concerns they would like to see addressed.
Please e-mail her at dsilverberg@cnnm.net or call her at (503) 248-4703.*

AGENDA

1. Welcome and introductions.
2. [Early Bird Water Supply Forecast \[Corps Link\]](#) - RFC
3. Chum update - OR
4. Other Snake River issues:
 - Spring spill trigger and Dworshak operations into September - BPA
 - Zero Flow in the Snake River
 - Update on Salmon Managers' review of fishery data
5. Spring Creek Update - USFWS
6. Water Management Plan - Fall / Winter Update - COE
7. Operations Update - ALL
8. Other
 - Set agenda for next meeting

Questions about the meeting may be referred to Cindy Henriksen at (503) 808-3945, or Rudd Turner at (503) 808-3935, or Cathy Hlebechuk at (503) 808-3942

**TECHNICAL MANAGEMENT TEAM
CONFERENCE CALL NOTES
January 7, 2004**

1. Greeting and Introductions

The January 7 Technical Management Team meeting became a conference call when severe winter weather closed many offices in the Portland area. The call was chaired by Cindy Henriksen of the Corps. The following is a distillation, not a verbatim transcript, of items discussed at the meeting and actions taken. Anyone with questions or comments about these minutes should call Henriksen at 503/808-3945.

2. Early Bird Water Supply Forecast.

The January early-bird forecast developed by the Northwest River Forecast Center broke down as follows: Grand Coulee, January-July, 100% of normal; The Dalles January-July, 103 MAF, 96% of normal; Libby, January-July, 6.38 MAF, 101% of normal; Hungry Horse, April-September, 2.12 MAF, 100% of normal; Brownlee 67% of normal; Lower Granite, April-July, 19.4 MAF, 90% of normal. This does not include the most recent snowstorm, however, and includes only 25-50% of all of the stations reporting. The January final forecast will be available on January 9. [Editor's note: The Corps and Reclamation prepare the official forecasts for Libby, Dworshak and Hungry Horse. The official forecasts from the Corps, Reclamation, or RFC were not complete at the time of the call].

What about Dworshak? Paul Wagner asked. The Corps' forecast is 2.6 MAF, 99% of normal, Henriksen replied. I was surprised to see that Dworshak is releasing 8 Kcfs, currently, said Ron Boyce. We have the operational flexibility to do that, Henriksen replied – we increased flow to meet power demand with the cold weather. Today is the last day we'll be doing that; by tomorrow, we'll be back to minimum outflow. Assuming that inflows continue at the current level, we felt we still have a good chance to meet the March 31 flood control point of 1521 at that project – we're at 1516 feet, currently, Henriksen said.

What is the anticipated outflow at Dworshak after March 31? Dave Statler asked. Good question – I don't know the answer, Henriksen replied. But are you assuming minimum outflow from Dworshak through the end of June in order to refill? It's too soon to say, Henriksen said. It is very unlikely that we will be on minimum outflow at Dworshak for that entire period, Scott Bettin replied. Having Dworshak on minimum outflow would be very undesirable, said Statler; my concern is that any operations like we've seen over the past few days could take water away from the spring migrants. We would prefer to see you be a bit more aggressive in your current refill schedule, he said. Our first milestone is really the April 10 refill target, said Henriksen – it's actually a bit lower than 1521 feet. Based on the information we have now, the Corps is confident that the increased outflow over the past several days will not significantly impact our ability to meet the March 31 flood control elevation.

When will the decision about a Dworshak/Grand Coulee flood control shift be made?

Statler asked. Typically in March, Henriksen replied. Russ Kiefer noted that the current Dworshak operation has caused some concerns for local fishermen; he asked that, in the future, such planned operations be posted to the Lewiston Tribune. I understand the need for the operation, he said, but making more of an effort to get that information out would be helpful.

Bettin noted that there is a chance that the current Dworshak operation could continue a little longer, given continued cold temperatures throughout the region. So there is some question about whether we will go to minimum outflow at Dworshak tomorrow? Boyce asked. I'm just saying that isn't off the table, Bettin said. Henriksen said that at the time of this discussion there were no plans to maintain flow greater than minimum from Dworshak beyond today.

3. Chum Update.

We have completed the final 2003 chum spawning survey, said Boyce; December 12 was the last survey date. For chum, the total 2003 lives were 1,381, much lower than last year's total of 6,600+ – that's 21% of the 2002 live count. That really dropped off, Boyce said. For chinook, the cumulative was 1,677, about 80% of the 2002 count at Ives Island. It appears that that wasn't the case in the tributaries, he said, and we don't have an explanation why it occurred. Did you mainly see four-year-old fish this year? Bettin asked. That appeared to be the case, Boyce replied. Bettin observed that the 2003 four-year-olds would have resulted from the 1999 spawning, which saw limited use of the Ives Island spawning grounds, so this isn't unexpected.

We're currently in an 11.8-12.1-foot Bonneville operating range, said Boyce – will that be the incubation flow? Unless something changes radically in the forecast, Bettin replied.

4. Other Snake River Issues.

A. Spring Spill Trigger and Dworshak Operations Into September. Bettin said he was wondering what the reaction from the salmon managers would be if 80 Kcfs was used as the spill trigger in the Snake River this spring. It seems to me it would make more sense to set the spill trigger based on a range of factors, rather than a total flow threshold, Boyce replied. If you look at the literal interpretation of the BiOp, we shouldn't have spilled in 2003, because we never quite achieved the 80 Kcfs flow level in the Snake, said Bettin. If you look at the survival data, however, it's better to have fish in-river under those flow conditions, said Boyce. I'm just going into the lessons learned context to see if we couldn't refine the spill operation, said Bettin – if the forecast for the week says we're not going to hit 80 Kcfs, our proposal would be no spill. There are other factors involved, said Boyce. Perhaps we could ask FPAC to discuss that proposal and develop some pros and cons to the proposal, said Bettin. We can do that, said Paul Wagner.

The other issue was whether it would be possible to firm up our draft to 1520 at Dworshak into mid-September, said Bettin – we've spent a lot of time on that issue at TMT and the IT over the past two years, and given the fact that the operation has worked well both years, perhaps we could try to come to some agreement ahead of time this year. We can discuss that, Boyce replied, but bear in mind that for the past two years we've had favorable water temperature conditions. If the river is hotter this year, then there will be conflicts. Dave Statler said it would be difficult, at this point, to get to a firm agreement on that specific operation.

Kiefer agreed, noting that, while the operation has worked well over the past two years, it might make more sense to seek an intermediate agreement, saying that, while that is the most likely operation, actual operations will depend on actual conditions in the river.

Part of my reason for asking is that maintaining that flexibility does cost the hydrosystem some money, so if we could firm it up ahead of time, that would be helpful, said Bettin. We'll definitely explore that question, said Kiefer. We appreciate your willingness to look into that, said Bettin.

B. Zero Flow in the Snake River. We agreed to look at this question and did so yesterday, said Boyce; we talked about the count criteria and were unable to come to resolution. One thing we do need is real-time adult counts in the Snake, said Boyce; if there is a funding issue, we need to explore that. Perhaps that's a funding issue for SCT, Henriksen suggested. That would probably be too late, said Boyce – I think it would be more productive for the Corps and BPA to discuss it directly. Some time early in February, fish will start migrating again, and we need that information. So you're talking about 2004 counts? Henriksen asked. Yes, Boyce replied. Obviously when the ladders are shut down, there would not be a need for counting, said Kiefer. As soon as the ladders start up again, video data indicates that several hundred fish per day passing.

What we're requesting is that whenever the ladders are operating, we have count data, said Boyce. I would agree with Cindy that SCT would be the most appropriate forum to handle that request, said Bettin – this is not a new issue, it's something we've been doing forever. What about the feasibility of asking Bonneville to fund it this year? Boyce asked. I would say it's about zero, Bettin replied. I think SCT would need to reprioritize its FY'04 program, even so, said Henriksen. Perhaps we can at least explore what it would take to get that done in 2004, said Boyce. OK, Henriksen replied – I'll try to have that for you by the January 21 TMT meeting.

The bottom line is that, by next month, when the steelhead resume their migration, the zero flow operation could begin to have a biological impact, said Boyce.

C. Update on Salmon Managers' Review of Fishery Data. This topic was not discussed at today's meeting.

D. Little Goose Outage. We have to do a line switch at Little Goose, so we're planning to go to zero flow for 5-6 hours at that project, Bettin said – I think it's January 22. No TMT objections were raised to this operation.

5. Spring Creek Update.

In the absence of a Fish and Wildlife Service representative, no Spring Creek update was presented at today's meeting.

6. 2004 Water Management Plan Fall/Winter Update.

Henriksen said there is little new to report on this issue; the revised draft of the draft plan

and fall/winter update should be available via the TMT homepage by the end of this week. The most recent draft includes updated information such as the current chum operation at Bonneville. We have had no comments on the plan and assume it is near final. I have not had an opportunity to review the plan, said Boyce. We can revisit this topic at the January 21 meeting, Henriksen said, and we can finalize it then.

7. Operations Update.

The current elevation at Grand Coulee is 1280 feet; Hungry Horse is at 3524 and meeting Columbia Falls minimum flow, which will likely go up as soon as we get the January final forecast, said Tony Norris – probably 3.5 Kcfs. Again, the Corps' expectation is that we will be reducing Dworshak outflow to minimum later today, said Henriksen.

We increased Libby outflow from 10 Kcfs to 12 Kcfs on Monday, to meet the January 31 flood control point at that project, Henriksen said – that's a few days sooner than expected.

8. Next TMT Meeting Date.

The next meeting of the Technical Management Team was set for Wednesday, January 21. Meeting summary prepared by Jeff Kuechle.

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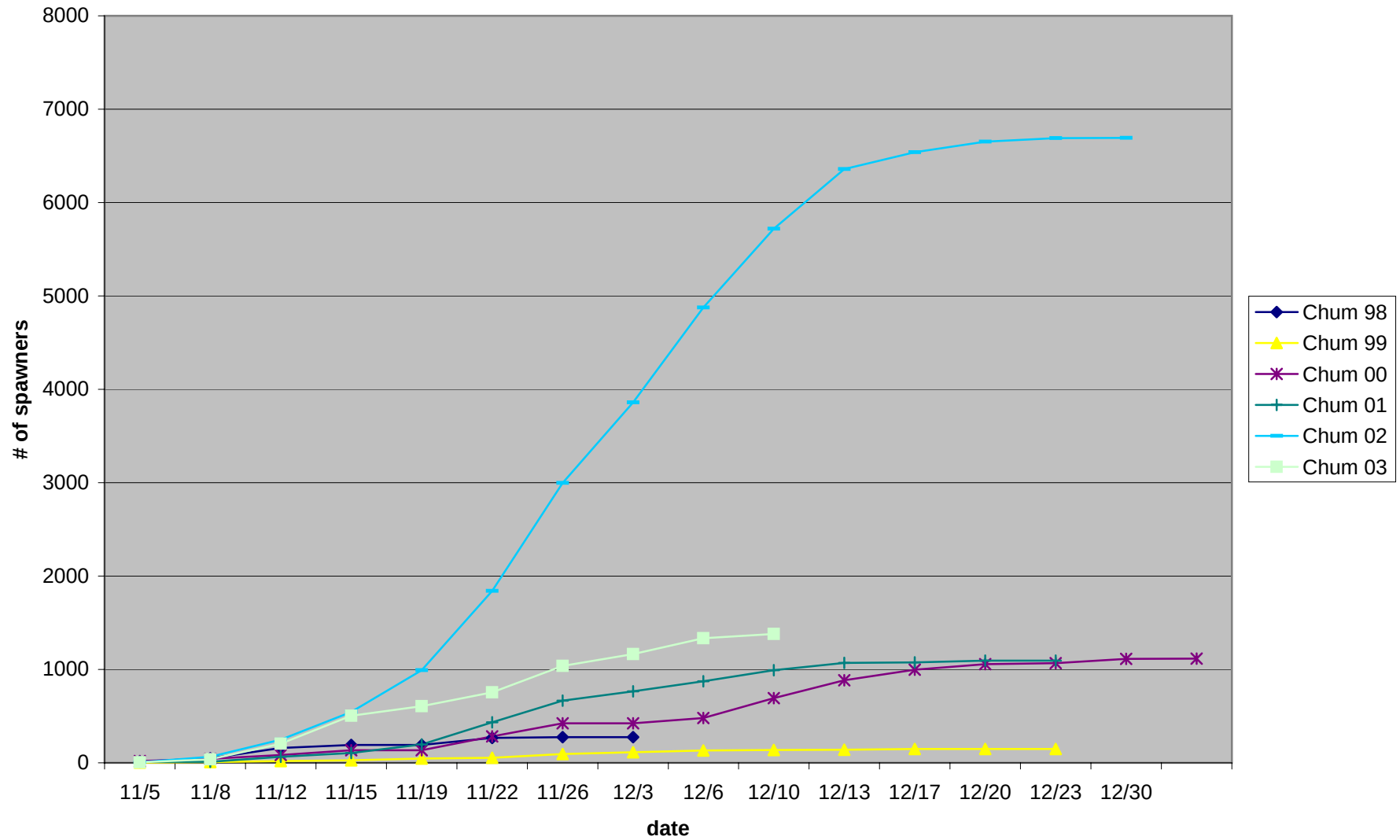
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AGENDA

1. Welcome and introductions.
2. Chum Update - ODFW
[\[Columbia River Chum Spawning Grd Survey Summary, 2003\]](#)
[\[Number \(cumm\) of Ives I. chum spawners, 1998-2003\]](#)
[\[Chum Data 1998-2003\]](#)
3. Salmon Managers' Discussion of:
 - a. Weekly flow level to determine spill (on/off) in spring
 - b. Timing of Dworshak draft to elevation 1520 in 2004
4. Adult Fish Counts in the Lower Snake River in 2004
5. Spring Creek Update - USFWS
6. Final Water Management Plan-Fall/Winter Update - COE
7. Operations Update - ALL
 - a. Water Supply Forecast from RFC
8. Other
 - Set agenda for next meeting

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Number (cumm.) of Ives l. chum spawners, 1998-2003.



Lives

	Chum 98		Chum 99		Chum 00		Chum 01		Chum 02		Chum 03	
11/6	13	11/2	3	11/6	18	11/5	10	11/5	5	11/4	6	
11/9	48	11/5	7	11/8	42	11/9	11	11/8	65	11/6	39	
11/16	158	11/9	19	11/9	84	11/12	65	11/12	248	11/10	205	
11/23	191	11/12	26	11/13	136	11/16	104	11/15	544	11/14	503	
11/30	191	11/16	46	11/14	136	11/19	196	11/19	993	11/18	607	
12/7	266	11/19	55	11/17	283	11/26	435	11/22	1,840	11/21	756	
12/14	274	11/23	95	11/20	423	11/30	665	11/26	2,997	11/25	1037	
12/27	274	11/30	113	11/21	423	12/3	766	12/3	3,860	12/2	1164	
		12/3	131	11/27	479	12/6	873	12/6	4,875	12/5	1335	
		12/7	137	12/1	694	12/10	991	12/10	5,719	12/12	1381	
		12/10	140	12/4	883	12/13	1071	12/13	6,358			
		12/14	147	12/8	996	12/17	1075	12/17	6,540			
		12/17	147	12/12	1057	12/20	1093	12/20	6,653			
		12/27	147	12/15	1067	12/27	1093	12/23	6,690			
				12/18	1114			12/30	6,694			
				12/27	1115							

12/10 97% 12/10 95 12/10 86 12/10 91 12/10 85 +200

Columbia River Chum Spawning Grd Survey Summary, 2003.

Peak live count in 2003.

Site	Date	Lives	Carcasses	Redds	Peak live count, 2002	Comments
Abernathy Ck RM 54	12/23/2003	0	0	0	17 - 12/05/02	Nearly twice as many lives in 03.
	12/18/2003	0	0	0		
	12/8/2003	0	1	0		
	12/1/2003	0	0	0		
	11/24/2003	4	0	3		
	11/17/2003	5	1	2		
	11/11/2003	8	0	10		
	11/4/2003	32	0	6		
	10/28/2003	0	0	0		
	10/22/2003	0	0	0		
Beaver Ck (Elochoman Trib RM 36)	12/16/2003	0	0	0	no fish observed	Larger number in 03
	12/8/2003	0	0	0		
	12/1/2003	3	0	0		
	11/17/2003	10	0	2		
Cameron Ck RM 53	no fish observed				no fish observed	
Carson Ck	no fish observed				no fish observed	
Cedar Ck	no fish observed				no fish observed	
Coal Ck RM 57	no fish observed				no fish observed	
Columbia River Horsetail Fall: RM 139	12/29/2003	0	3	0	no live fish observed 12/19/2002 - 23 dead	Larger number in 03
	12/11/2003	9	10	8		
	12/2/2003	53	12	31		
	11/24/2003	6	0	8		
	11/21/2003	47	0	19		
	11/20/2003	18	1	15		
	11/14/2003	9	0	10		
Columbia River Mult. Falls RM 136	12/29/2003	2	12	47	344 - 12/12/02 This number includes area from Cape Horn to Duncan Cr.	
	12/11/2003	39	24	69		
	12/2/2003	216	27	188		
	11/24/2003	175	8	147		
	11/21/2003	263	5	189		
	11/20/2003	178	3	93		
	11/14/2003	103	0	51		
Columbia River St Clour RM 137	12/11/2003	7	8	16	no live fish observed 12/17/2002 - 4 dead	Larger number in 03
	12/2/2003	27	4	3		
	11/24/2003	23	0	3		
	11/21/2003	5	0	1		
	11/20/2003	4	0	0		
	11/14/2003	0	0	0		
Coweeman River RM 61	no fish observed				no live fish observed	
Cowlitz River RM 68	12/17/2003	0	1	0	no live fish observed	
Crazy Johnson Ck RM 21	12/22/2003	0	2	17	1,640 - 11/18/02	11% more lives counted at peak in 2003
	12/15/2003	2	1244	533		
	12/8/2003	14	394			
	12/1/2003	611	644	207		
	11/23/2003	1818	747	970		
	11/17/2003	986	334	244		
	11/10/2003	1089	199	12		
	11/3/2003	402	17	25		
	10/27/2003	51	3	0		
Dog Ck	no fish observed				no live fish observed	
Duncan Ck RM 142	12/13/2003	4	5	2	5 - 12/06/02	Similar numbers in 02 and 03.
	12/6/2003	6	1	1		
	11/29/2003	6	2	0		

Site	Date	Lives	Carcasses	Redds	Peak live count, 2002	Comments
East Fork Lewis Rive RM 87	12/29/2003	0	0	0	no live fish observed 12/23/2002 - 1 dead	Larger number in 03
	12/23/2003	0	0	0		
	12/18/2003	0	0	0		
	12/11/2003	0	0	0		
	12/5/2003	0	0	0		
	12/3/2003	0	1	0		
	11/26/2003	1	1	0		
	11/21/2003	2	0	1		
	11/13/2003	0	0	0		
	11/6/2003	0	0	0		
	10/30/2003	0	0	0		
	12/18/2003	0	0	0		
	11/21/2003	0	0	0		
Elochoman River RM 36	12/16/2003	0	0	0	no live fish observed	Larger number in 03
	12/8/2003	0	0	0		
	12/1/2003	0	3	0		
	11/12/2003	2	0	0		
	10/29/2003	0	1	0		
Germany Ck RM 54	12/23/2003	0	0	0	14 - 12/10/02	Almost twice the peak count in 03.
	12/18/2003	0	0	0		
	12/8/2003	7	0	8		
	12/1/2003	9	1	2		
	11/24/2003	12	1	6		
	11/17/2003	25	3	0		
	11/13/2003		31			
	11/11/2003	15	3	3		
	11/4/2003	17	0	4		
	10/28/2003	0	0	0		
	10/22/2003	0	0	0		
Goodbear Ck RM 13E	no fish observed				no live fish observed	
Grays River RM 21	12/22/2003	0	209	0	1,421 - 12/18/02	65% more lives counted at peak in 2003
	12/15/2003	0	143	1		
	12/8/2003	33	146	3		
	12/1/2003	65	286			
	11/23/2003	674	493	112		
	11/10/2003	2340	86	13		
	11/3/2003	1019	0	99		
Grays River ex	10/27/2003	60	0	7		
Greenleaf Ck	12/23/2003	0	73			
no fish observed					5 - 12/11/02	
Hamilton Ck RM 143	12/12/2003	61	118	15	452 - 12/04/02	More than 7 times the live fish at peak in 02
	12/5/2003	47	45			
	11/25/2003	44	40			
	11/21/2003	36	8	5		
	11/14/2003	52	2	0		
Hamilton Springs RM 143	12/23/2003	22			281 - 11/29/02	peak less in 03 than 02.
	12/19/2003	37				
	12/12/2003	75				
	12/5/2003	155				
	11/25/2003	258				
	11/21/2003	255				
Hardy Ck RM 142	11/14/2003	16			139 - 12/04/02	63% more lives counted at peak in 2003
	12/23/2003	12				
	12/19/2003	70				
	12/12/2003	206				
	12/5/2003	227				
	11/25/2003	134				
	11/21/2003	88				
	11/14/2003	1				

Site	Date	Lives	Carcasses	Redds	Peak live count, 2002	Comments
Hatchery Ck RM 111	12/22/2003	0	0	0	no live fish observed	
	12/17/2003	0	1	0		
	12/10/2003	0	0	0		
	11/26/2003	0	0	0		
	11/19/2003	0	0	0		
	11/12/2003	0	0	0		
	11/5/2003	0	0	0		
Ives Island area RM 143	11/4/2003	6	0	1	1,015 - 12/05/02	3.5 times less lives in 03 than 02.
	11/6/2003	33	0	4		
	11/10/2003	166	2	41		
	11/14/2003	298	2	114		
	11/18/2003	104	13	62		
	11/21/2003	149	37	169		
	11/25/2003	281	63	164		
	12/2/2003	127	93	216		
	12/5/2003	171	98	262		
	12/12/2003	46	46	187		
Jim Crow Ck RM 28	no fish observed				no live fish observed	
Josephs Ck RM 111	12/22/2003	0	4	1	8 - 12/04/02	More in 02 than 03
	12/17/2003	0	8	0		
	12/10/2003	5	5	3		
	11/26/2003	2	2	1		
	11/19/2003	1	0	0		
	11/12/2003	1	0	1		
	11/5/2003	0	0	0		
Kalama River RM 73	12/17/2003	0	0	0	no live fish observed	
	12/10/2003	1	1	1		
	11/5/2003	0	0	0		
	10/29/2003	0	0	0		
Kanaka Ck	no fish observed				no live fish observed	
Klitz Ck RM 28	no fish observed				no live fish observed	
LaCamas Ck RM 119	12/24/2003	0	0	0	15 - 12/18/02	Similar peak numbers
	12/19/2003	3	2	0		
	12/12/2003	6	0	0		
	12/4/2003	13	1	5		
	11/24/2003	2	14	5		
	11/14/2003	0	0	0		
	11/7/2003	0	0	0		
	10/31/2003	0	0	0		
Lawton Ck RM 125	no fish observed				no live fish observed	
Little White Salmon River	no fish observed				no live fish observed	
Mason Ck (trib. of E.F. Lewis R.)	no fish observed				no live fish observed	
Mill Ck RM 53	no fish observed				no live fish observed	
Moffet Ck RM 144	no fish observed				no live fish observed	
Nelson Ck RM 44	no fish observed				no live fish observed	
North Fork Lewis River RM 87	12/23/2003	0	0	0	15 - 12/19/02	3.6 more in 03 than 02
	12/18/2003	0	0	0		
	12/12/2003	0	0	0		
	12/4/2003	0	2	0		
	11/26/2003	0	8	0		
	11/20/2003	6	3	3		
	11/13/2003	54	40	21		
	11/6/2003	24	4	20		
	11/5/2003	24	17	4		
	10/30/2003	0	0	0		
RiverShore RM 113	12/22/2003	0	0	0	152 - 12/11/02	2003 and 2002 are similar.
	12/17/2003	9	3	4		
	12/10/2003	81	7	39		
	11/26/2003	147	2	46		
	11/19/2003	23	0	15		
	11/12/2003	15	0	6		

Site	Date	Lives	Carcasses	Redds	Peak live count, 2002	Comments
RiverShore	11/5/2003	0	0	0		
Rock Ck	no fish observed				no live fish observed	
Sea Resources Returns RM 6	11/24/2003 11/19/2003	101 321			293	10% larger peak in 2003.
Skamokawa Ck RM 35	12/17/2003 12/9/2003 12/2/2003 11/13/2003 11/11/2003 11/3/2003 10/28/2003	0 0 2 45 51 9 13	0 34 33 2 4 1 0	0 0 0 0 13 1 0	no live fish observed	Larger number in 03
Skamokawa Ck ex	11/11/2003 11/3/2003 12/9/2003 12/2/2003	34 3 2 27	3 1 20 27	4 0 0 14	no live fish observed	Larger number in 03
Smith Ck	no fish observed				no live fish observed	
St Cloud Ck RM 138	no fish observed				12/17/2002 - 4 dead	
Washougal River RM 120	12/24/2003 12/12/2003 12/4/2003 11/24/2003 11/14/2003 11/7/2003 10/31/2002	0 3 0 0 3 0 0	0 1 0 1 0 0 0	0 0 0 0 2 0 0	10 - 12/09/02	Larger number in 02
West Fork Grays RM 21	12/22/2003 12/15/2003 12/8/2003 12/1/2003 11/23/2003 11/17/2003 11/10/2003 11/3/2003 10/27/2003	0 1 73 313 2271 313 1261 726 216	184 285 183 506 804 259 255 18 1	10 9 37 40 1014 114 29 37 102	2,076 - 11/18/02	approx. 10% increase in 2003.
White Salmon River RM 168	no fish observed				11/13/2002 - 2 dead	
Wind River RM 155	no fish observed				no live fish observed	
Woodard Ck RM 141	no fish observed				no live fish observed	
Woods Landing seeps RM 112	12/22/2003 12/17/2003 11/26/2003 11/19/2003 11/12/2003 11/5/2003 12/10/2003	17 93 161 91 51 0 187	12 26 6 0 0 0 27	22 38 57 38 16 0 89	218 - 12/18/02	17% more in 02

Peak live counts for 2002 and 2003 are from FPC's website. 2002 data taken from PSMFC's annual report, "2002
Chum Salmon Spawning Ground Surveys on the Mainstem Columbia River and its Washington Tributaries."
River Mile (RM) are approximate.

Summary comments:

Except in the Ives Island and Hamilton Creek areas, overall, peak chum live counts were larger in 2003 than 2002.

COLUMBIA RIVER REGIONAL FORUM

TECHNICAL MANAGEMENT TEAM

January 21st, 2004

FACILITATOR'S SUMMARY NOTES ON FUTURE ACTIONS

Facilitator: Donna Silverberg

The following notes are a summary of issues that are intended to point out future actions or issues that may need further discussion at upcoming meetings. These notes are not intended to be the "record" of the meeting, only a reminder for TMT members.

Introductions: TMT members welcomed Cindy LeFleur, the new TMT representative for WDFW, to the team. Members introduced themselves and provided some background about their individual roles in the Regional Forum. Cindy brings expertise on harvest management issues – the team agreed that Cindy's knowledge on this will add greatly to the technical discussions. Welcome to the TMT Cindy!

Chum Update:

Ron Boyce, Oregon, reported that all chum counts were up in 2003 compared to 2002, except for Ives Island. Biologists looked at stream flows and tailwater, which showed that in late March to early April, low flows and out-migration may have caused dewatering. It could also be low 2001 fish numbers. Oregon continues to look at the data to try to determine why chum numbers were down in the Ives Island area. The annual report is being developed; data will be provided to the TMT as it is analyzed. Oregon is leaning toward an analysis that low spring flows may contribute to low returns at Ives Island.

Spill at Bonneville:

Scott Bettin, BPA, reported that the Bonneville project has been spilling 1.8 kcfs per day for adult fish attraction since December 1st. FPOM discussed this operation and found that an average 4-7 fish are passing the dam per day for the January/February time period. BPA requested a no spill operation at this project, effective immediately. Chris Ross reported that NOAA coordinated internally since the TMT representatives have never dealt with this issue before. NOAA feels that because it is wintertime and there is low passage, there might be a short term benefit to stopping spill now. NOAA would like to work with FPAC to continue discussions on this, review the data and monitor the fish at the project.

Oregon felt that this issue was not appropriate for TMT members to discuss, considering the group has not dealt with this in the past. Ron reported that the Oregon FPOM representative holds the position that it is beneficial to the fish to spill at the project. Ron Boyce would like to review the numbers and impacts of no spill before making a decision. Ron suggested that FPOM look at the issue and give a short description to FPAC for review. This process was not acceptable to BPA.

Other members weighed in on the request:

- USFWS: Mostly concerned with when spill will be turned back on. Supports NOAA's recommendation and is hard pressed to support the continuation of spill.
- Idaho: Seems like a reasonable request given the low steelhead numbers. Would like FPAC to discuss:
 - o a) criteria/number of fish for turning on BON spill as an adult attraction operation, and
 - o b) criteria for ending zero flow in the Snake River.
- COE: Looked at average numbers of passing steelhead from 1995-2002, which showed an average 10 fish or less passing during this timeframe. Based on the low numbers, multi-use of the dam and understanding the salmon managers will discuss this further, the COE is prepared to shut off spill at BON.
- Washington: Doesn't make logical sense to continue spill given the very low numbers of fish passing.
- BOR: Will support the recommendations of NOAA and the COE.
- BPA: What is the change in survival based on stopping spill? The effect is to delay migration by one day.
- Oregon: Requests that in the future if such an issue is brought to the TMT, members are allowed more time to coordinate internally.

ACTION: The COE will stop spill at spillway 1 effective immediately. FPAC will continue to monitor the project and review data, and specifically address the two points suggested by Idaho above. There will be an update on this at the next TMT meeting.

Salmon Managers Discussion:

- *Use of weekly flow level to determine on/off spring spill*: BPA, at the last meeting, suggested an alternate trigger than is in the BiOp for spring spill operations. The salmon managers discussed other options, and are not in favor of a weekly on/off management. The ISAB recommended the use of "all passage routes" in order to "spread the risk" and do not favor one route over the other. Russ Keifer, Idaho, said that the spring spill work group will discuss this and other alternatives. He pointed out that there is no evidence, except during very low flow conditions, that transport (which would be the fallback if spill is turned off) is as beneficial as spill, and may even be harmful. The weekly on/off option seems to move away from protecting fish.
- *Timing of Dworshak draft to elevation 1520'*: The salmon managers prefer a 1520' end of August planning target with flexibility to go to September 15th via adaptive management. Dave Statler said that the Nez Perce are comfortable with 1535' by August 31st, which allows a 200 kaf carryover to September. TMT will continue discussion of this in mid- to late February when beginning the Spring/summer update to the WMP.

Adult Fish Counts in Lower Snake 2004:

Dave Wills, USFWS, reported that the salmon managers are hoping to get Monday and Thursday numeric counts tallied from the video counts being done at Little Goose and Lower Monumental to provide for TMT. The COE noted that unless funded elsewhere, video counting will end at the end of February. A question was raised to the salmon managers: Based on historic data, is there a recommendation for how to proceed? The

salmon managers are working on this question. Other questions were raised: How will the counts help make decisions? What are the biological impacts on fish? Also, if future funding of the video counts is desired, all TMT members should alert their SCT member of the issue.

Spring Creek Update:

No changes have occurred since the last update to TMT. There is an upper policy level meeting scheduled for next week to discuss this issue. Dave Wills will update TMT on those discussions at the next TMT meeting.

Water Management Plan Fall/Winter Update:

The final WMP fall/winter update is now on the web. Oregon will have comments, which will be attached to the web report sometime this week.

Operations Update:

- *Water supply:* The January final water supply forecast is out. The forecast shows near normal water supply at each of the projects (90-98%). The mid-month forecast is slightly lower. The COE has posted the flood control levels on the TMT web page. Because Dworshak is showing a near normal water supply forecast, the shifted flood control is 1530' for the end of March. The COE has some flexibility in the meantime, some of which was used from Jan. 5-7. Idaho requested advisement of level changes for Dworshak prior to making changes should that occur in the future.
- *Other operations:* Tony Norris, BOR, reported that Grand Coulee is at elevation 1272'; Hungry Horse is at 3521.4' and meeting minimums at Albeni Falls. Kyle Martin reported that CRITFC is hosting a flood control workshop in Portland on February 12th. The workshop will involve technical and policy discussions, particularly addressing ways to improve fish passage. Cindy Henriksen, COE, gave the TMT a heads up that Little Goose will be operating at speed/no load for a line switch on Thursday, 1/22. The COE is coordinating on this and working to minimize the number of hours for the special operation.

Next Meeting, February 4th, 9 am:

Agenda items include:

- Summer Spill Review and Discussion (information/technical input)
 - o Options
 - o Sympass analysis
 - o Offsets
 - o [NOTE: The COE will send information for this agenda item out to TMT members early next week]
- Spill at Bonneville Update from Salmon Managers
- Adult Fish Counts in Lower Snake – update from salmon managers and COE
- Spring Creek Operations Update from USFWS
- Operations Update

1. Greeting and Introductions

The January 21 Technical Management Team meeting was chaired by Cindy Henriksen of the Corps and facilitated by Donna Silverberg. The following is a distillation, not a verbatim transcript, of items discussed at the meeting and actions taken. Anyone with questions or comments about these minutes should call Henriksen at 503/808-3945.

Silverberg welcomed new WDFW representative Cindy LeFleur to today's meeting.

2. Chum Update.

Ron Boyce said he had provided a written summary of the 2003 chum spawning ground survey prior to today's meeting; this information is now available via hotlink from the TMT's Internet homepage. At the last TMT, I reported that we saw a decrease in 2003 chum spawning in the Ives Island area, said Boyce; we then looked at all of the mainstem and tributary data, as well as data from past years. The long and short of it is that chum counts were up in 2003 compared to 2002 numbers for all sites except Ives Island, said Boyce. The total number of live chum counted in 2003 was just over 1,300, compared to more than 6,000 in 2002.

Boyce went through some of the potential factors behind this decline, including reduced incubation flows from Bonneville during March and April 2001, which may have dewatered some chum redds and led to higher-than-normal outmigration mortality in 2001. In any event, we feel that a lower-than-average Age-3 return in 2003 may be attributable to these and other factors, said Boyce; we will run some further analyses and include that information in our annual report.

Do you have a count for the index as a whole? Scott Bettin asked. I don't have the final counts for 2003, Boyce replied; it was 20,000-25,000 in 2002. The bottom line is that we did see a decline in the live spawner counts at Ives Island in 2003, which may be at least partially attributable to the flow regime in the spring of 2001, he said. And you will continue to look at the data to try to reach some conclusions? Silverberg asked. Yes, Boyce replied – in the meantime, I think the lesson may be that we need to be very careful to maintain the Bonneville tailwater elevation during the spring period to avoid adverse impacts to chum. When do you expect the annual report to be available? Henriksen asked. Not until September, Boyce replied, but we will provide summary data as it is developed. In the meantime, again, I am convinced that the low tailwater elevations at Bonneville during the spring of 2001 may have been a factor in the lower 2003 returns to Ives Island. I hope we will keep that in mind this spring, he added.

3. Outcome of Salmon Managers' Discussion of Weekly Flow Level to Determine Spill (On/Off) in Spring.

Scott Bettin said this issue arose out of the TMT's year-end review, and was raised at the last TMT meeting; he noted that, according to a literal interpretation of the

BiOp criteria, there would have been no spring spill at the Lower Snake projects in 2003, because total river flow at Lower Granite never quite reached 85 Kcfs. I suggested, then, that we consider using a weekly spill trigger of 90 Kcfs at Lower Granite in 2004, Bettin said.

David Wills said FPAC had discussed this issue and did not favor a total shutdown of spill throughout the Snake River if total river flow falls below 90 Kcfs. We're not in favor of the weekly on/off plan, he said – for various reasons, we would prefer to continue spill once it begins. The ISAB's recommendation was essentially that we should provide all passage routes, spreading the risk rather than favoring one route of passage over another, said Paul Wagner – the on/off approach would definitely favor transportation over in-river passage. That is what the current BiOp tells us to do, Bettin observed. True, but the data that is emerging shows that the fish that migrate in-river during April, when flows are generally lower, survive better than the fish that are transported or pass through the turbines during that period, said Wagner.

Russ Kiefer said FPAC will be discussing this issue in more detail in the future; however, he said, I agree that we do not have conclusive evidence that transportation provides a survival benefit in the Snake River, except under extremely low-flow conditions. I am reluctant to get into a difficult battle over changing this criteria before the new BiOp is available later this year, Kiefer said – it will be very bloody if we try to reach a resolution on this issue before the BiOp is issued.

After a few minutes of additional discussion, Silverberg noted that the TMT is not expected to make a decision on this issue at today's meeting. It was agreed to revisit this issue at a future TMT meeting.

4. Outcome of Salmon Managers' Discussion of the Timing of the Dworshak Draft to Elevation 1520 in 2004.

Bettin said the intent of this agenda item was to firm up the date by which Dworshak will be drafted to elevation 1520 – August 31 or September 15 - in 2004. Procedurally, we're still saying we would draft to 1520 by August 31, recognizing that it is an in-season decision, David Wills replied - in other words, we would prefer to retain the operational flexibility to draft the project sooner if water temperatures warrant. Dave Statler said the Nez Perce Tribe is comfortable setting a Dworshak draft limit of 1535 by August 31. Bettin noted that retaining that operational flexibility does have some cost. Is this something that will be addressed in the new BiOp? Silverberg asked. Likely, Wagner replied.

We wouldn't necessarily oppose what BPA is proposing, said Kiefer, but at the last FPAC meeting, we discussed a slightly different question. It was agreed that discussions on this issue will continue, and that it will be revisited at a future TMT meeting.

5. Adult Fish Counts in the Lower Snake River in 2004.

Wills said FPAC discussed this issue at its last meeting, but did not finish that discussion. They're doing video counts at Little Goose and Lower Monumental over the winter, but we need more information on the manpower costs involved in reviewing those tapes so that we have real-time passage information in season, Wills said. We will then pass that funding request along to the powers that be, he said.

The Corps has also discussed this issue, said Henriksen; currently, although those counts are going to be reviewed by WDFW, there is no plan to review the tapes until early February. Currently, some of the fishways are out of service at the Lower Snake projects, she added; daily Lower Granite counting will officially begin on March 1. Once the data is available from WDFW, we can discuss it further, she added. Our concern is that, based on historic data, steelhead migration resumes in the Lower Snake some time in February, and the salmon managers would like to have real-time information about winter passage to support real-time decision-making, Wills said. Bettin noted that the February video counting is scheduled to end after 2004, so if the salmon managers would like the program to continue, they should speak to their SCT representative.

The question then becomes, what conclusions would you draw from the previous two years of video counting data? Henriksen asked. Is there a salmon manager recommendation that is being formulated based on that data? We're working on some ideas that we're planning to bring to TMT in the future, Wills replied, but we're not quite ready to present them yet. In response to a question, Kiefer said one of those ideas is to try to develop criteria to better-define "few" in the context of "few fish pass the projects" during this period. The bottom line is impacts on fish, and concerns on the part of the salmon managers about impacts to adult steelhead, Boyce said – we want to be able to obtain that critical real-time information in-season, and will be pursuing funding with the appropriate agencies. We'll discuss this further at the February 4 TMT meeting, said Silverberg.

6. Spring Creek Update.

Wills reported that there have been no major developments in the Spring Creek spill discussions; there will be a meeting next week to discuss spill protocols for the Bonneville corner collector in 2004, and I remain optimistic, he said. And will that meeting be for policy-level personnel? Henriksen asked. Yes, Wills replied.

7. Final Water Management Plan – Fall/Winter Update.

Scott Boyd said the final 2004 Water Management Plan and fall/winter update are now available via a hotlink from the TMT's Internet homepage. We now consider that a final document, said Henriksen, and are moving on to the spring/summer update. Boyce said Oregon still plans to submit comments on the fall/winter update. We will attach them to the document once those are received, said Boyd, although I do not intend to revise the actual document further at this time.

8. Operations Update.

Henriksen said the January final water supply forecast is now available, as well as a mid-month forecast, which is slightly lower than the final. According to the January final WSF, the Grand Coulee January-July forecast is 61 MAF, 98% of normal; the Lower Granite April-July forecast is 19.8 MAF, 92% of normal; The Dalles January-July forecast is 103 MAF, 96% of normal. With that data, the flow objectives would be greater than the minimum numbers at Lower Granite and McNary, and closer to the top of the scale, Henriksen said. According to the mid-month forecast, Grand Coulee is at 97% of normal, the Lower Granite forecast increased slightly, and the forecast at The Dalles decreased slightly. The forecast error at The Dalles is about 27 MAF. The Corps has posted Columbia River flood control elevations for storage projects around the basin on the Corps web page, Henriksen added.

At Dworshak, the January final water supply forecast is normal, which puts the project's shifted flood control elevation at 1530 feet on March 3, said Henriksen. That gives us a little extra operational flexibility at Dworshak, Henriksen said; you will recall that we used some of that flexibility to release some additional water during early January when the region experienced below average cold temperature. The bottom line is that we have 25-30 ksf in additional operational flexibility at Dworshak between now and the end of March, she said. Basically, we wanted to give you a heads-up that we may run some additional water out of Dworshak over the coming weeks, said Bettin. And there will be a Grand Coulee/Dworshak flood control shift this year? Wagner asked. The 2000 BiOp recommends a shift in an average water year such as this, so that was part of the criteria in developing the amount of flexibility available at Dworshak, Henriksen replied.

Tony Norris reported that Grand Coulee is currently at elevation 1272; Hungry Horse is at 3521.4 feet and meeting the 3.5 Kcfs Columbia Falls minimum flow.

Libby is operating at minimum outflow of 4 Kcfs, down from 10 Kcfs at the beginning of January, Henriksen said. The January final water supply forecast was 91% of normal at Libby, said Henriksen; that puts the project's January 31 VARQ elevation at 2422.5 feet. The current elevation is 2405, hence the reduction in outflow from the project, Henriksen said.

Bettin said there are no power issues to report, currently.

9. Attraction Spill at Bonneville.

Bettin said that, currently, Bonneville is spilling 1.8 Kcfs during daytime hours for fish attraction at Bonneville Spillbay 1. That operation is not in the BiOp, so we weren't sure why it was occurring, Bettin said. I took the issue to FPOM; they, too, were unsure why it was occurring, but agreed to look into it. It appears that 4-7 fish are passing Bonneville per day; I asked if we could cut off spill for now, but FPOM said no, that we would need to elevate that issue if we want to stop spill, said Bettin. He noted that a number of adult steelhead – about 100 -- appear to be living in the ladder, but again, only 4-7 fish per day are actually passing the project, total. Is it all right with TMT if we stop the attraction spill at Bonneville for now? Bettin asked.

Chris Ross said Gary Fredricks, NOAA Fisheries' lead biologist for Bonneville, would prefer to continue attraction flow if the fishway is operational, but was unaware of the current passage numbers, and is willing to live with whatever decision TMT makes on this issue. We have not reviewed the historic data, and this is the first time Paul Wagner and I have addressed this issue. Currently, most of the water is going past the second powerhouse, which is where the fish are going to be attracted, Ross said; the Washington-side fishway, which is near Powerhouse 2, is operational. I guess my thinking is that it is wintertime, and with single-digit passage, it may make sense to stop the spill, look at the data, and monitor in-season to see when the fish start moving up to the spawning grounds, probably some time in February, Ross said. The bottom line is that I'm leaning toward accommodating BPA's request, said Ross, while monitoring the situation in the river.

Boyce said that, in his opinion, this issue isn't ripe for TMT decision. Winter steelhead are depressed and very important to the State of Oregon, and I'm not ready to make this decision today before I've had a chance to look at the available data, he said.

Bettin said he has been working this issue through FPOM for the past 52 days, and that he is now elevating it to the TMT. I'm willing to move quickly on this issue, said Boyce, but I would like FPOM to develop a short description of the issue, to which FPAC will provide a response within a specified time-frame. Is that acceptable? Boyce asked. No, Bettin replied – BPA would prefer to stop the spill now, rather than continuing to spill at a cost of \$48,000 per day, while we study the issue. In response to a question from Cindy LeFleur, Bettin said this is a money issue, pure and simple; even this modest amount of spill costs Bonneville nearly \$500,000 over the course of the season. He added, however, that cutting off spill at Spillbay 1 is not a survival issue – it will only delay fish passage by a day or so.

After a few minutes of further discussion, Kiefer said that, given the single-digit passage occurring at Bonneville at this time, he may be in favor of BPA's request, because the Washington-side ladder at B2 is operational now; his concern is what criteria will be used to turn spill back on at the Cascade Island ladder. It was agreed to ask FPOM to look at both this question and when to end zero nighttime flow at the Snake River projects. Wagner reiterated that NOAA Fisheries is not opposed to BPA's request, particularly given the fact that the fishways are currently out of service at The Dalles and John Day Dams. Wills said that, from a Fish and Wildlife Service perspective, he agrees with Kiefer that FPOM should consider the criteria under which attraction spill would resume. With that caveat, he said, the Fish and Wildlife Service will not oppose BPA's request.

What about the Washington? Silverberg asked. LeFleur replied that it doesn't seem to make a lot of sense to continue attraction spill at the Cascade Island ladder at this time, given the information presented at today's meeting. The Corps? Silverberg asked. One item of information we looked at was the historic steelhead passage data dating back to 1995, said Henriksen; on average, from January through late February, the historic steelhead passage index is 10 fish or less until late February or early March. Based on that information, and the need for multi-purpose use of the project, the Corps is prepared

to stop spill at Bonneville Spillbay 1 until we get further criteria, Henriksen said. Reclamation will follow NOAA Fisheries' and the Corps' recommendations, said Norris.

Procedurally, then, unless another TMT member chooses to elevate this issue, the action agencies have the authority to end spill at Bonneville, said Silverberg. Do any TMT members wish to elevate this issue to the IT? Boyce reiterated his opposition to this course of action, but said he does not chose to elevate this issue at this time. He asked that, in the future, BPA provide information about such operational requests in advance of the TMT meeting, rather than simply putting them on the table at the last minute. Understood, said Bettin, but this forum does allow for real-time decisions.

Later in the meeting, Boyce said he had spoken to ODFW's FPOM representative, and it was Oregon's understanding that FPOM would revisit this issue once various informational requests relating to wild winter steelhead passage were answered. We were completely unaware that BPA planned to elevate this issue to TMT, without further discussion at FPOM, Boyce said. We will provide that data, said Bettin, but it will not be significantly different than the 10 fish per day passage number you've already heard. He noted that he had requested a special FPOM meeting to discuss this issue, but that request was not met.

BPA and the Corps, then, will move forward with stopping spill at Spillbay 1, said Silverberg; FPAC, FPOM and NOAA Fisheries will continue to monitor and discuss the situation, as well as the criteria under which spill will resume. Bettin said spill will end at 10:15 this morning. We'll discuss this issue further at the February 4 TMT meeting, Silverberg said.

10. Other.

Kyle Martin said CRITFC will be hosting a flood control workshop on February 12; its purpose will be to explore ways to optimize flood control operations to benefit fish.

There is an operation tomorrow at Little Goose under which the project will go to speed-no-load for five hours to accommodate a line change, Bettin reported. Also, said Henriksen, next week at Libby Dam, they may be testing each of the five units, which will increase flow from 4 Kcfs to 5 Kcfs for a few hours. We're working to minimize that operation to avoid drafting the project, she said.

11. Next TMT Meeting Date.

The next meeting of the Technical Management Team was set for Wednesday, February 4. Henriksen noted that, at that meeting, the TMT will be asked to take up the ongoing discussion of the 2004 summer spill program. This will be an opportunity for technical input to this regional discussion, she said; I think we all understand that the actual decision will be made at a higher level than TMT. Meeting summary prepared by Jeff Kuechle.

TMT PARTICIPANT LIST

January 21, 2004

Name	Affiliation
Donna Silverberg	Facilitation Team
Mary Karen Scullion	COE
Mike O'Bryant	CBB
Kyle Martin	CRITFC
Cindy Henriksen	COE
Tony Norris	USBR
Scott Bettin	BPA
Scott Boyd	COE
Robin Harkless	Facilitation Team
Nic Lane	BPA
Tim Heizenrater	PPM
Ruth Burris	PGE
Lance Elias	PPL
Tom Le	PSE
Margaret Filardo	FPC
Todd Perry	Constellation Energy
Mike Buchko	Powerex
Kevin Nordt	PGE
Ron Boyce	ODFW
Glenn Traeger	Avista
Richelle Beck	D. Rohr & Associates
Russ Kiefer	IDFG
Cindy LeFleur	WDFW
Dave Ryan	PPM
David Benner	FPC
Laura Hamilton	COE
Tiffany Jenks	BPA
Martin Hatscher	SCL

Paul Wagner	NOAA Fisheries
Chris Ross	NOAA Fisheries
Russ George	WMCI
David Wills	USFWS
Steve Haeseker	USFWS
Dave Statler	NPT
Jim Adams	COE

TECHNICAL MANAGEMENT TEAM

BOR: Tony Norris / John Roache

BPA: Scott Bettin / John Wellschlager

NMFS: Paul Wagner / Chris Ross

USFWS: David Wills / Howard Schaller

OR: Ron Boyce

WA: Cindy LeFleur

ID: Russ Kiefer

MT: Jim Litchfield

COE: Cindy Henriksen / Rudd Turner / Cathy Hlebechuk

TMT MEETING

04 February 2004 0900-1200 hours

**Custom House Room 118
Portland, Oregon
Conference call line: 503-808-5190**

*All members are encouraged to call Donna Silverberg with any issues or concerns they would like to see addressed.
Please e-mail her at dsilverberg@cnnm.net or call her at (503) 248-4703.*

AGENDA

1. Welcome and introductions.
2. Summer Spill: Status of Discussions - All - Comment Period Extended to February 20, 2004.

[\[January 22, 2004 - Comments\]](#)  [\[February 11, 2004 - Comments Modified in response to TMT/IT\]](#) 

a. Options

[\[Presentation January 21, 2004 Summer Spill Update and Analysis Power Point\]](#)

[\[Presentation modified February 11, 2004 - Modified in response to TMT/IT\]](#)

[\[2000 BIOP Summer Spill Cost & Summer Spill Criteria\]](#) 

[\[2000 BIOP Summer Spill Costs With Near Average Flows at The Dalles\]](#) 

b. SIMPASS Analysis -

[\[Simpass Results\]](#) [\[Simpass Results - Modified in response to TMT/IT\]](#)

1.

[\[Draft Current Above Bonneville Production Tables - Added in response to TMT/IT\]](#)

c. Offsets

[\[January 27, 2004 - Alternative Mitigation Actions to Offset Survival Impacts of Reduced Summer Spill Operations\]](#) 

[\[January 23, 2004 - Modified in response to TMT/IT\]](#) 

1.

[\[Pike Minnow Detail - Added in response to TMT/IT\]](#)

2.

[\[Hanford Reach Fall Chinook Estimates - Added in response to TMT/IT\]](#)

d. Comments received 05-Feb-2004 at IT Meeting

[\[CRITFC-February-03-2004\]](#)  [\[Nez Perce-February-04-2004\]](#) 

3. Bonneville Adult Ladder Attraction Spill December through March - ODFW

4. Salmon Managers Update of Adult Fish Counts in the Lower Snake River: Criteria for decisions
5. Spring Creek Update - USFWS
6. Operations Update - ALL
 - a. Operational projections for 2004 (QADJ)

[\[Summary of January 2003 QADJ Model Runs 03-Feb-04\]](#)  [\[Charts January 2003 QADJ Model Runs 03-Feb-04\]](#) 

7. Other
 - Set agenda for next meeting

Questions about the meeting may be referred to Cindy Henriksen at (503) 808-3945, or Rudd Turner at (503) 808-3935, or Cathy Hlebechuk at (503) 808-3942

2000 BIOP SUMMER SPILL COSTS

	The Dalles July- August average outflow (kcfs)	2000 BiOp Jul- Aug Juvenile Spill Cost (\$Millions)	<u>SUMMER SPILL CRITERIA:</u>	
1929	148	82	IHR	50% of outflow 24 hrs/day
1930	153	80		
1931	145	80	JDA	60% of outflow 12 hrs/day, 30% of outflow 24 hrs/day on alternating days
1932	195	86		
1933	234	62		
1934	158	75		
1935	188	83	TDA	40% of outflow 24 hrs/day
1936	162	84		
1937	156	82	BON	140 kcfs 12 hrs (night), 120 kcfs 12 hrs (day)
1938	167	80		
1939	165	81		
1940	151	81		
1941	145	84		
1942	198	88		
1943	209	78		
1944	139	71		
1945	164	92		
1946	196	84		
1947	189	78		
1948	220	80		
1949	148	78		
1950	222	76		
1951	212	74		
1952	177	75		
1953	203	77		
1954	238	74		
1955	241	55		
1956	212	71		
1957	164	80		
1958	162	91		
1959	216	77		
1960	185	80		
1961	171	76		
1962	187	83		
1963	193	79		
1964	226	63		
1965	200	85		
1966	192	74		
1967	215	76		
1968	204	75		
1969	179	80		
1970	154	84		
1971	221	76		
1972	233	62		
1973	144	69		
1974	245	64		
1975	200	60		
1976	247	77		
1977	130	56		
1978	181	84		
Average	188	77		
Min	130	55		
Max	247	92		



COLUMBIA RIVER INTER-TRIBAL FISH COMMISSION

729 NE Oregon, Suite 200, Portland, Oregon 97232

Telephone 503 238 0667

Fax 503 235 4228

February 3, 2004

Jim Ruff, Chair
Implementation Team
NOAA Fisheries
Portland, OR 97232

Dear Mr. Ruff,

I understand that the Implementation Team at its meeting this Thursday will discuss the Bonneville Power Administration's and others' proposal to curtail summer spill. It does not appear that representatives from the Commission's member tribes will be able to attend this meeting due in part to an overlapping commitment to meet with General Grisoli, ACOE-NWD, to discuss this topic and related issues.

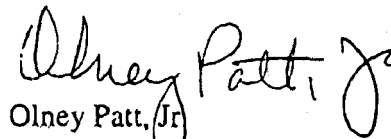
I would like to offer the following points for your consideration

- 1 The operations described in summer spill option 4 and the study methodology developed by CBFWA to support summer spill options 3 and 4 would provide sound biological data to assess and quantify the benefits of summer spill. Summer spill options 3 and 4 refer to proposals developed to assess existing Biological Opinion spill operations (option 3) and expanded spill operations intended to increase salmon protection (option 4).
- 2 The Skalski-Beeman study method for summer spill option 2 would not allow for the development of data addressing the range of stocks affected by spill curtailment nor would it provide information on project effects at any dams other than Bonneville. Summer spill option 2 refers to the proposal(s) to reduce summer spill.
- 3 The projections of benefits estimated to accrue from those actions described in the federal postings on the TMT web page are unreasonably high and do not meet the test that the survival benefits should be equal to or greater than the benefits of summer spill
- 4 The offset exercise actions contain elements of "double-counting." For example, Bonneville's support for the "Vernita Bar plus" operation, which has been ongoing for the last several years, was recently made contingent on reduction of summer spill. Likewise, continuation of Bonneville funding for tribal law enforcement appears to be contingent on reductions in summer spill. These "offsets" are inconsistent with the notion that offset actions should result in survival improvement above current conditions.

5. The impacts to salmon resulting from the loss of summer spill appear to be low. A more conservative estimate of loss would be approximately double the losses presented in the federal materials posted on the TMT web page. Actual assessment of summer spill effects should be undertaken by studying option 4, with the associated methods for options 3/4.
6. The notion that federally imposed unilateral reduction in tribal salmon harvest may be considered an offset to additional hydropower impacts is contrary to our understanding of the law and antithetical to tribal proposals for salmon conservation.

Additional comments addressing this subject matter will be forthcoming in response to NOAA's white papers and in response to Judge Redden's remand of the FCRPS BiOp. We will address this matter in additional forums as appropriate.

Sincerely

A handwritten signature in black ink, appearing to read "Olney Patt, Jr.", with a stylized flourish at the end.

Olney Patt, Jr.
Executive Director

February 5, 2004

System Configuration Team Update to IT

* Corps recently informed that saving & slippage hold-back to the FY04 CRFM appropriation would be 22.5% rather than 16% as expected. And, contrary to previous annual budgets, do not count on receiving any funds later in the year. Hence, Corps no longer leaning forward.

* This meant that CRFM '04 budget would be \$4 million less than what had previously been planned for.

* To accommodate the reduced budget the Corps proposed to SCT a reduced '04 work and study plan.

* SCT recommended several changes to the Corps proposal

1) John Day turbine survival evaluation be deferred to FY05, saving \$800 k.

2) Hydroacoustic monitoring of juvenile fish passage at Lower Granite be reinstated, this adds \$750 k back into the budget.

3) Improvements to the barge loading flume at Lower Monumental continue on schedule, this entails replacement of the dewatering system, be reinstated which adds \$100 k back in the budget.

* With the SCT recommended changes the budget is approximately balanced at the \$70 million level, however, there is interest in seeing the modified behavioral guidance curtain (BGS) evaluated at Lower Granite, with an in/out two treatment test, which would require another \$200 k for improvements to permit movement of the curtain.

* Corps is now considering SCT's recommendations.

* Chair's Summary - FY04 CRFM Budget is now down to the bare bones, but all the time sensitive and biologically important work and studies are still moving forward. However, major work achievements, such as the start of construction of the Ice Harbor RSW, may not survive any further cuts.

Alternative Mitigation Actions to Offset Survival Impacts of Reduced Summer Spill Operations

January 2004

Information about Hanford Reach Anti-Stranding Operations has been added based on requests received at TMT and IT. Edits are in blue text with yellow highlighting.

The following information was developed in conjunction with the Offset Team established through the CBFWA-led Spill Subcommittee. This document is a compilation of the information developed through the Offset Team's efforts. It contains descriptions of potential alternative mitigation actions, or offsets, as well as estimated survival or productivity benefits, costs and implementation requirements. Offset actions contained in this document include the following:

- Northern Pikeminnow Management Program Heavy-Up (Offset Action 1)
- Smallmouth Bass Control (Offset Action 2)
- Commercial Harvest Reduction (Offset Action 3)
- Avian Predation Research (Offset Action 4)
- Pile Dike Removal (Offset Action 5)
- Anti-Stranding Flow Fluctuation Limits in the Hanford Reach (Offset Action 6)

In addition, the Offset Team developed a set of principles or criteria for consideration by policymakers as they contemplate alternatives to the current summer spill operation. These principles are located in the Appendix to this document.

Offset Action 1 – Northern Pikeminnow Management Program Heavy-Up

Description of Proposed Action

One of the primary non-operational actions to improve in-river survival of fall chinook is the management of predatory fishes. The Northern Pikeminnow Management Program (NPMP) is a multi-year effort to reduce piscivorous predation on juvenile salmon through public angler-driven system-wide removals of predator-sized northern pikeminnow.

Bonneville Power Administration (BPA) funds the NPMP. Since program inception, over 2 million northern pikeminnow have been removed throughout the system with an estimated benefit of reducing predation mortality by 25 percent (Friesen and Ward). This equates to over 4 million juvenile fish not eaten by pikeminnow each year. This has been achieved through annual harvest of northern pikeminnow since 1990. Currently, multi-year annual average harvest is approximately 12 percent, with annual harvest ranging between approximately 8 percent and 14 percent (14 percent harvest was achieved in 2001 as a result of the “heavy-up” that was implemented during the drought/power emergency). While the benefit of annual removals accrue over time, removals within a year can also have significant immediate benefits to fish survival within the same year.

More aggressive and focused removals could provide substantial survival benefit to reduce the impact of the conditions that inriver outmigrants face in 2004 and beyond. The NPMP is now a turnkey operation with demonstrated success in adaptively managing to changed conditions and responding to special circumstances.

a. Location

The NPMP is a system-wide predator control program in the Columbia Basin. Open waters include the mainstem lower Columbia River up to Priest Rapids Dam in Washington and the Snake River up to Hells Canyon Dam in Idaho. Also open within this reach are backwaters, sloughs, and up to 400 feet into tributaries on the Columbia and Snake rivers.

b. Affected Species

Juvenile salmonids are the major dietary component of northern pikeminnow greater than 250mm fork length. The importance of salmonids in the diet of northern pikeminnow varies seasonally. Research conducted between 1982 and 1988 in John Day Reservoir indicates that juvenile salmonids were of greatest importance in the diet during July (82 percent) when the run of subyearling chinook salmon peaked. (Poe 82-3).

c. Statement of Feasibility and Certainty of Implementation

Increasing removals due to a program heavy-up is feasible utilizing current program infrastructure. The most effective and logistically feasible approach to increase the fishery performance would be to increase the basic reward structure using the 2001 increase in the NPMP reward structure as a model.

d. Coordination Needs and Additional Requirements

Coordination of activities associated with a NPMP heavy-up would occur utilizing existing program coordination and review processes. The NPMP has a separate Biological Opinion and NEPA documentation to cover program activities. A program heavy-up is not inconsistent with the existing BiOp for NPMP.

Estimated Survival or Productivity Increase

Using the 2001 Power Emergency NPMP heavy-up as a model for 2004 and beyond, the objective for the heavy-up is that a modified reward structure for the 2004 season could reasonably increase catch by 20,000 to 40,000 fish. An increase in the annual harvest of northern pikeminnow within this range (approximately a 1 percent to 2 percent increase in average annual exploitation) would result in an additional savings of approximately 1,400,000 to 2,800,000 smolts across the lifespan of the northern pikeminnow caught. Sustaining this increased catch would, over time, result in a similar annual savings in smolts at equilibrium (in approximately 8 to 10 years). To the extent that most of such improvements in survival would be achieved in the lower Columbia River where northern pikeminnow abundance and predation losses are highest, the survival benefit would be similar to all stocks (proportional to their abundance).

Additional benefits to juvenile salmonids migrating during the 2004 season are calculated by taking the anticipated additional catch resulting from program heavy-up incentives in 2004 and dividing it by the average percentage catch contribution by statistical week and multiplying by the average smolt consumption rate for the remaining duration of the open season. Based upon the objective of increasing catch by between 20,000 to 40,000 northern pikeminnow, a within-year benefit of between 200,000 to 400,000 smolts not consumed by pikeminnow would be realized. (Beamesderfer et al)

Estimated Cost, Duration, and Proposed Funding Source

The heavy-up approach is two-pronged. The approach will provide substantial incentive while simultaneously minimizing potential abuse of the program. The most effective and logistically feasible approach to increase the fishery performance is to increase the basic reward structure. An additional reward of \$500 per tagged northern pikeminnow caught provides substantial incentive to successful anglers and to minimize potential fraud on the program. In addition, modification across all three tiers provides nominal but certain reward for successful anglers. Increasing tier 2 from \$5 to \$6 per fish, and tier 3 from \$6 to \$9 per fish, would substantially increase the monetary incentive to those who have already demonstrated their ability to contribute substantially to the program's catch. Increasing tier 1 from \$4 to \$5 per fish would provide additional incentive for less effective anglers to continue to participate and increase fishing effort in order to graduate to the next tier. Also, past productive anglers who are not currently fishing in the program may choose to return. Finally, increasing the reward will result in modest additional recruitment of new anglers into the program if the treatment is coupled with minimal advertising.

Total cost would be dependent on its effectiveness, but likely on the order of between \$500,000 and \$1,000,000.

Additional opportunity exists for stock-specific survival benefit through initiation of a removal fishery in the lower reaches of the Yakima River. Available data suggest significant losses of juvenile outmigrants to northern pikeminnow in the Yakima River.

Process for Implementation and Schedule

Logistics associated with modifying the current NPMP to accommodate a program incentive increase would occur during pre-season program and contract discussions. The contract for the 2004 performance period is up for renewal at the end of March 2004. The new agreement for the performance period of the contract would be modified to reflect changes to the NPMP for purposes of an offset to summer spill. The field season for the NPMP Sport-Reward season typically starts in early May and runs through the majority of September in a given year.

Lead Entity

The Bonneville Power Administration funds the NPMP. The Pacific States Marine Fisheries Commission and the Washington Department of Fish and Wildlife together have the responsibility for administration and record keeping for the Sport-Reward fishery. The Oregon Department of Fish and Wildlife has responsibility for biological evaluation of program accomplishments in terms of the annual exploitation rate on Northern pikeminnow and impacts on juvenile salmonid predation by northern pikeminnow and other resident fishes.

Friesen, T.A., and D.L. Ward. "Management of Northern Pikeminnow and Implications for Juvenile Salmonid Survival in the Lower Columbia and Snake Rivers." *North American Journal of Fisheries Management*, 19:406-420.1999.

Poe, T. "System-Wide Significance of Predation of Juvenile Salmonids in Columbia and Snake River Reservoirs," BPA project. 1982-003-00.

Beamesderfer, R, D. Ward, and A. Nigro. *Evaluation of the Biological Basis for a Predator Control Program on Northern Squawfish (Ptychocheilus oregonensis) in the Columbia and Snake Rivers*, Volume 53, Number 12, 2898-2908.1996.

Offset Action 2: Smallmouth Bass Control

Description of Proposed Action

a. Location

Lower Columbia R. reservoirs, especially hot-spots near The Dalles Dam; Lower Granite Reservoir.

b. Affected Species

Primarily summer-migrating fall chinook (ChF), but also spring-migrating juveniles of other ESUs. Implementation in Columbia River reservoirs would benefit all listed and unlisted (e.g., Hanford Reach brights) ESUs originating from upstream areas, particularly areas downstream of collection/transport points. Action in Lower Granite Reservoir would benefit Snake River ChF and other Snake River ESUs, all listed (with the exception of hatchery and reintroduced stocks).

c. Statement of Feasibility and Certainty of Implementation

Depends on control method (table below). Control by removal is very feasible with sanction by fishery managers (particularly the states of Oregon and Washington). Retention of smallmouth bass (SMB) incidentally caught by Oregon Department of Fish & Wildlife (ODFW) during northern pikeminnow electrofishing is most feasible. Additional removal probably would be implemented by contracts to state fish and wildlife agencies (perhaps through the Northern Pikeminnow Management Program). Control by manipulating reservoir level probably is most feasible for Lower Granite Reservoir and probably not feasible for the Lower Columbia R. Manipulation of reservoir levels would probably require considerable public input/process.

d. Coordination Needs and Additional Requirements

State fishery agencies, interested public. Control by removal probably would not require additional NEPA; reservoir manipulation probably would.

Estimated Productivity Increase (juveniles saved) and Costs

Each large (e.g., >200mm) SMB may consume one juvenile salmon per day in some seasons and areas, although precise estimates of predator abundance and impacts on salmon populations are lacking. The following table contains estimates of juvenile increases, adult equivalents (AEQ), and costs by location and by control method for actions in 2004. The biological evaluation surveys/tagging by ODFW under the Northern Pikeminnow Management Program (Agency electrofishing) will occur in 2004, which could retain its catch and perhaps increase its effort in the target locations. Juvenile and AEQ increases are estimated for 2004 only (i.e., no benefits are assumed from fewer predators in subsequent years), and accrue to the mix of stocks migrating through the target locations.

Location Control method	Juv. Saved 1 st year	AEQ (basis: 0.5%-4.0% SAR)	Cost
Lower Columbia reservoirs			
Agency electrofishing: <i>Retain survey catch</i>	9,000	45-360	0
<i>Add 5 days in spring @ hot-spots</i>	5,000	25-200	\$12,000
Lower Granite Reservoir			
Agency electrofishing: <i>Retain survey catch</i>	4,000	20-160	0
<i>Add 5 days in spring @ hot-spots</i>	9,000	45-360	\$17,000
Public bass derby fishery (3-5 days in June)	4,000	20-160	\$30,000
Reservoir manipulation (effects begin 2008)	75,000	375-3,000	??

Process for Implementation

- 1. Agency electrofishing.** SMB captured during ODFW predator-control tagging and surveys or other management activities in 2004 could be retained, rather than returned to the river, at no additional cost or process (e.g., ESA permits). Additional electrofishing effort could be targeted on SMB removal at certain times and locations (hot-spots) at moderate cost, but may require additional ESA process. These actions would require the full support and concurrence of Oregon Department of Fish & Wildlife, Washington Department of Fish & Wildlife (WDFW), and Idaho Fish & Game (IDFG) for actions at the head of Lower Granite Reservoir.
- 2. Lower Granite public bass derby fishery.** This derby would encourage fishing pressure in a relatively limited and discrete location (e.g., Lower Granite Reservoir, or portions thereof). Concurrence by WDFW and IDFG is necessary and may be difficult, depending on regulations regarding game fish. Derbies often require that participants use live-wells to allow the catch to be released alive. For this purpose, anglers could be encouraged to retain their (dead) catch or surrender it live to be stocked into a closed-system pond where youth, disabled, and/or other anglers might enjoy recatching them. The derby could be sponsored by a state agency, perhaps in conjunction with WDFW's northern pikeminnow sport reward fishery or by a private event organizer under contract.
- 3. Lower Granite Reservoir manipulation.** Periodic short-term (hours) and limited (perhaps < 10 feet) drawdown of Lower Granite Reservoir during the spawning season of SMB could significantly reduce their reproductive success. This action could be controversial and costly. The effect on the SMB could be significant (perhaps >50 percent reduction in the 2004 brood year), as could the eventual benefits to salmon survival. The benefits to salmon would lag 4 to 6 years, because of the time required for the affected (diminished) brood year of SMB to recruit to predaceous size. The effect would endure 2 to 3 years. This action assumes that SMB spawn in shallow littoral margins of the reservoir during a relatively short (e.g., 2 to 4 weeks) season and that incubating eggs would be vulnerable for several days (e.g., ≥ 7 days). It is essential to review research and local knowledge of SMB reproductive behavior beforehand. Significant regulatory and public information processes may be necessary. Expected physical, biological, economic, and social costs of this action could be gleaned from the Lower Granite drawdown study of the early 1990s.

Lead Entity

Bonneville Power Administration for removal fisheries; the Army Corps of Engineers (Corps) for reservoir manipulation.

Offset Action 3 – Commercial Harvest Reduction

Description of Proposed Action

Harvest reductions in various forms are one of the few human impacts on salmon that resource managers can directly control in the short run that have immediate and direct effects on escapement. This feature allows managers to conserve when necessary and increase allocation when stock abundance warrants it. As an offset measure, it has the potential to significantly boost adult returns and recruitment to the terminal area for inriver harvest or additional spawning escapement. Most fisheries that significantly impact Columbia Basin stocks consist of commercial troll, net, and recreational sport fisheries.

The development of salmon aquaculture the last two decades has pushed the wholesale price of salmon downward to its lowest level in 20+ years as its market share now approaches 60 percent. (Knapp). This has put tremendous pressure upon traditional wholesale suppliers (commercial net and troll) as prices have fallen, while operational costs have increased. In addition, markets put pressure on fisheries to become more efficient, develop niche markets, and in some cases drop out of the fishery. This attrition can have positive ecological benefits in cases where wild fish are a significant or important proportion of mixed stock fisheries provided that other fisheries do not increase their catch to compensate. This unique market condition may make it viable to enable some fishery reductions through easements or other agreements on a willing buyer/willing seller basis to pay for forgone catch.

Harvest reductions, as an offset, do not necessarily have to occur during the same juvenile outmigration year as a modified spill program since the juveniles do not mature and become vulnerable to harvest until subsequent years (i.e., after 1 to 4 years in the ocean); this allows time for development and coordination of reasonable alternatives. Another feature of harvest reductions is that they can be scaled to achieve a broad range of survival objectives, as deemed necessary; this provides the additional advantage of selective management alternatives that do not compromise the viability of the overall fishery.

a. Location

There are multiple ocean and inriver fisheries that impact significant proportions of Columbia River fall bright chinook, as illustrated by the catch distribution of Hanford Reach fall chinook (figure 1). These fisheries include as far north as Southeast Alaska and Canadian troll fisheries and terminal areas such as Columbia River management zones 1 through 6. Determining the appropriate location to focus depends upon a number of policy, market, and technical considerations.

b. Affected Species

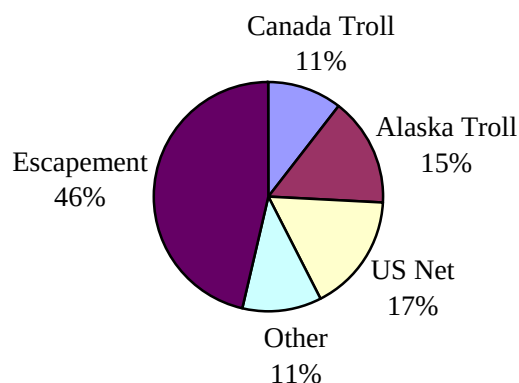
Most commercial fisheries in the ocean and in the Columbia River occur on a mixed aggregate of multiple species and stocks as exemplified by the pie chart on Southeast Alaska Commercial Troll fishery (figure 2). Typically, fisheries that target Columbia River upriver bright stock also impact to varying degrees other species/stocks, including Snake River bright, Mid-Columbia bright, Bonneville upriver bright, Deschutes natural chinook, A and B run steelhead, Bonneville Pool Hatchery stocks, and coho. Other non-Columbia hatchery and natural stocks could be affected in ocean commercial harvest reduction scenarios as well.

Methods

Market and/or regulatory-based harvest reduction programs have been employed by the United States and Canadian governments through permit buy-back programs to reduce fishing capacity. If the recent market trend toward more farm-raised salmon continues its growth, additional opportunities may exist for further voluntary harvest reductions through the use of harvest easements that reimburse fishers for the market value of forgone harvest. In addition to direct payment to fishers, opportunities also exist to develop new markets or invest in infrastructure to better compete with other supplies of salmon through value-added processing. Assistance from government and local trade organizations in determining participation and payment schemes or general programs to distribute the funds gained from such agreements among fishers and processors is essential.

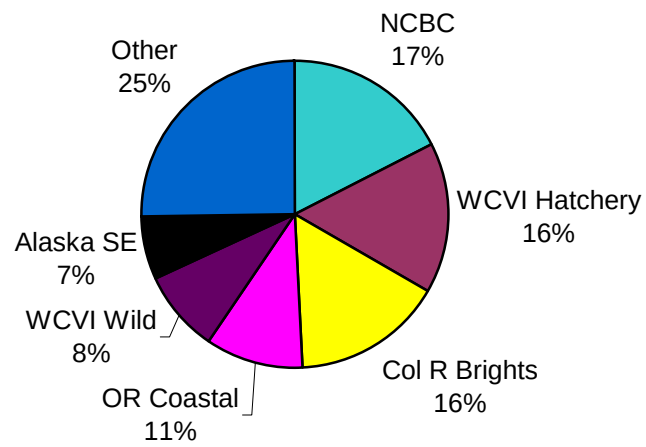
Over a dozen distinct commercial and sport fisheries impact Columbia Basin stocks that may be affected by summer spill reductions (figure 2), but a few fisheries with higher proportional catch offer the most feasible opportunities in which to pursue harvest easements. Modification to harvest for purposes of offsetting potential impacts of summer spill is scalable, depending on objectives and subject fisheries. For example, if modifications to fisheries are designed to limit the impact to no more than 5 percent of the total catch, then the benefit to Columbia River fall chinook escapement may range between approximately 1,000 and 6,000 adults at an estimated economic value (market value * 2x multiplier) of \$125,000 to \$275,000.

Figure 1. Hanford Wild Brights Distribution of Total Fishing Mortalities



Source: Pacific Salmon Commission, Report TCCNINOOK (01)-2, Table H.58, August 9, 2001

Figure 2. Stock Composition of Southeast Alaska Troll Fishery



Source: Columbia River Inter-Tribal Fish Commission

Knapp, G. *Challenges and Strategies for the Alaska Salmon Industry*, December 20, 2001. p.31.

Offset Action 4 – Avian Predation Research

Description of Proposed Action

Additional caspian tern and double-crested cormorant research activities in the Columbia River estuary and upriver at Crescent Island to support development of an EIS to evaluate alternatives to address avian predation on migrating juvenile salmonids.

a. Location

Research activities would take place in the estuary and at Crescent Island.

b. Affected Species

Sub-yearling salmon stocks.

c. Statement of Feasibility and Certainty of Implementation

The additional research has been scoped and would supplement work already planned and funded for this year. The activities would be a continuation of work initiated in prior years and, with funding, could readily be implemented.

d. Coordination Needs and Additional Requirements

Funding is the only significant requirement at this time.

Estimated Survival or Productivity Increase

This research would support an Environmental Impact Statement (EIS) developing alternatives to reduce avian predation on salmonid species. No direct benefit to the 2004 migration would be achievable. The schedule for the EIS completion is mid-July 2004 and subsequent implementation of selected alternatives could begin in 2005 or 2006. The preliminary objective for caspian tern population in the estuary would be a reduction to 2,500 to 4,500 pairs from the current level of 8,000 to 9,000 pairs. If achieved, this reduction could provide for an estimated 3 to 4 million reduction in total salmonid juveniles consumed. Based on 2003 data, the sub-yearling component could be a reduction of 350,000 to 500,000 consumed. The future benefits for summer migrants resulting from yet to be determined cormorant management actions cannot be estimated at this time.

Estimated Cost, Duration, and Proposed Funding Source

The estimated cost for the additional research in 2004 is \$300,000. Funding may come from BPA or the Corps.

Process for Implementation and Schedule

The research would be initiated in the spring of 2004, under contracts with the Corps of Engineers or BPA.

Lead Entity

The Army Corps of Engineers.

Offset Action 5 – Pile Dike Removal

Description of Proposed Action

This action would entail removal of some existing Corps of Engineer constructed pile dikes in the lower Columbia River. Pile dikes slated for removal were identified based on an evaluation from a previous Corps study, which evaluated their function with respect to their original purpose. Their removal could benefit migrating salmonids. Pile dikes provide perches and enhanced foraging opportunities for double-crested cormorants and result in establishment of backwater predator habitat.

a. Location

For offset purposes, pile dikes between river miles 52 and 136 would be removed. It is assumed that cormorant use of pile dike fields below river mile 52 are already addressed in the existing 40-foot channel BiOp. Habitat improvement associated with removal of specific pile dikes in that reach may be creditable under RPA action 160 of the NOAA Fisheries FCRPS 2000 BiOp.

b. Affected Species

Sub-yearling salmon stocks.

c. Statement of Feasibility and Certainty of Implementation

Removal of unnecessary pile dikes is a feasible action. However, accomplishment of their removal soon enough to benefit 2004 summer outmigrants may be difficult.

d. Coordination Needs and Additional Requirements

Funding would be needed in January to complete an Environmental Assessment and contract for the removal action. A waiver from in-water work timing restrictions would be necessary.

Estimated Survival or Productivity Increase

The action would reduce opportunities for cormorant perching and associated foraging for juvenile salmonids, reduce fish predator habitat, restore natural flow velocities, and potentially improve benthic invertebrate/fisheries habitat conditions in the immediate location of the removed pile dikes. A quantitative benefit in terms of reduced predation on migrating salmonids and habitat improvements cannot be readily derived.

Estimated Cost, Duration, and Proposed Funding Source

The estimated length of pile dikes in this reach of the lower Columbia is about 45,000 linear feet, constructed with approximately 18,000 pilings. The estimated cost to remove all of the pilings (at an estimated \$69/piling) would be about \$1.4M. This project could be funded by BPA.

Process for Implementation and Schedule

Preparation of an Environmental Assessment (EA) and to prepare and award a contract is optimistically estimated to require 90 days. Before July 2004 (the assumed summer spill season), it may be possible to remove 4,500 pilings.

Lead Entity

The Army Corps of Engineers.

Offset Action 6 – Anti-Stranding Flow Fluctuation Limits in the Hanford Reach

HANFORD REACH FALL CHINOOK PROTECTION (REARING PERIOD)

(Resubmitted February 11, 2004 per IT and TMT discussions – edits are in blue type.)

1. Description of Proposed Action: The Action is intended to protect Hanford Reach fall Chinook juveniles as they rear and pass out of the Hanford Reach in the spring. The Action limits flow fluctuations from Priest Rapids. The Program constitutes a long-term commitment as opposed to the voluntary annual arrangements for studies and evaluation of the past few years.

a. Location: Mid-Columbia River.

b. Affected Species: Hanford Reach fall Chinook.

c. Statement of Feasibility and Certainty of Implementation: The Parties have not signed the Hanford Reach Fall Chinook Protection Program Grant has proposed - of which this Action is a part. Grant has stated that if the Mid-Columbia operators and WDFW do not sign the Program, there is no guarantee of an operation to protect the Hanford Reach fall Chinook during the Rearing Period. The Program must be signed before the fall Chinook Rearing Period begins (about May 1) if any offset credit is to be accounted in 2004.

d. Coordination Needs and Additional Requirements: Grant, Douglas and Chelan PUDs, BPA, WDFW, NOAA Fisheries and the Colville Tribe are very close to reaching agreement on the terms of the Hanford Reach Fall Chinook Protection Program. Grant and BPA then need to sign a separate agreement to cover delivery of energy to mitigate losses at Grant's projects.

2. Estimated survival or Productivity increase: In preparation for Grant PUD's Priest Rapids FERC relicensing application, Battelle-Pacific Northwest Division produced a study of Hanford Reach fall Chinook spawning and rearing (McMichael et al, 2003). That study describes a methodology for estimating mortality of rearing fry based on counts of stranded fish for 1999-2003 provided by Washington Department of Fish and Wildlife (WDFW). Grant PUD limited flow fluctuations, following predetermined criteria to protect fry from stranding, in all of those years.

The only year for which WDFW counts of stranded fish were available and no flow fluctuation limits were in place at Priest Rapids was 1998. Using that data, BPA applied the Battelle methodology to estimate rearing fry mortality to establish a baseline for the operation without fluctuation limits. The result was an estimate that almost 7% of the rearing fry may have died as a result of unlimited flow fluctuations at Priest Rapids.

The Battelle estimates of fry mortality from stranding for the years 1999, 2000, 2002 and 2003 were averaged (0.45 percent) so that it could be used to make estimates for future years' operations when the flow fluctuation limits are in effect. The mortality estimate for 2001 was not included in the average. 2001 flows have an extremely low probability of recurrence (less than 5 percent) and would have skewed the average significantly if equally weighted with the other years.

The difference in pre- and post-flow fluctuation limit stranding mortality rates (6.63 vs. 0.45) was then used in the determination of additional adults returning to the Hanford Reach as a result of limited flow fluctuation operation of Priest Rapids. A reduction in mortality of rearing fry translates directly to an increase of equal magnitude in the number of adults expected to return.

Key assumptions in the procedure used by Battelle (McMichael et al, 2003) are:

% of adults that are females: 58.7% (average of 1999-2003)

number of eggs per female: 4,500

egg to fry survival rate: 63.2%

fry mortality due to stranding: 0.45% (average of 1999, 2000, 2002, 2003)

Using these assumptions and the following:

fry to smolt survival rate: 34.0%

smolt to adult return rate: range of 0.5% to 4.0%;

BPA estimates a range of additional adults returning from 8,000 to 66,000 in an average out-migration year and a range of additional adults returning as a result of the 2004 out-migration from 15,000 to 124,000.

3. Estimated Cost, Duration, and Proposed Funding Source(s): Grant County will lose energy and capacity at their projects while limiting Priest Rapids outflow fluctuations to protect the rearing fry. They have estimated the cost to be more than \$2 million annually. BPA will deliver Grant amounts of energy to mitigate a portion of the losses at Grant's projects. The portion of the loss at Grant's projects that BPA will replace is the incremental head loss attributable to the operation of the federal projects upstream. The estimated cost to BPA, of the mitigation energy to be delivered to Grant, is an annual average of approximately \$100,000.

4. Process for Implementation and Schedule: Grant has scheduled the next meeting for discussion of signing the Hanford Reach Fall Chinook Protection Program on January 6, 2004.

5. Lead Entity - BPA

APPENDIX

DRAFT

Potential Offsets to Summer Spill Reduction

Discussion

The Northwest Power and Conservation Council's Mainstem Amendment of 2003 calls for an evaluation of summer spill. Based on analyses of research performed in conjunction with the FCRPS 2000 Biological Opinion, spill generally provides the highest passage survival at most mainstem hydro facilities. Therefore, any reduction in spill is presumed to result in some level of reduced survival to listed Snake River fall chinook and other stocks migrating through the lower Columbia at the time spill is ceased or reduced. Many believe the resulting increase in juvenile mortality can be compensated through "offsets" designed to enhance survival in one or more life stage. Thus, whatever survival was associated with the spill can potentially be offset through implementation of additional non-spill measures.

Offset Principles:

1. Offset measures should be designed to provide equal or greater survival, as measured or estimated, than provided by current BiOp spill requirements.
2. Offset measures should be temporally consistent, i.e., as a priority they should provide survival benefits to juveniles or adults of the affected brood years.
3. Offset measures should capture the diversity of the affected stocks, i.e., provide survival benefits to the portion of the outmigration suffering the loss.
4. Offset measures should address anticipated losses to each of the affected stocks, whether listed or not.
5. Offset measures for fall chinook should be over and above those currently contemplated by the BiOp for implementation and whose survival benefits are included in the analysis of jeopardy, now or in the future.
6. Offset measures must be implementable or committed to in writing in the year spill is reduced including provisions for NEPA, Consultation, etc.
7. Offset measures should be funded or implemented over an above the current fish and wildlife spending caps or programs.

Potential Offsets – The following have been mentioned as potential offset measures.

1. Increases in predator control measures
 - a. Pikeminnow Program
 - b. Terns
 - c. Cormorants
 - d. Walleye
 - e. Smallmouth Bass
 - f. Marine mammals
2. Changes in operation (e.g., flow augmentation) or system configuration (e.g., RSWs)
3. Commercial harvest reductions
4. Increased law enforcement
5. Habitat improvement

6. Supplementation

Potentially Impacted Stocks

Deschutes River fall chinook*	Mid-Columbia fall chinook
Klickitat River fall chinook	Umatilla River fall chinook
Yakima River fall chinook	Marion Drain fall chinook
Mid-Columbia summer chinook*	Hanford Reach fall chinook*
Priest Rapids Hatchery fall chinook	Snake River fall chinook**
Upper Columbia steelhead adults	Snake River steelhead adults
Ringold Springs Hatchery fall chinook	Upper Columbia steelhead adults***

* Denotes an indicator stock for U.S.-Canada PST Chinook management

** Listed as threatened under ESA

*** Listed as endangered under ESA

February 11, 2004

Regional Forum Participant:

The Federal Agencies (Bonneville Power Administration, Corps of Engineers, NOAA Fisheries, Bureau of Reclamation and US Fish and Wildlife Service) are seeking input on analysis of the biological impacts of alternative summer spill operations and assessments of the benefits of alternative mitigation actions, or offsets.

These analyses are posted on the Technical Management Team (TMT) webpage at the following URL:

<http://www.nwd-wc.usace.army.mil/tmt/agendas/2004/0204.html>~~http://www.nwd-wc.usace.army.mil/tmt/agendas/2004/0204.html~~

Presentation and discussion of these analyses has been made at the following Regional Forum meetings:

- Implementation Team – February 5, 2004, 9:00am – 1:00pm at NOAA Fisheries
- Technical Management Team – February 4, 2004, 9:00am – 12:00pm at Corps' Custom House

Based on comments received at the previous meetings additional background information relating to the analyses will be posted with the existing documents. The closing date for comments has also been changed to February 20, 2004 in order to allow more time for interested parties to respond.

How to Comment:

Verbal comments provided during these Regional Forum meetings will be included in the notes as part of the meeting record. Comments for the above project will be accepted through Friday, February 20, 2004. When sending in comments, please refer to the following project title: "Summer Spill Analysis". There are a number of ways for you to comment on the project. You can mail the enclosed form to BPA, Communications - DM-7, P.O. Box 14428, Portland, OR 97293-4428; fax them to 503-230-3285; or submit your comment on-line at: www.bpa.gov/comment.

January 22, 2004

Regional Forum Participant:

The Federal Agencies (Bonneville Power Administration, Corps of Engineers, NOAA Fisheries, Bureau of Reclamation and US Fish and Wildlife Service) are seeking input on analysis of the biological impacts of alternative summer spill operations and assessments of the benefits of alternative mitigation actions, or offsets.

These analyses will be posted to the Technical Management Team (TMT) webpage at the following URL by Monday January 26, 2004:

<http://www.nwd-wc.usace.army.mil/tmt/agendas/2004/0204.html>

Presentation and discussion of these analyses will occur at upcoming Regional Forum meetings as follows:

- Implementation Team – February 5, 2004, 9:00am – 1:00pm at NOAA Fisheries
- Technical Management Team – February 4, 2004, 9:00am – 12:00pm at Corps' Customs House

How to Comment:

Verbal comments provided during these Regional Forum meetings will be included in the notes as part of the meeting record. Comments for the above project will be accepted through Friday, February 13, 2004. When sending in comments, please refer to the following project title: "Summer Spill Analysis". There are a number of ways for you to comment on the project. You can mail the enclosed form to BPA, Communications - DM-7, P.O. Box 14428, Portland, OR 97293-4428; fax them to 503-230-3285; or submit your comment on-line at: www.bpa.gov/comment.

**TECHNICAL MANAGEMENT TEAM
MEETING NOTES
February 4, 2004
CORPS OF ENGINEERS NORTHWESTERN DIVISION OFFICES – CUSTOM HOUSE
PORTLAND, OREGON**

FACILITATOR'S SUMMARY NOTES ON FUTURE ACTIONS

Facilitator: Donna Silverberg

The following notes are a summary of issues that are intended to point out future actions or issues that may need further discussion at upcoming meetings. These notes are not intended to be the “record” of the meeting, only a reminder for TMT members.

Summer Spill: Alternatives and Options:

Overview: Suzanne Cooper, BPA, gave an overview and context for the analysis of alternative spill options and potential offsets that were presented to the TMT today (see TMT agenda for supporting analysis information and documentation). She explained that the Federal agencies are looking at the analysis as a decision support tool to help look at varying impacts—in other words, there are no absolutes or certainties that should be taken from the numbers. Today's presentation was given to inform TMT and others about how the analysis was done, and to give the TMT the opportunity to provide technical comments on the analysis. Similar opportunities will be provided at IT and the WQT. Written comments are encouraged and should be sent to BPA (via mail or www.bpa.gov/comments) by February 13th.

Suzanne explained that the alternatives presented range from small changes to the BiOp's recommended spill to larger departures from the BiOp. She noted that technical aspects of the proposed test alternatives (# 5 and 6 under the Spill Alternative Options) are also being discussed at FFDRWG. Suzanne clarified that, at this point, the options and analysis being considered are only for 2004. The Regional Executives will need to decide whether to consider future years. She also noted that there will be a Regional Executives' meeting in March to discuss and make decisions about operations for 2004 and possibly beyond. Oregon commented that a written explanation of the methods, assumptions and results would be very helpful to have for the review and comment on the entire analysis.

Analysis: Kim Fodrea, BPA, presented information about the analysis, which was created out of a set of assumptions agreed to through collaboration of federal agencies, with input from state and tribal representatives. Kim highlighted stock calculations for July/August migrating fish. This was a one year analysis, based on expected conditions for 2004 (average flow year). Input passage parameters were put into the Simpas model, and the output numbers were used for calculations. To access more detailed information about the formulas or assumptions used in the analysis, which is posted on the TMT web page, go to the excel spreadsheet and hit **Format: Sheet: Unhide**.

Comments & questions:

- A question was raised about revenue impacts based on the expected water year (as was done for fish passage) as opposed to the “average” (which gives a wide range). This should be made clearer.

- Idaho expressed a strong concern that the SIMPAS model is being used in a way that it was not designed to do: so it underestimates the affects on fish. CRITFC noted there are other models available that might be better for the analysis.
- There is a danger that the way information is presented will be read by some as certainties instead of probabilities. While everyone here may know there are no certainties, the presentation should be sharpened to better reflect that.
- A question was raised whether there was a better way to calculate the run at large, such as using pit tag information instead of fish indexes.

Offsets: John Palensky, NOAA, gave background on the group that looked at feasible offsets based on agreed upon principles. He walked through those options that seemed worthy of consideration at this point. He noted that NOAA will await comments from the co-managers regarding the analysis of losses, the potential of offsets mitigating those losses, and any other considerations before Bob Lohn will weigh in with NOAA's position. To be in the best position for the BiOp Remand, NOAA would like to see no harm and a *benefit* from any offset actions that might be taken.

Comments on the offsets presentation were shared:

- Impacts to fish will be immediate if spill is stopped while most of the offsets are longer term and will need time to be put into place. There is concern about the lack of the link up between the two.
- A question was raised whether the McNary test proposal is a possible offset that could occur in spring and then the gain be realized during the summer spill season (as spill).
- The Northwest Sport Fishing Industry commented that there is a need to match potential offsets with other stocks – what are the affects and tradeoffs?
- Specifics on the numbers used for the Hanford Reach analysis are needed before comments can be made—they seem off somehow.
- What is the anticipated overall benefit of offsets to all stocks? Is this anticipated?

The Way Forward: Cindy Henriksen, COE, commented that the discussion today was very helpful from a technical standpoint. She encouraged folks to share any additional technical questions as soon as possible and focus the information only relative to 2004, for now. Input from today's discussion WILL be considered! Also, written comments can be sent to www.salmonrecovery.gov, or to the BPA PO Box included on the TMT web page under "Summer Spill: Status of Discussions -- Comments" document. A Regional Executives meeting is anticipated for mid-March, after which a decision is anticipated. Montana commented that they would like to see the Hungry Horse/Libby proposal discussed at that meeting as well.

Next Meeting, February 18th, 9 am:

- QADJ For Flood Control (please review and have comments ready)
- Spring Creek Spill? – Update
- BON Adult Fish Attraction Flow—Criteria from Salmon Managers
- Snake River End of Zero Flow—Criteria from Salmon Managers
- Spring/Summer Update—Begin to develop

1. Greeting and Introductions

The February 4, 2004 Technical Management Team meeting was chaired by Cindy Henriksen of the Corps and facilitated by Donna Silverberg. The following is a distillation, not a verbatim transcript, of items discussed at the meeting and actions taken. Anyone with questions or comments about these minutes should call Henriksen at 503/808-3945.

2. Summer Spill – Status of Discussions.

BPA's Suzanne Cooper began by providing some background on the summer spill effort. She noted that, last spring, the Council passed its updated mainstem amendments, which told the action agencies to evaluate the effectiveness of the summer spill program, and to evaluate offsets that might provide the same biological benefits at a lower cost. We have been working since October to see whether the objectives of our executives could be met, she said, through CBFWA's spill subcommittee, and through the Regional Forum, where we have participated in a number of discussions on this issue. Working with the Corps and NOAA Fisheries, BPA has also analyzed the biological and revenue impacts of various spill program options, she said, as well as the benefits of various mitigative actions and offsets. Results were presented to the Council on January 21, said Cooper, adding that the comment period on the summer spill evaluation ends February 13. Our goal today is to present the analysis to you, to help you formulate your written comments, she said.

Cooper then provided an overview of the analysis, beginning with the alternatives evaluated:

1. Full BiOp spill in July and August
2. BiOp spill in July and August/no spill at Ice Harbor
3. BiOp spill in July-August 15/no spill at Ice Harbor
4. BiOp spill in July/no spill in August
5. BiOp spill in July except test 50 Kcfs v BiOp at Bonneville/no spill in August/no spill at Ice Harbor
6. BiOp spill in July except test 0 Kcfs v. BiOp at Bonneville/no spill in August/no spill at Ice Harbor/no spill July-August
7. No spill in July or August

Cooper devoted a few minutes of explanation to the thinking underlying these various alternatives; she noted that the ultimate decision on which spill strategy to pursue in 2004 will be made by the Regional Executives, hopefully in March.

Is this one-year proposal, or a proposal for future years? Paul Wagner asked. In terms of a change to the operation, that is something that will have to be worked out at the executive level, as far as its longevity past 2004, Cooper replied.

Cooper then moved on to the expected revenue impacts of each of these alternatives, based on a \$36/MwH average price:

Revenue Impacts of Summer Spill Alternatives

Spill Option	Annual savings Compared to BiOp in millions (50-yr average)	Annual savings range compared to BiOp in millions (low-high)
1	\$0	
2	\$8	\$5-11
3	\$26	\$15-32
4	\$42	\$25-50
5	\$51	\$30-61
6	\$54	\$32-64
7	\$77	\$55-92

Have you factored in the years when there is so much water the spill program essentially costs you nothing? Liz Hamilton asked. Yes, Cooper replied, but under the 50-year historic record, the least the summer spill program cost in lost power revenues was \$55 million. Bear in mind that this is summer spill – July and August, months when there is never any involuntary spill, Scott Bettin added.

Did the pricing analysis take into account shaping between on and off-peak? Tom Haymaker asked. We used a month-average model, Cooper replied. So in all likelihood, in reality, the cost would be higher, if you were able to shape flows into the heavy-load hours, Haymaker said. I’m not sure that’s true, Cooper replied – the Aurora model is a marginal cost model.

It would be helpful if we had a narrative explaining the assumptions used to project those savings, said Ron Boyce. That’s why we’re going to walk through this today, Cooper said. This is a very big decision you’re asking the region to make, Boyce said – it would be helpful if we had a written document explaining how these costs were estimated. We don’t have that available, Cooper replied. That is unfortunate, said Boyce, because it would help us develop our comments. Bill Maslen noted that all of the assumptions underlying these analyses have been posted to the BPA website. Wagner observed that one thing that could drive down the cost assumptions in this analysis would be if conservation suddenly became fashionable, if people were willing to “sweat for salmon” and energy conservation was tied to the cause of salmon recovery. In other words, I’m not sure conservation is fully valued, Wagner said. That’s one of the roles of the Council, Jim Litchfield observed.

Cooper then yielded the floor to Kim Fodrea, who led the group through the biological analysis portion of the summer spill evaluation. She distributed a pair of documents, “General Overview of Methods Used to Estimate Impacts of Summer Spill Reductions,” and a spreadsheet showing the expected survival impacts of various operational alternatives on a wide array of listed juvenile and adult, wild and hatchery fall and summer chinook stocks. She went briefly through the spreadsheet, explaining how to read the model outputs. In general, explained Fodrea, to calculate the expected impacts of these operations, we multiplied the number of fish in each affected stock times the percentage migrating in July and August times the delta in survival rates for each operational alternative to get the estimated survival impacts of each alternative.

Fodrea noted that the juvenile hatchery fish number estimates came from PATH, while the wild fish number estimates came from NOAA Fisheries' 2003 estimates. She discussed how she developed the calculation of the percentage of each stock migrating in July and August. Fodrea then went through the large spreadsheet, which compared the expected survival of each stock under each of the seven alternatives analyzed.

In the course of this discussion, Fodrea answered a series of clarifying questions and comments, many having to do with the passage timing assumptions for various stocks at various projects. Bill Maslen admitted that this is an area the analysts have struggled with; what we're after is the best way to measure when various stocks are passing a given project, and in what abundance, he said. Maslen and Fodrea encouraged anyone with comments or suggestions on this portion of the analysis to provide them as soon as possible, because it is critical to the accuracy of the analysis. Fodrea noted that more detail about the assumptions underlying her "Estimated Percent of Fish Passing During Each Period" analysis can be found by clicking "format/sheet/unhide" on the Excel page.

Fodrea noted that the survival rate analysis was based on SIMPAS outputs showing relative survival percentages under the various scenarios (columns J-O on the spreadsheet). Wagner noted that SIMPAS is not designed to produce absolute numbers; there is significant uncertainty around those outputs, he said, and it would be a mistake for people to lock on to the absolute numbers on the spreadsheet. Fodrea noted that the assumptions underlying the SIMPAS analysis can be found on the "Comments on SIMPAS Input" tab at the bottom of the page.

Fodrea noted that all of the materials presented today, including the functional Excel file, are available via hotlink from today's agenda on the TMT homepage.

The group also offered a series of detailed questions and comments about the flow (the sensitivity of the SIMPAS model to flow ranges) and transport assumptions underlying the analysis. Fodrea noted that this analysis anticipates that 2004 will be a near-average water year, so average flow assumptions are germane; it also anticipates that the full BiOp transportation program will continue to be in effect. Fodrea noted that one assumption that the group was unable reach agreement on was the Bonneville spill cap; for the purposes of this analysis, it was assumed to be 125 Kcfs, but according to Gary Fredricks of NOAA Fisheries, it may be increased to 145 Kcfs in 2004.

Fodrea then moved on to the results, in terms of survival for each stock, under each of the alternative operations, and the assumptions and calculations underlying those results. What this is calculating, basically, is July and August fish survival for each of these stocks, Fodrea explained. The bottom line, in terms of estimated adult impacts to listed stocks, based on a 2 percent SAR, is that none of the operational alternatives considered in the summer spill evaluation, including zero spill in July or August, is estimated to result in a decrease in adult survival of greater than 1%.

Maslen noted that, in response to comments received, the analysis also attempted to capture the difference in pool survival under the zero spill option, basically using best professional judgement in the absence of significant empirical data. We certainly aren't trying to minimize those impacts, he said; if anyone has empirical data that would be germane to that

calculation, we would welcome it. In response to a comment from Boyce, Fodrea emphasized that this is a one-year analysis, focused on the average water year expected in 2004. In other words, as a decision support tool, it made sense to focus on expected conditions for 2004, rather than a range of low-high water and flow-year conditions, she said.

With respect to the financial component of the analysis, Filardo asked that the analytical team add a column showing “Expected savings in 2004” – in other words, the savings in the specific water years in the 50-year record that are closest to average-flow years.

Russ Kiefer said one concern he has about the biological analysis is that there is empirical information that shows a large percentage of the PIT-tagged adult returns to the Snake River were never interrogated as juveniles. According to Appendix D of the NOAA Fisheries BiOp, juvenile survival rates are based on juvenile passage studies only and cannot be used to infer the likelihood of adult returns. In other words, said Kiefer, the SIMPAS results are consistently biased against juvenile spillway passage, and basing this analysis on those results will underestimate the biological impacts of reducing spill. Still, said Fodrea, while it may not be perfect, according to NOAA Fisheries, it is the best method we have to estimate adult returns. Kiefer provided a document, “Caveats to SIMPAS Modeling Results,” in support of his comment. Kyle Martin noted that the FLuSH and EDT models both offer viable alternatives to SIMPAS, particularly FLuSH. Wagner added that Fredricks does not use SIMPAS in this way, specifically, using it to extrapolate the impacts of given operation on adult returns.

John Palensky then discussed the outputs of the offsets subcommittee, which he has been chairing. The offsets subcommittee is an offshoot of the spill committee set up under CBFWA auspices; its charge was to define and evaluate various mitigation measures to offset the anticipated impacts of any reduction in the summer spill program. The group developed a series of seven principals to guide their efforts, including implementation feasibility, temporal consistency and the fact that any offsets needed to be over and above existing BiOp measures. They then developed the following list of potential offset measures:

- Increased Northern pikeminnow management
- Increased smallmouth bass management
- Unneeded pile dike removal to reduce predation
- Reductions in commercial harvest
- Hanford Reach rearing protection
- Avian predation research
- Habitat improvements

The group considered other potential offsets, which, for various reasons related to the principals established by the group, were considered not feasible, at least for implementation in 2004:

- Marine mammal management
- Walleye management
- Increased law enforcement
- Habitat improvements, including estuary
- Hatchery supplementation
- Raised spillway weirs
- Dam removal
- Reservoir drawdowns
- Reintroduction of fall chinook above Hells Canyon Dam
- Additional O&M funding
- Manage turbine operations to maximize passage survival

Palensky said that, ultimately, the group will make a recommendation to Bob Lohn as to what measures should be implemented; he reiterated that the executives are expected to make a decision on this issue some time in March.

The group offered a few clarifying questions and comments. Palensky then encouraged the TMT participants to look closely at the offset measures under consideration and to provide any comments they may have prior to February 13. NOAA staff will then look at those comments and incorporate them into our recommendations to Bob Lohn. In response to a question from Litchfield, Palensky said that some of the items on the “Other Offsets Considered” list, including law enforcement and additional O&M funding, may conceivably still be on the table.

One general comment, said Boyce – the impacts to fish from any spill reductions will be immediate, while it will take some time to get these offset measures up and running. Will spill reductions be contingent on having a viable offset program up and running? Boyce asked. You would have to ask my boss, Palensky replied, but all of that is still under discussion. My concern is that it may take several years of mitigation to offset the impacts of a spill reduction in 2004, Boyce said. Boyce also discussed the proposed VBS and operation outside 1% tests at McNary this year – could we take that into consideration as an offset, which would limit the reduction in summer spill? he asked. The idea of offsets is to offset for biological impacts, Cooper replied – it’s not about the financial impacts. The short answer is that that is not the way offsets were contemplated to work, she said.

Liz Hamilton said her understanding was that the Council had listed the pikeminnow program as a low priority. The Council didn't lower their ranking, but recommended a 50% reduction in the program funding, said Maslen; BPA disagreed but did reduce the funding level, with the understanding that we would look at the biological results of that decreased program with the option of increasing funding in future years if we don't see similar results to previous years. Also, said Hamilton, when you talk about harvest reductions, were you thinking of in-river harvest, or ocean harvest? We're still discussing that, Palensky replied, but the primary intent would be to protect Snake River fall chinook. Hamilton added the comment that any offsets need to benefit, as directly as possible, the stocks that are impacted most directly by the reduction in the spill program.

Steve Haeseker observed that, before the Fish and Wildlife Service can comment on the Hanford Reach assumptions in the analysis, they need to be able to review the calculations that went into the 1998 estimates.

Silverberg reiterated that comments on the summer spill analysis are due by February 13. There will be another presentation, and another opportunity to comment, at tomorrow's IT meeting. Henriksen thanked the group for a very productive discussion at today's meeting; from a TMT perspective, if there are technical questions about the analysis, we want to get those answered as quickly as possible. And again, she said, bear in mind that this analysis is offered in the context of 2004 operations only. Written comments can be posted to the www.bpa.gov/comment website, she added.

Obviously this is a huge regional discussion, but it is moving forward, she said – the regional executives will be meeting in mid-March, and by that time, your executives need to know how they are going to approach this question, because the decision on 2004 operations will be made soon thereafter. Written comments should be submitted to BPA Communications, DM-7, PO Box 14428, Portland 97209.

Litchfield noted that Montana will want to discuss the Libby/Hungry Horse reservoir operations provisions of the Council's mainstem amendments at the March regional executives meeting; we would like to be sure that is addressed, he said.

3. Bonneville Adult Ladder Attraction Spill, December-March.

Boyce said he had looked at the daily November-March winter steelhead counts for the past seven years; the bottom line is that, in some years, we have seen a substantial number of summer and wild winter steelhead – up to 100 per day – passing Bonneville. The question is whether attraction spill is warranted at the Cascade Island ladder, he said. My suggestion is that we re-evaluate that operation based on current passage numbers to revisit the decision to terminate spill, as passage numbers change, Boyce said. It was agreed that FPAC will develop criteria as to what passage numbers should trigger a re-start of spill at the Cascade Island ladder.

4. Salmon Managers Update of Adult Fish Counts in the Lower Snake.

Any progress on getting real-time counts on the Snake? Boyce asked. Starting February 1, WDFW staff will begin reviewing the video counts on Monday, Wednesday

and Friday, Cindy LeFleur replied. It sounds, then, as though the video counts are being reviewed on a timely basis under the current contract, said David Wills – the question then becomes, how do we get that information on a timely basis. Henriksen said she will coordinate the availability of that data. We'll track it from this end and see what we find, she said.

5. Spring Creek Spill Update.

It was agreed to discuss this topic at the next TMT meeting.

6. Operations Update.

Henriksen said the Corps had provided the first Q-Adjust run of the season at today's meeting; she asked the other TMT participants to evaluate whether it provides the kind of information they would like to see for future meetings. She asked the other TMT participants to email her with any suggestions they may have.

7. Next TMT Meeting Date.

The next Technical Management Team meeting was set for Wednesday, February 18. Meeting summary prepared by Jeff Kuechle.

TMT Meeting Participants February 4, 2004

Name	Affiliation
Jim Litchfield	Montana
Ron Boyce	ODFW
David Wills	USFWS
Russ Kiefer	IDFG
Cindy Henriksen	COE
Cindy LeFleur	WDFW
Bruce Suzumoto	NWPPC
Donna Silverberg	Facilitation Team
Robin Harkless	Facilitation Team
Shane Scott	PNUCC
David Benner	FPC
Kyle Martin	CRITFC
Tom Haymaker	PNGC

Scott Boyd	COE
Rudd Turner	COE
Mary Karen Scullion	COE
Tim Heizenrater	PPM
Mike O'Bryant	CBB
John Palensky	NOAAF
John Wellschlager	BPA
Scott Bettin	BPA
Nic Lane	BPA
Paul Wagner	NOAAF
Suzanne Cooper	BPA
Kim Fodrea	BPA
Bill Maslen	BPA
Birgit Kohler	BPA
Kevin Bannister	PNUCC
Kevin Nordt	PGE
Don Schwartz	NWSFI
Liz Hamilton	NWSFI
Dave Ryan	PPM
Steve Haeseker	USFWS
Sauna McReynolds	PNUCC
Margaret Filardo	FPC
Dan Bedbury	EWEB
Bill Rudolph	NW Fish Letter
Martin Hatscher	SCL
Tom Le	PSE
Lance Elias	PPL
Richele Beck	D. Rohr & Associates
Rod Sando	CBFWA

Assumptions:

- * Streamflows were adjusted to the January Final Water Supply Forecast for the period of January thru August of 111 MAF at The Dalles and shaped 59 different ways based on observed historical runoff.
- * Starting elevations were observed data from December 31, 2003.
- * Grand Coulee helps meet Bonneville minimum flow objective of 125 kcfs in Jan-Mar drafting no lower than 1248.0 ft in Jan, 1253.7 ft in Feb, and 1246.2 ft in March. Operate to meet McNary flow objective of 250 kcfs drafting no lower than 1236 ft by Apr 15. Minimum draft elevations are based on a GCL/Dworshak shifted flood control and VECC/AER
- * Hungry Horse operates to VARQ flood control or minimum flow from Jan - May and meets minimum flow of 3500 cfs at Columbia Falls, targets full in June, and drafts to 3540 ft by 31 Aug.
- * Brownlee operates to flood control elevations.
- * Dworshak targets elevation 1530.2 ft in Mar, 1528.8 ft by 15 Apr, and 1520.9 ft by 30 Apr, based on a GCL/DWR shifted flood control operation and maximum releases of 13 kcfs. DWR targets full in June with a minimum flow of 1.5 kcfs, releases a maximum of 13 kcfs in July - August to meet LWG flow objectives, and targets 1520 ft by 31 Aug.
- * Libby operates on minimum flow or VARQ flood control Jan - Apr. Targets 9,200 cfs in May and 15,600 cfs in June for Sturgeon, based on an Apr-Aug forecast of 5.71 MAF and a Tier 3 required pulse of 0.9 MAF. Targets full in July with a minimum flow of 8,000 cfs for bull trout. Drafts to 2439 ft by 31 Aug.

Results:

Priest Rapids Meets Flow Objectives of 70 kcfs in Jan - Apr 15 and 135 kcfs in Apr 16 - Jun.

Month	Occurrences out of 59 Years	Average Flow for 59 Years (kcfs)
Feb	57	96
Mar	59	106
Apr 15	59	107
Apr 30	9	103
May	58	157
Jun	58	141

Grand Coulee meets the Apr 15 flood control target elevation of 1235.9 ft in all 59 years. GCL operates to meet Bonneville objective of 125 kcfs in Jan-Mar.

Lower Granite Meets Flow Objectives of 99.3 kcfs in Apr - May, 83.4 kcfs in June and 51.6 kcfs in Jul - Aug:

Month	Occurrences out of 59 Years	Average Flow for 59 Years (kcfs)
Apr 30	16	83
May	40	105
Jun	43	96
Jul	26	48
Aug 15	0	40
Aug 31	0	31

Bonneville Meets Flow Objectives of 125 kcfs in Feb - Apr:

Month	Occurrences out of 59 Years	Average Flow for 59 Years (kcfs)
Feb	58	165
Mar	59	180
Apr 15	59	206
Apr 30	59	212

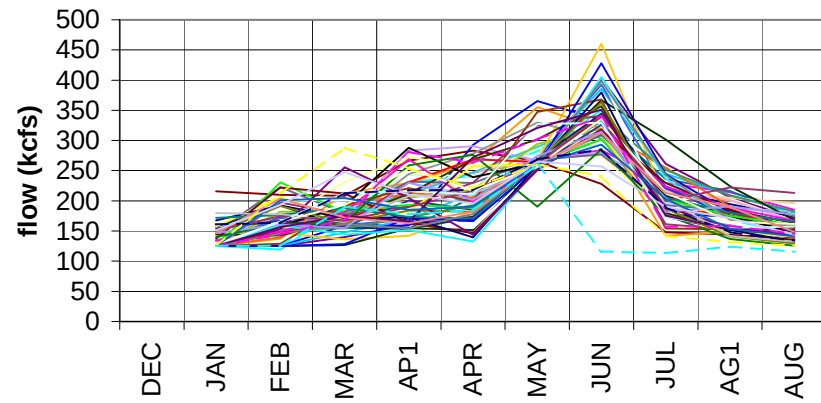
McNary Meets Flow Objectives of 250 kcfs in Apr 15 - Jun and 200 kcfs in Jul - Aug:

Month	Occurrences out of 59 Years	Average Flow for 59 Years (kcfs)
Apr 30	5	188
May	56	261
Jun	55	313
Jul	26	192
Aug 15	4	166
Aug 31	1	148

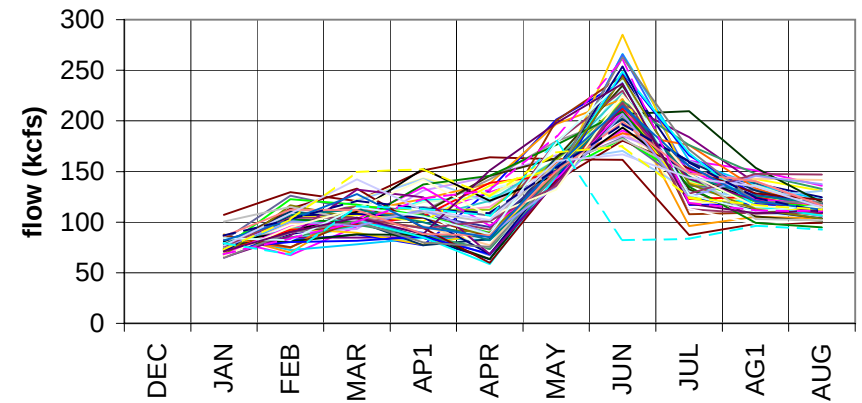
Projects Refill by 30 June:

Month	Occurrences out of 59 Years	Average Elevation on 30 Jun for 59 Years
Libby	46	2458
Hungry Horse	59	3560
Grand Coulee	59	1290
Dworshak	43	1595

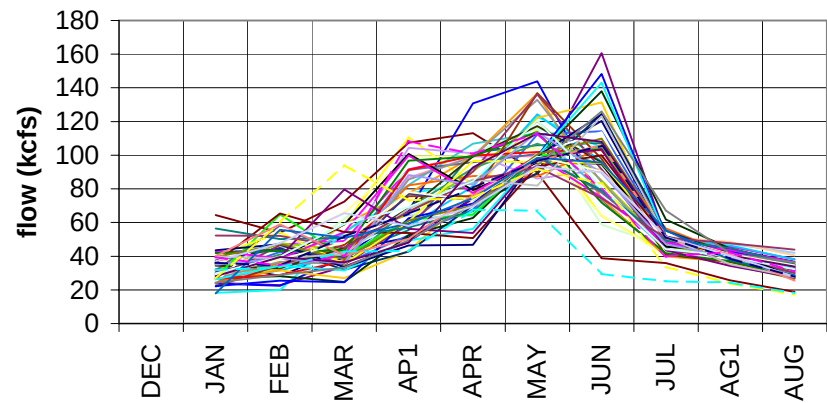
Bonneville Flow



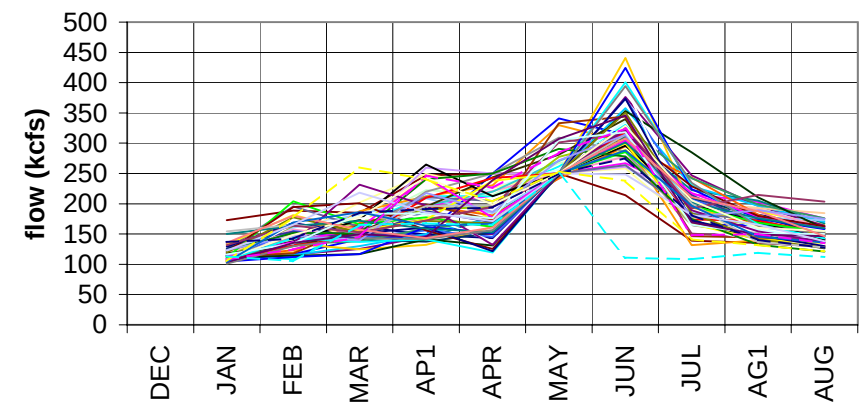
Priest Rapids

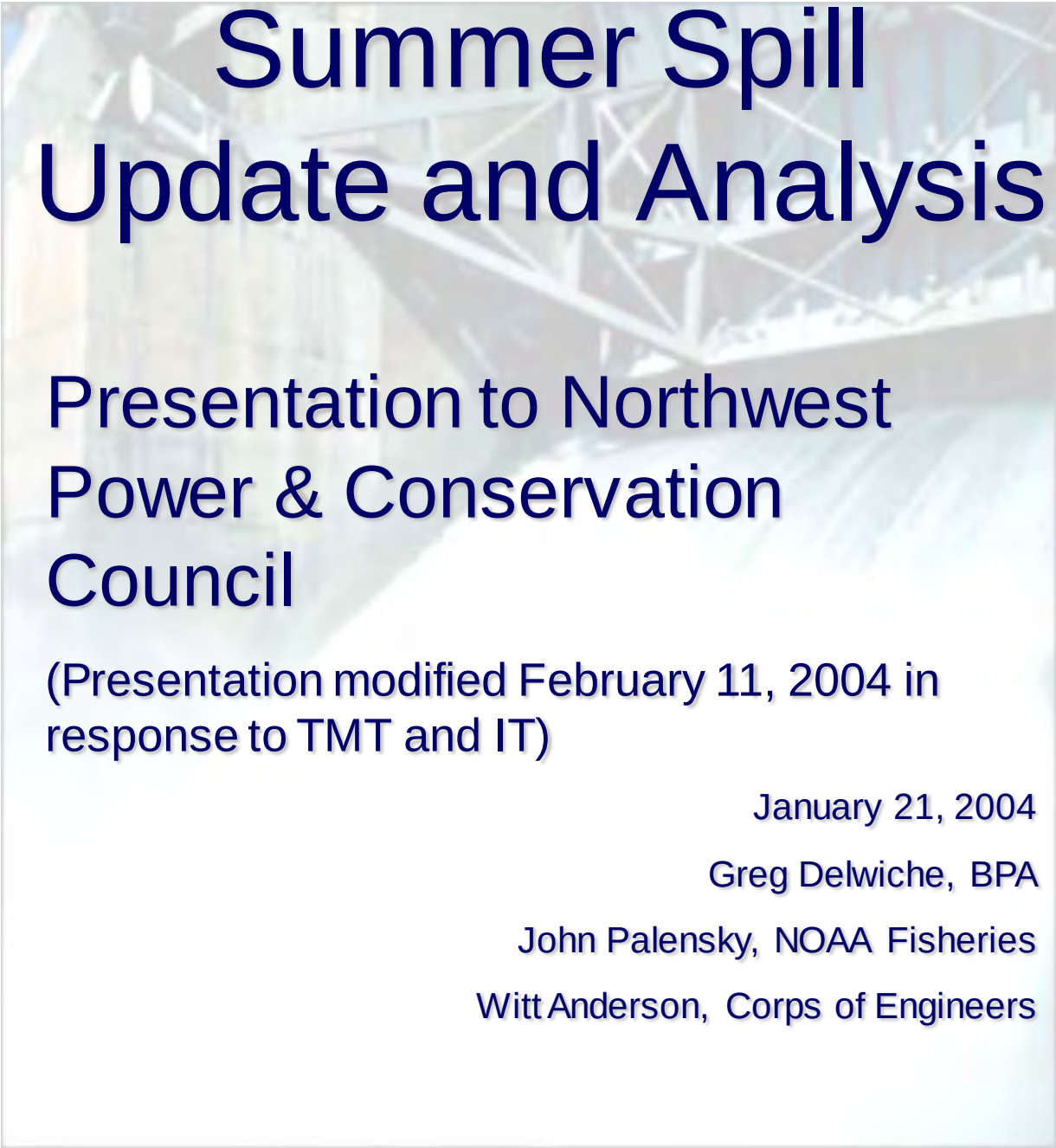


Lower Granite



McNary





Summer Spill Update and Analysis

Presentation to Northwest Power & Conservation Council

(Presentation modified February 11, 2004 in
response to TMT and IT)

January 21, 2004

Greg Delwiche, BPA

John Palensky, NOAA Fisheries

Witt Anderson, Corps of Engineers

Introduction

- **Analysis of Biological and Revenue Impacts**
- **Alternative Mitigation Actions or Offsets**
- **Way Forward**

Alternatives Evaluated

1. Full BiOp Spill July and August
2. BiOp Spill July and August / No Spill at IHR
3. BiOp Spill July - August 15 / No Spill at IHR
4. BiOp Spill in July / No Spill in August
5. BiOp Spill in July Except Test 50 kcfs v. BiOp at BON / No Spill in August / No Spill at IHR
6. BiOp Spill in July Except Test 0 kcfs v. BiOp at BON / No Spill in August / No Spill at IHR No Spill July-Aug
7. No Spill in July or August

Approach to Biological Analysis

- Starting populations or fish numbers for each stock
- Passage timing or distribution of migration in July and August
- SIMPAS model to analyze survival rates under each scenario

Adult Impacts

Affected Stock	Number of Juveniles Migrating	Percent Migrating in July and August	Number Migrating in July and August	Adult Conversions Based on a 2% SAR (Converted from Juveniles Surviving to below BON in July and August)						
				Variations of Option 2						
				BiOp Spill Jul-Aug	BiOp Spill Except IHR	BiOp Spill thru Aug 15, No IHR Spill	BiOp Spill in July, No August Spill	No IHR, No Aug, BON 50 v. BiOp, JDA 30% (Option C)	No IHR, No Aug, BON 0 v. BiOp, JDA 30% (Option B)	No Spill July-Aug
FALL CHINOOK										
Upriver Bright										
Priest Rapids & Ringold Springs Hatcheries	10,200,000	66%	6,763,000	83,800	83,800	83,600	82,600	82,000	81,800	79,600
Hanford Reach Natural	25,000,000	66%	16,575,000	205,600	205,600	204,600	202,400	201,000	200,600	195,200
Yakima River & Marion Drain	1,020,000	46%	468,000	5,800	5,800	5,800	5,800	5,600	5,600	5,600
Snake River Bright										
Listed Wild Snake River	1,052,000	90%	944,000	2,420	2,418	2,416	2,414	2,408	2,408	2,396
Unlisted Lyons Ferry Hatchery	3,300,000	90%	2,963,000	7,600	7,600	7,600	7,600	7,600	7,600	7,600
Unlisted Nez Perce and Big Canyon Hatcheries	2,050,000	90%	1,841,000	4,800	4,800	4,800	4,800	4,600	4,600	4,600
Mid-Columbia Bright										
Deschutes River	1,474,000	41%	599,000	8,400	8,400	8,400	8,200	8,200	8,200	7,600
Klickitat River	4,000,000	41%	1,626,000	27,200	27,200	27,000	27,000	26,800	26,600	26,400
Umatilla River	1,080,000	41%	439,000	4,200	4,200	4,200	4,000	3,800	3,800	3,400
Little White Salmon River	2,000,000	41%	813,000	13,600	13,600	13,600	13,400	13,400	13,400	13,200
SUMMER CHINOOK										
Upper-Columbia	2,574,000	66%	1,706,000	21,200	21,200	21,000	20,800	20,600	20,600	20,000
TOTAL	53,750,000	65%	34,737,000	384,400	384,400	382,800	378,800	376,200	375,400	365,400

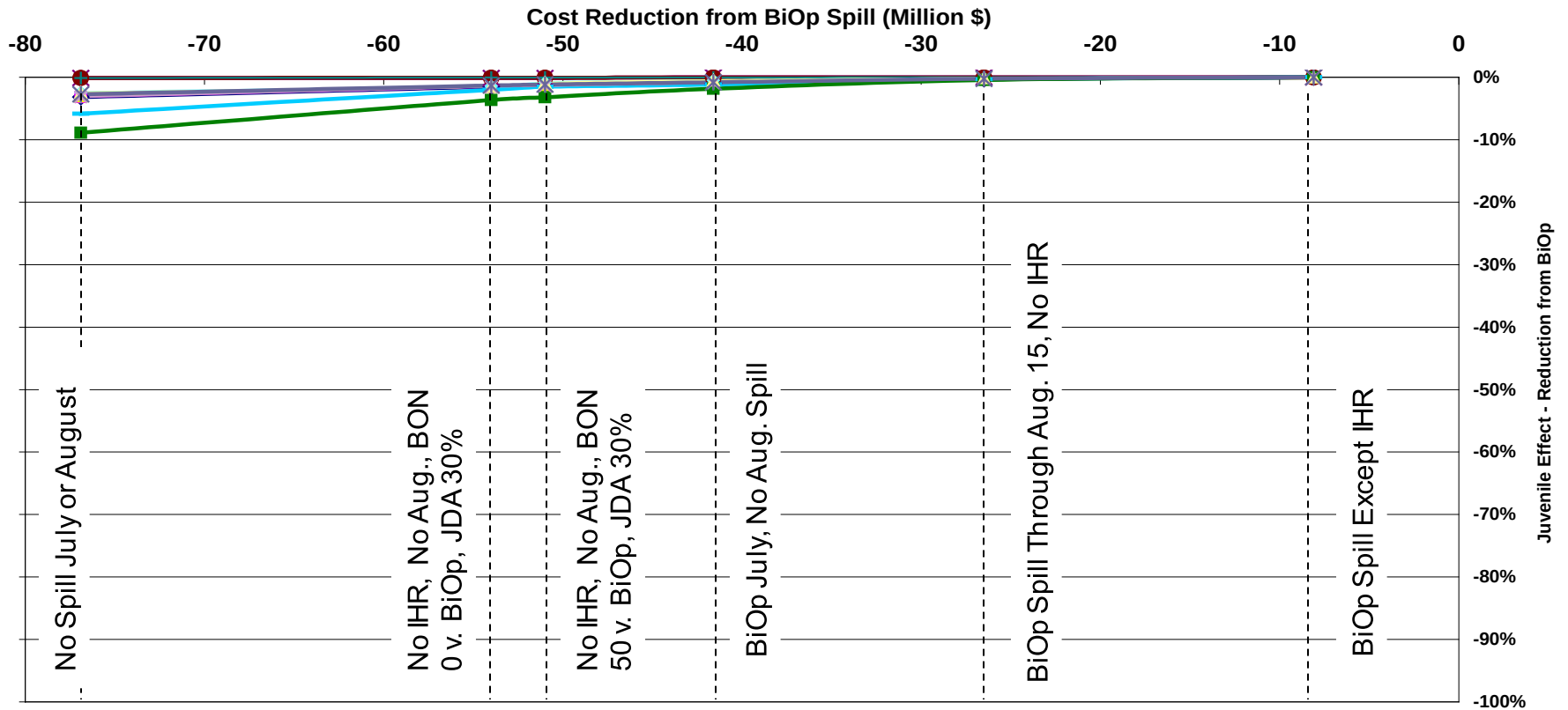
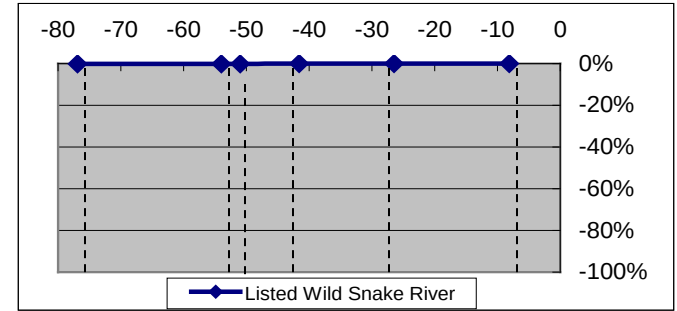
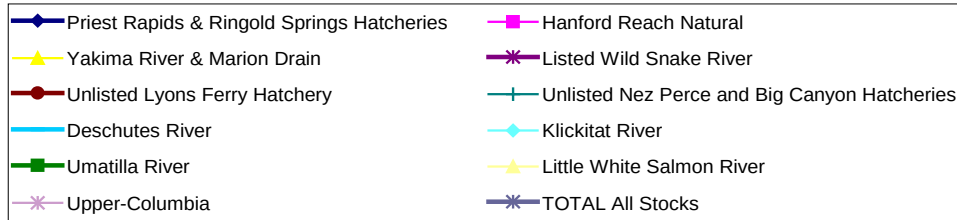
Adult Conversions Based on 0.5% to 4% SAR

TOTAL LISTED Juveniles	1,052,000	90%	944,000	121,000	121,000	121,000	121,000	120,000	120,000	120,000
# of juveniles difference from BiOp spill	-			-	(130)	(210)	(370)	(610)	(650)	(1,200)
difference converted to adults with 0.5% SAR	-			-	-	-	-	-	-	(10)
difference converted to adults with 1% SAR	-			-	-	-	-	(10)	(10)	(10)
difference converted to adults with 2% SAR	-			-	-	-	(10)	(10)	(10)	(20)
difference converted to adults with 4% SAR	-			-	(10)	(10)	(10)	(20)	(30)	(50)
TOTAL Juveniles	53,749,000	65%	34,738,000	19,221,000	19,220,000	19,142,000	18,941,000	18,814,000	18,767,000	18,273,000
# of juveniles difference from BiOp spill	-			-	(1,000)	(79,000)	(280,000)	(407,000)	(454,000)	(948,000)
difference converted to adults with 0.5% SAR	-			-	-	-	(1,000)	(2,000)	(2,000)	(5,000)
difference converted to adults with 1% SAR	-			-	-	(1,000)	(3,000)	(4,000)	(5,000)	(9,000)
difference converted to adults with 2% SAR	-			-	-	(2,000)	(6,000)	(8,000)	(9,000)	(19,000)
difference converted to adults with 4% SAR	-			-	-	(3,000)	(11,000)	(16,000)	(18,000)	(38,000)
Cost savings from BiOp (in millions)	\$0			\$0	\$8	\$26	\$42	\$51	\$54	\$77
Cost savings range (in millions)	\$0				5-11	15-32	25-50	30-61	32-64	55-92

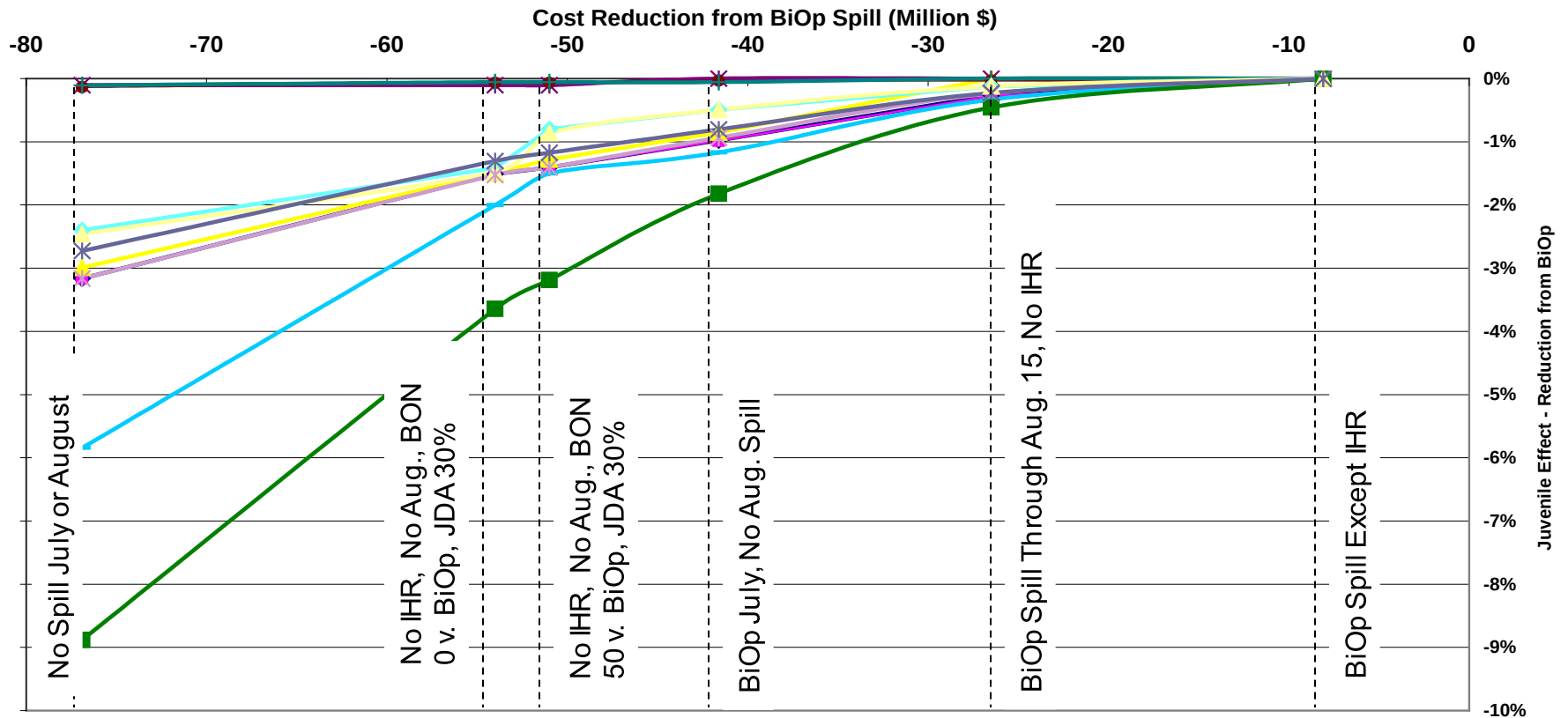
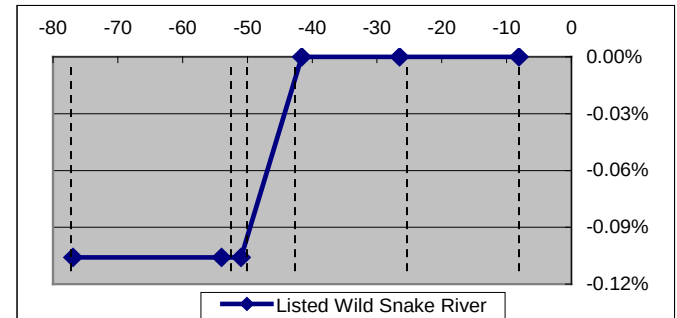
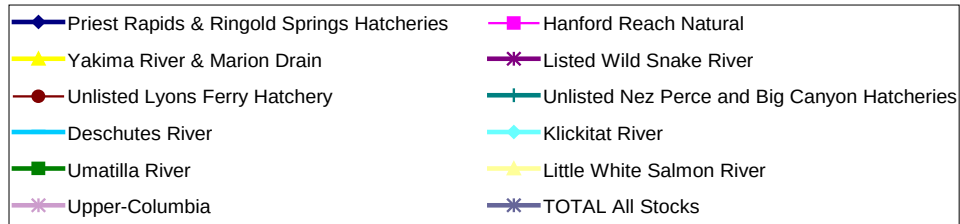
Option B	July 1-20	July 21-31	August 1-31
Bonneville	0kcfs vs BiOp		no spill
The Dalles	40% 24-hr		no spill
John Day	30% 24-hr	30% 12-hr	no spill
Ice Harbor	no spill	no spill	no spill

Option C	July 1-20	July 21-31	August 1-31
Bonneville	BiOp vs 50kcfs		no spill
The Dalles	40% 24-hr		no spill
John Day	30% 24-hr	30% 12-hr	no spill
Ice Harbor	no spill	no spill	no spill

Percent Juvenile Survival Change of Summer Spill Reduction Alternatives (Scaled to 100%)



Percent Juvenile Survival Change of Summer Spill Reduction Alternatives (Reduced Scale)



50-Yr. Average Revenue Impacts of Summer Spill Alternatives

Spill Option	Cost of Spill Option in Millions	Value of Additional Generation Compared to BiOp in Millions	Range of Value of Additional Generation in Millions
Full BiOp Spill Jul-Aug	\$77	\$0	
BiOp Spill Except IHR	\$69	\$8	\$5 - \$11
BiOp Spill thru Aug 15, No IHR Spill	\$51	\$26	\$15 - \$32
BiOp Spill in July, No August Spill	\$35	\$42	\$25 - \$50
No IHR, No Aug, BON 50 v. BiOp	\$26	\$51	\$30 - \$61
No IHR, No Aug, BON 0 v. BiOp	\$23	\$54	\$32 - \$64
No Spill July-Aug	--	\$77	\$55 - \$92

Offsets

Summary of Potential Biological Offsets for Summer Spill Reduction

Action	Affected Species or Life Stage	Estimated Benefit	Cost	Timeline (critical path)
Northern Pikeminnow Management – increase annual exploitation rate of northern pikeminnow by ~1-2% to further reduce predation losses (i.e., modify sport-reward structure to increase catch).	Primarily fall chinook outmigrating during summer proportional to individual stock abundance; also benefits spring migrants	102,000-206,000 smolts during first year (500-8,000 adults), equilibrating at 1.4 - 2.8 million annually in approximately year 8 (7,000-56,000 adults).	\$0.5-\$1 million annually	Implement with annual NPMP contract modification effective April, 2004
Smallmouth Bass Management – site specific removal of bass at known “problem” locations to achieve within year survival improvement (e.g., TDA tailrace, JDA forebay, LGR reservoir)	Primarily fall chinook outmigrating during summer; also benefits spring migrants	a) 20 adults (retain current catch); additional 30 adults with additional Agency electrofishing. b) 5 SR adults (retain current catch); additional 15 SR adults with additional Agency electrofishing c) 50 adults/derby	a) \$10,000 annually b) \$8,000 annually c) \$30,000/derby	a) and b) Implement with annual NPMP contract modification effective April, 2004 (bass removal during NPMP evaluation) c) Implement in coordination w/ States and contracted “derby coordinator”
Pile Dike Removal – Remove unneeded pile dikes used by avian and piscine predators	All juveniles migrating through the lower Columbia River	Action would remove resting areas used by cormorant and other piscivorous birds. This could result in reduced avian predation on juvenile salmonids. No data on which to calculate potential benefits	Scalable at \$69 per piling. With approximately 18,000 pilings it would cost about \$1.4 million	90 days for preparation of an EA and contract award. Could remove 4500 pilings before July 2004

Offsets Continued

Action	Affected Species or Life Stage	Estimated Benefit	Cost	Timeline (critical path)
Commercial Harvest Reductions – purchase easements on portions of allowable harvest in selected fisheries	Adult fall chinook; benefit to individual stocks proportional to their abundance and distribution in fisheries.	Scalable. E.g., if modifications to fisheries are designed to limit the impact to no more than 5% of the total catch, then the benefit to Columbia River fall chinook escapement would range between approximately 1,000 and 6,000 adults.	Approximate estimated economic value (market value * 2x multiplier) of \$125,000 to \$275,000	Implementation in 2005, 2006, or 2007 would provide in-kind survival benefit relative to impact of spill reduction.
Hanford Reach Rearing Protection – limit flow fluctuations to protect juveniles against stranding (i.e., deliver energy to Grant PUD to mitigate head losses attributable to operation of federal projects upstream).	Hanford Reach fall chinook	30 million fry in 2004, which equates to greater than 50,000 more returning adults.	\$100,000 annual average	Incorporate into operations planning effective Spring, 2004 (beginning in approximately May)
Avian Predation Research – Continue research to support EIS needed to evaluate alternatives actions to address tern and cormorant predation	Sub-yearling salmon stocks	No direct benefit to 2004 out-migration. Implementation of selected alternatives could begin in '05 or '06. If and when implemented, there is a possible reduction in loss of 350k to 500k sub-yearlings	\$300,000 in 2004	Research initiated in spring of 2004.
Habitat Improvements – targeted riparian habitat protection and water transactions to benefit fall chinook	All species/stocks. Site-specific offsets would emphasize benefit to fall chinook	Qualitative at this time. Improvements to terrestrial and aquatic environments would have long-term to permanent benefit to resident and anadromous species as well as general ecosystem health.	Estimate \$1.5 to \$4 million annually for increased riparian protection, may be phased and occur in increments. -Estimate \$500,000 in short term to \$6 million in additional annual funding could be used to increase number and term of water transactions.	Implementation of increased riparian habitat protection in 2005, 2006, 2007 in coordination with entities involved with riparian protection. Potential to also protect riparian land through long term or permanent easements. -Augmented water transactions may be possible by increasing number and length of transactions of the Columbia Basin Water Transactions Program, beginning in 2004.

Offsets

Other Offsets Discussed/Considered:

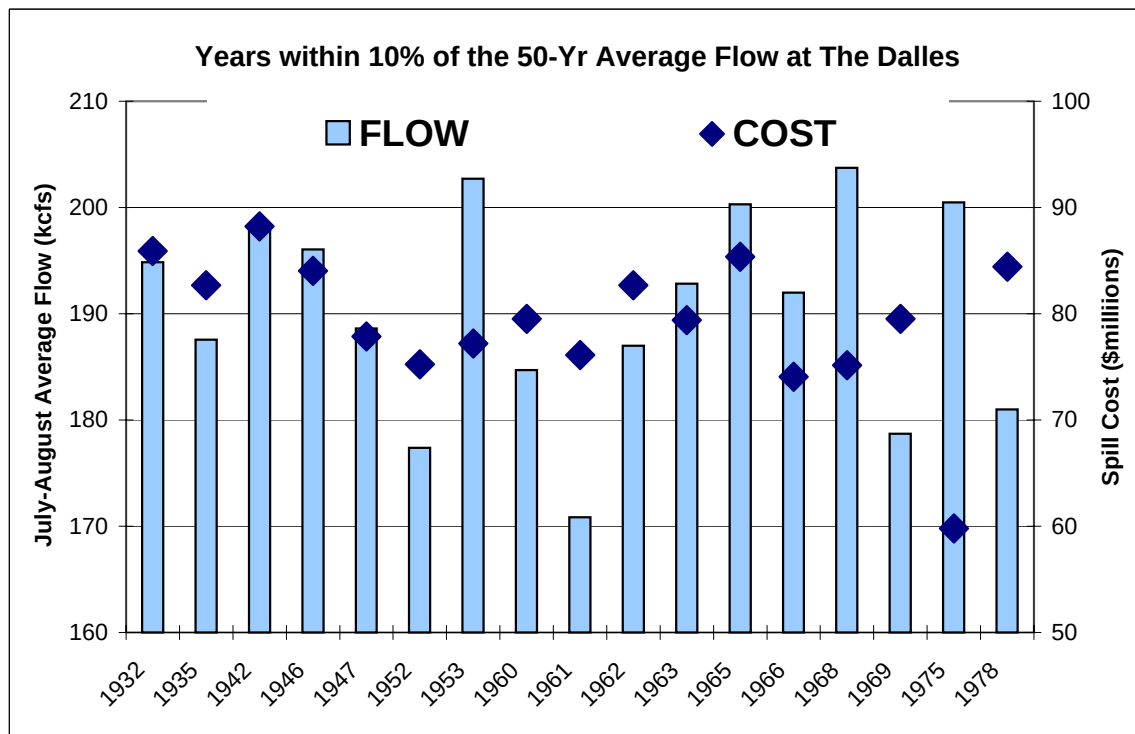
- Marine mammal management
- Walleye management
- Increased law enforcement
- Habitat improvements, including estuary
- Hatchery supplementation
- Raised spillway weirs
- Dam removal
- Reservoir drawdowns
- Reintroduction of fall Chinook above Hell's Canyon
- Additional O&M funding
- Manage turbine operations to maximize passage survival

Way Forward

- Distributing analysis to the Regional Forum teams for technical review and input by February 13 (The amended closing date for the public comment period is February 20th)
- Need to engage 3 sovereigns and provide opportunity for non-sovereign input
- Decision by March

2000 BIOP SUMMER SPILL COSTS WITH NEAR AVERAGE FLOWS AT THE DALLES

	Years when The Dalles Jul/Aug average outflow is within 10% of the 50-yr ave.	The Dalles July- August average outflow (kcfs)	2000 BiOp Juvenile Spill Cost (\$Millions)	SUMMER SPILL CRITERIA:	
1	1932	195	86	IHR	50% of outflow 24 hrs/day
2	1935	188	83		
3	1942	198	88	JDA	60% of outflow 12 hrs/day, 30% of outflow 24 hrs/day on alternating days
4	1946	196	84		
5	1947	189	78		
6	1952	177	75		
7	1953	203	77	TDA	40% of outflow 24 hrs/day
8	1960	185	80		
9	1961	171	76	BON	140 kcfs 12 hrs (night), 120 kcfs 12 hrs (day)
10	1962	187	83		
11	1963	193	79		
12	1965	200	85		
13	1966	192	74		
14	1968	204	75		
15	1969	179	80		
16	1975	200	60		
17	1978	181	84		
Average		190	79		
Minimum		171	60		
Maximum		204	88		
50-Yr Average		188	77		
Minimum		130	55		
Maximum		247	92		





Nez Perce

TRIBAL EXECUTIVE COMMITTEE

P.O. BOX 305 • LAPWAI, IDAHO 83540 • (208) 843-2253

4 February 2004

Steven Wright (*via facsimile*)
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B. G. William Grisoli (*via facsimile*)
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Bob Lohn, Director (*via facsimile*)
National Marine Fisheries Service
Northwest Regional Office
7600 Sand Point
Seattle, WA 98115-0700

Re: Nez Perce Tribe's Opposition to Elimination/Reduction in Summer Spill

We are appalled by the continuing efforts of Bonneville Power Administration, the Corps of Engineers and NOAA Fisheries to eliminate or reduce summer spill.

The Nez Perce Tribe has long supported the spill and flow to vital measures to provide passage conditions for juvenile salmon. Absent breaching the four lower Snake River dams and investing in affected local communities, these measures are even more critical to salmon survival.

These proposals directly impair the United States' ability to comply with the Endangered Species Act, which is the currently the subject of the National Wildlife Federation v. National Marine Fisheries Service litigation in the United States District Court in Portland. These proposals also contain measures that represent a direct infringement on the Nez Perce Tribe's treaty-reserved fishing rights, which are the under the United States District Court's continuing jurisdiction in United States v. Oregon. Finally, as the State of Alaska has expressed, these proposals are inconsistent with the Pacific Salmon Treaty.

The federal government's "Summer Spill Update and Analysis" is woefully short of actual analysis, and the information that is presented is flawed and inaccurate. This document grossly understates the impacts to salmon (as documented by the analysis conducted by the fish and wildlife co-managers). This document also includes numerous flaws in even the most basic of information, such as considering Nez Perce and Big Canyon releases to be releases of "unlisted" fish.

The "Offsets" contained in the "Summer Spill Update and Analysis" and in the "Alternative Mitigation Actions" document are particularly disturbing. In contrast to the actual documented benefits that spill provides, the United States proposes a handful of "potential biological offsets" consisting of the following:

- things such the United States previously committed to in the 2000 FCRPS BiOp ("Law Enforcement");

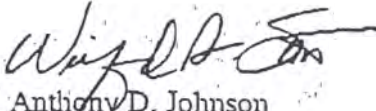
- things that are of unspecified benefit to salmon (the vague reference to "Habitat Improvements" with no indication of where, when or what benefit they would provide which is similar to the deficiencies which led the United States District Court in the NWF v. NMFS case to rule that NOAA's reliance on such measures was "arbitrary and capricious");

- things that admittedly have no direct benefit to outmigration ("Avian Predation Research"); and,

- things that would violate the Nez Perce Tribe's treaty-reserved rights ("Commercial Harvest Reductions").

As you have previously acknowledged at the Regional Executives Meeting last August, any change in summer spill would affect the NWF v. NMFS litigation, and we trust you will advise the Court accordingly.

Sincerely,


Anthony D. Johnson
Chairman

February 4, 2004

Page #3

cc: Governor Frank H. Murkowski
Senator Ted Stevens
Senator Lisa Murkowski
Representative Don Young
James Connaughton, Chairman, Council on Environmental Quality
Governor Ted Kulongoski
Governor Gary Locke
Governor Judy Martz
Governor Dirk Kempthorne
IT/TMT
Stan Speaks, BIA
J. William McDonald, Northwest Regional Director, U.S. Bureau of Reclamation
Alaska Trollers Association
Fred Disheroon, DOJ, Counsel in NWF v. NMFS and U.S. v. Oregon

Alternative Mitigation Actions to Offset Survival Impacts of Reduced Summer Spill Operations

January 2004

The following information was developed in conjunction with the Offset Team established through the CBFWA-led Spill Subcommittee. This document is a compilation of the information developed through the Offset Team's efforts. It contains descriptions of potential alternative mitigation actions, or offsets, as well as estimated survival or productivity benefits, costs and implementation requirements. Offset actions contained in this document include the following:

- Northern Pikeminnow Management Program Heavy-Up (Offset Action 1)
- Smallmouth Bass Control (Offset Action 2)
- Commercial Harvest Reduction (Offset Action 3)
- Avian Predation Research (Offset Action 4)
- Pile Dike Removal (Offset Action 5)
- Anti-Stranding Flow Fluctuation Limits in the Hanford Reach (Offset Action 6)

In addition, the Offset Team developed a set of principles or criteria for consideration by policymakers as they contemplate alternatives to the current summer spill operation. These principles are located in the Appendix to this document.

Offset Action 1 – Northern Pikeminnow Management Program Heavy-Up

Description of Proposed Action

One of the primary non-operational actions to improve in-river survival of fall chinook is the management of predatory fishes. The Northern Pikeminnow Management Program (NPMP) is a multi-year effort to reduce piscivorous predation on juvenile salmon through public angler-driven system-wide removals of predator-sized northern pikeminnow.

Bonneville Power Administration (BPA) funds the NPMP. Since program inception, over 2 million northern pikeminnow have been removed throughout the system with an estimated benefit of reducing predation mortality by 25 percent (Friesen and Ward). This equates to over 4 million juvenile fish not eaten by pikeminnow each year. This has been achieved through annual harvest of northern pikeminnow since 1990. Currently, multi-year annual average harvest is approximately 12 percent, with annual harvest ranging between approximately 8 percent and 14 percent (14 percent harvest was achieved in 2001 as a result of the “heavy-up” that was implemented during the drought/power emergency). While the benefit of annual removals accrue over time, removals within a year can also have significant immediate benefits to fish survival within the same year.

More aggressive and focused removals could provide substantial survival benefit to reduce the impact of the conditions that inriver outmigrants face in 2004 and beyond. The NPMP is now a turnkey operation with demonstrated success in adaptively managing to changed conditions and responding to special circumstances.

a. Location

The NPMP is a system-wide predator control program in the Columbia Basin. Open waters include the mainstem lower Columbia River up to Priest Rapids Dam in Washington and the Snake River up to Hells Canyon Dam in Idaho. Also open within this reach are backwaters, sloughs, and up to 400 feet into tributaries on the Columbia and Snake rivers.

b. Affected Species

Juvenile salmonids are the major dietary component of northern pikeminnow greater than 250mm fork length. The importance of salmonids in the diet of northern pikeminnow varies seasonally. Research conducted between 1982 and 1988 in John Day Reservoir indicates that juvenile salmonids were of greatest importance in the diet during July (82 percent) when the run of subyearling chinook salmon peaked. (Poe 82-3).

c. Statement of Feasibility and Certainty of Implementation

Increasing removals due to a program heavy-up is feasible utilizing current program infrastructure. The most effective and logistically feasible approach to increase the fishery performance would be to increase the basic reward structure using the 2001 increase in the NPMP reward structure as a model.

d. Coordination Needs and Additional Requirements

Coordination of activities associated with a NPMP heavy-up would occur utilizing existing program coordination and review processes. The NPMP has a separate Biological Opinion and NEPA documentation to cover program activities. A program heavy-up is not inconsistent with the existing BiOp for NPMP.

Estimated Survival or Productivity Increase

Using the 2001 Power Emergency NPMP heavy-up as a model for 2004 and beyond, the objective for the heavy-up is that a modified reward structure for the 2004 season could reasonably increase catch by 20,000 to 40,000 fish. An increase in the annual harvest of northern pikeminnow within this range (approximately a 1 percent to 2 percent increase in average annual exploitation) would result in an additional savings of approximately 1,400,000 to 2,800,000 smolts across the lifespan of the northern pikeminnow caught. Sustaining this increased catch would, over time, result in a similar annual savings in smolts at equilibrium (in approximately 8 to 10 years). To the extent that most of such improvements in survival would be achieved in the lower Columbia River where northern pikeminnow abundance and predation losses are highest, the survival benefit would be similar to all stocks (proportional to their abundance).

Additional benefits to juvenile salmonids migrating during the 2004 season are calculated by taking the anticipated additional catch resulting from program heavy-up incentives in 2004 and dividing it by the average percentage catch contribution by statistical week and multiplying by the average smolt consumption rate for the remaining duration of the open season. Based upon the objective of increasing catch by between 20,000 to 40,000 northern pikeminnow, a within-year benefit of between 200,000 to 400,000 smolts not consumed by pikeminnow would be realized. (Beamesderfer et al)

Estimated Cost, Duration, and Proposed Funding Source

The heavy-up approach is two-pronged. The approach will provide substantial incentive while simultaneously minimizing potential abuse of the program. The most effective and logistically feasible approach to increase the fishery performance is to increase the basic reward structure. An additional reward of \$500 per tagged northern pikeminnow caught provides substantial incentive to successful anglers and to minimize potential fraud on the program. In addition, modification across all three tiers provides nominal but certain reward for successful anglers. Increasing tier 2 from \$5 to \$6 per fish, and tier 3 from \$6 to \$9 per fish, would substantially increase the monetary incentive to those who have already demonstrated their ability to contribute substantially to the program's catch. Increasing tier 1 from \$4 to \$5 per fish would provide additional incentive for less effective anglers to continue to participate and increase fishing effort in order to graduate to the next tier. Also, past productive anglers who are not currently fishing in the program may choose to return. Finally, increasing the reward will result in modest additional recruitment of new anglers into the program if the treatment is coupled with minimal advertising.

Total cost would be dependent on its effectiveness, but likely on the order of between \$500,000 and \$1,000,000.

Additional opportunity exists for stock-specific survival benefit through initiation of a removal fishery in the lower reaches of the Yakima River. Available data suggest significant losses of juvenile outmigrants to northern pikeminnow in the Yakima River.

Process for Implementation and Schedule

Logistics associated with modifying the current NPMP to accommodate a program incentive increase would occur during pre-season program and contract discussions. The contract for the 2004 performance period is up for renewal at the end of March 2004. The new agreement for the performance period of the contract would be modified to reflect changes to the NPMP for purposes of an offset to summer spill. The field season for the NPMP Sport-Reward season typically starts in early May and runs through the majority of September in a given year.

Lead Entity

The Bonneville Power Administration funds the NPMP. The Pacific States Marine Fisheries Commission and the Washington Department of Fish and Wildlife together have the responsibility for administration and record keeping for the Sport-Reward fishery. The Oregon Department of Fish and Wildlife has responsibility for biological evaluation of program accomplishments in terms of the annual exploitation rate on Northern pikeminnow and impacts on juvenile salmonid predation by northern pikeminnow and other resident fishes.

Friesen, T.A., and D.L. Ward. "Management of Northern Pikeminnow and Implications for Juvenile Salmonid Survival in the Lower Columbia and Snake Rivers." *North American Journal of Fisheries Management*, 19:406-420.1999.

Poe, T. "System-Wide Significance of Predation of Juvenile Salmonids in Columbia and Snake River Reservoirs," BPA project. 1982-003-00.

Beamesderfer, R, D. Ward, and A. Nigro. *Evaluation of the Biological Basis for a Predator Control Program on Northern Squawfish (Ptychocheilus oregonensis) in the Columbia and Snake Rivers*, Volume 53, Number 12, 2898-2908.1996.

Offset Action 2: Smallmouth Bass Control

Description of Proposed Action

a. Location

Lower Columbia R. reservoirs, especially hot-spots near The Dalles Dam; Lower Granite Reservoir.

b. Affected Species

Primarily summer-migrating fall chinook (ChF), but also spring-migrating juveniles of other ESUs. Implementation in Columbia River reservoirs would benefit all listed and unlisted (e.g., Hanford Reach brights) ESUs originating from upstream areas, particularly areas downstream of collection/transport points. Action in Lower Granite Reservoir would benefit Snake River ChF and other Snake River ESUs, all listed (with the exception of hatchery and reintroduced stocks).

c. Statement of Feasibility and Certainty of Implementation

Depends on control method (table below). Control by removal is very feasible with sanction by fishery managers (particularly the states of Oregon and Washington). Retention of smallmouth bass (SMB) incidentally caught by Oregon Department of Fish & Wildlife (ODFW) during northern pikeminnow electrofishing is most feasible. Additional removal probably would be implemented by contracts to state fish and wildlife agencies (perhaps through the Northern Pikeminnow Management Program). Control by manipulating reservoir level probably is most feasible for Lower Granite Reservoir and probably not feasible for the Lower Columbia R. Manipulation of reservoir levels would probably require considerable public input/process.

d. Coordination Needs and Additional Requirements

State fishery agencies, interested public. Control by removal probably would not require additional NEPA; reservoir manipulation probably would.

Estimated Productivity Increase (juveniles saved) and Costs

Each large (e.g., >200mm) SMB may consume one juvenile salmon per day in some seasons and areas, although precise estimates of predator abundance and impacts on salmon populations are lacking. The following table contains estimates of juvenile increases, adult equivalents (AEQ), and costs by location and by control method for actions in 2004. The biological evaluation surveys/tagging by ODFW under the Northern Pikeminnow Management Program (Agency electrofishing) will occur in 2004, which could retain its catch and perhaps increase its effort in the target locations. Juvenile and AEQ increases are estimated for 2004 only (i.e., no benefits are assumed from fewer predators in subsequent years), and accrue to the mix of stocks migrating through the target locations.

Location Control method	Juv. Saved 1 st year	AEQ (basis: 0.5%-4.0% SAR)	Cost
Lower Columbia reservoirs			
Agency electrofishing: <i>Retain survey catch</i>	9,000	45-360	0
<i>Add 5 days in spring @ hot-spots</i>	5,000	25-200	\$12,000
Lower Granite Reservoir			
Agency electrofishing: <i>Retain survey catch</i>	4,000	20-160	0
<i>Add 5 days in spring @ hot-spots</i>	9,000	45-360	\$17,000
Public bass derby fishery (3-5 days in June)	4,000	20-160	\$30,000
Reservoir manipulation (effects begin 2008)	75,000	375-3,000	??

Process for Implementation

- 1. Agency electrofishing.** SMB captured during ODFW predator-control tagging and surveys or other management activities in 2004 could be retained, rather than returned to the river, at no additional cost or process (e.g., ESA permits). Additional electrofishing effort could be targeted on SMB removal at certain times and locations (hot-spots) at moderate cost, but may require additional ESA process. These actions would require the full support and concurrence of Oregon Department of Fish & Wildlife, Washington Department of Fish & Wildlife (WDFW), and Idaho Fish & Game (IDFG) for actions at the head of Lower Granite Reservoir.
- 2. Lower Granite public bass derby fishery.** This derby would encourage fishing pressure in a relatively limited and discrete location (e.g., Lower Granite Reservoir, or portions thereof). Concurrence by WDFW and IDFG is necessary and may be difficult, depending on regulations regarding game fish. Derbies often require that participants use live-wells to allow the catch to be released alive. For this purpose, anglers could be encouraged to retain their (dead) catch or surrender it live to be stocked into a closed-system pond where youth, disabled, and/or other anglers might enjoy recatching them. The derby could be sponsored by a state agency, perhaps in conjunction with WDFW's northern pikeminnow sport reward fishery or by a private event organizer under contract.
- 3. Lower Granite Reservoir manipulation.** Periodic short-term (hours) and limited (perhaps < 10 feet) drawdown of Lower Granite Reservoir during the spawning season of SMB could significantly reduce their reproductive success. This action could be controversial and costly. The effect on the SMB could be significant (perhaps >50 percent reduction in the 2004 brood year), as could the eventual benefits to salmon survival. The benefits to salmon would lag 4 to 6 years, because of the time required for the affected (diminished) brood year of SMB to recruit to predaceous size. The effect would endure 2 to 3 years. This action assumes that SMB spawn in shallow littoral margins of the reservoir during a relatively short (e.g., 2 to 4 weeks) season and that incubating eggs would be vulnerable for several days (e.g., ≥ 7 days). It is essential to review research and local knowledge of SMB reproductive behavior beforehand. Significant regulatory and public information processes may be necessary. Expected physical, biological, economic, and social costs of this action could be gleaned from the Lower Granite drawdown study of the early 1990s.

Lead Entity

Bonneville Power Administration for removal fisheries; the Army Corps of Engineers (Corps) for reservoir manipulation.

Offset Action 3 – Commercial Harvest Reduction

Description of Proposed Action

Harvest reductions in various forms are one of the few human impacts on salmon that resource managers can directly control in the short run that have immediate and direct effects on escapement. This feature allows managers to conserve when necessary and increase allocation when stock abundance warrants it. As an offset measure, it has the potential to significantly boost adult returns and recruitment to the terminal area for inriver harvest or additional spawning escapement. Most fisheries that significantly impact Columbia Basin stocks consist of commercial troll, net, and recreational sport fisheries.

The development of salmon aquaculture the last two decades has pushed the wholesale price of salmon downward to its lowest level in 20+ years as its market share now approaches 60 percent. (Knapp). This has put tremendous pressure upon traditional wholesale suppliers (commercial net and troll) as prices have fallen, while operational costs have increased. In addition, markets put pressure on fisheries to become more efficient, develop niche markets, and in some cases drop out of the fishery. This attrition can have positive ecological benefits in cases where wild fish are a significant or important proportion of mixed stock fisheries provided that other fisheries do not increase their catch to compensate. This unique market condition may make it viable to enable some fishery reductions through easements or other agreements on a willing buyer/willing seller basis to pay for forgone catch.

Harvest reductions, as an offset, do not necessarily have to occur during the same juvenile outmigration year as a modified spill program since the juveniles do not mature and become vulnerable to harvest until subsequent years (i.e., after 1 to 4 years in the ocean); this allows time for development and coordination of reasonable alternatives. Another feature of harvest reductions is that they can be scaled to achieve a broad range of survival objectives, as deemed necessary; this provides the additional advantage of selective management alternatives that do not compromise the viability of the overall fishery.

a. Location

There are multiple ocean and inriver fisheries that impact significant proportions of Columbia River fall bright chinook, as illustrated by the catch distribution of Hanford Reach fall chinook (figure 1). These fisheries include as far north as Southeast Alaska and Canadian troll fisheries and terminal areas such as Columbia River management zones 1 through 6. Determining the appropriate location to focus depends upon a number of policy, market, and technical considerations.

b. Affected Species

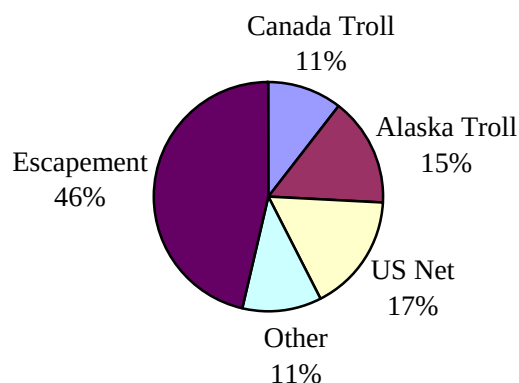
Most commercial fisheries in the ocean and in the Columbia River occur on a mixed aggregate of multiple species and stocks as exemplified by the pie chart on Southeast Alaska Commercial Troll fishery (figure 2). Typically, fisheries that target Columbia River upriver bright stock also impact to varying degrees other species/stocks, including Snake River bright, Mid-Columbia bright, Bonneville upriver bright, Deschutes natural chinook, A and B run steelhead, Bonneville Pool Hatchery stocks, and coho. Other non-Columbia hatchery and natural stocks could be affected in ocean commercial harvest reduction scenarios as well.

Methods

Market and/or regulatory-based harvest reduction programs have been employed by the United States and Canadian governments through permit buy-back programs to reduce fishing capacity. If the recent market trend toward more farm-raised salmon continues its growth, additional opportunities may exist for further voluntary harvest reductions through the use of harvest easements that reimburse fishers for the market value of forgone harvest. In addition to direct payment to fishers, opportunities also exist to develop new markets or invest in infrastructure to better compete with other supplies of salmon through value-added processing. Assistance from government and local trade organizations in determining participation and payment schemes or general programs to distribute the funds gained from such agreements among fishers and processors is essential.

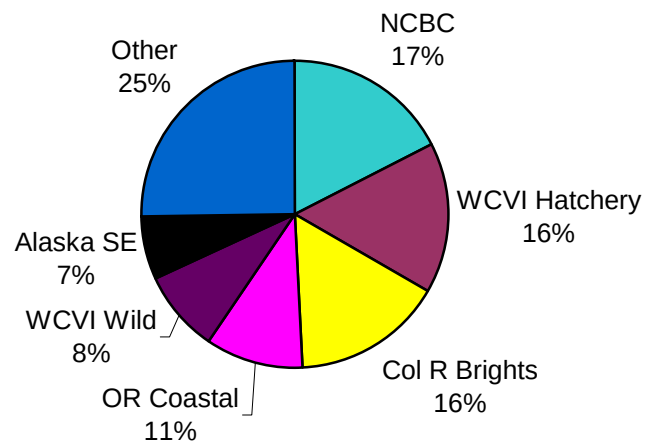
Over a dozen distinct commercial and sport fisheries impact Columbia Basin stocks that may be affected by summer spill reductions (figure 2), but a few fisheries with higher proportional catch offer the most feasible opportunities in which to pursue harvest easements. Modification to harvest for purposes of offsetting potential impacts of summer spill is scalable, depending on objectives and subject fisheries. For example, if modifications to fisheries are designed to limit the impact to no more than 5 percent of the total catch, then the benefit to Columbia River fall chinook escapement may range between approximately 1,000 and 6,000 adults at an estimated economic value (market value * 2x multiplier) of \$125,000 to \$275,000.

Figure 1. Hanford Wild Brights Distribution of Total Fishing Mortalities



Source: Pacific Salmon Commission, Report TCCNINOOK (01)-2, Table H.58, August 9, 2001

Figure 2. Stock Composition of Southeast Alaska Troll Fishery



Source: Columbia River Inter-Tribal Fish Commission

Knapp, G. *Challenges and Strategies for the Alaska Salmon Industry*, December 20, 2001. p.31.

Offset Action 4 – Avian Predation Research

Description of Proposed Action

Additional caspian tern and double-crested cormorant research activities in the Columbia River estuary and upriver at Crescent Island to support development of an EIS to evaluate alternatives to address avian predation on migrating juvenile salmonids.

a. Location

Research activities would take place in the estuary and at Crescent Island.

b. Affected Species

Sub-yearling salmon stocks.

c. Statement of Feasibility and Certainty of Implementation

The additional research has been scoped and would supplement work already planned and funded for this year. The activities would be a continuation of work initiated in prior years and, with funding, could readily be implemented.

d. Coordination Needs and Additional Requirements

Funding is the only significant requirement at this time.

Estimated Survival or Productivity Increase

This research would support an Environmental Impact Statement (EIS) developing alternatives to reduce avian predation on salmonid species. No direct benefit to the 2004 migration would be achievable. The schedule for the EIS completion is mid-July 2004 and subsequent implementation of selected alternatives could begin in 2005 or 2006. The preliminary objective for caspian tern population in the estuary would be a reduction to 2,500 to 4,500 pairs from the current level of 8,000 to 9,000 pairs. If achieved, this reduction could provide for an estimated 3 to 4 million reduction in total salmonid juveniles consumed. Based on 2003 data, the sub-yearling component could be a reduction of 350,000 to 500,000 consumed. The future benefits for summer migrants resulting from yet to be determined cormorant management actions cannot be estimated at this time.

Estimated Cost, Duration, and Proposed Funding Source

The estimated cost for the additional research in 2004 is \$300,000. Funding may come from BPA or the Corps.

Process for Implementation and Schedule

The research would be initiated in the spring of 2004, under contracts with the Corps of Engineers or BPA.

Lead Entity

The Army Corps of Engineers.

Offset Action 5 – Pile Dike Removal

Description of Proposed Action

This action would entail removal of some existing Corps of Engineer constructed pile dikes in the lower Columbia River. Pile dikes slated for removal were identified based on an evaluation from a previous Corps study, which evaluated their function with respect to their original purpose. Their removal could benefit migrating salmonids. Pile dikes provide perches and enhanced foraging opportunities for double-crested cormorants and result in establishment of backwater predator habitat.

a. Location

For offset purposes, pile dikes between river miles 52 and 136 would be removed. It is assumed that cormorant use of pile dike fields below river mile 52 are already addressed in the existing 40-foot channel BiOp. Habitat improvement associated with removal of specific pile dikes in that reach may be creditable under RPA action 160 of the NOAA Fisheries FCRPS 2000 BiOp.

b. Affected Species

Sub-yearling salmon stocks.

c. Statement of Feasibility and Certainty of Implementation

Removal of unnecessary pile dikes is a feasible action. However, accomplishment of their removal soon enough to benefit 2004 summer outmigrants may be difficult.

d. Coordination Needs and Additional Requirements

Funding would be needed in January to complete an Environmental Assessment and contract for the removal action. A waiver from in-water work timing restrictions would be necessary.

Estimated Survival or Productivity Increase

The action would reduce opportunities for cormorant perching and associated foraging for juvenile salmonids, reduce fish predator habitat, restore natural flow velocities, and potentially improve benthic invertebrate/fisheries habitat conditions in the immediate location of the removed pile dikes. A quantitative benefit in terms of reduced predation on migrating salmonids and habitat improvements cannot be readily derived.

Estimated Cost, Duration, and Proposed Funding Source

The estimated length of pile dikes in this reach of the lower Columbia is about 45,000 linear feet, constructed with approximately 18,000 pilings. The estimated cost to remove all of the pilings (at an estimated \$69/piling) would be about \$1.4M. This project could be funded by BPA.

Process for Implementation and Schedule

Preparation of an Environmental Assessment (EA) and to prepare and award a contract is optimistically estimated to require 90 days. Before July 2004 (the assumed summer spill season), it may be possible to remove 4,500 pilings.

Lead Entity

The Army Corps of Engineers.

Offset Action 6 – Anti-Stranding Flow Fluctuation Limits in the Hanford Reach

Description of Proposed Action

The Action is intended to protect Hanford Reach fall chinook juveniles as they rear and pass out of the Hanford Reach in the spring. The action limits flow fluctuations from Priest Rapids.

a. Location

Mid-Columbia River.

b. Affected Species

Hanford Reach fall chinook.

c. Statement of Feasibility and Certainty of Implementation

Relevant parties have not signed the Hanford Reach Fall Chinook Protection Program that Grant PUD has proposed of which this action is a part. Grant PUD has stated that if the Mid-Columbia operators and WDFW do not sign the agreement for the program, there is no guarantee of an operation to protect the Hanford Reach fall chinook during the rearing period.

d. Coordination Needs and Additional Requirements

Grant, Douglas, and Chelan Public Utility Departments (PUDs), BPA, WDFW, NOAA Fisheries, and the Colville Tribe are very close to reaching an agreement on the terms of the Hanford Reach Fall Chinook Protection Program. When the agreement is reached, Grant and BPA will sign a separate agreement to cover delivery of energy to mitigate losses at Grant PUD projects.

Estimated Survival or Productivity Increase

In preparation for Grant PUD's Priest Rapids FERC relicensing application, Battelle-Pacific Northwest Division produced a study of Hanford Reach fall chinook spawning and rearing (McMichael et al, 2003). That study describes a methodology for estimating mortality of rearing fry based on counts of stranded fish for 1999 to 2003 provided by WDFW. Grant PUD limited flow fluctuations, following predetermined criteria to protect fry from stranding, in all of those years.

The year 1998 was the only year for which WDFW counts of stranded fish were available and no flow fluctuation limits were in place at Priest Rapids. Using that data, BPA applied the Battelle methodology to estimate rearing fry mortality to establish a baseline for the operation without fluctuation limits. The result was an estimate that 20 percent of the rearing fry may have died as a result of unlimited flow fluctuations at Priest Rapids.

The Battelle estimates of fry mortality from stranding for the years 1999, 2000, 2002, and 2003 were averaged (0.45 percent) so that it could be used to make estimates for future years' operations when the flow fluctuation limits are in effect. The mortality estimate for 2001 was not included in the average. 2001 flows have an extremely low probability of recurrence (less

than 5 percent) and would have skewed the average significantly if equally weighted with the other years.

The difference in pre- and post-flow fluctuation limit stranding mortality rates (20.23 vs. 0.45) was then used in the determination of additional adults returning to the Hanford Reach as a result of limited flow fluctuation operation of Priest Rapids. A 20% reduction in mortality of rearing fry translates directly to a 20% increase in the number of adults expected to return.

Key assumptions in the procedure used by Battelle (McMichael et al, 2003) are:

Percent of adults that are females: 58.7 (average of 1999-2003)
Number of eggs per female: 4,500
Percent of egg to fry survival rate: 63.2
Percent of fry mortality due to stranding: 0.45 (average of 1999, 2000, 2002, 2003)
Percent of fry to smolt survival rate: 75.0
Percent of smolt to adult return rate: 0.52

Results using these assumptions and an average return of 44,000 adults are:

total adults previous fall	44,000
total females	25,837
total eggs	116,265,600
rearing fry	73,479,859
fry stranding mortality	331,910
smolts	54,860,962
expected adult return	285,277
adult savings from limits	56,428

Estimated Cost, Duration, and Proposed Funding Source

BPA will deliver Grant PUD amounts of energy to mitigate losses at Grant projects while Grant PUD limits flow fluctuations to protect juvenile fish. The losses at Grant projects are the incremental head losses attributable to the operation of the federal projects upstream. BPA has estimated the cost of the energy to be delivered to Grant to be an annual average of approximately \$100,000.

Process for Implementation and Schedule

The program must be signed before the fall chinook rearing period begins (about May 1) if any offset credit is to be accounted in 2004.

Lead Entity

Bonneville Power Administration.

APPENDIX

DRAFT

Potential Offsets to Summer Spill Reduction

Discussion

The Northwest Power and Conservation Council's Mainstem Amendment of 2003 calls for an evaluation of summer spill. Based on analyses of research performed in conjunction with the FCRPS 2000 Biological Opinion, spill generally provides the highest passage survival at most mainstem hydro facilities. Therefore, any reduction in spill is presumed to result in some level of reduced survival to listed Snake River fall chinook and other stocks migrating through the lower Columbia at the time spill is ceased or reduced. Many believe the resulting increase in juvenile mortality can be compensated through "offsets" designed to enhance survival in one or more life stage. Thus, whatever survival was associated with the spill can potentially be offset through implementation of additional non-spill measures.

Offset Principles:

1. Offset measures should be designed to provide equal or greater survival, as measured or estimated, than provided by current BiOp spill requirements.
2. Offset measures should be temporally consistent, i.e., as a priority they should provide survival benefits to juveniles or adults of the affected brood years.
3. Offset measures should capture the diversity of the affected stocks, i.e., provide survival benefits to the portion of the outmigration suffering the loss.
4. Offset measures should address anticipated losses to each of the affected stocks, whether listed or not.
5. Offset measures for fall chinook should be over and above those currently contemplated by the BiOp for implementation and whose survival benefits are included in the analysis of jeopardy, now or in the future.
6. Offset measures must be implementable or committed to in writing in the year spill is reduced including provisions for NEPA, Consultation, etc.
7. Offset measures should be funded or implemented over an above the current fish and wildlife spending caps or programs.

Potential Offsets – The following have been mentioned as potential offset measures.

1. Increases in predator control measures
 - a. Pikeminnow Program
 - b. Terns
 - c. Cormorants
 - d. Walleye
 - e. Smallmouth Bass
 - f. Marine mammals
2. Changes in operation (e.g., flow augmentation) or system configuration (e.g., RSWs)
3. Commercial harvest reductions
4. Increased law enforcement
5. Habitat improvement

6. Supplementation

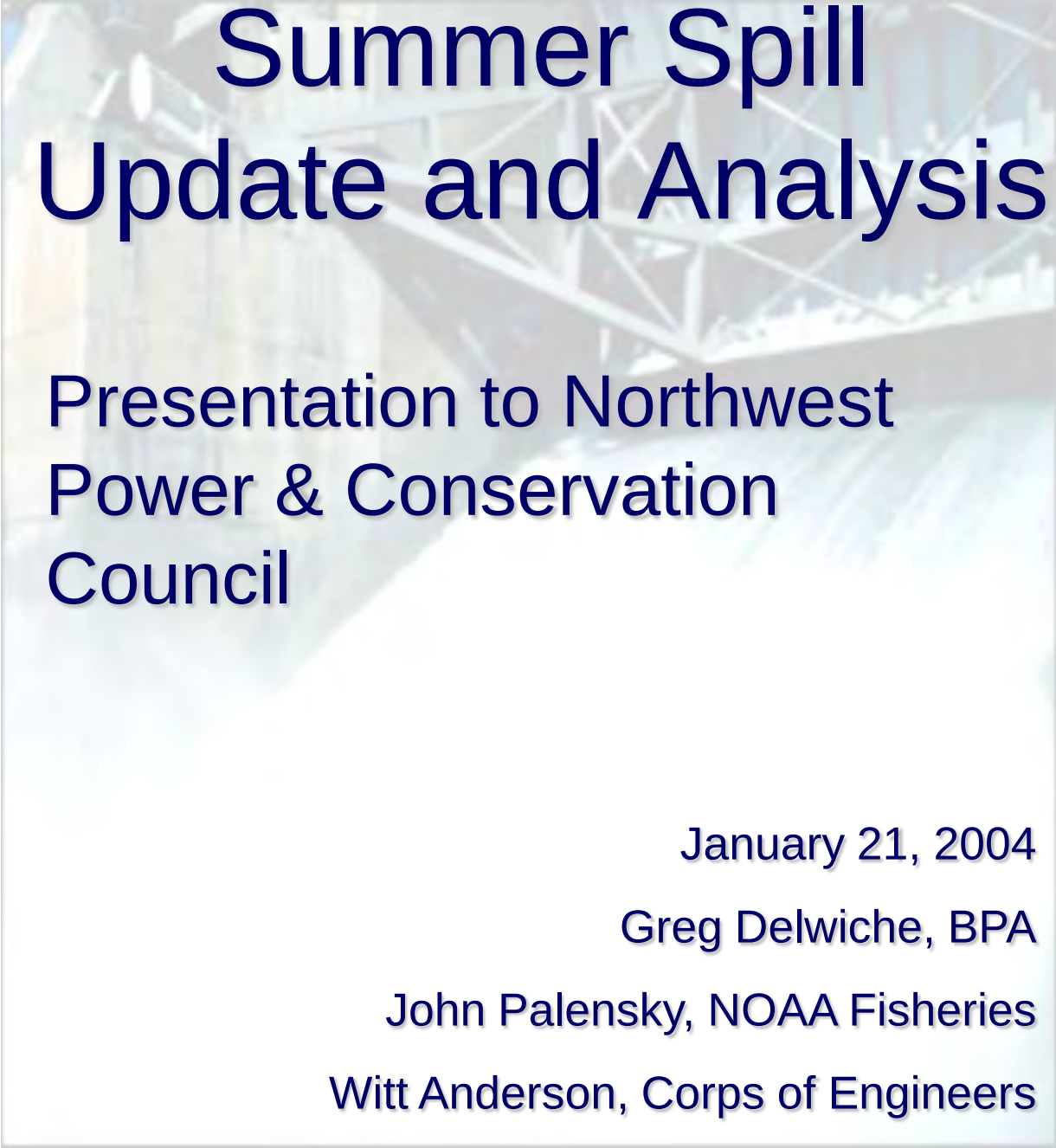
Potentially Impacted Stocks

Deschutes River fall chinook*	Mid-Columbia fall chinook
Klickitat River fall chinook	Umatilla River fall chinook
Yakima River fall chinook	Marion Drain fall chinook
Mid-Columbia summer chinook*	Hanford Reach fall chinook*
Priest Rapids Hatchery fall chinook	Snake River fall chinook**
Upper Columbia steelhead adults	Snake River steelhead adults
Ringold Springs Hatchery fall chinook	Upper Columbia steelhead adults***

* Denotes an indicator stock for U.S.-Canada PST Chinook management

** Listed as threatened under ESA

*** Listed as endangered under ESA



Summer Spill Update and Analysis

Presentation to Northwest
Power & Conservation
Council

January 21, 2004

Greg Delwiche, BPA

John Palensky, NOAA Fisheries

Witt Anderson, Corps of Engineers

Introduction

- **Analysis of Biological and Revenue Impacts**
- **Alternative Mitigation Actions or Offsets**
- **Way Forward**

Alternatives Evaluated

1. Full BiOp Spill July and August
2. BiOp Spill July and August / No Spill at IHR
3. BiOp Spill July - August 15 / No Spill at IHR
4. BiOp Spill in July / No Spill in August
5. BiOp Spill in July Except Test 50 kcfs v. BiOp at BON / No Spill in August / No Spill at IHR
6. BiOp Spill in July Except Test 0 kcfs v. BiOp at BON / No Spill in August / No Spill at IHR No Spill July-Aug
7. No Spill in July or August

Approach to Biological Analysis

- Starting populations or fish numbers for each stock
- Passage timing or distribution of migration in July and August
- SIMPAS model to analyze survival rates under each scenario

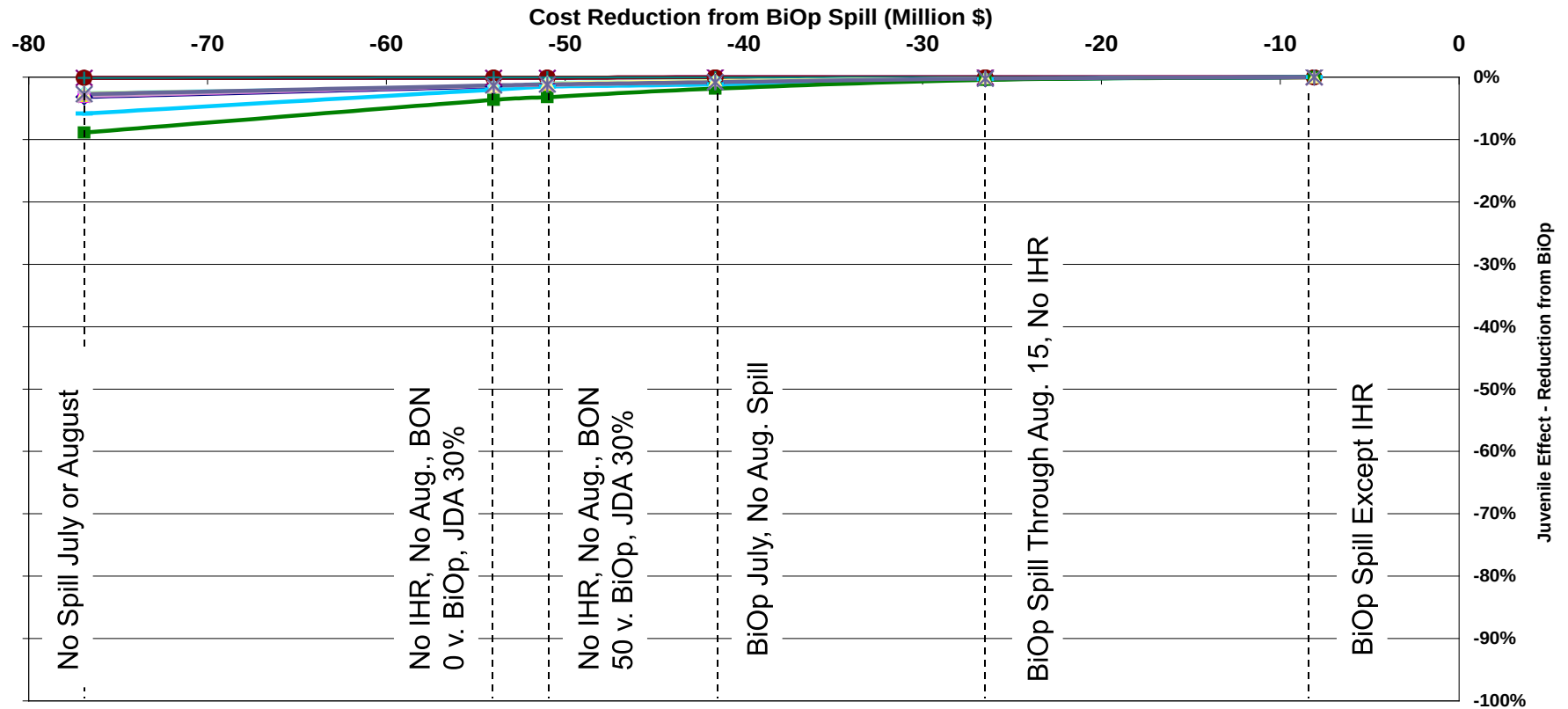
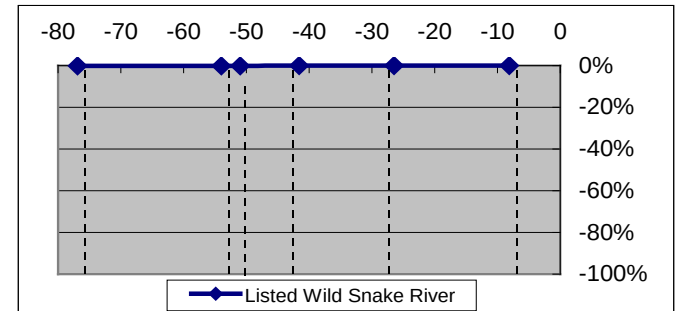
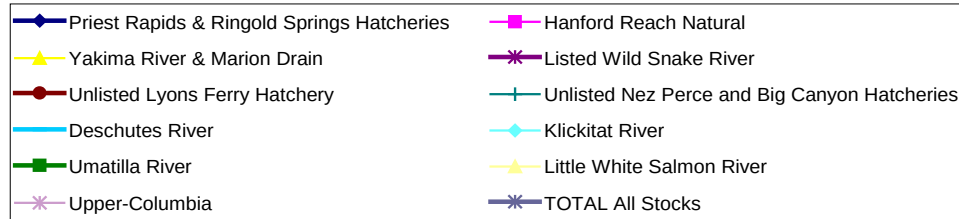
Adult Impacts

Affected Stock	Number of Juveniles Migrating	Percent Migrating in July and August	Number Migrating in July and August	Adult Conversions Based on a 2% SAR (Converted from Juveniles Surviving to below BON in July and August)						
				Variations of Option 2						
				No Spill July-Aug	No IHR, No Aug, BON 0 v. BiOp, JDA 30% (Option B)	No IHR, No Aug, BON 50 v. BiOp, JDA 30% (Option C)	BiOp Spill in July, No August Spill	BiOp Spill thru Aug 15, No IHR Spill	BiOp Spill Except IHR	BiOp Spill Jul-Aug
FALL CHINOOK										
Upriver Bright										
Priest Rapids & Ringold Springs Hatcheries	10,200,000	66%	6,763,000	79,600	81,800	82,000	82,600	83,600	83,800	83,800
Hanford Reach Natural	25,000,000	66%	16,575,000	195,200	200,600	201,000	202,400	204,600	205,600	205,600
Yakima River & Marion Drain	1,020,000	46%	468,000	5,600	5,600	5,600	5,800	5,800	5,800	5,800
Snake River Bright										
Listed Wild Snake River	1,052,000	90%	944,000	2,396	2,408	2,408	2,414	2,416	2,418	2,420
Unlisted Lyons Ferry Hatchery	3,300,000	90%	2,963,000	7,600	7,600	7,600	7,600	7,600	7,600	7,600
Unlisted Nez Perce and Big Canyon Hatcheries	2,050,000	90%	1,841,000	4,600	4,600	4,600	4,800	4,800	4,800	4,800
Mid-Columbia Bright										
Deschutes River	1,474,000	41%	599,000	7,600	8,200	8,200	8,200	8,400	8,400	8,400
Klickitat River	4,000,000	41%	1,626,000	26,400	26,600	26,800	27,000	27,000	27,200	27,200
Umatilla River	1,080,000	41%	439,000	3,400	3,800	3,800	4,000	4,200	4,200	4,200
Little White Salmon River	2,000,000	41%	813,000	13,200	13,400	13,400	13,400	13,600	13,600	13,600
SUMMER CHINOOK										
Upper-Columbia	2,574,000	66%	1,706,000	20,000	20,600	20,600	20,800	21,000	21,200	21,200
TOTAL	53,750,000	65%	34,737,000	365,400	375,400	376,200	378,800	382,800	384,400	384,400
Difference from BiOp spill				(19,000)	(9,000)	(8,000)	(6,000)	(2,000)	-	-
Cost savings from BiOp (in millions)				\$77	\$54	\$51	\$42	\$26	\$8	\$0
Cost savings range (in millions)				\$55 - \$92	\$32 - \$64	\$30 - \$61	\$25 - \$50	\$15 - \$32	\$5 - \$11	\$0

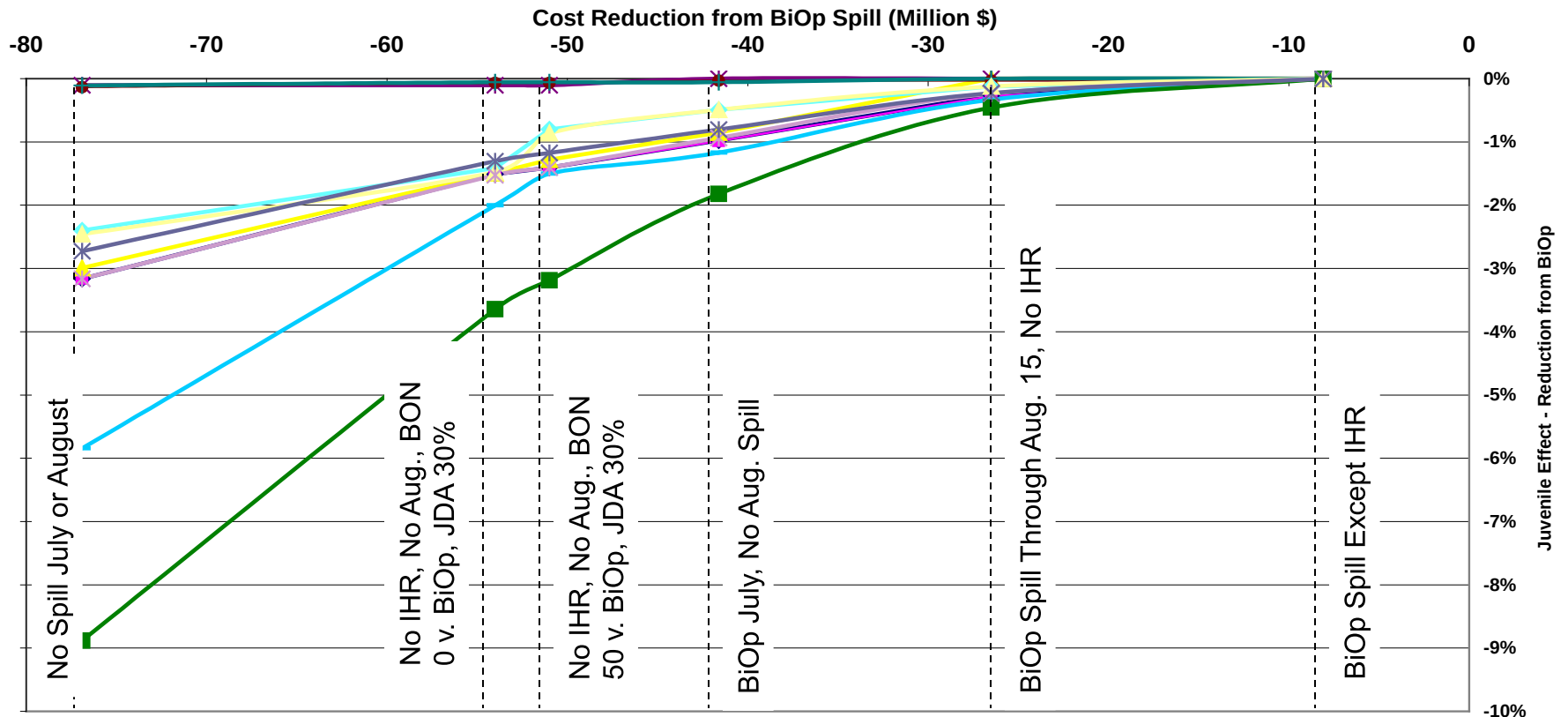
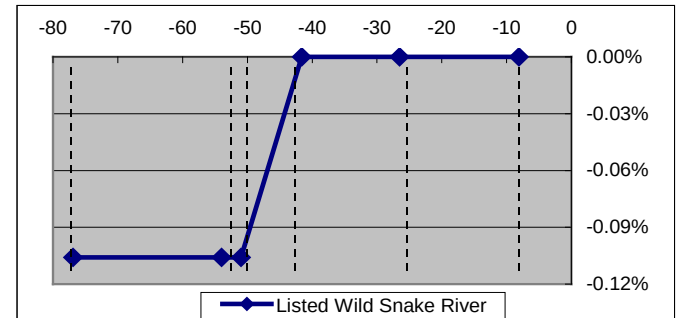
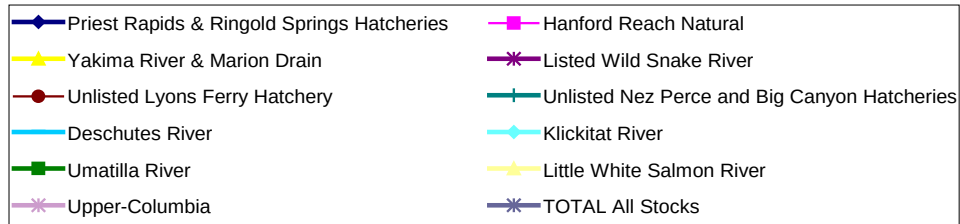
Option B	July 1-20	July 21-31	August 1-31
Bonneville	0kcfs vs BiOp		no spill
The Dalles	40% 24-hr		no spill
John Day	30% 24-hr	30% 12-hr	no spill
Ice Harbor	no spill	no spill	no spill

Option C	July 1-20	July 21-31	August 1-31
Bonneville	BiOp vs 50kcfs		no spill
The Dalles	40% 24-hr		no spill
John Day	30% 24-hr	30% 12-hr	no spill
Ice Harbor	no spill	no spill	no spill

Percent Juvenile Survival Change of Summer Spill Reduction Alternatives (Scaled to 100%)



Percent Juvenile Survival Change of Summer Spill Reduction Alternatives (Reduced Scale)



Revenue Impacts of Summer Spill Alternatives

Spill Option	Savings Compared to BiOp in Millions (50-Year Average)	Savings Range Compared to BiOp in Millions (Low - High)
Full BiOp Spill Jul-Aug	\$0	
BiOp Spill Except IHR	\$8	\$5 - \$11
BiOp Spill thru Aug 15, No IHR Spill	\$26	\$15 - \$32
BiOp Spill in July, No August Spill	\$42	\$25 - \$50
No IHR, No Aug, BON 50 v. BiOp	\$51	\$30 - \$61
No IHR, No Aug, BON 0 v. BiOp	\$54	\$32 - \$64
No Spill July-Aug	\$77	\$55 - \$92

Offsets

Summary of Potential Biological Offsets for Summer Spill Reduction

Action	Affected Species or Life Stage	Benefit	Cost	Timeline (critical path)
Northern Pikeminnow Management – increase annual exploitation rate of northern pikeminnow by ~1-2% to further reduce predation losses (i.e., modify sport-reward structure to increase catch).	Primarily fall chinook outmigrating during summer proportional to individual stock abundance; also benefits spring migrants	200,000-400,000 smolts during first year (1,000-16,000 adults), equilibrating at 1.4 - 2.8 million annually in approximately year 8 (7,000-56,000 adults)	\$0.5-\$1 million annually	Implement with annual NPMP contract modification effective April, 2004
Smallmouth Bass Management – site specific removal of bass at known “problem” locations to achieve within year survival improvement (e.g., TDA tailrace, JDA forebay, LGR reservoir)	Primarily fall chinook outmigrating during summer; also benefits spring migrants	a) 20 adults (retain current catch); additional 30 adults with additional Agency electrofishing. b) 5 SR adults (retain current catch); additional 15 SR adults with additional Agency electrofishing c) 50 adults/derby	a) \$10,000 annually b) \$8,000 annually c) \$30,000/derby	a) and b) Implement with annual NPMP contract modification effective April, 2004 (bass removal during NPMP evaluation) c) Implement in coordination w/ States and contracted “derby coordinator”
Pile Dike Removal – Remove unneeded pile dikes used by avian and piscene predators	All juveniles migrating through the lower Columbia River	Action would reduce opportunities for cormorant perching and associated foraging for juvenile salmonids	Scalable at \$69 per piling. With approximately 18,000 pilings it would cost about \$1.4 million	90 days for preparation of an EA and contract award. Could remove 4500 pilings before July 2004

Offsets Continued

Action	Affected Species or Life Stage	Benefit	Cost	Timeline (critical path)
Commercial Harvest Reductions – purchase easements on portions of allowable harvest in selected fisheries	Adult fall chinook; benefit to individual stocks proportional to their abundance and distribution in fisheries.	Scalable. E.g., if modifications to fisheries are designed to limit the impact to no more than 5% of the total catch, then the benefit to Columbia River fall chinook escapement would range between approximately 1,000 and 6,000 adults.	Approximate estimated economic value (market value * 2x multiplier) of \$125,000 to \$275,000	Implementation in 2005, 2006, or 2007 would provide in-kind survival benefit relative to impact of spill reduction.
Hanford Reach Rearing Protection – limit flow fluctuations to protect juveniles against stranding (i.e., deliver energy to Grant PUD to mitigate head losses attributable to operation of federal projects upstream).	Hanford Reach fall chinook	30 million fry in 2004, which equates to greater than 50,000 more returning adults.	\$100,000 annual average	Incorporate into operations planning effective Spring, 2004 (beginning in approximately May)
Avian Predation Research – Continue research to support EIS needed to evaluate alternatives actions to address tern and cormorant predation	Sub-yearling salmon stocks	No direct benefit to out-migration. Implementation of selected alternatives could begin in '05 or '06. Ultimate reduction in loss of 350k to 500k sub-yearlings	\$300,000 in 2004	Research initiated in spring of 2004.
Habitat Improvements – targeted riparian habitat protection and water transactions to benefit fall chinook	All species/stocks. Site-specific offsets would emphasize benefit to fall chinook	Qualitative at this time. Improvements to terrestrial and aquatic environments would have long-term to permanent benefit to resident and anadromous species as well as general ecosystem health.	Estimate \$1.5 to \$4 million annually for increased riparian protection, may be phased and occur in increments. -Estimate \$500,000 in short term to \$6 million in additional annual funding could be used to increase number and term of water transactions.	Implementation of increased riparian habitat protection in 2005, 2006, 2007 in coordination with entities involved with riparian protection. Potential to also protect riparian land through long term or permanent easements. -Augmented water transactions may be possible by increasing number and length of transactions of the Columbia Basin Water Transactions Program, beginning in 2004.

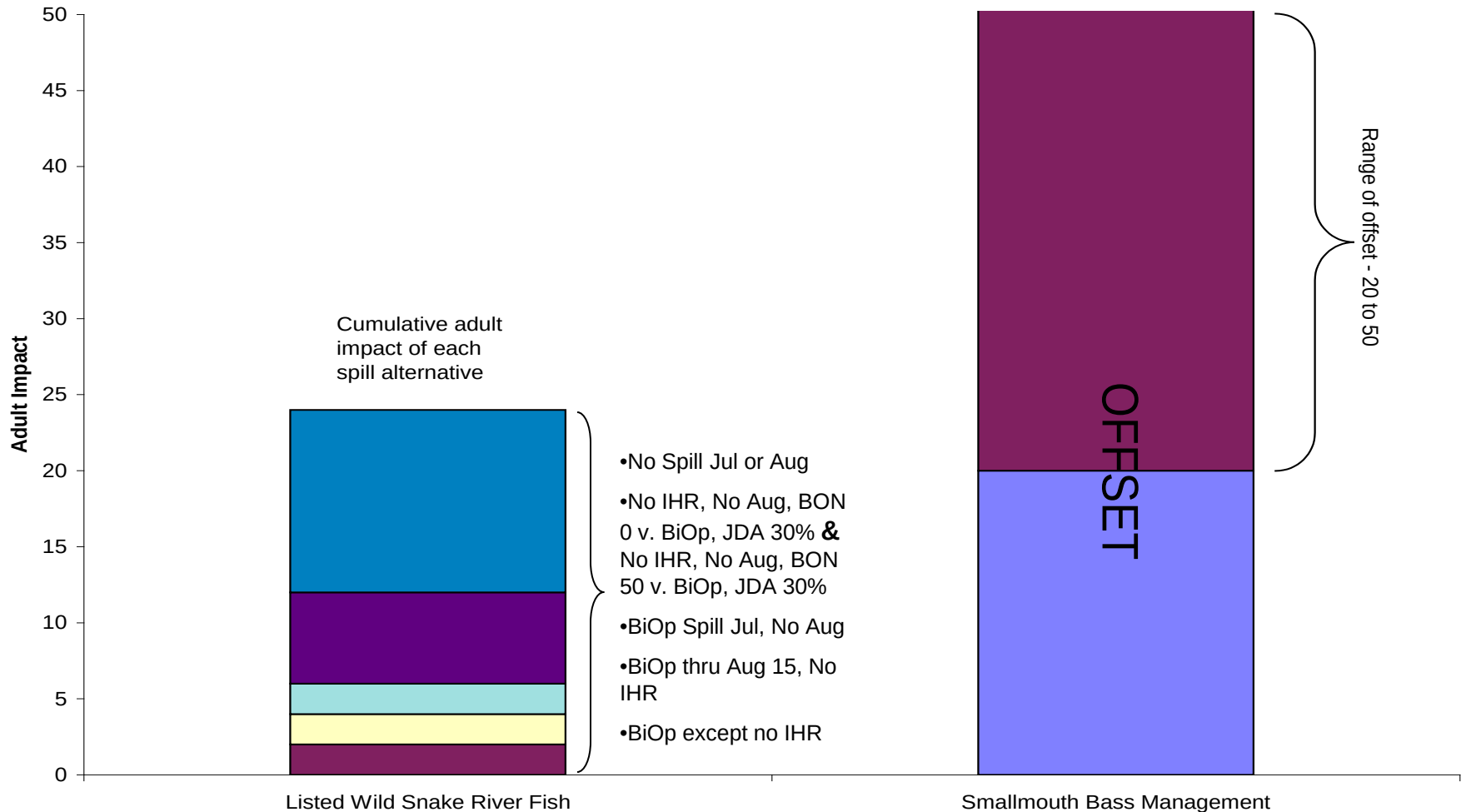
Offsets

Other Offsets Discussed/Considered:

- Marine mammal management
- Walleye management
- Increased law enforcement
- Habitat improvements, including estuary
- Hatchery supplementation
- Raised spillway weirs
- Dam removal
- Reservoir drawdowns
- Reintroduction of fall Chinook above Hell's Canyon
- Additional O&M funding
- Manage turbine operations to maximize passage survival

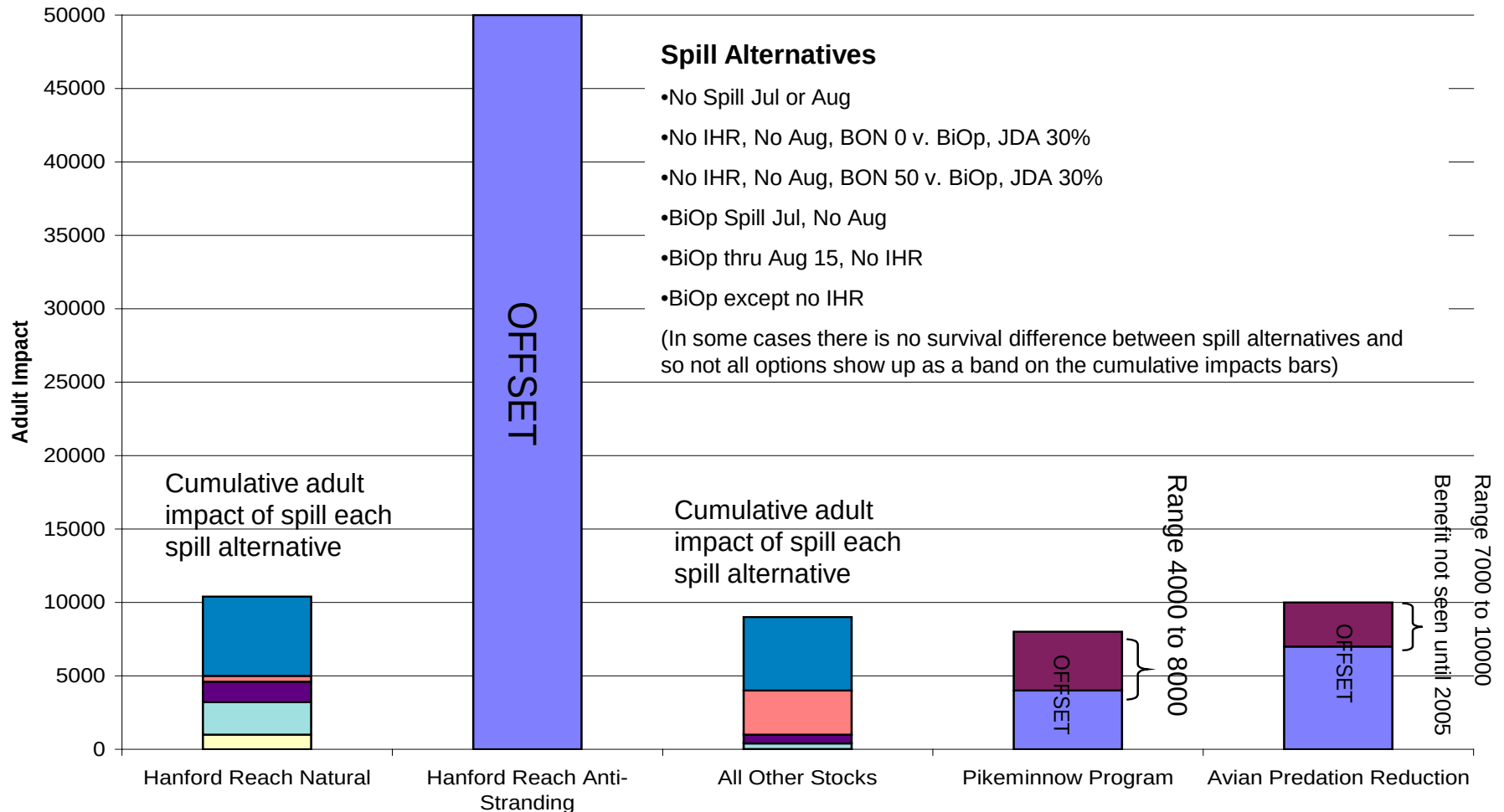
Impacts to Listed Snake River Fall Chinook & Effect of Offset

Adult Impacts & Offsets of Spill Alternatives



Impacts to Hanford Reach and Other Stocks & Effect of Offsets

Adult Impacts & Offsets of Spill Alternatives



Way Forward

- Distributing analysis to the Regional Forum teams for technical review and input by February 13
- Need to engage 3 sovereigns and provide opportunity for non-sovereign input
- Decision by March

TECHNICAL MANAGEMENT TEAM

BOR: Tony Norris / John Roache

BPA: Scott Bettin / John Wellschlager

NMFS: Paul Wagner / Chris Ross

USFWS: David Wills / Howard Schaller

OR: Ron Boyce

WA: Cindy LeFleur

ID: Russ Kiefer

MT: Jim Litchfield

COE: Cindy Henriksen / Rudd Turner / Cathy Hlebechuk

TMT MEETING

18 February 2004 0900-1200 hours

**Custom House Room 118
Portland, Oregon
Conference call line: 503-808-5190**

*All members are encouraged to call Donna Silverberg with any issues or concerns they would like to see addressed.
Please e-mail her at dsilverberg@cnnm.net or call her at (503) 248-4703.*

AGENDA

1. Welcome and introductions.
2. Bonneville Adult Ladder Attraction Spill December through March
[\[Few Steelhead at Bonneville.doc\]](#)
3. Salmon Managers Update of Adult Fish Counts in the Lower Snake River: Criteria for decisions
[\[Few Steelhead Criterion.doc\]](#)
4. Spring Creek Update - USFWS
5. Spring/Summer Update
6. Operations Update - ALL
 - a. QADJ Output
[\[Summary of February 2004 QADJ Model Runs\]](#)
7. Other
 - Cindy here is your Link
[\[Natural Resource Management Section Adult Fish Counts\]](#)
 - Set agenda for next meeting

Questions about the meeting may be referred to Cindy Henriksen at (503) 808-3945, or Rudd Turner at (503) 808-3935, or Cathy Hlebechuk at (503) 808-3942

FPAC proposed criterion for defining when attraction spill for the two adult ladders below the spillway at Bonneville Dam is required during the winter.

1. The number of adults migrating per day is defined as the number of upstream counts minus the number of downstream counts.
2. A three-day moving average will be used to determine if the few migrating wild adult steelhead criterion has been met.
3. The few migrating wild adult steelhead criterion is defined as less than 10 returning wild adult steelhead passing Bonneville Dam per day, during the three-day average period.
4. If a running three-day average of 10 or more returning wild adult steelhead are passing Bonneville Dam, then attraction spill will be provided for the next three day period.

FPAC proposed criterion for defining when Snake River adult steelhead are migrating in few numbers through the lower Snake River during the winter.

1. The number of adults migrating per day is defined as the number of upstream counts minus the number of downstream counts.
2. A three-day moving average will be used to determine if the few migrating adult criterion has been met.
3. “Wild” and “total” returns will be calculated separately. Only one of the categories is necessary to show that more than a few adults are migrating.
4. The run to date is defined as the cumulative number of adult steelhead in the “wild” and “total” categories passing Lower Granite Dam since June 1st of the return year.

The few migrating adult criterion trigger will be defined on a sliding scale outlined in the following table. The table applies to both “wild” and “total” categories of returning adult steelhead.

Run to date > #	Run to date ≤ #	Few criteria < #
0	30,000	10
30,000	60,000	20
60,000	100,000	35
100,000	150,000	50
150,000	200,000	65
200,000	250,000	80
250,000		100

**TECHNICAL MANAGEMENT TEAM
MEETING NOTES
February 18, 2004
COE RESERVOIR CONTROL CENTER - CUSTOMS HOUSE
PORTLAND, OREGON**

FACILITATOR'S SUMMARY NOTES ON FUTURE ACTIONS

Facilitator: Donna Silverberg

The following notes are a summary of issues that are intended to point out future actions or issues that may need further discussion at upcoming meetings. These notes are not intended to be the "record" of the meeting, only a reminder for TMT members.

Bonneville Adult Ladder Attraction Spill:

Currently, there is a March 1 start date operation for beginning spill for adult fish attraction at Bonneville. FPAC discussed and developed a set of criterion that could be used in addition to the March 1 start date target, over the next few weeks. Dave Wills, USFWS, presented the criterion:

- Using a three day average, if less than 10 adult wild steelhead are observed passing Bonneville, do not spill.
- If 10 or more fish are observed, spill for three days, then reevaluate.

The 'threshold' number of ten fish was a compromise amongst the salmon managers based on historical data of fish passing the dam during this time period. BPA commented that this number seems very conservative. The salmon managers reported that the stock status review shows these fish are at a very high risk of extinction. FPOM is also looking at the issue and working to develop a longer term plan to put into the Fish Passage Plan. The salmon managers brought their proposal to TMT in the context of 2004. Handouts with data on steelhead numbers was provided, and can also be viewed on the TMT web page.

ACTION: *TMT members agreed to the following criteria from now until March 1st: If the numbers of wild adult steelhead rise appreciably over a three day period, TMT will revisit the issue and potentially start spill earlier than March 1st. (Note: Dave Statler, Nez Perce, raised a concern that the fish counts are not always immediately available. Therefore, how effective can the agreed-to process be?) There may be a follow-up discussion of this at the next TMT meeting.*

Salmon Managers Update of Adult Fish Counts in the Lower Snake:

The salmon managers discussed the criteria, relative to actively migrating adults, for stopping zero night time flow in the Lower Snake. They focused on the 'few, if any' language and developed the following criteria:

- Using a three day moving average, wild and total adult steelhead passing Lower Granite calculated separately. Using a sliding scale, "few" was calculated based on the run to date. (A more detailed description of the criteria was provided in a handout and can be found on the TMT web page.)

The Nez Perce did not object to the sliding scale proposal, but prefer a fixed criterion of less than 10 adults. Russ Kiefer, Idaho, said that the salmon managers' goal was to avoid a mid-season debate by defining the criteria before the season. He also noted that the criteria were based on a compromise amongst the salmon managers. The next step discussion will be what the impacts of zero nighttime flow are on these fish.

After further discussion and a caucus, the COE offered their interpretation of the language, because there are few if any fish in the river, zero nighttime flows are acceptable during this time period. Cindy Henriksen expressed appreciation for the work the salmon managers put into this, including the quick turnaround on a 'big question'. Given the uncertainties about impacts, the COE would like to continue the current operation of zero nighttime flow through the end of February. BPA agreed that there needs to be further exploration of the impacts, and at this time was not ready to move forward with the salmon managers' proposed criteria.

ACTION: The salmon managers proposed criteria will not be used at this time; operations will continue with zero nighttime flow. FPAC will revisit this issue at their next meeting and discuss what the next steps should be. TMT members agreed that additional study of the impacts of zero nighttime flow on adults is needed. There may be a follow-up discussion of this at the next TMT meeting.

Spring Creek Update:

Dave Wills reported that there was a meeting scheduled for later today (2/18); at this time the action agencies and USFWS are still in negotiations on how to approach the evaluation for Spring Creek hatchery releases. The release could occur as soon as March 4th. Dave will continue to update the TMT on this issue.

Spring/Summer Update:

A rough draft spring/summer update of the WMP will be available at the next TMT meeting. In the meantime, TMT members should look at the final from last year, dated May 7, 2003 – the document is available on the TMT web page. Any comments provided over the next week will be included in the first draft for '04. Scott Boyd, COE, will send the document in Word Perfect to anyone who requests it.

Operations Update:

The February final water supply forecast is out: Grand Coulee is at 59.8 MAF (95% normal); the Lower Granite Jan-July is 20.8 (97%); The Dalles April-Aug is 88.2 (95%). All forecasts are slightly down from the January final. Cindy Henriksen provided a handout of the QAdjust, which can also be found on the TMT web page. The handout included assumptions for 2004 operations, results of flow objectives, and period average flows (this was provided as requested by a TMT member).

Hungry Horse is at elevation 3516' and drafting to meet Columbia Falls. Grand Coulee is at 1263'. The BOR's February final forecast for Grand Coulee April-Aug is 2146 kaf (104% normal). The Libby final is 5.6 MAF (90% normal). VARQ is at elevation 2435'. The Dworshak final is 2.6 MAF (98% normal). Some flexibility is being used at Dworshak with the shifted flood control elevation, in order to avoid spill in March. Idaho supported steady, gradual shaping throughout the week, which is how the COE is

currently operating. Nez Perce and CRITFC support a high Dworshak elevation through April 30 to support Lower Granite flow augmentation.

Next Meeting, March 3, 9am-noon:

Agenda items:

- CRITFC 2004 River Operations Plan
- Spring/summer Update
- Spring Creek Update
- Continue Criteria Discussion(s) from today?

1. Greeting and Introductions

The February 18 Technical Management Team meeting was chaired by Cindy Henriksen of the Corps, and facilitated by Donna Silverberg. The following is a distillation, not a verbatim transcript, of items discussed at the meeting and actions taken. Anyone with questions or comments about these minutes should call Henriksen at 503/808-3945.

2. Bonneville Adult Ladder Attraction Spill December Through March.

David Wills said FPAC discussed this issue at some length at its meeting yesterday; there were various opinions about how much, if any, attraction spill is needed at the Bonneville adult ladders. We did develop a proposed criterion for defining when attraction spill might be most useful, he said; you look at a moving three-day average, and if the running three-day wild steelhead count hits 10 or greater, then spill would be initiated, and evaluated for three days. The concern is that we didn't want to have a stoplog there if we saw large numbers of steelhead moving at an unexpected time of year, Wills said.

What kind of data exists about the influence of attraction spill on wild steelhead? John Wellschlager asked. I'm not sure what data exists, Wills replied, but it has customarily been provided when the fish begin to move. Basically, we don't want to wait too long to optimize passage conditions once the steelhead start to move, added Chris Ross. It sounds as though there is no way to quantify that, however, said Wellschlager. That's correct, said Ross – it's best professional judgement. Ross added that the ladders themselves are very efficient; once the fish are guided into the ladders, they pass the project very efficiently. In response to a question from Henriksen, Ross said there are studies, at Bonneville and other projects, that show that attraction spill is effective in helping adult migrants find ladder entrances.

The Fish Passage Plan specifically states that attraction spill will be provided from March 1 through December 1? Wellschlager asked. Yes, but the FPP was a part of the BiOp consultation, Ross replied. Wellschlager said that, while he understands the need for attraction spill, 10 fish per day seems like a very low threshold. Not as low as some FPAC members wanted to see, Wills replied – it was a compromise. Bear in mind that we're talking about 10 wild listed steelhead, which is one of the species we're trying hardest to protect, given the risk of extinction for this stock shown in the stock status

review, said Ross – numbers are low, and they tend to increase rapidly once passage begins. We wanted to be sure we had good passage conditions once passage begins in earnest, he said.

Is FPAC's criteria proposal for this year only? Henriksen asked. We didn't discuss that specifically, Wills replied; I guess I would say let's look at it this year, and see what happens with the BiOp remand. But isn't there a parallel process looking at this issue through FPOM? Henriksen asked. Yes, that's correct, Ross replied – our recommendation is to re-initiate attraction spill for 2004 only, while the FPOM subcommittee looks at the issue longer-term.

Russ Kiefer reiterated that wild winter steelhead are a critically depressed population, and said that, in IDFG's view, it is important to provide whatever protection the salmon managers deem appropriate for this species. Ross noted that the FPP doesn't mandate or prohibit spill during the December 1-March 1 period; he noted that these criteria might be applied in addition to the guidance in the FPP, if a surge in wild steelhead passage is seen during that period. We agree that once the steelhead start moving, we want to keep them moving, said Henriksen; in years past, however, we've seen them starting to move around March 1. It seems to us that the March 1 date is reasonable; however, if we do see a large upsurge in steelhead movement, we're certainly willing to engage in conversation about re-initiating attraction spill at Bonneville, Henriksen said. And that was the intent of this criterion, said Wills. That's reasonable, said Wellschlager; however, from my perspective, I'm not sure the criterion you propose – 10 fish per day for three days – is. That's why we propose three consecutive days of 10 or more fish, Ross replied. Henriksen noted that the most recent adult steelhead counts at Bonneville are now linked to the TMT homepage.

Turner noted that the last three days of counting (ending on February 12) showed five, five and zero wild adult steelhead moving past Bonneville. Henriksen said that, in her opinion, the three-day, 10-fish-per-day criteria are somewhat awkward, because the counts often hover around the 10-fish-per-day level at this time of year. Wellschlager suggested that something farther outside the norm, in terms of passage numbers, might be more appropriate.

The discussion continued in this vein for some minutes. Henriksen reiterated that the Corps would like to see a steady rise in wild steelhead passage over two, three or four consecutive days before re-initiating attraction spill. Ross noted that there is always a delay in the counts, because the video is not being reviewed daily. Basically, the intent of these criteria is that we don't want to wait too long to provide spill once fish start moving upstream, Ross said. Ultimately, Henriksen said the Corps will resume attraction spill at the Bonneville adult ladders on March 1, unless wild steelhead counts increase appreciably for at least three consecutive days. Everyone will be watching the numbers, said Henriksen; if a surge in wild steelhead passage numbers is seen, then we'll certainly discuss that at TMT. Dave Statler observed that, without up-to-date information, such a discussion will lack meaning. I can't answer that, Henriksen replied; WDFW is doing the counting, and they're the ones who are controlling the timing of that information.

3. Salmon Managers Update on Adult Fish Counts In the Lower Snake River: Criteria for Decisions.

Wills said FPAC had also discussed this issue at its meeting yesterday, with the goal of developing criteria for determining when “few, if any” adult steelhead are arriving at Lower Granite for the purpose of starting and stopping the zero nighttime flow operation at the Lower Snake projects. The greatest consensus we were able to reach was on a sliding scale for total or wild adult steelhead arriving at Lower Granite over a three-day moving average, he said. This year’s total run was about 170,000 steelhead; the “few fish” criterion for the total steelhead column was set at 65 fish. The wild run for this year showed about 43,000-45,000 fish; the criterion for wild fish, given that total run size, would be a three-day period of 20 fish or less passing Lower Granite. In response to a question from Wellschlager, Wills agreed that these criteria are somewhat conservative, and err on the side of the fish.

Statler said the Nez Perce Tribe would have preferred to define “few, if any” as less than 10 adults passing Lower Granite, but they will not object to the sliding scale as proposed. Kiefer added that the goal of the sliding scale was to avoid discussion of what constitutes “few, if any” to facilitate in-season decision-making. In other words, he said, we didn’t want to have lengthy discussions of what “few, if any” means in the middle of the migration season. But we’re not in the migration season, Wellschlager observed. This is for the winter period, Wills clarified – again, we’re concerned about getting caught with substantial numbers of fish moving, and having zero nighttime flow in the river at that time.

Henriksen asked whether FPAC had discussed the biological impacts of zero nighttime flow on migrating adult steelhead. Wills said the salmon managers have not yet reached consensus on what the data show; Cindy’s question is a fair one, but those discussions are ongoing, he said. Russ Kiefer noted that, given that uncertainty and difference of opinion, these criteria are intended as a compromise that takes that uncertainty into account. If you want to re-open that discussion, Kiefer said, that’s a much larger debate, and we’re not going to resolve it at TMT today. Again, the intent of these criteria was to reach agreement within the region on what “few, if any” means, so that we don’t have to debate that in-season; I would personally prefer to keep the discussion focused on the “few, if any” criteria, Kiefer said. Statler said the Nez Perce Tribe agrees with IDFG’s position.

Henriksen said that, while these criteria are helpful, this is a multi-purpose system, and the Corps has other responsibilities in addition to fish passage. If you’re saying you would like to have a discussion of the biological impacts of zero nighttime flow in the Snake River during the winter, we’ll probably need to put that on a future TMT agenda, Silverberg observed. Wellschlager asked for some time to discuss these criteria with others at BPA, since today is the first time he has seen them. It was so agreed.

The group discussed the overall movement of adult steelhead through the system during the winter months. Ross noted that many steelhead are moving to tributaries below the Snake; there is no link to total steelhead counts at Bonneville and passage

upward through the Snake system. The bottom line is that we don't know precisely what triggers the start of the steelhead migration into the Snake in February or March, he said; that uncertainty was reflected in the development of these criteria. It was agreed to revisit the biological impacts of zero nighttime flow issue at a future TMT meeting.

In the interim, given the lack of consensus among the salmon managers on what the biological information tells us, we aren't likely to change our current operation of the system, Henriksen said. Statler observed that the agreement is that the Snake projects can be operated at zero nighttime flow as long as there are "few, if any" adult steelhead present; such a decision would run counter to that agreement. The salmon managers were asked to define "few, if any" steelhead, he said; we have done so. If you're just going to ignore the criteria we developed, said Kiefer, it would appear that FPAC wasted its time. He added that, last year, on one day in late February, 151 migrating adult steelhead were counted passing Little Goose Dam. If we wait until two weeks from now to reach agreement, and something similar happens in the interim, he said, then we really will have wasted our time.

Following a caucus break, Wellschlager said that, from BPA's perspective, there is still some doubt that the biological need to abandon the zero nighttime flow operation has been sufficiently demonstrated. What I'm wrestling with is the question of whether resuming nighttime flow has a quantifiable biological benefit, he said; also, to me, it hasn't been sufficiently demonstrated that the existing attraction flow is insufficient to allow adult migrants to pass the projects in the absence of nighttime flow. He said that, in the absence of that quantifiable information, BPA will plan to resume nighttime flow at the Snake projects on March 1.

Henriksen reiterated that today is the first time the action agencies have seen the criteria; this is excellent work, she said, and we do appreciate all of the hard work FPAC put into developing the criteria. One question I have, however, is how these criteria would translate into actual operations at the Lower Snake projects. The way we read the language from the Water Control Manual, she said, is that, *because* there are few if any fish passing Lower Granite during the winter months, based on previous studies, we can go to zero nighttime flow at the Lower Snake projects during the winter months. That interpretation was made with input from NOAA Fisheries, she added. Based on that understanding, she said, we do plan to continue the zero nighttime flow operation through the end of February – particularly since there is no consensus among the salmon managers about what the detrimental impacts of this operation to salmon actually are. That interpretation runs counter to the language in the 2004 Water Management Plan, Statler said. It sounds as though, regardless of our good-faith efforts, the Corps has decided to operate the way they want to operate, he said.

The 2004 Water Management Plan states "From December to February, 'zero' minimum project discharge is permitted on a limited basis. Under an agreement between the Corps of Engineers and the fisheries agencies, zero riverflow is allowed for water storage during low power demand periods (at night and on weekends) when there are few, if any, actively migrating anadromous fish present in the Snake River." The group devoted a few minutes of discussion to this language and the action agencies' interpretation of it; Statler observed that he is somewhat taken aback by the process

through which the Corps' interpretation has been made. Silverberg noted that anyone who wishes to elevate this issue to the Implementation Team is free to do so.

Wellschlager observed that, while today's discussion has focused on semantic interpretation of the language in the Water Management Plan, the real issue is the fact that the detrimental biological impacts of zero nighttime flow on adult steelhead migrants have not been demonstrated. Without that piece of evidence to support the criteria, he said, the interpretation of this language is a secondary issue. Wills said he will discuss this issue in more detail with the other salmon managers, and will inform Silverberg if a TMT conference call is needed on this issue prior to the next regularly-scheduled TMT meeting.

4. Spring Creek Update.

Wills said the Fish and Wildlife Service, the Corps and BPA have had a number of good discussions about how to craft a corner collector evaluation in conjunction with the Spring Creek Hatchery release in March. There is no consensus yet among these three groups about how to craft that evaluation, Wills said, but as soon as we reach agreement, we'll let the TMT know. In response to a question, Wills said the Spring Creek fish need to be released no earlier than March 4 and no later than March 12. He noted that he has coordinated with the Corps to ensure that the downstream gauges will be operating, and the necessary waiver from Oregon DEQ is in hand. Now we just need to craft the operation, he said.

5. Spring/Summer Update.

Scott Boyd asked the TMT to use the final 2003 WMP spring/summer update as a starting-point for the discussion of the 2004 spring/summer update; he said he hopes to have a rough first draft available for discussion at the March 3 TMT meeting. There is a lot of uncertainty about what we'll be doing, particularly with respect to spill, in 2004, so any input the other TMT participants may have would be helpful, he said. If anyone has comments on the 2003 spring/summer update, or on what should be in the 2004 update, please email them to me by Wednesday, February 25, Boyd said. He stressed, however, that the TMT will have a number of other opportunities to provide comments on the 2004 spring/summer update to the Water Management Plan.

6. Operations Update.

Henriksen began by saying that the February final water supply forecast is now available. It shows that for Grand Coulee, January-July, the forecast is now 59.8 MAF, 95% of average, a slight decline from the January final. At Lower Granite, April-July, the February final forecast shows a slight increase to 20.8 MAF, 97% of average. At The Dalles, for the April-August period, the new forecast shows 88.2 MAF, 95% of average, down slightly from the January final.

Based on that new forecast, she said, the Corps has prepared a new Q-adjust run, available via hot-link from today's TMT agenda. Mary Karen Scullion said both flow targets and reservoir elevation targets changed slightly as a result of the new forecast.

Grand Coulee is operating to maintain a Bonneville minimum flow of 125 Kcfs from February through April; that target is achieved in almost every year of the 59-year study. Meeting McNary's flow targets (247.3 Kcfs spring, 200 Kcfs summer) looks likely in the spring and unlikely in the summer. With respect to the prospects for reservoir refill, she said, under the most recent Q-adjust run, Libby refill occurs in 29 out of 59 years; Hungry Horse refill in 44 of 59 years, Grand Coulee refill in 48 of 59 years and Dworshak refill in 39 of 59 years. The Q-adjust run also provides the following project-by-project flow projections during the spring and summer periods:

Period average flow (Kcfs)

	Feb 1-29	Mar 1-31	Apr 1-15	Apr 16-30	May 1-31	June 1-30	July 1-31	Aug 1-15	Aug 16-31
LIB	4.0	4.0	4.0	4.0	14.2	16.4	24.0	17.2	14.7
HGH	2.0	1.8	1.1	4.2	2.0	8.7	6.7	5.0	4.5
GCL	62.4	96.7	98.7	117.0	136.3	144.8	122.2	107.6	105.2
PRD	67.4	102.7	107.2	129.8	163.3	180.2	138.5	116.5	110.5
DWR	2.0	4.2	6.8	15.0	14.3	5.1	10.7	12.3	10.9
BRN	19.4	18.4	24.1	24.3	18.0	14.6	12.8	16.8	12.7
LWG	38.7	47.0	70.0	89.8	110.2	94.7	48.8	40.5	31.8
MCN	115.7	157.6	186.1	220.8	272.8	277.8	192.3	161.5	145.1
BON	175.8	202.8	245.3	285.1	291.0	201.4	169.0	151.3	

Henriksen emphasized that actual flows will vary, and will be set by TMT in response to the size and shape of the anticipated runoff at each of these projects.

Grand Coulee is currently at elevation 1263, said Tony Norris. In response to a question, Scullion said that, for the purpose of this run, she assumed a standard BiOp operation at Dworshak – elevation 1520 by August 31. Again, she said, that will be adjusted in season based on the actual size and shape of the 2004 runoff.

Hungry Horse is at 3516 and drafting to meet the Columbia Falls minimum flow, said Norris. Reclamation's February final forecast for Hungry Horse, April-August, is 2.1 MAF, 104% of average. The February final forecast at Libby is 5.6 MAF, 90% of normal, Henriksen said. Therefore, the revised March 31 VARQ elevation at that project is 2435 feet; we're currently at elevation 2400. Dworshak's February final forecast is 2.6 MAF, 98% of average. The March 31 shifted flood control elevation at that project is 1533.2; the project is currently at 1511. Dworshak outflow has been increased to 8 Kcfs, but even so, assuming average inflow, we will have to release greater than minimum outflow to avoid overfilling the project, she said. We're using some of the available operational flexibility now to avoid larger releases later in March, she said, during a period when we will have only two small units available. We don't want to spill at Dworshak, she said. Couldn't we release 8 Kcfs in March, rather than now, given that

we're currently well below the flood control elevation at Dworshak? Statler asked. No, because based on the ESP runs, we need to move that water out now, to avoid being above the flood control elevation at that project or having to spill in March, Henriksen replied.

Statler said the Nez Perce Tribe would prefer to see the action agencies use their existing operational flexibility to retain as much storage as possible in Dworshak for release in April and May, mimicking, to the greatest extent possible, a naturally-peaking hydrograph. CRITFC agrees with that position, said Kyle Martin. In response to a question, Julie Ammann said Dworshak will continue to release 8 Kcfs during through Monday, February 23; the operation will be re-evaluated at that point. In response to another question, Ammann said the 8 Kcfs is not currently being load-shaped; the project is releasing a straight 8 Kcfs through the day. That operation is preferable, from the point of view of the fishermen downstream from that project, Kiefer said.

7. Other.

Henriksen reminded the group that the comment period on the summer spill program has been extended to Friday, February 20.

8. Next TMT Meeting Date.

The next Technical Management Team meeting was set for Wednesday, March 3. Meeting summary prepared by Jeff Kuechle.

TMT Attendance List
February 18, 2005

Name	Affiliation
Donna Silverberg	Facilitation Team
Robin Harkless	Facilitation Team
Kyle Martin	CRITFC
Russ George	WMCI
Tim Heizenrater	PPM
Steve Kern	PNGC
Mike O'Bryant	CBB
Rudd Turner	COE
Julie Ammann	COE
Davis Wills	USFWS
John Wellschlager	BPA
Nic Lane	BPA

Chris Ross	NOAAF
Tony Norris	USBR
Bruce McKay	Consultant
Ruth Burris	PGE
Dave Ryan	PPM
David Benner	FPC
Scott Boyd	COE
Dan Bedbury	EWEB
Martin Hatscher	SCL
Dave Statler	NPT
Russ Kiefer	IDFG
Lance Elias	PPL
Tom Le	PSE

Assumptions:

- * Streamflows were adjusted to the February Final Water Supply Forecast for the period of February thru August of 104 MAF at The Dalles and shaped 59 different ways based on observed historical runoff.
- * Starting elevations were observed data from January 31, 2004.
- * Grand Coulee helps meet Vernita Bar minimum flow objective of 70 kcfs in Feb-Mar drafting no lower than 1259.2 ft in Feb and 1261.0 ft in March. Operate to meet McNary flow objective of 247.3 kcfs drafting no lower than 1250.1 ft by Apr 15. Minimum draft elevations are based on a GCL/Dworshak shifted flood control and VECC/AER requirements.
- * Hungry Horse operates to VARQ flood control or minimum flow from Jan - May and meets minimum flow of 3500 cfs at Columbia Falls, targets full in June, and drafts to 3540 ft by 31 Aug.
- * Brownlee operates to flood control elevations
- * Dworshak targets elevation 1533.2 ft in Mar, 1542.2 ft by 15 Apr, and 1523.4 ft by 30 Apr, based on a GCL/DWR shifted flood control operation and maximum releases of 15 kcfs in April and 13 kcfs May-Jun. DWR targets full in June with a minimum flow of 1.5 kcfs, releases a maximum of 13 kcfs in July - August to meet LWG flow objectives, and targets 1520 ft by 31 Aug
- * Libby operates on minimum flow or VARQ flood control Jan - Apr. Targets 13,900 cfs in May and 10,700 cfs in June for Sturgeon, based on an Apr-Aug forecast of 5.644 MAF and a Tier 3 required pulse of 0.88 MAF. Targets full in July with a minimum flow of 7,000 cfs for bull trout. Drafts to 2439 ft by 31 Aug.

Results:

Priest Rapids Meets Flow Objectives of 70 kcfs in Jan - Apr 15 and 135 kcfs in Apr 16 - Jun.

Month	Occurrences out of 59 Years	Average Flow for 59 Years (kcfs)
Feb	24	67
Mar	52	103
Apr 15	47	107
Apr 30	27	130
May	56	163
Jun	57	138

Grand Coulee meets the Apr 15 flood control target elevation of 1249.0 ft in all 59 years. GCL operates to meet Bonneville objective of 125 kcfs in Feb-Mar.

Lower Granite Meets Flow Objectives of 100 kcfs in Apr - May, 84 kcfs in June and 52 kcfs in Jul - Aug:

Month	Occurrences out of 59 Years	Average Flow for 59 Years (kcfs)
Apr 30	18	90
May	44	110
Jun	40	95
Jul	31	49
Aug 15	0	40
Aug 31	0	32

Bonneville Meets Flow Objectives of 125 kcfs in Feb - Apr:

Month	Occurrences out of 59 Years	Average Flow for 59 Years (kcfs)
Feb	59	136
Mar	57	176
Apr 15	57	203
Apr 30	59	245

McNary Meets Flow Objectives of 247.3 kcfs in Apr 15 - Jun and 200 kcfs in Jul - Aug:

Month	Occurrences out of 59 Years	Average Flow for 59 Years (kcfs)
Apr 30	16	221
May	55	273
Jun	46	278
Jul	25	192
Aug 15	2	161
Aug 31	0	145

Projects Refill by 30 June:

Month	Occurrences out of 59 Years	Average Elevation on 30 Jun for 59 Years
Libby	29	2456
Hungry Horse	44	3558
Grand Coulee	48	1288
Dworshak	39	1595

Period Average Flows (kcfs)

	FEB 1-29	MAR 1-31	APR 1-15	APR 16-30	MAY 1-31	JUN 1-30	JUL 1-31	AUG 1-15	AUG 16-31
LIB	4.0	4.0	4.0	4.0	14.2	16.4	24.0	17.2	14.7
HGH	2.0	1.8	1.1	4.2	2.0	8.7	6.7	5.0	4.5
GCL	62.4	96.7	98.7	117.0	136.3	144.8	122.2	107.6	105.2
PRD	67.4	102.7	107.2	129.8	163.3	180.2	138.5	116.5	110.5
DWR	2.0	4.2	6.8	15.0	14.3	5.1	10.7	12.3	10.9
BRN	19.4	18.4	24.1	24.3	18.0	14.6	12.8	16.8	12.7
LWG	38.7	47.0	70.0	89.8	110.2	94.7	48.8	40.5	31.8
MCN	115.7	157.6	186.1	220.8	272.8	277.8	192.3	161.5	145.1
BON	136.5	175.8	202.8	245.3	285.1	291.0	201.4	169.0	151.3

TECHNICAL MANAGEMENT TEAM

BOR: Tony Norris / John Roache

BPA: Scott Bettin / John Wellschlager

NMFS: Paul Wagner / Chris Ross

USFWS: David Wills / Howard Schaller

OR: Ron Boyce

WA: Cindy LeFleur

ID: Russ Kiefer

MT: Jim Litchfield

COE: Cindy Henriksen / Rudd Turner / Cathy Hlebechuk

TMT MEETING

03 March 2004 0900-1200 hours

**Custom House Room 118
Portland, Oregon
Conference call line: 503-808-5190**

*All members are encouraged to call Donna Silverberg with any issues or concerns they would like to see addressed.
Please e-mail her at dsilverberg@cnnm.net or call her at (503) 248-4703.*

AGENDA

1. Welcome and introductions.
2. CRITFC 2004 River Operations Plan
[\[Kyle Martin 03-03-04\]](#)
3. Spring/Summer Update (Action Agencies)
[\[Draft 03-03-04\]](#)
4. Spring Creek Update (USFWS)
5. MOP on the Lower Snake River (CRTA)
[\[TOWBOAT ASSOCIATION 03-03-04\]](#)
6. Operations Update (ALL)
7. Other
 - Continue Criteria Discussion(s)
 - Set agenda for next meeting

Questions about the meeting may be referred to Cindy Henriksen at (503) 808-3945, or Rudd Turner at (503) 808-3935, or Cathy Hlebechuk at (503) 808-3942

Columbia River Inter-Tribal Fish Commission



2004 River Operations Plan

Columbia River Inter-Tribal Fish Commission

2004 River Operations Plan

March 3, 2004

Overview

The Columbia River Inter-Tribal Fish Commission (CRITFC) presents the 2004 River Operations Plan (ROP) for the Federal Columbia River Power System (FCRPS), the Hells Canyon Complex and mid-Columbia FERC-licensed hydro-projects including Rock Island, Rocky Reach, Wanapum and Priest Rapids. The ROP is a detailed extension of the mainstem recommendations from the CRITFC tribes' Columbia River Anadromous Fish Restoration Plan, *Wy-Kan-Ush-Mi Wa-Kish-Wit* (Spirit of the Salmon; Nez Perce et al. 1995). The ROP contains recommendations for water management and dam operations, including flows, reservoir elevations, spill, and fish facility operations and is consistent with CRITFC's recommendations on the federal 2004 Water Management Plan.¹ The ROP also contains recommendations for water acquisition. Each of the recommended actions will contribute singularly and cumulatively to increase mainstem anadromous fish protection and survival. Current direct mortality and indirect mortality for Snake River yearling chinook is estimated between 25%-73% and 37%-68% respectively (Budy et al. 2002). If implemented, the recommended actions in this Plan will reduce these significant mortality rates.

Near historical levels of adult salmon escapement in 2002 and 2003 indicate that many juvenile salmon will be out-migrating this spring and summer through the mainstem Snake and Columbia River hydrosystem of 13 dams and reservoirs. For example, escapement estimates for Hanford Reach bright fall chinook indicate that over 30 million fry will outmigrate from the Reach spawning areas this spring and summer. Thus, it is critical that substantial anadromous fish productivity in 2004 be protected through the hydro-system by the implementation of the appropriate river operations contained in the ROP.

The USDA-Natural Resources Conservation Service and NOAA's National Weather Service forecast a 100 million acre feet (MaF) January-July runoff (February final forecast) for the Columbia River at The Dalles or 93% of normal for 2004. CRITFC staff, through independent analyses, forecast a 104 MaF runoff forecast (Table 1).²

¹ These comments can be found in Attachment 5 to this document.

² CRITFC uses the experimental one-year streamflow forecast for the Columbia at The Dalles from the University of Washington's Climate Impacts Group (Hamlet and Lettenmaier 2003). That forecast is used in another regression analysis that accounts for the phase of the Pacific Decadal Oscillation. The 2004 runoff forecast compares to a 103 MaF average runoff at The Dalles during the 1929-2003 period of record.

The foundation of the ROP is a normative, natural peaking hydrograph that offers juvenile and adult salmon migrations a more natural flow regime to: 1) reduce time of entry into saltwater, 2) create enhanced water quality conditions in the mainstem and estuary and Columbia River near-ocean plume to enhance critical habitat, and 3) minimize predation and residualization losses (Williams et al. 1996; Bunn and Arthington 2002). ROP water management is based upon judicious use of available storage and altered flood control modifications to create a peaking hydrograph in early June at the Columbia at The Dalles to assure flow and increase critical mainstem habitat for anadromous fish.

ROP operations were modeled against actual extant and probable future federal river operations for 2004, based upon the historical flow record and federal operations of the FCRPS since 1995, when the minimum flows of the Biological Opinion was first established. The Northwest Power Planning Council's GENESYS Hydro-regulation model (Version 2.7.1) was used to simulate recommended monthly flow and reservoir elevations at index points in the region.

The ROP uses altered flood control rule curves and additional upper basin storage to create a normative, peaking flow regime for all major river index points (Martin 2004). Peak flow frequency analysis (WY 1929-1978) suggest the average system-wide flood risk for the Columbia at The Dalles (550 kcfs) for the CRITFC plan is 16% versus 14% for Federal operations and 42% for historical observed data. For bankfull flows (450 kcfs), the system-wide flood risk for the Columbia at The Dalles for the CRITFC plan is 50% versus 42% for Federal operations and 62% for historical observed data. When they become available later this spring, the Northwest River Forecast Center's NWSRFS-STP hydro model results, in daily time steps, will be used to update and fine-tune the ROP for spring and summer operations.

The ROP is based upon restoring ecosystem functions and values and assures beneficial flows for anadromous fish, while seeking to maintain higher reservoir levels for resident fish and tribal cultural resource protection. The federal 2004 Water Management Plan lacks any reference to a basin-wide, ecosystem approach to increase productivity of listed and unlisted anadromous and resident fish. Spill is a major component of the ROP consistent with the normative river paradigm (Williams et al. 1996). The spill season in the ROP is extended and enhanced over that required in the NMFS 2000 Biological Opinion for the FCRPS and 2004 Water Management Plan in the spring and summer at most federal dams. The Plan's spring and summer spill recommendations extend spill timing and amounts for Rocky Reach, Rock Island and Priest Rapids and Wanapum dams. These spill levels are an enhancement over levels in the three Mid-Columbia Habitat Conservation Plans and current spill levels provided at Priest and Wanapum dams by Grant PUD.

The ROP also contains specific recommendations and guidelines to: 1) reduce power peaking, 2) enhance adult and kelt passage, 3) enhance water temperature criteria to meet Clean Water Act standards, 4) enhance river conditions for the tribal treaty fisheries, 5) enhance fish facility operations and 5) direct mainstem research. Also offered in the ROP is a list of key fish facility mitigation projects, which, if implemented, could result in significant improvements in fish passage survival. The ROP also offers a water management paradigm that avoids the

weaknesses of week-to-week trade offs common to the Technical Management Team, Implementation Team, and Regional Executive Committee forums.

The storage volume difference in ROP's altered flood control operation and the federal Water Management Plan's standard flood control operation is almost 15 MaF, distributed between Mica, Arrow, Libby, Grand Coulee, Brownlee, and Dworshak projects.³ The ROP applies this storage to both spring and summer salmon migrants. The federal flood control drafts will likely result in a loss of storage that may impact spring flows and the ability to meet the April 10 refill requirement called for by the NMFS 2000 Biological Opinion for the FCRPS. For example, the federal flood control operations place Lake Roosevelt elevations 29 feet below its flood control rule curve for February 29th, which may reduce Hanford Reach spring flows and contribute to flow fluctuations and stranding losses. Dworshak is 21 feet below its February 29th flood control rule curve. The loss of this storage may also reduce the ability to 1) meet the April 10 refill requirement and, 2) meet McNary spring target flows called for by the NMFS' 2000 Biological Opinion for the FCRPS.

Tribal treaty fishing occurs in all of Zone 6 from McNary to Bonneville dams. The ROP includes water management regulations to promote the treaty fishery during the extremely limited fishing periods. Federal river operations should be restricted to fish and wildlife related actions, flood control and navigation actions. Recreational demands for pool operations during treaty fisheries are of a lower priority and should not conflict with the other actions. Pool elevation restrictions and steady flows should be provided during tribal fisheries for all of Zone 6, not just Bonneville Pool. The federal operators have a trust and treaty responsibility to provide these operations to insure that tribal fishers may successfully engage in the exercise of their fisheries.

Given the droughts in 2001 and 2003, and the extraordinary numbers of juvenile salmon migrating seaward through the hydro-system, it is critical that measures in the 2004 CRITFC River Operations Plan be fully implemented. CRITFC urges the federal government, Idaho Power Company, and the Mid-Columbia Public Utility Districts to seriously consider implementing the recommendations in this Plan.

³ See Table 2. Results derived with GENESYS model.

Key Plan Recommendations

Decision Making

- The Technical Management Team (TMT) and Implementation Teams are useful for regional information sharing but they do not suffice for river operations decision-making and are not government-to-government forums. CRITFC's member tribes formally withdrew from TMT and other NMFS' ESA forums in 1997, due to the lack of formal government-to-government consultation mandated in various federal agency policies including the 1997 Secretarial Order to the Departments of Interior and Commerce. Further, the TMT is prevented from candid discussions of operational alternatives due to the presence of power marketing agents.⁴ To avoid these serious problems, the federal operators and NMFS should use the Columbia Basin Fish and Wildlife Authority as a technical forum to discuss river operations where all 13 Columbia Basin tribes can have meaningful input. Disputed issues should be raised to an executive committee table comprised of policy representatives from the tribes and states and federal entities. Similarly, spill and flow decisions in the Mid-Columbia should be determined in the Mid-Columbia Coordinating Committees established by individual settlement agreements for Wells and Rock Island Projects and under the Mid-Columbia Proceedings established under existing licenses for Rocky Reach, and Priest-Wanapum Projects.

Emergency Declarations

- The definition of "emergency" and related procedures must be recast for 2004 to exclude any BPA financial problems. The definition of "emergency" must be based on unforeseen circumstances. Any power sales revenues accruing to BPA and attributable to an emergency operation must be set aside for salmon mitigation, where such amounts will be in addition to and not in lieu of previously planned BPA expenditure levels.

Energy and Water Conservation

- Water and land acquisition programs begun in 2001 should be continued.
- BPA should renew the 1995-2001 contract with Idaho Power Company to allow flexibility in flow augmentation for fish through power exchanges.

⁴ Many power-marketing representatives from private or public corporations attend TMT meetings. These representatives are present to learn of real-time federal operators' river operation plans, in order to maximize power-marketing arrangements. As a result, federal operators are hesitant to disclose vital information and make decisions for fishery management to the tribes, state and federal fishery managers in this forum. TMT was not burdened with this situation in the early years of its implementation, but now it is a serious obstacle to regional information sharing, and has greatly diminished and compromised the effectiveness of TMT.

Runoff Forecast

- A comparison using the University of Washington's Climate Impact Group's (CIG) Experimental One-Year forecast (Hamlet and Lettenmaier 2003), using their VIC Hydro Model, matches well with CRITFC's regression analysis (Table 1).
- Water supply forecast correction curves (Martin 2002) suggest a medium-high water year. Runoff in the CRITFC 2004 Plan is projected to be 104 MaF for the Columbia at The Dalles.

Table 1. UW-Climate Impact Group forecast for the Columbia at The Dalles for WY 2004.

Initial Conditions WY1994	Number of Water Years Used:	Number of Water Years Used:	Flow (kcfs)
	11 UW-CIG (KaF)	3 Unregulated CRITFC (KaF)	
oct	5597	5501	89
nov	6252	6030	101
dec	5631	5755	93
jan	5347	5069	82
feb	5588	6391	110
mar	7194	6255	101
apr	10310	10214	170
may	20142	17010	274
jun	32271	32062	534
jul	25124	23011	371
TOTAL:	106.0	100.0	
(Jan. - July)	(MaF)	(MaF)	
Regression:	110.1	103.7	

Flow and Reservoir Management

- Available storage and runoff should be shaped to meet natural peaking, normative hydrographs at Priest Rapids, Lower Granite, The Dalles and other index points (Attachment 1). The object is to provide flushing flows during the main portions of the juvenile and adult migrations and to leave as much storage as possible for resident fish and tribal cultural resource protection.
- In general, reservoirs are left at the end of the salmon migration season at or above elevations specified by the NMFS 2000 FCRPS Biological Opinion.
- Dworshak. Refill of Dworshak Reservoir by the end of June is a high priority (Attachment 1). The majority of flow should be dedicated to summer migrants and

temperature control to attempt to meet Clean Water Act standards in the Lower Snake River. Consistent with the Nez Perce Tribe-State of Idaho Plan, Dworshak should fill to mean sea level (msl) 1600 feet by June 30 for juvenile and adult summer migrants and temperature control. A draft to msl 1590 feet by July 31 may be needed to alleviate temperature problems in the lower Snake. Dworshak should draft to msl 1520 feet by September 30. Neither CRITFC nor the Nez Perce Tribe supports any drafts down to 1500 feet and this compromises refill for the next water year and exposes tribal cultural resources to theft and vandalism.

- Lower Granite Reservoir should be drawn down to msl 723 feet during June 20 - October 31 to decrease juvenile and adult travel time and to make increase the effectiveness of temperature control from Dworshak.
- Hells Canyon Complex. The 110 KaF described in the 1998 FERC Biological Assessment for the Hells Canyon Complex should augment Snake River spring flows in May. For summer flows in June and July, Brownlee should contribute an additional 237 KaF described in the 1998 Biological Assessment and should pass through all upper Snake storage in June-August in addition to the 237 KaF from Brownlee. Idaho Power Company is requested to follow plan recommendations and should continue negotiations with BPA concerning establishment of a power and water exchange contract (Attachment 3). NMFS should release a biological opinion for the Hells Canyon Complex that includes Plan recommendations, with or without power/water exchange contract.
- Upper Snake storage. An additional 450 KaF should be added to the 427 KaF required in the NMFS 2000 FCRPS Biological Opinion for a total of 877 KaF flow augmentation from the upper Snake from Bureau of Reclamation and Corps of Engineers upper Snake reservoirs. This water should be passed through the Hells Canyon Complex in a timely manner to augment July flows, before the water heats up.
- Lake Roosevelt. Reservoir flood control drafts should be restricted to msl 1260 feet during April, which allows runoff refill for spring flows, Hanford Reach juvenile out-migration protection and summer flows (Attachment 1). Lake Roosevelt is drafted to msl 1289 feet by July 31, drafted to 1280 by August 31, and fills to msl 1283 feet by late September for resident fish and cultural resources.
- Banks Lake. Storage of 260 KaF (10 foot draft at Banks Lake) should remain in Lake Roosevelt instead of being pumped into Banks Lake to provide additional flow augmentation for salmon in August and September.
- Canadian storage. Storage should be released in early spring in order to leave some storage in Lake Roosevelt for salmon migrants and energy needs (Attachment 1). An extra 500 KaF from Canadian Non-Treaty storage over the 1 MaF called for by the NMFS Biological Opinions should be allocated for downstream flows.
- The CRITFC 2004 Plan recommends that modified VAR-Q operations be implemented at Libby and Hungry Horse without compensating drafts of Lake Roosevelt (Attachment

1). This action would hold storage in upper basin reservoirs for later anadromous fish migrations and reduce impacts to resident fish.

- Libby. Storage should be managed for sturgeon flows (an operation is offered for late June and early July), downstream salmon migrations and resident fish needs by implementing modified VAR-Q operations and fills within one-foot of full by late July (Attachment 1). Libby should be drafted to avoid drafting Dworshak, which has substantial temperature control capacity in the lower Snake.
- Hungry Horse. Storage should be managed for salmon flows and resident fish needs by implementing modified VAR-Q operations. CRITFC operations leave the reservoir 1.4 feet from full by June 30 (Attachment 1). Minimum flows of 2.5 kcfs maintained through September would benefit Columbia Falls flows.
- Power peaking/load following. Should be restricted to: 1) avoid stranding of juvenile salmon in the Hanford Reach, 2) allow fish ladders and other fish passage facilities to operate within established criteria and protocols and 3) to allow proper conduct of tribal treaty fisheries.
- Meeting Clean Water Act standards for dissolved gas and temperature is a high priority. Juvenile salmon should be left in river to take advantage of cool water releases and to avoid high temperatures in screen and transportation systems.

Hanford Reach Flows

- Power peaking should be restricted to avoid stranding of Hanford Reach juvenile chinook, especially during the key fry susceptibility period (March 15 - June 10). Fluctuations during this period should not exceed specified criterion during each 24-hour period in the CRITFC 2004 Hanford Stranding Operations Recommendations. (Attachment 2). To accomplish these fluctuation reductions, all seven Mid-Columbia Projects should stay on Mid-Columbia Hourly Coordination during all of the early migration and susceptibility period. Grant PUD should fund and should cooperate with tribal and fishery agency 2004 Reach monitoring and evaluation efforts.

Spill

- Spill has been demonstrated to be the most effective and safest means of juvenile project passage (Fishery Managers 1994; FPAC 2003; Whitney et al. 1998; NPPC 1999). Spill also best protects the beneficial use under the Clean Water Act by providing salmon access to lower temperatures found at depth in the reservoirs instead of higher temperatures found in dam bypass and transportation systems. Spill also provides safer downstream passage for steelhead kelts and adults that fallback over dams than powerhouse routes.

- The ROP spill planning dates are March 20-September 15 (Snake) and March 20-September 30 (Columbia). The extended spill period accommodates early spring juvenile migrants and kelts. Analysis by the Fish Passage Center indicates that federal 2004 Water Management Plan spring spill planning dates are April 10- June 20 (Snake) or June 30 (Columbia). End dates include August 31 (Snake) and September 15 (Columbia).
- CRITFC recommends provision for summer spill at Lower Granite, Little Goose, Lower Monumental and McNary dams above the requirements of the NMFS' 2000 FCRPS Biological Opinion.
- CRITFC recommends provision for daytime spill at John Day, McNary and the Lower Snake River dams. When implemented, daytime spill at most dams has been demonstrated to be as successful, or more so, than nighttime spill.
- The Corps of Engineers should complete their timely application for a total dissolved gas waiver to the appropriate water quality agencies to allow for both spring and summer spill at the eight federal dams and five Mid-Columbia dams.

Dam Facility Operations and Research

- Fish facilities should be operated according to CRITFC and other salmon managers' recommendations for the Corps of Engineers' 2004 Fish Passage Plan.⁵ Inspection of facilities should be increased to a minimum of three inspections per day.
- Fish facilities should have full components of spare parts and backup systems, consistent with CRITFC and other fishery agencies recommendations to the Corps' 2004 Fish Passage Plan.
- Monitoring systems for water quality should be installed by the federal operators throughout the dams and reservoirs with real-time tracking of data.
- Mainstem research that involves fish handling and tagging and modifications to fish protection measures should be extremely limited, should not compromise fishery operations and should meet consensus tribal and fishery agency approval.

Fish Facility Mitigation Projects

- A list of mitigation projects has been compiled for dam fish passage facilities (Attachment 4). Funding of these projects would individually and collectively increase juvenile and adult passage success and survival.

⁵ Formal CRITFC comments on the 2004 Corps' passage plan are in progress and will be submitted by March 16. CRITFC recommendations on the Corps' 2003 passage plan are attached to the ROP as a placeholder.

2004 FCRPS Flow Operations

The 2004 River Operations Plan recommends that the federal operators reshape available runoff and reservoir storage to create a natural peaking (i.e., normative) flow regime. The Plan specifically dedicates available runoff and storage to shaping the limited amount of water to best meet the migration and habitat requirements for anadromous fish.

That salmon flow is positively related to increases in survival and productivity has been established in various forums worldwide including a 1994 independent scientific review under the Northwest Power Planning Council, biological opinions and recent analyses by the fishery agencies and tribes (Agencies and Tribes 2003). In their 1995-1998 FCRPS Biological Opinion, NMFS provided minimum flow recommendations for listed salmon and established seasonal, flat, “target flow” regimes, which were considered the minimum flows necessary to prevent jeopardy to listed salmon populations. The NMFS’ 2000 FCRPS Biological Opinion continues the concept of “target flows” for salmon, where specific seasonal average flows are to be met at Lower Granite, Priest Rapids and McNary Dam. During the creation of the target flow concept, it was realized by NMFS and the federal operators that the seasonal targets would not be met during the lowest series of water years, such as the case in 2003 and 2001, and in many higher runoff years.

The 2000 Biological Opinion differs from the 1995-1998 Biological Opinion in that the federal operators have more discretion to avoid implementing measures that will insure that flow targets are met. For example, the 1995-1998 Biological Opinion required the Corps to shift flood control storage further down the system and modify flood control rule curves to allow reservoirs to store more of the spring runoff for fish summer flows. In the 1995-1998 Biological Opinion, the Bureau of Reclamation was to provide an additional 1 million acre-feet (MaF) of water from the upper Snake for salmon flows. Again, this operation has yet to be realized.

The Plan’s hydrograph has monthly flow objectives that would have flows peak well below flood stages in Portland and other locations ⁶ (Figures 1 and 2). Alternative flood control curves were modeled with GENESYS (Martin 2004) and the proposed URC values are listed in Table 2. Water Years 1961, 1962, and 1967 are used in the modeling because their volumes average out to near CRITFC’s projected 104 MaF forecast for WY 2004.

In the Plan, the receding limb of the hydrograph that provides summer fish flows would be augmented by adding drafts of upper basin storage beyond what is required in the NMFS 2000 Biological Opinion. Drafts include an additional 500 KaF from Non-Treaty Storage from BC Hydro projects, an additional 450 KaF of upper Snake storage from Brownlee, and 237 KaF of Hells Canyon Complex storage. The resultant summer flows would create better migration conditions by reducing both salmon travel time and mainstem river temperatures.

⁶ Flood stage is defined by the Corps as 550 kcfs measured at The Dalles Dam. Bank-full stage is defined by the Corps as 450 kcfs measured at The Dalles. The peak flow in CRITFC’s 2004 River Operations Plan with altered flood control rule curves is about 386 kcfs at The Dalles, or 64 kcfs below bank-full. In the 2002 Biological Assessment for the Lower Columbia Channel Deepening, the Corps states that flood control was managed to keep peak flows at The Dalles at 550 kcfs in 1970 and prior years. In recent years, the Corps has managed to keep peak flows at The Dalles at about 360 kcfs, without Congressional authorization.

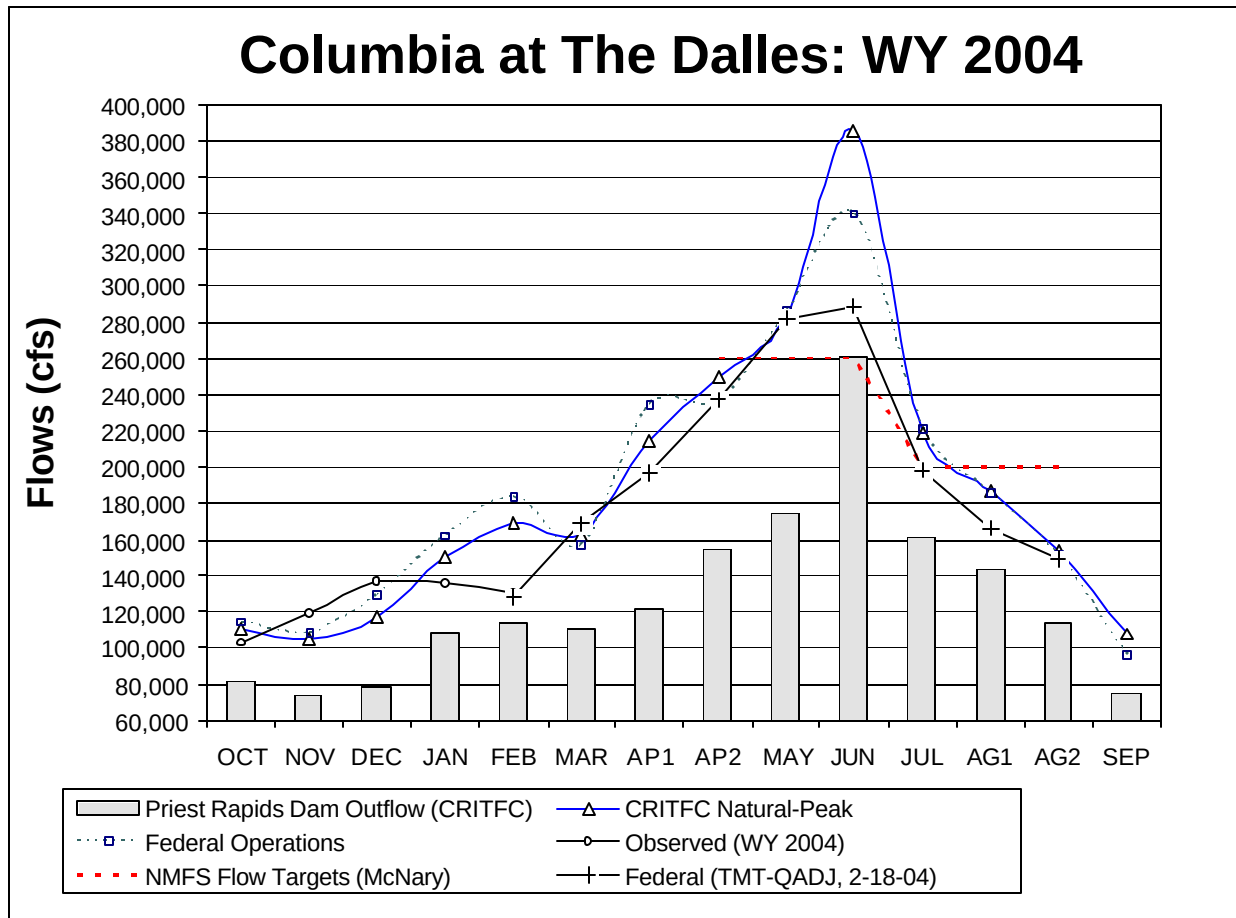


Figure 1. 2004 CRITFC River Operations Plan hydrograph for the Columbia at The Dalles and Columbia at Priest Rapids as compared to 2000 Biological Opinion flow targets, WY 2004 observed river flows, and likely WY 2004 river flows under federal operations (TMT-QADJ).

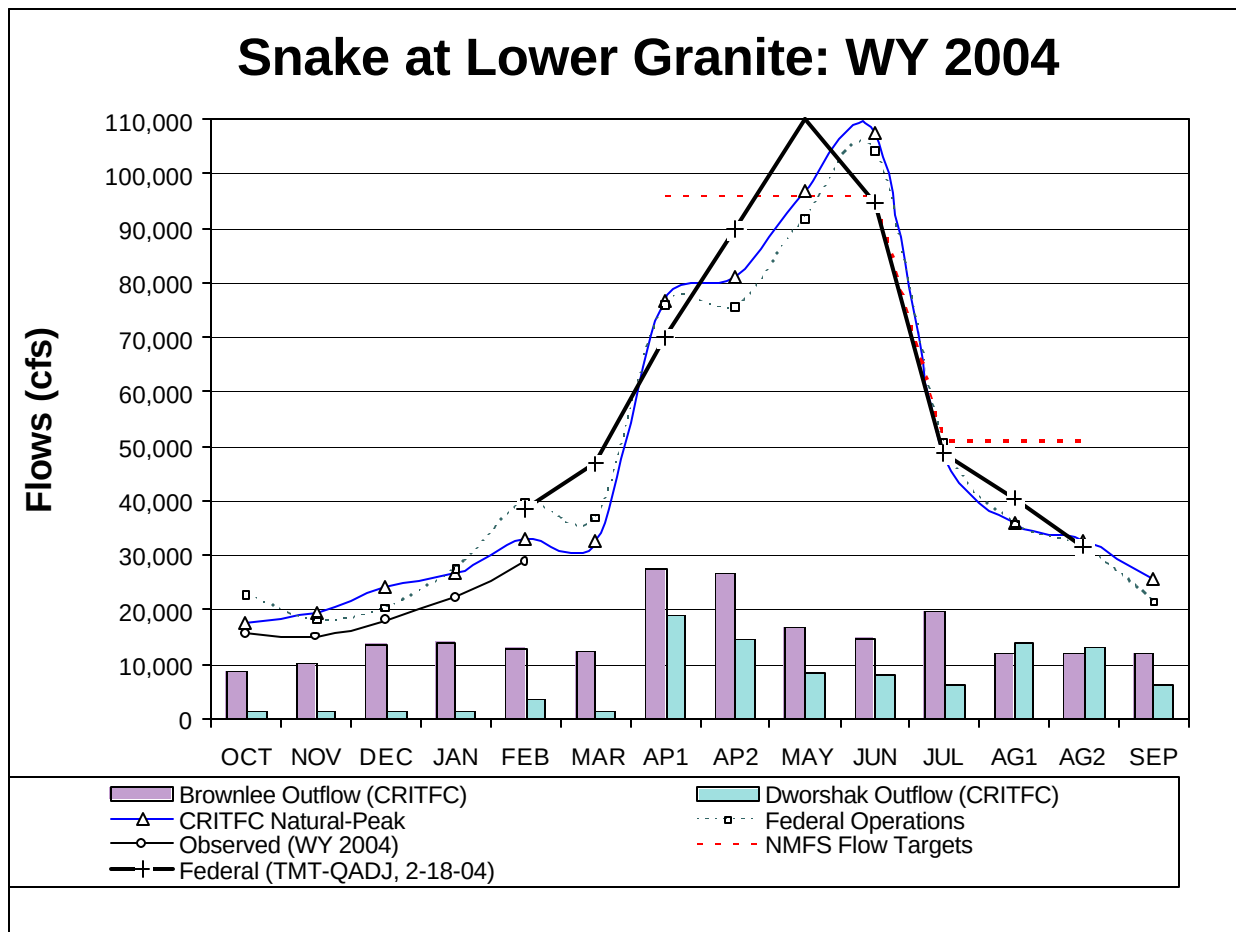


Figure 2. 2004 CRITFC River Operations Plan hydrograph for the Snake River at Lower Granite as compared to 2000 Biological Opinion flow targets, observed WY 2004 river flow, and likely 2004 river flows under federal operations (TMT-QADJ).

SYSTEM FLOOD CONTROL: UPPER RULE CURVE (URC), as modeled in GENESYS
WATER YEAR 2004 (average of WY 1961, 1962, and 1967)

GRAND TOTAL:
 KaF: **14863**

<i>January 31st, KaF:</i>	CRITFC	(elev.)	Federal Plan	(elev.)	Difference (KaF)	Sum Total
Mica, BC	10704.9	2457.3	10704.9	2457.3	0.0	
Arrow, BC	4885.8	1426.2	4687.4	1424.5	198.3	
Grand Coulee	5184.8	1290.0	5185.0	1290.0	-0.2	
Brownlee	975.2	2077.0	975.2	2077.0	0.0	
Dworshak	1286.4	1556.2	989.0	1535.2	297.4	496

<i>February 28th, KaF:</i>	CRITFC	(elev.)	Federal Plan	(elev.)	Difference (KaF)	Sum Total
Mica, BC	10120.8	2451.4	10120.8	2451.5	0.0	
Arrow, BC	3609.9	1415.1	3411.6	1413.3	198.3	
Grand Coulee	4988.9	1287.5	4988.9	1287.5	0.0	
Brownlee	898.8	2071.4	832.7	2066.7	66.1	
Dworshak	1175.9	1548.5	779.3	1519.5	396.6	661

<i>March 31st, KaF:</i>	CRITFC	(elev.)	Federal Plan	(elev.)	Difference (KaF)	Sum Total
Mica, BC	9472.9	2444.7	9472.9	2444.7	0.0	
Arrow, BC	3586.3	1414.9	1999.7	1400	1586.6	
Grand Coulee	5036.3	1288.1	3208.4	1263.6	1827.9	
Brownlee	975.2	2077.0	914.2	2072.5	61.0	
Dworshak	1629.2	1578.3	737.1	1516.2	892.1	4368

<i>April 15th, KaF:</i>	CRITFC	(elev.)	Federal Plan	(elev.)	Difference (KaF)	Sum Total
Mica, BC	9671.2	2446.7	9472.9	2444.7	198.3	
Arrow, BC	3322.4	1412.5	2132.4	1401.2	1190.0	
Grand Coulee	4648.8	1283.1	1930.4	1244.7	2718.5	
Brownlee	729.5	2058.0	580.8	2044.8	148.7	
Dworshak	1136.7	1545.8	513.9	1497.5	622.7	4878

<i>April 30th, KaF:</i>	CRITFC	(elev.)	Federal Plan	(elev.)	Difference (KaF)	Sum Total
Mica, BC	9671.2	2446.7	9472.9	2444.7	198.3	
Arrow, BC	2560.2	1405.4	2361.9	1403.4	198.3	
Grand Coulee	2995.7	1260.5	1210.7	1232.0	1784.9	
Brownlee	501.6	2037.3	501.6	2037.3	0.0	
Dworshak	1088.0	1542.4	592.9	1504.4	495.0	2677

<i>May 31st, KaF:</i>	CRITFC	(elev.)	Federal Plan	(elev.)	Difference (KaF)	Sum Total
Mica, BC	10268.2	2452.8	10069.8	2450.8	198.3	
Arrow, BC	4018.1	1418.8	3621.4	1415.2	396.7	
Grand Coulee	3247.4	1264.1	2255.8	1249.3	991.6	
Brownlee	664.8	2052.7	664.8	2052.7	0.0	
Dworshak	1681.1	1581.4	1483.6	1569.3	197.5	1784

Table 2. Flood control Upper Rule Curves, as modeled in the NPPC GENESYS Hydro model.

2004 Spill Program for the Columbia Basin

The 2004 River Operations Plan recommends a program to increase spill at key projects in order to significantly increase overall passage success and survival for the 2004 juvenile and adult migrants. CRITFC does not support any reduction in Biological Opinion spill; in fact the ROP extends the spill season and adds additional spill at mainstem dams.

Principal features of this spill program include:

- Provision for summer spill at Snake River and McNary dams. The current NMFS 2000 FCRPS Biological Opinion does not require summer spill, despite the lack of scientific evidence that indicates transporting summer migrants would be advantageous compared to spilling migrants over dams.⁷ CRITFC has advocated for a summer spill program and transport study (with summer spill) in the Lower Snake River for at least the last five years. This controversy was expressed in the fall fishery negotiations in *U.S. v. Oregon* in the last several years. CRITFC will continue to oppose any Snake River or McNary transport study that does include a reasonable spill and flow component.
- Provision for daytime spill at John Day, McNary and Lower Snake River dams. When implemented, daytime spill has been demonstrated to be as successful, or more so, than nighttime spill at most dams. Early migrations of abundant 2004 fall chinook migrants from the Hanford Reach will achieve better protection from daytime spill at McNary and John Day than under no spill conditions.
- Extension of spill season. The Plan also recommends that the spill season be extended in duration over that offered in the NMFS 2000 FCRPS Biological Opinion. Because mainstem river temperatures have been much warmer than in past years, it is very likely that juvenile migrations will start earlier than in the past and kelts will be migrating and need downstream protection. Early spill will better protect spring chinook kelts emigrating seaward. Recent radio-telemetry studies indicate that about half of steelhead spawners return to sea and that spill increases kelt survival (English et al. 2001; English et al. 2003; Evans et al. 2001; Evans 2002).⁸ Spill should begin at mainstem dams around March 20, depending on the status of the migrations. Depending on monitoring assessments, spill should be extended to September 15 at lower Columbia Dams to assist millions of late migrating juvenile salmon and to reduce powerhouse injuries to adult steelhead and fall chinook that fall back at dams. Recent analysis by the Fish Passage Center indicates that a significant number of ESA- listed fish, including Clearwater fall Chinook and unlisted fish migrate through the hydrosystem in September.

⁷ Recent analysis *Review of the Bonneville Power Administration's analysis of the biological impacts of alternative summer spill operations* (Bouwes 2004) indicates

⁸ Telemetry data from these studies indicate that in 2001 with no spill and screen system turbine passage, only 3.8% of radio-tagged kelts survived from Lower Granite Dam to the Bonneville Dam tailrace. These studies indicate that if spill and sluiceway passage is provided, 86-93% of kelts will use these routes, which insure substantially higher survival rates through the dams.

- Real-time spill ramping impacting fish passage goals. During the 2002 spill season, spill levels were ramped up and down depending on the TDG readings from monitoring sites below dams. Atmospheric conditions, combined with temperature greatly influence the accuracy of TDG monitoring sites. Depending on exceedences of TDG levels that would violate gas waivers from the state water quality agencies, spill levels were reduced to levels well below the TDG waiver levels, and this condition was left for several hours. Thus, spill volumes required in the NMFS 2000 FCRPS Biological Opinion were not provided. It appears to CRITFC that Corps' actions to hold spill at levels below the gas waivers for hours after reducing spill is negatively impacting regional passage goals. For example, total dissolved gas levels at Bonneville's tailwater location are quite variable and these levels can impact spill operations at Bonneville, The Dalles and, to a lesser degree, John Day. It is our understanding that the Corps has set up a protocol to deal with ramping down spill when the monitoring sites are above the standard, however, a protocol for the real-time expedited ramping up of spill when the monitoring sites are under the gas waiver and the spill level is lower than intended in the NMFS 2000 FCRPS Biological Opinion has not been completed. The Corps should install the capacity to resolve this issue at all Corps dams by implementing project operational measures in the 2003 Fish Passage Plan and ensure that all dam operators closely follow the measures.

Priorities:

Refer to Table 3 for the details of project spill operations. All proposed operations conform to existing total dissolved gas constraints.

Bonneville (BON). Spill is very effective and efficient at Bonneville. Past survival studies indicate that for juvenile migrants, spill resulted in a relative survival to the estuary of 98% compared to screen bypass and turbine passage survival of 80% and 82% respectively. Recent installation of spillway deflectors decreased total dissolved gas levels to allow increased spill levels. CRITFC recommends daytime spill to the 120 kcfs until an additional fallback and potential delay of adults can be evaluated to determine if daytime spill to the cap is warranted. Fallback information for 2000 and 2002 showed little difference between fallback within 24 hours of exiting the adult ladder under low (75 kcfs) and gas cap spill. The 2002 balloon tag work showed higher survival and lower mortality under the higher spill rates at Bonneville (Normadeu, 2002 the final draft is still under review). Nighttime spill would set at ~150 kcfs or Gas Cap. At least three days of spill should be allocated at these levels to protect release of the Spring Creek Hatchery fall chinook migration during mid-March.

McNary (MCN). McNary is the only Lower Columbia dam that is not scheduled to have voluntary spill 24 hours a day in either spring or summer. The Plan's recommended hydrograph will create some involuntary spill at McNary as the powerhouse is hydraulically limited for flows up to about 140 kcfs. However, there is discussion of eliminating the 1% turbine operating range at this project which would further reduce any amount of involuntary spill. McNary passes a substantial number of Columbia Basin salmon from the Mid-Columbia, Snake River and Hanford Reach. The existing screened bypass system has structural and hydraulic problems; PIT-

Tag studies indicate that juveniles that experience multiple screen bypass passage have lower smolt-to-adult returns than juveniles that pass thorough spill and turbines (Bouwes et al. 2002; Budy et al. 2002). Of about 200,000 juvenile spring chinook marked and released in 1995 from the bypass system, no adults returned. Transportation results to date have been equivocal. Thus, to spread-the-risk⁹ and encourage better tailrace egress conditions to avoid predators and delay, the Plan recommends that the Corps provide daytime spill at a level commensurate with the current nighttime Biological Opinion spill operation. Further, the Plan recommends that the Corps consider removing half of the turbine intake screens especially during the summer months when river temperatures often exceed the water quality standard.

The Dalles (TDA). Due to concerns with juvenile turbine passage (survivals in the low 80% range; 2000 FCRPS Opinion, Appendix D), it is prudent to increase non-turbine passage routes, which include the sluiceway and spillway. Spill is the only passage route that can immediately increase juvenile passage survival. The 1995-1998 FCRPS biological opinion required spill at 64% of daily average flow. Based upon questionable survival studies, NMFS decreased spill to 40% of daily average flow. In 2002 project survival decreased significantly. This subjects more juveniles to turbine passage. The CRITFC Plan recommends an increase in spill from the 2000 FCRPS Opinion level from 40% to 50% of daily average flow. North loading of the spillway with these flows would avoid placing juvenile salmon toward shallow island predation zones where they were placed with the 64% spill. The 2003 research and fish passage at TDA is best served by maintaining a constant spill level during the migration season.

John Day (JDA). Critical uncertainties remain regarding spill operations at John Day. Research in 2001 (Beeman, Counihan et al. USGS, 2001) indicated that radio-tagged juveniles using the screened bypass outfall had a direct survival of 88-92%, while juveniles passing through spill survived in the 98-100% range. CRITFC proposes the best operation would be 30% of daily average flow during the day with 45 – 50% daily average flow at night. Night spill is very effective at passing fish. However the large volume of spill required to generate the high fish passage efficiency may in part, create poor conditions at the screened bypass outfall, which in 2002, may have led to lower survival. (Beeman and Counihan 2002) Furthermore project operations of the turbine units were shown to be different than that outlined in the COE Fish Passage Plan (FPP). Hydraulic studies indicated a marked improvement in tailrace conditions at the outfall when turbine priority was followed as outlined in the FPP. Because indirect mortality rates and lowered smolt-to-adult survival rates occur for smolts that pass through screened bypass systems and bypass systems select against juvenile lamprey and certain salmon stocks, we recommend maximizing spill at John Day and examining fish passage without turbine intake screens through comparative survival studies as a high priority. In the future, to increase passage we recommend investigations of removable spillway weirs or similar surface spill options at JDA to increase fish passage efficiency. Current estimates for turbine passage in 2002 were extremely low with large confident intervals. Therefore, it is prudent to reduce the exposure of juveniles to the powerhouse and potential turbine passage.

⁹ Under the CRITFC Plan, “Spread the risk” entails an operation where approximately half of the migrants are passed through the dam via surface bypass and/or spill and the other half are passed through turbine screened systems and transported in trucks or barges.

Lower Monumental (LMN). With the repairs to the stilling basin complete, CRITFC strongly recommends the implementation of 24-hour spill for spring migrants and summer migrants. Transportation at Lower Monumental for spring migrants has shown to return fewer adults than Lower Granite, indicating that some serious problem in the screened bypass system or transportation system may be selecting against migrants. Summer migrant transportation has not been examined yet, but results from summer migrant transportation at McNary are not encouraging. We recommend spread the risk for migrants at this project and comparative survival studies that require removal of turbine intake screens. Furthermore, NMFS has suggested an operational change in the spill program at Lower Monumental. The 2000 FCRPS Biological Opinion indicated a 24-hour spill to gas cap operation. The proposed federal 2004 spill operation is one based on spill rates of approximately 50% of the instantaneous flow in order to reduce tailrace eddies. Whether or not this change would be beneficial for salmon has not been reviewed and CRITFC recommends a carefully structured evaluation before the spill change takes place. Survival and passage data from other projects, such as Priest Rapids indicate that salmon migration timing and survival has not been reduced from large eddy conditions in tailraces.

Little Goose (LGS). Currently, under the 2000 FCRPS Biological Opinion, the Corps does not provide daytime or summer spill. CRITFC strongly recommends the implementation of 24-hour spill for spring migrants and summer migrants. Smolt-to-adult survivals for juveniles that pass through screened bypass systems indicate fewer adults lower rates than for juveniles that pass through non-screened bypass routes. Spring transportation at Little Goose has been equivocal (Bouwes et al. 2002), thus, CRITFC recommends a spread the risk approach for juvenile migrants with about half passed in spill and the other half transported. Summer migrant transportation has not been examined yet, but results from summer migrant transportation at McNary are not encouraging. We recommend spread the risk for summer migrants at this project and comparative survival studies that require removal of turbine intake screens.

Lower Granite (LWG). For 2004, the Corps has left the removable spillway weir (RSW) installed in an attempt to increase fish passage effectiveness. CRITFC believes that the weir, with some auxiliary spill, should be tested in 2004 against spill at levels that approach total dissolved gas cap limits to determine if there is a difference in project fish passage efficiency (FPE). Auxiliary spill should be set at 22 kcfs to insure that juveniles are provided the best possible tailrace egress conditions, and that they are attracted to the RSW zone of influence in the forebay. RSW/spill tests should only compare two conditions to insure that there are adequate test blocks to insure results have statistical precision and robustness. It is vital to test the performance of the RSW at Lower Granite for summer migrants.

Ice Harbor (IHR). For 2004, CRITFC recommends a comprehensive study to evaluate passage as a whole at Ice Harbor. Several survival studies have been done at IHR in recent years with a large variety in survival estimates for both spring and summer. (Eppard et al. 2002 and 2003) It appears that high spill volumes in low tail water and low flow conditions do not provide optimal passage for juveniles. Whether this problem is due to mechanical/hydraulic conditions at the spillway, poor egress from the tailrace, which increases predation, or some combination of these factors is unclear. CRITFC recommends conducting a study that compared a nighttime spill

level less than the 100-kcfs/TDG cap to the existing spill level. Further refinement and study of the current spill patterns should also be examined to insure the best egress conditions possible.

Rock Island. This project still is under the authority of the Rock Island Settlement Agreement and established spill conservation account, despite incomplete Habitat Conservation Plan development. Chelan PUD should coordinate project spill with fishery managers through the Mid-Columbia Coordinating Committee. Spill should begin and end at the direction of the Committee, and should be provided at a minimum rate of 31 kcfs consistent with the 2000 spill program.

Rocky Reach. This project is still under the authority of the Mid-Columbia FERC proceedings, despite incomplete Habitat Conservation Plan Development. Chelan PUD should coordinate project spill with fishery managers at the direction of the Mid-Columbia Coordinating Committee. Spill should begin and end at the direction of the Committee, and should be provided at a minimum rate of 20% of daily average flows.

Wanapum. Spill should be provided as specified by the 2000 Spill Memorandum of Agreement (MOA) between Grant PUD and the Joint Fishery Parties, as modified by mutually agreeable research. The Agreement specifies that Grant will spill 43% of daily average flow in the spring and 49% of daily average flow in the summer to pass 95% of the juvenile migrants and meet an 80% FPE and 95% survival standard estimate. The beginning and end of spring spill is determined by the Mid-Columbia Coordinating Committee and the beginning of summer spill is June 15 or when fish are present, whichever occurs first and ends between August 15 and August 30 based upon in-season monitoring.

Priest Rapids. Spill should be provided as specified by the 2000 Spill Memorandum of Agreement (MOA) between Grant PUD and the Joint Fishery Parties as modified by mutual agreement for research. The Agreement specifies that Grant will spill 61% of daily average flow in the spring and 39% of daily average flow in the summer to pass 95% of the juvenile migrants and meet an 80% FPE and 95% survival standard estimate. The beginning and end of spring spill is determined by the Mid-Columbia Coordinating Committee and the beginning of summer spill is June 15 or when fish are present, whichever occurs first and ends between August 15 and August 30 based upon in-season monitoring. Spill at Priest should be increased by an equal amount of spill foregone at Wanapum if total dissolved gas restrictions limit Wanapum spill from achieving MOA required percentages.

Table 3. 2004 River Operations Plan Spill Program

Project	Biological Opinion Spill Spring	CRITFC Plan Spring	Biological Opinion Summer Spill	CRITFC Plan Summer
BON				
Day	75 kcfs	120 kcfs	75 kcfs	120 kcfs
Night	120-150 kcfs (Cap)	120-150 kcfs (Cap)	120-150 kcfs (Cap)	120-150 kcfs (Cap)
TDA				
Day	40% of flow	50% of flow	40% of flow	50% of flow
Night	40% of flow	50% of flow	40% of flow	50% of flow
JDA				
Day	0	30%	0	30%
Night	60% flow or max 180	45% vs. 60% (BiOp)	60% of flow	60% vs. 30%
MCN				
Day	0	50%	0	50%
Night	Gas Cap	Gas Cap	0	50%
IHR				
Day	45 kcfs	45 kcfs	0	45 kcfs
Night	100 kcfs	~50% flow vs. 100 kcfs	0	~50% flow vs. 100 kcfs
LMN				
Day	~50% of flow variable	40 kcfs (Gas Cap) vs. ~50% flow	0	30 kcfs vs ~50% flow
Night	~50% of flow variable	40 kcfs (Gas Cap) vs. ~50% flow	0	40 kcfs (Gas Cap)
LGS				
Day	0	45 kcfs (Gas Cap)	0	30 kcfs vs. ~50% flow
Night	45 kcfs (Gas Cap)	45 kcfs (Gas Cap)	0	45 kcfs (Gas Cap)
LWG				
Day	0	22 kcfs vs. 60 kcfs	0	22 kcfs vs. 60 kcfs
Night	60 kcfs (Gas Cap)	22 kcfs vs. 60 kcfs	0	22 kcfs vs. 60 kcfs

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Attachment 2

2004 Hanford Protection Operations to Reduce Juvenile Hanford Reach Fall Chinook Stranding and Mortality

Power peaking causing flow fluctuations from federal and FERC licensed dams in the mid-Columbia River can be extreme (Figure 3), with shoreline water levels varying up to 13 feet over a 24 hour period. When this occurs during the early emergence and migration of Hanford fall chinook from redds, hundreds of thousands of fry are stranded in pools or other entrapments left by the receding river. Fry are susceptible to avian or fish predation, thermal shock, stress and desiccation. Most of the significant stranding occurs with shoreline fluctuations of 1-3 feet (Wagner et al. 2000). Fluctuations at flows of 120 kcfs and under are especially problematic because they dewater significant shoreline areas and cause greater risks of stranding (Table 4). Due to 2003 drought conditions, flows are likely to be in this range. Thus, CRITFC recommends no more than plus or minus 10 kcfs changes in mainstem flows in the Reach over a 24 hour period measured from noon to noon the prior day.

Biological and hydrological monitoring of the stranding has occurred since 1998 with funding provided by BPA and Grant PUD. The tribes and fishery agencies initially recommended that ever increasing or stable flows be provided in the Reach, consistent with the recommendations of the NPPC's Independent Scientific Advisory Board (Williams et al. 1998). In the CRITFC tribes' *Spirit of the Salmon* restoration plan, fluctuation of no more than 10 % of the previous day's average flow in the Reach was recommended. However, the federal and mid-Columbia FERC power operators claimed that this operation could not be accomplished because of power needs. Instead they offered regimes that targeted flow fluctuations to plus or minus 20-40 kcfs over the previous 24-hour flows. Tribes and fishery agencies were left with no recourse and could but monitor the dead and stranded salmon over the next three years.

In 1999-2001, the federal and mid-Columbia FERC power operators implemented an operational regime aimed at limiting flow fluctuations to reduce stranding. In 1999, the operators attempted to keep flow fluctuations within a plus or minus 20 kcfs range. In other words, the river flow levels from Priest Rapids dam could fluctuate up to 40 kcfs in a 24-hour period. The estimated fry "at risk" of mortality¹⁰ from these levels for 17 miles of the Reach (about one third of the Reach) in 1999 was about 382,000 and about 255,000 in 2000. The confidence intervals around these estimates were wide because more sampling effort is needed. The overall annual fry production for the Reach has been estimated by WDFW as 16-27 million salmon.¹¹ The operators believed that these losses were acceptable as a cost of doing business for regional power production. To date, no mitigation or compensation for these losses has been offered by the operators.

¹⁰ "At risk" are fry that have been stranded and are not likely to get passage back to the river in time to avoid predation, thermal shock or other mortality.

¹¹ The reader should note the difficulties and uncertainties in deriving these estimates in footnote four and text below.

In 2001, the operators wanted greater power peaking flexibility, thus, they proposed a flow fluctuation of 40-80 kcfs in a 24-hour period. Given the extreme low flow conditions, with the second worst runoff conditions in the 70-year record, CRITFC objected to this flow band and proposed no more than a 10 kcfs fluctuation in a 24 hour period. The fishery agencies and operators agreed to proceed with up to a 40-80 kcfs band. The result was more than a four-fold increase for “at risk” fry or an estimate of about 1.6 million fry.

Based upon 1) review of the four years susceptibility data, 2) additional information supplied by the USFWS on dewatered areas below Priest Rapids Dam and, 3) taking into account likely 2003 Hanford Reach flow regimes from 50-200 kcfs, we recommend the specific operations provided below. These are offered to reduce stranding impacts on Hanford Bright fall chinook, ESA-listed steelhead and Pacific Lamprey. In order to achieve the recommended flow bands, the federal operators should limit power peaking from Grand Coulee and release additional water on weekends to assure the FERC-licensed operators can keep the flows within the CRITFC recommended 10-20 kcfs maximum flow fluctuations. During the period of high fry stranding susceptibility, if necessary, the federal operators should rely on other generation sources than Grand Coulee to meet power contract obligations to reduce flow fluctuations. In turn, the Mid-Columbia FERC operators, in particular Grant PUD, will have to fill reservoirs on Fridays to assure that appropriate Reach flows would be maintained over weekends when reduced power demand and/or flood control operations limit upriver flows from federal dams.

Monitoring of stranding impacts and overall loss estimates for the middle section of the reach will be implemented by Grant PUD and WDFW using similar methods and effort as in 2002. For 2004, CRITFC, WDFW, and the Yakama Nation will expand sampling efforts to the entire Reach based upon a stratified sampling design that focuses on entrapments. The USGS plans on studying behavioral aspects of stranding in conjunction with these efforts.

The following are CRITFC’s recommendations for 2004 operational constraints for flow releases below Priest Rapids Dam to reduce mortality of emerging and rearing juvenile fall chinook in the Hanford Reach. In 2002, a large escapement of adult chinook will create an estimated 39 million fry into the Reach. Due to much warmer temperatures than normal these fry have already begun to emerge from the redds. It is critical that the following criteria be implemented by the federal and Mid-Columbia PUD operators to protect this significant productivity.

2004 Hanford Juvenile Fall Chinook Flow Recommendations

Starting Program Operating Constraints

Seining of the six established index sites will be conducted three days per week (Monday, Wednesday, and Friday) beginning one week prior to the estimated start of emergence. Once a daily total of 50 sub-yearling fall chinook salmon fry are captured, a daily flow fluctuation constraint of 40 kcfs would be imposed. This constraint will continue until a daily total of 100 fry are captured from the index sites at which time the following proposed flow constraints will be implemented. After the 100 chinook criteria have been met, index sampling would be decreased to once weekly (Wednesday).

When PRD daily discharge is between 36 and 80 kcfs.

When average daily discharge at Priest Rapids is between 36 and 80 kcfs, the mid-Columbia projects will limit flow fluctuations to no more than 10 kcfs in a 24-hour period.

- Flow bands between 36 and 80 kcfs dewater the most area with the least amount of fluctuation and have the most potential for catastrophic fish kills.
- River configuration - long shelves, and shallow water entrapments, substrates that heat up or drain quickly.

When PRD daily discharge is between 80 and 110 kcfs.

When average daily discharge at Priest Rapids is between 80 and 110 kcfs, the mid-Columbia projects ¹² will limit flow fluctuations to no more than 10 kcfs in a 24-hour period.

- Flow bands between 80 and 110 kcfs hold optimal rearing habitat. Data suggests these areas hold large entrapments and some stranding sites including backwater sloughs with good rearing habitat.
- These flow bands are located at the upper most reaches of the lower river shelves. Evaluation years 1999 and 2000, showed the highest susceptibility areas between 80 and 120 kcfs.

When PRD daily discharge is between 110 and 140 kcfs.

When daily average discharge is between 110 and 140 kcfs, the mid-Columbia projects¹ will limit fluctuations to no more than 20 kcfs in a 24-hour period.

- Data suggests that flow bands between 120 and 190 kcfs offer reduced susceptibility but not in the reach directly below Priest Rapids Dam.

¹² The mid-Columbia projects refer to Grand Coulee, Chief Joseph, Wells, Rocky Reach, Rock Island, Wanapum and Priest Rapids that are operated under mid-Columbia hourly coordination agreements.

- River configuration - steep banks, area of exposed shoreline drop significantly between 110 and 140 kcfs.

When PRD daily discharge is between 140-170 kcfs

When daily average discharge is between 140 and 170 kcfs, the mid-Columbia projects¹ will limit fluctuations to no more than 20 kcfs in a 24 hour period.

- Data suggests that flow bands between 120 and 190 kcfs offer reduced susceptibility in the SHOALS reach, but not in the reach just below Priest Rapids Dam.

When PRD daily discharge is 170 kcfs and above

When daily average discharge is 170 and above, the mid-Columbia projects¹ will limit fluctuations to no more than 20 kcfs in a 24-hour period. A minimum hourly flow of 150 kcfs will be maintained.

- Constraints will protect the backwater areas of the sloughs (Hanford Slough and White Bluffs Slough) from dewatering.

Ending Program Operating Constraints

CRITFC and WDFW recommend that flow constraints be terminated after the accumulation of 1400 temperature units (TU) past calculated end of spawning under the Vernita Bar Settlement Agreement.

- Evaluations from 1999, 2000, and 2001 show that susceptibility drops significantly after 1200 TU's and after 1400 TU it is assumed that susceptibility has reduced to allow for termination of constraints. The last fish found stranded and entrapped in 1999 and 2000 fell relatively close to 1400 TU's. The 2001 evaluation showed fish becoming entrapped and stranded past this deadline but at decreased rates.

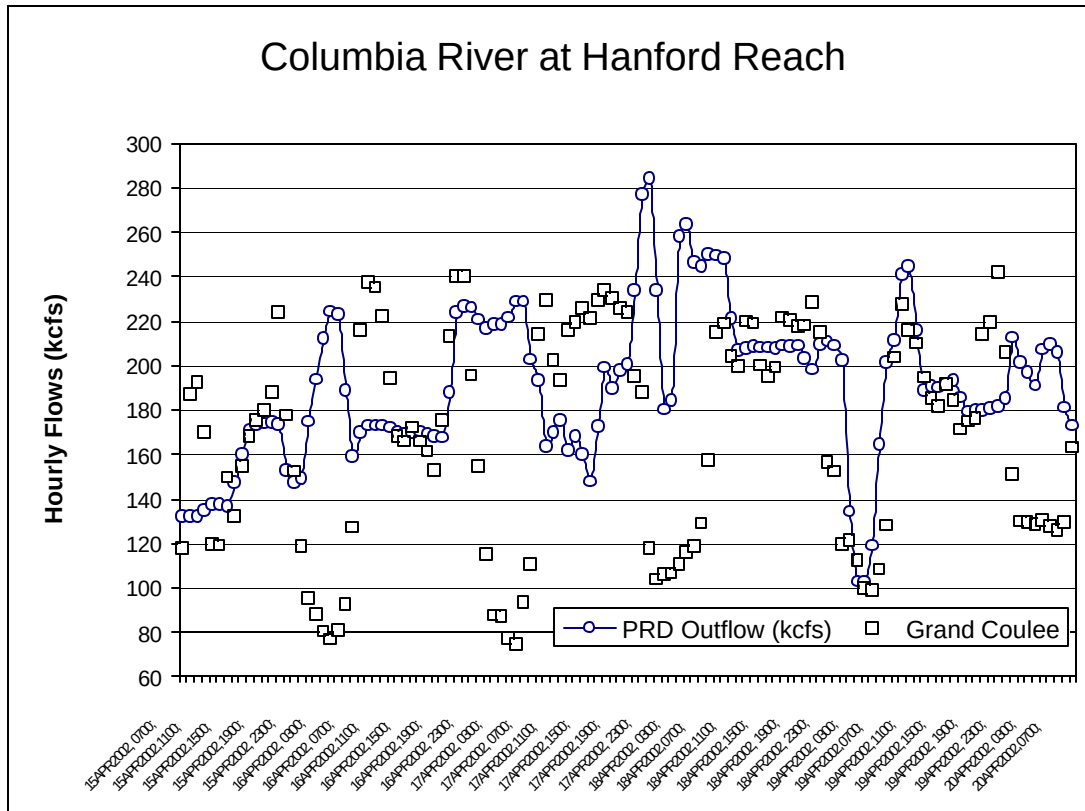


Figure 3. Hourly flows in the Hanford Reach during the 2002 out-migration.

Table 4. Flow bands and number of stranded and entrapped juvenile fall chinook salmon found on the Hanford Reach of the Columbia River in 2002 (From WDFW 2003).

Flow Band (kcfs)	Total Shoreline Within Study Area (hectares)	Number of Flow Fluctuations During Season	Shoreline Exposed During Season (hectares)	Number of Plots Sampled	Area Sampled (hectares)	Number of Plots with Chinook	Number of Chinook Found at Risk	Number of Chinook Found at Risk per Hectare
50-80	1,234.64	2.98	3,683.97	28	7.03	12	98	13.93
80-120	1,203.43	4.90	5,895.14	36	8.84	6	65	7.36
120-160	701.12	18.54	12,997.51	51	15.42	7	15	0.97
160-200	767.48	20.00	15,347.91	44	10.16	3	8	0.79
200-240	691.96	9.82	6,797.96	27	7.21	0	0	0.00
240-280	569.80	8.83	5,031.03	8	2.18	1	2	0.92
Total	5,168.43	65.07	336,320.91	194	50.84	29	188	3.70

Attachment 3

BPA-Idaho Power Company Water and Power Exchange

From the late 1980's until April 2001, BPA and Idaho Power Company (IPC) were engaged in annual exchange contracts for water and power. Typically, IPC would store water in the Hells Canyon Complex (Complex) in early spring and BPA would provide a power exchange to IPC. This storage would be released later in spring for salmon. The power generated from this release was sent back to BPA.

In the late summer, IPC would release storage and generate power, which would be sent to BPA. BPA would replace this power in September, which allowed IPC to store water to meet project elevations and assure that enough water was on hand for Hells Canyon fall chinook spawning.

In 1995, after release of the 1995-1998 FCRPS Biological Opinion, firm water exchange volumes and timing were established in contracts to meet Opinion RPAs. A five-year contract was finalized for power and water exchanges in 1996. In early May, IPC would release 110 KaF, and send power to BPA. BPA would send the power back to IPC the latter half of May and refill the Complex. In summer, IPC would 1) release 237 KaF from the Complex and 2) shape and pass 427 KaF of Bureau of Reclamation water through the Complex. The power generated from these releases was sent to Bonneville. Bonneville would send exchange power for the 237 KaF to IPC in September and send exchange power for the 427 KaF back to IPC the following winter.

Because power markets are more lucrative in summer months, BPA claimed that IPC gained a substantial financial advantage in the contract arrangement. BPA negotiated with NMFS to have the power exchange contract omitted from the 2000 Biological Opinion and the five-year contract expired on April 1, 2001. During 2001 and 2002 negotiations with the federal operators, the CRITFC tribes, Oregon and Idaho all pressed BPA to renew the exchange contracts with IPC. BPA claimed that they were at a financial disadvantage, thus, were unwilling to renew the contract, despite long negotiations with IPC that involved the Idaho Governor's office.

Without the contract in place, it appears difficult but not impossible for IPC to: 1) assure that the 427 KaF or additional upper Snake water will be shaped and passed through the Complex, 2) assure that the 110 KaF and 237 KaF will be provided in a timely manner for fish. This would assure that salmon obtain the water critical to their migrations, habitat and survival.

IPC recently released a draft license application for relicensing of the Complex, and is still engaged in ESA consultation for the Complex. In CRITFC comments on the draft license application, CRITFC analyses utilizing the GENESYS hydrologic model¹³ indicate that, in

¹³ The GENESYS model was developed by the Northwest Power Planning Council as a basinwide hydrologic model. It incorporates water routing thorough the Federal Columbia River Power System using a data set of 50 years of historical runoff (WY 1929-1978).

nearly all water years on record, a discrete 450 KaF ¹⁴ could be delivered downstream from Brownlee storage primarily in July for anadromous fish to meet the Opinion's Lower Granite target flows and the recommendations in the tribal recovery plan, *Wy-Kan-Ush-Mi Wa-Kish-Wit* (Nez Perce et al. 1995). These analyses show that in nearly all years, inflows into the Complex leave enough water to provide a minimum of 9.5 kcfs for fall chinook spawning flows in late September through early November, with spawning flows up to 13 kcfs possible in higher flow years. In addition, delivery of Complex water in July to the lower Snake would allow more judicious use of Dworshak Reservoir storage for temperature control. Idaho Power should conduct analyses that examine the potential for supplying 450 KaF, primarily in July, for flow augmentation in all water years while assuring that at least 9.5 kcfs is available for fall chinook spawning and rearing flows below the Complex.

Renewal of the BPA-IPC water exchange contract is important to facilitate vital flows downstream of the Complex for listed Snake River chinook and steelhead and endangered Snake River sockeye. Nonetheless, IPC has an obligation as a competent licensee to provide equitable treatment for salmon by providing the above storage volumes for flow augmentation.

¹⁴ The 450 KaF should be contributed directly from Brownlee Reservoir. Bureau of Reclamation water from the upper Snake could be passed through in addition to the 450 KaF from Brownlee.

Attachment 4

2004 Fish Facility Mitigation Projects

- 1) Bonneville Dam. Automated Chain gates at Bonneville Powerhouse I sluiceway. This would allow for improved operation and better compliance with sluiceway criteria. The sluiceway has been shown to be a passage route for both juveniles and kelts; insuring that the sluiceway stays in criteria assures better access and utilization of this passage route.
- 2) Bonneville Powerhouse Two. Adult fishway trash rake system. Currently the rack and the rakes are not properly meshed, thus trash raking does not work well. The fishway units have to shut down to allow debris to float off. This problem has been ongoing for several years. In the past, during the adult passage season, debris build-up in the diffusers led to a failure of the system, and the ladder was forced to operate with only the emergency auxiliary water-supply system for nearly a month and fishway criteria was not met. Purchase of a proper rake system that meshes well with the rack will help to reduce the debris problem and should halt the operation of having to turn off the fish units at night to remove the debris. This on/off operation can lead to premature failure of the units and can possibly affect night passage of adults.
- 3) John Day Dam- North shore fishway pump. The fishway pump is currently unable to provide entrance criteria for both north shore adult entrances due to a potential constriction in the hydraulic conduit. Funds could be used to determine a remedy for this situation.
- 4) John Day Dam- Full Flow PIT-Tag detection on the juvenile transport flume. Currently, adults that fallback over the dam can spend extended periods of time in the juvenile system since there is no way to move them from the channel. Several hundred adults are removed each time the system is dewatered. This dewatering is stressful to adults and has led to mortality. A full flow PIT-Tag detection system would allow for operation of the juvenile facility so that adults would not hold in the dewatering section of the transport flume. Further, juvenile stress would be reduced since the dewatering structure would not need to be operated.
- 5) McNary Dam juvenile screen system outfall. Concern has been raised about increased avian predation in conjunction with the outfall. Methods for reducing predation should be designed, implemented and evaluated for effectiveness.
- 6) Bonneville Dam. Bradford Island adult ladder repair and modernization. Currently the Bradford Island ladder is the oldest in the Columbia River Basin and renovation and repairs are underway. Increased funding would assure that the work would be expedited. This ladder system passes a significant portion of the entire Basin's returning adults, thus, expedient repairs are critical.



COLUMBIA RIVER INTER-TRIBAL FISH COMMISSION

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October 7, 2003

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North Pacific Division
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P.O. Box 2870
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Jim Ruff
NOAA Fisheries
525 NE Oregon Street
Portland, Oregon 97232

SUBJECT: Comments on Draft 2004 FCRPS Water Management Plan for the Federal Columbia River Power System

Dear Ms. Henriksen and Mr. Ruff:

On behalf of its member tribes, the Columbia River Inter-Tribal Fish Commission (CRITFC) appreciates the opportunity to comment on the draft 2004 Water Management Plan (DWMP) for the federal hydro system. We believe that significant information that is necessary to develop the plan has yet to be available or materialize. Thus, it is premature at this time to be considering many DWMP foundation issues. In the future, we recommend that the region expend precious fish recovery resources only once in developing the plan, when critical information is available in mid-January. This information includes but is not limited to:

- The first official water supply forecast is not released until January 1, 2004. Water supply is integral to the draft plan.
- Research results for many hydrosystem and fishery studies that will highly influence draft plan measures are not currently available.
- Other issues such as new transmission capability are still under development.

We have the following additional general comments on the DWMP.

First, the conduct of the Technical Management Team does not allow the free exchange of information between the fishery managers and the federal operators of the FCRPS. This is

because power marketing representatives are allowed to observe and “listen in” on discussions regarding river operations that influence power marketing and sales, which may place federal operators to an economic disadvantage. This leads the federal operators to restrict fishery manager access to important river operation information, such as forecasted daily reservoir outflows and reservoir elevations to the fishery managers. Thus, CRITFC and other fishery managers cannot access critical information to plan operations to best benefit fish populations before and during the fish migration season.¹⁵ To address this problem, we recommend that the federal operators convene a routine preseason and during season forum that excludes the marketing representatives, but allows the free exchange of hydrological and other information to the tribes and other fisheries managers. We suggest that the final water management plan (WMP) include a reference to this forum.

Second, we strongly recommend that the Corps’ Annual Fish Passage Plan be appended to the final WMP. The FPP has specifics on spill operations, transportation, research and fish facility operations that are intricately tied to the WMP. Both of these documents are called for by the 2000 Biological Opinion; it does not make sense that they are kept in separate forums and never formally integrated.

Third, although the CRITFC tribes officially withdrew from the NMFS’ Adaptive Management Forum in 1997,¹⁶ the federal operators and federal fishery agencies still have a trust responsibility to formally consult with the CRITFC tribes before implementing actions, such as the water management plan, that will impact their trust and treaty resources. CRITFC can assist the federal agencies in arranging these consultations. The final WMP should contain a specific section indicating how the federal agencies intend to coordinate and consult with the tribes regarding all actions that will affect their treaty trust resources as required by the 1998 Secretarial Order for the Departments of Commerce and Interior, BPA’s obligations to tribes, and the Corps’ Nationwide Policy for Native American Tribes.

Fourth, the final WMP should include reference to and the details of the Detailed Operating Plan and annual PNCA planning hydro-regulations and non-power fishery constraints data submittals as the overarching plan to operate the FCRPS. The Corps and Reclamation’s respective data submittals create the foundation for real-time decision making for river operations. Thus, while real-time river operations may be “tweaked” by the TMT, the actual plan to operate the river has already been established the February before the water year begins by the PNCA parties.

¹⁵ This information includes forecasted elevation at storage reservoirs and outflow information. Without this information, fishery managers cannot make well-informed decisions about flow management for fishery needs.

¹⁶ In a letter dated May 16, 1997 from Ted Strong, CRITFC Executive Director to Will Stelle, NMFS Regional Director, CRITFC informed the federal government that it would, “... no longer participate in the NMFS adaptive management process, except as necessary to obtain information on system operations and configuration that cannot otherwise be obtained.” In reaching this conclusion, CRITFC stated, “It is absolutely inappropriate for the policies of the United States, with respect to fulfillment of our treaties, to be determined by technical committees of biologists and engineers.” CRITFC recommended that, “NMFS and the other federal agencies work with the Commission’s member tribes to establish meaningful government-to-government relationship between the federal agencies and the tribes.” And, “Consultations must be structured to reach agreement between NMFS and the tribes on policy issues before technical issues are referred to technical committees”.

Fifth, there is not enough emphasis on water quality in the plan. Other than a section on dissolved gas, the plan is essentially silent on water quality actions to establish preferred temperatures and turbidity for the survival and productivity of anadromous fish. For example, water temperatures at the McNary juvenile bypass facility violate standards for an extended period of time every summer. There is no mention of point source pollution from the FCRPS (i.e., leaks from turbine and other equipment on dams).

Sixth, there is no mention of load following or power peaking operations in the plan. Such operations can cause desiccation of salmon redds, stranding of juvenile anadromous and resident fish and cause delay of juvenile and adult salmon. The final plan should acknowledge the impacts of power peaking on fish and offer management actions to reduce these impacts, such as limited peaking to some small percentage of the predicted base flow for the month. Such actions as experimental measures were offered by the ISAB in Report 2003-1, *Review of flow augmentation: Update and Clarification*.

Specific Comments

Section 1.1: Preparation of Plans

The DWMP does not refer to the tribes' *Spirit of the Salmon* (Nez Perce et al. 1995) anadromous fish restoration plan that has specific measures for river operations for all anadromous fish. As in the 2000 FCRPS Biological Opinion, the federal agencies should include reference to the tribes' plan, consistent with the federal agencies' obligations to consult and provide trust responsibility to the tribes.

Section 1.2: Strategy

This section lacks any reference to a basin-wide, ecosystem approach to increase productivity of listed and unlisted anadromous and resident fish (see Williams et al. 1996). Simply measuring reach survival of migrating juvenile fish as a performance standard is not adequate to restore productivity. For example, delayed mortality from hydrosystem passage does not occur until after the fish leave the last dam and enter saltwater (Budy et al. 2002). Further, there is no mention of increasing adult survival through the hydrosystem and increasing spawning success, two metrics essential to increasing anadromous fish productivity (Lichatowich and Cramer 1979). This section should be expanded beyond mere reach survival-performance standards.

Section 1.2.1. Hydro Strategies and Substrategies

Actions to meet water quality standards are needed for this section. Among other things, actions should include selected water releases from Dworshak Reservoir, investigation of selected water releases from Lake Roosevelt, keeping fish out of dam bypass and transportation systems under elevated temperature conditions that exceed standards, avoiding trapping adult fish under elevated temperature conditions that exceed standards, and monitoring of disease at dams under elevated temperature conditions. A high CRITFC priority is establishment of a

peaking (i.e., normative) hydrograph that provides for the environmental and passage conditions that support anadromous fish productivity to recovery goals (Williams et al. 1996). This is not mentioned in the DWMP.

Section 1.3: Non-Biological Opinion Actions

Tribal fishing should be listed for the John Day and The Dalles pools—not just Bonneville, and provision for a summer fishing season in July should be included. We recommend that the final WMP be restricted to fish and wildlife related actions, flood control and navigation actions. Recreational actions are lower priority and should not conflict with the other actions.

Section 2.1: Hydro-System Priorities

The action agencies must consult with NMFS and USFWS and the tribes before establishing priorities in the plan. We recommend that:

- The April 10 refill operation of reservoirs to their upper rule curve should be priority one.
- Refill of reservoirs to the June 30 should be priority two.
- Operation of storage reservoirs to meet criteria for bull trout and sturgeon as priority three.

Meeting these priorities should take precedence over meeting power generation needs. If flood control is operated with flexibility and a reasonable minimum spawning flow for chum is established and maintained through reduction of lower river power peaking, it is not necessary to consider reducing Hanford Reach flows established to protect thousands of fall chinook redds. The 2000 FCRPS Biological Opinion, through adoption of the 1995 FCFPS Biological Opinion, established scientific evidence why the flow targets must be met as the minimum to avoid jeopardy to listed stocks. Meeting flow targets must be given a higher priority than meeting minimum elevations in reservoirs at the end of August and not the other way around as stated by the DWMP.

Adaptive management is not, as described in the DWMP, “.... The concept that the operation of the system should be adjusted based on acquired knowledge about current conditions in the system...” but is instead involves management actions that will increase the ability to discriminate between alternative states of nature (Hilborn 1987). This requires that exploratory, probing actions be employed that provide information about the true state of nature. An example of this probing could be that no fish are transported in an average flow year. The final WMP should reflect this difference in the use of the terminology. We concur with the ISAB (2003) that, “... decisions to implement actions that have any potential for adversely affecting an ESU will be required to satisfy a burden of proof that no harm is likely to be done as a result of the action.”

We disagree with the statement that, "...[t]he use of water for any one fish species or project purpose will most likely affect the amount of water available for other fish species or project purposes." This is not correct. For example, storage added to natural runoff will provide good migration conditions for a particular year class for all anadromous fish stocks that are present. On the other hand, filling of reservoirs for recreational purposes, such as boat races, will increase water particle travel time through those reservoirs and delay fish migrations. The final WMP should correct this broad, incorrect statement.

Because chum spawning requirements affect storage and refill for all anadromous fish the following year, a precautionary approach should be used when setting chum flows in November and December. Preseason forecasts, groundwater storage and the previous year's runoff and meteorological conditions should be carefully considered when setting minimum chum flow spawning regimes. For example, the University of Washington Climate Impacts Group has projected a 110 MAF January- July runoff at The Dalles for 2004, while CRITFC has independently projected a 104 MAF runoff for the same period. Use of this information and the status of deficient groundwater supplies from the below normal runoff in 2003 supports limiting minimum chum spawning flows below Bonneville Dam to 120 kcfs. Power peaking from load following tends to complicate chum spawning and the maintenance of flows to protect chum redds. CRITFC strongly encourages the Corps and the other federal operators to consider reducing load following at Bonneville Dam to reduce these impacts.

The 2000 FCRPS Biological Opinion requires flow and spill measures to increase the survival of listed anadromous fish in order to avoid jeopardy and to meet tribal trust obligations, since these fish must pass many dams and reservoirs. The action agencies must consult, not coordinate, with NMFS, USFWS and the tribes on all aspects of river operations that affect this very high priority. The final WMP should reflect these responsibilities.

Section 2.2: Conflicts

In order to meet the 2000 Biological Opinion river operations requirements and other requirements, flood control rule curves should be modified. There is additional flood control space located in Canadian reservoirs that is available for purchase that could be utilized as part of this modification.¹⁷ The DWMP fails to include relaxing flood control management in Libby, Dworshak, Brownlee and other storage reservoirs in the upper Snake River. Further, several state-of-the-art advanced weather and climate diagnostic tools are available to be used to modify flood control, especially when conducting long-range water planning.¹⁸ These include: probabilistic streamflow and climate forecasts, multivariate ENSO (El Niño Southern Oscillation) index, ENSO Risk Model, and sea-surface temperature departure analysis. As mention above, the University of Washington Climate Impacts Group now produces a one-year lead ensemble forecast for the Columbia at The Dalles that should be considered. A

¹⁷ This space of 500 kaf, is noted in the 1995 FCRPS Biological Opinion.

¹⁸ RPA Number 35 in the 2000 FCRPS Biological Opinion specifies use of these new technologies that, "...[w]ould enhance system response and afford greater precision in system flood control operations". To our knowledge, the federal operators are not using available technologies that could make available more fish flows.

comprehensive package of the above climate forecast tools is needed to better manage all Columbia Basin reservoirs. These methods are recommended in the 2000 FCRPS Biological Opinion and should be included in the final plan.

Section 2.2.2: Spring Flows vs. Project Refill

CRITFC continues to advocate for a natural peaking flow or normative hydrograph concept. For the past several years we have offered the federal operating agencies a detailed water management plan that meets the dual objectives of a peaking hydrograph and meeting reservoir refill levels. We have yet to receive any written comments on these plans. Again, we ask the federal operators to review our River Operations plans and consider using them as a paradigm to meet spring and summer flows and reservoir elevations.

Section 2.2.3: Chum Tailwater Elevations vs. Spring Flows

We responded to this issue in our above comments.

Section 2.2.4: Sturgeon Pulse vs. Summer Flows

We are unsure as to how the sturgeon operation comports with VAR-Q at Libby that is likely to occur in WY 2004. The final WMP should carefully explain this issue.

Section 2.2.5: Fish Operations vs. Other Project Uses

If non-power constraints are identified in detail and specified in the 2004 PNCA planning, there should only be minimal in-season conflicts between fish and power operations. Spill levels and flows should be clearly specified from the PNCA non-power constraint in the 2004 final WMP. Irrigation demands and recreational elevations can and should be modeled prior to the water management season to determine if conflicts will exist. In any case, they should have a lower priority than meeting fish flows under the Endangered Species Act. If preseason runoff forecasting tools are utilized and an increased level of precision and detail is applied to planning to avoid conflicts before the fish passage season begins, in-season conflicts should be minimal and all parties involved with water management actions will know beforehand what to expect.

Section 2.2.6: Conflicts and Priorities

As mentioned above, CRITFC's member tribes withdrew from the NMFS' Adaptive Management Forum several years ago. The regional federal executives have a trust responsibility to meet with our member tribes' government officials before and during the fish passage season with respect to FCRPS operations.

Section 2.3: Emergencies

Short-term FCRPS emergencies that impact fish flows, spill and dam operations over a few hours or days should be avoided. If they do occur, tribal technical and policy representatives should be immediately notified and consulted and appropriate in-kind mitigation should be implemented as soon as possible. In no case should fish operations be interrupted due to financial reasons such as poor financial planning.

Section 4.1.1: Reservoir Passage

The Corps operated Lower Snake reservoirs to MOP+1.5 in 2003, contrary to the Biological Opinion. CRITFC expects that Lower Snake reservoirs will be operated within one foot of MOP in 2004.

Section 5.1: Flow Objectives

The 1995 FCRPS Biological Opinion stated that the minimum flows were set as bare thresholds to avoid jeopardizing the listed salmon ESUs. If the minimum flows are not met, then the listed species are placed in jeopardy. Thus, every effort must be made to meet the minimum flows through modification of flood control, and purchase of flood control space and purchase of power produced off of the river. This includes meeting the minimum flows during weekends. To migrating salmon that need flows for critical life history functions, a weekend is the same as a weekday. The FCRPS must be adjusted to meet the needs of salmon, instead of salmon trying to exist in the face of federal operators running the FCRPS to achieve financial gains. Further, substantial numbers of juvenile salmon migrate in September (FPC 2003 unpublished data) and the majority of adult salmon and steelhead migrate in September, so serious consideration should be given to extending salmon flows and spill through September.

As noted elsewhere in these comments, in CRITFC' *River Operations Plan*, we have developed a normative peaking hydrograph that in general meets seasonal target flow objectives and reservoir refill objectives. The normative peaking hydrograph also provides the physical habitat parameters, such as sediment transport, nutrient cycling, enhancement of mainstem and estuarine riparian corridors and water quality elements critical to salmon life histories (Williams et al. 1996). Using this paradigm, with trended-and-corrected Water Supply Forecasts during the fish passage season, the Federal Operators can deliver more water in a timely manner to better coincide with the salmon's life cycle and better protect listed and unlisted salmon and other anadromous fish. We recommend that these paradigms be tested for the FCRPS in WY 2004.

Section 5.2 All Storage Projects

Available research indicates a direct flow-survival relationship for juvenile steelhead, that are spring migrants (NMFS 1998). For example, Mullan et al. (1992 in NMFS 1998) regressed smolt-to-adult returns of Wells hatchery steelhead against spring flows which indicated that flows over 140 kcfs resulted in smolt-to-adult returns that were three times higher than for lower flows. Berggren and Filardo (1993) also showed a strong relationship with steelhead migrations and increased flows. Under low flows in 2001, only 4% of Snake River steelhead were estimated to survive, the survival rate in 2002, a near normal runoff year, was about 26%. All

efforts, described above, must be made to achieve spring flows and reservoir refill. All of these elements should be included in the final WMP.

Brownlee and upper Snake reservoirs are not listed in this section. In the final WMP, these storage reservoirs should be listed and operations for fish should be specified. Included in these specifications should be the steps that Reclamation is taking to guarantee that the 427 Kaf of upper Snake flow augmentation will be delivered in a timely manner for 2004 fish migrations.

Section 5.8.3: Dworshak Summer Operations

Water from the upper Snake reservoirs and the Hells Canyon Complex should augment natural flows. BPA should enter into a water-power swap with Idaho Power to provide timely summer flow augmentation from the Complex. Dworshak should be prioritized for temperature control, not flow augmentation. Summer drafts should be limited to 1535 feet by August 31 unless additional water is needed for temperature control. Dworshak should be targeted for refill to msl 1600 by June 1 or earlier and be targeted for msl 1520 feet by mid-to-late September. A monitoring program should be put in place to evaluate effectiveness of Dworshak operations. The Corps should provide the Nez Perce Tribe with financial resources to protect cultural sites and resources during reservoir draw downs. All of these elements should be included in the final WMP.

Section 6.0 Hydrosystem Substrategy 2.3: Spill operations for project passage

The final WMP should describe the 120% total gas pressure as conservative, because, among other things, salmon can and do achieve depth compensation in the river from elevated levels of dissolved gas. This comports with the relevant regional research (Backman et al. 2002 and Backman and Evans 2002), a risk assessment by the regions' fishery managers (Columbia Basin Agencies and Tribes 1995) and the water quality appendix to the 2000 FCRPS Biological Opinion. All of these indicate that total dissolved gas levels cause little harm up to 125% TGP. Thus, spill management should not be overly concerned about some excursions above 120% TGP.

Recent data obtained from turbine survival and transportation studies at McNary Dam indicate that turbine mortality of summer migrants is very high and that transportation, with respect to smolt-to-adult returns is at best the same as in-river passage may be worse. Serious consideration to implementing a spread-the-risk passage action ¹⁹ at McNary for summer migrants should be included in the final WMP.

Recent data for spill at Bonneville Dam indicates that adult fallback is not substantially affected by daytime spill. The final WMP should incorporate a 24-hour spill program at Bonneville without a daytime spill cap.

¹⁹ This action would entail summer spill at McNary as necessary to pass 50% of summer migrants over the spillways.

Bonneville spill for Spring Creek National Hatchery fall chinook is not mentioned in this section. The final WMP should include a 3-7 day spill program in March to protect this stock of international importance.

Section 7.1.3: Libby Storage Reservation Diagram

The December 31 preemptive draft at Libby to msl 2411 feet should not be implemented in this year to leave additional water in storage for WY 2004. The final WMP should contain all work that the Corps has accomplished to modify the December 31 flood control draft point.

Section 7.9: Dworshak Draft to 1500 feet

CRITFC does not support any draft below msl 1520 feet. Drafts below this level may reduce refill probabilities the following year and cultural resources are particularly exposed at drawn down elevations and are vulnerable to vandalism and theft.

Section 7.10: Other Reclamation Water Management Actions

The final WMP should incorporate, in detail, what specific actions will be taken in 2004 to reduce illegal water spreading. The Columbia Basin Institute, in its 1994 report on the Columbia Basin Irrigation Project, identified 800 to 1000 Kaf, out of the 2.8 Maf being diverted by the Bureau of Reclamation, that is illegally being misused by some irrigation districts. The upper Snake contribution from Reclamation reservoirs should be specified in the final WMP as a minimum of 427 Kaf.

Section 12.4.1: Kokanee—Grand Coulee

The upper Columbia Tribes have indicated to us that Lake Roosevelt needs to be at msl 1283 by the end of September to allow kokanee spawning access to tributaries. Filling to elevation 1285 feet by October 1 is not necessary for kokanee spawning and such refill could reduce lower river mainstem flows in September that would negatively impact CRITFC' member tribes treaty fisheries.

12.5 Hanford Reach Protection Flows

Flow fluctuations from Grand Coulee and Chief Joseph projects can overwhelm efforts of the mid-Columbia public utility districts to reregulate and stabilize flows into the Hanford Reach. Stable flows in the Reach are vital to protect millions of emerging and migrating fall chinook from stranding and entrapment. The federal operators should work with the fishery managers to limit flow fluctuations during the susceptibility period from late March until early June. These issues should be specifically detailed in the final WMP.

Section 12.9.1: Tribal Fishing

CRITFC's member tribes' treaty fisheries occur in all of Zone 6 (Bonneville to McNary dams). Pool elevation restrictions and steady flows should be provided during tribal fisheries for

all of Zone 6, not just Bonneville Pool. The federal operators have a trust and treaty responsibility to provide this operation. The final WMP should specify these requirements.

Conclusion

CRITFC appreciates the opportunity to review and comment on the 2004 DWMP. We anticipate that the federal agencies will consider and adopt our recommendations for the final WMP. Should you have questions about these comments, please contact Kyle Martin or myself at (503) 238-0667.

Sincerely,

/s/

Robert Heinith
Hydro Program Coordinator

CC: Commissioners, Tribal staffs, tribal attorneys, CBFWA Fish Managers, Regional Executives

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**TECHNICAL MANAGEMENT TEAM
MEETING NOTES
March 3, 2004
CORPS OF ENGINEERS NORTHWESTERN DIVISION OFFICES – CUSTOM
HOUSE
PORTLAND, OREGON**

FACILITATOR’S SUMMARY NOTES ON FUTURE ACTIONS

Facilitator: Donna Silverberg

The following notes are a summary of issues that are intended to point out future actions or issues that may need further discussion at upcoming meetings. These notes are not intended to be the “record” of the meeting, only a reminder for TMT members.

Spring Creek Update:

Scott Bettin, BPA, reported that spill for the Spring Creek hatchery releases began at 8:00 pm on 3/2. The gauge reading at Warrendale showed 105 TDG this morning. As a higher flow than expected has been needed for this operation due to tidal and other influences, BPA requested that the elevation be reduced from 12.7’ to 12.4’. Oregon reported that TDG monitoring will be done where chum redds are residing, currently at elevation 11.3’. The preferred operation for protecting chum redds from gas saturation is one foot above redd spawning areas and no higher than 108% TDG.

ACTION: During the break, Oregon and USFWS coordinated and agreed to the new proposed operation and will continue to monitor gas levels carefully. If a concern develops after talking with field staff, Oregon and USFWS will contact the COE.

Steve Haeseker, USFWS, reported that both this and next week’s sets of hatchery fish are marked and will be studied for routes of passage and survival rates. The release operation for next week is still being coordinated. The agencies coordinating on this issue agreed to a three year operation: spill and study this year and no spill for the next two years (2005-2006) for Spring Creek hatchery releases.

MOP on the Lower Snake River:

John Pigott, chair of the Columbia River Towboat Association, presented information to TMT about the Lower Snake River as an important export corridor. There has not yet been agreement for dredging of the Snake River, so the Towboat Association requested that TMT consider another year of operating at MOP+1 at all the Snake River projects beginning around April 1, in order to provide safety measures. John noted that safety concerns are an issue regardless of the towboaters’ good safety record, and that this has become an increasing concern for the towboaters as well as the Coast Guard.

Kyle Martin offered that while CRITFC’s general policy is to operate at MOP, he will make certain that his commission considers the request put forth today. Kyle will report back to the group next week.

ACTION: TMT will consider the proposed operation and continue discussions at the March 17th TMT meeting.

CRITFC 2004 River Operations Plan:

Kyle Martin provided a hard copy of CRITFC's 2004 River Operations Plan, which is also posted on the TMT website. Kyle offered TMT an overview and answered initial questions that TMT members had about the plan. Bob Heinith will send a cover letter to the Action Agencies requesting a formal review, with comments due by all who wish to comment on March 31st.

WMP Spring/Summer Update:

Cindy Henriksen, COE, reported that the first draft Spring/Summer update has been posted on the TMT website and is available for comment. She noted that some of the information in the update is from last year's data and will be updated in the next draft (e.g. Hanford Reach operations will be updated once an agreement is reached by the parties). "Other Spill" operations were added to include the Chief Joseph/Grand Coulee spill swap. Anyone that has questions on this particular item should contact Jim Adams, the water quality coordinator for the COE. The COE is hoping to finalize the document by the end of March; TMT members are encouraged to provide comments by and at the March 17th TMT meeting.

Operations Update/Fish Status:

BOR: Grand Coulee is at elevation 1260.2'; Hungry Horse is at 3513.5' and discharging to meet Columbia Falls.

COE: Libby is releasing 4 kcfs (minimum) and is just below 2400'. Dworshak is at elevation 1508'; outflow was reduced to minimum on 3/2. The March final water supply forecast from the RFC is not out yet, but the February final and March early bird show a downward trend in water supply.

Salmon Managers: Cindy LeFleur, Washington, reported that the first commercial fishery started yesterday. Fishing is slow as of yet, which is not unusual for this time of the year. Ron Boyce, Oregon, noted that good returns are expected this year.

Next Meeting, March 17th, 9am-noon:

Agenda items:

- WMP Spring/Summer Update
- MOP+1 at Lower Snake Projects
- Unresolved Issues Discussion (from last fall)

1. Greeting and Introductions

The March 3 Technical Management Team meeting was chaired by Cindy Henriksen of the Corps and facilitated by Donna Silverberg. The following is a distillation, not a verbatim transcript, of items discussed at the meeting and actions taken. Anyone with questions or comments about these minutes should call Henriksen at 503/808-3945.

2. CRITFC 2004 River Operations Plan.

Kyle Martin briefed the TMT on CRITFC's 2004 River Operations Plan, noting that a letter requesting formal review and comment will be forthcoming from CRITFC in the next week. Martin noted that the tribes have offered similar plans for the past five years as an alternative to the TMT annual Water Management Plan. He then touched on the following major topics:

The foundation of the plan is a naturally-peaking hydrograph to benefit outmigrating juvenile and returning adult salmon. Its operational goals include faster travel time to the estuary, enhanced water quality in the mainstem and the estuary, and reduced predation

- The plan uses altered flood control rule curves at Mica, Arrow, Grand Coulee, Brownlee and Dworshak to bring about a naturally-peaking hydrograph – in general, CRITFC would have the storage projects at significantly higher elevations than the federal plan by April 15.
- CRITFC is concerned about current flood control operations; a number of storage projects are currently well below their Upper Rule Curve elevations
- Brownlee operations – the CRITFC plan advocates the release of an additional 450 KaF of Upper Snake storage from Brownlee, as well as 237 KaF of Hells Canyon storage. The plan makes the following elevation recommendations for Brownlee: 2077 feet by March 31 (vs. the planned elevation of 2072.5 feet); 2058 feet by April 15 (vs. 2044.8 feet planned). The other Brownlee elevations in the CRITFC plan match the planned operations in the federal Water Management Plan.
- Spill (p. 19) – CRITFC is advocating more spill than the BiOp requires in 2004, as well as an extended spill season (mid-March through mid-September)
- Operate the Mid-Columbia projects to minimize Hanford Reach stranding
- With respect to the Nez Perce/Idaho plan for Dworshak operations, CRITFC would like to see that plan fully implemented in 2004
- With respect to tribal treaty fishing, CRITFC would like the Corps to recognize all of Zone 6, not just the Bonneville pool
- With respect to process, CRITFC believes CBFWA, not the TMT, should be the proper forum for FCRPS operational decision-making.

Martin asked that formal comments on CRITFC's 2004 River Operations Plan be submitted by March 31. How deep would CRITFC take Libby and Hungry Horse this summer? Bettin asked. We would take Libby down to elevation 2441.5 by the end of September, Martin replied; at Hungry Horse, we would draft to 3540 by September 30. But you would take Libby down to 2370 by mid-April? Henriksen asked. That's correct, Martin replied, but the model runs show that Libby would refill by early May. In response to another question, Martin said Hungry Horse operations would follow a similar, aggressive VARQ operation. Bettin noted that Mica Dam is unlikely to refill in 2004, in contrast to CRITFC's more optimistic assumption.

3. Spring/Summer Update.

Henriksen said the first draft of the 2004 spring/summer update is now available via the TMT homepage; she noted that the flow and reservoir elevation information it contains is based on the February final forecast, and will change as the season progresses. Based on this forecast, the 2004 sturgeon flow volume has been calculated at 0.88 MAF; Grand Coulee's summer draft limit would be 1278 feet, Henriksen said. She went briefly through some of the other items that have been changed in the 2004 plan. In response to a question, Tony Norris noted that Reclamation is estimating that 300 kaf will be available for Upper Snake flow augmentation in 2004, similar to what was provided in 2004; the 2004 Upper Snake water supply forecast is running only about 27% of average.

With respect to spill, Henriksen said the Corps had provided its best guess as to what those operations will be in 2004. The main question, of course, is the duration of spill, she said; we have provided estimates of its shape and quantity. The group briefly discussed the planned 2004 Chief Joseph/Grand Coulee spill swap, as well as planned fish passage research.

Henriksen asked that any comments on this document be provided prior to the TMT's next meeting on March 17; she said the Corps hopes to finalize the spring/summer update by March 31. Please let the Corps know if you see anything that needs to be changed, said Silverberg, and we will discuss the update further at the March 17 TMT meeting.

4. Spring Creek Update.

Scott Bettin said Bonneville spill started last night at 8 p.m. in support of the Spring Creek hatchery release. The gauge at Bonneville acts differently once you turn spill on, he said; for that reason, we are releasing 155 Kcfs, rather than 135 Kcfs, to maintain a tailwater elevation of 12.7 feet. He asked that the TMT agree to reduce the Bonneville tailwater elevation to 12.4 feet during the Spring Creek spill operation, to reduce the total flow volume at Bonneville. Rudd Turner said District technical personnel feel that the gauge is operating correctly; however, there is a slope between the spill bays and the gauge, which is what causes the discrepancy. David Wills said there may be some wiggle room in the tailwater elevation, said Turner, because the highest redd is believed to be at about 11.8 feet.

The current Bonneville discharge is...? Paul Wagner asked. About 157 Kcfs, with 49 Kcfs spill, Jim Adams replied. We were targeting 108 percent TDG at Warrendale, Wagner noted; so far, the monitors are showing relatively low TDG levels – 104-105 percent. If we stay at this tailwater elevation, we will have to shut off spill for awhile to allow the pool to refill, said Bettin.

Ron Boyce said field crews will be measuring TDG levels at the redds, which is probably the best indicator; he said he would prefer to get that information before agreeing to reduce total flow at Bonneville. Why is it taking so much flow to maintain that tailwater elevation? Steve Haeseker asked. Because the tides are against us, and flow out of the Willamette has dropped off, Bettin replied. And the intent is to maintain the spill operation for 96 hours? Boyce asked. Correct, Bettin replied.

Again, I would like to talk to field staff before agreeing to a reduction in Bonneville's tailwater elevation, Boyce said. Can you do that within an hour? Bettin asked. Yes, Boyce replied. It was so agreed.

After a break, Haeseke said that, after conferring with Boyce, the salmon managers are willing to accept Bonneville's proposed reduction in the Bonneville tailwater elevation to 12.4 feet, contingent on physical monitoring information. If the field crews find anything alarming, Haeseker said, we will contact TMT. It was so agreed.

Haeseker said that, with respect to the Spring Creek release, the fish were released Monday afternoon; spill started last night at 8 p.m., once the fish started to arrive at Bonneville in large numbers. Field crews are out today monitoring both fish movement and gas levels, he said, adding that the operations in support of next week's release of the second batch of fish are still under discussion. That release is likely to be made on Monday, so the operation will probably be quite similar to this week's, Turner observed. We may wait until Wednesday to release the fish, said Haeseker; again, we'll work out the specifics, and let the TMT know the plan via email. Spill for the current release is scheduled to end Saturday, March 6 at 8 p.m. Bettin added that the Spring Creek spill agreement will run for three years, with no spill in support of the release in 2005 or 2006, unless conditions are catastrophically different.

5. MOP on the Lower Snake River.

John Pigott, chair of the Columbia River Towboat Association, said that, since his group addressed TMT last year, the Snake River has not been dredged, despite the fact that the Columbia/Snake is the second most-important export corridor in the U.S. We have been unable to reach agreement on responsible dredging of the Snake, he said; we therefore respectfully make our annual request that you operate the Snake river pools at one foot above minimum operating pool (MOP +1).

We have done everything we can do to bring the dredging situation to a favorable conclusion, said Pigott; in the meantime, we are running out of water. Although we continue to have an excellent safety record, the reality is that this situation is analogous to shortening a runway at PDX. A transportation company cannot afford to fail; we have adjusted our operating strategies and business model to this situation. People therefore seem to feel, well, they're getting by, so this is much ado about nothing, Pigott said. However, the fact is that we have reduced our safety margin, and the river continues to silt up. What will happen is that, at some point in the future, one of our operators will run out of runway, and there will be a tragedy. I urge you not to view the fact that we continue to operate safely as a diminished threat, either to our operators, or to the communities we serve, or to listed fish species that might suffer if there was a spill in the river, Pigott said. All we're asking for is some reasonable consideration of the importance of this trade corridor, until a reasonable dredging plan that meets everyone's needs can be put in place.

Larry Johnson of the Columbia River Towboat Association, described the specific safety problems that arise because of shoaling in the Snake River, noting that the fact is,

in some parts of the river, in the channel, if the operators don't pull back enough on the throttles, they ground every time – that's how much worse it's gotten since last year. This is an issue that affects the economies of the 13 states the Snake/Columbia navigation corridor serves, observed Dixon Shaver.

Travis Coley of the Coast Guard, noted that the Coast Guard is very concerned about safety issues during the dredging impasse. Things are getting pretty dicey, he said; we've not only had issues with towboaters carrying cargo, but with passenger vessels as well. It's a problem that is going to persist, he said; we're simply trying to buy time until the dredging issue is settled in court, and ask for your consideration.

Your request is for all four Lower Snake pools? Wagner asked. Correct, Pigott replied. The group discussed the extent of the shoaling problems within the pools, as well as the deployment of navigation aids to mark shoal areas. Kyle Martin said he will run this request by the CRITFC tribal commission. Russ Kiefer asked whether the shoaling or "filling up" has changed the cross-sectional configuration of the reservoir, such that MOP +1 is actually producing the same hydrologic/flow velocity conditions as MOP did a few years ago. At some points in the reservoir, that is likely true, said Tony Norris.

What's the time-frame for this request? Silverberg asked. Typically, we would want MOP +1 to begin in the first week in April, Pigott replied. In response to a question from Henriksen, Glenn Vancelow said the shoaling problem is especially acute at the ports of Lewiston and Clarkston in the Lower Granite pool; the ports could actually use 1.5-2 feet of water above MOP.

After a few minutes of additional discussion, it was agreed to revisit this issue at the TMT's March 17 meeting.

6. Operations Update.

Norris reported that Grand Coulee is currently at elevation 1262; Hungry Horse is at 3513.5 feet and meeting the Columbia Falls minimum flow. Libby continues to release the 4 Kcfs minimum, and is just below elevation 2400, said Henriksen; Dworshak is currently near elevation 1508 and is now at minimum outflow. We're awaiting the March final water supply forecast from the River Forecast Center, she said; the March early-bird continues to show a declining trend – at The Dalles, for example, the March mid-month forecast shows 87 percent of average, down from 93 percent of average in the February final. Bettin said there are no current problems to report on the power side.

7. Next TMT Meeting Date.

The next Technical Management Team meeting was set for Wednesday, March 17. Meeting summary prepared by Jeff Kuechle, BPA contractor.

TMT PARTICIPANT LIST

March 3, 2004

Name	Affiliation
Donna Silverberg	Facilitation Team
Mary Karen Scullion	COE
Kyle Martin	CRITFC
Scott Bettin	BPA
Tim Heizenrater	PPM
Nic Lane	BPA
Russ George	WMCI
Robin Harkless	Facilitation Team
David Benner	FPC
Mike O'Bryant	CBB
Laura Hamilton	COE
Tony Norris	USBR
Steve Haeseker	USFWS
Jim Adams	COE
Cindy LeFleur	WDFW
Rudd Turner	COE
Paul Wagner	NOAAF
Julie Ammann	COE
Ron Boyce	ODFW
Tom Haymaker	PNGC
Dan Bedbury	EWEB
Lance ELias	PPM
Tom Le	PSE
Kevin Nordt	PGE
Ruth Burris	PGE
Martin Hatscher	SCL
Kevin Bannister	PNGC
Bruce McKay	Consultant
Jiong Ji	Avista

John Pigott	CRTBA
Dixon Shaver	Shaver Transport
Glen Vancelow	CRTBA
Ryan Wagner	Coast Guard
Russ Kiefer	IDFG
Cindy Henriksen	COE

Spring / Summer Update to the 2004 Water Management Plan

1. Introduction

The 2004 Spring / Summer update to the Water Management Plan (WMP) updates information on how the Action Agencies plan on operating the Federal Columbia River Power System (FCRPS) reservoirs during the spring and summer seasons.

The *Spring / Summer WMP Update* (S/S Update) is needed because water supply forecasts for the spring and summer time period are not available at the time the water management plan is written in the fall of 2003. Planned operations in the Spring / Summer update are based on the most current water supply forecast which is considered to be the best available forecast of the expected runoff water volume, and thus how the FCRPS will be operated in 2004. The “April Final” forecast is the most current forecast available when the final version of the Spring Summer update was written.

The *S/S Update* also reports 2004 research operations planned for the FCRPS projects. Research studies are routinely conducted to test the performance of current or new fish passage operations and the effects on a wide range of conditions, including spill survival, tailrace egress, transport benefits and the performance of new passage devices like the Bonneville corner collector and the Lower Granite Removable Spillway Weir (RSW). The Studies Review Work Group establishes the research study plan in the spring just prior to the commencement of the spring migration. The *S/S Update* summarizes the project operations that support these research activities.

The *S/S Update* does not repeat all of the information in the Water Management plan, but provides additional detail and specifies operations based on the current water supply forecast or changes that need to be made in operations because of the availability of current water supply forecasts and other new information.

2.0 Role of Water Supply Forecasts

There are four forecast points that are used to determine BiOp operation of the FCRPS reservoirs. The latest forecasts are given below.

Forecast Point	Forecast Period	Forecast Date	Value (April Final Forecast)
Lower Granite	April – July	February Final	20.8 MAF ^A
Lower Granite	April – July	February Final	20.8 MAF
The Dalles	April – August	February Final	88.2 MAF ^A
The Dalles	April – August	February Final	88.2 MAF
Hungry Horse	April – August	February Final	2.15 MAF ^{AB}
Libby	April - August	February	5.6 MAF ^C

All forecasts from Weather Service unless otherwise indicated

A – Value that is used to set operations

B – USBR Forecast C – COE Forecast

Note: The April Final Forecast put out by the Weather Service assumes future precipitation to be normal.

3.0 Flow Objectives

Spring

The spring flow objectives for Lower Granite and McNary are established by the April final water supply forecast. The Priest Rapids spring flow objective is fixed (not dependent on the water supply forecast). Based on the April final forecast the spring flow objectives are shown below.

Project	Spring Flow Objective
Lower Granite	100 KCFS
McNary	247 KCFS
Priest Rapids	135 KCFS

Summer

Based on the latest water supply forecast (April Final) the summer flow objectives are shown below. The McNary summer flow objective is fixed (not dependent on the water supply forecast).

Project	Summer Flow Objective
Lower Granite	52 KCFS
McNary	200 KCFS

Prospects For Meeting Flow Objectives

An analysis of the likelihood of meeting the flow objectives was conducted by using the Corps' QADJ runs of the HYSSR model. This model uses the volume of the current water supply forecast and applies the 59-runoff shapes observed in the historical record to this forecast volume. The likelihood of meeting the flow objectives and refilling the reservoirs by the targeted dates is a function of both the runoff volume and the timeframe in which the snowmelt and stream flows occur. The likelihood of meeting the 2004 spring/summer flow objectives are listed below.

Summary of February 2004 QADJ Model Runs

19-Feb-04

Assumptions:

- * Streamflows were adjusted to the February Final Water Supply Forecast for the period of February thru August of 104 MAF at The Dalles and shaped 59 different ways based on observed historical runoff.
- * Starting elevations were observed data from January 31, 2004.
- * Grand Coulee helps meet Vernita Bar minimum flow objective of 70 kcfs in Feb-Mar drafting no lower than 1259.2 ft in Feb and 1261.0 ft in March. Operate to meet McNary flow objective of 247.3 kcfs drafting no lower than 1250.1 ft by Apr 15. Minimum draft elevations are based on a GCL/Dworshak shifted flood control and VECC/AER requirements.
- * Hungry Horse operates to VARQ flood control or minimum flow from Jan - May and meets minimum flow of 3500 cfs at Columbia Falls, targets full in June, and drafts to 3540 ft by 31 Aug.
- * Brownlee operates to flood control elevations.
- * Dworshak targets elevation 1533.2 ft in Mar, 1542.2 ft by 15 Apr, and 1523.4 ft by 30 Apr, based on a GCL/DWR shifted flood control operation and maximum releases 15 kcfs in April and 13 kcfs May-Jun. DWR targets full in June with a minimum flow of 1.5 kcfs, releases a maximum of 13 kcfs in July - August to meet LWG flow objectives, and targets 1520 ft by 31 Aug.
- * Libby operates on minimum flow or VARQ flood control Jan - Apr. Targets 13,900 cfs in May and 10,700 cfs in June for Sturgeon, based on an Apr-Aug forecast of 5.644 MAF and a Tier 3 required pulse of 0.88 MAF. Targets full in July with a minimum flow of 7,000 cfs for bull trout. Drafts to 2439 ft by 31 Aug.

Results:

Priest Rapids Meets Flow Objectives of 70 kcfs in Jan - Apr 15 and 135 kcfs in Apr 16 - Jun.

Month	Occurrences out of 59 Years	Average Flow for 59 Years (kcfs)
Feb	24	67
Mar	52	103
Apr 15	47	107
Apr 30	27	130
May	56	163
Jun	57	138

Grand Coulee meets the Apr 15 flood control target elevation of 1249.0 ft in all 59 years. GCL operates to meet Bonneville objective of 125 kcfs in Feb-Mar.

Lower Granite Meets Flow Objectives of 100 kcfs in Apr - May, 84 kcfs in June and 52 kcfs in Jul - Aug:

Month	Occurrences out of 59 Years	Average Flow for 59 Years (kcfs)
Apr 30	18	90
May	44	110
Jun	40	95
Jul	31	49
Aug 15	0	40
Aug 31	0	32

Bonneville Meets Flow Objectives of 125 kcfs in Feb - Apr:

Month	Occurrences out of 59 Years	Average Flow for 59 Years (kcfs)
Feb	59	136
Mar	57	176
Apr 15	57	203
Apr 30	59	245

McNary Meets Flow Objectives of 247.3 kcfs in Apr 15 - Jun and 200 kcfs in Jul - Aug:

Month	Occurrences out of 59 Years	Average Flow for 59 Years (kcfs)
Apr 30	16	221
May	55	273
Jun	46	278
Jul	25	192
Aug 15	2	161
Aug 31	0	145

Projects Refill by 30 June:

Month	Occurrences out of 59 Years	Average Elevation on 30 Jun for 59 Years
Libby	29	2456
Hungry Horse	44	3558
Grand Coulee	48	1288
Dworshak	39	1595

Period Average Flows (kcfs)

	FEB 1-29	MAR 1-31	APR 1-15	APR 16-30	MAY 1-31	JUN 1-30	JUL 1-31	AUG 1-15	AUG 16-31
LIB	4.0	4.0	4.0	4.0	14.2	16.4	24.0	17.2	14.7
HGH	2.0	1.8	1.1	4.2	2.0	8.7	6.7	5.0	4.5
GCL	62.4	96.7	98.7	117.0	136.3	144.8	122.2	107.6	105.2
PRD	67.4	102.7	107.2	129.8	163.3	180.2	138.5	116.5	110.5
DWR	2.0	4.2	6.8	15.0	14.3	5.1	10.7	12.3	10.9
BRN	19.4	18.4	24.1	24.3	18.0	14.6	12.8	16.8	12.7
LWG	38.7	47.0	70.0	89.8	110.2	94.7	48.8	40.5	31.8
MCN	115.7	157.6	186.1	220.8	272.8	277.8	192.3	161.5	145.1
TDA	128.0	168.3	196.4	237.2	282.5	288.6	198.3	166.4	149.1
BON	136.5	175.8	202.8	245.3	285.1	291.0	201.4	169.0	151.3

4.0 Storage Project Operations

Libby Dam

Sturgeon Pulse

The current water supply forecast (February) of 5.64 MAF for Libby (April – August) puts Libby operations in the 3rd tier of operation for sturgeon called for in the USFWS 2000 Biological Opinion. 5,64 MAF interpolated between Tier 3 and 4 calls for a Sturgeon flow volume of .88 MAF.

Libby Outlook

Hungry Horse Dam

Bull Trout Flows & Ramping Rates

Based on the Bureau of Reclamation February forecast for April – August of 2146 kaf, the minimum outflow from Hungry Horse will be 900 cfs and the minimum flow for Columbia Falls will be 3,500 cfs.

Hungry Horse Outlook

Grand Coulee Dam

Grand Coulee Summer Draft Limit

Based on the February final forecast of April – August runoff volume at the Dalles, the summer draft limit for Grand Coulee is expected to be 1278 feet.

Dworshak Dam

Summer Draft for Temperature Control

A key operation at Dworshak Dam is to draft cold water from the Dworshak reservoir in July and August to cool water temperatures in the Lower Snake River for the benefit of migrating salmon and steelhead. In-season modeling will be done to provide information to aid in the making the decisions of when and how to draft Dworshak for water temperature control.

Dworshak Outlook

5.0 Upper Snake River Flow Augmentation

The Bureau of Reclamation currently estimates that between 250 and 300 kaf will be available for flow augmentation in 2003.

6.0 Flood Control Operations

The flood control elevations based on the February final forecast are shown in the following table.

Note that April 10th flood control elevations are interpolated. As there is no official method of determining April 10th flood control elevations

	Date						
Project	31-Jan	28-Feb	15-Mar	31-Mar	10-Apr	15-Apr	30-Apr
ARDB	1430.5	1422.9		1414.1		1414.1	1414.1
LIB	2422.5	2431.6	2435.4	2435.4	2435.4	2435.4	2435.4
DCDB	1839.8	1807.7		1807.7		1807.7	1807.7
HGH	3543.8	3536.3		3529.1	3526.8	3525.6	3522
GCL	1290	1290		1272.8	1261.3	1255.5	1239.3
GCL-shifted	1290	1286		1265.8	1251.0	1243.6	
BRN	2077	2051.4		2049		2050.2	2049.8
BRN-shifted	2077	2077		2077		2077	
DWR	1539.5	1529.8		1521.6	1514.3	1510.6	1523.4
DWR-shifted	1539.5	1529.8		1533.2	1539.2	1542.2	0

Dworshak/Grand Coulee flood control shift

At the current time we are planning on shifting flood control from Dworshak to Grand Coulee.

7.0 Minimum Operating Pool

The minimum operating pool (MOP) operation for the Lower Snake projects is scheduled to start April 3rd. The table below shows BiOp MOP operations. TMT may address, on an in-season management basis, navigation or other concerns that may result in adjustments in BiOp MOP operations.

	Lower Range		Upper Range	
Project	Operation	Elevation	Operation	Elevation
Ice Harbor	MOP	437	MOP + 1	438
Lower Monumental	MOP	537	MOP + 1	538
Little Goose	MOP	633	MOP + 1	634
Lower Granite	MOP	733	MOP + 1	734

At John Day the forebay will be operated within a 1.5-foot range between 262.5 and 264.0 feet from April 10th to September 30th.

8.0 Hanford Reach

Note: This is last year's agreement.

GRANT COUNTY PUD ADAPTIVE MANAGEMENT PLAN to protect SALMON & STEELHEAD in the HANFORD REACH, PRIEST RAPIDS PROJECT AREA, AND UPPER TRIBUTARIES of the COLUMBIA RIVER July 29, 2002

Subject to the limitations and conditions set out below, Grant PUD, shall provide the following flow regimes through the rearing period for fall Chinook salmon spawning and rearing in the Hanford Reach.

1. Spawning Period

(a) Flows maintained during the spawning period and escapement levels are factors influencing the placement of redds. The flow manipulation is directed to minimize formation of redds above the 70 kcfs elevation. Minimizing formation of redds above the 70 kcfs elevation in turn is a key factor influencing the success of the flow regime during the emergence period.

(b) During the spawning period, Grant PUD will operate the Priest Rapids Project to the extent feasible through use of the mid-Columbia hourly coordination and reverse load factoring to produce a Priest Rapids outflow during daylight hours equal to 68% of the daily average Wanapum inflow. This obligation shall be in effect only if the daily average Wanapum inflow is between 80 kcfs and 125 kcfs. The goal during the spawning period is to limit spawning to the area below the 70 kcfs elevation on Vernita Bar. In the event physical changes are made at Priest Rapids which affect Grant PUD's ability to provide reverse load factoring, Grant PUD agrees to meet with the Fishery Agencies and Tribes to determine what adjustments to Grant PUD's obligation shall be made.

2. Pre-Hatch Period

During the pre-hatch Period the Priest Rapids outflow may be reduced to 36 kcfs for up to 8 hours on weekdays and 12 hours on weekends (with no two consecutive minimum periods). All participants recognize that utilization of the 36 kcfs minimum may have to be limited to achieve the Priest Rapids outflow goal during the spawning period.

3. Post-Hatch Period

(a) After hatching has occurred at redds located in the 36 to 50 kcfs zone, the protection level flow shall be maintained over Vernita Bar so that the intergravel water level is no less than 15 cm below the 50 kcfs elevation.

(b) After hatching has occurred at redds located in the zone above the 50 kcfs elevation, the protection level flow shall be maintained over Vernita Bar through the post hatch period so that the intergravel water level is no less than 15 cm below the critical elevation.

4. Emergence Period

(a) During the emergence period, after emergence has occurred in the 36 to 50 kcfs zone, the protection level flow shall not be less than necessary to maintain water over Vernita Bar at the 50 kcfs elevation.

(b) During the emergence period, after emergence has occurred above the 50 kcfs elevation, the protection level flow shall be maintained at or above the critical elevation.

5. Rearing Period

(a) Flow fluctuations during the rearing period may impact juvenile fall chinook. Elimination of all flow fluctuations is not physically possible without severely impacting the ability of mid-Columbia operators to produce a reliable supply of electricity. The goal during the rearing period is to provide a high level of protection for juvenile fall chinook rearing in the Hanford Reach by limiting flow fluctuations while retaining a reasonable level of load-following capability at each of the 7 dams on the mid-Columbia River.

(b) During the rearing period, Grant PUD will operate the Priest Rapids Project to the extent feasible through use of the mid-Columbia Hourly Coordination Agreement to produce a Priest Rapids outflow that limits flow fluctuations according to the following criteria:

(1) When previous day average weekday Priest Rapids outflow is between 36 and 80 kcfs limit Priest Rapids outflow weekday delta to no more than 20 kcfs. When the average of BPA's Friday Priest Rapids outflow estimates for Saturday and Sunday is between 36 and 80 kcfs limit the Priest Rapids outflow weekend delta to no more than 20 kcfs.

(2) When previous day average weekday Priest Rapids outflow is between 80 and 110 kcfs limit Priest Rapids outflow weekday delta to no more than 30 kcfs. When the average of BPA's Friday Priest Rapids outflow estimates for Saturday and Sunday is between 80 and 110 kcfs limit the Priest Rapids outflow weekend delta to no more than 30 kcfs.

(3) When previous day average weekday Priest Rapids outflow is between 110 and 140 kcfs limit Priest Rapids outflow weekday delta to no more than 40 kcfs. When the average of BPA's Friday Priest Rapids outflow estimates for Saturday and Sunday is between 110 and 140 kcfs limit the Priest Rapids outflow weekend delta to no more than 40 kcfs.

(4) When previous day weekday average Priest Rapids outflow is between 140 and 170 kcfs limit Priest Rapids outflow weekday delta to no more than 60 kcfs. When the average of BPA's Friday Priest Rapids outflow estimates for Saturday and Sunday is between 140 and 170 kcfs limit the Priest Rapids outflow weekend delta to no more than 60 kcfs.

(5) When previous day average Priest Rapids outflow is greater than 170 kcfs Priest Rapids outflow for the following day will be at least 150 kcfs.

6. Monitoring Team

For purposes of determining the protection level flow during the post hatch and emergence periods, a critical elevation shall be determined each year as follows:

(a) The monitoring team will survey redds on Vernita Bar in a specified area for the purpose of determining the initiation of spawning, the location of redds and the extent of spawning. The surveys will be conducted on weekends beginning on the weekend closest to October 15 of each year.

(b) The monitoring team will make a final redd survey the weekend prior to Thanksgiving to determine the critical elevation, which will be set as follows: (Elevations must be in 5 kcfs increments beginning at the 40 kcfs elevation.)

(1) If 31 or more redds are located above the 65 kcfs elevation, the critical elevation will be the 70 kcfs elevation.

(2) If there are 15 to 30 redds above the 65 kcfs elevation, the critical elevation will be the 65 kcfs elevation.

(3) If there are fewer than 15 redds above the 65 kcfs elevation, then the critical elevation will be the first 5 kcfs elevation above the elevation containing the 16th highest redd within the survey area on Vernita Bar (see Table 1 below for examples of the application of these counts).

Table 1. Examples illustrating theoretical final Vernita Bar redd counts and the resulting critical elevations, elevations are provided in kcfs ranges.

	36-50 kcfs	50-55 kcfs	55-60 kcfs	60-65 kcfs	65-70 kcfs	70+ kcfs	Resulting Critical Elevation
Example 1	836	418	148	71	48	34	70
Example 2	283	94	65	28	16	4	65
Example 3	105	35	10	3	1	0	55

(c) Additional activities of the monitoring team will include calculation of temperature units, determination of the dates of initiation of spawning, hatching, emergence, the end of the emergence period and the end of the rearing period. The monitoring team may also make nonbinding recommendations including non-binding recommendations to protect redds above the critical elevation or to address special circumstances. By August 1 of the following year, Grant PUD will submit an annual report to the monitoring team and BPA. The annual report will include, but not be limited to: 1) Vernita Bar redd counts, 2) dates on which the hatching, emergence, end of emergence and end of rearing occurred, 3) a record of Columbia River flows through the Hanford Reach based on Priest Rapids discharges, and 4) a description of the actual flow regimes from the initiation of spawning through the rearing period based on available data. After review by the monitoring team, the final report will be sent to all participants.

7. Redds Above Critical Elevation

This Agreement is not intended either to preclude or require protection of redds above the critical elevation.

9.0 Spill for Juvenile Fish Passage

Note: At this time the spill operations for the 2004 spill season have not been finalized yet. Information below is the best of our knowledge and subject to change.

Spring Spill Operations – Snake River Dams

At the current time it appears that the forecasted inflow will be greater than 85 kcfs this year we will be spilling the Lower Snake projects in the spring. The spring spill season on the Snake River is from April 3rd to June 20th. .

Lower Granite Dam

Spring spill at Lower Granite will consist of spill using the RSW 24 hours a day. Spill using the RSW consists of spilling 6.7 – 7.7 kcfs through the RSW and some yet to be determined training spill. Last year the training spill was approximately 13 kcfs. A proposed test for this spring is testing the effect of having the BGS (Behavioral Guidance Structure) in place as compared to having the BGS not in place. (See section 11 for further details)

Little Goose Dam

Spring spill passage at Little Goose Dam will be as specified in the BiOp. Spill nights to gas cap (1800 – 0600)

Lower Monumental Dam

Spring spill at Lower Monumental Dam has been modified from that called for in the BiOp. Spill will be 24 hours a day with the spill percentage being 45% when total project outflow is less than 75 kcfs or greater than 100 kcfs. The spill percentage is 50% when the total project outflow is between 75 and 100 kcfs. Spill not to exceed the TDG gas cap. (See section 11 for further details)

Ice Harbor Dam

Spill operation will involve two distinct operations including one “bulk” spill pattern and one small gate-opening pattern. Specifics will be coordinated with the fishery agencies and others as needed. The last I heard was the “bulk” spill pattern will consist of spilling 100 kcfs 24 hours a day and spilling the small gate pattern will consist of spilling 45 kcfs 24 hours a day. (See section 11 for further details)

Summer Spill Operations – Snake River Dams

Note: The Action Agencies are currently looking at the possibility of modifying the summer spill program. What is presented below is the BiOp summer spill program.

The summer spill planning period is June 21-August 31 for the Lower Snake projects.

Lower Granite Dam, Little Goose, Lower Monumental Dam

As recommended in the BiOp, no spill and full transport will be conducted at the Snake River transport dams.

Ice Harbor Dam

Spill operation will involve two distinct operations including one “bulk” spill pattern and one small gate-opening pattern. Specifics will be coordinated with the fishery agencies and others as needed. The last I heard was the “bulk” spill pattern will consist of spilling 100 kcfs 24 hours a day and spilling the small gate pattern will consist of spilling 45 kcfs 24 hours a day. (See section 11 for further details)

Spring and Summer Spill Operations – Lower Columbia River Dams

Note: The Action Agencies are currently looking at the possibility of modifying the summer spill program. What is presented below is the BiOp summer spill program.

The spring spill planning period for the Lower Columbia River dams is 4/10-6/30 (Spill started 4/14). The summer spill planning period is July 1 - August 31 for Lower Columbia River projects. Spring and summer spill operations on the Lower Columbia River Dams are nearly identical. The exception is McNary Dam at which no summer spill occurs.

McNary Dam

Spring spill will be conducted as specified in the BiOp which calls for night spill (1800 – 0600) to the gas cap. Spring spill will be suspended when river conditions are no longer spring-like (flows <200 kcfs and water temperature >62-degrees F) and transport initiated. No summer spill occurs at McNary Dam.

John Day Dam

Spill will be provided from April 10 through August 31 for spring and summer migrants as required in the NMFS Biological Opinion. Between May 15 and July 20, spill will occur from 1900 to 0600 hours (11 hours total). Before that time period, spill will be for 12 hours nightly, from 1800 to 0600 hours. From April 10 to July 20, spill discharges will be 60% of instantaneous project flow at project flows up to 300,000 cfs. Above 300,000 cfs project flow, spill discharges will be 180,000 cfs (up to the hydraulic limit of the powerhouse). From July 21 through August 31, spill will be 30% of instantaneous project flow 24-hours per day. Spill will be provided in a manner consistent with TDG management to avoid excessive gas supersaturation

The Dalles Dam

Spill will be 40% of total project outflow out to exceed the TDG cap.

Bonneville Dam

Spill will be as specified in the BiOp, spill to the TDG cap at night and spill 75 kcfs (fallback limit) during the day.

10. Water Quality***Spill Priority List***

River operations are conducted to meet State Clean Water Act total maximum daily load (TMDL) dissolved gas standards. Also, research operations at a particular dam can be impacted by involuntary spill. Thus spill at research projects is given lower priority in the hope that involuntary spill can be eliminated during research. In 2004 involuntary spill will occur in the following order:

1. Little Goose
2. Lower Monumental
3. McNary
4. The Dalles
5. Bonneville
6. Priest Rapids
7. Rocky Reach
8. Wells
9. Rock Island
10. Lower Granite
11. Ice Harbor
12. John Day
13. Wanapum
14. Chief Joseph
15. Grand Coulee

2003 GAS Cap levels

The range of gas caps during 2003 at the projects were:

	Min	Max
BON	100	170
TDA	85	135
JDA	95	165
MCN	100	160
IHR	51	110
LMN	15	44
LGS	27	43
LWG	36	43

Other Spill Operations

Based on a study conducted by a subgroup of the Regional Forum Water Quality Team, it was determined that joint operations of Chief Joseph and Grand Coulee Dam for power and total dissolved gas production could result in an overall reduction in TDG levels both upstream and downstream of Chief Joseph dam by taking advantage of the larger generation flow capacity of Grand Coulee and the lower average TDG loading below the Chief Joseph spillways (absent deflectors). As a result of this study, and coordination with the Bureau of Reclamation and the Colville Tribe, the joint operation of Grand Coulee and Chief Joseph will be conducted during the 2004 spill season. Operationally, this will be as follows,

- When Lake Roosevelt is below 1260' elevation, spill from the Grand Coulee outlet tubes be avoided by shifting all spill to Chief Joseph for spill discharges up to 70 kcfs. If river conditions require spill releases above 70 kcfs at Chief Joseph, the additional spill should be distributed between Chief Joseph and Grand Coulee in a 2.5 to 1 ratio.
- When Lake Roosevelt TDG is elevated and at or above 1260' elevation, spill over the drum gates at Grand Coulee may be beneficial to the system due to potential degassing. The continuation of monitoring practices and additional investigations of these operational measures on TDG exchange are recommended to further establish efficient and effective joint operations at Grand Coulee and Chief Joseph.

11. 2004 Fish Passage Research

A summary of 2004 fish passage research studies that have the potential to change project operation are described below and in the 2004 Snake River and Lower Columbia River Spring-Summer Research Summary Tables (following pages).

Lower Granite Dam

The Removable Spillway Weir (RSW) was installed in the summer of 2001. It underwent extensive biological testing in spring 2002 and 2003. During February and March 2004, the Behavioral Guidance Structure will be moved to the north two units and the depth decreased along part of its length. The 2004 biological test will likely take place between mid-April and early June. The expected forebay elevation during testing will be between 734 and 735 feet, providing approximately 6,700 to 7,700 cfs over the RSW. A specific study design has not been finalized at this time, but will likely involve 24 hour per day operation of the RSW, along with some level of “training spill”. Monitoring will likely consist of radio-telemetry. Monitoring will focus on RSW efficiency and effectiveness, and fish behavior in the vicinity of the RSW and relocated BGS. The evaluation may involve periodic removal of the BGS, which would likely result in short-term (1 – 3 hours) outages at units 5 and 6. A summer test of the RSW and BGS may also take place in 2004. This would occur sometime between mid-June and late July and would most likely run for 3 or 4 weeks. Radio-telemetry would again be used to assess RSW performance. Project operations would most likely include the RSW (between 6,000 and 7,700 cfs) and some level of training spill, 24 hours per day.

Lower Monumental Dam

Lower Monumental Spillway Survival Study. Survival studies will be conducted using radio-telemetry in 2004. Two spill patterns will be tested in a 2-day blocked design. The two patterns will be determined through discussions within the region and physical model testing at ERDC in Mississippi.

Near-field Study of Total Dissolved Gas Exchange and Evaluation of Added Spillway Deflector Performance. As part of the COE Fastrack Gas Abatement Program, total dissolved gas abatement alternatives are being developed to reduce the TDG exchange associated with spill operations and to provide greater flexibility in scheduling spillway operations. Additional spillway deflectors for bays 1 and 8 were constructed in late 2002 and early 2003, and now all spillway bays are so equipped. A field study is proposed to address the TDG exchange associated with the modified spillway and associated operations under a wide range of operating conditions. The proposed long-term monitoring program will be initiated in April 2004 prior to the spill season and continue through the end of spill, typically in June.

This three month sampling period will provide for the widest range of operating and environmental conditions. This study will primarily focus on determining the total dissolved gas exchange characteristics associated with spillway operation for discharges up to the design spill for a 7-day, 10-year frequency flood. The incorporation of specific operations could significantly enhance study findings. These special operations could include scheduled spill outage to maintain TDG instruments, alternative spill patterns including bulk spill, management of tailwater stage through storage in Lake Sacagawea, and constant spill with and without powerhouse flows. Circulation patterns below the dam will also be described through a variety of sampling devices. This information will

support the interpretation of study TDG data and related issues concerning fish passage through this river reach.

Ice Harbor Dam

Spillway Survival Study. Radio telemetry, PIT, and balloon tag studies will estimate the survival rates of test fish passing over the spillway. Project operations (spill levels and possibly patterns) will change according to a randomized block schedule. Details of the schedule and operations are not available at this time, but will be developed through the SRWG and FFDRWG. Spill operation will involve two distinct operations including one “bulk” spill pattern and one small gate opening pattern. Specifics will be coordinated with the fishery agencies and others as needed.

McNary Dam

Operation of Turbine Units Outside of 1% best Operating Range. An operation of turbine units at McNary Dam outside of the normal 1% best efficiency operating range, up to 115% of overload (approximately 80 MWs), is proposed for the spring of 2004. A plan for monitoring this operation is being prepared and coordinated with the region.

The Dalles Dam

Spillwall Post Construction Evaluation. Survival and injury estimates for spillway passed fish will be generated using balloon tag techniques. Test fish will be passed through bays 2 and 4 and 8 (optional, depending on river flow) via release hoses. Control fish will be released downstream of the end sill via a hose. Two test discharges will be evaluated: one per bay discharge that is between 12 and 18 kcfs, and 21 kcfs.

The 21 kcfs treatment may require a forebay restriction at Bonneville, in order to achieve an appropriate tailwater elevation at The Dalles. This will be coordinated with RCC, BPA and regional salmon managers during the study. The balloon-tag study is expected to run from 13 April – 1 May. Each day testing will begin at 0700 hours and conclude around 1900 hours. The balloon-tag study will occur only in the springtime. The start date will be selected prior to the finalization of the FPP. To conduct these evaluations, tailrace BRZ access is required. The hydraulic environment encountered by test fish in the tailrace will be characterized using autonomous sensors released through spillway hoses. Total mortality rates will be estimated using radio telemetry. Radio tagged fish will be released in John Day Dam’s tailrace, The Dalles Ice and Trash Sluiceway, and The Dalles tailrace. This study element will start in late April and conclude around July 20.

Sluice Operations Evaluation. An alternative sluiceway operation will be evaluated in 2004. Fixed hydroacoustics, 3-D acoustic telemetry, and radio telemetry will be used to estimate sluice passage. The schedule (Table 1 and Table 2) will include 2 treatments: operation of gates 1-1, 1-2, 1-3 and operation of gates 1-1, 1-2, 1-3, 18-1, 18-2, and 18-3.

Treatments will be switched at 0800 hours daily. Testing will begin April 19 and end on July 17

Table 1. TDA spring sluice operations(all 3 gates open for MU1 and MU18).

Study Block	Study Day	Summer Date	Day of Week	Sluice Treatment	Study Block	Study Day	Summer Date	Day of Week	Sluice Treatment
1	1	19-Apr	Mon	MU 1	14	27	15-May	Sat	MU 1, MU 18
1	2	20-Apr	Tue	MU 1, MU 18	14	28	16-May	Sun	MU 1
2	3	21-Apr	Wed	MU 1, MU 18	15	29	17-May	Mon	MU 1
2	4	22-Apr	Thur	MU 1	15	30	18-May	Tue	MU 1, MU 18
3	5	23-Apr	Fri	MU 1, MU 18	16	31	19-May	Wed	MU 1, MU 18
3	6	24-Apr	Sat	MU 1	16	32	20-May	Thur	MU 1
4	7	25-Apr	Sun	MU 1, MU 18	17	33	21-May	Fri	MU 1
4	8	26-Apr	Mon	MU 1	17	34	22-May	Sat	MU 1, MU 18
5	9	27-Apr	Tue	MU 1	18	35	23-May	Sun	MU 1, MU 18
5	10	28-Apr	Wed	MU 1, MU 18	18	36	24-May	Mon	MU 1
6	11	29-Apr	Thur	MU 1, MU 18	19	37	25-May	Tue	MU 1, MU 18
6	12	30-Apr	Fri	MU 1	19	38	26-May	Wed	MU 1
7	13	1-May	Sat	MU 1	20	39	27-May	Thur	MU 1, MU 18
7	14	2-May	Sun	MU 1, MU 18	20	40	28-May	Fri	MU 1
8	15	3-May	Mon	MU 1	21	41	29-May	Sat	MU 1
8	16	4-May	Tue	MU 1, MU 18	21	42	30-May	Sun	MU 1, MU 18
9	17	5-May	Wed	MU 1	22	43	31-May	Mon	MU 1
9	18	6-May	Thur	MU 1, MU 18	22	44	1-Jun	Tue	MU 1, MU 18
10	19	7-May	Fri	MU 1	23	45	2-Jun	Wed	MU 1, MU 18
10	20	8-May	Sat	MU 1, MU 18	23	46	3-Jun	Thur	MU 1
11	21	9-May	Sun	MU 1, MU 18	24	47	4-Jun	Fri	MU 1
11	22	10-May	Mon	MU 1	24	48	5-Jun	Sat	MU 1, MU 18
12	23	11-May	Tue	MU 1, MU 18					
12	24	12-May	Wed	MU 1					
13	25	13-May	Thur	MU 1, MU 18					
13	26	14-May	Fri	MU 1					

Table 2. TDA summer sluice operations(all 3 gates open for MU1 and MU18).

Study Block	Study Day	Summer Date	Day of Week	Sluice Treatment	Study Block	Study Day	Summer Date	Day of Week	Sluice Treatment
1	1	6-Jun	Sun	MU 1	12	23	28-Jun	Mon	MU 1, MU 18
1	2	7-Jun	Mon	MU 1, MU 18	12	24	29-Jun	Tue	MU 1
2	3	8-Jun	Tue	MU 1, MU 18	13	25	30-Jun	Wed	MU 1, MU 18
2	4	9-Jun	Wed	MU 1	13	26	1-Jul	Thur	MU 1
3	5	10-Jun	Thur	MU 1, MU 18	14	27	2-Jul	Fri	MU 1, MU 18
3	6	11-Jun	Fri	MU 1	14	28	3-Jul	Sat	MU 1
4	7	12-Jun	Sat	MU 1, MU 18	15	29	4-Jul	Sun	MU 1
4	8	13-Jun	Sun	MU 1	15	30	5-Jul	Mon	MU 1, MU 18
5	9	14-Jun	Mon	MU 1	16	31	6-Jul	Tue	MU 1, MU 18
5	10	15-Jun	Tue	MU 1, MU 18	16	32	7-Jul	Wed	MU 1
6	11	16-Jun	Wed	MU 1, MU 18	17	33	8-Jul	Thur	MU 1
6	12	17-Jun	Thur	MU 1	17	34	9-Jul	Fri	MU 1, MU 18
7	13	18-Jun	Fri	MU 1	18	35	10-Jul	Sat	MU 1, MU 18
7	14	19-Jun	Sat	MU 1, MU 18	18	36	11-Jul	Sun	MU 1
8	15	20-Jun	Sun	MU 1	19	37	12-Jul	Mon	MU 1, MU 18
8	16	21-Jun	Mon	MU 1, MU 18	19	38	13-Jul	Tue	MU 1
9	17	22-Jun	Tue	MU 1	20	39	14-Jul	Wed	MU 1, MU 18
9	18	23-Jun	Wed	MU 1, MU 18	20	40	15-Jul	Thur	MU 1
10	19	24-Jun	Thur	MU 1	21	41	16-Jul	Fri	MU 1
10	20	25-Jun	Fri	MU 1, MU 18	21	42	17-Jul	Sat	MU 1, MU 18
11	21	26-Jun	Sat	MU 1, MU 18					
11	22	27-Jun	Sun	MU 1					

Bonneville Dam

Bonneville Rehab Biological Testing (also testing under the Turbine Survival Program). Main unit 1 will need to be commission tested once it returns to service in May 2004. The unit will undergo a series of pre-startup tests. A normal pre-start scenario is to mechanically roll the unit for 1 day. After the unit has been deemed structurally sound, the unit will be HIPOT tested for 2-3 days. After this test series is complete the unit will be subjected to a minimal run load rejection test. Once test are completed the unit will be then advanced to a 72 hour run test, followed by the 100 day commissioning test. Unit 1 is scheduled to return to normal operation by early June 2004. This commissioning test was coordinated with the FFDRWG group and endorsement was gained to complete the test on February 3, 2004.

Survival Evaluation. As part of the B2 corner collector evaluation, project and route specific survival, and passage distribution will be estimated for spring and summer migrants. We will evaluate survival of spring chinook salmon and steelhead through (1) the B1 ice and trash sluiceway, (specific gates to be evaluate are 2c, 4c, & 6c in the Spring, and 1c, 3c, & 6c in the Summer), (2) through an MGR turbine unit (MU-4), and from upstream releases through the B2 CC, B2 JBS, spillway, and both powerhouses. We will evaluate survival of fall chinook salmon through the B1 ice and trash sluiceway (specific sluice gates to be evaluated are 1c, 3c, & 6c in the Summer), and with upstream

releases through the B2 CC, B2 JBS, Spillway and both powerhouses. It is expected that unit 4 that is being used for turbine survival testing will need to be shut down for release pipe/hose installation, and potentially in-season fixes. Due to the potential for changes in operations that could affect presently planned survival research contingency plans are being formulated for discussions with regional fishery managers.

Research at MU-4 MGR likely will occur during the spring passage season only. Unit outages will be required for the installation and removal of monitoring equipment in the sluiceway and MU-4 both Spring and Summer. Further, there will likely be the need for unit outages in order to fix broken or non-functional equipment within the evaluation timeframe (April through July). Specific project operations required will be maintaining unit 4 as a priority unit for the spring passage season/evaluation. Powerhouse priority during the MGR testing should keep unit 4 as first on last off with a minimum of unit 2 operating as the same time during testing to maintain good egress conditions of test fish through the test period (April- July 2004).

Prototype Testing of Fish Guidance Efficiency (FGE) Improvements and Unit Gap Loss at Bonneville Second Powerhouse. In 2004, prototype testing of a newly designed VBS will be conducted with two differing technologies (DIDSON & hydroacoustics). Testing will begin in late April and conclude in late July and will require the test units (15 & 17) to be shut down for short periods for removal and placement of the DIDSON camera frame. The required outage will be for approximately 1-2 hours for each unit per day for two weeks. Additional hydroacoustics transducers have will be installed in units 11, 12, 15, 17 to measure changes in FGE minus Turbine Intake Extensions (TIEs) and the B2CC operating.

Hydroacoustics will be used to estimate FGE (ERDC and PNNL). For the PNNL deployment, transducers will be installed both on the STS and on the trash racks prior to the test start date. Testing will be completed by Mid July. Installation on both the trash racks and STS will require a one-day outage. As always, several outages should be expected throughout the testing season to repair equipment.

It is expected that the test units will be available for normal operation during non-testing periods (unless significant fish injury is seen) to meet project/regional needs.

Unit Priorities for spring and summer. Unit priorities will be the same at B2 for the spring and summer in order of first on last off – 11, 17, 12, 13, 18, 14, 15, & 16. These operations are in support of the FGE and survival tests planned. Unit priorities will differ at B1 from spring and summer. Spring priorities at B1 are 4, 2, 3, 5, 6, 7, 10, 8, & 9. Sluice gates at B1 that will be operational in the spring will be 2c, 4c, & 6c. Summer priorities at B1 are 1, 3, 4, 5, 6, 7, 10, 8, & 9. Sluice gates that will be operational in the summer will be 1c, 3c, & 6c.

12 Appendix – Research Plans

To be filled out later as more details become available.



Technical Management Team

System Operation Request to Operate the Snake River Projects at MOP + 1 During 2004 Season

March 3, 2004

Introduction

The Columbia River Towboat Association consists of the nine major tug and barge companies operating along the Columbia Snake River System. We work in close coordination with other navigation interests in the region including the Columbia River Steamship Operators; Regional Maritime Security Coalition; Columbia River Pilots; Columbia River Bar Pilots; all 26 Ports; the International Longshore and Harbor Worker's Union; the Inland Boatman's Union and the Master, Mates and Pilots Union to facilitate the transportation annually of nearly 14 million tons of mostly agricultural products. Freight forwarders, exporters, shippers, growers and producers count on the low-cost barging alternative to insure the competitiveness of the region with the other export centers around the world. 49,000 family wage jobs depend on the continued viability of this, the second-most vital trade corridor in the United States. A permanent loss of one foot of barge draft equates to the loss of 1,000 jobs. The second foot would likely eliminate the most cost-competitive transportation alternative available.

Most Americans are blithely aware that international commerce is approaching 25% of gross domestic product and that 95% of U.S. foreign commerce is transported by maritime. The U.S. Commerce Department is forecasting a doubling of international trade by 2020. Current transportation infrastructure, with respect to truck and rail, is nearing maximum capacity. The barging industry, on the other hand, is approximately 40% utilized. In many parts of the country, and in other areas of the world, the positive benefits of barging are recognized and strong efforts are underway to make best use of it.

It is not widely understood that barging is the most environmentally benign mode of transportation. To illustrate the point, consider that a modal shift from barge to rail would require 1,400 more trains annually to handle the volume. The trains would burn 331% more fuel and produce an additional 8,000 tons of hydrocarbons, carbon monoxide and nitrous oxide each year. A modal shift from barge to truck would require 500,000 more trucks burning 826% more fuel and generate an additional 44,000 tons of emissions per year. Runoff from the country's roads and parking lots are the cause of 90% of the contaminants entering the nation's waterways each year.

Despite the benefits of barging, the system is degrading.

Background

On Wednesday April 9, 2003, the Columbia River Towboat Association (CRTA) submitted evidence of significant shoaling in the Snake River to the Technical Management Team (TMT). The U.S. Army Corps of Engineers lacked current and, in some cases, previous survey data necessary to determine the

accuracy of the information provided by the CRTA. At the request of the CRTA, the TMT authorized continued operation of the reservoirs to MOP +1 for one week, until April 16, 2003. This allowed a designated team, including CRTA; USACOE and USCG representatives, time enough to physically verify CRTA claims by taking soundings of the identified areas. On April 15, 2003, the CRTA presented their findings to the Technical Management Team. The group confirmed that significant shoaling has occurred in the areas identified by the CRTA.

Another year has passed without dredging. Each year, more sedimentation enters the system. Shoaling is most evident near the confluence of the Snake and Clearwater Rivers. Other trouble spots include the approaches to Ice Harbor, Lower Monumental and Lower Granite Dams and the upper reaches of the Lower Granite Reservoir. CRTA has requested the United States Coast Guard to establish navigation aids in the following areas to mark the extent of shoaling and help avoid a serious marine incident:

Lower approach to Ice Harbor

Establish green can at approx. 46 13. 641 N , 118 59. 605 W

Ice Harbor Pool (mile 27.5)

Establish red can at approx. 46 23. 754 N , 118 39. 793 W

Ice Harbor Pool (mile 28.2)

Relocate red nun #38 to approx. 46 24. 273 N , 118 39. 201 W

Ice Harbor Pool (mile 30.8)

Relocate red nun #34 to approx. 46 26. 186 N, 118 38. 405 W

Ice Harbor Pool (mile 31.5)

Relocate red nun #38 to approx. 46 26. 603 N, 118 38. 387 W

Little Goose Pool (mile 99.9)

Establish red nun at approx. 46 40. 756 N, 117 33. 127 W

Lower Granite Pool (mile 129.2)

Establish green nun at approx. 46 26. 155 N, 117 12. 656 W

Lower Granite Pool (mile 129.8)

Establish green nun at approx. 46 25. 801 N, 117 12. 703

Failure of the Army Corp of Engineers to maintain the channel approaches to docks near the confluence of the Clearwater River has resulted in several recent groundings. One such grounding involved a cruise vessel attempting to dock at Clarkston, Washington. The vessel was loaded with passengers and the incident resulted in personal injury.

In December 2004, a grounding occurred in the Ice Harbor Cut resulting in a \$ 1.0 million loss. The stakes can be much higher. In this case, there were no injuries, there was no oil spill, the barges were not affected and the tug was re-floated within 12 hours. The cost of an incident involving the release of oil

could reach a level in excess of \$50 million not counting the impact of a prolonged system-wide outage or loss of life. While lack of dredging was not specifically attributable to this particular incident, there is no doubt, on the part of CRTA, that system degradation from lack of maintenance dredging is increasing the danger to the lives and safety of our crews and increasing the potential for a serious marine incident.

The CRTA, based on reports received from our vessels, will continue to make recommendations to the Army Corp of Engineers for areas that should be included in future surveys. Our Captains and crews are relying on the Coast Guard's willingness to establish and relocate aids to navigation necessary for safe navigation. The CRTA is committed to monitoring this situation and will endeavor to keep the USCG and the COE apprised of changes we observe which affect safety to navigation and the environment. CRTA cannot over emphasize the importance of maintaining the system.

Tugs and barges engaged in this work are purpose-built and specifically designed to safely operate within the physical confines of the federally-authorized 14-foot deep by 250-foot wide navigation channel. A typical, fully-laden grain barge draws 13.6 feet. Most barges are 42-feet wide by 272-feet long. The typical four-barge tow is 84-feet wide by 544-feet long. Tugs range in draft between 10.6 feet and 12.6 feet. Their overall length is between 90-feet and 103-feet. This allows, dependent on the configuration of the typical four-barge tow, between 3 feet to 16 feet of clearance between the tow and the end of the navlock and 1 foot on either side between the edge of the barge and the lock wall. In addition to the obvious limitations to maneuvering in such tight quarters, there are other effects amplified by changes in the hydrodynamics of the navigation channel caused by lack of dredging that multiply the degree of difficulty in handling the tug and tow.

The problem of controllability of tows in confined waters, particularly narrow waterways and the potential hazards of collision or allision and grounding, is maximum. Hydrodynamic forces and moments acting on vessels in narrow, shallow waterways are greatly different from those in open, deep waters. A great deal of technical research, including captive model tests, digital simulations and computer modeling, has been conducted in recent years at various hydrographic facilities to assess the hydrodynamic characteristics of vessels in confined waters. The predictability of the dynamic behavior of the tugs and tows can no longer be relied upon under a constantly changing environment. Some important factors affecting the directional stability and control of vessels in restricted waters include:

Sinkage & Trim

As a tug and tow increases speed, she sinks appreciably with respect to the mean surface of the water. Both the bow and stern ride lower in the water as the velocity is increased and the water level alongside is lower than the surrounding water. There is a distinct bow wave and a distinct stern wave, and the water between the two is depressed. The tow rides in this depression. If the trim is off (leaning), the handling characteristics are affected. The operator always prefers his barges to be trim.

Squatting

As the tow travels along, it rides in a depression created by her own passage. If the speed is increased, the bow begins to rise and the stern sinks more rapidly. This is known as *squatting*.

Both *sinking* and *squatting* are increased in shallow water. The proximity of the bottom causes increased relative velocity as the water flows under the tow. The combined effect of *sinking* and *squatting*, in the extreme, can add up to 15% greater draft to the tow. *Squatting* can become a serious problem, both from

the effect on the propulsion system (cavitation), the reduction in under-keel clearance and the danger from the resultant wake (*bank cushion*).

Bank Suction and Bank Cushion

If the tow strays from the center of the channel, there is a tendency for the tow to move bodily toward the near bank. As she steams closer to one bank than the other, the passage between her side and the nearer bank becomes more restricted and the velocity of the flow on that side increases reducing the water level between the tow and the near bank. This tends to force the tow into the near bank, an effect known as *bank suction*. If the tow is maintained on a course parallel to the adjacent bank, she will move into the bank. As the tow approaches the bank, the bow wave on the near side tends to push the bow away from the bank. So, in addition to *bank suction* tending to draw the tow bodily into the bank, there is the *bank cushion* effect, which tends to make the tow sheer away from the bank. The resultant sheer may become so great that the tow will cross the channel and go aground on the opposite shore.

In practice, the tow can usually transit safely near one bank, but she must maintain an inclination (crabbing) away from the bank to overcome the *bank suction*. This requires several degrees of rudder and sometimes the *bank cushion* effect may be too large to be overcome by the rudder. When the tow is crabbing, it uses more of the channel. A typical 84-foot wide tow with an inclination of just 10 degrees, in effect, uses the entire authorized 250-foot wide channel. For this reason, passing arrangements with other vessels are made well in advance and only in the increasingly atypical areas that have adequate water depths outside of the authorized channel.

Current

The resistance of the underbody of the tow to the flow of current is proportional to the square of the velocity of the current and the cross-sectional area presented to the flow. It is impossible to have a current relative to the tow other than ahead or astern. If the current, as it is often, is other than parallel to the axis of the tow, then offsetting forces must be applied. As speed is changed, the effect of the current increases. If the tow becomes broadside to the current, the tow will be swept along with the current requiring large forces to compensate. Currents around the approaches to the dams range in velocity and predictability from moderate to extreme. To overcome these forces, the operator entering the navlocks must maintain sufficient speed over the ground to maintain steerage and overcome these forces until reaching the entrance of the lock. When departing the locks, full power is often required to gain sufficient speed to overcome the effects of the current. Currents, man-made and/or natural, commonly reach velocities in excess of 6 miles per hour.

Steerage

At slow speeds, even a hard-over rudder, in some instances, is not sufficient to overcome some forces. When the vessel has lost *steerageway*, her heading can no longer be controlled by rudder alone. *Steerageway* depends on the water flow over the rudders. The greater the flow, the greater the effect. Even with propellers turning at full speed increasing the flow past the rudders, sufficient momentum must be carried to overcome the effects of wind and current. When the tow is proceeding on an off-centerline course parallel to the centerline of the channel, the effects of *bank suction* force is produced..

Meeting and Passing

As tows approach one another, they must move off of their centerline course. The yaw and sway forces created by the *bank cushion* tends to force the tows toward the center of the channel and the oncoming vessel. As the tows close on one another, very large interacting forces take place. As sediments encroach on the extremities of the channel, the tugs find themselves sweeping the bottom with their propellers. The dynamic disturbances are combined with the channel wall to create oscillatory diverging motions that will cause noticeable heading changes. To overcome these forces, the operator must maintain inertia. A top down view of the approaching vessels would reveal that they are carrying large drift angles to the centerline of the channel (crabbing). The drift angle could easily exceed 10 degrees. A ten-degree drift angle will place the stern of the vessel outside of the channel limits. Meeting situations must be carefully planned to occur in wide and deep areas of the river.

Conclusion

These effects are not inclusive of all of the external forces our operators are challenged with nor do they represent the full extent of those forces that are changing, as a direct result of degradation of the system. In some areas, where silt is encroaching on channel boundaries and, particularly, the entrances to the navlocks, the effects of some of the aforementioned forces are becoming increasingly pronounced. As the depth of the channel diminishes and the width is further constricted, reaction to conditions that affect the handling characteristics of tugs and tows becomes more unpredictable.

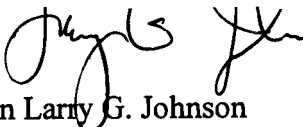
If this situation is not resolved, we in the CRTA fear that the result could be devastating to the environment. Further, we respectfully caution policy makers that if the system is allowed to continue to degrade, the welfare of 49,000 families will likely suffer.

We also feel strongly that the lack of maintenance dredging is unfairly increasing the risk to the lives and safety of our crews in whom we entrust with the responsibility to deliver their vessel and cargoes. In the absence of dredging, it is imperative to safe navigation that we are provided with the authorized depth of water (14-feet) by operating at least one foot above MOP.

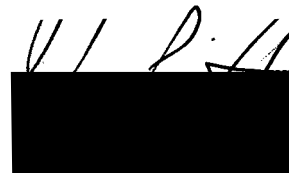
We request that the pools above the Snake River Dams be operated at a level at least one foot above MOP during 2004 as necessary to insure a fourteen foot channel.

Respectfully,

COLUMBIA RIVER TOWBOAT ASSOCIATION



Captain Larry G. Johnson
Member



TECHNICAL MANAGEMENT TEAM

BOR: Tony Norris / John Roache

BPA: Scott Bettin / John Wellschlager

NMFS: Paul Wagner / Chris Ross

USFWS: David Wills / Howard Schaller

OR: Ron Boyce

WA: Cindy LeFleur

ID: Russ Kiefer

MT: Jim Litchfield

COE: Cindy Henriksen / Rudd Turner / Cathy Hlebechuk

TMT MEETING

17 March 2004 0900-1200 hours

**Custom House Room 118
Portland, Oregon
Conference call line: 503-808-5190**

*All members are encouraged to call Donna Silverberg with any issues or concerns they would like to see addressed.
Please e-mail her at dsilverberg@cnmm.net or call her at (503) 248-4703.*

AGENDA

1. Welcome and introductions.
2. WMP Spring/Summer Update
3. MOP+1 at Lower Snake Projects
4. April 10 flood control elevations
5. RSW operations during non-test periods
6. McNary operations (1% tests)
[\[SOR #2004-1\]](#) [\[Analysis for SOR #2004-1\]](#)
7. Start of Spring Transport (NOAA F)
8. Update of summer spill discussion
[\[Summer Spill Proposal Decision Process Timeline\]](#)
9. Current Operations
 - a. Corps QADJ run for March
[\[Summary of March 2004 QADJ Model Runs\]](#)
10. Other
 - Unresolved Issues Discussion (from last fall)
 - Set agenda for next meeting

Questions about the meeting may be referred to Cindy Henriksen at (503) 808-3945, or Rudd Turner at (503) 808-3935, or Cathy Hlebechuk at (503) 808-3942

State, Federal and Tribal Fishery Agencies Joint Technical Staff

US Fish and Wildlife Service

Columbia River Inter-Tribal Fish Commission

Idaho Department of Fish and Game

Oregon Department of Fish and Wildlife

Washington Department of Fish and Wildlife

Shoshone-Bannock Tribe

May 29, 2003

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Dear Mr. Brown, Ms. Kalamaz, Ms. Fodrea and Mr. Peters:

The Bonneville Power Administration has developed and distributed a proposal to the Corps of Engineers Study Review Work Group (SRWG) to discontinue the 1% peak turbine efficiency turbine operating limits included in the NMFS Biological Opinion. We understand and support the ongoing process of evaluating hydrosystem operations and how they relate to fish survival. However, we find that the available evidence strongly suggests that operations outside the 1% of peak efficiency would be detrimental to fish. Therefore we cannot support the draft proposal submitted by BPA to discontinue operations within the 1% of peak efficiency in all mainstem federal projects. We support the implementation of the Biological Opinion (BiOp) measures requiring that turbines operate within 1% of their efficiency range.

State and tribal co-managers have reviewed the proposal and have summarized their comments and concerns below which are presented in detail in the following discussion. In addition we have attached our comments on a specific study proposal presented to the SRWG to study the 1% turbine efficiency operating criteria at McNary Dam in 2003.

- Our review of historic and recent data only finds evidence that supports maintaining the 1% peak efficiency limits included in the NOAA Biological Opinion.
- The BPA proposal shifts the burden of proof of risks to the fishery resource in favor of apparently more certain economic benefits for the hydropower system.
- The BPA proposal abandons the precautionary approach to hypothesis testing which is warranted in an endangered species context.
- The BPA proposal reflects a management priority, which is inconsistent with the fishery management priorities of the state, tribal and federal fishery managers submitting these comments. The BPA proposal to expend effort and limited funds to test fish survival relative to turbine efficiency ranges above levels that are safer for fish is establishing a federal operator priority for increasing hydropower revenue rather than fish protection. A priority established for fish protection would direct expenditures at keeping fish out of turbines and providing alternative passage routes rather than increasing passage of fish in turbines and operating turbines at levels that reduce fish survival. Expenditure of fish mitigation funds for this study is unacceptable to the natural resource managers.
- The BPA proposal does not address the deterioration of conditions in the gatewells and on the vertical barrier screens that will result from higher turbine flows. Gatewell and vertical barrier screen and orifice conditions will deteriorate and result in significantly increased fish injury, stress and mortality.

Our review of historic and recent data only finds evidence that supports maintaining the 1% peak efficiency limits for turbines included in the NOAA Fisheries Biological Opinion.

The NOAA Fisheries 2000 Biological Opinion (BiOp) includes the requirement that turbine operations be limited to within 1% of peak efficiency based upon evidence (both empirical data and expert opinion) suggesting that smolt survival was higher within these limits compared to operations beyond them. In an effort to re-evaluate this BiOp requirement, Bonneville Power Administration (BPA) has submitted a draft proposal (dated May 19, 2003) to discontinue these turbine operating limits. However, in our review of this proposal, historic data, and recent data, we only find evidence that supports maintaining the 1% of peak efficiency limits, and therefore do not support the BPA proposal on turbine operations. Our basis for this conclusion is outlined below.

Milo Bell Compendiums

Bell et al. (1967) and Bell et al. (1981) provided the first basis for the 1% of peak efficiency limits. These reports present published and unpublished data on survival of small fish passing through Kaplan- and Francis-type turbines. The Bell Compendiums provide compelling evidence that fish survival is generally higher when turbines are operated within the 1% limits than when they are operated beyond these limits. In

addition, survival appears to decrease linearly as turbines are operated beyond peak efficiency.

These results make sense from a mechanistic perspective as well. Mechanistically, when turbines are operated beyond peak efficiency, flow fields in the turbines are disrupted, resulting in cavitation and damage to the metal surfaces in contact with the water. Clearly, this is an undesirable condition for fish, and therefore operations that create these conditions (i.e., operations beyond the 1% of peak efficiency limits) are expected to reduce survival. The data provided by the Bell Compendiums clearly support this expectation.

Eicher and Associates (1987)

In a comprehensive review of fish mortality through turbines, Eicher and Associates for EPRI (1987) reported the conclusions of a panel of experts that the maximum survival of fish coincides with the greatest turbine efficiency. Further they noted that turbine efficiency is determined by wicket gate openings and resulting flow qualities and design head in relationship to operation head, and that efficiency falls off after reaching a peak of 60-80% maximum flow into a unit. Eicher and Associates also note that the hydraulic character of the backroll of the turbine discharge into the tailrace is a function of overall flow into the turbine unit. They note as was described by NMFS in Bonneville Dam survival studies (Gilbreath et al. 1993) that the backroll carries fish into heavy predation zones. Eicher and Associates concluded by noting that diverting fish from turbines is probably the most cost-effective way of reducing fish mortality.

Skalski et al. (2002)

The data evaluated in Skalski et al. (2002) provide a second basis for maintaining the 1% efficiency limits. While their analysis was primarily focused on evaluating the academic question of whether peak survival coincides with peak efficiency, they do provide a useful summary of more recent data on the relevant operational question of maintaining the 1% of peak efficiency limits. Based on the data provided in Skalski et al. (2002, Table A.1), mean survival is reduced by 1.13% (for Columbia/Snake River projects) to 1.64% (for all projects) when Kaplan-type turbines are operated beyond the 1% of peak efficiency limits (Figures 1 and 2). In addition, survival decreases linearly as turbines are operated beyond peak efficiency for Columbia/Snake River projects (Figure 3).

Normandeau et al. (2003)

The presence of several study design flaws severely limits the utility of the 2002 McNary turbine survival study results summarized by Normandeau et al. (2003) for evaluating the BiOp turbine efficiency requirement. These flaws stem from both how the study was conducted and how the results can be interpreted given the greater context of fish passage at dams. We condense some of these issues into five main points, below.

First, operations beyond peak efficiency increase turbulence and flow within the gatewells, resulting in screen and orifice clogging, increased current velocities, and fish mortality along the intake and vertical barrier screens. During times of high debris

loading, this problem is especially severe. Because fish were released within the gatewells in the 2002 McNary study, the survival estimates do not reflect this known problem. Furthermore, the estimates do not incorporate the changes in fish guidance efficiency that would occur with operations beyond the BiOp regulations.

Second, the sole use of large chinook salmon smolts prevents the application of study results to other species and size classes. As found in Skalski et al. (2002), turbine survival is significantly related to fish size, with smaller fish showing lower survival rates. Species that are more sensitive to turbine passage or are smaller than the large chinook smolts used in the 2002 McNary study will show reduced survival compared with results presented in Normandeau et al. (2003). Therefore using the 2002 McNary study results to overturn the BiOp turbine efficiency operating requirements, which in nature apply to all species and size classes, is inappropriate.

Third, spill operations and sample sizes were not consistent across the treatments in the 2002 McNary study. Treatments outside of the 1% limits (i.e., the 14 kcfs and 16.4 kcfs operations) had no spill during 6 of the 7 study days, whereas the treatments inside of the 1% limits had no spill for 4 of the 9 study days. This inconsistency in spill operations creates the question of whether the differences in survival estimates are the result of differences in turbine operations or of differences in spill. The number of fish released also differed among the treatments. Between 350 and 390 fish were released for 5 of the 6 treatments, but only 270 fish were released for the 14 kcfs treatment. The fact that this treatment also showed the highest survival is curious. Further, based on the results from previous studies, we expect survival to decline linearly as turbines are pushed beyond peak efficiency. Because the survival estimate at the 14 kcfs treatment is well above an interpolation between the 11.2 kcfs and 16.4 kcfs treatment estimates, this casts additional doubt upon the validity of the 14 kcfs survival estimate.

Fourth, we question the use of 48 h survival rates for evaluating delayed turbine mortality. Studies have shown that delayed mortality associated with turbine passage can be significant, and often is not manifested until several days following passage (Kostecki et al. 1987). Without holding the fish for longer periods, we cannot ensure that operations outside the BiOp limits will not jeopardize the long term survival of smolts. Further, forebay and tailrace mortality must be evaluated. Extended holding to assess delayed mortality presents other biases that make this approach difficult experimentally. These delayed and indirect effects may only be understood through studies that evaluate effects on smolt-to-adult survival rates.

Fifth, the efficiency levels chosen for the 2002 McNary study are not informative for comparing fish survival inside and outside of the 1% of peak efficiency operations. The 8 kcfs and 11.2 kcfs treatments lie at the boundary of the 1% limits and the other two treatments are beyond the limits. To evaluate whether operations outside the 1% limits do not negatively impact fish, data must be collected well inside of the 1% limits. Studies operating at the limits and beyond (e.g., the 2002 McNary study) do not provide information on the effects of turbine efficiency on survival because estimates are only collected at operations beyond the efficiency limits. Furthermore it is important to note

the fact that Normandeau et al. (2003) report the planned discharges (8, 11.2, 14 and 16.4 kcfs) rather than the actual discharges (7.7, 12, 13.4, and 16.6 kcfs) throughout the document. This was misleading, as was the practice of claiming that the 11.2 kcfs treatment was near peak efficiency when in fact it was at the 1% boundary. We encourage proper and accurate documentation of study outcomes and request the authors of Normandeau et al. (2003) in the future refrain from reporting misleading and inaccurate treatment data and results.

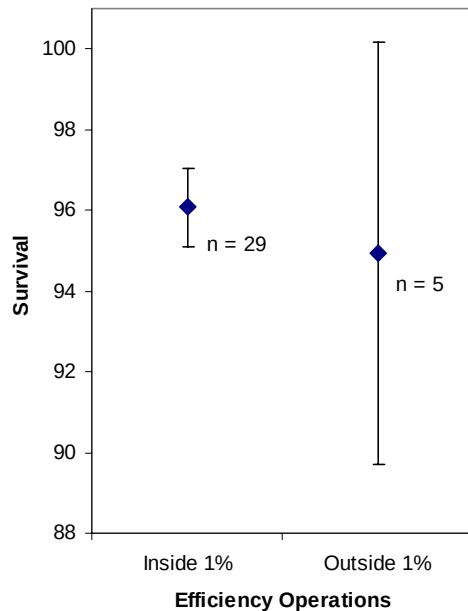


Figure 1. Mean survival and 95% confidence intervals for Kaplan-type turbines operated inside and outside of the 1% of peak efficiency bounds for Columbia/Snake River projects [Data from Skalski et al. (2002, Table A.1)].

Figure 2. Mean survival and 95% confidence intervals for Kaplan-type turbines operated inside and outside of the 1% of peak efficiency bounds for all projects [Data from Skalski et al. (2002, Table A.1)].

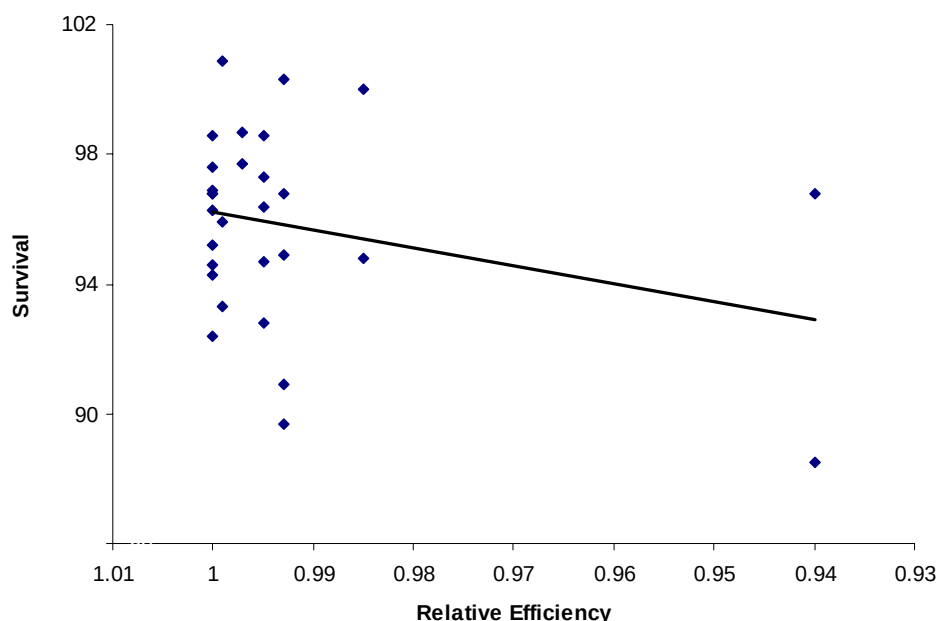


Figure 3. Relationship between survival and relative efficiency of Kaplan-type turbines for Columbia/Snake River projects [Data from Skalski et al. (2002, Table A.1)].

With respect to risks, the BPA proposal shifts the burden of proof to the fishery resource in favor of apparently more certain economic benefits for the hydropower system. The BPA proposal abandons the precautionary approach to hypothesis testing which is warranted in an endangered species context.

The BPA proposal is based upon BPA's decision to place the burden of proof for protection upon the ESA listed salmon, and other anadromous fish resources in favor of anticipated economic benefits to BPA.

The choice of a significance level determines the relative frequency of two kinds of mistakes, either rejecting the H_0 when it is correct making a Type I error, or failing to detect the truth of H_A when it is correct making a Type II error (Snedecor & Cochran, 1989). The failure rate β of not rejecting the null hypothesis when the alternative is "true" is termed the "Type II error" and the failure rate α of rejecting the null hypothesis when the null hypothesis is "true" is termed the "Type I error". In ecological studies, it is often desirable to balance these errors by applying the same failure rates to each type of error or even setting the failure rate such that $\beta < \alpha$. The proposal indicates that BPA is more willing to accept a Type II error than a Type I error. However, there are reasons why a more precautionary approach to hypothesis testing is warranted in endangered species contexts (Peterman 1990, Dayton 1998). Steidl and Thomas (2001) cite investigators who have suggested that Type II errors be considered paramount when monitoring endangered species; or at least that Type I and Type II errors be balanced based on their relative costs. In endangered species recovery activities, if a Type II error is committed, a population could be on its way to extinction before the decline is detected and preventative action is taken. Conversely, if the population is monitored after initiating recovery actions (such as implementing turbine efficiency limitations), and the population is

actually increasing, a Type II error would lead to the mistaken inference that the actions are not having the desired effect, perhaps jeopardizing continuance of those actions. The limitations of empirical data and ability to determine small differences in survival should not result in placing listed stocks at additional risk. If the data and methods do not allow differentiation of small differences a precautionary approach to management of endangered species require adoption of the measures that provide conservation and protection of the species.

Proper consideration of the possible detrimental effects of failing to meet turbine efficiency requirements requires acknowledging the limitations inherent in the available empirical data on turbine efficiency and survival. It should be kept in mind, for instance, that it's difficult to accurately characterize exact turbine conditions experienced by individual release groups in the turbine survival studies. The most relevant question we can ask in light of these limitations of data is not whether we can tease out effects on highly variable survival estimates from small variations in turbine operations within a season. Many factors affecting turbine survival probability will always remain outside of management influence. A more relevant question is, over a longer time series, given a representative range of uncontrolled variation in factors affecting survival, are turbine operations within their efficiency ranges associated with higher survival rates?

The BPA proposal does not address the deterioration of conditions in the gatewells, on the vertical barrier screens, and in the tailrace which would result from higher turbine flows. Gatewell and vertical barrier screen conditions would deteriorate and result in fish injury, stress, and direct and delayed mortality.

During 1997 and 1998 studies were conducted (Brege et al. 1998, Brege et al. 2001) to evaluate the vertical barrier screens and outlet flow control devices at McNary Dam. In those studies turbines in the test units were operated at low load 60 MW and high load 80 and 75 MW. Those tests with spring migrants showed that there was significantly higher levels of descaling under high turbine load operations. Under high load conditions descaling averaged 17 % versus 6.7% at low loads.

Present studies indicate that delayed mortality is an important factor in return of adult transported salmon and steelhead. Smolt to adult return data (CSS status report 2001) indicates that smolt to adult return rates for bypassed smolts are lower than spill passage. The BPA proposal to operate turbines at higher loads, given the results of gatewell vertical barrier screen descaling data, will potentially exacerbate and add to delayed mortality for transported smolts and reduced survival of bypassed smolts.

The current proposal outlines BPA's justification for operating turbines, specifically at McNary Dam, outside the current 1% efficiency guidelines. The 1% operation was implemented based upon previous research that showed a relationship between peak efficiency of the turbine and maximum survival. BPA has outlined their rationale for believing that this data may not be accurate. Regardless of the debate over operating ranges and juvenile survival through the turbines, operating the turbines outside of 1% percent to increase generation will divert more flow through the turbines. This will likely increase the number of juveniles using this route of passage. As flow through a route increases so does the number of juveniles that use the specific route. This has been shown through countless passage evaluations. Thus, more juveniles will pass via the turbines; only the percent increase is uncertain. Current estimates for passage through the turbines are 86% and 87% from the radio tagged fish evaluation in the 2002 survival study conducted at McNary dam to test the 11.2 and 16.4 kcfs flow rates through the turbines. The project goal is to attain project survival in the high to upper 90's, ideally a route specific survival would be 98%. By increasing the number

of juveniles using the turbines, project survival is going in the wrong direction, making it more difficult to attain the goals set out in the 2000 BiOp.

While gatewell releases during the April 2002 evaluation showed no difference in fish condition or survival, the gatewells were clean and operating at an ideal condition. During this time of year, there is little debris and no temperature problems; hence, this evaluation did not test a worst-case situation. By increasing flow through the turbines, more flow will be directed up the gatewell. Peak debris loads normally occur during the spring freshets and during the late summer. As debris and grasses are guided up into the gatewells with the migrating fish, increased head differentials across the barrier screens become evident and normally fish quality/condition problems start to manifest itself at the project. Not only is this hard on the screen mesh and other associated equipment in the gatewells, but fish that are guided into the slots can be injured or worse yet killed as hot spots (increased velocities) along the screen mesh develop. In past years and at present, to best counteract this problem, the project biologists would advise the project to reduce turbine loading to minimum operating levels and where warranted the unit would be taken down and the barrier screens cleaned. Increasing megawatts at McNary for example would only exasperate a "known" condition that currently exists at the project and is counter to improved fish survival goals stated in the 2002 BiOp.

Furthermore, the 2002 spring evaluation measured a much reduced residence time for fish released into the gatewell at 16.4 kcfs. Reductions in gatewell residence have been noted in the past when gatewell conditions become more turbulent and more aggressive hydraulically, which make it more difficult for juveniles to avoid the orifices. Under these conditions the juveniles are more similar to buoyant particles than active swimmers. This situation can be very injurious to fish, even under medium debris loads. This would also likely lead to reduced survival for fish using the bypass system, which would again drive project survival in the opposite direction of the survival goals for McNary as outlined in the 2002 BiOp.

The BPA proposal states that the SIMPASS model showed no difference in project survival. Notably the evaluation is missing the summer component. The evaluation used in the proposal used spring conditions. However the current operation under region discussion will continue through the summer. Current operations at McNary involve daytime involuntary spill. By increasing turbine flow, more fish will be passed via the powerhouse and turbine units as daytime involuntary spill is reduced. Because of the limited powerhouse capacity at McNary, involuntary spill was included in the biological effects analysis during the ESA consultation in 2000. By reducing the involuntary spill, project survival will be decreased and once again the separation between current conditions and the survival targets in the BiOp will be increased.

Table 3 in the BPA proposal, on page 27 describes the SIMPASS assumptions, has questionable values for turbine survival. BPA used balloon tag survival estimates for turbine survival. Balloon tag survival is not an appropriate technique to get a route specific survival due to the interaction of the tag and test animal. Balloon tags only estimate direct survival at best, and do not look at indirect survival post passage. Balloon tags are commonly used to identify areas of concern for passage, not to estimate route specific survival. A radio tag survival study was conducted along with the balloon tag study in 2002. Estimates for survival between the two turbine levels were 86% versus 87% as opposed to the 95% and 93% survival used by BPA in the SIMPASS model. Furthermore, BPA did not model any changes in FGE or FPE as more flow was passed by the turbines, which is questionable when doing a sensitivity analysis for turbine and project survival.

We understand that Bonneville Power Administration's objective is to enhance hydropower production without reducing fish survival. However, the proposal eliminate the 1% turbine efficiency operating criteria included in the NOAA Biological Opinion does not accomplish that objective.

BPA's proposal for operations and study does not represent a prudent expenditure of funds or assignment of priorities from a fish protection standpoint or a Biological Opinion progress check in dates. The BPA proposal is counter to BPA's historical position that turbines should run at peak efficiency during fish migration season. The primary objective of the BPA proposal is to increase hydrosystem revenue.

However, running turbine units outside of 1% peak efficiency will cause cavitation and poor operational conditions that would require more frequent shutdowns of units to repair cavitation damage (Shelton and Loupin 1995). In Europe, turbine units are never operated outside peak efficiency criteria because the costs of shutdowns and repairs are prohibitive. Increased repair costs and unit shutdowns for repairs may actually reduce overall FCRPS hydro revenues, or simply shift anticipated revenue gains to BPA with repairs costs to the Corps.

Precautionary management as anticipated by ESA would place the highest priority on increasing fish survival at the projects which would place the highest priority for expenditure of funds on actions that would reduce injury through the bypass, reduce fish passage through the turbines and provide alternatives to turbine passage. Fish survival is lowest through turbines than any other passage route even within the most efficient turbine operating range, , the BPA proposal will increase the proportion of fish passing through the most lethal project route.

Study design

Studies conducted to date have not shown that survival is improved or unchanged under high load turbine operations. The precision of the balloon tag studies does not support a management decision to eliminate the turbine efficiency requirements of the NMFS Biological Opinion. Please refer to our specific comments (attached) on the BPA,COE proposal to study the 1% turbine efficiency criteria at McNary Dam in 2003.

Conclusions

- Historical and present data does not support the BPA proposal to eliminate turbine efficiency requirements of the BIOP.
- The BPA proposal inappropriately shifts the burden of proof to the fishery resource, placing a higher level of risk on listed and non-listed fish stocks.
- The BPA proposal if implemented is likely to exacerbate issues of delayed mortality on transported fish, and reduced survival of bypassed fish and turbine passed fish due to increased stress, injury and descaling in the gatewells and degraded tailrace conditions.
- Studies of survival relative to turbine operations are turbine operations are a low funding priority in comparison to funding alternatives to turbine passage.
- Funds intended for current fish mitigation programs should not be expended on these proposed studies.
- A proposal to increase fish passage through turbines is counter to the aggressive, non-breach all-H recovery plan that BPA to this point has supported.

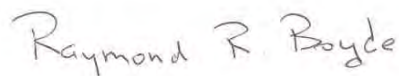
Sincerely,



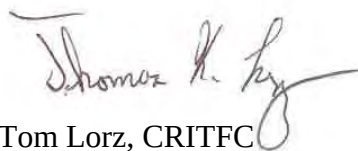
Dave Wills, USFWS



Steve Pettit, IDFG



Ron Boyce, ODFW



Tom Lorz, CRITFC



Keith Kutchins, SBT



Shane Scott, WDFW



Bob Heinith, CRITFC

Assumptions:

- * Streamflows were adjusted to the March Final Water Supply Forecast for the period of March thru August of 90.6 MAF at The Dalles and shaped 59 different ways based on observed historical runoff.
- * Starting elevations were observed data from February 29, 2004.
- * Grand Coulee helps meet Vernita Bar minimum flow objective of 70 kcfs in Mar. Operate to meet McNary flow objective of 228.3 kcfs. Minimum draft elevations are based on a GCL/Dworshak shifted flood control and VECC/AER requirements.
- * Hungry Horse operates to VARQ flood control or minimum flow from Mar - May and meets minimum flow of 3500 cfs at Columbia Falls, targets full in June, and drafts to 3540 ft by 31 Aug.
- * Brownlee operates to flood control elevations.
- * Dworshak targets elevation 1547.2 ft in Mar, 1557.5 ft by 15 Apr, and 1534.8 ft by 30 Apr, based on a GCL/DWR shifted flood control operation and maximum releases of 12.5 kcfs in April and 13 kcfs May-Jun. DWR targets full in June with a minimum flow of 1.5 kcfs, releases a maximum of 13 kcfs in July - August to meet LWG flow objectives, and targets 1520 ft by 31 Aug.
- * Libby operates on minimum flow or VARQ flood control Mar - Apr. Targets 13.9 kcfs in May and 9.4 kcfs in June for Sturgeon, based on an Apr-Aug forecast of 5.359 MAF and a Tier 2 required pulse of 0.80 MAF. Targets full in July with a minimum flow of 7,000 cfs for bull trout. Drafts to 2439 ft by 31 Aug.

Results:

Priest Rapids Meets Flow Objectives of 70 kcfs in Mar - Apr 15 and 135 kcfs in Apr 16 - Jun.

Month	Occurrences out of 59 Years	Average Flow for 59 Years (kcfs)
Mar	59	74
Apr 15	59	82
Apr 30	39	149
May	45	148
Jun	48	132

Lower Granite Meets Flow Objectives of 100 kcfs in Apr - May, 84 kcfs in June and 52 kcfs in Jul - Aug:

Month	Occurrences out of 59 Years	Average Flow for 59 Years (kcfs)
Apr 30	17	86
May	32	104
Jun	43	96
Jul	27	49
Aug 15	0	41
Aug 31	0	31

Bonneville Meets Flow Objectives of 125 kcfs in Mar - Apr:

Month	Occurrences out of 59 Years	Average Flow for 59 Years (kcfs)
Mar	42	133
Apr 15	57	160
Apr 30	59	247

McNary Meets Flow Objectives of 228.3 kcfs in Apr 15 - Jun and 200 kcfs in Jul - Aug:

Month	Occurrences out of 59 Years	Average Flow for 59 Years (kcfs)
Apr 30	31	231
May	38	246
Jun	39	244
Jul	16	182
Aug 15	0	143
Aug 31	0	129

Projects Refill by 30 June:

Month	Occurrences out of 59 Years	Average Elevation on 30 Jun for 59 Years
Libby	14	2452
Hungry Horse	59	3560
Grand Coulee	59	1290
Dworshak	56	1600

Period Average Flows (kcfs)

	MAR 1-31	APR 1-15	APR 16-30	MAY 1-31	JUN 1-30	JUL 1-31	AUG 1-15	AUG 16-31
LIB	4	4	4	14	10	19	16	14
HGH	2	1	1	2	6	7	5	4
GCL	68	75	137	125	120	118	92	91
PRD	74	82	149	148	151	132	100	96
DWR	2	2	13	6	6	11	13	11
BRN	17	22	23	21	17	13	17	12
LWG	42	63	86	104	96	49	41	31
MCN	121	151	231	246	244	182	143	129
TDA	127	154	241	249	249	184	144	129
BON	133	160	247	254	254	188	148	133

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- * Starting elevations were observed data from February 29, 2004.
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Month	Occurrences out of 59 Years	Average Flow for 59 Years (kcfs)
Apr 30	0	86
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Jun	0	95
Jul	0	49
Aug 15	0	40
Aug 31	0	31

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Libby	14	2452
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Period Average Flows (kcfs)

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HGH	2	1	1	2	6	7	5	4
GCL	68	75	137	125	120	118	92	91
PRD	74	82	149	148	151	132	100	96
DWR	2	2	13	6	6	11	13	11
BRN	17	22	23	21	17	13	17	12
LWG	42	63	86	104	96	49	41	31
MCN	44	67	86	103	95	49	40	31
TDA	127	154	241	249	249	184	144	129
BON	133	160	247	254	254	188	148	133

**TECHNICAL MANAGEMENT TEAM
MEETING NOTES
March 17, 2004
CORPS OF ENGINEERS NORTHWESTERN DIVISION OFFICES – CUSTOM
HOUSE
PORTLAND, OREGON**

FACILITATOR’S SUMMARY NOTES ON FUTURE ACTIONS

Facilitator: Donna Silverberg

The following notes are a summary of issues that are intended to point out future actions or issues that may need further discussion at upcoming meetings. These notes are not intended to be the “record” of the meeting, only a reminder for TMT members.

WMP Spring/Summer Update:

The COE hopes to finalize the spring summer update of the Water Management Plan by March 31. So far, the COE has received comments from the BOR; Oregon and Idaho plan to submit comments before March 31. TMT members will discuss and try to finalize the document at the 3/31 TMT meeting.

[NOTE]: The Department of Interior is offline, so communication with USFWS and BOR representatives needs to be done via phone or fax.

MOP+1 at Lower Snake Projects:

Continuing discussions from the last TMT meeting, the Towboat Association submitted a request that all Snake River projects be operated at MOP+1 until the dredging issue in the Lower Snake is resolved. John Pigott said the Towboaters would be willing to accept a MOP operation at Lower Monumental with all other projects operated at MOP+1, which was similar to the operation implemented in 2003. John reported that dredging is expected to begin in winter 2004-05, based on a BiOp expected out this week from NOAA particular to dredging in the Lower Snake. TMT members commented on the Towboaters’ operational request:

Oregon: The proposed operation would have some impact on fisheries, but no objection as long as there is resolution on dredging by next year.

Idaho: Appreciate the Towboaters’ willingness to alter the request to not include Lower Monumental, and support this new request.

NOAA: Given health and safety issues, no objection to the proposed operation.

USFWS: Impacts to fish are probably slight, and understand the tradeoffs, so no objection.

BOR: No objections.

BPA: No objections.

CRITFC: While the tribes have a preferred policy of MOP as a minimum operating target, they do understand the Towboaters’ concerns and wish them the best of luck.

COE: Hearing no strong objections to the proposal and agreement on concerns for health and safety, recommend that the requested operation (operate all Lower Snake

projects except Lower Monumental at MOP+1 during the 2004 spring spill season) be implemented. The specifics of the operation will depend on current conditions (i.e. fish and elevation needs). This operation is expected to begin on or after April 3, and will be included in the spring/summer update of the WMP.

The Towboat Association expressed appreciation for the TMT's willingness to consider the request and balance TMT needs with the Towboaters' needs. They stressed that they have come to the TMT in a collaborative spirit, fully supportive of the needs of the TMT.

April 10 Flood Control Elevations:

Cindy Henriksen, COE, provided a handout (also on the TMT web page) that showed the water supply forecast and flood control elevations. Water supply forecasts have decreased to 90-93% of normal for the projects. The resulting flood control elevation has increased to 1534-1538' at Dworshak and 1272-1283' at Grand Coulee. It was suggested that the projects be operated more conservatively in the future to avoid a shortage of water and missing flood control objectives. Oregon commented that it seems as though the region is in this position more often because of power needs/use.

Lower Granite RSW Operations During Non-test Periods:

NOAA has recommended that the Lower Granite project be operated the same during non-test as during test periods, which is RSW (7-8 kcfs) plus 12 kcfs training spill. A question was raised: Why not use BiOp operations during non-test periods? Two years worth of data suggests that better survival occurs with the revised operations. ODFW and WDFW requested a consideration for RSW plus spill to the gas cap. No agreement has been reached at this time. A decision is needed by April 3rd. Resolution of this issue is expected to occur at TMT or IT. The question raised was, is there a technical basis to spill at higher levels than the 12 kcfs (which is supported by studies)?

ACTION: Steve Rainey, NOAA, will send radio telemetry 2002 results to Cindy Henriksen for distribution to TMT. The salmon managers will discuss this issue further before TMT; TMT will make a decision at the 3/31 TMT meeting. If a decision is not reached, the issue will be added to the 4/1 IT agenda for resolution.

SOR 2004-1:

SOR 2004-1, presented by the salmon managers, requests that McNary turbines be operated within 1% peak efficiency during the spring/summer season. Steve Haeseker, USFWS, said that, upon review of science studies conducted last summer, a majority of evidence suggests that operating outside 1% peak efficiency is detrimental to fish. The SOR is meant to show salmon manager support for the BiOp and RPA 58. The salmon managers do not object to tests underway that already go outside of 1%.

The federal executives and FFDRWG have discussed a spring monitoring plan for McNary, on how to monitor and minimize impacts if restrictions to operate within 1% peak efficiency are removed. Agreement is needed on the monitoring plan. The salmon managers feel that the executives need to determine the basis for going outside 1% and present that to the salmon managers. Information for the monitoring plan discussions will be circulated to TMT before 3/31, at which time there will be a follow-up TMT

discussion. There will be a FFDRWG meeting to discuss the monitoring plan on 3/23 in Portland.

Start of Spring Transport:

NOAA has some new data that suggests that in-river fish do as well as transported fish, so NOAA proposed starting transport at a later date. The salmon managers requested more time to review the preliminary data, particularly new COE data which potentially supports NOAA's findings. The region decided to operate to BiOp this year and review the data for decisions next year, so collection will begin on 3/25 at Lower Granite and 4/1 at Little Goose and Lower Monumental. (Actual transport will begin 1-2 days later).

Summer Spill Proposed Decision Process Timeline:

A federal summer spill proposal for actions and offsets is expected to be released for comment at the end of March. Written comments will be received until April 16th, at which time a regional executives meeting is scheduled. The federal executives will make a decision sometime after that meeting. TMT will continue to receive updates on this issue.

Current Operations:

QAdjust: The COE presented the latest QAdjust run using the March final forecast. This information can be found on the TMT web page.

Operations: Grand Coulee is at elevation 1259.8' – when it reaches 1255' the BOR will hold that elevation for approximately two weeks for annual repair work. Hungry Horse is at 3511.8' and drafting to meet Columbia Falls. Approximately 300 kaf of water is expected from the Lower Snake. April 15 flood control at Libby is 2433' (VARQ). The COE expects to maintain Libby at minimum outflows at least through March. Dworshak is at elevation 1513.5' and filling slightly. The April flood control elevation for Dworshak is 1534'.

Fish status: Chum are being caught at numbers similar to previous years at this time; Ron Boyce provided a handout and will continue to update TMT on this. The Spring Creek corner collector was operated from last Thursday (3/11) through Monday (3/15). This operation appears to have succeeded in passing the bulk of the hatchery fish.

Other: B2 Corner Collector: There will be a dedication ceremony on April 9th, at which time the corner collector will begin operating. Jim Adams, COE, provided initial water quality monitoring data from the corner collector and added that Mike Schneider, COE, is currently gathering more information at the project.

Next Meeting, March 31, 9am-noon:

Agenda Items:

- WMP Spring/Summer Update
- RSW Operations at Lower Granite
- McNary Operations – 1% Peak Efficiency
- Summer Spill Update
- Start of Season Review

1. Greeting and Introductions

The March 17, 2004 Technical Management Team meeting was chaired by Cindy Henriksen of the Corps and facilitated by Donna Silverberg. The following is a distillation, not a verbatim transcript, of items discussed at the meeting and actions taken. Anyone with questions or comments about these minutes should call Henriksen at 503/808-3945.

2. WMP Spring/Summer Update.

The first draft of the spring/summer update was made available at the last TMT meeting, said Henriksen; the only comments received to date have been from the Bureau of Reclamation. Many of the unresolved issues within the spring/summer update are on today's agenda for discussion, Henriksen said; the goal is still to finalize this document at the March 31 TMT meeting. As always, she said, the update will be updated as we go through the season and additional monthly final water supply forecasts are received. Ron Boyce said he hopes to provide Oregon's comments on the spring/summer update within the next week. Sharon Kiefer said Idaho will also provide its comments prior to the March 31 TMT meeting.

3. MOP +1 at Lower Snake River Projects.

Henriksen reminded the group of the presentation it received from the Columbia River Towboat Association at its last meeting; the Association submitted an SOR requesting MOP +1 operation at the Lower Snake projects beginning in early April. The operation would continue through August 31. The reason for this request is that, due to conflicts with the BiOp, channel dredging did not take place in 2003, so river safety conditions, in the form of shoal areas that pose a hazard to barges, have not been improved since last year. We were hoping to reach resolution on this issue today, so that we can finalize this section in the spring/summer update, Henriksen said.

John Piggott of the CRTA said the Association would be happy if they could get MOP +1 at every pool with the exception of Lower Monumental pool; there is no obstruction that would prevent safe operation at MOP in Lower Monumental. So you're requesting the same operation as we implemented in 2003? asked Sharon Kiefer. Correct, Piggott replied. And in the longer term, is dredging on the horizon? Boyce asked. We're hoping to get it done in the winter of 2004/2005, Henriksen replied. Jack Sands said the Corps' Walla Walla District is proposing dredging during the upcoming winter in-water work period; it is impossible to say for sure whether or not that will happen. The proposed dredging would include Little Goose, Ice Harbor and Lower Granite pools, said Sands. Do you feel any optimism that the outstanding issues will be resolved so that dredging can go forward this winter? Boyce asked. We're just about ready to go back before the court, Sands replied; we are anticipating that the new Biological Opinion will allow for a one-year dredging program, and anticipate that the court will see the need for that activity to proceed.

Where does the TMT stand on this issue? Silverberg asked – is the Corps planning to move forward, depending on what we hear from the rest of the TMT? Yes, Henriksen replied. Boyce said this is an operation that is identified in the BiOp, so Oregon will not object to it, as long as there is a plan in place to resolve the dredging situation. Chris Ross said that, despite the slight increase in travel time caused by the higher pool elevations, given the potential for environmental disaster and human safety concerns, NOAA Fisheries is not going to object to the MOP +1 operation. Steve Haeseker echoed Oregon's and NOAA Fisheries' remarks, saying that the Fish and Wildlife Service does not object to the proposed operation. Kiefer said Idaho fully supports the proposed operation. Kyle Martin said the CRITFC tribes understand and appreciate the towboat association's concerns, but remains concerned about the fisheries impacts from the Lower Snake dams. The tribes would prefer to see MOP as the minimum operation for fish; we object to this proposed operation from a policy perspective, and feel that the Biological Opinion's MOP-only operation should be implemented, Martin said. That said, however, we will not elevate this proposed operation to the IT, he said. Bonneville and the Bureau of Reclamation had no objection to the proposed operation.

I'm not hearing any strong objection to operating Ice Harbor, Little Goose and Lower Granite pools at MOP +1 this year, said Henriksen; while there are concerns about increased travel time from the higher elevations, there are also concerns about human safety and the potential for environmental disaster. Therefore, the MOP +1 operation will begin the week of April 3-10. In response to a question, Henriksen said the exact timing and order of the operation will be determined based on where and when the fish begin to arrive. Piggott said the towboat association appreciates the TMT's willingness to look at the broader perspective on this issue, as well as everyone's willingness to be flexible. Hopefully, it will not be an issue in future years, he said.

4. April 10 Flood Control Elevations.

Henriksen said the most recent flood control elevation data can be found via the flood control summary link on the TMT homepage. She noted that the Corps does not calculate April 10 flood control elevations; rather, it calculates March 31 and April 15 flood control elevations. The water supply forecast has been diminishing, from well above-average to the low-90% range, currently. The snowpack has not been building as quickly as anticipated; as a consequence, inflows have remained on the low side and flood control elevations have been rising.

Henriksen said that, as a result of the falling forecast, Grand Coulee is currently about 11 feet below its April 15 flood control elevation of 1272 feet. That means that, to refill the project to 1272 feet by April 15, Columbia River flows will need to be reduced. The Vernita Bar minimum flow requirement has been driving the Grand Coulee operation, she said. Could we have done something different to prevent this situation? Boyce asked. Hindsight is 20-20, and the operational choices we made were based on the best information available at the time we made them, Henriksen replied. However, we have been consistently below flood control elevation at Grand Coulee this winter, releasing water primarily for power production, Boyce observed. We were also meeting the Vernita Bar minimum, John Wellschlager observed. Tom Haymaker noted that the

March forecast moved the April 15 flood control elevation at Grand Coulee by 17 feet. My point is that if we had been operating a little closer to flood control elevation through the winter, we wouldn't be in this position, said Boyce. Martin noted that his most recent forecast is for precipitation in the 110%+ of average range for April and May, which should help many projects refill more quickly.

Dworshak's current water supply forecast is 90% of average, down from 99% of average in the December final forecast, said Henriksen. That project's March 31 flood control elevation went up 20 feet in one day, she said. She noted that, based on those earlier forecasts, the decision was made to draft that project somewhat more aggressively than might otherwise have been done, anticipating that late winter precipitation would quickly refill Dworshak. My concern is that we seem to find ourselves in this situation with some frequency, said Boyce – in 2002, for example. If we don't get some precipitation, spring flows will be at rock bottom again. We fully understand that we're at the mercy of the weather, Henriksen replied, recall the "miracle March" of 2003 where heavy precipitation filled reservoirs quickly in March. The forecast can go either way. However, it sounds as though Ron's point about learning the lessons of the last few years is a valid one, said Silverberg.

Haeseker observed that, despite what BPA said at the last TMT meeting about running out of water, during the Spring Creek spill event, the average Bonneville tailwater elevation was 13.7 feet. The Fish and Wildlife Service calculated that an additional 184 kaf over what was needed to maintain the minimum Bonneville tailwater elevation was released during that period. Wellschlager replied that the Columbia River system is not an aquarium; hitting exact elevation targets is more of an art than a science. Still, my point is, why not operate more conservatively, given that uncertainty, said Boyce – we probably should be operating to a worst-case scenario, because again, if we don't see the precipitation, or if snowmelt is delayed, system flows are going to be very low once the migration starts this spring.

5. Lower Granite RSW Operations During Non-Test Periods.

Henriksen said the Corps will be testing the Lower Granite RSW with and without the behavioral guidance screen from April 15-May 30; during that period, the RSW will be operated with 6 Kcfs-7 Kcfs spill through the RSW plus 12 Kcfs training spill. The question is what to do during the non-test periods, she said; we wanted to discuss what those operations should be. We discussed that in some detail at the most recent Walla Walla District FFDRWG meeting, but did not reach resolution, said Boyce.

Tim Wick of the Corps' Walla Walla District said various options were discussed at FFDRWG; the decision was that FPOM would be discussing this issue further. Steve Rainey said Bill Hevlin had raised this issue at FPOM; while the issue wasn't fully reconciled, Bill feels it would be appropriate to operate the RSW the same way outside of the test period as it will be operated inside the test period – 6 Kcfs-7 Kcfs through the RSW, plus 12 Kcfs training spill. We see better survival through that operation than we do through the BiOp spill operation (to the gas cap) at Lower Granite, Rainey said.

Boyce said Oregon and Washington would like the action agencies to consider RSW operation plus higher training spill – perhaps spill up to the gas cap. We were concerned that the RSW test represents a reduction from BiOp spill levels, he said, and that the option we’re proposing is not being tested. So when does a decision need to be made on this issue? Silverberg asked. Before April 3, Henriksen replied.

Marvin Shutters said that, while Oregon and Washington’s proposal is reasonable, the Corps is unsure what would be gained through that operation. We find that 12 Kcfs is enough extra spill to meet NOAA Fisheries’ project passage expectations, so anything above that becomes an operational call, with significant power implications.

So what’s the plan for reaching resolution on this issue? Henriksen asked. For this year, it will likely be a policy call, rather than a technical decision, said Shutters. Do you think this will be resolved at FPOM? Silverberg asked. If TMT doesn’t make the decision, it could be up to FPOM, although FPOM is not going to make a policy call like that, observed Rainey. It sounds as though we need to have a detailed technical discussion at TMT prior to April 3, said Boyce. It was suggested that the TMT re-engage on this issue at its March 31 meeting; if TMT is unable to resolve it, then it can be elevated to the Implementation Team, which meets the next day. It was so agreed.

The group discussed what the Lower Granite RSW test results showed for 2002 and 2003; Boyce observed that, while the RSW plus training spill operation passed approximately 15% more fish than the BiOp spill operation, operating the RSW with higher training spill volumes passed even more fish. Wellschlager replied that the issue then becomes the increment of that improvement vs. the cost of the operation. Rainey said he will distribute 2002 Lower Granite radio telemetry results to the TMT prior to the March 31 meeting. Boyce said FPAC will discuss this issue at its next meeting. In response to a question from Wellschlager, Boyce said Oregon and Washington’s proposed operation would not increase total river flow – it would simply increase the percentage of river flow that passes Lower Granite via spill.

6. McNary Operations (1% Tests).

On March 16, the action agencies received SOR 2004-1. This operational request, supported by USFWS, IDFG, WDFW, CRITFC and ODFW, requests the following specific operations:

- Operate McNary turbine units within the 1% peak efficiency range during spring and summer 2004 as described in RPA Measure 58 in the 2000 Biological Opinion.

Haeseker noted that the salmon managers had conducted an extensive review of the available fish passage information and concluded that all of that information showed that operating McNary outside of 1% would be detrimental to fish passage at that project. So this SOR is requesting that the research planned for 2004 not be done? Ross asked. We’re supportive of the test for the three VBS units, Boyce replied; we’re talking about the other units – we don’t want them operating outside 1%. So the test would go forward? Silverberg asked. Correct, Haeseker replied, although I would characterize the

salmon managers' position on the test as grudging lack of objection, rather than support. We would like to know what the federal action agencies are proposing in terms of operation of the non-VBS units at McNary, said Boyce.

Henriksen said there has been no decision by the federal executives to operate all McNary units outside of 1% peak efficiency; Walla Walla District is putting together a monitoring plan for McNary for 2004; this plan will be discussed at a special FFDRWG meeting next Tuesday. It just seems to the salmon managers that if you're trying to develop a monitoring plan for operating McNary outside of 1%, you're needlessly studying something we know is going to be bad for fish, Haeseker observed. The direction we've received is to put together an appropriate monitoring plan that everyone can agree on, said Henriksen – my understanding is that everyone would have to agree to the plan, which would include off-ramps that would stop operation outside 1% if certain biological criteria are exceeded. Boyce said his concern is that the plan, as currently envisioned, would monitor only gatewell conditions, but would not monitor the detrimental impacts of reduced spill or increased smolt mortality through the turbines.

Silverberg noted that there is obviously more information that needs to be provided before the TMT can meaningfully engage on this issue. The monitoring plan is a separate discussion, observed Boyce; what we're discussing today is the SOR, and asking the TMT to make a decision on it. If the action agencies decide to operate McNary outside 1%, he said, then we would ask that you provide the rationale behind that decision in writing. And we would ask that you look at the proposed monitoring plan and provide your input into its development, Henriksen said. Rebecca Kalamasz described the process under which the monitoring plan will be developed, beginning with next week's FFDRWG meeting.

It seems to me that the question of whether or not it is wise to operate McNary outside 1% should be the first item to be discussed, said Boyce – what evidence is there that operating in any other way would be acceptable? It sounds as though, from the salmon managers' perspective, the action agencies need to build up their case that operation outside 1% would be acceptable, Silverberg observed. And we do plan to do that at the meeting on March 23, Kalamasz said.

Henriksen noted that the reason the Corps is doing this is because this is the task that was handed to them by the federal executives – to develop a monitoring plan that would allow McNary to be operated outside 1%. We understand your concerns, she said, but we're following up on that direction from the executives. Again, the currently-proposed monitoring plan is missing crucial elements, Boyce replied. It was agreed to discuss this issue further at the March 31 TMT meeting.

7. Start of Spring Transport.

Ross said NOAA Fisheries had suggested consideration of a plan to initiate transportation on a later date than usual in 2004; we discussed that plan with our co-managers, he said, but were unable to reach consensus, because many people wanted more time to study the data on which that recommendation was based. We're left, then, with the BiOp operation as a default, under which we would begin to collect and

transport fish at the Lower Snake projects beginning in late March. Basically, it seemed more prudent to delay this decision for a year to give us time to evaluate all of the study results, said Haeseker. In response to a question, Rudd Turner said collection for transport will begin March 25 at Lower Granite and April 1 at Little Goose and Lower Monumental. The first fish will be transported by truck; barge transport will begin in mid-April.

8. Summer Spill Discussions Update.

Silverberg noted that the action agencies had provided a document laying out the summer spill proposal decision process timeline. Henriksen said TMT and IT had discussed the summer spill decision process at previous meetings; comments were closed on February 20. Those comments are currently being evaluated and responded to; there have been ongoing discussions among the regional stakeholders in the interim. She noted that, according to this schedule, the federal proposal for a specific summer spill operation will be available on March 26. After that, the federal agencies will conduct informal briefings for state, tribal and other regional stakeholders. There will then be a short written comment period, followed by a meeting of the Regional Executives on April 16. The federal executives will then make a decision on the specific summer spill operation soon after the April 16 meeting.

9. Current Operations Update.

Mary Karen Scullion went through the most recent Q-Adjust run, based on the most recent water supply forecast. She noted that, according to this run, Priest Rapids and Bonneville are expected to meet their flow targets through the spring and summer; at Lower Granite and McNary, it looks as though the flow targets will be met during the spring period, but not the summer period. In terms of refill, Libby would refill by June 30 in only 14 of the 59 years modeled, but doesn't miss refill by much. The prospects for refill at Hungry Horse, Grand Coulee and Dworshak look much better, Scullion said; they would refill under virtually all of the 59 years modeled.

Tony Norris reported that Grand Coulee is at 1259.8 this morning, while Hungry Horse is at elevation 3511.8. Hungry Horse is still drafting to meet the Columbia Falls minimum flow. In response to a question, Norris said the Upper Snake flow augmentation volume for 2004 is expected to be about 300 kaf. Once Grand Coulee drafts to elevation 1255, we will hold at 1255 or less for about two weeks to do drum gate maintenance – likely in late April or early May. This operation is unlikely to adversely affect Grand Coulee's prospects for refill by June 30, Norris said, adding that this is the only time of year when Grand Coulee's elevation will be low enough to accomplish this operation.

Henriksen said Libby continues to release minimum outflow; the reservoir is at 2398.5 feet and drafting slightly. The April 15 flood control elevation at that project is 2443 feet; we will likely continue to release minimum flow from Libby well into April. Dworshak is currently at 1513.5 feet and filling slightly; releasing minimum flow; 1534 is the April 15 flood control elevation at that project. Dworshak inflow has increased slightly in recent days. Will Dworshak continue on minimum outflow? Ross asked.

Certainly through the month of March, Henriksen replied; we will need to increase Dworshak outflow somewhat in April for flood control. One of the generating units will be out at Dworshak in April, and there will be some transmission line issues at the project as well; we will be limited to 7.5 Kcfs at that project through April. The STP run shows that we could see flows of up to 12 Kcfs for a portion of April, which is about the maximum we can release from Dworshak without violating the gas cap, she said.

Why not release that water now? Tom Haymaker asked. We'll be releasing that water to augment flow in April to start the fish passage season, Henriksen replied. Wellschlager said there are no power issues to report, currently, other than the transmission system limitations at Dworshak in April. In response to a question from Ross, Wellschlager said no problem in meeting the chum or Hanford Reach incubation flows this spring is anticipated.

Anything to report on fish? Silverberg asked. Ross replied that there is nothing to report at present, because there is no monitoring going on in the system. Boyce provided an update on chum and fall chinook monitoring data in the lower river; we are catching chum, he said, and the emergence appears to be going along in much the same fashion as it has in previous years. We'll keep people posted if any stranding events occur, he said. Ross said smolt monitoring will begin on March 25 at Lower Granite.

Haeseker described last week's Spring Creek Hatchery release and corner collector operation; he noted that the four days of spill was deemed sufficient to pass a good portion of the fish. It appears that the corner collector passed the smolts as efficiently as spill? Wellschlager asked. It's too early to say, Haeseker replied.

10. Other.

A. Unresolved Issues Discussion. It was agreed to defer this item until the next TMT agenda.

B. Bonneville 2 Corner Collector and Other Upcoming Events. Henriksen said the Corps will be dedicating the B2 corner collector on April 9; during that ceremony, the corner collector will be started up for the season. Adams noted that, during the operation of the corner collector, TDG averaged between 105% and 108% at Warrendale and Camas/Washougal. Still, there is some evidence that the corner collector is gassing up the water, Adams said. It's hard to believe that the corner collector spill of 6 Kcfs could cause that much of an effect, said Boyce – it looks as though it's an instrument problem to me. Adams replied that the Corps believes the high plunge of spill through the corner collector into deep water may be responsible for the TDG increase. In response to a question, Adams said the Corps was monitoring TDG from a boat immediately below the corner collector during the spill event; he said he will provide that data at the next TMT meeting.

11. Next TMT Meeting Date.

The next meeting of the Technical Management Team was set for Wednesday, March 31. Meeting summary prepared by Jeff Kuechle.

TMT Participant List

March 17, 2004

Name	Representing
Donna Silverberg	Facilitation Team
Robin Harkless	Facilitation Team
Tony Norris	USBR
Tim Heizenrater	PPM
Russ George	WMCI
Cathy Hlebechuk	COE
Kevin Nordt	PGE
Scott Boyd	COE
Cindy Henriksen	COE
Laura Hamilton	COE
Mike O'Bryant	CBB
Steve Haeseker	USFWS
Ron Boyce	ODFW
Sharon Kiefer	IDFG
Jiong Ji	Avista
Jack Sands	COE
Ann Glassley	COE
Martin Hatscher	SCL
Richelle Beck	D. Rohr & Associates
Nic Lane	BPA
Tom Haymaker	PNGC
Chris Ross	NOAAF
John Wellschlager	BPA
David Benner	FPC
Bruce MacKay	Consultant
Ruth Burris	PGE

Eric Brown	COE
Dixon Shaver	Shaver Transport
John Piggott	CRTA
Glenn Vancelow	CRTA
Todd McClosky	
Kyle Martin	CRITFC
Jim Adams	COE
Mike Buchko	Powerex
Steve Rainey	NOAAF
Rudd Turner	COE

Assumptions:

- * Streamflows were adjusted to the March Final Water Supply Forecast for the period of March thru August of 90.6 MAF at The Dalles and shaped 59 different ways based on observed historical runoff.
- * Starting elevations were observed data from February 29, 2004.
- * Grand Coulee helps meet Vernita Bar minimum flow objective of 70 kcfs in Mar. Operate to meet McNary flow objective of 228.3 kcfs. Minimum draft elevations are based on a GCL/Dworshak shifted flood control and VECC/AER requirements.
- * Hungry Horse operates to VARQ flood control or minimum flow from Mar - May and meets minimum flow of 3500 cfs at Columbia Falls, targets full in June, and drafts to 3540 ft by 31 Aug.
- * Brownlee operates to flood control elevations.
- * Dworshak targets elevation 1547.2 ft in Mar, 1557.5 ft by 15 Apr, and 1534.8 ft by 30 Apr, based on a GCL/DWR shifted flood control operation and maximum releases of 12.5 kcfs in April and 13 kcfs May-Jun. DWR targets full in June with a minimum flow of 1.5 kcfs, releases a maximum of 13 kcfs in July - August to meet LWG flow objectives, and targets 1520 ft by 31 Aug.
- * Libby operates on minimum flow or VARQ flood control Mar - Apr. Targets 13.9 kcfs in May and 9.4 kcfs in June for Sturgeon, based on an Apr-Aug forecast of 5.359 MAF and a Tier 2 required pulse of 0.80 MAF. Targets full in July with a minimum flow of 7,000 cfs for bull trout. Drafts to 2439 ft by 31 Aug.

Results:

Priest Rapids Meets Flow Objectives of 70 kcfs in Mar - Apr 15 and 135 kcfs in Apr 16 - Jun.

Month	Occurrences out of 59 Years	Average Flow for 59 Years (kcfs)
Mar	59	74
Apr 15	59	82
Apr 30	39	149
May	45	148
Jun	48	132

Lower Granite Meets Flow Objectives of 100 kcfs in Apr - May, 84 kcfs in June and 52 kcfs in Jul - Aug:

Month	Occurrences out of 59 Years	Average Flow for 59 Years (kcfs)
Apr 30	17	86
May	32	104
Jun	43	96
Jul	27	49
Aug 15	0	41
Aug 31	0	31

Bonneville Meets Flow Objectives of 125 kcfs in Mar - Apr:

Month	Occurrences out of 59 Years	Average Flow for 59 Years (kcfs)
Mar	54	140
Apr 15	59	166
Apr 30	59	254

McNary Meets Flow Objectives of 228.3 kcfs in Apr 15 - Jun and 200 kcfs in Jul - Aug:

Month	Occurrences out of 59 Years	Average Flow for 59 Years (kcfs)
Apr 30	33	231
May	53	246
Jun	39	244
Jul	16	182
Aug 15	0	143
Aug 31	0	129

Projects Refill by 30 June:

Month	Occurrences out of 59 Years	Average Elevation on 30 Jun for 59 Years
Libby	14	2452
Hungry Horse	59	3560
Grand Coulee	59	1290
Dworshak	56	1600

Period Average Flows (kcfs)

	MAR 1-31	APR 1-15	APR 16-30	MAY 1-31	JUN 1-30	JUL 1-31	AUG 1-15	AUG 16-31
LIB	4	4	4	14	10	19	16	14
HGH	2	1	1	2	6	7	5	4
GCL	68	75	137	125	120	118	92	91
PRD	74	82	149	148	151	132	100	96
DWR	2	2	13	6	6	11	13	11
BRN	17	22	23	21	17	13	17	12
LWG	42	63	86	104	96	49	41	31
MCN	121	151	231	246	244	182	143	129
TDA	133	160	247	254	254	188	148	133
BON	140	166	254	257	256	191	150	135

SYSTEM OPERATIONAL REQUEST: #2004-1

The following State, Federal, and Tribal Salmon Managers have participated in the preparation and support this SOR: U.S. Fish & Wildlife Service, Idaho Department of Fish and Game, Washington Department of Fish and Wildlife, Columbia River Inter Tribal Fish Commission, and the Oregon Department of Fish and Wildlife.

TO:	B. G. Grisoli	COE-NWD
	William Branch	COE-Water Management
	Cathy Hlebechuk	COE-RCC
	Witt Anderson	COE-P
	Col. Richard Hobernicht	COE-Portland District
	LTC Kertis, Jr.	COE-Walla Walla District
	J. William McDonald	USBR-Boise Regional Director
	Steven Wright	BPA-Administrator
	Greg Delwiche	BPA-PG-5



FROM: David A. Wills, Chairperson, Salmon Managers

DATE: March 16, 2004

SUBJECT: Turbine Operations at McNary Dam

SPECIFICATIONS: Operate McNary turbine units within the 1% of peak efficiency range during spring and summer 2004 as described in RPA Measure 58 in the 2000 Biological Opinion.

JUSTIFICATION: In a comprehensive review of the 1% of peak efficiency operating criterion described in RPA Measure 58 in the NOAA Fisheries 2000 Biological Opinion, salmon managers found no evidence to support changing the criterion (attached). This review, which primarily focused on turbine survival, estimated a 1.1% direct turbine mortality increase associated with operations outside of the 1% limits based on the data published in Skalski et al. (2002).

In addition to the 1.1% increase in direct turbine mortality, several other factors associated with operations beyond the 1% limits would also increase mortality imposed upon ESA-listed and non-listed fish encountering the operation. Increasing the proportion of flow routed to the turbines will decrease the proportion and number of fish passing over the spillway during involuntary spill periods. The spillway passage route is widely accepted as the passage route associated with highest survival and least delay. Additionally, smolt-to-adult return data (CSS status report 2001) indicate that smolt-to-adult return rates for bypassed smolts are lower than those that passed through spillways. Increasing volume of flow routed to the turbines will also result in deterioration of fish passage conditions in the gatewells, on the vertical barrier screens,

and in the tailrace. Studies in 1997 and 1998 at McNary Dam indicated descaling rates under low load (60 MW) were less than half those under high load (80 and 75 MW), 6.7% versus 17.0%, respectively.

Based on the available information, there is significant biological risk associated with operating turbines outside the 1% of peak efficiency range described in RPA Measure 58 in the NOAA Fisheries 2000 Biological Opinion. It is clear that operations beyond the limits will increase the immediate and delayed mortality imposed upon ESA-listed and non-listed fish by the FCRPS.

Summer Spill Proposal Decision Process Timeline

- The federal proposal for a specific summer spill operation will be released in late March
- Federal agencies will conduct informal briefings for state and tribal executives, and regional stakeholders
- There will be a short written comment period followed by a meeting of state, tribal and federal executives April 16 for further discussion
- The federal executives will make a decision shortly after the April 16 meeting

McNary 1 Percent Meeting (FFDRWG)

March 23, 2004
NOAA Fisheries Offices
Portland, Oregon

Today's meeting was convened to discuss the action agencies' biological monitoring plan to allow the McNary Dam powerhouse to operate outside 1 percent peak efficiency in 2004.

Marvin Shuttters said he had distributed an issue paper just prior to the lunch break, as well as a sheet summarizing a range of possibilities in terms of operations and effects. Ron Boyce noted that these documents are a good starting-point in trying to frame the McNary 1 percent issue. In response to a question, Shuttters said most of the data used to develop the issue paper came from the recent joint data meeting. The group devoted a few minutes of discussion to this information; Boyce noted that it will be very difficult to get at the delayed effects of turbine passage, rather than spill passage, that may result from operating McNary outside 1 percent.

Steve Rainey observed that NOAA Fisheries does not agree that higher egress flows will result in improved survival. Why do we study that, then? another participant asked. We haven't studied it in enough detail, Rainey replied; the responsibility for demonstrating that higher survival would result from faster flows through the outfall rests on the action agencies. What empirical data are you relying on? Boyce asked. There is none, Shuttters replied – it's based on best professional judgement and an understanding of hydraulic effects and conditions. The point is that faster velocities should provide better egress conditions, he said.

Boyce asked that the action agencies fully document all of the model parameters and assumptions used in this analysis. The group discussed the total river flows assumed (260 Kcfs-280 Kcfs), as well as the spill effectiveness assumed (1 to 1). Bill Hevlin noted that run timing also has a major effect on how many fish will be affected by this operation, because some fish will be passing the project at times when there is no daytime spill. Is it accurate to say that the turbines will not be operating outside 1 percent during nighttime hours? Boyce asked. We want the flexibility to operate outside 1 percent during both daytime and nighttime hours, Kim Fodrea replied; however, we will be providing BiOp spill during nighttime hours. And during the day, you're proposing that you will operate as many turbine units as necessary outside 1 percent in order to meet load? Boyce asked. Correct, was the reply. That makes for a very complex modeling exercise, Boyce observed.

One very important point is that this analysis either doesn't look at the difference in performance, in terms of survival, between fish that pass McNary via spill vs. those that pass through the turbines, Rod Woodin observed – potentially, that difference in survival is on the order of 20 percent. That's correct, Shuttters replied. I believe that is the main impact, said Boyce – you simply can't assume that spillway survival and powerhouse survival are equivalent. We should probably try to develop a detriment number for bypassed fish vs. spilled fish, Hevlin suggested – 1 percent, perhaps. I agree that if we're going to go down this road, we need to take that approach, Boyce agreed. We could look at doing that, said Shuttters – any specific

suggestions you may have would be appreciated.

Rainey also took issue with the statement that juveniles move out more quickly with the greater amount of flow through the gatewell. Another question is, if in fact you have fish that, because of a turbulent environment in the upper part of the gatewell, fish that either don't get out or take up to three hours to get out, are those fish surviving at all? Rainey said. If we see 90 percent OPE in three hours, what happens to the other 10 percent? Rainey said. I just think you need to be careful about assuming that the higher flows through the gatewell and quicker egress will necessarily provide a biological benefit. It's a subjective incremental benefit, is my point, Rainey said.

Will you be providing a final draft of the paper laying out the biological effects of this operation? Boyce asked. Yes – we will distribute that within the next few days, as soon as comments have been received and incorporated, Shutters replied.

The discussion then turned to the action agencies' McNary 1 percent monitoring plan. One of the major goals is to use this monitoring plan as an off-ramp for the 1 percent operation. The Corps also distributed a document summarizing the discussion of this issue at the February 11 FFDRWG meeting. Hevlin noted that this document does not include the operation he suggested at that meeting – operate McNary's powerhouse at whatever unit loading the action agencies feel is appropriate, while providing BiOp spill during the day. The Corps agreed to add that suggested operation to the list. It was noted that the Corps regards this as a regionally coordinated, FFDRWG-developed monitoring plan.

The group went through the monitoring plan line by line, touching on the following major topics:

- gatewell conditions for fish
- high water temperature/temperature monitoring
- gatewell debris loading
- impacts to forebay delay
- total dissolved gas

Boyce noted that the major problem he sees with this plan is that it does not monitor the major parameters that will affect fish survival – the increase in turbine passage and mortality and the decrease in spill passage and survival. The best thing we could do there is monitor the reduction in spill in-season, replied Mark Smith. At the very least, we will be able to document that reduction in spill. But you won't have any way to document the effects of the decrease in spill and the increase in powerhouse passage on fish, Boyce observed. That is absolutely true, Shutters replied.

Kim Fodrea distributed an internal Bonneville memo describing the December 23 meeting between BPA, NOAA Fisheries and the Corps at which the McNary 1 percent issue was discussed. According to this memo, the attendees discussed four policy questions:

1. Does the existing information suggest reporting rationale to operate outside (above) the 1 percent criteria?

2. If the answer to #1 is yes, is there a preferred range of operation?
3. Can a viable plan be developed for operating outside 1 percent that addresses off-ramps for debris conditions if they arise?
4. Do we need the additional PIT-tag research if we operate outside 1 percent?

The meeting attendees concluded that the answer to Question 1 is yes; that, with respect to Question 2, additional evaluation of the available data is needed to determine an appropriate operating range, that, with respect to Question 3, there is a need to determine criteria for gateway condition, fish condition etc., and that the answer to Question 4 is no, although this type of research may be needed in the future. As the memo notes, absent such research this year, there will be no documentation as to the impact of this operational change.

Hevlin noted that, in 1994, a mortality event occurred that killed 50,000 fish at McNary almost instantly. That event happened almost before people knew what was happening, said Hevlin, and my concern is that this monitoring plan isn't going to allow us to react quickly enough if something bad happens this year. If there is another large fish kill as a result of this operation, he said, that will look very bad for the Corps.

The group continued on through the monitoring plan, discussing which monitoring criteria to use as an "off-ramp" that would cause operation outside 1 percent peak efficiency to end: descaling was the primary criteria discussed. It was noted that PIT-tag collections will provide data from five gateways every other day during the test period. Woodin noted that a Unit 6 block study design would also be a useful source of information. We need a baseline before we can really develop these criteria, said Boyce.

So the plan is to monitor the fish in the gateway every other day, and if you see high descaling or injury rates – as yet undefined – you will respond immediately by either reducing unit loading or removing debris, Woodin observed. Correct, was the reply. To me, the first response should be for you to return to 1 percent operation, Woodin observed – the concern is that you're only looking at the fish every other day, so there could be 48 hours before a problem is seen. If you're going to operate conservatively, he said, reducing unit loading should be your first response as soon as a problem is identified. Perhaps we could agree to leave it up to the discretion of the project biologist, Scott Bettin suggested.

Rock Peters suggested that, if a problem occurs, a second-level test of 16.4 Kcfs vs. some other unit loading would yield useful information as to what is causing the problem. Rainey said that, in his view, the benefit of the doubt needs to go to fish, rather than to power operations. All I'm saying is that it would be useful to get some information about why the problem occurred, if possible, Peters said. I think that's a good point, said Rainey.

Boyce observed that more detail, with respect to response time, the allowable increase in descaling rate, and species to be studied is needed in the McNary monitoring plan. Do we need to pick a level of descaling if we use the delta for Unit 6, which is being operated within 1 percent, compared to the descaling rate for the other units? Shuttles asked. Is the approach Steve has been advocating acceptable to everyone else? The question is, who can approve an incremental increase in descaling as a criteria, between Unit 6 and the sample at large? Rainey

asked. I think what we agreed is 2 percent, Hevlin replied. The question, however, is whether smolt monitoring personnel can detect that small a difference in the number of descaled fish. So if we're seeing 4 percent of the fish descaled in Unit 6, we would tolerate no more than 6 percent through the units being operated outside of 1 percent? Rainey asked. That's correct, Hevlin replied. Ultimately, the Corps said they will work with NOAA Fisheries to develop the appropriate number, in terms of the allowable increase in descaling.

Once we have that number, said Smith, if we see that increase in descaling, would the next step be for us to back off the unit loading to within 1 percent until the next sample is taken? What if the problem is obviously debris, and it can be removed more quickly? Bettin asked – would we still have to keep the units within 1 percent for the next 48 hours? Also, what about the step we discussed previously, where the project biologist assesses the situation? Fodrea asked. That would be happening at the same time, Shutters replied. Boyce suggested that it would make more sense to be as conservative as possible, and wait until two or three consecutive samples show acceptable rates of descaling before returning to operation outside 1 percent.

Are you still planning to do some work with fry smaller than taggable size at Unit 6? Woodin asked. Yes, Smith replied. We're also going to look at lamprey, said Shutters; we did work with PIT-tagged lamprey a few years ago, and found that many of the lamprey released in the gatewell never showed up at the facility.

We still need to get down to a more detailed level, said Boyce, because supposedly the TMT is going to make a decision on this issue next week. The Corps agreed, requesting that the other participants provide any specific suggestions they may have. So we're expected to go to TMT next Wednesday and tell them we either do or do not have a good monitoring plan? David Wills asked. That's correct, was the reply. Wills noted that, at last week's TMT meeting, the Fish and Wildlife Service, CRITFC and the state fishery agencies of Oregon, Washington and Idaho submitted an SOR requesting that McNary be operated within 1 percent peak efficiency in 2004. To us, we haven't even got a yes to Question 1 in the action agencies' memo – that it would be acceptable to operate the project outside 1 percent, he said.

It was observed that the action agencies have been tasked to develop this monitoring plan so that if operation outside 1 percent is approved, they will be ready. While we understand your position, said Smith, that's what we've been tasked with – to develop the best monitoring plan possible in order to minimize the biological impacts of operation outside 1 percent at McNary. We want to encourage you to participate, added Shutters – the more participation we have, the better the final product will be. The fact of the matter is, there are a lot of us in the room today who are just playing the cards we've been dealt.

Is this really a technical issue? Fodrea asked. Because I don't think it is, she added. Bob Lohn has been very clear that if problems occur, then that is a technical problem, from NOAA Fisheries' perspective. The problem is that we can't measure the survival impacts from this operation, Fodrea said.

The Corps will put together a different proposal on monitoring and descaling and get that out to you later this week, said Mark Smith. There have also been other concerns raised, he said

– shall we address them now? In response to a question from Boyce, Shutters said he does not believe it would be possible, logistically, to effectively evaluate the biological impacts of reduced spill under the proposed operation – we simply don’t have the study or equipment in place to do that this year, he said. We do plan to run a block test to get at that information in 2005, added another Corps representative.

The discussion then moved on to where the study fish should be released; Rainey suggested 1,000 feet from the tip of the navigation wall. There was a few minutes of discussion of the details of the test fish release, including when and where the fish will be released. Ultimately, the Corps requested that any questions, comments or concerns about the fish releases be submitted to Shutters as soon as possible.

Steve Haeseker said it would, in his opinion, be possible to study the change in project survival as a result of operating outside 1 percent peak efficiency in 2004. It was noted that the cost of such a study would be approximately three times the cost of the study proposed for this year – about \$6 million. Again, we are proposing that type of study for 2005, Shutters said.

The group also discussed the planned water temperature monitoring activities under the monitoring proposal. Are you going to propose a temperature threshold, which, if exceeded, would curtail operation outside 1 percent? Haeseker asked. We will, but it isn’t currently included in the monitoring plan, Smith replied. The group also discussed the trigger point for full transportation: 68 degrees or higher at the McNary forebay monitoring station.

TECHNICAL MANAGEMENT TEAM

BOR: Tony Norris / John Roache

BPA: Scott Bettin / John Wellschlager

NMFS: Paul Wagner / Chris Ross

USFWS: David Wills / Howard Schaller

OR: Ron Boyce

WA: Cindy LeFleur

ID: Russ Kiefer

MT: Jim Litchfield

COE: Cindy Henriksen / Rudd Turner / Cathy Hlebechuk

TMT MEETING

31 March 2004 0900-1200 hours

**Custom House Room 118
Portland, Oregon
Conference call line: 503-808-5190**

*All members are encouraged to call Donna Silverberg with any issues or concerns they would like to see addressed.
Please e-mail her at dsilverberg@cnnm.net or call her at (503) 248-4703.*

AGENDA

1. Welcome and introductions.
2. WMP Spring/Summer Update
[\[Draft 03-24-2004 \]](#) 
3. RSW Operations at Lower Granite
4. McNary Operations - 1% Peak Efficiency
5. Summer Spill Update
[\[Salmon Recovery Gov \]](#)
6. Start of Season Review
 - a. SOR 2004-2, Implementation of Snake River Spill Operations and MOP
[\[#SOR 2004-2 \]](#) 
 - b. Etc.

[\[Spill Priority List April 03, 2004 \]](#) 
[\[Spill Priority List April 15, 2004 \]](#) 
7. Current Operations
 - a. Reservoir Status
 - b. Fish Status
 - c. Power System Status
8. Other
 - Set agenda for next meeting

Questions about the meeting may be referred to Cindy Henriksen at (503) 808-3945, or Rudd Turner at (503) 808-3935, or Cathy Hlebechuk at (503) 808-3942

**TECHNICAL MANAGEMENT TEAM
MEETING NOTES
March 31, 2004
CORPS OF ENGINEERS NORTHWESTERN DIVISION OFFICES – CUSTOM
HOUSE
PORTLAND, OREGON**

FACILITATOR’S SUMMARY NOTES ON FUTURE ACTIONS

Facilitator: Donna Silverberg

The following notes are a summary of issues that are intended to point out future actions or issues that may need further discussion at upcoming meetings. These notes are not intended to be the “record” of the meeting, only a reminder for TMT members.

WMP Spring/Summer Update:

Cindy Henriksen reported that very few comments had been received to date on the WMP spring/summer update. The COE will update the plan in April with the final water forecast, an update on Q Adjust, and more details in the research section. A suggestion was made to include a table similar to last year’s on research. Oregon will review and comment on the WMP spring/summer update in the next couple weeks.

CRITFC is still requesting comments on their 2004 River Operations plan. The BOR plans to comment, the COE is still evaluating the plan and determining how to respond, and BPA does not plan to comment (John Welschlagler will double check on this and get back to Kyle Martin).

McNary Operations: 1% Peak Efficiency:

John Welschlagler reported that there has not been agreement amongst the federal executives about whether to allow operations to go outside 1% peak efficiency at McNary. BPA is interested in pursuing the issue and will give a presentation at the next TMT meeting. For now, McNary will stay within 1% peak efficiency as per the BiOp. A request was made for BPA to address, during the presentation: What, during an alternative operation (outside 1% peak efficiency), will be done to reduce delayed mortality; and how will delayed mortality be detected in-season so that the operation that, if causing mortalities, can be changed.

Cindy Henriksen said that the COE is ultimately responsible for making the operational decision, and at this time no decision has been made to operate McNary outside 1% efficiency, except for four test units. The COE will follow the Fish Passage Plan for now.

CRITFC does not support any operation outside of 1% efficiency at McNary. A handout on this was provided. Dave Wills, USFWS, noted that the salmon managers did not support operating outside 1% efficiency, except for the 4 units of test spill. TMT members were reminded that SOR 2004-1 presented at the last TMT meeting from the salmon managers specifically requests that operations stay within 1% peak efficiency at McNary.

Summer Spill Update:

Cindy Henriksen reported that a new summer spill proposal from the action agencies was posted on the www.salmonrecovery.gov website yesterday, 3/30. The comment period on the proposal is open through April 7th. The Regional Executives will meet on 4/16 to discuss the proposal and comments, and a final decision on summer spill will be made 1-2 weeks after the Regional Executives meeting. (A full briefing on the proposal was given at the IT meeting on 4/1.)

Start of Season Review:

- **SOR 2004-2:**

SOR 2004-2, presented by the salmon managers, requests that spill operations begin on the Snake River on 4/3 at Lower Granite at 6 pm; then in two day intervals down the river: Little Goose on 4/5; Lower Monumental on 4/7; and Ice Harbor on 4/9. The salmon managers also requested that MOP operations begin at Lower Granite (MOP+1) on 4/3 at midnight; Little Goose (MOP+1) on 4/4; Lower Monumental (MOP) on 4/5; and Ice Harbor (MOP+1) on 4/6.

Kyle Martin noted that CRITFC prefers that spill begin in mid-March and that all projects be operated at a minimum of MOP, as expressed in the River Operations Plan.

- **Lower Granite Spill:** The salmon managers requested that spill be implemented at Lower Granite through the RSW (6-7 kcfs) and through the training spill (12 kcfs) for 24 hours until the RSW test starts; the test will begin dependent on the schedule for divers to install RSW parts, likely April 5, 8 and 9. NOAA recommended that during the time that the SOR cannot be implemented, the project be spilled to the gas cap for 12 hours and leave the RSW open. TMT agreed with this.

ACTION: There were no objections from TMT members to the salmon managers' proposed operation, so the COE agreed to operate as per the request. BPA would like to revisit spill and transport operations if the water supply forecast continues to decline. On Monday, 4/5, the salmon managers will get fish counts and contact Cindy at the COE to notify her whether, depending on the numbers, there should be an adjustment on the start of spill. If there are changes to the proposed operation from today, the COE will send an email to notify the rest of TMT.

Spill Priority List:

A handout was provided of the COE's proposed spill priority list, for 4/3-4/14 and 4/15-4/30. The differences in the lists were due to studies being conducted in the system as well as mechanical issues. This list is flexible and on-going.

ACTION: The salmon managers will review the spill priority lists and comment as necessary as the season continues.

Current Operations:

Reservoir operations: Hungry Horse is at elevation 3514.4' and filling ~.2' a day. There is some concern about refill in the area due to decreasing snow pack. Grand Coulee is at 1263.5' and filling slowly. The March 31 flood control at Grand Coulee is 1283'.

ACTION: Tony Norris will draft a memo that outlines maintenance work that needs to be completed at Grand Coulee, and send it to Ron Boyce.

Libby is at elevation 2398' and releasing 4 kcfs/day. Dworshak is refilling and at elevation 1528'. The 4/15 flood control elevation for Dworshak is 1534'. Brownlee is at 2052' with a March 31 flood control elevation of 2053.5'. Idaho Power requested a shift in flood control elevation at Brownlee, and it will likely not be necessary to implement the shift this year. The mid-month water supply forecast was slightly down from the early bird, slightly above the 'threshold' at The Dalles this year.

Fish status: Ron Boyce will update TMT on fish status at the next TMT meeting. Dave Wills reported that the USFWS is requesting, as written in the WMP, that Dworshak release 4-5 kcfs flow from 4pm-midnight on 3/31 and 4pm-midnight on 4/1 for the hatchery releases of spring chinook. The COE will implement the request.

A final report on Spring Creek hatchery releases and the effectiveness of the corner collector will be available in the next month – Dave Wills will present this to TMT when it is available. Initial results have been positive.

Next Meeting, Thursday April 8, 9-10:15 am (NOTE NEW DATE AND TIME!):

Agenda Items:

- Lower Columbia Spill
- Mid-Columbia Flows
- McNary Operations: 1% Peak Efficiency

1. Greeting and Introductions

The March 31, 2004 Technical Management Team meeting was chaired by Cindy Henriksen of the Corps and facilitated by Donna Silverberg. The following is a distillation, not a verbatim transcript, of items discussed at the meeting and actions taken. Anyone with questions or comments about these minutes should call Henriksen at 503/808-3945.

2. WMP Spring/Summer Update.

Henriksen said a new version of the spring/summer update to the 2004 Water Management Plan (dated March 24) is now available; relatively few comments have been received on this document to date. The update will be revised further once the April final water supply forecast is available. Henriksen went briefly through what has changed in the new draft of this document.

Paul Wagner requested that the Corps update and add the research summary included in the 2003 WMP spring/summer update. Kyle Martin noted that he had submitted CRITFC's annual operations plan on March 3; today is the deadline for comments on this document. He asked whether the action agencies plan to submit comments; Tony Norris said Reclamation will be providing comments, and Henriksen

indicated that the Corps plans to as well. Boyce said ODFW will be providing its comments on the 2004 spring/summer update some time in the next two weeks.

3. RSW Operations at Lower Granite.

This topic was covered under Agenda Item 6, below.

4. McNary Operations – 1% Peak Efficiency.

John Wellschlager said that, in a nutshell, the executives have been unable to reach consensus as to whether or not to allow the operation of the full McNary powerhouse outside 1% peak efficiency in 2004. This is an issue BPA is obviously interested in pursuing, he said; we still think it's possible to operate outside of 1% peak efficiency and not harm fish. He said he will invite the appropriate BPA personnel to provide a presentation on this topic at the next TMT meeting. He said Bonneville intends to continue to pursue this issue through the Regional Forum process; as it stands now, however, McNary will not be operated outside of 1% peak efficiency until there is consensus among the regional executives. Henriksen agreed that, at this time, the Corps, which is responsible for operations at McNary, has no plans to operate McNary outside 1%, except for the four units that are being tested in 2004.

Russ Kiefer noted that, in the mid-'90s, Significant delayed mortality was observed in both bypassed and transported fish at McNary. Those problems have since abated, but I would request that any operation outside 1% at McNary be coupled to an evaluation that will identify delayed mortality in-season, so that those conditions do not recur, Kiefer said. Wellschlager said he will try to ensure that whoever makes the presentation at the next TMT meeting addresses that issue. Martin provided a memo expressing CRITFC's strong objections to this proposed operation, noting that he wanted to ensure that CRITFC's views are included in the record. We'll make sure this topic is on the agenda next time, said Silverberg.

Stan Heller, the Corps' McNary 1% project manager, noted that if a decision is not made on this operation this week, the delay will have a serious detrimental effect on the Corps' ability to implement the McNary 1% project. My understanding is that the delay is coming from the Corps, said Silverberg. Since we don't even have a monitoring plan to discuss, it is difficult to make a decision today, said Henriksen. As long as you understand that even a one-week delay will have a detrimental effect on our contracting and other aspects of this project, Heller said. David Wills said not all salmon managers signed onto the SOR, submitted two weeks ago, opposing McNary operations outside of 1% with the exception of the four-unit test. The Fish and Wildlife Service is still actively evaluating the proposed monitoring plan, Wills said.

In response to a question from Kiefer, Henriksen reiterated that the plan at this point is to operate McNary within 1%, except for the four test units; therefore, the SOR submitted on this issue by FPAC has been accepted, at least for the time being. If a decision is made to operate differently, she said, we will discuss the SOR again.

5. Summer Spill Update.

The action agencies released a summer spill proposal yesterday, said Henriksen; it is available via the salmonrecovery.gov website. This is the federal proposal, she said; comments are being accepted through April 7, and the Regional Executives will be meeting on April 16 to discuss the operation and accept additional comments, with a decision to be made by the end of April. Silverberg reminded the group that there will be a full briefing on the proposal at tomorrow's IT meeting. Henriksen noted that the Regional Executives meeting will be held from 1-4 p.m. April 16, at the Embassy Suites Hotel at the Airport.

6. Start of Season Review.

On March 30, the Corps received SOR 2004-2. This SOR, supported by USFWS, NOAA Fisheries, IDFG, WDFW, CRITFC and ODFW, requests the following specific operations:

- Implement spill at Lower Granite Dam as described in the 2000 Biological Opinion. Begin spill at Lower Granite Dam beginning at 6 p.m. of April 3. It is anticipated that spill will then be phased in at the downriver projects at two-day intervals, initiating spill at Little Goose Dam on April 5, at Lower Monumental on April 7 and at Ice Harbor Dam on April 9. This two-day implementation interval may be modified pending collection of juvenile passage information at these downriver passage sites. The salmon managers will review the smolt monitoring data on the morning of April 5 and advise the Corps at that time.
- Implement MOP operations beginning at Lower Granite pool at MOP +1 on April 3 to coincide with the initiation of spill. MOP +1 operations are then to be implemented sequentially at Little Goose reservoir on April 4, and at Ice Harbor reservoir on April 6, with MOP at Lower Monumental reservoir beginning April 5. It is CRITFC's policy desire to operate at MOP, as mentioned at the March 3 TMT meeting, in order to be consistent with 2000 BiOp operations.

Wills went briefly through the contents of this SOR, the full text of which is available via hotlink from the agenda for today's meeting for today's meeting.

Fish are moving? Silverberg asked. Yes, Wills replied – we're seeing indices on the order of 500 fish per day and climbing at Lower Granite, the majority of which are unclipped. In other words, normal numbers for this time of year, hence this request, Wills said. Martin noted that CRITFC's River Operations Plan called for beginning spill in mid-March. Wagner said the spill request at Lower Granite reads "in accordance with the BiOp," however, that document does not specify how. What we've agreed to is, 6 Kcfs-7 Kcfs through the RSW with 12 Kcfs training spill, 24 hours a day, until April 15, when the RSW test period begins, Wagner said. Bill Hevlin noted that the RSW test may begin a day or two later, depending on when the BGS is attached to the powerhouse.

Henriksen noted that the trash boom in the Lower Granite forebay is being reinforced; if it isn't in place, that could cause issues with RSW operations. As Bill noted, there are also divers in the water attempting to fasten the BGS to the powerhouse, and installing hydroacoustic equipment, which means that we can't operate the RSW or

several units while they're in the water, she said. This operation will begin at Unit 6 on April 5, moving down to Unit 2 once that is done and on the RSW itself on April 8-9. That means we will not be operating those units or the RSW for eight hours during the day while that installation is ongoing, said Tim Wick -- in other words, two to three Lower Granite units will not be operating during the day from April 5-9.

Ron Boyce observed that the RSW plus 12 Kcfs training spill operation outside the RSW test period should not be interpreted as the agreed-upon long-term operation; that's fine as an interim operation, but what the longterm operation of the RSW should be is still a work in progress. Hevlin noted that, to compensate for not being able to operate the RSW during the day on those days when installation is taking place and divers are in the water, NOAA Fisheries is advocating spill up to the gas cap at night, with the RSW on. Silverberg clarified that this recommendation covers only five days -- April 5-9.

Is there any concern about using this volume of water at this point in the season, in a water year that is not looking that strong? Wellschlager asked. After all, we are right on the cusp, in terms of the seasonal average flow trigger for spill vs. transport in the Snake, and the water supply forecast is trending downward. BPA doesn't oppose the SOR, said Wellschlager, but I wanted to put a placeholder in the record that this could be an issue.

Have we ever seen this operation before -- RSW operation, plus spill to the gas cap? Jim Adams asked. Yes, it occurred at times in the spring at 2002, Hevlin replied. We'll look that up on the record to see what the gas cap might be, Adams said.

So we will begin spill this Saturday, April 3, at 6 p.m. with RSW operation plus 12 Kcfs training spill at Lower Granite, then begin spill at 6 p.m. April 5 at Little Goose, at 6 p.m. April 7 at Lower Monumental and at 6 p.m. April 9 at Ice Harbor? Henriksen asked. Yes, unless the fish passage numbers dictate a change from that schedule, Wills replied. We will be looking at the fish passage numbers on Monday morning, April 5, and will alert the action agencies if a change is necessary, Wills added. Once we know if there is a change, or if the operation is going forward, we will alert the TMT via email, said Henriksen.

With respect to the MOP operation requested in the SOR, Henriksen said the TMT has previously agreed to this operation. She noted that a number of the Snake River projects are currently operating at fairly low elevations; with respect to the timing of that operation, would it be acceptable to agree to be at MOP + 1 at Lower Granite by midnight between April 3-4? Yes, was the reply.

The discussion then moved on to the 2004 spill priority list. Adams said the corps' proposal is the following, in terms of the order at which spill will occur as flows and TDG levels rise, and the TDG spill caps for each project:

Project	TDG 110%	TDG 115%	TDG 120%	TDG 125%	TDG 130%
Lower Granite	20 Kcfs	30 Kcfs	40 Kcfs	90 Kcfs	125 Kcfs

Little Goose	20 Kcfs	25 Kcfs	38 Kcfs	80 Kcfs	110 Kcfs
Lower Monumental	10 Kcfs	20 Kcfs	34 Kcfs	55 Kcfs	110 Kcfs
Ice Harbor	30 Kcfs	45 Kcfs	92 Kcfs	125 Kcfs	135 Kcfs
McNary	40 Kcfs	80 Kcfs	140 Kcfs	230 Kcfs	290 Kcfs
John Day	20 Kcfs	60 Kcfs	95 Kcfs	240 Kcfs	300 Kcfs
The Dalles	20 Kcfs	60 Kcfs	95 Kcfs	240 Kcfs	300 Kcfs
Bonneville	80 Kcfs	110 Kcfs	135 Kcfs	205 Kcfs	250 Kcfs
Wanapum	10 Kcfs	15 Kcfs	20 Kcfs	50 Kcfs	100 Kcfs
Wells	10 Kcfs	15 Kcfs	25 Kcfs	45 Kcfs	130 Kcfs
Rocky Reach	5 Kcfs	10 Kcfs	20 Kcfs	30 Kcfs	150 Kcfs
Rock Island	5 Kcfs	10 Kcfs	20 Kcfs	30 Kcfs	150 Kcfs
Priest Rapids	20 Kcfs	30 Kcfs	40 Kcfs	40 Kcfs	40 Kcfs
Chief Joseph	5 Kcfs	10 Kcfs	15 Kcfs	33 Kcfs	45 Kcfs

It was agreed that the salmon managers will review the Corps proposal and will comment as necessary.

7. Current Operations.

Norris said that, currently, Hungry Horse is at 3514.4 feet, filling 2/10 of a foot per day. The project is well below flood control, and the snow pack has dropped to about 80% of average – the snow pack is evaporating, which goes for the Snake River basin as well. We're starting to get worried about refill at those projects, he said, as well as at Hungry Horse, where the June 30 refill probability is now probably down around 85%. Norris added that Grand Coulee is currently at 1263.5 feet and filling slowly. He said the April final water supply forecast will likely drop precipitously from current levels, which means Grand Coulee will have to draft significantly to meet the Priest Rapids flow target. The group also devoted a few minutes of discussion to the possible effects of the falling forecast on the planned gate maintenance operation at Grand Coulee this spring; In response to a request from Boyce, Norris agreed to provide a written description of Reclamation's planned maintenance operations at Grand Coulee.

At Libby, the current elevation is 2398, said Henriksen; the project is releasing 4 Kcfs. The April 15 VARQ elevation at that project is 2443 feet, which is unlikely to be achieved. The current forecast at the project is 86% of average. Dworshak is refilling, she said; it is at 1528 feet and releasing minimum flow. The non-shifted April 15 flood control elevation at that project is 1534 feet, and we may make it, she said, adding that inflows to Dworshak are running 7 Kcfs-10 Kcfs.

Henriksen said Idaho Power had requested a Brownlee flood control shift, to allow that project to be above its March 31 flood control elevation, while Grand Coulee would be proportionally lower. Last night, Brownlee was at 2052 feet; the flood control elevation is 2053.5 feet. It is unlikely that there will physically be a shift, she said, but IPC has requested that flexibility. Given the fact that Grand Coulee will be well below its March 31 flood control elevation no matter what Brownlee does, it's kind of a moot point, Norris said – physically, given the fact that they are 1.5 feet below that flood control elevation, it is unlikely that they will be able to fill above 2053.5 feet by midnight tonight.

Lower Granite outflow was 43.6 Kcfs yesterday, falling from about 60 Kcfs last week, Henriksen said. McNary is releasing 130 Kcfs-150 Kcfs, closer to 130 Kcfs. Priest Rapids has been releasing 71 Kcfs-72 Kcfs, meeting the Vernita Bar minimum, Henriksen added. She noted that, based on the March final water supply forecast, Lower Granite's April 15-30 average flow would be 86 Kcfs; in May, 104 Kcfs; in June, 96 Kcfs. She added that the mid-month forecast is 86% of average at The Dalles, slightly above last year's 82% of average water supply. Again, however, the worrisome thing is that the forecast is trending downward, Wellschlager observed.

Wellschlager said there are no power system problems to report at this time.

In response to a question, Boyce said he will provide an update on 2004 chum emergence at the next TMT meeting.

8. Other.

A. Dworshak Fish Hatchery Releases. Wills said it is now the time of year when Dworshak Fish Hatchery releases its spring chinook production. As usual, he said, we are requesting a push of extra flow from Dworshak Dam down the North Fork of the Clearwater, which is essentially a backwater at this time. Our request is similar to last year's, he said: 5 Kcfs-6 Kcfs total outflow from Dworshak from 4 p.m. to midnight tonight and tomorrow night. We can be at 5 Kcfs by 7 p.m., Henriksen said. After a brief discussion, no TMT concerns were raised about this operational request.

Boyd noted that the special dedication ceremony on April 9 for the Bonneville corner collector has been canceled. The corner collector will begin operation as scheduled once spill begins at Bonneville. Is there any fish passage information from the corner collector operation for the Spring Creek release? Jim Litchfield asked. The hydroacoustic information is still being collated, Wills replied, so that information will be forthcoming. Initial results were encouraging, however, Wills noted – the release went as planned, and during each of the four-day operations, it looked as though we passed 90% + of each release, which is what we had hoped to see.

9. Next TMT Meeting Date.

The next Technical Management Team meeting was set for 9 a.m. Thursday, April 8. Meeting summary prepared by Jeff Kuechle.

TMT Participant List

March 31, 2004

Name	Affiliation
Donna Silverberg	Facilitation Team
Robin Harkless	Facilitation Team
Cindy Henriksen	COE
Ron Boyce	ODFW
David Wills	FPC
Steve Haeseker	USFWS
Kyle Martin	CRITFC
Tom Haymaker	PNGC
Tim Heizenrater	PPM
Scott Boyd	COE
Russ George	WMCI
Mike Buchko	Powerex
Amy Reece	COE
Margaret Filardo	FPC
Cathy Hlebechuk	COE
Jim Adams	COE
Mark Smith	COE
Tim Wick	COE
David Benner	FPC
Tom Le	PSE
Jim Litchfield	Montana
John Wellschlager	BPA
Tony Norris	USBR
Bill Hevlin	NOAAF
Bruce McKay	Consultant
Dave Ryan	PPM
Lee Corum	PNUCC

Russ Kiefer	IDFG
Bill Cramden	CBB
Paul Wagner	NOAAF

ATTENTION: COLUMBIA RIVER BASIN PROJECTS AND BPA
SUBJECT: SPILL PRIORITY LIST
REFERENCE:

1. THIS TELETYPE PROVIDES GUIDANCE ON PROJECT OPERATION TO PROVIDE VOLUNTARY AND INVOLUNTARY SPILL.
2. UNTIL FURTHER NOTICE DURING PERIODS OF INVOLUNTARY SPILL ,PROJECTS SHOULD SPILL IN THE FOLLOWING ORDER: LWG, LGS, IHR, MCN, JDA, TDA, BON, PRD, RRH, WEL, RIS,WAN, CHJ
3. LOWER GRANITE IS FIRST ON THE LIST FOR VOLUNTARY SPILL TO BENEFIT SNAKE RIVER FISH THAT ARE MIGRATING IN THE SYSTEM.
4. CURRENT SPILL CAPS FOR THE VARIOUS TDG LEVELS, SUBJECT TO PERIODIC CHANGES BASED ON REAL-TIME DATA. VOLUNTARY AND INVOLUNTARY SPILL SHOULD BE IN THE FOLLOWING ORDER. DAYTIME SPILL ABOVE 75 KCFS AT BON AND 45 KCFS AT IHR IS AUTHORIZED IF NEEDED TO PROVIDE INVOLUNTARY SPILL. EXCEEDANCE LEVELS AND DURATION SHOULD BE MINIMIZED TO THE EXTENT POSSIBLE.

LGS-20	25	38	80	110
JDA-20	60	95	240	300
BON-80	110	135	205	250
LWG-20	30	40	90	125
LMN-10	20	34	55	110
IHR-30	45	92	125	135
MCN-40	80	140	230	290
TDA-20	60	125	250	260
WAN-10	15	20	50	100
WEL-10	15	25	45	130(1)
RRH-05	10	20	30	150(1)
RIS-05	10	20	30	150(1)
PRD-20	30	40	40	40
CHJ-05	10	15	33	45

LAURA HAMILTON
CENPD/RCC/
RCCBT/SPILLP041504

[illegible]

Draft Spring / Summer Update to the 2004 Water Management Plan

1. Introduction

The 2004 Spring / Summer update to the Water Management Plan (WMP) updates information on how the Action Agencies plan on operating the Federal Columbia River Power System (FCRPS) reservoirs during the spring and summer seasons.

The *Spring / Summer WMP Update* (S/S Update) is needed because water supply forecasts for the spring and summer time period are not available at the time the water management plan is written in the fall of 2003. Planned operations in the Spring / Summer update are based on the most current water supply forecast which is considered to be the best available forecast of the expected runoff water volume, and thus how the FCRPS will be operated in 2004. The “April Final” forecast is the most current forecast available when the final version of the Spring Summer update was written.

The *S/S Update* also reports 2004 research operations planned for the FCRPS projects. Research studies are routinely conducted to test the performance of current or new fish passage operations and the effects on a wide range of conditions, including spill survival, tailrace egress, transport benefits and the performance of new passage devices like the Bonneville corner collector and the Lower Granite Removable Spillway Weir (RSW). The Studies Review Work Group establishes the research study plan in the spring just prior to the commencement of the spring migration. The *S/S Update* summarizes the project operations that support these research activities.

The *S/S Update* does not repeat all of the information in the Water Management plan, but provides additional detail and specifies operations based on the current water supply forecast or changes that need to be made in operations because of the availability of current water supply forecasts and other new information.

2.0 Role of Water Supply Forecasts

There are four forecast points that are used to determine BiOp operation of the FCRPS reservoirs. The latest forecasts (March Final) are given below. Note: The mid-month trend continues to be lower than the final forecast

Forecast Point	Forecast Period	Forecast Date	Value (April Final Forecast)
Lower Granite	April – July	March Final	20.0 MAF ^A
Lower Granite	April – July	March Final	20.0 MAF
The Dalles	April – August	March Final	82.5 MAF ^A
The Dalles	April – August	March Final	82.5 MAF
Hungry Horse	April – August	March Final	1939 KAF ^{AB}
Libby	April - August	March	5.4 MAF ^C

All forecasts from Weather Service unless otherwise indicated

A – Value that is used to set operations

B – USBR Forecast C – COE Forecast

3.0 Flow Objectives

Spring

The spring flow objectives for Lower Granite and McNary are established by the April final water supply forecast. The Priest Rapids spring flow objective is fixed (not dependent on the water supply forecast). Based on the April final forecast the spring flow objectives are shown below.

Project	Spring Flow Objective
Lower Granite	100 KCFS
McNary	228 KCFS
Priest Rapids	135 KCFS

Summer

Based on the latest water supply forecast (April Final) the summer flow objectives are shown below. The McNary summer flow objective is fixed (not dependent on the water supply forecast).

Project	Summer Flow Objective
Lower Granite	51 KCFS
McNary	200 KCFS

Prospects For Meeting Flow Objectives

An analysis of the likelihood of meeting the flow objectives was conducted by using the Corps' QADJ runs of the HYSSR model. This model uses the volume of the current water supply forecast and applies the 59-runoff shapes observed in the historical record to this forecast volume. The likelihood of meeting the flow objectives and refilling the reservoirs by the targeted dates is a function of both the runoff volume and the timeframe in which the snowmelt and stream flows occur. The likelihood of meeting the 2004 spring/summer flow objectives are listed below.

See Next Pages

Assumptions:

- * Streamflows were adjusted to the March Final Water Supply Forecast for the period of March thru August of 90.6 MAF at The Dalles and shaped 59 different ways based on observed historical runoff.
- * Starting elevations were observed data from February 29, 2004.
- * Grand Coulee helps meet Vernita Bar minimum flow objective of 70 kcfs in Mar. Operate to meet McNary flow objective of 228.3 kcfs. Minimum draft elevations are based on a GCL/Dworshak shifted flood control and VECC/AER requirements.
- * Hungry Horse operates to VARQ flood control or minimum flow from Mar - May and meets minimum flow of 3500 cfs at Columbia Falls, targets full in June, and drafts to 3540 ft by 31 Aug.
- * Brownlee operates to flood control elevations.
- * Dworshak targets elevation 1547.2 ft in Mar, 1557.5 ft by 15 Apr, and 1534.8 ft by 30 Apr, based on a GCL/DWR shifted flood control operation and maximum releases of 12.5 kcfs in April and 13 kcfs May-Jun. DWR targets full in June with a minimum flow of
- * Libby operates on minimum flow or VARQ flood control Mar - Apr. Targets 13.9 kcfs in May and 9.4 kcfs in June for Sturgeon, based on an Apr-Aug forecast of 5.359 MAF and a Tier 2 required pulse of 0.80 MAF. Targets full in July with a minimum flow of 7,0

Results:

Priest Rapids Meets Flow Objectives of 70 kcfs in Mar - Apr 15 and 135 kcfs in Apr 16 - Jun.

Month	Occurrences out of 59 Years	Average Flow for 59 Years (kcfs)
Mar	59	74
Apr 15	59	82
Apr 30	39	149
May	45	148
Jun	48	132

Lower Granite Meets Flow Objectives of 100 kcfs in Apr - May, 84 kcfs in June and 52 kcfs in Jul - Aug:

Month	Occurrences out of 59 Years	Average Flow for 59 Years (kcfs)
Apr 30	17	86
May	32	104
Jun	43	96
Jul	27	49
Aug 15	0	41
Aug 31	0	31

Bonneville Meets Flow Objectives of 125 kcfs in Mar - Apr:

Month	Occurrences out of 59 Years	Average Flow for 59 Years (kcfs)
Mar	54	140
Apr 15	59	166
Apr 30	59	254

McNary Meets Flow Objectives of 228.3 kcfs in Apr 15 - Jun and 200 kcfs in Jul - Aug:

Month	Occurrences out of 59 Years	Average Flow for 59 Years (kcfs)
Apr 30	33	231
May	53	246
Jun	39	244
Jul	16	182
Aug 15	0	143
Aug 31	0	129

Projects Refill by 30 June:

Month	Occurrences out of 59 Years	Average Elevation on 30 Jun for 59 Years
Libby	14	2452
Hungry Horse	59	3560
Grand Coulee	59	1290
Dworshak	56	1600

Period Average Flows (kcfs)

	MAR 1-31	APR 1-15	APR 16-30	MAY 1-31	JUN 1-30	JUL 1-31	AUG 1-15	AUG 16-31
LIB	4	4	4	14	10	19	16	14
HGH	2	1	1	2	6	7	5	4
GCL	68	75	137	125	120	118	92	91
PRD	74	82	149	148	151	132	100	96
DWR	2	2	13	6	6	11	13	11
BRN	17	22	23	21	17	13	17	12
LWG	42	63	86	104	96	49	41	31
MCN	121	151	231	246	244	182	143	129
TDA	133	160	247	254	254	188	148	133
BON	140	166	254	257	256	191	150	135

4.0 Storage Project Operations

Libby Dam

Sturgeon Pulse

The current water supply forecast (March) of 5.36 MAF for Libby (April – August) puts Libby operations in the 2nd tier of operations for sturgeon called for in the USFWS 2000 Biological Opinion. The 2nd tier sturgeon operation calls for a sturgeon flow volume of .8 MAF and minimum bull trout flows of 7 kcfs in July.

Hungry Horse Dam

Bull Trout Flows & Ramping Rates

Based on the Bureau of Reclamation February forecast for April – August of 1939 kaf, the minimum outflow from Hungry Horse will be 900 cfs and the minimum flow for Columbia Falls will be 3,500 cfs.

Grand Coulee Dam

Grand Coulee Summer Draft Limit

Based on the March final forecast of April – August runoff volume at the Dalles, the summer draft limit for Grand Coulee is expected to be 1278 feet.

Dworshak Dam

Summer Draft for Temperature Control

A key operation at Dworshak Dam is to draft cold water from the Dworshak reservoir in July and August to cool water temperatures in the Lower Snake River for the benefit of migrating salmon and steelhead. In-season modeling will be done to provide information to aid in the making the decisions of when and how to draft Dworshak for water temperature control.

5.0 Upper Snake River Flow Augmentation

The Bureau of Reclamation currently estimates 300 kaf will be available for flow augmentation in 2004.

6.0 Flood Control Operations

The flood control elevations based on the March final forecast are shown in the following table.

Note that April 10th flood control elevations are interpolated. As there is no official method of determining April 10th flood control elevations

Project	Date						
	31-Jan	28-Feb	15-Mar	31-Mar	10-Apr	15-Apr	30-Apr
ARDB	1430.5	1422.9		1414.1		1414.1	1414.1
LIB	2422.5	2431.6	2441.1	2441.1	2442.2	2442.8	2443.4
DCDB	1839.8	1807.7		1815.9		1815.9	1815.9
HGH	3543.8	3536.3		3538.5	3537.2	3536.6	3534.8
GCL	1290	1290		1283.3	1275.8	1272.1	1255.2
GCL-shifted	1290	1286		1277.7	1268.4	1263.7	
BRN	2077	2051.4		2053.4		2056	2057.6
BRN-shifted	2077	2077		2077		2077	
DWR	1539.5	1529.8		1538.3	1535.5	1534.1	1534.8
DWR-shifted	1539.5	1529.8		1547.2	1554.1	1557.5	

Dworshak/Grand Coulee flood control shift

No Dworshak/Grand Coulee flood control shift is planned this year.

7.0 Minimum Operating Pool

The minimum operating pool (MOP) operation for the Lower Snake projects is scheduled to start April 3rd. The table below shows planned operations in 2004. It was agreed at the March 17, 2004 TMT meeting that because of navigation concerns Ice Harbor, Little Goose, and Lower Granite would be operated at MOP+1 to MOP+2. TMT may address, on an in-season management basis, navigation or other concerns that may result in adjustments in BiOp MOP operations.

Project	Lower Range		Upper Range	
	Operation	Elevation	Operation	Elevation
Ice Harbor	MOP+1	438	MOP + 2	439
Lower Monumental	MOP	537	MOP + 1	538
Little Goose	MOP+1	634	MOP + 2	635
Lower Granite	MOP +1	734	MOP + 2	735

At John Day the forebay will be operated within a 1.5-foot range between 262.5 and 264.0 feet from April 10th to September 30th.

8.0 Hanford Reach

An agreement is being negotiated for 2004 and will be included when it is signed.

9.0 Spill for Juvenile Fish Passage

Note: At this time the spill operations for the 2004 spill season have not been finalized yet. Information below is the best of our knowledge and subject to change.

Spring Spill Operations – Snake River Dams

At the current time it appears that the forecasted inflow will be greater than 85 kcfs this year we will be spilling the Lower Snake projects in the spring. The planning dates for spring spill season on the Snake River is from April 3rd to June 20th.

Lower Granite Dam

A test of the effect of the BGS (Behavioral Guidance Structure) impact on horizontal distribution of fish passage will occur this spring. Planned test dates are from April 15th to May 30th. During this test spill will consist of spilling the RSW (approximately 7 kcfs) along with a training spill (approximately 12 kcfs) 24 hours a day. (See section 11 for further details) It has not been decided yet what the non-test operation at Lower Granite will be. The options are spill using the spill as specified in the BiOp (spill at night to the gas cap) or spill using the RSW (spill 24 hours a day 7 kcfs through the RSW with a training spill of approximately 12 kcfs)

Little Goose Dam

Spring spill passage at Little Goose Dam will be as specified in the BiOp. Spill nights to gas cap (1800 – 0600)

Lower Monumental Dam

A test of the effect on juvenile fish of two different spill patterns will be tested this spring. The dates of this test will be from April 15 to June 17. The two spill patterns to be tested are the pattern in the FPP and a bulk spill pattern. (See section 11 for further details) During the test the project will be spilling 24 hours a day. The spill amount during the test will be a percentage of the project outflow with the spill percentage being 45% when total project outflow is less than 75 kcfs or greater than 100 kcfs. The spill percentage is 50% when the total project outflow is between 75 and 100 kcfs. Spill not to exceed the TDG gas cap. When the test is not occurring the spill operation will be as described above using the spill pattern in the FPP.

Note: A near field TDG test is scheduled during the spring (See section 11 for further details)

Ice Harbor Dam

A test of the effect on juvenile fish of two different spill patterns will be tested this spring and summer. The dates of this test will be from April 15th to July 15th. Spill operation will involve two distinct operations including one “bulk” spill pattern and one small gate-opening pattern. Specifics will be coordinated with the fishery agencies and others as needed. The “bulk” spill pattern will consist of spilling up to the gas cap 24 hours a day and spilling the small gate pattern will consist of spilling 45 kcfs 24 hours a day. (See section 11 for further details). At this time I am assuming that the non-test period spill operation will be as specified in the BiOp (spill limited to 45 kcfs during the day and spill to the gas cap at night).

Summer Spill Operations – Snake River Dams

Note: The Action Agencies are currently looking at the possibility of modifying the summer spill program. What is presented below is the BiOp summer spill program.

The summer spill planning period is June 21-August 31 for the Lower Snake projects.

Lower Granite Dam, Little Goose, Lower Monumental Dam

As recommended in the BiOp, no spill and full transport will be conducted at the Snake River transport dams.

Ice Harbor Dam

See spring spill section for details.

Spring and Summer Spill Operations – Lower Columbia River Dams

Note: The Action Agencies are currently looking at the possibility of modifying the summer spill program. What is presented below is the BiOp summer spill program.

The spring spill planning period for the Lower Columbia River dams is 4/10-6/30. The summer spill planning period is July 1 - August 31 for Lower Columbia River projects. Spring and summer spill operations on the Lower Columbia River Dams are nearly identical. The exceptions are McNary Dam at which no summer spill occurs and at John Day where the spill percentage and spill period changes between the spring and summer spill periods.

McNary Dam

Spring spill will be conducted as specified in the BiOp which calls for night spill (1800 – 0600) to the gas cap. Spring spill will be suspended when river conditions are no longer spring-like (flows <200 kcfs and water temperature >62-degrees F) and transport initiated. No summer spill occurs at McNary Dam.

John Day Dam

Spill will be provided from April 10 through August 31 for spring and summer migrants as required in the NMFS Biological Opinion. Between May 15 and July 20, spill will occur from 1900 to 0600 hours (11 hours total). Before that time period, spill will be for 12 hours nightly, from 1800 to 0600 hours. From April 10 to July 20, spill discharges will be 60% of instantaneous project flow at project flows up to 300,000 cfs. Above 300,000 cfs project flow, spill discharges will be 180,000 cfs (up to the hydraulic limit of the powerhouse). From July 21 through August 31, spill will be 30% of instantaneous project flow 24-hours per day. Spill will be provided in a manner consistent with TDG management to avoid excessive gas supersaturation

The Dalles Dam

Spill will be 40% of total project outflow out to exceed the TDG cap.

Bonneville Dam

Spill will be as specified in the BiOp, spill to the TDG cap at night and spill 75 kcfs (fallback limit) during the day.

10. Water Quality – Spill Priority List

River operations are conducted to meet State Clean Water Act total maximum daily load (TMDL) dissolved gas standards. Also, research operations at a particular dam can be impacted by involuntary spill. Thus spill at research projects is given lower priority in the hope that involuntary spill can be eliminated during research. In 2004 involuntary spill will occur in the following order:

1. Little Goose
2. Lower Monumental
3. McNary
4. The Dalles
5. Bonneville
6. Priest Rapids
7. Rocky Reach
8. Wells
9. Rock Island
10. Lower Granite
11. Ice Harbor
12. John Day
13. Wanapum
14. Chief Joseph
15. Grand Coulee

2003 GAS Cap levels

The range of gas caps during 2003 at the projects were:

	Min	Max
BON	100	170
TDA	85	135
JDA	95	165
MCN	100	160
IHR	51	110
LMN	15	44
LGS	27	43
LWG	36	43

Other Spill Operations

Based on a study conducted by a subgroup of the Regional Forum Water Quality Team, it was determined that joint operations of Chief Joseph and Grand Coulee Dam for power and total dissolved gas production could result in an overall reduction in TDG levels both upstream and downstream of Chief Joseph dam by taking advantage of the larger generation flow capacity of Grand Coulee and the lower average TDG loading below the Chief Joseph spillways (absent deflectors). As a result of this study, and coordination with the Bureau of Reclamation and the Colville Tribe, the joint operation of Grand Coulee and Chief Joseph will be conducted during the 2004 spill season. Operationally, this will be as follows,

- When Lake Roosevelt is below 1260' elevation, spill from the Grand Coulee outlet tubes be avoided by shifting all spill to Chief Joseph for spill discharges up to 70 kcfs. If river conditions require spill releases above 70 kcfs at Chief Joseph, the additional spill should be distributed between Chief Joseph and Grand Coulee in a 2.5 to 1 ratio.
- When Lake Roosevelt TDG is elevated and at or above 1260' elevation, spill over the drum gates at Grand Coulee may be beneficial to the system due to potential degassing. The continuation of monitoring practices and additional investigations of these operational measures on TDG exchange are recommended to further establish efficient and effective joint operations at Grand Coulee and Chief Joseph.

11. 2004 Fish Passage Research

A summary of 2004 fish passage research studies that have the potential to change project operation are described below

Lower Granite Dam

Lower Granite RSW 2004 Study Plan

Background

A Removable Spillway Weir (RSW) was installed in spillbay 1 at Lower Granite Dam in 2001. It was evaluated for fish passage in spring 2002 and fish passage and survival in spring 2003. In 2002, the Behavioral Guidance Structure (BGS), Surface Bypass Collector (SBC) and Simulated Wells Intake (SWI) were all in place in the Lower Granite Forebay. These structures presumably worked together to guide fish toward the RSW. For the 2003 evaluation, all of these guidance structures were removed and the RSW was tested as a “stand-alone” fish passage structure.

For 2004, the BGS will be shifted to the north. It is presently attached to the dam between units 3 and 4. The new attachment point will be between units 5 and 6. The downstream end of the BGS will also be made shallower. The bottom of several of the downstream sections will be removed. This will allow the use of the existing anchor system and will retain velocities of less than 2 feet per second beneath the BGS.

The 2004 Lower Granite RSW test will run from approximately April 15 to May 30.

RSW/spillway operation

The RSW will be operated 24 hours per day during the spring test. Training spill level will likely be around 12 kcfs, spread out over bays 2 – 8. This is one stop per bay, or around 1.7 kcfs per bay. This operation was tested in 2003, with high passage and survival. Training spill is to provide adequate tailrace hydraulic conditions. Few fish are expected to pass through training spill, based on results from the 2002 and 2003 evaluations.

The forebay level will be at MOP plus 1 foot. The actual forebay level will fluctuate between elevation 734 ft. and 735 ft. This is the forebay level that was used in both the 2002 and 2003 evaluations. The RSW flow in this forebay range will be approximately 6.7 to 7.7 kfs.

Powerhouse Operation

The proposed powerhouse operation will be a priority for units 2, 3 and 4, in any order. Unit 6 will be operated on a last-on, first-off basis. Unit 1 is expected to be out of service for the entire evaluation period.

BGS Moves

The BGS will be moved in or out of position periodically to assess its impact on horizontal distribution of fish passage. RSW, spillway and powerhouse passage will be compared for periods when the BGS is in the deployed position compared to periods when it is in the stored (upstream) position. The test period is divided into 6 blocks. Each block has three days of BGS-IN and three days of BGS-OUT. The blocks each begin with a randomly chosen condition, so there are periods of up to six days with one condition in place.

This design is a combination of the desire to get a reasonable number of study blocks with the realization that each time the BGS is moved, it takes much of a day and that day cannot go into the BGS in/out analysis.

2004 Spring Lower Granite RSW Test

RSW operates 24 hours per day, every day

3 day treatment periods for BGS IN or BGS OUT, one day to move

	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
April	11	12	13	14	15 BGS IN Begin blk 1	16 BGS IN	17 BGS IN
	18 BGS Move	19 BGS OUT	20 BGS OUT	21 BGS OUT	22 BGS Move	23 BGS IN Begin blk 2	24 BGS IN
	25 BGS IN	26 BGS Move	27 BGS OUT	28 BGS OUT	29 BGS OUT	30 BGS OUT Begin blk 3	1 BGS OUT
May	2 BGS OUT	3 BGS Move	4 BGS IN	5 BGS IN	6 BGS IN	7 BGS Move	8 BGS OUT Begin blk 4
	9 BGS OUT	10 BGS OUT	11 BGS Move	12 BGS IN	13 BGS IN	14 BGS IN	15 BGS IN Begin blk 5
	16 BGS IN	17 BGS IN	18 BGS Move	19 BGS OUT	20 BGS OUT	21 BGS OUT	22 BGS Move
	24 BGS IN Begin blk 6	25 BGS IN	26 BGS IN	27 BGS Move	28 BGS OUT	29 BGS OUT	30 BGS OUT

Monitoring

Hydroacoustics is planned to monitor fish passage through the RSW, spillway and powerhouse in spring. One spillbay will be outfitted with a split-beam transducer. The other six bays will be monitored with single beam transducers. The RSW will have two uplooking split-beam transducers mounted on a frame in front of the structure. Powerhouse passage will be monitored with transducers mounted low on the inside of the Trashracks. One unit will have a transducer in each of the three intakes. Three units will have a single, randomly chosen intake monitored with a single beam transducer. Finally, one unit will have a split-beam transducer located in a randomly chosen intake bay. Unit 1 will not be instrumented, as it will be out of service during the test period.

Lower Monumental Dam

Lower Monumental Spillway Survival Study. Survival studies will be conducted using radio-telemetry in 2004. Two spill patterns will be tested in a 2-day blocked design.

Bulk spill pattern for Lower Monumental - 2004

Spill Bay								Total Stops	Total Spill
1	2	3	4	5	6	7	8		
1								1	1.1
1							1	2	2.2
1	1						1	3	3.3
1	1					1	1	4	4.4
1	1	1				1	1	5	5.5
1	1	1			1	1	1	6	6.6
1	1	1	1		1	1	1	7	7.7
1	1	1	1	1	1	1	1	8	8.8
2	1	1	1	1	1	1	1	9	10.5
2	1	1	1	1	1	1	2	10	12.2
2	2	1	1	1	1	1	2	11	13.9
2	2	1	1	1	1	2	2	12	15.6
2	2	2	1	1	1	2	2	13	17.3
2	2	2	1	1	2	2	2	14	19
5		5				5		15	23.7
5.5		5				5.5		16	26.3
5.5		5.5				6		17	27.1
6		6				6		18	28.8
6.5		6				6.5		19	30.5
7		6				7		20	
7		7				7		21	31.4
5.5		5.5		5.5		5.5		22	35.0
6		5.5		5.5		6		23	36.7
6		6		6		6		24	38.4
6		6		6		7		25	40.1
7		6		6		7		26	41.8
7		7		6		7		27	43.5
7		7		7		7		28	45.2
2	5	4	4	4	4	4	2	29	44.8
2	5	4	4	4	4	5	2	30	46.4
2	5	5	4	4	4	5	2	31	48.1
2	5	5	4	4	5	5	2	32	49.8
2	5	5	5	4	5	5	2	33	51.5
2	5	5	5	5	5	5	2	34	53.2

2	6	5	5	5	5	5	2	35	54.9
2	6	5	5	5	5	6	2	36	56.6
2	6	6	5	5	5	6	2	37	58.3
2	6	6	5	5	6	6	2	38	60
2	6	6	6	5	6	6	2	39	61.7
2	6	6	6	6	6	6	2	40	63.4
2	7	6	6	6	6	6	2	41	65.1
2	7	6	6	6	6	7	2	42	66.8
2	7	7	6	6	6	7	2	43	68.5
2	7	7	6	6	7	7	2	44	70.2
2	7	7	7	6	7	7	2	45	71.9
2	7	7	7	7	7	7	2	46	73.6
2	8	7	7	7	7	7	2	47	75.3
2	8	7	7	7	7	8	2	48	77
2	8	8	7	7	7	8	2	49	78.8
2	8	8	7	7	8	8	2	50	80.6
2	8	8	8	7	8	8	2	51	82.4
2	8	8	8	8	8	8	2	52	84.2
2	9	8	8	8	8	8	2	53	86
2	9	8	8	8	8	9	2	54	87.8
2	9	9	8	8	8	9	2	55	89.5
2	9	9	8	8	9	9	2	56	91.2
2	9	9	9	8	9	9	2	57	92.9
2	9	9	9	9	9	9	2	58	94.6
2	10	9	9	9	9	9	2	59	96.3
2	10	9	9	9	9	10	2	60	98
2	10	10	9	9	9	10	2	61	99.7
2	10	10	9	9	10	10	2	62	101.4
2	10	10	10	9	10	10	2	63	103.1
2	10	10	10	10	10	10	2	64	104.8
2	11	10	10	10	10	10	2	65	106.5
2	11	10	10	10	10	11	2	66	108.2
2	11	11	10	10	10	11	2	67	109.9
2	11	11	10	10	11	11	2	68	111.6
2	11	11	11	10	11	11	2	69	113.3
2	11	11	11	11	11	11	2	70	115
2	12	11	11	11	11	11	2	71	116.7
2	12	11	11	11	11	12	2	72	118.4
2	12	12	11	11	11	12	2	73	120.2

2	12	12	11	11	12	12	2	74	122
2	12	12	12	11	12	12	2	75	123.8
2	12	12	12	12	12	12	2	76	125.6
2	13	12	12	12	12	12	2	77	127.4
2	13	12	12	12	12	13	2	78	129.2
2	13	13	12	12	12	13	2	79	130.9
2	13	13	12	12	13	13	2	80	132.6
2	13	13	13	12	13	13	2	81	134.3
2	13	13	13	13	13	13	2	82	136
2	14	13	13	13	13	13	2	83	137.7
2	14	13	13	13	13	14	2	84	139.4
2	14	14	13	13	13	14	2	85	141.1
2	14	14	13	13	14	14	2	86	142.8
2	14	14	14	13	14	14	2	87	144.5
2	14	14	14	14	14	14	2	88	146.2
2	15	14	14	14	14	14	2	89	147.9
2	15	14	14	14	14	15	2	90	149.6
2	15	15	14	14	14	15	2	91	151.4
2	15	15	14	14	15	15	2	92	153.2
2	15	15	15	14	15	15	2	93	155
2	15	15	15	15	15	15	2	94	156.8
2	16	15	15	15	15	15	2	95	158.6
2	16	15	15	15	15	16	2	96	160.4

Lower Monumental Spill schedule - Spring 2004

	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
April	11	12	13	14	15 Bulk	16 Bulk	17 FPP
	18 FPP	19 Bulk	20 Bulk	21 FPP	22 FPP	23 Bulk	24 Bulk
	25 FPP	26 FPP	27 Bulk	28 Bulk	29 FPP	30 FPP	1 Bulk
May	2 Bulk	3 FPP	4 FPP	5 Bulk	6 Bulk	7 FPP	8 FPP
	9 Bulk	10 Bulk	11 FPP	12 FPP	13 Bulk	14 Bulk	15 FPP
	16 FPP	17 Bulk	18 Bulk	19 FPP	20 FPP	21 Bulk	22 Bulk
	23 FPP	24 FPP	25 Bulk	26 Bulk	27 FPP	28 FPP	29 Bulk
June	30 Bulk	31 FPP	1 FPP	2 Bulk	3 Bulk	4 FPP	5 FPP
	6 Bulk	7 Bulk	8 FPP	9 FPP	10 Bulk	11 Bulk	12 FPP
	13 FPP	14 Bulk	15 Bulk	16 FPP	17 FPP	18	19

Near-field Study of Total Dissolved Gas Exchange and Evaluation of Added Spillway Deflector Performance. As part of the COE Fastrack Gas Abatement Program, total dissolved gas abatement alternatives are being developed to reduce the TDG exchange associated with spill operations and to provide greater flexibility in scheduling spillway operations. Additional spillway deflectors for bays 1 and 8 were constructed in late 2002 and early 2003, and now all spillway bays are so equipped. A field study is proposed to address the TDG exchange associated with the modified spillway and associated operations under a wide range of operating conditions. The proposed long-term monitoring program will be initiated in April 2004 prior to the spill season and continue through the end of spill, typically in June.

This three month sampling period will provide for the widest range of operating and environmental conditions. This study will primarily focus on determining the total dissolved gas exchange characteristics associated with spillway operation for discharges up to the design spill for a 7-day, 10-year frequency flood. The incorporation of specific operations could significantly enhance study findings. These special operations could include scheduled spill outage to maintain TDG instruments, alternative spill patterns including bulk spill, management of tailwater stage through storage in Lake Sacagawea, and constant spill with and without powerhouse flows. Circulation patterns below the dam will also be described through a variety of sampling devices. This information will support the interpretation of study TDG data and related issues concerning fish passage through this river reach.

Ice Harbor Dam

Spillway Survival Study. Radio telemetry, PIT, and balloon tag studies will estimate the survival rates of test fish passing over the spillway. Project operations (spill levels and possibly patterns) will change according to a randomized block schedule. Spill operation will involve two distinct operations including one “bulk” spill pattern and one small gate-opening pattern. Specifics will be coordinated with the fishery agencies and others as needed.

IHR Bulk Spill Pattern - 2004

Spill Bay (stops)										Total Stops	Total Flow
1	2	3	4	5	6	7	8	9	10		
		5		5		5		5		20	33.60
		5.5		5		5		5.5		21	35.3
		5.5		5.5		5.5		5.5		22	37
		5.5		5.5		5.5		5.5		22	37.00
		5.5		5.5		5.5		5.5		22	37
		6		6		6		6		24	40.4
		6	6	6		6		1		25	42.1
		6	6	6		6		2		26	43.8
		6	6	6		6		3		27	45.5
		6.5	6.5	6.5		6.5		2		28	47
		6.5	6.5	6.5		6.5		3		29	48.7
		6	6	6		6		6		30	50.5
		6	6	6		7		6		31	52.1
		6	6	6		7		7		32	53.7
		7	6	7		7		6		33	55.3
		7	6	7		7		7		34	56.9
		7	7	7		7		7		35	58.5
		6	6	6	6	6		6		36	60.6
		6	6	6	6	7		7		38	63.8
		6	6	6	7	7		7		39	65.4
		6	6	7	7	7		7		40	67
		6	7	7	7	7		7		41	68.6
		7	7	7	7	7		7		42	70.2
	6	6	6	6	6	7		6		43	72.3
	6	6	6	6	7	7		6		44	73.9

	6	6	6	7	7	7		6		45	75.5
	6	6	7	7	7	7		6		46	77.1
	6	7	7	7	7	7		6		47	78.7
	6	6	6	6	6	6	6	6		48	80.8
	6	6	6	6	6	7	6	6		49	82.4
	6	6	6	6	7	7	6	6		50	84
	6	6	6	6	7	7	6	7		51	85.6
	6	6	6	7	7	7	6	7		52	87.2
	6	6	7	7	7	7	6	7		53	88.8
	6	7	7	7	7	7	6	7		54	90.4

Ice Harbor Spill Schedule - Spring and Summer, 2004

	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
April	11	12	13	14	15 Bulk	16 Bulk	17 FPP
	18 FPP	19 Bulk	20 Bulk	21 FPP	22 FPP	23 Bulk	24 Bulk
	25 FPP	26 FPP	27 Bulk	28 Bulk	29 FPP	30 FPP	1 Bulk
May	2 Bulk	3 FPP	4 FPP	5 Bulk	6 Bulk	7 FPP	8 FPP
	9 Bulk	10 Bulk	11 FPP	12 FPP	13 Bulk	14 Bulk	15 FPP
	16 FPP	17 Bulk	18 Bulk	19 FPP	20 FPP	21 Bulk	22 Bulk
	23 FPP	24 FPP	25 Bulk	26 Bulk	27 FPP	28 FPP	29 Bulk
June	30 Bulk	31 FPP	1 FPP	2 Bulk	3 Bulk	4 FPP	5 FPP
	6 Bulk	7 Bulk	8 FPP	9 FPP	10 Bulk	11 Bulk	12 FPP
	13 FPP	14 Bulk	15 Bulk	16 FPP	17 FPP	18 Bulk	19 Bulk
	20 FPP	21 FPP	22 Bulk	23 Bulk	24 FPP	25 FPP	26 Bulk
	27 Bulk	28 FPP	29 FPP	30 Bulk	1 Bulk	2 FPP	3 FPP
July	4 Bulk	5 Bulk	6 FPP	7 FPP	8 Bulk	9 Bulk	10 FPP
	11 FPP	12 Bulk	13 Bulk	14 FPP	15 FPP	16	17

McNary Dam

Operation of Turbine Units Outside of 1% best Operating Range. An operation of turbine units at McNary Dam outside of the normal 1% best efficiency operating range, up to 115% of overload (approximately 80 MWs), is proposed for the spring of 2004. A plan for monitoring this operation is being prepared and coordinated with the region.

The McNary Modernization Program will be conducting both fish condition studies (gatewell) and Fish Guidance Efficiency (FGE) studies at McNary in 04. Purpose of these studies are two fold: 1) Evaluation of fish condition under higher gatewell conditions (also new Vertical Barrier Screens) and estimating FGE under higher turbine loading.

For these tests it will be required to operate up to 5 units in a two day blocked design with high and low loads. In other words, test units will be operated at 12,200 for two days, and then 16,400 for two days. Units 2, 3, 4 and 5 will be operating on the schedule below. Unit 9 will be operated the "opposite" of these units. We will need to ensure that units 5 and 9 are treatments on the same day for the fish condition testing.

Table 1. Proposed Randomized block treatment schedule.

Date	Block	Treatment	Date	Block	Treatment	Date	Block	Treatment
4/15	1	High Q	5/16	8	High Q	6/16	16	Low Q
4/16	1	High Q	5/17	9	Low Q	6/17	16	Low Q
4/17	1	Low Q	5/18	9	Low Q	6/18	17	Low Q
4/18	1	Low Q	5/19	9	High Q	6/19	17	Low Q
4/19	2	High Q	5/20	9	High Q	6/20	17	High Q
4/20	2	High Q	5/21	10	Low Q	6/21	17	High Q
4/21	2	Low Q	5/22	10	Low Q	6/22	18	High Q
4/22	2	Low Q	5/23	10	High Q	6/23	18	High Q
4/23	3	High Q	5/24	10	High Q	6/24	18	Low Q
4/24	3	High Q	5/25	11	Low Q	6/25	18	Low Q
4/25	3	Low Q	5/26	11	Low Q	6/26	19	High Q
4/26	3	Low Q	5/27	11	High Q	6/27	19	High Q
4/27	4	Low Q	5/28	11	High Q	6/28	19	Low Q
4/28	4	Low Q	5/29	12	High Q	6/29	19	Low Q
4/29	4	High Q	5/30	12	High Q	6/30	20	Low Q
4/30	4	High Q	5/31	12	Low Q	7/1	20	Low Q
5/1	5	High Q	6/1	12	Low Q	7/2	20	High Q
5/2	5	High Q	6/2	13	Low Q	7/3	20	High Q
5/3	5	Low Q	6/3	13	Low Q	7/4	21	Low Q
5/4	5	Low Q	6/4	13	High Q	7/5	21	Low Q
5/5	6	High Q	6/5	13	High Q	7/6	21	High Q
5/6	6	High Q	6/6	14	High Q	7/7	21	High Q
5/7	6	Low Q	6/7	14	High Q	7/8	22	High Q
5/8	6	Low Q	6/8	14	Low Q	7/9	22	High Q
5/9	7	High Q	6/9	14	Low Q	7/10	22	Low Q
5/10	7	High Q	6/10	15	High Q	7/11	22	Low Q
5/11	7	Low Q	6/11	15	High Q	7/12	23	Low Q
5/12	7	Low Q	6/12	15	Low Q	7/13	23	Low Q
5/13	8	Low Q	6/13	15	Low Q	7/14	23	High Q
5/14	8	Low Q	6/14	16	High Q	7/15	23	High Q
5/15	8	High Q	6/15	16	High Q			

The Dalles Dam

Spillwall Post Construction Evaluation. Survival and injury estimates for spillway passed fish will be generated using balloon tag techniques. Test fish will be passed through bays 2 and 4 and 8 (optional, depending on river flow) via release hoses. Control fish will be released downstream of the end sill via a hose. Two test discharges will be evaluated: one per bay discharge that is between 12 and 18 kcfs, and 21 kcfs.

The 21 kcfs treatment may require a forebay restriction at Bonneville, in order to achieve an appropriate tailwater elevation at The Dalles. This will be coordinated with RCC, BPA and regional salmon managers during the study. The balloon-tag study is expected to run from 13 April – 1 May. Each day testing will begin at 0700 hours and conclude around 1900 hours. The balloon-tag study will occur only in the springtime. The start date will be selected prior to the finalization of the FPP. To conduct these evaluations,

tailrace BRZ access is required. The hydraulic environment encountered by test fish in the tailrace will be characterized using autonomous sensors released through spillway hoses. Total mortality rates will be estimated using radio telemetry. Radio tagged fish will be released in John Day Dam's tailrace, The Dalles Ice and Trash Sluiceway, and The Dalles tailrace. This study element will start in late April and conclude around July 20.

Sluice Operations Evaluation. An alternative sluiceway operation will be evaluated in 2004. Fixed hydroacoustics, 3-D acoustic telemetry, and radio telemetry will be used to estimate sluice passage. The schedule (Table 1 and Table 2) will include 2 treatments: operation of gates 1-1, 1-2, 1-3 and operation of gates 1-1, 1-2, 1-3, 18-1, 18-2, and 18-3. **Treatments will be switched at 0800 hours daily.** Testing will begin April 19 and end on July 17

Table 1. TDA spring sluice operations(all 3 gates open for MU1 and MU18).

Study Block	Study Day	Summer Date	Day of Week	Sluice Treatment	Study Block	Study Day	Summer Date	Day of Week	Sluice Treatment
1	1	19-Apr	Mon	MU 1	14	27	15-May	Sat	MU 1, MU 18
1	2	20-Apr	Tue	MU 1, MU 18	14	28	16-May	Sun	MU 1
2	3	21-Apr	Wed	MU 1, MU 18	15	29	17-May	Mon	MU 1
2	4	22-Apr	Thur	MU 1	15	30	18-May	Tue	MU 1, MU 18
3	5	23-Apr	Fri	MU 1, MU 18	16	31	19-May	Wed	MU 1, MU 18
3	6	24-Apr	Sat	MU 1	16	32	20-May	Thur	MU 1
4	7	25-Apr	Sun	MU 1, MU 18	17	33	21-May	Fri	MU 1
4	8	26-Apr	Mon	MU 1	17	34	22-May	Sat	MU 1, MU 18
5	9	27-Apr	Tue	MU 1	18	35	23-May	Sun	MU 1, MU 18
5	10	28-Apr	Wed	MU 1, MU 18	18	36	24-May	Mon	MU 1
6	11	29-Apr	Thur	MU 1, MU 18	19	37	25-May	Tue	MU 1, MU 18
6	12	30-Apr	Fri	MU 1	19	38	26-May	Wed	MU 1
7	13	1-May	Sat	MU 1	20	39	27-May	Thur	MU 1, MU 18
7	14	2-May	Sun	MU 1, MU 18	20	40	28-May	Fri	MU 1
8	15	3-May	Mon	MU 1	21	41	29-May	Sat	MU 1
8	16	4-May	Tue	MU 1, MU 18	21	42	30-May	Sun	MU 1, MU 18
9	17	5-May	Wed	MU 1	22	43	31-May	Mon	MU 1
9	18	6-May	Thur	MU 1, MU 18	22	44	1-Jun	Tue	MU 1, MU 18
10	19	7-May	Fri	MU 1	23	45	2-Jun	Wed	MU 1, MU 18
10	20	8-May	Sat	MU 1, MU 18	23	46	3-Jun	Thur	MU 1
11	21	9-May	Sun	MU 1, MU 18	24	47	4-Jun	Fri	MU 1
11	22	10-May	Mon	MU 1	24	48	5-Jun	Sat	MU 1, MU 18
12	23	11-May	Tue	MU 1, MU 18					
12	24	12-May	Wed	MU 1					
13	25	13-May	Thur	MU 1, MU 18					
13	26	14-May	Fri	MU 1					

Table 2. TDA summer sluice operations(all 3 gates open for MU1 and MU18).

Study Block	Study Day	Summer Date	Day of Week	Sluice Treatment	Study Block	Study Day	Summer Date	Day of Week	Sluice Treatment
1	1	6-Jun	Sun	MU 1	12	23	28-Jun	Mon	MU 1, MU 18
1	2	7-Jun	Mon	MU 1, MU 18	12	24	29-Jun	Tue	MU 1
2	3	8-Jun	Tue	MU 1, MU 18	13	25	30-Jun	Wed	MU 1, MU 18
2	4	9-Jun	Wed	MU 1	13	26	1-Jul	Thur	MU 1
3	5	10-Jun	Thur	MU 1, MU 18	14	27	2-Jul	Fri	MU 1, MU 18
3	6	11-Jun	Fri	MU 1	14	28	3-Jul	Sat	MU 1
4	7	12-Jun	Sat	MU 1, MU 18	15	29	4-Jul	Sun	MU 1
4	8	13-Jun	Sun	MU 1	15	30	5-Jul	Mon	MU 1, MU 18
5	9	14-Jun	Mon	MU 1	16	31	6-Jul	Tue	MU 1, MU 18
5	10	15-Jun	Tue	MU 1, MU 18	16	32	7-Jul	Wed	MU 1
6	11	16-Jun	Wed	MU 1, MU 18	17	33	8-Jul	Thur	MU 1
6	12	17-Jun	Thur	MU 1	17	34	9-Jul	Fri	MU 1, MU 18
7	13	18-Jun	Fri	MU 1	18	35	10-Jul	Sat	MU 1, MU 18
7	14	19-Jun	Sat	MU 1, MU 18	18	36	11-Jul	Sun	MU 1
8	15	20-Jun	Sun	MU 1	19	37	12-Jul	Mon	MU 1, MU 18
8	16	21-Jun	Mon	MU 1, MU 18	19	38	13-Jul	Tue	MU 1
9	17	22-Jun	Tue	MU 1	20	39	14-Jul	Wed	MU 1, MU 18
9	18	23-Jun	Wed	MU 1, MU 18	20	40	15-Jul	Thur	MU 1
10	19	24-Jun	Thur	MU 1	21	41	16-Jul	Fri	MU 1
10	20	25-Jun	Fri	MU 1, MU 18	21	42	17-Jul	Sat	MU 1, MU 18
11	21	26-Jun	Sat	MU 1, MU 18					
11	22	27-Jun	Sun	MU 1					

Bonneville Dam

Bonneville Rehab Biological Testing (also testing under the Turbine Survival Program). Main unit 1 will need to be commission tested once it returns to service in May 2004. The unit will undergo a series of pre-startup tests. A normal pre-start scenario is to mechanically roll the unit for 1 day. After the unit has been deemed structurally sound, the unit will be HIPOT tested for 2-3 days. After this test series is complete the unit will be subjected to a minimal run load rejection test. Once test are completed the unit will be then advanced to a 72 hour run test, followed by the 100 day commissioning test. Unit 1 is scheduled to return to normal operation by early June 2004. This commissioning test was coordinated with the FFDRWG group and endorsement was gained to complete the test on February 3, 2004.

Survival Evaluation. As part of the B2 corner collector evaluation, project and route specific survival, and passage distribution will be estimated for spring and summer migrants. We will evaluate survival of spring chinook salmon and steelhead through (1) the B1 ice and trash sluiceway, (specific gates to be evaluate are 2c, 4c, & 6c in the Spring, and 1c, 3c, & 6c in the Summer), (2) through an MGR turbine unit (MU-4), and from upstream releases through the B2 CC, B2 JBS, spillway, and both powerhouses. We will evaluate survival of fall chinook salmon through the B1 ice and trash sluiceway (specific sluice gates to be evaluated are 1c, 3c, & 6c in the Summer), and with upstream releases through the B2 CC, B2 JBS, Spillway and both powerhouses. It is expected that

unit 4 that is being used for turbine survival testing will need to be shut down for release pipe/hose installation, and potentially in-season fixes. Due to the potential for changes in operations that could affect presently planned survival research contingency plans are being formulated for discussions with regional fishery managers.

Research at MU-4 MGR likely will occur during the spring passage season only. Unit outages will be required for the installation and removal of monitoring equipment in the sluiceway and MU-4 both Spring and Summer. Further, there will likely be the need for unit outages in order to fix broken or non-functional equipment within the evaluation timeframe (April through July). Specific project operations required will be maintaining unit 4 as a priority unit for the spring passage season/evaluation. Powerhouse priority during the MGR testing should keep unit 4 as first on last off with a minimum of unit 2 operating as the same time during testing to maintain good egress conditions of test fish through the test period (April- July 2004).

Prototype Testing of Fish Guidance Efficiency (FGE) Improvements and Unit Gap Loss at Bonneville Second Powerhouse. In 2004, prototype testing of a newly designed VBS will be conducted with two differing technologies (DIDSON & hydroacoustics). Testing will begin in late April and conclude in late July and will require the test units (15 & 17) to be shut down for short periods for removal and placement of the DIDSON camera frame. The required outage will be for approximately 1-2 hours for each unit per day for two weeks. Additional hydroacoustics transducers have will be installed in units 11, 12, 15, 17 to measure changes in FGE minus Turbine Intake Extensions (TIEs) and the B2CC operating.

Hydroacoustics will be used to estimate FGE (ERDC and PNNL). For the PNNL deployment, transducers will be installed both on the STS and on the trash racks prior to the test start date. Testing will be completed by Mid July. Installation on both the trash racks and STS will require a one-day outage. As always, several outages should be expected throughout the testing season to repair equipment.

It is expected that the test units will be available for normal operation during non-testing periods (unless significant fish injury is seen) to meet project/regional needs.

Unit Priorities for spring and summer. Unit priorities will be the same at B2 for the spring and summer in order of first on last off – 11, 17, 12, 13, 18, 14, 15, & 16. These operations are in support of the FGE and survival tests planned. Unit priorities will differ at B1 from spring and summer. Spring priorities at B1 are 4, 2, 3, 5, 6, 7, 10, 8, & 9. Sluice gates at B1 that will be operational in the spring will be 2c, 4c, & 6c. Summer priorities at B1 are 1, 3, 4, 5, 6, 7, 10, 8, & 9. Sluice gates that will be operational in the summer will be 1c, 3c, & 6c.

12. Research Activities that will Impact Project Operations

Project	2004 Snake River Research Summary Table		
	Research Objectives	Spring Spill Plan	Summer Spill Plan
Lower Granite	RSW/BGS study	4/15 – 5/30: 24 hrs ~7kcfs RSW & 12kcfs training spill. 3-day blocks BGS in vs. BGS out.	N/A
Little Goose		N/A	N/A
Lower Monumental	Spillway survival study: bulk vs. BiOp/FPP spill	4/15 – 6/17: 24 hrs Bulk spill vs. FPP 2- day block design.	N/A
Ice Harbor	Spillway survival	4/15 – 7/15: 24 hrs Bulk spill vs. FPP 2-day block design.	

Project	2004 Lower Columbia River Research Summary Table		
	Research Objectives	Spring Spill Plan	Summer Spill Plan
Bonneville	Route specific and spill survival	6/20 – 7/31 50kcfs/24 hrs vs. <u>Day:</u> 75kcfs <u>Night:</u> Gas cap	
The Dalles	Post-construction evaluation of spillway wall	4/13 – 5/1: Daytime only balloon tag releases. 12-18kcfs vs. 21kcfs Late April – 7/20: Radio tag mortality estimates	
	Sluice operations evaluation	4/19 – 6/30: 24 hrs 2-day block design 3 gates vs. 6 gates	7/1 – 7/17: 24 hrs 2- day block design 3 gates vs. 6 gates
John Day		N/A	N/A
McNary		N/A	N/A

SYSTEM OPERATIONAL REQUEST: #2004-2

The following State, Federal, and Tribal Salmon Managers have participated in the preparation and support this SOR: U.S. Fish & Wildlife Service, NOAA Fisheries, Idaho Department of Fish and Game, Washington Department of Fish and Wildlife, Columbia River Inter Tribal Fish Commission, and the Oregon Department of Fish and Wildlife.

TO:	B. G. Grisoli	COE-NWD
	William Branch	COE-Water Management
	Cathy Hlebechuk	COE-RCC
	Witt Anderson	COE-P
	Col. Richard Hobernicht	COE-Portland District
	LTC Kertis, Jr.	COE-Walla Walla District
	J. William McDonald	USBR-Boise Regional Director
	Steven Wright	BPA-Administrator
	Greg Delwiche	BPA-PG-5



FROM: David A. Wills, Chairperson, Salmon Managers

DATE: March 30, 2004

SUBJECT: Implementation of Snake River Spill Operations and MOP.

SPECIFICATIONS:

1. Implement spill at Lower Granite Dam as described in the 2000 Biological Opinion. Begin spill at Lower Granite Dam beginning at 1800 hours on April 3, 2004. It is anticipated that spill will then be phased in at the downriver projects at two-day intervals, initiating spill at Little Goose on April 5, at Lower Monumental on April 7 and at Ice Harbor Dam on April 9. (This two-day implementation interval may be modified pending collection of juvenile passage information at these downriver passage sites. The Salmon Managers will review the smolt monitoring data on the morning of April 5 and advise the COE at that time.)
2. Implement MOP operations beginning at Lower Granite Pool at MOP+1 on April 3 to coincide with the initiation of spill. MOP+1 operations are then to be implemented sequentially at Little Goose Reservoir on April 4, and Ice Harbor Reservoir on April 6, with MOP at Lower Monumental Reservoir beginning on April 5. (Note: It is CRITFC's policy desire to operate at MOP, as mentioned at TMT on March 3rd, 2004, in order to be consistent with 2000 Biological Opinion operations.)

JUSTIFICATION:

Spill is being requested in accordance with the NMFS 2000 Biological Opinion. According to the NMFS 2000 Biological Opinion 9.6.1.3.2 Action 40, "The Corps and BPA shall continue to implement voluntary spill at all three Snake River collector projects when seasonal average flows are projected to meet or exceed 85 kcfs." Further, 9.6.1.4.3 Action 54 specifies that the annual planning dates for spill for Snake River projects detailed in Table 9.6-3 are April 3 to June 20.

Chapter 9.6.1.2.1 explains that when the April final runoff volume at Lower Granite between April and July is 16 MAF the spring flow objective at Lower Granite Dam will be 85 kcfs. The March Mid Month Forecast at Lower Granite (April-July) is 18.2 MAF, which includes recorded precipitation through the 15th of March, assumes 90% average precipitation in the second half of the month and normal precipitation subsequent to the end of March. It is assumed that the April Final Water Supply Forecast will be well above 16 MAF at Lower Granite and flow objectives will be equal or greater than 85 kcfs. Hence, the Biological Opinion would project average seasonal flows to meet or exceed 85 kcfs, and voluntary spill would be implemented at the Lower Snake River projects.

In the first week of monitoring efforts at Lower Granite Dam, the yearling chinook numbers have increased from 70 to 430 fish per day. The unclipped proportion of the daily catch is approximately twice the clipped proportion. These numbers reflect what is occurring at the upriver sampling sites. At the Whitebird Trap the collection of juvenile chinook yearlings increased sharply, reaching 1,706 fish per day on March 24, 2004. The collection of wild yearling chinook also increased at the Imnaha Trap. Yearling chinook daily catch at the Grande Ronde Trap was significantly higher, ranging from 182 to 381 fish daily over a similar time period. All four trap sites have captured small numbers of steelhead since they went into operation this season, but catches are similarly increasing. The steelhead index at Lower Granite Dam has increased from 110 to over 930 in the first week of monitoring activities at this site. All of the passage index data indicates that the spring migration is underway in the Snake River for yearling wild and hatchery chinook and steelhead.

Smolt monitoring data indicates that the juvenile fish migration has begun. This objective of this request is to implement the intent of the fish passage measures in the Biological Opinion, implementing protection when fish passage occurs.

In addition to the upriver fish the Lyons Ferry Hatchery has started releasing listed spring chinook into the Tucannon River (170,000) and will begin releasing yearling fall chinook from the hatchery (450,000) on April 1. These fish are expected to be passing Lower Monumental and Ice Harbor dams shortly thereafter.

The MOP operations are requested to facilitate the passage of these fish through the Lower Snake River reach. This operation is to provide the fastest travel time possible at the present flows.

ATTENTION: COLUMBIA RIVER BASIN PROJECTS AND BPA
SUBJECT: SPILL PRIORITY LIST
REFERENCE:

1. THIS TELETYPE PROVIDES GUIDANCE ON PROJECT OPERATION TO PROVIDE VOLUNTARY AND INVOLUNTARY SPILL.
2. UNTIL FURTHER NOTICE DURING PERIODS OF INVOLUNTARY SPILL ,PROJECTS SHOULD SPILL IN THE FOLLOWING ORDER: LWG, LGS, IHR, MCN, JDA, TDA, BON, PRD, RRH, WEL, RIS,WAN, CHJ
3. LOWER GRANITE IS FIRST ON THE LIST FOR VOLUNTARY SPILL TO BENEFIT SNAKE RIVER FISH THAT ARE MIGRATING IN THE SYSTEM.
4. CURRENT SPILL CAPS FOR THE VARIOUS TDG LEVELS, SUBJECT TO PERIODIC CHANGES BASED ON REAL-TIME DATA. VOLUNTARY AND INVOLUNTARY SPILL SHOULD BE IN THE FOLLOWING ORDER. DAYTIME SPILL ABOVE 75 KCFS AT BON AND 45 KCFS AT IHR IS AUTHORIZED IF NEEDED TO PROVIDE INVOLUNTARY SPILL. EXCEEDANCE LEVELS AND DURATION SHOULD BE MINIMIZED TO THE EXTENT POSSIBLE.

```

LWG-20---30---40---90---125---
LGS-20---25---38---80---110---
LMN-10---20---34---55---110---
IHR-30---45---92---125---135---
MCN-40---80---140---230---290---
JDA-20---60---95---240---300---
TDA-20---60---125---250---260---
BON-80---110---135---205---250---
WAN-10---15---20---50---100---
WEL-10---15---25---45---130(1)-
RRH-05---10---20---30---150(1)-
RIS-05---10---20---30---150(1)-
PRD-20---30---40---40---40---
CHJ-05---10---15---33---45---

```

(1)=LIMIT DAYTIME SPILL
TO 100KCFS

LAURA HAMILTON
CENPD/RCC/
RCCBT/SPILLP040304

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

TECHNICAL MANAGEMENT TEAM

BOR: Tony Norris / John Roache

BPA: Scott Bettin / John Wellschlager

NMFS: Paul Wagner / Chris Ross

USFWS: David Wills / Howard Schaller

OR: Ron Boyce

WA: Cindy LeFleur

ID: Russ Kiefer

MT: Jim Litchfield

COE: Cindy Henriksen / Rudd Turner / Cathy Hlebechuk

TMT MEETING

THURSDAY 08 April 2004 0900-1015 hours

**Custom House Room 118
Portland, Oregon**

Conference call line: 503-808-5191

NOTE: NEW DAY and PHONE BRIDGE

*All members are encouraged to call Donna Silverberg with any issues or concerns they would like to see addressed.
Please e-mail her at dsilverberg@cnmw.net or call her at (503) 248-4703.*

AGENDA

1. Welcome and introductions.
2. Status of Hanford Reach Fall Chinook Protection Flows (Chris Carlson, Grant PUD)
[\[Hanford Reach Fish Protection Programs \]](#) 
3. Lower Columbia Spill
4. Mid-Columbia Flows
5. McNary Operations - 1% Peak Efficiency
6. Early-bird Water Supply Forecast and Seasonal Average Flow at Lower Granite
[\[QADJ \]](#)  [\[ESP \]](#) 
7. Current Operations
 - a. Reservoir Status
[\[Volumes at Dworshak \]](#)  [\[Volumes at Libby \]](#)  [\[Volumes at Hungry Horse \]](#) 
 - b. Fish Status
 - c. Power System Status
8. Other
 - Set agenda for next meeting

Questions about the meeting may be referred to Cindy Henriksen at (503) 808-3945, or Rudd Turner at (503) 808-3935, or Cathy Hlebechuk at (503) 808-3942

Hanford Reach Fish Protection Program: Weeks of March 15 - 21, March 22 - 28 and March 29 - April 4, 2004

Posted: 2004-04-06 09:55:46 from 66.119.196.164

by: Chris Carlson, Grant County PUD

Priest Rapids Operations

Date	Ave.Q	Min.Q	Max.Q	Prog.Q	Day's Delta	Band
15-Mar	71.4	69.9	73.2		3.3	None
16-Mar	71.7	70.9	72.4	73.2	1.5	None
17-Mar	72.1	70.9	74.0	72.4	3.1	None
18-Mar	72.0	70.6	76.3	74.0	5.7	None
19-Mar	79.1	70.9	104.6	76.3	33.7	None
20-Mar	71.5	70.6	76.0	57	5.4	None
21-Mar	71.3	70.7	72.0	57	1.3	20 Start of emergence
Week	72.7					

Priest Rapids Operations

Date	Ave.Q	Min.Q	Max.Q	Prog.Q	Day's Delta	Band
22-Mar	71.5	70.6	72.6	87.5	2.0	30
23-Mar	72.0	70.8	73.2	76.7	2.4	20
24-Mar	73.4	71.1	80.4	77.2	9.3	20
25-Mar	84.3	71.6	99.1	87.6	27.5	30
26-Mar	81.4	70.8	95.6	86.5	24.8	30
27-Mar	72.4	70.9	73.2	61	2.3	20
28-Mar	71.6	70.4	72.8	61	2.4	20
Week	75.2					

Priest Rapids Operations

Date	Ave.Q	Min.Q	Max.Q	Prog.Q	Day's Delta	Band
29-Mar	72.6	71.1	74.9	77.2	3.8	20
30-Mar	71.5	70.4	72.8	79.7	2.4	20
31-Mar	73.6	70.2	89.0	75.3	18.8	20
1-Apr	74.5	71.1	89.3	80.1	18.2	30
2-Apr	94.6	82.1	107.5	79.5	25.4	20
3-Apr	82.7	71.2	90.6	55	19.4	20
4-Apr	71.7	70.5	73.5	55	3.0	20
Week	77.3					

As of April 4, 2004

TU's since end of spawning (Nov. 24) = 679

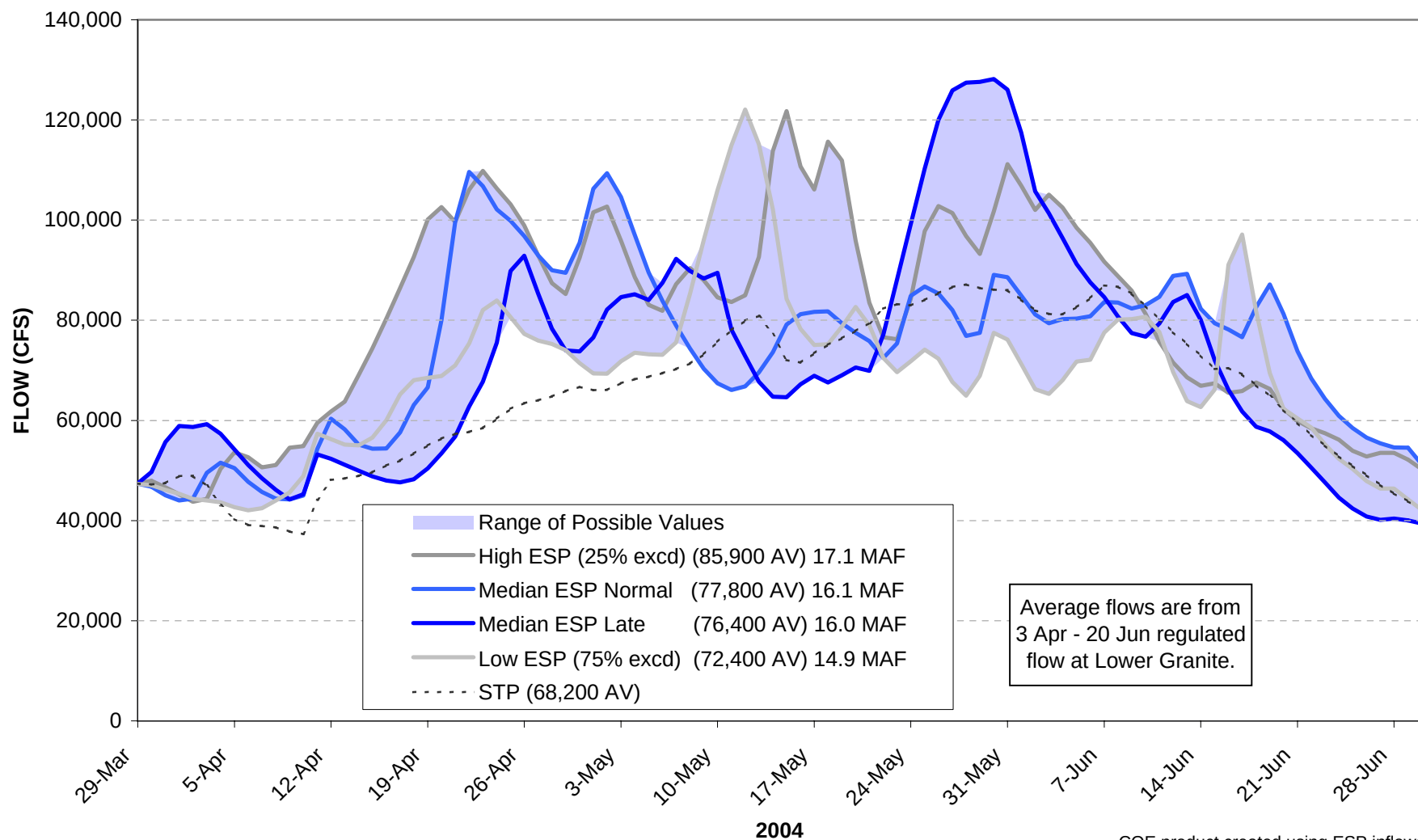
TU's since start of emergence (Mar. 21) = 98

TU's since end of emergence (not occurred) = 0

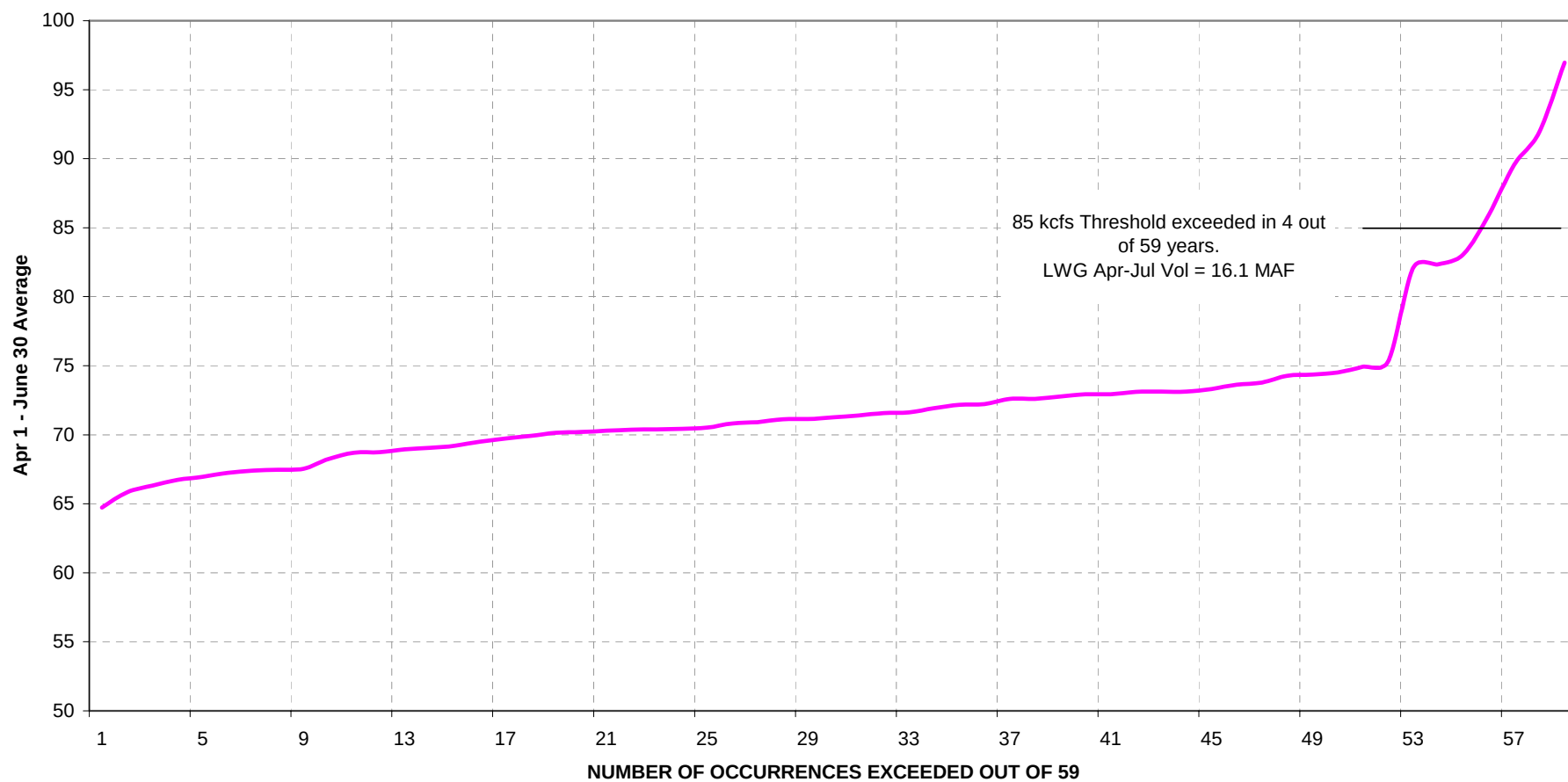
Maintaining 70 kcfs minimum flow until end of emergence.

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LOWER GRANITE FLOWS



QADJ - REGULATED FLOWS AT LOWER GRANITE



**TECHNICAL MANAGEMENT TEAM
MEETING NOTES
April 8, 2004
CORPS OF ENGINEERS NORTHWESTERN DIVISION OFFICES – CUSTOM
HOUSE
PORTLAND, OREGON**

FACILITATOR'S SUMMARY NOTES ON FUTURE ACTIONS

Facilitator: Donna Silverberg

The following notes are a summary of issues that are intended to point out future actions or issues that may need further discussion at upcoming meetings. These notes are not intended to be the “record” of the meeting, only a reminder for TMT members.

Hanford Reach Update:

Chris Carlson, Grant County PUD, reported to TMT that fish began emerging on March 21st, so the emergence operation at Priest Rapids based on the 70 kcfs Vernita Bar agreement began. Flow data for 3/15-4/4 and the VB agreement are posted on the TMT web page. Chris reported that the project was operated within the flow band except for April 2nd. The PUD plans to maintain a minimum 70 kcfs flow until the end of emergence, and will continue to update TMT on Hanford Reach and Priest Rapids operations.

Lower Columbia Spill:

The planning date for start of spill in the Lower Columbia is April 10th. FPAC held discussions on Tuesday and looked at numbers of fish passing the projects. The salmon managers did not feel the numbers were high enough to start spill and would like to check the numbers on Monday (4/12). They will then advise the COE on a recommendation of whether to start spill the afternoon of 4/12. Likely they will recommend that spill begin Monday afternoon at all of the Lower Columbia projects.

ACTION: The salmon managers planned to coordinate with the action agencies during a subsequent meeting in the afternoon of 4/8.. If there is a change in recommended operations next week, Cindy will email notification to the rest of the group.

Mid-Columbia Flows:

The salmon managers reported that steelhead numbers are not high enough to recommend start of flow augmentation this week, so the recommendation is to revisit this issue at the TMT meeting on 4/14. The salmon managers will prepare an SOR before the next meeting. The COE will run two models in preparation for next week's discussions: 135 kcfs 4/15 through the end of May; and last year's ramp up operation.

McNary 1% Peak Efficiency:

Cindy Henriksen, COE, reported that notes from the 3/23 FFDRWG meeting (which include discussions on operating outside 1% efficiency at McNary) are available on the TMT web page. A Monitoring Plan is being developed and hoped to be completed by next Monday 4/12 for FPAC to review and discuss on Tuesday 4/13. The issue will then

come to TMT on Wednesday 4/14. The COE hopes to post the monitoring plan on the TMT web page on Monday.

Early Bird Forecast and Seasonal Flow at Lower Granite:

Cindy Henriksen presented the April final water supply forecast, which shows a decline from the early bird. The Jan-July forecast at Grand Coulee is 53.6 MAF (85% of normal). Lower Granite April-July is 15.6 MAF (72% of normal). The Dalles Jan-July is 84.2 MAF (78%) and April-August is 73.4 MAF (79%).

The 30- and 90- day forecasts show above average temperatures and below average precipitation. The Northwest River Forecast Center ran contingency forecasts that show 50%, 75%, and 125% of normal scenario. The 125% forecast, which would mean a very wet spring from here on out, showed Lower Granite reaching just 82% of average conditions. The QAdjust model, using the April early bird forecast, showed flows well below the 85 kcfs transport/spill threshold.

Paul Wagner, NOAA, offered that new information on transport is available which shows that there are no benefits of transport on the fish, particularly early in the season, during average flow years, and that transport may even be detrimental to the fish. The decision on whether to transport or spill should be based on all current available data. Also, there are ongoing spill studies that would not be completed if spill were curtailed. Concern was raised that the annual planning process was never resolved due to the BiOp remand– this to some means that the current BiOp recommendation should remain the default this year until the issue is further resolved in the BiOp remand process.

After further discussions, BPA recommended that spill continue at Lower Granite and Little Goose (where it has already started), but not begin spill at the other projects.

ACTION: NOAA will develop and put in writing alternative spill criteria/recommendation for review and discussion during a special TMT meeting next Monday, April 12 at 3:30 pm, along with data to support it. The criteria are: 1) when steelhead comprise a significant portion of the migration; 2) 9.5 centigrade or higher; or 3) no later than May 1. NOAA also supports the continuation of spill studies at Lower Granite and Lower Monumental. The salmon managers would like to see the costs of not doing research on spill this year. (The COE noted that they are not as concerned about not completing the studies). The spring spill issue and discussions will focus on Lower Monumental, Lower Granite and Little Goose. Until that time, spill will continue at Lower Granite and Little Goose, but will not begin at the other projects. BPA clarified that if there is no resolution on this issue on Monday, they plan to stop spill under guidance from the BiOp.

Current Operations:

TMT will receive updates on status of operations, fish, and power system at the April 12 meeting.

Next Meeting: There will be a special meeting to discuss spring spill on Monday, April 12 at 3:30. There will be another regular TMT meeting on Wednesday, April 14th to discuss the following agenda items:

- Current System Status
- McNary 1% Peak Efficiency
- Lower Snake Spill Update
- Lower Columbia Spill Update
- Mid-Columbia Flows

1. Greeting and Introductions

The April 8 Technical Management Team meeting was chaired by Cindy Henriksen of the Corps and facilitated by Donna Silverberg. The following is a distillation, not a verbatim transcript, of items discussed at the meeting and actions taken. Anyone with questions or comments about these minutes should call Henriksen at 503/808-3945.

2. Status of Hanford Reach Fall Chinook Protection Flows.

Chris Carlson reminded the group that, although the new Vernita Bar agreement has not yet been signed by all parties, as a good-faith gesture, when fish started to emerge on March 21, Grant County PUD decided to go ahead and implement the new agreement. As you will recall, he said, the critical elevation agreed to is 70 Kcfs Priest Rapids minimum outflow until the end of emergence. There were a lot of fish spawning in 2003, so there will be a lot of fish emerging, he said. As far as I know, no one is looking at the number of fish in the reach, so we're not reporting that, said Carlson. All we'll be reporting is flows this year – there will be no fish stranding information presented. Henriksen noted that the flow information is attached to the TMT agenda. Carlson briefly explained how the flow bands are calculated.

For the week of March 15-21, if you look at average discharge, it was right around the minimum, Carlson said. We had a flow band of 20 Kcfs for that week, he said. We will try to get a signed copy of the Vernita Bar/Hanford Reach agreement to the Corps for posting to the TMT website, he added.

For the week of March 22-28, said Carlson, we were within the flow band that entire week. For March 29-April 4, the flow bands ranged from 20 Kcfs to 30 Kcfs. On April 2, we were outside the flow band, 25.4 Kcfs rather than 20 Kcfs, because Grand Coulee was filling and Chief Joseph discharge was biased. As of April 4, the fish had seen 679 temperature units since the end of spawning in late November. We're currently at 98 temperature units since the beginning of emergence; once we reach 400 temperature units, the flow restrictions will end, Carlson added. In response to a question from Paul Wagner, Carlson said the fish are expected to reach 800 temperature units since the end of spawning within another one to two weeks.

3. Lower Columbia Spill.

Henriksen said that, according to the BiOp, the planning date to start Lower Columbia spring spill is April 10, this Saturday. This is on the agenda in case the salmon managers want that to happen on schedule, she said. We have been discussing that issue, said David Wills; our feeling is that the numbers are not yet right to begin spill at the Lower Columbia projects. We would like to recommend a planning date of the evening of April 12 – Monday – for the start of spill, he said. We will be watching the fish passage numbers and will check in with the Corps on Monday morning. And would that be spill at all four projects starting Monday night? Henriksen asked. That's what we've done in the past, Wills replied; again, though, we'll look at the numbers on Monday morning and let you know. At this point, though, I would say it is likely that spill would begin at all four projects on Monday evening, said Wills.

The group briefly discussed the biological rationale behind starting spill simultaneously at the four Lower Columbia projects; Wills noted that, in the Lower Columbia, smolts are emerging from multiple tributaries throughout the lower river at this time of year, in contrast to the Lower Snake system, where the tributaries contribute relatively few smolts. What do you recommend as far as Bonneville corner collector operation? Rock Peters asked. We'll get back to you on that this afternoon, Wills replied. So we'll set the evening of April 12 as the planning date to start spill at all four Lower Columbia projects, pending the outcome of the salmon managers' discussion on Monday morning, Silverberg said. If that changes, the Corps will send out an email.

4. Mid-Columbia Flows.

Wills said the salmon managers had also discussed this topic at their most recent meeting; he said steelhead numbers are not yet at a level to warrant the initiation of Mid-Columbia flow augmentation. We would like to revisit this issue at next Wednesday's TMT meeting, Wills said. It was so agreed.

5. McNary Operations.

At last week's TMT meeting, we heard that there was no regional consensus about operating the full McNary project outside 1 percent, said Silverberg. Has anything changed? Henriksen noted that the monitoring plan for McNary in 2004 is expected to be available by Monday, April 12, in advance of the April 13 FPAC meeting. The salmon managers can discuss it at their Tuesday meeting, and we will then discuss the plan in more detail at next Wednesday's TMT meeting, Henriksen said. In response to a question, Henriksen said the monitoring plan has been updated in response to comments received at the March 23 FFDRWG meeting. The group briefly discussed the type of information they would like the Corps to model in advance of that meeting.

6. Early-Bird Water Supply Forecast and Seasonal Average Flow at Lower Granite.

Henriksen said the April final water supply forecast is now available. In general, the forecast is down, she said, even lower than the April early-bird forecast. At Grand Coulee, the forecast has fallen to 53.6 MAF, down from 88% of average in the March final to 85% of average in the April final. At Lower Granite, April-July, it's now 15.6 MAF, 72% of average, down from 80% of average. The forecast at The Dalles,

January-July, is now 84.2 MAF, 78% of average. For the April-August period, The Dalles forecast is now 73.4 MAF, 79% of average. River Forecast Center representatives said the April final forecast assumes 74% of average precipitation through April 15, then average precipitation after mid-April; however, the 30- and 90-day forecasts show below-normal precipitation and above-normal temperatures.

Wellschlager said that, while the current Q-Adjust run is based on early-bird forecast numbers, in virtually all model years, average April-June flow at Lower Granite is below the 85 Kcfs threshold for spill at the Lower Snake projects. While we're willing to let the Corps re-model this based on the April final numbers, it appears extremely unlikely that flow in the Lower Snake is going to reach the 85 Kcfs voluntary spill threshold, and the BiOp is clear that if the 85 Kcfs threshold is not reached, we will go to transport, rather than spill, at the Lower Snake projects, Wellschlager said.

It is clear, and it isn't, Wagner replied – while the BiOp does say that, it also says we should use adaptive management to take into account new information. Wagner said that the 2003 information, another low-flow year, showed a survival benefit for in-river fish vs. transported fish. However, there is a big difference between 2004 and 2003, Wellschlager said – last year, we were very close to the 85 Kcfs threshold, and the forecast was rising. This year, we're looking nowhere near the threshold, and the forecast is falling like a rock.

The expectation was that the remand, which was supposed to be completed by April 1, would resolve this issue, said Wagner. As part of that process, NOAA Fisheries was to consider the scientific basis for the 85 Kcfs threshold. We have been re-examining the data on transported fish from recent years, Wagner said; clearly, during very low flow years, there is a biological benefit to transporting fish across the season. In near-average water years, however, there is a biological detriment to transporting chinook early in the season, before Lower Snake water temperatures reach 9.5 degrees C. There is new information out there, said Wagner, and we're looking at it.

From Bonneville's perspective, said Wellschlager, while we acknowledge that there may be new information, in terms of our operational parameters, the BiOp is clear. If you want to make a change to the BiOp, from a process standpoint, there is a process that needs to occur, and that hasn't occurred yet. Wagner replied that the remand process leaves the process for making changes to the BiOp operations somewhat in limbo. However, the judge's perspective is clear that we ought to consider new technical information, he said.

Ultimately, said Wellschlager, this is a policy issue – it isn't going to be decided at TMT. Chris Ross noted that there is new information, based on the 2000 outmigration and 2003 adult returns from that outmigration, which shows that it is beneficial to have spring chinook in the river in April. Ron Boyce suggested that it would make sense to bring all of this technical information to the table at next Wednesday's TMT meeting for an in-depth technical discussion. We need to know, for example, exactly how detrimental transport is in April, Jim Litchfield observed.

In general, said Wagner, it was clear to NOAA Fisheries that the 85 Kcfs threshold was a judgement call; we're bringing new information to the table, and we need to take it into account. Are you trying to leave fish in river, or are you trying to continue spill? Scott Bettin asked. Both, Wagner replied. For the next week, could we discontinue spill and bypass fish in-river? Bettin asked. That wouldn't be my preferred operation, Wagner replied. How detrimental would bypass be vs. spill? Bettin asked. I haven't seen that information, so I couldn't really tell you what the biological effects of bypass vs. spill would be, Wagner replied. Russ Kiefer said that, if there was no spill at the Lower Snake projects and the fish were bypassed instead, fewer adults will return. Whether it is better to spill or bypass early in the season, the data is unclear. However, in the draft white paper, bypassed fish did significantly worse than fish that passed through spill or the turbine, Kiefer said.

Bettin said Bonneville would prefer to stop spill at the Lower Snake projects until the next TMT meeting, and bypass the fish instead, to give the fish the benefit of the doubt in terms of in-river passage vs. transport. Spilling now, given the flow forecast in the Snake, represents a huge policy departure for Bonneville, with respect to the BiOp operations, one that would have to be agreed to unanimously at TMT, said Bettin. I think the salmon managers would argue that we should err on the side of the fish, Wagner said.

The question, then, is what we should do between now and next Wednesday's TMT meeting, said Wagner. In response to a question, it was observed that spill is now occurring at Lower Granite and Little Goose. The group discussed another potential compromise: continue to spill at Lower Granite and Little Goose between now and next Wednesday, but defer the start of spill at Lower Monumental and Ice Harbor until after the TMT meeting. The group also revisited potential criteria for the end of spill – for example, when steelhead passage reaches a specified level for three consecutive days, when Lower Snake water temperatures reach 9.5 degrees C, and when a specified date – for example, May 1 – is reached. Ross added that Lower Granite and Lower Monumental have scheduled RSW/transport research this year, and curtailing or not providing spill during the test periods would seriously compromise that research. Henriksen said that, in her view, the curtailment of that research would not necessarily be a show-stopper. If we decide not to spill there, she said, we can still move forward.

So the question on the table is whether or not to wait to begin spill at Lower Monumental until after next Wednesday's TMT meeting, Ross said. After a brief caucus break, Wills said the salmon managers have agreed to leave spill implementation at Ice Harbor off the table for now; continuing to spill at Lower Granite and Little Goose is acceptable, and the salmon managers will agree not to spill at Lower Monumental until after the TMT can meet on Monday. Henriksen noted that the BiOp's RPA 40 refers to Lower Granite, Little Goose and Lower Monumental, not Ice Harbor, which is not a collector project. It was agreed that the TMT will reconvene at 3:30 on Monday, April 12. And if we can't reach agreement at that meeting, will spill end at the Lower Snake projects Monday evening? Wills asked. My understanding is that if you want to do something different at the Lower Snake projects, you need to make a proposal and, if we're unable to reach agreement on that proposal at TMT, it would need to be elevated to IT, Wellschlagler replied.

7. Current Operations.

This topic was not discussed at today's meeting.

8. Next TMT Meeting Date.

The next meeting of the Technical Management Team was set for Wednesday, April 14.

TMT Participant List

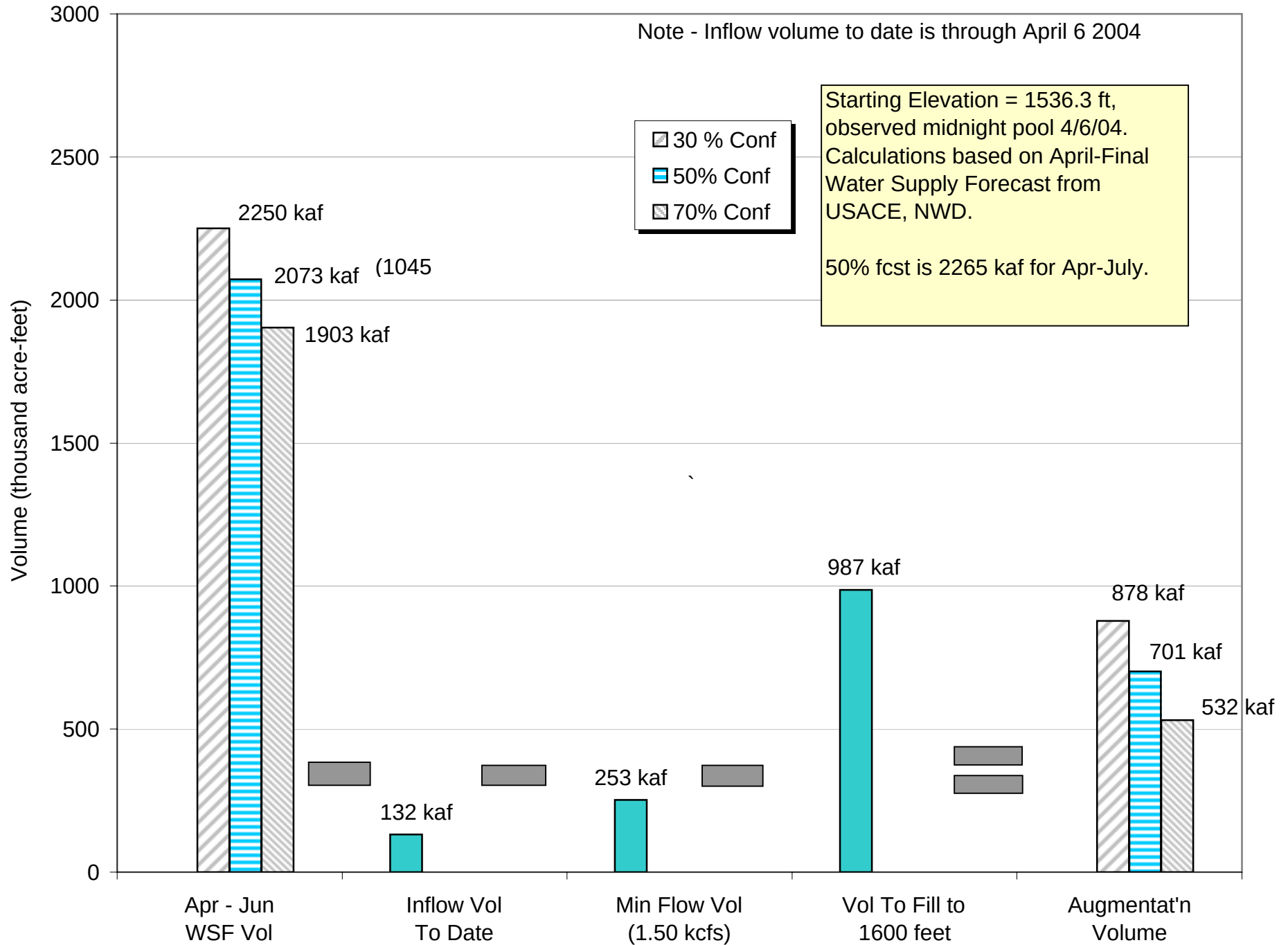
April 8, 2004

Name	Affiliation
Cindy Henriksen	COE
Donna Silverberg	Facilitation Team
Ron Boyce	ODFW
Jim Litchfield	Montana
Paul Wagner	NOAAF
David Wills	USFWS
John Wellschlager	BPA
Tony Norris	USBR
Tom Lorz	CRITFC
Chris Ross	NOAAF
David Benner	FPC
Robin Harkless	Facilitation Team
Scott Boyd	COE
Jim Adams	COE
Laura Hamilton	COE
Tim Heizenrater	PPM
Kevin Nordt	PGE
Ken Corum	PPC
Kevin Bannister	PNGC
Margaret Filardo	FPC
Kevin Bannister	

Denise Peterson	PPC
Ed Mount	PRM
Russ Kiefer	IDFG
Chris Carlson	Grant PUD
Nic Lane	BPA
Rock Peters	COE
Martin Hatscher	SCL
Ruth Burris	PGE
Cindy LeFleur	WDFW
Bill Rudolph	NWFL
Shauna McReynolds	PNGC
Joe McGrath	Snohomish PUD
Glenn Traeger	Avista
Tom Le	PSE
Scott Bettin	BPA

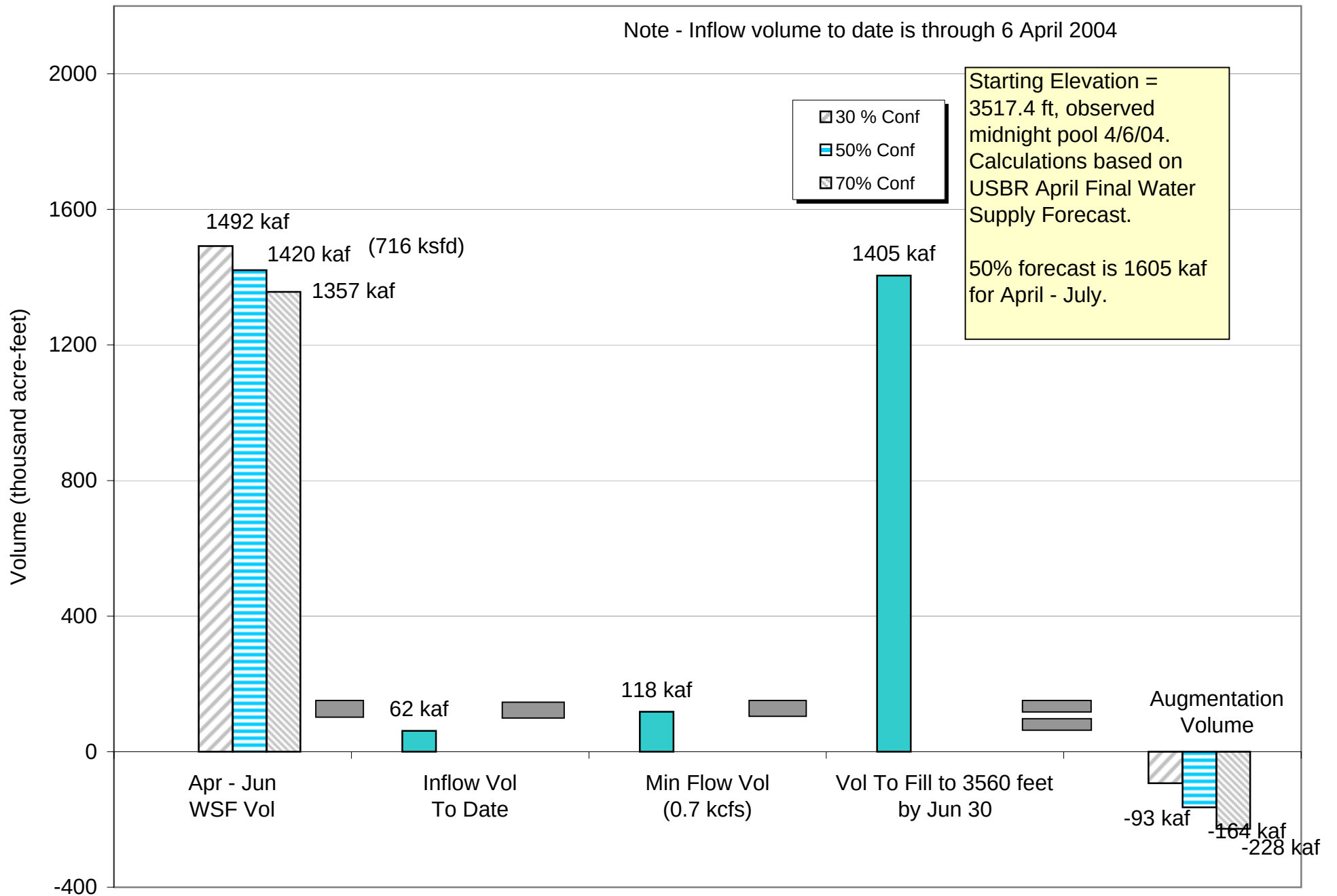
Volumes at Dworshak
1 April Through 30 June

Note - Inflow volume to date is through April 6 2004

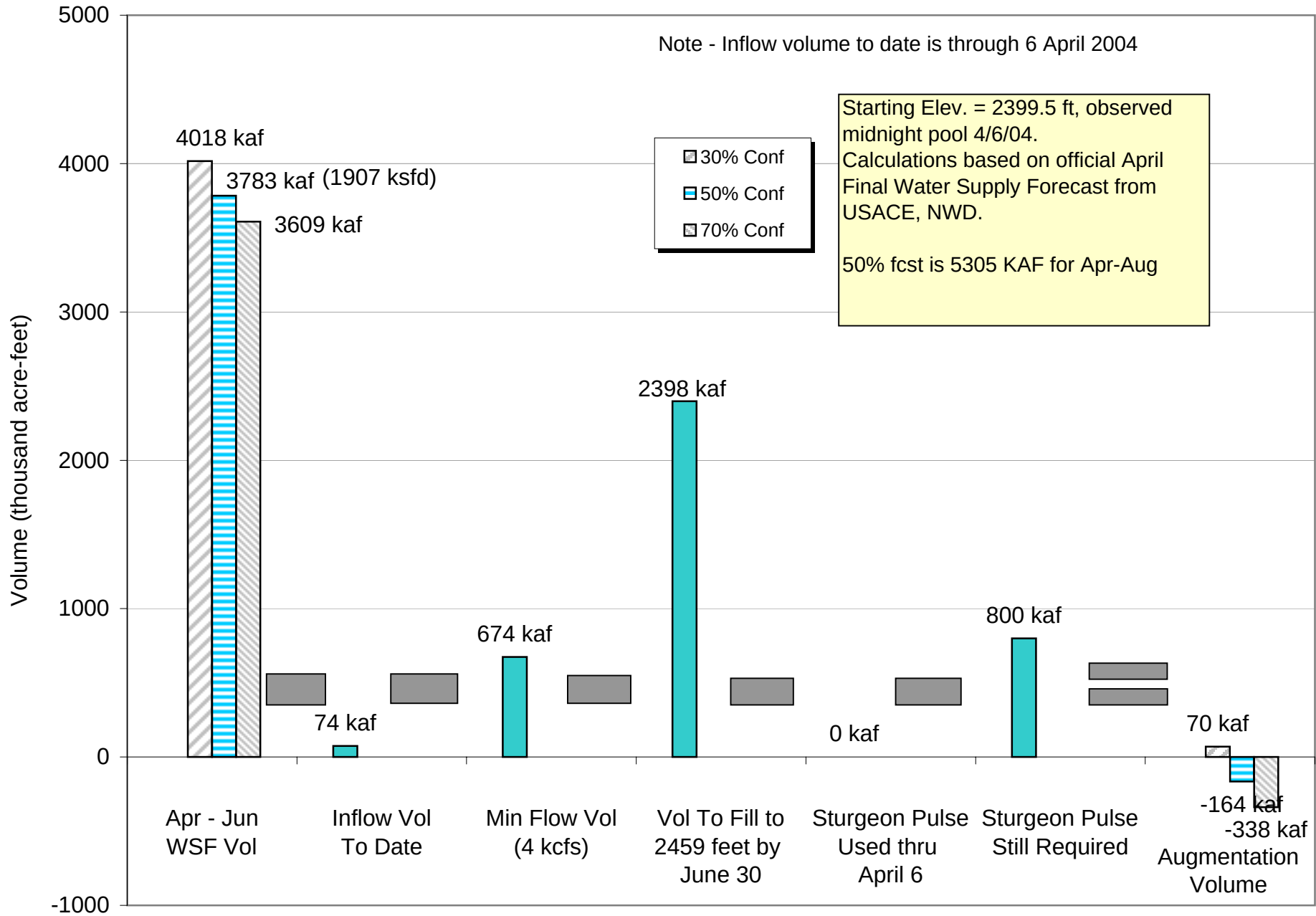


Volumes at Hungry Horse 1 April Through 30 June

Note - Inflow volume to date is through 6 April 2004



Volumes at Libby 1 April Through 30 June



TECHNICAL MANAGEMENT TEAM

BOR: Tony Norris / John Roache

BPA: Scott Bettin / John Wellschlager

NMFS: Paul Wagner / Chris Ross

USFWS: David Wills / Howard Schaller

OR: Ron Boyce

WA: Cindy LeFleur

ID: Russ Kiefer

MT: Jim Litchfield

COE: Cindy Henriksen / Rudd Turner / Cathy Hlebechuk

TMT MEETING

MONDAY 12 April 2004 1530-1700 hours

**Custom House Room 118
Portland, Oregon**

Conference call line: 503-808-5191

NOTE: NEW DAY and PHONE BRIDGE

*All members are encouraged to call Donna Silverberg with any issues or concerns they would like to see addressed.
Please e-mail her at dsilverberg@cnmw.net or call her at (503) 248-4703.*

AGENDA

1. Welcome and introductions.
2. QADJ summaries based on April final forecast
[\[Version 1 \]](#)  [\[Version 2 \]](#) 
3. Technical memo for FCRPS impacts
[\[Tech Memo \]](#) 
4. Spring Spill at Lower Snake Collector Projects
[\[SOR #2004-03 \]](#) 
 - a. Transport Information

 - b. Research at Collector Projects
5. Spring Spill at Lower Columbia Projects
[\[SOR #2004-04 \]](#) 
6. Other
 - Set agenda for next meeting

Questions about the meeting may be referred to Cindy Henriksen at (503) 808-3945, or Rudd Turner at (503) 808-3935, or Cathy Hlebechuk at (503) 808-3942

**TECHNICAL MANAGEMENT TEAM
MEETING NOTES
April 12, 2003
CORPS OF ENGINEERS NORTHWESTERN DIVISION OFFICES – CUSTOM HOUSE
PORTLAND, OREGON**

FACILITATOR'S SUMMARY NOTES ON FUTURE ACTIONS

Facilitator: Donna Silverberg

The following notes are a summary of issues that are intended to point out future actions or issues that may need further discussion at upcoming meetings. These notes are not intended to be the “record” of the meeting, only a reminder for TMT members.

SOR 2004-04:

The salmon managers presented SOR 2004-04 requesting spill up to 120% TDG at all of the Lower Columbia projects except Bonneville beginning today, 4/12. Spill Bonneville at 50 kcfs for 24/hours daily, and maintain an instantaneous tailwater elevation of 13' to protect chum and avoid exceeding TDG. Also, operate the corner collector at Bonneville simultaneous with spill. The request was based on the recommendation in the BiOp and on numbers of fish observed at McNary. On the bullet referring to the tailwater elevation at Bonneville Dam, the word “instantaneous” in the SOR was changed to “minimum” to better reflect the intent of the request. The salmon managers, in response to a question from the COE, recommended that TDG levels stay at or below 110% at the Bonneville tailwater, and for the COE to contact Paul Wagner or Dave Wills if a problem arises.

CRITFC noted a preference for operating Bonneville at 75 kcfs and continuing monitoring, but did not object to the salmon managers' SOR. No objections were raised, so the SOR will be implemented. The salmon managers reported that 1,044 yearling chinook were observed at McNary, and 7,770 subyearling (which is up about 6,000 from previous years).

QAdjust Summaries:

The April final water supply forecast was used to run models presented today by the COE, per requests at the last TMT meeting. The model ran Priest Rapids at 70 kcfs through 4/15, then 135 kcfs 4/16-30. It also ran the ramp-up operation used last year of 70 kcfs through 4/15, 105 kcfs from 4/16-30, and 135 kcfs from 5/1-31. The BOR proposed implementing the first operation (135 kcfs starting on 4/16) as the model run shows that this operation supports maintenance work that needs to be done at Grand Coulee this year. Oregon expressed concerns with lowering spring flows in the Mid-Columbia, and the COE responded that the issue is not over the amount of water, but rather the shape of flow. CRITFC raised a concern that the alternative operation might affect the Hanford Reach agreement, and would like to see a more refined analysis. The salmon managers agreed to review the agreement and consider CRITFC's concerns, then come back to TMT on Wednesday, April 14th, with a proposal for operations. Appreciation was expressed to the COE for running the models. Jim Litchfield noted that Montana would like to put Libby operations back on the table for discussion concurrent with summer spill operations discussions.

SOR 2004-3:

The salmon managers requested that spill continue at Lower Granite and Little Goose, begin spill today (4/12) at Lower Monumental and Ice Harbor, and continue spill at the projects through April 30th. They also requested that spill at Lower Monumental and Ice Harbor continue as necessary to conduct research tests. (NOAA supported the full SOR, but did not object to ending the research at Lower Granite early.) This request was put forth as a result of consideration for NOAA data that shows no significant benefit to transporting fish in the early part of spring. Paul Wagner clarified that while no conclusions from the studies were drawn by the NOAA Science Center, it was made clear during the BiOp remand collaboration that the intent was for the information to be used by management to make decisions. Paul also clarified that the 9.5 C criteria that NOAA presented at the 4/8 TMT meeting pertained only to the already-collected fish, not those left in-river. (So, if temperatures rise above 9 C, transport the collected fish.)

- Oregon, Idaho, NOAA and USFWS supported spill through April 30th, and consider this a “spread the risk” operation.
- Montana felt that the 85 kcfs criteria is more compelling than the recent data/criteria presented, so does not support the SOR.
- BPA commented that during low flow years such as this, the BiOp recommendation for using an 85 kcfs threshold for spill/transport is a good management tool. BPA did not object to continuing spill at Lower Granite and Little Goose (for now), but did not support starting spill at Lower Monumental until further discussion and if/when a consensus is reached on the issue.
- TMT will re-visit this issue at a subsequent TMT meeting on 4/14. Until then, spill will continue at Lower Granite and Little Goose, but will not start at Lower Monumental. John Wellschlager will request operators to set the system up for Wednesday, 4/14 so that spill can begin at Lower Monumental; and so that spill can end at Lower Granite and Little Goose. TMT members agreed to consider Ice Harbor operations separately from the other Lower Snake projects.

Next Meeting, April 14th, 9am-noon:

Agenda Items:

- Status of Hanford Reach
- Lower Snake Spring Spill
- McNary Operation Outside 1% Efficiency
- Mid-Columbia Flow

1. Greeting and Introductions

The April 12 Technical Management Team meeting was chaired by Cindy Henriksen of the Corps and facilitated by Donna Silverberg. The following is a distillation, not a verbatim transcript, of items discussed at the meeting and actions taken. Anyone with questions or comments about these minutes should call Henriksen at 503/808-3945.

2. Update on Spring Spill at the Lower Columbia Projects.

At today's meeting, the salmon managers submitted SOR 2004-4, a new SOR covering Lower Columbia spill. David Wills said that, after looking at the fish passage numbers, the salmon managers would like to initiate spill at typical BiOp levels at The Dalles, John Day and McNary, starting at 6 p.m. tonight. At Bonneville, the salmon managers are recommending a minimum of 50 Kcfs spill (rather than the BiOp level of 75 Kcfs) and corner collector operation 24 hours a day, again starting at 6 p.m. tonight, in order to protect emerging chum from high TDG levels. The salmon managers are requesting that a minimum tailwater elevation of 13 feet be maintained at Bonneville. It was agreed that spill at The Dalles, John Day and McNary will run from 6 p.m. to 6 a.m. until May 19, when spill will begin at 7 p.m. and run until 6 a.m. Is there a TDG reading at Warrendale that should trigger a response, in terms of curtailing Bonneville spill? Jim Adams asked. We don't want to see TDG levels at Warrendale any higher than 110%, Wills replied. And spill would be turned off if TDG at Warrendale begins to exceed 110%? Adams asked. Correct, Wills replied – if there is any question, please contact Paul Wagner or myself.

When is the estimated end-of-emergence date for the stocks below Bonneville? John Wellschlager asked. April 26 for chum and May 26 for chinook, Ron Boyce replied. The group then devoted a few minutes of discussion to current smolt passage index data.

Are there any objections to starting spill at 6 p.m. tonight at the four Lower Columbia projects? Silverberg asked. None were raised; Wellschlager said that, in response to the discussion at last Thursday's TMT meeting, BPA went ahead and set up a schedule that would allow spill to begin tonight. Tom Lorz said CRITFC would prefer that Bonneville spill 75 Kcfs 24 hours a day, with monitoring at the redd sites to ensure that no TDG-related adverse biological impacts occur; however, CRITFC will not object to the SOR spill operation.

3. QADJ Summaries Based on April Final Forecast.

The discussion then moved on to the current Q-Adjust run. Henriksen distributed copies of the most recent version of this document, generated in response to a request at last week's TMT meeting. The group spent a few minutes going through the various Grand Coulee operating scenarios modeled by the Corps based on the April final water supply forecast; the bottom line is that, if we target meeting an average flow of 135 Kcfs at Priest Rapids from April 16-May 31, Grand Coulee will be at 1252 feet by April 30 and 1263 feet by May 31. The average flow at McNary for the month of June would then be about 190 Kcfs, because Grand Coulee will be refilling, Henriksen said.

The group discussed the impact of the Grand Coulee drum gate repair operation on flows in the Lower Columbia. Wellschlager and Norris observed that, according to the Q-Adjust run, there is little difference in May and June flows between the drum gate repair/non-drum gate repair scenarios. In response to a question, Norris said the drum gate repairs will begin as soon as Grand Coulee elevation reaches 1255 feet, probably some time in the end of April. The same volume will come out of Grand Coulee between now and the end of April, regardless of whether the drum gate repairs go ahead as scheduled, Henriksen observed. It was agreed that the TMT will revisit this operation at its April 14 meeting. Bob Heinith asked whether it would be possible

to get an analysis of how the difference in Grand Coulee elevations caused by the drum gate repair work might impact flow fluctuations through the Hanford reach; Henriksen replied that the model is not set up to do that. She suggested that Heinith develop the operational scenarios he would like to see modeled to the other signatories to the Hanford Reach fish protection agreement. The proposed operation should allow those parties to implement the agreement as written, Norris added – again, there isn't going to be a significant departure from normal operations as a result of the repairs. It was agreed that the TMT will take a look at the 2004 Vernita Bar agreement (to be posted soon to the TMT homepage) to inform discussion of this topic at Wednesday's TMT meeting. We'll talk about this at tomorrow's FPAC meeting, said Boyce. Norris added that the drum gate repairs are a dam safety issue; we put it off last year, and we really can't put it off again.

4. Technical Memo for FCRPS Impacts.

5. Spring Spill at the Lower Snake Collector Projects.

As you will recall, said Silverberg, several meetings ago, the salmon managers submitted SOR 2004-3, covering spring spill at the Snake River projects. Following the last TMT meeting, said Wills, the salmon managers agreed to discuss this issue, specifically, how best to use spill early in the spring season at the Snake. We want you to continue spill at Lower Granite and Little Goose, and to begin BiOp spill at Lower Monumental and Ice Harbor tonight. Spill would then continue at Ice Harbor through June 20, but would end on April 30 at the other projects, except for spill needed for the ongoing research at some dams.

The group discussed the justification for this SOR; Wellschlager observed that, under the BiOp, given the current forecast, there would be no spring spill at the Snake River collector projects. We still feel it is appropriate to bring this to the TMT table at this point, said Wills. And NOAA Fisheries concurs? Silverberg asked. Yes, Wagner replied.

Wellschlager said the biological data BPA has been able to review does not seem conclusive, in terms of whether or not spring spill and in-river migration were beneficial, in comparison to transportation, in low-water years. The group devoted a few minutes of discussion to this information, as presented in the NOAA Fisheries technical memo, titled "Effects of the Federal Columbia River Power System on Salmon Populations," dated December 21, 2003. This document is available via hot-link from today's agenda on the TMT homepage. The bottom line is that, according to this data, over multiple years, what this data shows is that, up until May 1, in most years, both chinook and steelhead in-river migrants do pretty well, in comparison to transported fish, up until about May 1, Wagner said.

So is there agreement among the salmon managers that this evidence is compelling? Wellschlager asked. Is transport an effective bridge tool in a low-water year? he asked. Transport started in 1976, Wagner replied; it quickly grew into the management tool, because it avoided mortality downstream. Yet, you look at the adult returns, and you don't see that reflected the way you would expect. The question then becomes, what have we done to these fish over the past 25-

30 years? Wagner said.

Wellschlager reiterated his question about agreement among the salmon managers about what the evidence shows. It would be fair to say that, once we reach the end of April, there is less consensus, Wills replied; earlier in April, however, we have a solid consensus among the salmon managers that we should be providing spill. This is simply a spread-the risk strategy, Wagner added.

Wellschlager observed that two of the parameters cited by the salmon managers as being needed for successful in-river migration are strong flows and water temperatures below 9.5 degrees C at Lower Granite. Obviously flows are not very strong at the moment, Wellschlager said; also, water temperatures are now being measured at 10.5 degrees C at Lower Granite. Wagner replied that all fish collected are now being transported; the requested spill is simply to ensure the best possible in-river conditions for the uncollected fish.

The discussion continued in this vein for some minutes, with various TMT participants providing alternative viewpoints as to what the transport vs. in-river survival data shows. Ultimately, Boyce asked whether anyone plans to object to this SOR. Wellschlager replied that this SOR represents a major change in the BiOp operations of the FCRPS to which everyone has agreed. I'm not saying you don't have compelling evidence in support of your position, he said; however, I have to say that, if BPA came to the table with a major operational change based on evidence we found compelling, you would likely object. Wellschlager said he is willing to revisit this issue at Wednesday's TMT meeting, but he is not willing to start spill at Lower Monumental before that discussion occurs. Russ Kiefer and Boyce said they are unwilling to wait to make a decision on this issue unless spill goes forward at Lower Monumental. Wellschlager said he is unable to agree to that.

Ultimately, Henriksen observed that, logistically, there is no way to start spill at Ice Harbor or Lower Monumental before Wednesday, because of the pre-scheduling that has already occurred. She suggested that spill continue at Lower Granite and Little Goose until the Ice Harbor/Lower Monumental spill issue can hopefully be resolved at Wednesday's TMT meeting. Does anyone object to waiting until Wednesday to resolve this issue? Silverberg asked. Cindy LeFleur noted that one concern is that, if we wait until Wednesday, we will find ourselves in the same boat, in terms of another two-day, prescheduling-caused delay in the onset of spill. We can agree to set things up such that, if the recommendation is made to spill at Wednesday's TMT meeting, we will be ready to go with spill at Lower Monumental on Wednesday night. Conversely, however, we will set things up to stop spill at the Lower Snake projects if that is the decision we make, Wellschlager said. In response to a request from Boyce, Wellschlager agreed to begin spill at Ice Harbor as soon as possible. It won't happen tonight, however, Wellschlager cautioned. It was agreed to separate out Ice Harbor spill from Lower Monumental spill, in terms of the TMT's Wednesday discussions. It was further agreed that the Corps, BPA and NOAA Fisheries will continue to discuss the 85 Kcfs spill trigger question between now and Wednesday morning.

6. Next TMT Meeting Date.

The next meeting of the Technical Management Team was set for Wednesday, April 14.

TMT Attendance List

April 12, 2004

Name	Affiliation
Cindy Henriksen	COE
Chris Ross	NOAAF
Cindy LeFleur	WDFW
Ron Boyce	ODFW
Jim Litchfield	Montana
Tom Le	PSE
Tom Lorz	CRITFC
Paul Wagner	NOOAF
Bruce MacKay	Consultant
Russ Kiefer	IDFG
Donna Silverberg	Facilitation Team
John Wellschlager	BPA
David Wills	USFWS
Tony Norris	USBR
Robin Harkless	Facilitation Team
Scott Boyd	COE
Tom Haymaker	PNGC
Rudd Turner	COE
Tim Heizenrater	PPM
Maria Van Houten	PPM
Russ George	WMCI
Lee Corum	PNUCC
David Benner	FPC
Jim Adams	COE
Mike O'Bryant	CBB

Mike Buchko	Powerex
Martin Hatscher	SCL
Steve Haeseker	USFWS
Glenn Traeger	Avista
Todd Perry	CPS
Bill Rudolph	NWFL

Assumptions:

- * Streamflows were adjusted to the April Final Water Supply Forecast for the period of April thru August of 73.4 MAF at The Dalles and shaped 59 different ways based on observed historical runoff.
- * Starting elevations were observed data from March 31, 2004.
- * **Grand Coulee operates to meet Priest Rapids flow objective of 70 kcfs from April 1-15, 105 kcfs from April 16-30, and 135 kcfs from May 1-31, then tries to refill by June 30. Grand Coulee has an April 30 and May 31 draft limit of 1236 ft and a daily draft limit of between 1.0 and 1.5 ft/day (for bank stabilization) which limits the capability of meeting Priest Rapids flow objectives.**
- * Hungry Horse operates to VARQ flood control or minimum flow from Apr - May and meets minimum flow of 3500 cfs at Columbia Falls, targets full in June, and drafts to 3540 ft by 31 Aug.
- * Brownlee targets 2077 ft by 31 May, 2076 ft by 30 June, 2070 ft by 31 July and 2057 ft by 31 August.
- * Dworshak targets elevation 1566.8 ft by 15 Apr, and 1548.0 ft by 30 Apr, based on a GCL/DWR shifted flood control operation and maximum releases of 12.5 kcfs in April and 13 kcfs May-Jun. DWR targets full in June with a minimum flow of 1.5 kcfs, releases a maximum of 13 kcfs in July - August to meet LWG flow objectives, and targets 1520 ft by 31 Aug.
- * Libby operates on minimum flow or VARQ flood control Mar - Apr. Targets 13.9 kcfs in May and 9.4 kcfs in June for Sturgeon, based on an Apr-Aug forecast of 5.305 MAF and a Tier 2 required pulse of 0.80 MAF. Provides a minimum flow of 7,000 cfs for bull trout in July and August. Drafts to 2449 ft by 31 July and 2439 ft by 31 Aug.

Results:

Priest Rapids Meets Flow Objectives of 70 kcfs in Apr 1 - 15, 105 kcfs Apr 16-30, and 135 kcfs from May 1 - Jun 30.

Month	Occurrences out of 59 Years	Average Flow for 59 Years (kcfs)
Apr 15	58	87
Apr 30	51	105
May	56	141
Jun	31	136

Lower Granite Meets Flow Objectives of 85 kcfs in Apr - May, 73.3 kcfs in June, and 50 kcfs in Jul - Aug:

Month	Occurrences out of 59 Years	Average Flow for 59 Years (kcfs)
Apr 15	0	47
Apr 30	4	61
May	19	77
Jun	31	74
Jul	7	42
Aug 15	0	37
Aug 31	0	23

Bonneville Meets Flow Objectives of 125 kcfs in Apr:

Month	Occurrences out of 59 Years	Average Flow for 59 Years (kcfs)
Apr 15	54	160
Apr 30	59	184

Grand Coulee End of Month Elevations:

	Average	Median
Apr 15	1263.5	1265.2
Apr 30	1260.0	1257.5
May	1268.3	1270.6

McNary Meets Flow Objectives of 220 kcfs

from Apr 15 - Jun 30 and 200 kcfs from Jul 1 - Aug 31:

Month	Occurrences out of 59 Years	Average Flow for 59 Years (kcfs)
Apr 30	1	162
May	11	206
Jun	11	197
Jul	1	154
Aug 15	0	126
Aug 31	0	111

Projects Refill by 30 June:

Month	Occurrences out of 59 Years	Average Elevation on 30 Jun for 59 Years
Libby	15	2453
Hungry Horse	54	3559
Grand Coulee	59	1290
Dworshak	54	1600

Period Average Flows (kcfs)

	APR 1-15	APR 16-30	MAY 1-31	JUN 1-30	JUL 1-31	AUG 1-15	AUG 16-31
LIB	4	4	14	10	19	16	14
HGH	1	1	2	5	6	5	4
GCL	80	94	119	108	106	86	86
PRD	87	105	141	136	119	93	91
DWR	2	9	5	5	14	14	7
BRN	14	12	13	13	9	14	8
LWG	47	61	77	74	42	37	23
MCN	141	162	206	197	154	126	111
TDA	154	177	214	206	159	130	115
BON	160	184	216	208	162	132	116

Priest Rapids flow objective of 70 kcfs from April 1-15, and 135 kcfs from April 16-to May 31**Assumptions:**

- * Streamflows were adjusted to the April Final Water Supply Forecast for the period of April thru August of 73.4 MAF at The Dalles and shaped 59 different ways based on observed historical runoff.
- * Starting elevations were observed data from March 31, 2004.
- * **Grand Coulee operates to meet Priest Rapids flow objective of 70 kcfs from April 1-15 and 135 kcfs from April 16-to May 31, then tries to refill by June 30. Grand Coulee has an April 30 and May 31 draft limit of 1236 ft and a daily draft limit of between 1.0 and 1.5 ft/day (for bank stabilization) which limits the capability of meeting Priest Rapids flow objectives.**
- * Hungry Horse operates to VARQ flood control or minimum flow from Apr - May and meets minimum flow of 3500 cfs at Columbia Falls, targets full in June, and drafts to 3540 ft by 31 Aug.
- * Brownlee targets 2077 ft by 31 May, 2076 ft by 30 June, 2070 ft by 31 July and 2057 ft by 31 August.
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Results:

Priest Rapids Meets Priest Rapids Flow Objectives of 70 kcfs in Apr 1 - 15, and 135 kcfs from Apr 16 - Jun 30.

Month	Occurrences out of 59 Years	Average Flow for 59 Years (kcfs)
Apr 15	58	87
Apr 30	30	124
May	54	138
Jun	22	130

Lower Granite Meets Flow Objectives of 85 kcfs in Apr - May, 73.3 kcfs in June, and 50 kcfs in Jul - Aug:

Month	Occurrences out of 59 Years	Average Flow for 59 Years (kcfs)
Apr 15	0	47
Apr 30	4	61
May	19	77
Jun	31	74
Jul	7	42
Aug 15	0	37
Aug 31	0	23

Bonneville Meets Flow Objectives of 125 kcfs in Apr:

Month	Occurrences out of 59 Years	Average Flow for 59 Years (kcfs)
Apr 15	54	160
Apr 30	59	202

Grand Coulee End of Month Elevations:

	Average	Median
Apr 15	1263.5	1265.2
Apr 30	1251.9	1247.2
May	1262.9	1259.2

McNary Meets Flow Objectives of 220 kcfs

from Apr 15 - Jun 30 and 200 kcfs from Jul 1 - Aug 31:

Month	Occurrences out of 59 Years	Average Flow for 59 Years (kcfs)
Apr 30	1	181
May	6	203
Jun	9	190
Jul	1	154
Aug 15	0	126
Aug 31	0	111

Projects Refill by 30 June:

Month	Occurrences out of 59 Years	Average Elevation on 30 Jun for 59 Years
Libby	15	2453
Hungry Horse	52	3558
Grand Coulee	59	1290
Dworshak	54	1600

Period Average Flows (kcfs)

	APR 1-15	APR 16-30	MAY 1-31	JUN 1-30	JUL 1-31	AUG 1-15	AUG 16-31
LIB	4	4	14	10	19	16	14
HGH	1	1	3	4	6	5	4
GCL	80	113	117	101	106	86	86
PRD	87	124	138	130	119	93	91
DWR	2	9	5	5	14	14	7
BRN	14	12	13	13	9	14	8
LWG	47	61	77	74	42	37	23
MCN	141	181	203	190	154	126	111
TDA	154	196	211	199	159	130	115
BON	160	202	213	201	161	132	116

SYSTEM OPERATIONAL REQUEST: #2004-3

The following State, Federal, and Tribal Salmon Managers have participated in the preparation and support this SOR: U.S. Fish & Wildlife Service, NOAA Fisheries, Idaho Department of Fish and Game, Washington Department of Fish and Wildlife, Columbia River Inter Tribal Fish Commission, and the Oregon Department of Fish and Wildlife.

TO:	B. G. Grisoli	COE-NWD
	William Branch	COE-Water Management
	Cathy Hlebechuk	COE-RCC
	Witt Anderson	COE-P
	Col. Richard Hobernicht	COE-Portland District
	LTC Kertis, Jr.	COE-Walla Walla District
	J. William McDonald	USBR-Boise Regional Director
	Stephen J. Wright	BPA-Administrator
	Greg Delwiche	BPA-PG-5



FROM: David A. Wills, Chairperson, Salmon Managers

DATE: April 12, 2004

SUBJECT: Implementation of Snake River Spill Operations

SPECIFICATIONS:

1. Continue the implementation of spill at Lower Granite Dam and Little Goose dams as described in the 2000 Biological Opinion. Begin Biological Opinion spill at Lower Monumental and at Ice Harbor Dam on the evening of April 12.
2. Continue Biological Opinion spill through April 30 at Lower Granite, Little Goose and Lower Monumental dams. Continue Biological Opinion spill at Ice Harbor Dam through June 20.
3. Implement spill at all the Lower Snake River¹ projects as necessary throughout the spring period to conduct research tests scheduled for conduct in 2004.

JUSTIFICATION:

Spill was initiated at Lower Granite Dam on the evening of April 3, and at Little Goose Dam on the evening of April 7. Spill initiation was delayed at the lower Snake River projects last week by the Salmon Managers because of low fish numbers, but based on recent fish passage numbers spill at Lower Monumental and at Ice Harbor Dam should begin on the evening

¹ NOAA Fisheries does not recommend continuing research at Lower Granite Dam after April 30th.

of April 12. This is based on the fish passage numbers that increased over the weekend of April 9 through 11. Spill is being requested in accordance with the NMFS 2000 Biological Opinion. In a year when runoff volumes are predicted to produce flows that are on average less than 85 Kcfs, spill would be terminated at the collector projects. However, according to the NMFS 2000 Biological Opinion 9.6.1.3.2 language that further explains Action 40:

“If new information shows that survival through inriver migration, including returning fish to the river, is beneficial, these data will be reviewed and discussed during the annual planning process.”

and, according to Section 9.6.1.3.4 Action 51:

“If results of Snake River studies indicate that survival of juvenile salmon and steelhead collected and transported during any segment of the juvenile migration (i.e., before May 1) is no better than the survival of juvenile salmon that migrate inriver, the Corps and BPA, in coordination with NMFS through the annual planning process, shall identify and implement appropriate measures to optimize inriver passage at the collector dams during those periods.”

spill is being requested.

In the December 21, 2003 preliminary draft of the “Effects of the Federal Columbia River Power System on Salmon Populations”, NOAA Fisheries presents information (summarized in Figures 14 – 19) on the temporal SARs for spring migrant fish. The temporal SARs for hatchery and wild spring-summer chinook salmon show rather dramatically that the SARs of transported fish generally increase as the season progress, with a significant increase somewhere between mid April and mid May. The inriver migrants tend to have a higher SAR during this early time period. These data are consistent with the physiological mechanisms associated with smoltification. It is assumed that transportation brings these early migrants to the estuary too quickly and they are not in a physiological state adequate for survival. The data for steelhead is more limited and inconclusive.

Given that the survival data appears more consistent for chinook than steelhead, the management objective was to choose a date when steelhead passage predominates in the collection. It is difficult to use real time, in-season data for this management action, since it necessitates predicting proportions into the future. In order to choose an appropriate date the historic passage was reviewed for the last six years. Adjusted passage indices were used to represent relative numbers of yearling chinook and steelhead at Lower Granite Dam. The average daily proportion of the annual index was averaged across years. It was then multiplied by the average total passage index to develop an average daily passage index. The index was then adjusted to a population index to account for differences in average collection efficiency of steelhead and yearling chinook. The data presented in Figure 1 are the average daily population index for the years 1998 to 2003 for all yearling chinook compared to all steelhead, while Figure 2 shows the population index for unclipped yearling chinook (without coded wire tags) and unclipped steelhead. It is likely that unclipped hatchery origin fish make up 10% to 30% of the unclipped steelhead reported in Figure 2 while unclipped hatchery origin yearling chinook fish make up less than 10% of unclipped total.

Figure 1. Adjusted Average Daily Passage Index for combined yearling chinook and combined steelhead at Lower Granite Dam 1998 to 2003.

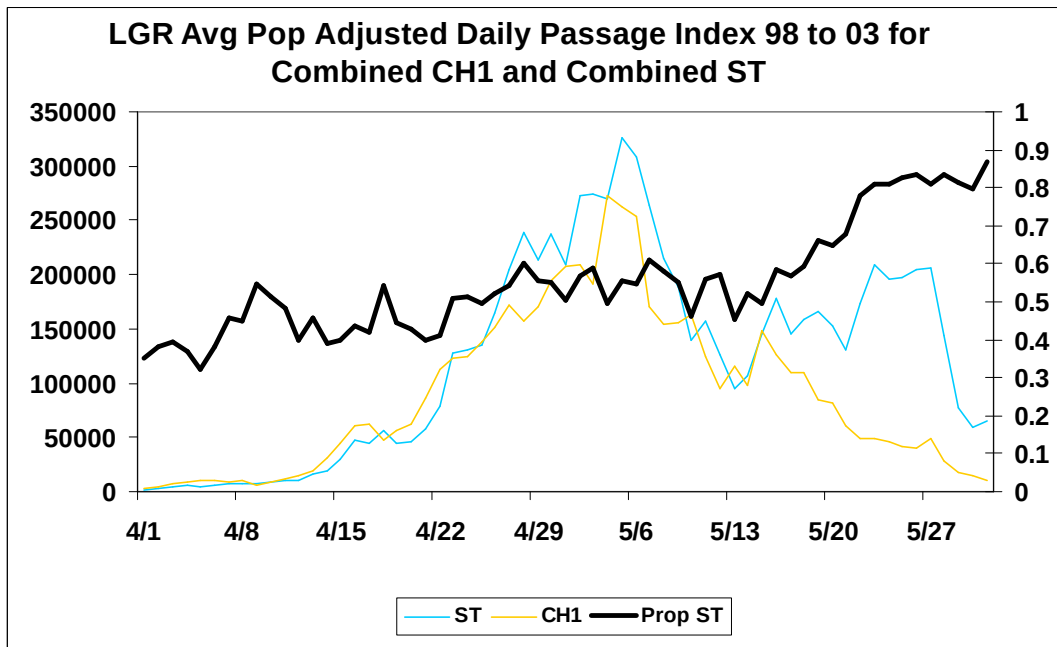
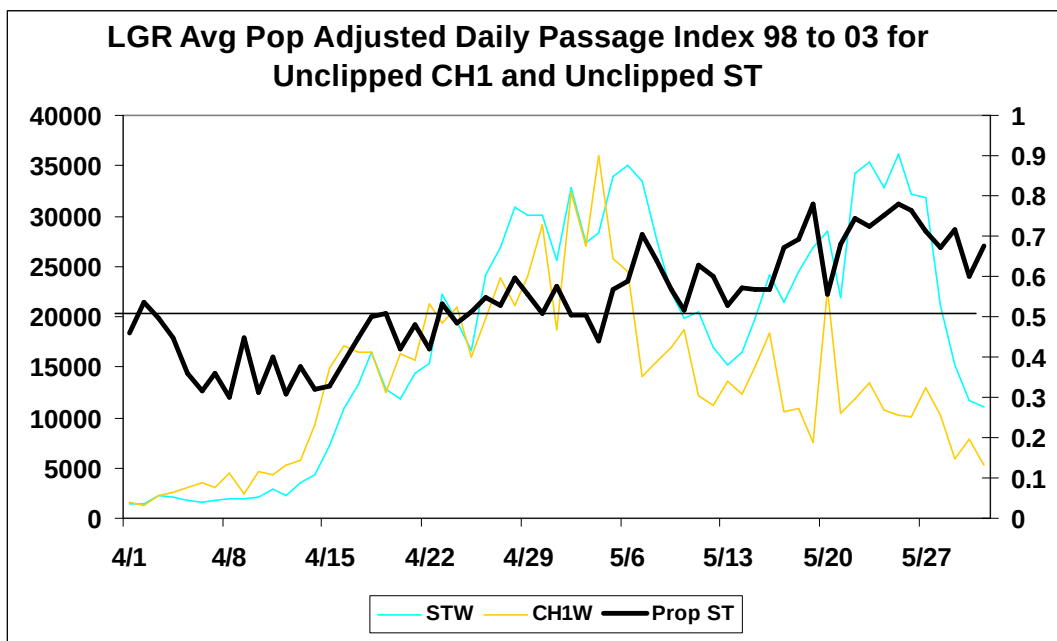


Figure 2. Adjusted Average Daily Passage Index for unclipped yearling chinook and unclipped steelhead at Lower Granite Dam 1998 to 2003.



From about April 22 on, there are near equal numbers of chinook and steelhead in the passage indices at Lower Granite Dam. It is only after the sixth of May when chinook numbers begin to decline that the steelhead clearly predominate in the passage at the project. The management objective is to delay transportation of chinook, while not missing a large portion of the steelhead migration. Therefore to be conservative, based on these data and consistent with Action 51, the Salmon Managers recommend continuing the Biological Opinion spring spill program at all the Snake River projects until May 1. This data allows the achievement of the management objective.

Research Impacts

The appropriate spill conditions should be implemented after May 1 to allow the conduct of scheduled research studies in 2004. A reduction in spring spill will have a significant impact to investments made and studies planned through the multi-agency technical Studies Review Work Group within the Corps Anadromous Fish Evaluation Program. The regional process's System Configuration Team ranked these studies for funding as top priorities in a year of reduced funding by the Congress for the Columbia River Fish Mitigation program. These studies are critical to making long-term decisions of fish passage improvements to meet survival and recovery thresholds of the Biological Opinion and will waste considerable capital improvement dollars already invested, which will have to be relocated in future budgets. The current budget level has been dramatically reduced in recent years and if spill termination results in double spending on these projects it will reduce the regions' ability to meet the thresholds described in the Biological Opinion in a timely and efficient manner.

Specific studies that will be impacted by elimination of spring spill this year include:

1. **Lower Granite RSW/BGS study-** \$4.5 million to evaluate the benefits of a behavioral guidance structure (BGS) operated in conjunction with RSW and 12 kcfs training spill. The BGS is reported by the Corps to be in tenuous physical condition, expected to survive in workable condition for only one more season. There is a high likelihood that the BGS would be unusable next season.
2. **Lower Monumental Bulk Spill study-** \$385K to evaluate BIOP spill in a bulk vs. even pattern.
3. **Lower Monumental Survival/Efficiency study-** \$1.8 million to determine route specific survival under BIOP spill.
4. **Ice Harbor Survival/Efficiency study-** \$3.1 million follow-up to the BIOP spill versus a bulk spill pattern. A significant portion of the juveniles used in this evaluation would be coming from the Lower Monumental Survival evaluation. Without these fish it will impact the Ice Harbor evaluation.

Further, several of the studies are just about to begin, or may have started, and making alterations to them now to salvage some portion of the evaluations would be difficult and would need to be coordinated through the regional process. This work represents a significant portion

of the 2004 Columbia Fish Mitigation Budget, which is currently at the \$67 million dollar level. Tentative budget estimates for 2004 are already over \$100 million dollars. Using the past years' budget levels as an indication of future years' funding, it is extremely unlikely that this amount of funding level will be met. Consequently, delaying the scheduled studies and incurring additional costs for these evaluations in 2005 or beyond will exacerbate an already limited budget. For biological reasons, the loss of data these studies will provide will raise the level of uncertainties in the continued development, deployment, and use of the Removable Spillway Weirs in the Lower Snake River.

SYSTEM OPERATIONAL REQUEST: #2004-4

The following State, Federal, and Tribal Salmon Managers have participated in the preparation and support this SOR: U.S. Fish & Wildlife Service, NOAA Fisheries, Idaho Department of Fish and Game, Washington Department of Fish and Wildlife, Columbia River Inter Tribal Fish Commission, and the Oregon Department of Fish and Wildlife.

TO:	B. G. Grisoli	COE-NWD
	William Branch	COE-Water Management
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	LTC Kertis, Jr.	COE-Walla Walla District
	J. William McDonald	USBR-Boise Regional Director
	Stephen J. Wright	BPA-Administrator
	Greg Delwiche	BPA-PG-5



FROM: David A. Wills, Chairperson, Salmon Managers

DATE: April 12, 2004

Re: Lower Columbia River Spill Program

SPECIFICATIONS:

Beginning on April 12, 2003, spill daily at Lower Columbia River projects according to the 2000 Biological Opinion up to the 120% spill cap, with the exception of Bonneville Dam. Spill at Bonneville Dam is to occur as described below.

- At McNary Dam spill should occur between the hours of 1800 and 0600 and instantaneous volumes should only be limited by the gas cap.
- Spill daily at John Day Dam at 60% of instantaneous flow during nighttime hours at flows up to 300 Kcfs, and up to the 120% gas cap at flows greater than 300 Kcfs. Spill should occur from one hour before sunset to one hour after sunrise.
- Spill at The Dalles Dam shall occur for 24 hours daily at a level equal to 40% of instantaneous flow.
- Until notified otherwise, spill 50 Kcfs at Bonneville Dam for 24 hours daily, maintaining an instantaneous tailwater elevation of 13 feet. Operate the corner collector for fish passage.

JUSTIFICATION:

The passage of juvenile fish into the Lower Columbia River is presently occurring. McNary Dam sampling is occurring on alternate days and has shown the presence of juvenile yearling chinook, subyearling chinook and steelhead. At John Day Dam passage numbers have increased steadily over the past week. While the second half of April is not normally characterized as a significant passage period for spring migrating juveniles as a whole, it does represent a period of time when significant proportions of specific stocks are migrating. Stocks migrating from the John Day, Umatilla and Yakama River basins dominate the second half of April. To-date PIT tagged wild spring/summer chinook from the Yakama and Walla Walla rivers have been detected at McNary Dam. Historic information for passage timing at John Day Dam indicates that the presence of Umatilla and John Day stocks is expected during the early part of April based on the historic passage. If spill is not initiated early enough during the migration season there is a higher likelihood that these stocks will pass under no spill conditions.

Similar to patterns observed at upstream sites, passage indices have been steadily increasing at Bonneville Dam over the past few days. Presently, ESA listed chum salmon continue to emerge from redds below Bonneville Dam and are expected to emerge until the last week of April. At present flows there is the potential of increasing total dissolved gas levels over the redds where salmon have not yet emerged. Consequently, the recommended spill conditions at Bonneville Dam have been changed to address this concern. Changes to the Bonneville recommendation will be made following emergence, or as river conditions improve.

Preliminary draft - 21 December 2003

EFFECTS OF THE FEDERAL COLUMBIA RIVER POWER SYSTEM ON SALMON POPULATIONS

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INTRODUCTION

The construction and operation of the 31 Federal Columbia River Power System (FCRPS) dams contributed to the decline of anadromous salmon populations in the Columbia River basin and continues to affect them. While the dams provide about 60 percent of the Pacific Northwest region's hydroelectric generating capacity, supply irrigation water to more than a million acres of land, and store water to enhance flood control, they also block access to historic spawning areas or alter the migratory corridor leading to increased direct and indirect mortality. In addition to the FCRPS, human impacts from construction of hundreds of other dams, harvest, mining and dredging, and agricultural practices, have impacted various stocks of Columbia River basin anadromous salmon populations. Thus, ascribing effects of the FCRPS is complicated. Although many physical and operational changes have occurred since the completion of the FCRPS dams in an attempt to minimize impacts on anadromous salmon populations, and research has shown that increases in direct survival of salmonids migrants has occurred from the changes, the possibility exists that effects of the FCRPS only express themselves as indirectly downstream of the hydropower system. Determining the extent to which direct and indirect effects of the hydropower system negatively affect salmon populations, in the context of all other factors influencing salmon populations, is critical for defining additional measures needed by the FCRPS to assure salmon survival. Although we can measure direct survival and travel time of fish on an annual basis, inferences on delayed mortality often rely on long-term trends in return rates of adult fish, and these data are inherently variable. Thus, estimating the extent to which the FCRPS and the sum of all other human-induced activities affects salmon populations requires trying to tease out an understanding of direct and indirect impacts in concert with the natural variability in salmon populations. Direct knowledge of natural salmon variability generally does not exist, but the historical record provides some indications of its magnitude.

Historical Background

The size of all animal populations fluctuate. For salmon, we most often associate our activities to their population trends, and in many cases, rightly so. However, we generally lack knowledge of natural population fluctuations independent of human interactions. Despite a long Native American oral history in the Pacific Northwest, little information exists on the size and extent of salmon population fluctuations. Estimates of annual adult salmon returns to the Columbia River basin in the last couple of centuries have ranged from 7.4 to 8.8 million fish (Chapman 1986). Of these, Chapman (1986) estimated that spring and summer chinook salmon numbered 500-590 thousand, and 2-2.5 million, respectively. However, at the end of the last ice age (approximately 15,000 years before the present), glaciers covered most of the upper Columbia River and much of the Salmon River drainage (McPhail 1986). Thus, these salmon populations arose from extremely small stocks. Chatters et al. (1995) concluded that over the past 7,000 years, salmon production in the Columbia basin has varied tremendously with changes in climate. They speculated that average salmon populations were much lower approximately 3,500 BP compared to recent centuries, but higher 1,200 years before the present.

Preliminary draft - 21 December 2003

These speculations comport with recent findings of Finney et al. (2002) for Alaska sockeye salmon populations.

Anecdotal evidence indicates that natural variations in Columbia River salmon abundance also occurred over shorter time spans. Chance (1973) quotes from a number of early diaries that in 1811 and again in the late 1820s salmon populations from the middle Columbia River (between the confluence of the Snake River and Kettle Falls) were so low that settlers and native Americans relied on horse flesh for survival. Although Snake River basin salmon populations were also likely low at the same time, based on catch records for the Columbia River basin as a whole, all stocks rebounded to high levels near the end of the century. At that time, dramatic declines in Columbia River salmon populations began as a result of overfishing, exacerbated further beginning early in the 20th century by environmental degradation from mining, grazing, logging, water withdrawals for irrigation, and dams constructed on major tributaries for power production and water storage. Although stocks decreased, a signal of variability in run size still existed. The upriver run (above Bonneville Dam) of spring chinook salmon averaged 119,000 fish from 1940-1949 (with an average harvest rate of 60%), increased to 208,000 fish from 1950-1959 (with an average harvest rate of 60%), and decreased to 171,000 from 1960-1969 (with an average harvest rate of 39%) Status Report, Columbia River fish runs and fisheries - available at: <http://www.dfw.state.or.us/ODFWhtml/InfoCntrFish/InterFish/crm.html#annual>)

Impacts From Dams

Concerns about the potential impacts of the Federal Columbia River Power System (FCRPS) on anadromous fish were raised prior to the construction of Bonneville Dam (Griffin 1935). In fact, with the dam's completion, studies began in 1939 to estimate survival through turbines and spill for juvenile salmon passing the project to determine the dam's affect on juvenile salmon (Harlan B. Holmes, unpublished U.S. Bureau of Commercial Fisheries Report). Results from these studies and those by Schoeneman and Junge (1961) at McNary Dam in the mid-1950s led to concern about the probable impact that dams had on juveniles. As five additional dams were scheduled for construction on the mainstem Columbia and Snake Rivers, a Fish Passage Program within the Bureau of Commercial Fisheries (now NOAA Fisheries), began studies to determine the adaptability of salmon to new environments created by dams, effects of impoundments on fish migration, impacts to migrants from dam passage, and means to mitigate for effects.

Raymond (1979) provided the initial summary of changes in survival and travel time for yearling migrants that occurred during and after dam completion. In short, the 1966 to 1968 average annual survival of wild yearling chinook salmon outmigrants from a trap on the Salmon River to Ice Harbor Dam averaged approximately 89% (Lower Monumental, Little Goose, and Lower Granite Dams were not yet completed) and the 1966 and 1967 (prior to completion of John Day) survival from Ice Harbor to The Dalles Dam averaged 64%. Combining these two estimates with an estimated survival between The Dalles and Bonneville Dam provided overall

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juvenile chinook salmon and steelhead survival estimates ranging between approximately 40-55% through what now constitutes the mainstem FCRPS dams (with 4 dams in place) (Williams et al. 2001). After completion of the system (with 8 dams in place), survival estimates for yearling chinook salmon and steelhead decreased to mean values of approximately 16 and 11%, respectively (but near 0 for both in the very low-flow year of 1977) (Williams et al. 2001).

Reservoirs behind dams increased travel time for juvenile migrants. Annual travel time estimates for fish were 10d (high flow) to 20 d (low flow) to migrate through the hydropower system with 4 mainstem dams in place (expansion of data from (Raymond 1979), but after completion of all 8 dams, annual travel time estimates ranged from 15d (high flow) to 40 d (low flow). Concurrent with research documenting direct impacts of the dams on fish, other researchers worked on means to mitigate for the dam's impacts. This research led the U.S. Army Corps of Engineers (COE) to construct juvenile bypass systems at dams, modify spillways, and implement a transportation program to collect fish at upstream dams and barge them to a release site below Bonneville Dam.

Despite these efforts, by the early to mid-1990s, stocks had not recovered. As a consequence, 12 of 16 Columbia River basin Evolutionarily Significant Units (ESUs) (Waples 1991) were listed as threatened or endangered under the Endangered Species Act (ESA) (April 22, 1992: 57 FR 14653).

The PATH Process

To provide information needed to write Biological Opinions associated with the stock listings, and develop estimates of FCRPS impacts, in 1995, NOAA Fisheries (NMFS) created the Plan for Analyzing and Testing Hypotheses (PATH). A summary of the PATH process based on a paper by Marmorek and Peters (2001) follows.

A group of approximately 30 scientists worked for nearly 5 years to develop analyses to explain the impact of the FCRPS on anadromous fish stocks above Bonneville Dam.. PATH scientists identified two key uncertainties that most strongly affect survival and recovery potentials of Snake River spring/summer and fall chinook salmon: delayed mortality of non-transported fish, and the relative post-Bonneville survival of transported fish compared to post-Bonneville survival of non-transported fish (designated as "D").

Delayed mortality was defined as any mortality occurring outside the juvenile migration corridor not accounted for by the other terms used in the PATH life cycle models (such as, productivity and carrying capacity, mortality in reservoirs and at dams, and estuarine/ocean mortality affecting all salmonid populations). As the observed historical patterns in delayed mortality were linked with several possible causes, PATH formulated three alternative hypotheses concerning delayed mortality and the possibility of actions within the FCRPS to decrease it:

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- a. “Hydro” – delayed mortality resulted from adverse effects to smolts from migrating through the 8 mainstem dams of the FCRPS. Removal of dams in the Snake River would eliminate delayed mortality.
- b. “Regime shift” – delayed mortality follows a 60-yr cycle related to long-term cycles in ocean conditions. No FCRPS actions will directly reduce delayed mortality, but delayed mortality will eventually dissipate when ocean conditions improve.
- c. “Stock viability” – delayed mortality resulted from processes not affected by any FCRPS action or regime shift. Stocks will remain low due to interactions with hatchery fish, the presence of diseases such as Bacterial Kidney Disease, or reduction in nutrients associated with historical declines in spawning stock.

In the PATH models, “D” represented an annual value of the differential survival downstream of Bonneville Dam for transported fish compared to non-transported fish. If D approached 1.0, it indicated that transportation of juveniles avoided all losses that migrants would have incurred had they migrated downstream through the hydropower system. On-the-other-hand, low values of “D” indicated that transportation did not provide full mitigation for losses at dams; that is, transported fish incurred more mortality downstream of Bonneville Dam than did non-transported fish. Further, if a low enough value of “D” existed it explained historical patterns of stock productivity without the need to require delayed mortality to explain changes in productivity.

Many PATH participants felt that delayed mortality existed; however, consensus among the group that it did, or causes as to why, was never reached. Arguments for the existence of delayed mortality and its linkage to the FCRPS were made by Schaller et al. (1999, 2000), Deriso et al. (2001), Petrosky et al. (2001), and Budy et al. (2002). Zabel and Williams (2000) suggested that differences in productivity could have occurred as a result of differences in underlying stock responses to changing ocean conditions. Subsequent to PATH, Levin and Tolimieri (2001) and Levin(2003) found that chinook salmon populations used in the PATH life cycle models, Snake, Upper Columbia, and middle Columbia, had different productivity, and productivity varied between different time periods, but not consistently with changes in ocean conditions.

Evaluations of Stocks Subsequent to PATH

Due to perceived complexity of PATH products by some Northwest Fisheries Science Center scientists not involved with PATH, a matrix model was developed in mid- to late 1999 to evaluate the status of listed Snake River spring-summer chinook salmon stocks. The results of the matrix modeling process indicated that little room to increase stock productivity existed within the migration corridor of the FCRPS because of past improvements made at dams. Results indicated that factors currently driving productivity occurred in the freshwater spawning and rearing areas and in estuary/early ocean residence (Kareiva et al. 2000). The matrix model set a value for “D” at 0.7, and used a range of values for delayed mortality.

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Concurrent with matrix-modeling efforts, other NWFSC staff developed draft “White Papers” to summarize knowledge about FCRPS impacts to stocks. After considering comments based on regional review, final versions of the “White Papers” were posted on the NWFSC website: <http://www.nwfsc.noaa.gov/publications/whitepapers/index.cfm>. The “White Papers” covered the following:

- 1) “Passage of Juvenile and Adult Salmonids Past Columbia and Snake River Dams,”
- 2) “Predation on Salmonids Relative to the Federal Columbia River Power System,”
- 3) “Salmonid Travel Time and Survival Related to Flow in the Columbia River basin,” and
- 4) “Summary of Research Related to Transportation of Juvenile Anadromous Salmonids Around Snake and Columbia River Dams”.

In developing the NMFS 2000 FCRPS BiOp, the Biological Effects Team reviewed and analyzed fish passage assumptions used by NMFS in earlier fish passage modeling exercises, those developed in the PATH process, fish passage information contained in the four “White Papers”, and the most recent empirical data to determine the fish passage parameters for input into the Simulated Passage (SIMPAS) model. To develop a new BiOp, NOAA Fisheries needs an update on impacts of the FCRPS on ESA listed salmonids in the Columbia River basin. In this Tech Memo we provide an update on hydropower system survival for listed juvenile and adult salmon through the mainstem Snake and Columbia River dams (to the extent data are available), impacts of transportation, flow effects on survival and travel time, and overall effects of FCRPS operations on adult returns. We focus primarily on Snake River spring-summer chinook salmon, as these fish migrate through the entire FCRPS mainstem dam complex and we have the most data about these stocks. Fewer data exist for all other stocks, so we either provide incomplete information or make inferences where we deem reasonable.

Returns of many listed Columbia River salmon stocks in the last several years have far exceeded numbers seen in recent decades. Thus, we also provide associations between direct FCRPS impacts to these changes in adult returns. Again, we do this most effectively for Snake River spring-summer chinook salmon, as we have the best measure of their population fluctuation over time. For other stocks, we must rely on changes in combined wild and hatchery adult returns to dams, as reliable estimates of wild adult returns and juvenile smolts do not exist.

The following sections provide summaries of methods and results from work contained in recent annual reports to the COE and BPA, or in peer-reviewed literature. We direct readers who want additional information to those sources. In a few cases, some of our work is not readily available as it is contained in manuscripts under review or “in press”. We will provide additional details of this information, on request.

METHODS

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Snake River Spring-summer Chinook Salmon SARs (Non-tagged Population)

Smolt-to-adult return rates (SARs) provide a measure of survival that encompasses the smolt migration, estuary/ocean, and adult return stages. It is calculated by dividing returning adults from a single brood year by smolts from the brood year. If SARs are calculated over an extended number of years, they can provide an index of temporal variability in stock productivity. We estimated recent smolt-to-adult return percentages (SARs) from Lower Granite Dam, and to compare them with earlier years adjust them for downstream harvest. We then used these estimates to compare to estimates of SARs (catch plus escapement) to the upper Snake River dam in earlier years. In brief, from Petrosky et al. (2001) we used estimated wild adult (1-, 2-, and 3-ocean fish) returns from 1964 to 1996 (we adjusted 1993 to 1996 1-ocean fish for estimated additional returns to Oregon) and harvest rates from 1964 to 1999. We used Raymond (1988) for estimates of smolt abundance between 1964 and 1984. We derived estimates for wild smolts from 1993 to 2003 by expanding the daily collection of wild fish at Lower Granite Dam (<http://www.fpc.org/smoltqueries/HistoricDailyData.asp>), by the daily estimates of detection efficiency (derived with (Sandford and Smith 2002) methodology) of wild smolts at the dam for each year. For smolt years 1998 to 2002, we adjusted smolt estimates by an estimated percentage of non-clipped hatchery fish arriving at the dam not identified as hatchery origin. This adjustment decreased numbers of wild smolts by 3, 8, 6, 11, and 1% for smolt years 1998 through 2002, respectively. We estimated smolt abundance from 1985 to 1993 based on a Beverton-Holt curve generated from estimated numbers of smolts from 1964 to 1984 and 1994 to 2003 ($R^2 \approx 0.80$), and the number of wild fish passing the upper Snake River dam 2 years earlier. We derived the estimated wild adult returns to Lower Granite Dam from 1997 through 2003 from annual fish counts of spring-summer chinook salmon reported to have passed the dam. Fish counters at the dam enumerated fish as they passed through the counting window and assigned them to either a group with adipose fins (ostensibly wild fish) or a group without adipose fins (known hatchery fish with fins clipped as juveniles). We adjusted the clipped hatchery fish returns by an estimated return rate of non-clipped hatchery juveniles. We then subtracted the corrected hatchery count from the total adult return to derive the wild fish estimate.

To separate adult returns into the respective 2- and 3-ocean component, we used an iterative process to estimate 3-ocean returns each year, starting with the 1997 return year. The total wild return for the 1994 outmigration was estimated by expanding the wild jack return (based on adjusted fin-clipped fish) in 1995 and 2-ocean return in 1996 from (Petrosky et al. 2001) by their estimated percentage of the return based on wild PIT-tagged fish estimated to have passed Lower Granite Dam in 1994. Subtracting the estimated jack and 2-ocean returns from the total provided an estimate of the 3-ocean returns in 1997. This number subtracted from the estimated total wild adult return in 1997 provided an estimate of the wild 2-ocean component. Thus, with the 1996 wild jack estimate and the just derived 1997 wild 2-ocean component, we could estimate the number of wild 3-ocean fish returning in 1998 based on the percentage of PIT-tagged adults that

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returned from the total returns of PIT-tagged fish from the 1995 outmigration. We repeated this process to estimate the 2- and 3-ocean components from each adult return year to Lower Granite Dam. Finally, to account harvest rates in the Columbia River that varied between 0 and 40%, we expanded adult returns to the uppermost Snake River dam for the period between 1964 and 1999 based on estimated Columbia River harvest rates Petrosky et al. (2001). We expanded adult returns for 2000 to 2003 based on unpublished harvest rates (Peter Dygert, NOAA Fisheries, personal communication).

Population Trends for Other Unmarked Stocks

We did not have detailed data for stocks other than wild Snake River spring-summer chinook salmon. To compare returns for other stocks to those for wild Snake River spring-summer chinook salmon, we used counts of adult fish at dams (data downloaded from the DART web site: <http://www.cqs.washington.edu/dart/adult.html>). We used Bonneville Dam for the composite wild steelhead run, Ice Harbor Dam for the wild Snake River steelhead run, and Priest Rapids Dam for the composite wild/hatchery spring chinook salmon run. For the natural-origin Snake River fall chinook salmon run we used updated (unpublished) adult escapements over Lower Granite Dam developed by NWFSC scientists for use in status reviews. For each stock grouping, we developed a ratio of the median return from 2001 to 2003 (2000 to 2002 for Snake River fall chinook) to the median return between 1990 and 1999. We then compared these ratios to a ratio of the median SARs from the 1988 to 1997 and 1998 to 2000 outmigrations for wild Snake River spring-summer chinook salmon.

PIT-tagged Fish Used for Analyses

PIT tagging juvenile salmonids began on a small scale in 1987 and has expanded tremendously since that time, although not homogeneously throughout the Columbia River basin. Between 1989 and 2001, the majority of tagged fish were Snake River spring/summer chinook salmon. The fish tagged do not always represent the run or rearing type for the general population of a species. Some studies PIT tag fish as they pass discrete points along the migration corridor, while others tag fish only in certain natal streams or hatcheries, or tag the same number in each stream or hatchery regardless of the total number of fish available. This leaves other streams or hatcheries unmarked or under represented in the sample population. Twenty different organizations have PIT tagged fish in the basin. By far, NOAA Fisheries has PIT-tagged the majority of fish (ca. 5.2 M) , followed by U.S. Fish and Wildlife Service (USFWS) (ca.1.1 M), and Idaho Fish and Game (IDFG) (ca. 1.0 M), to as few as ca. 235 by Columbia Intertribal Fisheries Commission (CRITFC) (Table 1).

Table 1. Number of juvenile salmonids PIT-tagged in the Columbia River basin, 1987-2003.

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Outmigration year	Upper Columbia River ^a	SNAKE River	Middle Columbia River ^b	Lower Columbia River ^c	Willamette River
1987	7,673	2,619	-	-	-
1988	-	19,728	25,088	-	-
1989	4,998	92,254	22,894	-	-
1990	7,857	66,804	22,099	1,700	-
1991	6,644	70,462	32,613	724	-
1992	11,021	66,144	30,645	1,002	-
1993	24,326	132,409	29,693	733	-
1994	33,916	335,845	1,853	721	1,775
1995	34,982	514,551	-	-	-
1996	46,213	373,356	3,044	2,980	-
1997	40,153	458,881	107,685	10,708	-
1998	147,133	589,815	200,595	12,666	-
1999	168,593	763,014	477,897	18,336	3,429
2001	214,688	561,453	178,734	33,025	7,791
2002	613,296	858,240	223,181	59,511	9,597
2003	1,023,730	907,460	121,805	124,748	3,927
Total	2,385,223	5,813,035	1,477,826	266,854	26,519

^a drainage above the confluence with the Yakima River (above RKm 539)

^b drainage between the confluence with the Wind and Yakima Rivers (between RKm 252-539)

^c drainage from the Wind River to the ocean (below RKm 252)

Juvenile Reach Survival Estimates for PIT-tagged Fish

General

All mainstem dams on the lower Snake and Columbia Rivers, except The Dalles Dam, have juvenile fish bypass facilities (Figure 1.) (Matthews et al. 1977). These systems use screens to divert migrant smolts away from turbine intakes and into gatewells. Fish pass out of gatewells through orifices into a collection channel, where they pass directly to a pipe that discharges them to the tailrace, or they pass through a dewatering section leading to sampling facilities. With the exception of Ice Harbor Dam, all bypassed fish pass through detectors that identify nearly 100% of PIT-tagged fish. PIT-tagged fish detected in the facilities at Lower Granite, Little Goose, Lower Monumental, and McNary dams (“collector”, or “transport dams”) can get routed to raceways for loading into trucks or barges for transportation, or they get routed back to the river via a slide gate (Marsh 1999). The most downstream site for detections of PIT-tagged juvenile

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fish exists in the Columbia River estuary between Rkm 65 and 84, where a 2-boat trawl tows a PIT-tag detector (Ledgerwood 2000).

We estimate survival probabilities for juvenile migrant fish from PIT-tag detection histories. The estimated survival probability for a particular segment of the migration corridor is a group-level statistic, interpreted as an estimate of the proportion of the group that survived the segment. Collections of PIT-tagged fish are defined as a “group” for survival estimation in three primary ways: (1) fish tagged at the same time and released as a batch at a single point (typical for studies planned to address a specific research question, and for daily samples of fish collected at a smolt trap); (2) tagged fish held together in a holding facility for a period of time and then released from the same point over a short period of time (typical for volitional releases from hatcheries); (3) tagged fish released at various sites upstream from a particular dam, then grouped according to the date on which they were detected at the dam and returned to the tailrace (typical for attempts to gather a time series of survival estimates throughout the migration season). For estimates and analyses reported here, groups sometimes contain both hatchery and wild fish, or we treat the two rearing types separately. In all cases, a “group” of fish includes fish of only one species.

However the group is defined, survival probabilities are estimated using the collection of records of detection (“detection histories”) for every individual fish in the group. Because each PIT tag is uniquely coded, and because the portion of detected fish that are returned to the river allows detection multiple times, we analyzed the detection history data using a multiple-recapture model for single release groups. We use a model originally presented and investigated by Cormack (1964), Jolly (1965), and Seber (1965), known as the “CJS Model” or “Single-Release (SR) Model.” Use of this model for survival estimation using PIT-tagged fish was first described in detail by (Skalski 1998).

The minimum requirements for survival estimation using the SR are the release of a group of PIT-tagged fish at the beginning of the river segment of interest, one detection site where at least some of the detected fish are returned to the river for subsequent detection opportunities, and at least one detection site farther downstream. If there were only one detection site downstream from the release site, or if all detected fish at the first site were removed from the river, then it would be impossible to distinguish failure to detect a passing (surviving) fish from mortality before arrival at the detection site (i.e., survival probabilities could not be estimated separately from detection probabilities). Fish detected downstream from the first detection site constitute a sample of the fish that were alive at the first site; they are used to estimate the proportion of fish passing the first site that were detected (detection probability). Having obtained the estimate of the detection probability, we can then estimate the survival probability. When there is a series of detection sites with return-to-river capabilities, survival estimates are possible from release to the first site, then between each pair of consecutive sites, except that the inability to distinguish mortality from the failure to detect a surviving fish always precludes estimation between the last two sites.

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In 1993, when a study specifically designed to estimate migrant smolt survival began, PIT-tag detectors were operational only at Lower Granite, Little Goose, Lower Monumental, and McNary Dams. Only Lower Granite and Little Goose Dams were equipped with slide gates to divert PIT-tagged fish from the bypass system back to the river. Under this configuration, estimates of survival could be calculated for a group of fish from the point of release above Lower Granite Dam to the Lower Granite Dam tailrace and from Lower Granite Dam tailrace to Little Goose Dam tailrace. PIT-tag detectors and slide-gates have been added gradually to other dams since 1993 (in a downstream direction). Under present conditions, provided sufficient fish from the group are detected by the estuarine trawl, survival can be estimated for any group of PIT-tagged fish from any release point upstream from Bonneville Dam to the tailrace of Bonneville Dam.

All survival estimates presented are from point of release (or the tailrace of a dam) to the tailrace of a dam downstream. All survival and detection probability estimates were computed using the statistical computer program SURPH ("Survival with Proportional Hazards") for analyzing release-recapture data, developed at the University of Washington (Skalski 1993, Smith 1994).

Assumptions of Single-Release Model

Using the SR Model, the passage of a single PIT-tagged salmonid through the hydropower system is modeled as a sequence of events. Examples of such events are survival from the tailrace of Lower Granite Dam to the tailrace of Little Goose Dam, and detection at Little Goose Dam. Each event has an associated probability of occurrence. The detection history is the record of the outcomes of the events. (As previously noted, the detection history is an imperfect record of outcomes; if the history ends with one or more "zeroes," we cannot distinguish mortality from survival without detection). The SR Model represents detection history data for a group of tagged fish as a multinomial distribution; each multinomial cell probability (detection history probability) is a function of the underlying survival and detection event probabilities. Estimates of survival probabilities under the SR Model are random variables, subject to sampling variability. When true survival probabilities are close to 1.0 and/or when sampling variability is high, it is possible for estimates of survival probabilities to exceed 1.0. For practical purposes, estimates should be considered equal to 1.0 in these cases.

Three key assumptions lead to the multinomial cell probabilities used in the SR Model:

- A1) Fish in a single group of tagged fish have common event probabilities (each conditional detection or survival probability is common to all fish in the group).
- A2) Event probabilities for each individual fish are independent from those for all other fish.
- A3) Each event probability is conditionally independent from all other probabilities.

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For a broader description of these assumptions and how to test them, see Burnham et al. (1987) and Zabel et al. (2002, Appendix 1).

To varying degrees, these assumptions are inevitably violated for any particular group of migrating salmonids. Reasons that the assumptions might not strictly hold are: variation in fitness among fish in a group; variation in migration rate means, for example, that individuals from the same group may pass a dam under different conditions; inherent traits or behavioral preferences might make detection of some fish more likely at all dams.

Violations of model assumptions can cause bias in resulting parameter estimates. However, known causes and degrees of SR Model violations for migrating juvenile salmonids have been investigated, and have been shown to cause minimal bias e.g. from (Skalski 1998). Studies are planned and analyses are designed to minimize the potential of significant bias due to violation of model assumptions.

Hatchery and Trap Release Groups

Seven hatcheries in the Snake River Basin released PIT-tagged fish each year between 1993 and 2003: Dworshak, Kooskia, Lookingglass, Rapid River, McCall, Pahsimeroi, and Sawtooth. For each hatchery each year we identified the group of PIT-tagged fish that was most representative of the hatchery's production release. For these groups of yearling chinook salmon and steelhead we calculated estimates of survival from release to the tailrace of Lower Granite Dam. Many of these groups were released as a batch on a single occasion; others are released volitionally over a period of days from hatchery ponds or raceways.

We also estimated survival from release to Lower Granite Dam for wild and hatchery PIT-tagged yearling chinook salmon and steelhead from the Salmon River (White Bird) and Snake River smolt traps. While fish are tagged and released nearly daily from these traps, daily groups rarely have sufficient data to calculate reliable survival estimates. For traps, then, we pooled all fish tagged and released between the beginning of operations in the spring and 31 May.

Annual Average Survival Estimates for Spring Migrants From Lower Granite and McNary Dams

Between 1993 and 2003, hatchery and wild yearling chinook salmon and steelhead have been tagged in varying numbers at various locations upstream from Lower Granite Dam. Studies have also been conducted involving fish collected and tagged at Lower Granite Dam and then released into the tailrace. For survival estimation each year, we create daily "release groups" from Lower Granite Dam by combining fish tagged at the dam and released into the tailrace with previously tagged fish that were detected at the dam and returned to the tailrace the same day. For each daily group, detection data downstream from Lower Granite Dam are usually sufficient

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to calculate SR-Model survival estimates between Lower Granite and Little Goose dams, between Little Goose and Lower Monumental dams, and between Lower Monumental and McNary dams. If data for a daily group are not sufficient, we pool adjacent days until estimates to McNary Dam are possible.

To obtain survival estimates downstream of McNary Dam, we regroup fish into daily groups at McNary Dam, using the same methods described above for Lower Granite Dam. Detection data downstream from McNary Dam are usually not sufficient for each daily group. Therefore, we pool the daily groups into weekly groups. For weekly groups leaving McNary Dam, we estimate survival between McNary and John Day dams, and between John Day and Bonneville dams.

Using these methods, we obtain estimates for particular river sections from multiple groups of PIT-tagged fish throughout each migration season. Annual average estimates for these river sections are obtained using a weighted mean as they provide the most unbiased survival estimates (Muir et al. 2001).

Annual Average Survival Estimates Through the Entire Hydropower System

For Snake River yearling chinook salmon and steelhead, we estimated the annual mean survival probability from the head of Lower Granite Dam reservoir to Bonneville Dam tailrace. We calculated this estimate by multiplying three components: the estimate of survival from the Snake River Trap (near the head of the reservoir) to Lower Granite Dam (hatchery and wild fish pooled); the weighted mean survival estimate for daily groups from Lower Granite Dam tailrace to McNary Dam tailrace; and the weighted mean estimate for weekly groups from McNary Dam tailrace to Bonneville Dam tailrace.

Data Sources and Limitation

Information for chinook salmon and steelhead PIT-tagged and released in the Columbia River basin was obtained from the regional PTAGIS database (information available at www.psmfc.org). From these, we grouped fish by migration year, species, run, rearing type, release site, and in some cases by time periods.

Sometimes, due to small or zero sample sizes at the most downstream observation sites caused by very poor survival to those sites, and/or low detection rates at those sites, survival for some cohorts for the MCN-JDA and/or JDA-BON reaches was not estimated or alternate survival estimates were calculated by using the pooled estimate for a particular species-run-rearing type. In particular, estimates to BON were not calculated for mid-Columbia and Yakima groups until 2001 and 2002, respectively.

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Our estimates were calculated only using information available from PTAGIS. We were certainly not aware of all the various experimental caveats and details involved in the studies for which fish were tagged. Thus, although we used available PIT-tagged fish for survival estimates, we recognize that not all fish were necessarily released for the single purpose of estimating downstream reach survival. Therefore, some survival estimates, even if mathematically "correct," may not reflect or represent the true survival of the untagged population to which inference is intended.

Piscivorous Bird Predation

All PIT-tagged fish that survived to the McNary pool were subject to predation by piscivorous birds residing on various islands, including Caspian terns, double-crested cormorants, gulls, and pelicans. The bird colony locations included, but were not limited to, Richland Island, Island 18, Foundation Island, Badger Island, and Crescent Island (all islands located in the McNary Dam reservoir - mostly above the confluence with the Snake River). Predation also occurred from birds residing in various locations below MCN to the mouth of the Columbia River and much of this information is contained in another Tech Memo on the role of the estuary in the recovery of Columbia River basin salmon and steelhead. We calculated the proportion of PIT-tags obtained from these islands for the cohorts detailed above. This provided a minimum mortality estimate of bird predation which can be used to assess relative impacts between various cohorts. Nearly all the PIT-tag information needed for this assessment was obtained by NOAA Fisheries researchers and is available from the PTAGIS database. We estimated only the proportion of fish released from hatcheries and dam that were detected on bird colonies as we could not estimate the proportion of fish alive upstream of the McNary Dam pool, since no PIT-tag estimates of survival to the head of MCN pool are available.

SARs for PIT-tagged Fish

To estimate SARs for PIT-tagged Snake River fish as measured from Lower Granite Dam as smolts to Lower Granite Dam as adults, we followed the methods in Sandford and Smith (2002). We estimated how many fish passed the dam on each day of the migration season and totaled the daily estimates. To get each day's estimate, we used the following process:

- 1) For fish detected on a given day at Little Goose Dam that had previously been detected at Lower Granite Dam, tabulate according to their detection (passage) day at Lower Granite Dam;
- 2) For fish detected on the same day at Little Goose Dam that had NOT previously been detected at Lower Granite Dam, assign them to their estimated "non-detection passage day" at Lower Granite Dam, assuming that their distribution over days at Lower Granite Dam was proportionate to that of fish detected at Lower Granite Dam;

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- 3) Repeat this process for all days of detection at Little Goose Dam;
- 4) Sum all these detected and non-detected fish for a given day at Lower Granite Dam;
- 5) Estimate that day's detection probability by calculating the proportion of detected fish to the total of detected and non-detected fish (after making an adjustment for fish transported at Lower Granite Dam); and
- 6) Divide the total detected number at Lower Granite Dam on that day (bypassed and transported) by the estimated detection probability to get an estimated daily total.

Formally, this process is referred to as the Schaefer method. We modified the method slightly for estimates in the tails of the passage distribution where the above process wasn't applicable (e.g., for days when no detections occurred at Little Goose Dam)

We then estimated SARs for various "detection-history categories", in particular for fish transported from Lower Granite, Little Goose, Lower Monumental, or McNary Dams, for fish bypassed back to the river one or more times at these dams, and for fish never detected at these dams. To do this, we developed daily passage estimates at Lower Granite Dam using the following process:

- 1) We estimated for each daily Lower Granite passage group the probabilities of detection at Little Goose, Lower Monumental, and McNary Dams using the Cormack-Jolly-Seber survival model (Cormack 1964, Jolly 1965, Seber 1965).
- 2) We multiplied the estimated daily Lower Granite Dam total by the appropriate detection and transport probabilities. For example, for the detection-history category "not detected at Little Goose Dam and then transported from Lower Monumental Dam", this is equivalent to multiplying the Lower Granite Dam daily estimate by (1 - probability of Little Goose Dam detection) times (probability of Lower Monumental detection).
- 3) We summed the estimates for all daily groups to get total smolts in each detection-history category.

Next we calculated SARs. For a given detection-history category, this was the ratio of the observed number of adults in the category to the estimated number of smolts in that category.

Finally, we estimated the precision for the estimated SAR using bootstrap methods where the individual fish information (i.e., detection history, detection dates, and adult return record) and the entire estimation process were bootstrapped 1,000 times. Confidence limits were generated from the bootstrapped estimates.

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Flow/travel Time Estimates for PIT-tagged Fish

Travel times were calculated for yearling chinook salmon and steelhead from 1) Lower Granite Dam to Little Goose Dam (60 km), 2) Little Goose Dam to Lower Monumental Dam (46 km), 3) Lower Monumental Dam to McNary Dam (199 km), 4) Lower Granite Dam to McNary Dam (225 km), 5) Lower Granite Dam to Bonneville Dam (461 km), 6) McNary Dam to John Day Dam (123 km), 7) John Day Dam to Bonneville Dam (113 km), and 8) McNary Dam to Bonneville Dam (236 km). Travel time between any two dams was calculated for each fish detected at both dams as the number of days between last detection at the upstream dam (generally at a PIT-tag detector close enough to the outfall site that fish arrived in the tailrace within minutes after detection) and first detection at the downstream dam. Travel time included the time required to move through the reservoir to the forebay of the downstream dam and any delay associated with residence in the forebay, gatewells, or collection channel prior to detection in the juvenile bypass system.

Migration rate through a river section was calculated as the length of the section (km) divided by the travel time (days) (which included any delay at dams as noted above). For each group, the 20th percentile, median, and 80th percentile travel times and migration rates were determined.

The true complete set of travel times for a release group includes travel times of both detected and not-detected fish. However, using PIT tags, travel times cannot be determined for a fish that traverses a river section but is not detected at both ends of the section. Travel time statistics are computed only from travel times for detected fish, which represent a sample of the complete set. Non-detected fish pass dams via turbines and spill; thus, their time to pass a dam is typically minutes to hours shorter than detected fish passing to the tailrace via the juvenile bypass system.

Transportation Evaluations

We evaluated the efficacy of transportation two ways. First, we compared the return rate of transported fish to the return rate of control fish that migrated volitionally through the hydropower system. This provided a $T:I$ ratio, simply the ratio of the return rates of transported (T) fish and non-transported (inriver) migrants (I). A value greater than 1 indicates transportation was beneficial. We also evaluated D , defined as the ratio of post-Bonneville Dam survival for transported fish to that of the non-transported fish. If $D < 1$, then fish released from barges survived at a lower rate compared to a non-transported migrants. We provide details of the methodology below.

Snake River Yearling Migrants

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We based our evaluation of transportation on comparisons of return rates from fish PIT-tagged as juveniles that migrated through the hydropower system versus fish collected and transported. We based most of our evaluations on fish from two general sources. We utilized fish PIT-tagged for the Comparative Survival Study (CSS) above Lower Granite Dam that passed through sort-by-code systems installed in bypass systems at collector dams (Lower Granite, Little Goose, and Lower Monumental Dams on the Snake River and McNary Dam on the Columbia River) and were specifically released to evaluate transportation. Of the fish collected, some were automatically diverted to raceways for transportation, while others were returned to the river to allow estimation of survival for the downstream migrants. We also PIT-tagged juvenile fish collected at Lower Granite Dam, some of which we released into raceways for subsequent transportation and others we released to the tailrace of the dam. Finally, as slide gates are not 100% effective at diverting PIT-tagged fish back to the river, some non-designated fish PIT-tagged above Lower Granite Dam get transported. We evaluated these fish where possible, but due to quite small sample sizes, SARs for these have large confidence bounds.

Groups of fish PIT tagged above and at Lower Granite Dam each have advantages and disadvantages for evaluating transportation. For fish PIT tagged above the dam, fish collected at Lower Granite Dam presumably represent the untagged population collected at the dam, while fish not collected (therefore not detected) represent the unmarked population of fish that passed the dam through turbines and spill. However, for fish tagged above the dam, we do not have a direct measure of how many non-detected fish pass the dam (we can estimate this). Moreover, when an adult returns that was not detected as a juvenile, we do not know when the fish passed the dam as a juvenile. For groups of these fish, we can only estimate annual transport to non-transport ratios (T/I) and annual values of D. For fish PIT tagged at Lower Granite Dam, no “true” controls exist because all fish for studies are first collected from the juvenile bypass facilities at Lower Granite Dam. Thus, no sample exists that represents untagged, uncollected fish. However, tagging at dams has some advantages. After release, we know the number of downstream migrants that subsequently represent the untagged population. Further we can estimate temporal SAR trends for transported and non-transported fish. From this we can estimate temporal D trends.

Upper Columbia River Subyearling Chinook Salmon

Prior to 2000, only Lower Granite Dam had equipment installed capable of detecting PIT-tagged adult migrants. Thus, to evaluate the efficacy of transportation at McNary Dam (after construction of the new juvenile bypass/collection facilities in 1994) required methods used previously to evaluate transportation. In 1995 and 1996, approximately 110,000 and 120,000 juvenile subyearling chinook salmon, respectively, were collected in the juvenile bypass facility at the dam and coded-wire tagged (CWT). Fish were tagged 5 days/week in proportion to the daily collection. Each day approximately 60% of the fish were released to the tailrace of the dam through the bypass facility pipe. The other 40% of the fish were transferred into barges and

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released downstream of Bonneville Dam. Evaluations of the transported to non-transported ratios (T/I) was based on CWT recoveries from fisheries and hatcheries.

Computing D

PATH-derived D

The PATH (Marmorek et al. 1998) definition of D (c.f. PATH Preliminary Decision Analysis Report on Snake River Spring/Summer Chinook; Figure 4.2-1 caption) involves terms for “direct survival” of non-transported (in-river) juvenile fish (V_n) and “direct survival” of transported juvenile fish (V_t). This requires estimation of the number of fish in each group (transported or non-transported) that were alive in the river below Bonneville Dam. The counted number of adult returns to Lower Granite Dam in each group is divided by the estimated number of juveniles below Bonneville to estimate post-Bonneville survival. The estimate of D is calculated as the ratio of post-Bonneville survival for the transported group to post-Bonneville survival for the non-transported group.

For a given dam, the expected return rates (SARs) for transported and non-transported fish are each composed of two components: the expected survival probability from the dam to below Bonneville Dam, and the expected survival probability from below Bonneville Dam to adult return. The SARs can be described by the equations

$$SAR_T = S_T \cdot \lambda_T$$

and

$$SAR_I = S_I \cdot \lambda_I$$

where the subscripts T and I refer to transported and non-transported (in-river fish), respectively; S is the downstream survival component, and λ is the post-Bonneville Dam component. The ratio of the SARs is the familiar $T:I$ ratio:

$$T:I = \frac{SAR_T}{SAR_I} = \frac{S_T}{S_I} \cdot \frac{\lambda_T}{\lambda_I} = \frac{S_T}{S_I} \cdot D$$

This equation decomposes the $T:I$ ratio into downstream and post-Bonneville Dam components, and introduces the parameter D , which is the ratio of post-Bonneville Dam survival for transported fish to that for non-transported fish. If transported fish and non-transported fish have the same survival probability from the transport release site to return as adults, then $D=1.0$. If transported fish incur greater mortality after release from the barge, then $D<1.0$.

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Transportation benefits fish stocks from a particular location only if the expected SAR for transported fish exceeds that for non-transported fish; that is, if the $T:I$ ratio is expected to exceed 1.0. Because S_T (survival in the barge from the collection dam to below Bonneville Dam) is near 1.0, the decision reduces to comparing survival to below Bonneville for fish left in the river versus differential post-Bonneville Dam survival. In terms of the equations, transportation benefits fish only if $D > S_r$.

One consequence of this relationship is that if D is the same for each transportation site, then the benefit of transportation is greater for collection sites farther upstream. This is because S_r increases for sites farther downstream. In other words, fish transported from Lower Granite Dam avoid the higher direct mortality incurred by fish prior to their collection and transportation from McNary Dam.

The definition of V_t implies that the value depends on the collection site, thus we apply a separate value for each collection site. We do not make a survival estimate from above Lower Granite Dam to the Lower Granite Dam tailrace, as both non-transported and transported juveniles transit the same area in common, and thus, any value cancels out of calculations without any effect on estimated D .

The estimated number of non-transported control group fish alive below Bonneville Dam is derived by multiplying the annual estimate of the number of “control” fish arriving at Lower Granite Dam by the estimated annual average survival between Lower Granite and Bonneville Dam tailrace (the “ V_n ” described above). With the PATH definition, it is impossible to calculate date-specific differential survival between transported fish and the “true” control group within a single migration season. While we can estimate the number of juveniles in the “never-detected” category that passed Lower Granite Dam on any particular day, we have no way of knowing what day a returning adult in that category passed Lower Granite Dam as a juvenile. Thus, we can’t calculate the SAR for the never-detected group for a specific date.

Non-PATH derived D

We also evaluated data to determine how differential post-Bonneville survival between transported and non-transported groups might change throughout a single migration season. As identified above, we used fish marked at Lower Granite Dam and compared transported fish to those released into the tailrace that subsequently had the same detection history as the untagged population of fish. We used 6-day running average SARs (LGR juveniles and LGR adults, plotted against date at LGR) to evaluate temporal changes in SARs of the transported and non-transported fish. We used the same methods to determine temporal D values as we did to determine average D over the season.

Factors That Influence SAR Estimates

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For most adult return analyses, we compare SARs derived from PIT-tagged fish. These analyses provide the evidence for differences in treatments, for instance, different passage routes or transportation method. Because we can uniquely identify PIT-tagged fish, we also evaluated probabilities of detection for PIT-tagged fish to determine if biases in detection may exist for fish from different treatments (Zabel et al. In review). Additionally, as detailed above, we used methods that did not rely on PIT-tagged fish to estimate annual SARs in recent years for the wild Snake River spring/summer chinook population as a whole. We compared these estimates to those of SARs derived from PIT-tagged fish to check for potential differences and biases.

Most studies using PIT-tagged fish that have evaluated bypass systems and survival through dams have as a basic assumption that the tagged fish have a homogeneous distribution passing dams. Zabel et al.(In review) estimated the relationship between detection probability (at Little Goose, Lower Monumental and McNary Dams) versus length at tagging for spring/summer chinook salmon and steelhead (hatchery and wild) PIT tagged and released at Lower Granite Dam during the years 1998 through 2002. They demonstrated that smaller fish are consistently detected at higher rates than larger ones at all three dams and for all fish groups examined (Figures 2 and 3). Coupled with the results from Zabel and Williams (2002) that larger spring/summer chinook salmon smolts return at higher rates than smaller ones, this may, at least partially, explain why multiple-bypassed fish in early analyses returned at lower rates than undetected ones (Sandford and Smith 2002). Fortunately, for applications of PIT tags in determining juvenile survival through the hydropower system, Zabel et al. (In review) found that although a heterogenous size distribution of fish passed through bypass systems, spill, and turbines, it did not bias survival estimates (Figure 4.)

Delayed Mortality

Delayed mortality is defined as mortality attributable to the hydropower system that is not expressed until after fish leave the hydropower system. To evaluate “delayed mortality”, we compared historic SARs for wild Snake River spring/summer chinook salmon to those in recent years. Differences in rates not explainable by differential mortality from transportation (“D”) might constitute evidence for delayed mortality. Additionally, Budy et al. (2002) hypothesized a large number of possible mechanisms to explain how the construction of the lower Snake River dams caused delayed mortality. They suggested that migration of juveniles through bypass systems at dams led to delayed mortality. To evaluate this possibility, we used the Sandford and Smith (2002) methodology to develop information for PIT-tagged fish with different juvenile bypass system histories. Based on adult returns, we placed fish into 1 of 5 categories: 1) not detected as juveniles passing downstream through LGR, LGO, LMO, or MCN; 2) detected once at any of these dams; 3) detected twice at some combination of these dams; 4) detected 3 times at some combination of these dams; 5) detected at all four dams. We analyzed wild and hatchery steelhead and wild and hatchery spring-summer chinook salmon PIT-tagged above LGR in the year of their migration. We reported results only in cases where at least 5 adults returned for any one category. We estimated the 95% confidence bounds for the return rates for each category. Our null hypothesis was that the number of juvenile detections (equates to number of bypass systems) had no impact on adult return, against the alternative that increased detections led to decreased (or increased) adult returns. We compared return rates relative to the non-detected group for each category, as we assumed under this hypothesis mechanisms causing delayed mortality would have little to no impact on fish not passing through bypass systems. For purposes of comparison, we set the non-detected return rate to 1.0. If the 95% confidence interval around the estimated relative return rate for fish in a bypass category did not contain 1.0, it indicated a significant difference in return rates.

Selective Mortality

As another way to analyze SAR data, we determined whether fish with certain traits survive at higher rates than the rest of the general population (Zabel and Williams 2002). We examined the traits length at tagging, and release date. In this Tech Memo we expand upon results presented by Zabel and Williams (2002).

The first step in the analysis involved calculating the directional selection coefficient (Endler 1986), which for a trait x , defined as:

$$\delta = \frac{\bar{x}_R - \bar{x}_T}{\sqrt{\text{var}_T}}$$

where $\bar{X}$ is the mean value of the trait in the entire tagged population (T) and in returning adults (R). Note that the returning adults represent a sub-population of the entire tagged population, and

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we are referring to their traits at the time of tagging. For instance, for the trait “length” a positive value of d means that larger fish returned at a higher rate than smaller ones. We performed a Monte Carlo test (see Zabel and Williams 2002 for details) to determine whether the selection coefficient was significantly different from zero.

ESUs Other than Snake River Spring-summer Chinook Salmon

For most of the listed ESUs other than Snake River spring-summer chinook salmon, recent data do not exist since “White Papers” were written in 1999 to conduct analyses on empirically derived SARs to determine recent impacts of the FCRPS on the stocks. Where possible, we compared trends in adult returns from other ESUs to those for Snake River spring-summer chinook salmon. We used this qualitative review to speculate on FCRPS impacts to other stocks. In some cases, we could reach no conclusions.

RESULTS

Trends in Populations

Estimated SARs (catch + escapement) of Snake River wild spring-summer chinook salmon from the 1999 and 2000 outmigrations increased to levels only previously observed prior to construction of the final mainstem dams in the FCRPS (Figure 5). The median SAR of 3.94 (range 2.17 to 4.51) from the 1998 to 2000 outmigrations was 5.9 times higher than the median SAR of 0.67 (range 0.20 to 1.31) from the 1988 to 1997 outmigrations. From the low-flow 2001 outmigration, the SAR presently stands at ca. 1.5%, with 3-ocean fish yet to return in the spring-summer of 2004. This return rate already exceeds total SARs for all Snake River wild spring-summer chinook outmigrations between 1976 and 1997. Absolute increases in total adult returns of other upper river populations over the past 3 years increased a comparable amount (Figure 6). Median counts of wild upper river summer steelhead at Bonneville Dam increased from 33 k (range 24 to 58 k) to 143 k (range 112 to 149 k). Median counts of Snake River wild steelhead at Ice Harbor Dam increased from 10 k (range 8 to 21 k) to 46 k (range 46 to 51 k). Median counts of Upper Columbia River spring chinook salmon (hatchery and wild combined) at Priest Rapids Dam increased from 10 k (range 1 to 28 k) to 34 k (range 17 to 50 k). Median counts of Snake River fall chinook salmon (natural origin fish) at Lower Granite Dam increased from ca. 475 fish (range 78 to ca. 900) to 2,116 (range 1,148 to 5,163).

Travel-time Estimates for Juvenile Fish

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With the exception of the low flow year of 2001, the annual median travel time (in days) for all Snake River spring-summer chinook salmon and steelhead passing between Lower Granite and Bonneville Dams from 1 April to 31 May each year varied by only a few days, as follows:

<u>Year</u>	<u>Chinook</u>	<u>Steelhead</u>
1995	18.4	20.2
1996	16.2	15.3
1997	14.1	12.2
1998	19.0	14.4
1999	16.1	15.4
2000	16.4	13.6
2001	31.0	29.8
2002	16.9	18.4
2003	14.4	15.4

Based on earlier data derived from Raymond (1979), these times were approximately 40-50% longer than when only 4 dams existed in the mainstem Snake and Columbia Rivers.

Juvenile Survival Estimates for Downstream Migrants

Snake River Basin Hatcheries to Lower Granite Dam Tailrace

Spring-summer chinook salmon

Mean estimated survival from Snake River Basin hatcheries to the tailrace of Lower Granite Dam (average for hatcheries combined) has ranged from a low of 0.494 in 1997 to 0.697 in 2000 with an increase in survival since 1998 compared to earlier years (Table 2). A strong inverse relationship exists between survival and migration distance ($r^2 = 0.941$, $p < 0.001$) (Figure 7), with average survival the highest (0.765) from Dworshak National Fish Hatchery, 116 km from Lower Granite Dam, and the lowest (0.403) from Sawtooth National Fish Hatchery, 747 km from Lower Granite Dam.

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Table 2. Estimated survival for yearling chinook salmon from Snake River Basin hatcheries to the tailrace of Lower Granite Dam, 1993-2003. Distance from each hatchery to Lower Granite Dam in parentheses in header. Standard errors in parentheses following each survival estimate.

Year	Dworshak (116)	Kooskia (176)	Imnaha River weir (209)	Rapid River (283)	McCall (457)	Pahsimeroi (630)	Sawtooth (747)	Mean
1993	0.647 (0.028)	0.689 (0.047)	0.660 (0.025)	0.670 (0.017)	0.498 (0.017)	0.456 (0.032)	0.255 (0.023)	0.554 (0.060)
1994	0.778 (0.020)	0.752 (0.053)	0.685 (0.021)	0.526 (0.024)	0.554 (0.022)	0.324 (0.028)	0.209 (0.014)	0.547 (0.081)
1995	0.838 (0.034)	0.786 (0.024)	0.617 (0.015)	0.726 (0.017)	0.522 (0.011)	0.316 (0.033)	0.230 (0.015)	0.576 (0.088)
1996	0.776 (0.017)	0.744 (0.010)	0.567 (0.014)	0.588 (0.007)	0.531 (0.007)	—	0.121 (0.017)	0.555 (0.096)
1997	0.576 (0.017)	0.449 (0.034)	0.616 (0.017)	0.382 (0.008)	0.424 (0.008)	0.500 (0.008)	0.508 (0.037)	0.494 (0.031)
1998	0.836 (0.006)	0.652 (0.024)	0.682 (0.006)	0.660 (0.004)	0.585 (0.004)	0.428 (0.021)	0.601 (0.033)	0.635 (0.046)
1999	0.834 (0.011)	0.653 (0.031)	0.668 (0.009)	0.746 (0.006)	0.649 (0.008)	0.584 (0.035)	0.452 (0.019)	0.655 (0.045)
2000	0.841 (0.009)	0.734 (0.027)	0.688 (0.011)	0.748 (0.007)	0.689 (0.010)	0.631 (0.062)	0.546 (0.030)	0.697 (0.035)
2001	0.747 (0.002)	0.577 (0.019)	0.747 (0.003)	0.689 (0.002)	0.666 (0.002)	0.621 (0.016)	0.524 (0.023)	0.653 (0.032)
2002	0.819 (0.011)	0.787 (0.036)	0.667 (0.012)	0.755 (0.003)	0.592 (0.006)	0.678 (0.053)	0.387 (0.025)	0.669 (0.055)
2003	<u>0.720 (0.008)</u>	<u>0.560 (0.043)</u>	<u>0.715 (0.012)</u>	<u>0.691 (0.007)</u>	<u>0.573 (0.006)</u>	<u>0.721 (0.230)</u>	<u>0.595 (0.149)</u>	<u>0.654 (0.028)</u>
Mean	0.765 (0.026)	0.671 (0.032)	0.665 (0.015)	0.653 (0.034)	0.571 (0.024)	0.526 (0.045)	0.403 (0.052)	

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Salmon and Snake River Traps to Lower Granite Dam Tailrace

Spring-summer chinook salmon

Estimated survival to the tailrace of Lower Granite Dam for yearling chinook salmon PIT-tagged at the Salmon River trap, 223 km above Lower Granite Dam, averaged 0.777 for hatchery fish and 0.862 for wild fish from 1993 - 2003 (Table 3).

Table 3. Estimated survival from the Salmon River (Whitebird) trap to Lower Granite Dam tailrace (233 km), 1993-2003. Standard errors in parentheses. Simple arithmetic means across all years are given.

Year	Hatchery chinook	Wild chinook	Hatchery steelhead	Wild steelhead
1993	0.782 (0.019)	0.832 (0.014)	0.875 (0.011)	0.832 (0.019)
1994	0.761 (0.024)	0.817 (0.017)	NA	NA
1995	0.802 (0.012)	0.863 (0.011)	0.882 (0.013)	0.892 (0.025)
1996	0.735 (0.026)	0.822 (0.029)	0.851 (0.022)	0.956 (0.060)
1997	NA	NA	0.872 (0.017)	0.876 (0.062)
1998	0.740 (0.012)	0.926 (0.016)	0.879 (0.016)	0.892 (0.070)
1999	0.800 (0.013)	0.909 (0.012)	0.825 (0.014)	0.816 (0.039)
2000	0.806 (0.015)	0.920 (0.021)	0.870 (0.019)	0.815 (0.041)
2001	0.819 (0.007)	0.878 (0.009)	0.786 (0.009)	0.878 (0.019)
2002	0.792 (0.016)	0.844 (0.016)	0.814 (0.041)	0.780 (0.050)
2003	<u>0.728 (0.016)</u>	<u>0.807 (0.011)</u>	<u>0.885 (0.028)</u>	<u>0.952 (0.092)</u>
Mean	0.777 (0.010)	0.862 (0.014)	0.854 (0.011)	0.869 (0.018)

Estimated survival from the Snake River trap, at the head of Lower Granite Reservoir 52 km above Lower Granite Dam, to the tailrace of Lower Granite Dam averaged 0.929 for hatchery yearling chinook salmon and 0.935 for wild yearling chinook salmon from 1993 - 2003 (Table 4).

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Table 4. Estimated survival from the Snake River trap (near head of Lower Granite Reservoir) to Lower Granite Dam tailrace (52 km), 1995-2003. Standard errors in parentheses. Simple arithmetic means across all years are given.

Year	Hatchery chinook	Wild chinook	Hatchery steelhead	Wild steelhead
1993	0.823 (0.016)	0.847 (0.024)	0.917 (0.008)	0.898 (0.009)
1994	0.951 (0.029)	0.913 (0.036)	NA	NA
1995	0.886 (0.013)	0.944 (0.015)	0.936 (0.011)	0.955 (0.013)
1996	0.974 (0.032)	0.984 (0.039)	0.941 (0.020)	0.973 (0.022)
1997	NA	NA	0.963 (0.016)	0.968 (0.051)
1998	0.928 (0.013)	0.915 (0.019)	0.926 (0.010)	0.919 (0.017)
1999	0.930 (0.013)	0.950 (0.011)	0.908 (0.012)	0.910 (0.024)
2000	0.911 (0.018)	0.951 (0.023)	0.947 (0.014)	0.977 (0.027)
2001	0.956 (0.015)	0.921 (0.058)	0.893 (0.008)	0.958 (0.010)
2002	0.925 (0.027)	0.985 (0.038)	0.893 (0.019)	0.899 (0.023)
2003	<u>1.001 (0.030)</u>	<u>0.943 (0.033)</u>	<u>0.946 (0.018)</u>	<u>0.893 (0.026)</u>
Mean	0.929 (0.016)	0.935 (0.013)	0.927 (0.008)	0.935 (0.011)

Steelhead

Estimated survival for wild steelhead was nearly identical to chinook salmon. Estimated survival to the tailrace of Lower Granite Dam for steelhead PIT-tagged at the Salmon River trap has averaged 0.854 for hatchery fish and 0.869 for wild fish (Table 3). Estimated survival from the Snake River trap to the tailrace of Lower Granite Dam has averaged 0.927 for hatchery steelhead and 0.935 for wild steelhead (Table 4).

Comparison Between Wild and Hatchery Fish

Wild yearling chinook salmon and steelhead have similar to slightly higher survival compared to hatchery reared fish between the Salmon and Snake River traps and the tailrace of Lower Granite Dam (Tables 3 and 4). Hatchery and wild yearling chinook salmon had similar average estimated survival from the tailrace of Lower Granite Dam to the tailrace of McNary Dam, through 4 dams and reservoirs (Table 5). Annually, estimated survival has been similar between hatchery and wild yearling chinook salmon, with neither stock having consistently higher survival. For steelhead, estimated survival through this reach has averaged about 5%

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higher for wild fish (0.586) compared to steelhead of hatchery origin (0.533), with wild steelhead survival higher in 4 of the 6 years compared (Table 5).

Table 5. Estimated survival from Lower Granite Dam tailrace to McNary Dam tailrace for hatchery and wild yearling chinook salmon and steelhead, 1998-2003. Standard errors in parentheses. Simple arithmetic means across all years are given.

Year	Hatchery chinook	Wild chinook	Hatchery steelhead	Wild steelhead
1998	0.773 (0.012)	0.771 (0.015)	0.644 (0.015)	0.698 (0.030)
1999	0.791 (0.007)	0.791 (0.014)	0.673 (0.019)	0.746 (0.019)
2000	0.763 (0.026)	0.775 (0.014)	0.574 (0.038)	0.714 (0.028)
2001	0.556 (0.019)	0.541 (0.027)	0.170 (0.013)	0.168 (0.010)
2002	0.759 (0.008)	0.768 (0.026)	0.533 (0.045)	0.593 (0.039)
2003	<u>0.746 (0.019)</u>	<u>0.729 (0.020)</u>	<u>0.606 (0.028)</u>	<u>0.597 (0.022)</u>
Mean	0.731 (0.036)	0.729 (0.039)	0.533 (0.075)	0.586 (0.087)

The similarity in survival between PIT tagged hatchery and wild fish through this reach and from the Snake River trap to the tailrace of Lower Granite Dam, about 50% of the hydropower system, supports the use of hatchery fish as surrogates for wild fish in estimating juvenile downstream migrant survival for these stocks.

Head of Lower Granite Dam Reservoir to Bonneville Dam Tailrace

Yearling chinook salmon

Estimated yearling chinook salmon (hatchery and wild combined) survival through the entire hydropower system, from the Snake River trap at the head of Lower Granite Reservoir to the tailrace of Bonneville Dam, through eight mainstem dams and reservoirs has ranged from 0.267 in the low-flow year of 2001 to 0.551 in 2002 (Table 6).

Steelhead

Estimated steelhead (hatchery and wild combined) survival through the entire hydropower system has ranged from a low of 0.038 in the low-flow conditions of 2001 to 0.462 in 1998. Based on PIT-tag recoveries, avian predation played a significant role in losses (wild and hatchery

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combined) based on the percent of PIT-tagged smolts detected at Lower Monumental Dam and later detected on McNary pool bird colonies (Table 7).

Table 6. Hydropower system survival estimates derived by combining empirical survival estimates from various reaches for Snake River yearling chinook salmon and steelhead (hatchery and wild combined), 1997-2003. Standard errors in parentheses. Abbreviations: Trap-Snake River Trap; LGR-Lower Granite Dam; BON-Bonneville Dam.

Year	Trap-LGR	LGR-BON	Trap-BON
<u>Yearling Chinook Salmon</u>			
1997	NA	NA	NA
1998	0.925 (0.009)	NA	NA
1999	0.940 (0.009)	0.557 (0.046)	0.524 (0.043)
2000	0.929 (0.014)	0.486 (0.093)	0.452 (0.087)
2001	0.954 (0.015)	0.279 (0.016)	0.266 (0.015)
2002	0.953 (0.022)	0.578 (0.060)	0.551 (0.057)
2003	0.993 (0.023)	0.532 (0.023)	0.528 (0.023)
<u>Steelhead</u>			
1997	0.964 (0.015)	0.474 (0.069)	0.457 (0.067)
1998	0.924 (0.009)	0.500 (0.054)	0.462 (0.050)
1999	0.908 (0.011)	0.440 (0.018)	0.400 (0.016)
2000	0.964 (0.013)	0.393 (0.034)	0.379 (0.032)
2001	0.911 (0.007)	0.042 (0.003)	0.038 (0.003)
2002	0.895 (0.015)	0.262 (0.050)	0.234 (0.045)
2003	0.932 (0.015)	0.309 (0.011)	0.288 (0.011)

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Table 7. Percentage of PIT-tagged smolts detected at Lower Monumental Dam subsequently detected on bird colonies in the McNary Dam reservoir.

Year	Yearling chinook salmon	Steelhead
1998	0.49	4.20
1999	0.84	4.51
2000	0.98	3.66
2001	5.59	21.06
2002	1.19	10.09
2003 ^a	1.06	3.71

^a Only the Crescent Island Caspian tern colony sampled

Snake River subyearling chinook salmon

Summer-migrating subyearling fall chinook salmon have a much more complex migration pattern than spring-migrating salmonids, thus, results from PIT-tag studies do not fall into neat, discrete parts. Most data on fall chinook survival come from studies conducted above Lower Granite Dam. Since 1992, Connor et al. (2003a) have beach seined, PIT-tagged, and released fall wild chinook in their rearing areas. Since 1995, NOAA Fisheries has also PIT-tagged subyearling fall chinook at Lyons Ferry Hatchery, trucked them upstream above Lower Granite Dam, and released them at a time and size to match wild subyearling fall chinook salmon in their rearing areas (Smith 2003). As travel time to the Lower Granite Dam dam typically averages one month or more from time of release after tagging, survival estimates to Lower Granite Dam, represent survival during both rearing and migration (Connor et al. 2003a, Connor et al. 2003b, Smith 2003). Subyearling fall chinook salmon rear and develop physiologically as they migrate, and their migration rate increases with migration distance and increased size. Unlike yearling smolts that generally all migrate quickly to Lower Granite Dam, some fall chinook don't for months. Thus, standard techniques used for yearling smolts to measure travel times or survival don't work quite as well. From 1995 to 2000, we released nearly 200,000 PIT-tagged smolts above Lower Granite Dam. Subsequently we detected only about 62,000. Of these nearly 15% were not detected at a Snake River dam until after 1 September of the year, some not until the following spring. For the "active" migrants, those that passed the Snake River dams in June, July, and August in the year of release for the hatchery fish, the median pooled travel time for all years from release to detection at Lower Granite Dam averaged 43.5 days (Smith 2003). Within each migration year, median migration rate between each pair of dams was substantially greater between Lower Monumental and McNary Dams and between McNary and Bonneville Dams than between pairs of dams upstream from Lower Monumental Dam (Figure 8)

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The survival of both wild and hatchery fish to Lower Granite Dam has varied widely among years and within years with survival declining as the migration season progresses, flows decrease, and water clarity and temperature increases (Connor et al. 2003a, Smith 2003). Certainly, a need exists for an estimated average survival through the Lower Granite Dam reservoir, but with data collected to date, we cannot partition what portion of the mortality occurred within the hydropower system as measures of survival (and travel time) represent both rearing and migration.

Connor et al.(2003a) divided wild subyearling fall chinook salmon into four equally sized cohorts each year (1998-2000), and estimated 57-88% survival to Lower Granite Dam tailrace for the earliest migrating cohort PIT-tagged in early to mid-May to 36% for fish tagged in mid-June. For hatchery subyearling chinook salmon, estimated survival was 35-55% for early June releases, 16-49% for mid-June releases, and 2-24% for the last releases in early July for fish released near Asotin, Washington, at Billy Creek during those years (Figure9) (Smith 2002, 2003).

Estimating survival for subyearling chinook salmon below Lower Granite Dam has also been difficult. Because of lower detection efficiencies (because of lower fish guidance efficiencies for fall chinook), fewer PIT-tagged fish, poor survival to Lower Granite Dam, and fish dispersed over a wide time period, survival for Snake River fall chinook has only been estimated as far as the tailrace of Lower Monumental Dam, and only for fish of hatchery origin (Smith 2002, 2003). Survival between the tailrace of Lower Granite Dam and the tailrace of Lower Monumental Dam has been highly variable, with a general decline in mid to late-August, and much lower overall than for spring migrating yearling chinook salmon (Figure 10).

We have no survival estimates for juvenile fish that migrate in September and October, nor for undetected fish. Based on adult returns, however, the two groups accounted for 14 and 36% of the total adult return from PIT-tagged fish.

Upper Columbia River yearling migrants

Fewer years of PIT-tag data exist for fish stocks from the Upper Columbia River basin compared to those in the Snake River Basin. Nonetheless, the data indicate that juveniles migrating from the Snake And Columbia River basins under normal flow conditions have similar survival (Tables 5 and 6 compared to Tables 8, 9, and 10). This was not the case in the 2001 low-flow year. Fish from the Upper Columbia River had higher estimated survival to the McNary Dam tailrace (hatchery releases) and sometimes Bonneville Dam tailrace (dam releases) than did fish from the Snake River. A spill program existed at upper Columbia River dams in 2001, but not at Snake River dams, thus possibly explaining some of the difference in survival. For fish released at dams, a stock effect may also have played a part. Yearling summer-fall chinook released at Upper Columbia River dams also had higher survival from McNary Dam to Bonneville Dam, whereas

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Table 8. Summary of survival and smolt-to-adult returns for upper Columbia River chinook. Hatchery and wild fish released upstream of Rock Island Dam are designated "Above RIS", hatchery fish released downstream of Rock Island Dam are designated "Below RIS", and wild fish released above the confluence of the Columbia and Yakima Rivers are designated "Above Yakima". Summer chinook released from Wells Hatchery are a separate category. Abbreviations: REL-release site, MCN-McNary Dam, JDA-John Day Dam, BON-Bonneville Dam, RIS-Rock Island Dam.

				REL-MCN		MCN-JDA		MCN-BON	
Year	Release Site	N	SAR	S	se	S	se	S	se
Hatchery spring chinook									
1999	Above RIS	14,894	0.0020	0.570 ^b	0.015	0.890 ^b	0.018		
2000	Above RIS	14,877	0.0095	0.543 ^b	0.051	0.892 ^b	0.064		
2001	Above RIS	15,014	0.0007	0.461	0.036	0.812	0.051	0.640	0.219
2002	Above RIS	404,138	0.0001	0.522	0.017	0.856	0.012	0.742	0.068
2003	Above RIS	355,321	0.0000	0.559	0.025	0.892	0.006	0.710	0.040
Hatchery summer chinook									
	Wells								
1999	Hatchery	5,998	0.0007	0.390 ^b	0.050	1.258 ^b	0.520	1.252	0.675
	Wells								
2000	Hatchery	5,997	0.0005	0.208 ^b	0.020	0.582	0.081	0.404	0.060
	Above RIS	45,981	0.0449	0.962	0.011	0.738	0.012	0.513	0.028
	Wells								
2001	Hatchery	6,000	0.0000	0.214 ^b	0.020	0.407 ^b	0.100		
	Above RIS	90,118	0.0054	0.723	0.026	0.863	0.018	0.679	0.060
	Below RIS	113,333	0.0039	0.817	0.031	0.922	0.009	0.727	0.047
	Wells								
2002	Hatchery	5,992	0.0002	0.450 ^b	0.030	0.792 ^b	0.160	0.952	0.260
	Above RIS	90,125	0.0001	0.771	0.024	0.866	0.013	1.041	0.189
	Wells								
2003	Hatchery	5,996	0.0000	0.449	0.025	1.158	0.456		
	Above RIS	103,907	0.0000	0.787	0.034	0.856	0.035	0.724	0.036
	Below RIS	117,149	0.0000	0.767	0.024	0.942	0.022	0.628	0.120
Hatchery fall chinook									
1999	Below RIS	6,778	0.0012	0.800 ^b	0.037	0.720 ^b	0.017		
2000	Below RIS	6,091	0.0031	0.624 ^b	0.068	0.483 ^b	0.069		
2001	Below RIS	35,762	0.0004	0.667 ^b	0.050	0.683 ^b	0.062		
2002	Below RIS	66,554	0.0008	0.716 ^b	0.019	0.778 ^b	0.030	0.613	0.093
2003	Below RIS	81,253	0.0000	0.558	0.034	0.820	0.042		
Wild spring chinook									
2003	Above RIS	6,402	0.0000	0.324	0.021	1.072	0.033	0.793	0.062
Wild fall chinook									
1999	Above	5,042	0.0014	0.398	0.024	0.833	0.119		

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	Yakima						
	Above	10,967	0.0067	0.432	0.035		
2000	Yakima						
	Above	9,481	0.0005	0.366	0.025	0.563	0.029
2001	Yakima						
	Above	414	0.0000	0.402	0.058	0.696	0.290
2002	Yakima						
	Above	2,975	0.0000	0.315	0.020	0.600	0.122
2003	Yakima						

^aIncludes data from Bickford et al. 2001

^bIncludes data from Columbia Basin Research (www.cbr.washington.edu/pitSurv/)

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Table 9. Summary of survival and smolt-to-adult returns for Yakima River chinook. Fish released at or upstream of Roza Dam are designated "Upper Yakima" and fish released downstream of Roza Dam are designated "Lower Yakima". Abbreviations: REL-release site, MCN-McNary Dam, JDA-John Day Dam, BON-Bonneville Dam.

Year	Release Site	N	SAR	REL-MCN		MCN-JDA		MCN-BON	
				S	se	S	se	S	se
Hatchery spring chinook									
1999	Upper Yakima	39,702	0.0051	0.472	0.023	0.929	0.024		
2000	Upper Yakima	40,417	0.0155 ^a	0.350 ^b	0.024	0.683	0.041		
	Lower Yakima	7,929	0.0193	0.749	0.025	0.683	0.041		
2001	Upper Yakima	41,234	0.0007 ^a	0.228 ^b	0.014	0.757	0.040		
	Lower Yakima	895	0.0000	0.496	0.022	0.812	0.105		
2002	Upper Yakima	40,701	0.0012	0.311 ^b	0.024	0.938	0.036	1.079	0.143
	Lower Yakima	1,261	0.0000	0.520	0.030	0.938	0.036	0.334	0.175
2003	Upper Yakima	41,671	0.0000	0.253	0.030	1.041	0.071	0.951	0.159
	Lower Yakima	4,308	0.0000	0.510	0.022	0.877	0.079	0.802	0.142
Hatchery fall chinook									
1999	Lower Yakima	7,324	0.0016	0.588	0.108	0.669	0.053		
2000	Lower Yakima	4,051	0.0022	0.645	0.119	0.573	0.137		
2001	Lower Yakima	3,979	0.0005	0.330	0.037	0.696	0.113		
2002	Lower Yakima	4,001	0.0005	0.223	0.011	0.867	0.132	0.627	0.230
2003	Lower Yakima	3,987	0.0000	0.183	0.083	0.783	0.071	0.561	0.051
Wild spring chinook									
1999	Upper Yakima	312	0.0032 ^a	0.611 ^b		0.866	0.056		
	Lower Yakima	3,040	0.0069	0.774	0.022	0.866	0.056		
2000	Upper Yakima	6,209	0.0322 ^a	0.487 ^b		0.814	0.055		
	Lower Yakima	5,727	0.0386	0.819	0.036	0.795	0.048		
2001	Upper Yakima	2,179	0.0046 ^a	0.149 ^b		0.631	0.070		
	Lower Yakima	1,606	0.0031	0.688	0.019	0.658	0.055		
2002	Upper Yakima	8,717	0.0001 ^a	0.339 ^b		0.870	0.054	0.801	0.373
	Lower Yakima	3,022	0.0007	0.643	0.010	0.870	0.054	0.545	0.218
2003	Upper Yakima	7,803	0.0000	0.274	0.015	0.883	0.113	0.691	0.271
	Lower Yakima	9,333	0.0000	0.637	0.008	0.768	0.045	0.888	0.067
Wild fall chinook									
1999	Lower Yakima	876	0.0023	0.790	0.021	0.720	0.188		
2000	Lower Yakima	1,979	0.0020	0.272	0.025				

^aIncludes data from Bill Bosch, Yakama Indian Nation (pers. comm.)

^bIncludes data from Neely, 2002.

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Table 10. Summary of survival and smolt-to-adult returns for upper Columbia and Yakima River steelhead. In the upper Columbia River, hatchery fish released upstream of Rock Island Dam are designated “Above RIS” and wild fish were released at Rock Island Dam. In the Yakima River, fish released downstream of Roza Dam are designated “Lower Yakima”. Abbreviations: REL-release site, MCN-McNary Dam, JDA-John Day Dam, BON-Bonneville Dam, RIS-Rock Island Dam.

				REL-MCN		MCN-JDA		MCN-BON	
Year	Release Site	N	SAR	S	se	S	se	S	se
Hatchery summer steelhead									
1999	Above RIS	134,251	0.0039	0.616	0.013	1.016	0.013		
2000	Above RIS	63,227	0.0174	0.607	0.009	0.861 ^a	0.059		
2001	Above RIS	4,029	0.0005	0.203	0.029	0.535	0.146	0.178	0.078
2002	Above RIS	3,623	0.0108	0.529	0.107	1.119	0.168	0.856	0.349
2003	Above RIS	391203	0.0000	0.447	0.014	1.027	0.025	0.800	0.042
Wild summer steelhead									
1999	Rock Island Dam	1,156	0.0043	0.635	0.055	1.103	0.148		
2000	Rock Island Dam	1,200	0.0217	0.679	0.102	0.873	0.224		
2001	Rock Island Dam	1,174	0.0009	0.211	0.022	0.304	0.082		
2002	Rock Island Dam	1,200	0.0100	0.623	0.063	0.680	0.125		
Wild spring-summer steelhead (Yakima)									
1999	Lower Yakima	1,241	0.0048	0.798	0.033	0.967	0.099		
2002	Lower Yakima	1,335	0.0180	0.314	0.054	0.924	0.302	0.560	0.585
2003	Lower Yakima	575	0.0000	0.394	0.099	0.860	0.359		

^aIncludes data from Bickford et al., 2001

spring chinook from the Yakima River did not. The Yakima River spring chinook had survival similar to Snake River spring chinook in the lower river.

We estimated the percent of avian predation on Upper Columbia River stocks in 2001 based on numbers of fish released at up river sites (Table 11). They were lower than for groups from the Snake, but do not take into account mortality from release to the head of the McNary Dam reservoir (wide range in values of survival from release to McNary Dam). If mortality averaged 50% to that point, doubling these recovery estimates indicates about avian predators had similar impacts on Upper Columbia River.

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Table 11. Estimated percent of PIT-tagged salmonids released in the Upper Columbia River basin subsequently found on the bird colonies in the McNary Dam reservoir.

Year	Yearling Chinook Salmon	Steelhead
1999	0.24	1.92
2000	0.26	2.36
2001	1.38	11.49
2002	0.39	3.81
2003 ^a	0.20	1.34

^a Only the Crescent Island Caspian Tern colony sampled

Upper Columbia River subyearling chinook

Between 1999 and 2002, survival was estimated for subyearling fall chinook salmon in the lower Columbia River between the tailraces of McNary and John Day Dams (Smith 2000b, Smith et al. 2002). Fall chinook salmon (primarily wild fish from the Hanford Reach) PIT-tagged at McNary Dam and released to the tailrace 3 to 7 days/week through most of the summer migration had average survival ranging from 58% in 2001 to 78% in 1999 (Table 12).

Table 12. Estimated survival of subyearling fall chinook salmon between the tailrace of McNary and John Day Dams. Standard errors (s.e.) in parentheses.

Year	Survival (s.e.)
1999	0.775 (0.019)
2000	0.774 (0.205)
2001	0.581 (0.016)
2002	0.756 (0.037)

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Relationships among flow, temperature, travel time and survival

Yearling migrants

Smith et al. (2002) investigated relationships between survival and travel time and river conditions for migrant yearling chinook salmon and steelhead in the Lower Snake River. Their study included juveniles migrating through the river segment between Lower Granite and McNary Dam tailrace. They concluded that in this limited segment both species showed strong, consistent relationships between flow volume and travel time, and little to no relationship between flow volume and survival.

Data from the 2002 and 2003 migration years continue to show the same result for steelhead. However, the influence of flow on travel time for juvenile spring-summer chinook salmon is not as clear in these data (Figure 11). In each of those 2 years, the early part of the migration season featured relatively long periods of nearly constant flow. In both years, median travel times for spring-summer chinook salmon decreased throughout the period, even without change in flow. This result suggests that physiological characteristics of juvenile fish (possibly degree of smoltification) that progress throughout the season might have more influence on migration rates than flow.

Smith et al. (2002) may have concluded that chinook salmon travel time was related to flow volume simply because flow volume was correlated with date, and hence smoltification, in most of the years of their study. In fact, 1998 was one year in their data set when the same pattern as in 2002 and 2003 was apparent (Figure 11). Smith et al. (2002) noted that the relationship between flow and travel time in 1998 was different from the other years. Data from recent years might point to a cause of that difference.

Data for steelhead from 2002 and 2003 do not show the same pattern (Figure 12). Flow volume (hence water velocity) apparently continues to heavily influence steelhead travel time.

Snake River Subyearling Chinook Salmon

In the Snake River, the migration rate of subyearling fall chinook salmon during their early rearing phase is not much influenced by flow, but as they grow, develop physiologically, and move farther offshore, their migration rate is related to flow (Connor et al. 2003b, Smith 2003). Significant correlations between survival from release above Lower Granite Dam to the tailrace of Lower Granite Dam were found for flow and temperature for wild fish (Connor et al. 2003a) and flow, temperature, and turbidity for hatchery fish (Smith 2003). Because the environmental variables were highly correlated among themselves, determining the relative importance of individual factors was not possible, but all have plausible biological effects on survival. Anderson (2003) argues that increasing temperature most likely leads toward decreased survival.

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Upper Columbia subyearling chinook salmon

In the McNary Dam tailrace to John Day Dam tailrace reach, the same relationship among survival, flow, temperature, and turbidity exists as it does for Snake River fall chinook salmon, but with only four data points, is not significant (Figure 13).

Transportation

Based on Sandford and Smith (2002) methodologies applied to fish PIT-tagged above Lower Granite Dam from 1993 through 2003, we estimated that the combined annual percentage of the non-tagged yearling fish in the population transported from Lower Granite, Little Goose, Lower Monumental, and McNary Dams ranged from approximately 62% to nearly 100%, as follows:

<u>Year</u>	<u>Wild chinook</u>	<u>Hatchery chinook</u>	<u>Wild steelhead</u>	<u>Hatchery steelhead</u>
1993	88.5	88.1	93.2	94.7
1994	87.7	84.0	91.3	82.2
1995	86.4	79.6	91.8	94.3
1996	71.0	68.7	79.8	82.9
1997	71.1	71.5	87.5	84.5
1998	82.5	81.4	88.2	87.3
1999	85.9	77.3	87.6	88.5
2000	70.4	61.9	83.9	81.5
2001	99.0	97.3	99.3	96.7
2002	72.1	64.2	75.2	70.4
2003	70.4	61.5	72.9	68.4

Thus, clearly the ultimate effect of the FCRPS on yearling fish from the Snake River basin depends to a high degree on the fate of fish transported from it.

Annual SARs for Spring Migrant Fish

Estimated annual SARs for PIT-tagged chinook salmon marked above Lower Granite Dam during outmigration years 1993 to 2000 ranged from 0.05% for non-transported hatchery chinook salmon to 3.08% for transported wild chinook salmon (Table 13). Estimated annual SARs for PIT-tagged steelhead marked above Lower Granite Dam during outmigration years 1993 to 2000 ranged from 0.10% for non-transported hatchery steelhead to 6.45% for transported wild steelhead (Table 14). The default setting for PIT-tagged fish detected at dams where transportation occurs shunts PIT-tagged fish to bypass pipes for return to the river. As these systems are not 100% effective, small numbers of PIT-tagged fish get transported. To transport greater numbers of PIT-tagged fish requires programming into the system, in advance, PIT-tag codes of fish needed for transportation. As a result of these conventions, with the exception of fish marked for the CSS, only incidental numbers of fish PIT-tagged above Lower Granite Dam get transported. These

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small numbers lead to large confidence bounds about SARs. When the 95% confidence bounds between two different groups did not overlap, it indicated a significant difference in SARs between the two groups. Confidence bounds overlapped for all comparison groups of wild spring-summer chinook salmon (Table 15) and wild and hatchery steelhead (Table 16). For hatchery spring-summer chinook salmon, the annual SAR for fish transported from Lower Granite Dam was significantly higher than for non-transported (non-detected category) fish from migration years 1997 - 2000.

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Table13. Annual SARs (with total adult returns) for spring-summer chinook salmon PIT-tagged above Lower Granite Dam and transported between 1993 and 2000, compared to annual SARs of non-detected fish (fish that represent the migration history for the non-tagged population.) Abbreviations. LGR = Lower Granite Dam, LGO = Little Goose Dam, LMO = Lower Monumental Dam, MCN = McNary Dam

Year	Rearing type	<u>Transported from (first time det.):</u>				Non-detected
		LGR	LGS	LMN	MCN	
1993	Wild	0.10 (2)	-	-	-	
	Hatchery	0.09 (4)	-	-	-	0.06 (2)
1994	Wild	0.74 (8)	0.93 (4)	0.18 (1)	-	0.05 (1)
	Hatchery	0.11 (2)	0.12 (1)	0.11 (1)	0.02 (2)	0.09 (7)
1995	Wild	0.39 (7)	0.29 (1)	-	-NA-	0.47 (9)
	Hatchery	0.59 (14)	0.80 (5)	0.37 (1)	-NA-	0.45 (27)
1996	Wild	0.35 (1)	1.10 (1)	-	-	0.20 (4)
	Hatchery	0.30 (6)	-	-	-	0.17 (29)
1997	Wild	0.99 (2)	6.45 (2)	-	-NA-	1.63 (14)
	Hatchery	0.89 (226)	0.69 (5)	0.66 (22)	-NA-	0.67 (162)
1998	Wild	1.30 (11)	0.89 (3)	0.96 (1)	-NA-	1.43 (31)
	Hatchery	1.74 (812)	0.84 (66)	0.57 (7)	-NA-	1.26 (260)
1999	Wild	2.59 (32)	2.15 (9)	1.75 (7)	-NA-	2.08 (73)
	Hatchery	2.75 (697)	2.91 (481)	1.24 (25)	-NA-	1.83 (567)
2000	Wild	1.07 (4)	1.94 (6)	1.00 (2)	-NA-	2.03 (116)
	Hatchery	3.08 (1029)	2.18 (310)	1.76 (86)	-NA-	1.66 (753)

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Table 14. Annual SARs (with total adult returns) for steelhead PIT-tagged above Lower Granite Dam and transported between 1993 and 2000, compared to annual SARs of non-detected fish (fish that represent the migration history for the non-tagged population.) Abbreviations. LGR = Lower Granite Dam, LGO = Little Goose Dam, LMO = Lower Monumental Dam, MCN = McNary Dam

Year	Species	Rearing type	<u>Transported from (first time det.):</u>				Non-detected
			LGR	LGS	LMN	MCN	
1993	Steelhead	Wild	0.24 (2)	-	-	1.85 (1)	-
		Hatchery	0.05 (1)	0.59 (1)	0.59 (2)	-	0.35 (2)
1994	Steelhead	Wild	1.70 (6)	0.46 (1)	0.52 (1)	-	0.93 (6)
		Hatchery	1.08 (21)	-	0.41 (2)	0.07 (1)	0.10 (7)
1995	Steelhead	Wild	-	-	4.17 (1)	-NA-	-
		Hatchery	0.70 (14)	1.60 (5)	-	-NA-	0.90 (11)
1996	Steelhead	Wild	0.99 (1)	-	-	-NA-	0.35 (2)
		Hatchery	0.36 (4)	-	-	-NA-	0.36 (14)
1997	Steelhead	Wild	1.32 (3)	-	-	-NA-	0.22 (1)
		Hatchery	0.60 (10)	-	-	-NA-	0.19 (8)
1998	Steelhead	Wild	0.33 (1)	-	-	-NA-	1.20 (9)
		Hatchery	0.63 (5)	0.24 (1)	0.52 (1)	-NA-	0.93 (24)
1999	Steelhead	Wild	2.49 (6)	4.21 (4)	2.53 (2)	-NA-	2.68 (25)
		Hatchery	0.95 (8)	1.20 (4)	-	-NA-	1.43 (37)
2000	Steelhead	Wild	2.82 (7)	3.08 (4)	2.11 (3)	-NA-	1.78 (36)
		Hatchery	3.04 (14)	0.98 (1)	0.61 (1)	-NA-	0.97 (39)

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Table 15. Confidence intervals (95%) around annual SARs (see Table 13) for chinook salmon PIT-tagged above Lower Granite Dam and transported between 1993 and 2000, compared to intervals around annual SARs of non-detected fish (fish that represent the migration history for the non-tagged population.) Abbreviations. LGR = Lower Granite Dam, LGO = Little Goose Dam, LMO = Lower Monumental Dam, MCN = McNary Dam

Year	Rearing type	<u>Transported from (first time det.):</u>				Non-detected
		LGR	LGS	LMN	MCN	
1993	Wild	0.00 - 0.19	0.00 - 1.01	-	-	-
	Hatchery	0.02 - 0.17	-	-	-	0.00 - 0.17
1994	Wild	0.36 - 1.12	0.19 - 1.58	0.00 - 0.61	-	0.05 - 0.43
	Hatchery	0.00 - 0.27	0.00 - 0.34	0.00 - 0.23	0.00 - 0.03	0.04 - 0.18
1995	Wild	0.22 - 0.62	0.00 - 0.61	-	-NA-	0.20 - 0.58
	Hatchery	0.30 - 0.83	0.33 - 1.38	0.00 - 0.86	-NA-	0.30 - 0.59
1996	Wild	0.00 - 1.43	0.00 - 3.72	-	-NA-	0.00 - 0.46
	Hatchery	0.20 - 0.44	-	-	-NA-	0.12 - 0.21
1997	Wild	0.00 - 2.22	0.00 - 24.2	-	-NA-	0.81 - 2.64
	Hatchery	0.80 - 0.96	0.31 - 1.12	0.00 - 1.35	-NA-	0.60 - 0.74
1998	Wild	0.72 - 2.31	0.28 - 1.58	0.00 - 3.13	-NA-	1.08 - 1.75
	Hatchery	1.66 - 1.81	0.70 - 0.97	0.32 - 0.81	-NA-	1.16 - 1.36
1999	Wild	1.66 - 3.27	0.71 - 3.38	0.93 - 2.80	-NA-	1.73 - 2.36
	Hatchery	2.56 - 2.95	2.62 - 3.09	0.85 - 1.66	-NA-	1.62 - 1.92
2000	Wild	0.25 - 1.91	0.81 - 3.41	0.00 - 1.81	-NA-	1.80 - 2.48
	Hatchery	2.92 - 3.25	1.86 - 2.42	1.31 - 2.31	-NA-	1.40 - 1.71

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Table 16. Confidence intervals (95%) around annual SARs (see Table 14) for steelhead PIT-tagged above Lower Granite Dam and transported between 1993 and 2000, compared to intervals around annual SARs of non-detected fish (fish that represent the migration history for the non-tagged population.) Abbreviations. LGR = Lower Granite Dam, LGO = Little Goose Dam, LMO = Lower Monumental Dam, MCN = McNary Dam

Year	Rearing type	Transported from (first time det.):				Non-detected
		LGR	LGS	LMN	MCN	
1993	Wild	0.00 - 1.67	1.30 - 5.12	0.00 - 2.68	-NA-	0.42 - 1.25
	Hatchery	0.00 - 0.15	0.00 - 1.84	0.00 - 1.72	-	0.00 - 0.99
1994	Wild	0.29 - 2.91	0.00 - 1.69	0.00 - 1.26	-	0.28 - 1.95
	Hatchery	0.68 - 1.52	-	0.00 - 0.89	0.00 - 0.14	0.04 - 0.15
1995	Wild	-	-	0.00 - 11.7	-NA-	0.00 - 1.22
	Hatchery	0.39 - 1.25	0.62 - 3.15	-	-NA-	0.50 - 1.23
1996	Wild	0.00 - 3.96	-	-	-NA-	0.00 - 1.04
	Hatchery	0.17 - 0.57	-	-	-NA-	0.17 - 0.53
1997	Wild	0.00 - 2.59	-	-	-NA-	0.00 - 0.55
	Hatchery	0.23 - 1.08	-	-	-NA-	0.07 - 0.28
1998	Wild	0.00 - 1.01	-	-	-NA-	0.56 - 1.94
	Hatchery	0.14 - 1.25	0.00 - 0.70	0.00 - 1.64	-NA-	0.65 - 1.22
1999	Wild	0.81 - 4.48	1.07 - 9.01	0.00 - 8.11	-NA-	1.06 - 2.20
	Hatchery	0.49 - 1.64	0.59 - 2.00	-	-NA-	1.08 - 1.86
2000	Wild	0.46 - 5.88	0.79 - 4.61	0.00 - 4.93	-NA-	1.30 - 2.31
	Hatchery	1.54 - 4.61	0.00 - 2.76	0.00 - 2.59	-NA-	0.60 - 1.34

Annual SARs for PIT-tagged juvenile spring-summer chinook salmon marked at Lower Granite Dam during outmigration years 1995 to 2000 ranged from a low of 0.06% for non-transported fish to a high of 2.10% for transported fish (Table 17). Annual SARs for PIT-tagged juvenile steelhead marked at Lower Granite Dam during outmigration years 1998 to 2000 ranged from a low of 0.24% for non-transported to 4.43% for transported fish (Table 18). The fish included in these results were first-time detections at the respective dam. For fish marked at Lower Granite Dam, first time detection was defined as after release from Lower Granite Dam (non-detected fish represented the route of passage of the non-tagged population downstream of Lower Granite Dam). Annual adult returns for wild spring-summer chinook salmon collected and marked at Lower Granite Dam were high enough that sufficiently narrow confidence bounds existed to indicate significantly higher annual SARs for transported fish in 1995 and 1999, but not in 1996, 1998, and 2000 (Table 19). The annual SARs of transported wild and hatchery steelhead

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were significantly higher for transported fish than non-transported fish from both the 1999 and 2000 outmigration (Table 20). Too few fish returned from marking in 1998 to determine differences in return rates.

Table 17. Annual SARs (with total adult returns) for spring-summer chinook salmon PIT-tagged at Lower Granite Dam for transportation studies between 1995 and 2000, compared to annual SARs of non-detected fish (fish that represent the migration history for the non-tagged population).

Year	Rearing type	Transported from:				Non-detected
		LGR	LGS	LMN	MCN	
1995	Wild	0.38 (92)	0.24 (8)	0.28 (4)	-	0.23 (26)
	Hatchery	0.54 (450)	0.37 (17)	0.30 (5)	-	0.32 (123)
1996	Wild	0.11 (9)	-	-	-	0.06 (3)
	Hatchery	0.13 (47)	0.10 (1)	-	-	0.11 (27)
1997		No studies				
1998	Wild	0.60 (34)	-	-	-NA-	0.95 (28)
	Hatchery	0.62 (245)	0.32 (6)	0.19 (2)	-NA-	0.57 (134)
1999	Wild	2.10 (176)	0.70 (1)	2.41 (15)	-NA-	1.35 (26)
	Hatchery	1.97 (833)	2.09 (12)	1.47 (50)	-NA-	1.45 (242)
2000 ^a	Wild	-NA-	1.47 (255)	0.66 (7)	-NA-	1.44 (385)
	Hatchery	-NA-	-NA-	-NA-	-NA-	-NA-

^a Fish were tagged at Lower Granite Dam, released into tailrace and collected and transported from Little Goose Dam.

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Table 18. Annual SARs (with total adult returns) for steelhead PIT-tagged at Lower Granite Dam for transportation studies between 1998 and 2000, compared to annual SARs of non-detected fish (fish that represent the migration history for the non-tagged population).

Year	Rearing type	Transported from:				Non-detected
		LGR	LGS	LMN	MCN	
1998	Wild	-	0.35 (1)	0.72 (3)	-NA-	0.37 (7)
	Hatchery	-	0.71 (7)	0.24 (2)	-NA-	0.41 (24)
1999	Wild	1.42 (86)	0.80 (1)	2.27 (9)	-NA-	0.54 (8)
	Hatchery	1.08 (442)	1.43 (15)	0.99 (22)	-NA-	0.79 (82)
2000	Wild	-NA-	3.96 (979)	4.43 (101)	-NA-	1.85 (435)
	Hatchery	-NA-	1.99 (11)	1.73 (11)	-NA-	0.85 (79)

^a Fish were tagged at Lower Granite Dam, released into tailrace and collected and transported from Little Goose Dam.

Table 19. Confidence intervals (95%) around annual SARs (see Table 17) for spring-summer chinook salmon PIT-tagged at Lower Granite Dam for transportation studies between 1995 and 2000, compared to intervals around annual SARs of non-detected fish (fish that represent the migration history for the non-tagged population).

Year	Rearing type	Transported from:				Non-detected
		LGR	LGS	LMN	MCN	
1995	Wild	0.30 - 0.45	0.17 - 0.59	0.07 - 0.49	-	0.17 - 0.28
	Hatchery	0.51 - 0.57	0.26 - 0.49	0.13 - 0.50	-	0.28 - 0.36
1996	Wild	0.05 - 0.18	-	-	-	0.02 - 0.15
	Hatchery	0.10 - 0.17	0.00 - 0.21	-	-	0.07 - 0.14
1997		No studies				
1998	Wild	0.46 - 0.77	-	-	-NA-	0.61 - 1.28
	Hatchery	0.58 - 0.68	0.16 - 0.55	0.00 - 0.38	-NA-	0.48 - 0.65
1999	Wild	1.83 - 2.42	0.00 - 2.99	1.51 - 4.00	-NA-	0.94 - 1.80
	Hatchery	1.90 - 2.06	1.05 - 3.25	1.29 - 1.71	-NA-	1.32 - 1.60
2000 ^a	Wild	-NA-	1.36 - 1.57	0.39 - 0.95	-NA-	1.36 - 1.57
	Hatchery	-NA-	-NA-	-NA-	-NA-	-NA-

^a Fish were tagged at Lower Granite Dam, released into tailrace and collected and transported from Little Goose Dam.

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Table 20. Confidence intervals (95%) around annual SARs (see Table 18) for steelhead PIT-tagged at Lower Granite Dam for transportation studies between 1998 and 2000, compared to intervals around annual SARs of non-detected fish (fish that represent the migration history for the non-tagged population).

Year	Rearing type	LGR	Transported from:		MCN	Non-detected
			LGS	LMN		
1998	Wild	-NA-	0.00 - 1.05	0.00 - 1.77	-NA-	0.16 - 0.61
	Hatchery	-NA-	0.10 - 1.36	0.00 - 0.69	-NA-	0.27 - 0.56
1999	Wild	1.19 - 1.70	0.00 - 2.39	1.16 - 3.70	-NA-	0.27 - 0.94
	Hatchery	1.02 - 1.14	1.00 - 1.83	0.78 - 1.19	-NA-	0.63 - 0.92
2000 ^a	Wild	-NA-	3.80 - 4.12	3.82 - 5.10	-NA-	1.71 - 1.98
	Hatchery	-NA-	1.01 - 3.37	0.87 - 2.85	-NA-	0.71 - 1.06

^a Fish were tagged at Lower Granite Dam, released into tailrace and collected and transported from Little Goose Dam.

Annual Estimates of Differential Post-Bonneville Dam Survival (D): Transport Location-Specific and Overall

Ultimately, management decisions must consider temporal variation within seasons in SARs for transported and non-transported fish. Other sections in this document include extensive discussion of temporal estimates of SARs and, by extension, temporal variation in for T/I ratios and differential post-Bonneville Dam survival. Here we summarize data on annual estimates of D. Annual estimates provide a general description of differences in return rates between transported and non-transported groups, and differences between transport locations. Again, we must repeat our caution that annual estimates of D require careful interpretation and have value only when considered in conjunction with in-season variation. Annual estimates of D are potentially misleading when there are large in-season variations.

Large adult returns in recent years have generally improved our ability to estimate differential post-Bonneville Dam survival separately for each transportation dam, and greatly increased the precision on the overall estimate. In all four cases of hatchery and wild Snake River spring-summer chinook salmon and steelhead, the greatest number of returning PIT-tagged adults have occurred in 1999 and 2000 (Tables 21 through 24).

No apparent consistent results exist. To summarize results, we offer the following, sometimes tentative, observations and conclusions:

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(1) For all four species and rearing-type combinations, the geometric mean annual estimated D from migration years 1994 through 2000 ranges between 0.55 and 0.63. That is, averaged over years and throughout migration seasons, survival for transported fish from below Bonneville Dam as a juvenile to return as an adult has averaged less than two-thirds that of the non-transported fish that arrived below Bonneville Dam.

(2) Wild and hatchery spring-chinook salmon transported from Lower Monumental Dam have had the lowest average post-Bonneville Dam survival. Average in-river survival from Lower Monumental Dam to Bonneville Dam has exceeded this average “D”, indicating that fish not transported from Lower Monumental Dam have higher average annual SARs than fish transported from the site.

(3) For wild spring-summer chinook salmon, average post-Bonneville Dam survival for fish transported from Lower Granite Dam has roughly equaled the average survival of non-transported fish that migrated between Lower Granite and Bonneville Dams. Wild chinook salmon transported from Lower Granite Dam in 2000 had particularly low annual post-Bonneville Dam survival.

(4) For hatchery spring-summer chinook salmon and hatchery steelhead, average post-Bonneville Dam survival for fish transported from Lower Granite Dam has considerably exceeded the average estimated survival for the non-transported fish that migrated between Lower Granite and Bonneville Dams. (Data are not sufficient to judge for wild steelhead).

(5) It is very difficult to estimate annual D values precisely. For example, even with more than 2,000 returns of hatchery chinook salmon in 2000, a wide 95% confidence interval still existed (Table 22). The number of juvenile fish from the outmigration, however, provided the ability to make a relative precise estimate for survival for non-transported fish that migrated between Lower Granite and Bonneville Dams.

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Table 21. Annual estimates of differential post-Bonneville survival (D) for Snake River wild spring-summer chinook salmon transported from various dams and for weighted average from all sites. Total adult returns are provided in parentheses (when 0 adults in a category, the number of juveniles is given as well). Non-transported PIT-tagged fish represent passage histories most representative of non-tagged fish that migrated to Bonneville Dam. All fish were tagged upstream from Lower Granite Dam. Approximate 95% confidence interval for weighted average given in brackets.

Year	Non-transported	Transported all sites	Transported LGR	Transported LGO	Transported LMO
1994	(6)	0.683 (13) [0.254, 1.844]	0.770 (8)	1.187 (4)	0.239 (1)
1995	(10)	0.457 (8) [0.177, 1.184]	0.559 (7)	0.467 (1)	(0/195)
1996	(5)	1.081 (2) [0.202, 5.783]	0.688 (1)	2.453 (1)	(0/43)
1997	(17)	0.498 (4) [0.162, 1.539]	0.224 (2)	1.262 (2)	(0/14)
1998	(48)	0.430 (15) [0.238, 0.783]	0.480 (11)	0.334 (3)	0.421 (1)
1999	(104)	0.656 (48) [0.460, 0.934]	0.730 (32)	0.641 (9)	0.563 (7)
2000	(174)	0.336 (12) [0.184, 0.613]	0.245 (4)	0.474 (6)	0.274 (2)
geometric mean: 0.553			0.478	0.779	0.353

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Table22. Annual estimates of differential post-Bonneville survival (D) for Snake River hatchery spring-summer chinook salmon transported from various dams and for weighted average from all sites. Total adult returns are provided in parentheses (when 0 adults in a category, the number of juveniles is given as well). Controls are PIT-tagged fish with passage histories most representative of nontagged fish that migrated to Bonneville Dam in-river (control adults given in parentheses next to year label). All fish were tagged upstream from Lower Granite Dam. Approximate 95% confidence interval for weighted average given in brackets.

Year	Non-trans-ported		Transported all sites		Transported LGR		Transported LGO		Transported LMO
1994	(7)	0.316	(6) [0.104, 0.963]	0.314	(2)	0.445	(1)	0.468	(1)
1995	(32)	0.886	(20) [0.501, 1.572]	0.808	(14)	1.238	(5)	0.661	(1)
1996	(32)	0.409	(6) [0.168, 0.995]	0.780	(6)		(0/510)		(0/366)
1997	(185)	0.523	(233) [0.430, 0.639]	0.561	(226)	0.469	(5)	0.517	(2)
1998	(336)	0.638	(885) [0.561, 0.727]	0.829	(812)	0.405	(66)	0.319	(7)
1999	(736)	0.903	(1203) [0.821, 0.993]	0.930	(697)	1.036	(481)	0.477	(25)
2000	(915)	0.870	(1426) [0.798, 0.948]	0.961	(1030)	0.726	(310)	0.658	(86)

* 2 fish transported from McNary Dam returned as adults; estimated differential post-Bonneville Dam survival for McNary transport = 0.098.

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Table 23. Annual estimates of differential post-Bonneville survival (D) for Snake River wild steelhead transported from various dams and for weighted average from all sites. Total adult returns are provided in parentheses (when 0 adults in a category, the number of juveniles is given as well). Controls are PIT-tagged fish with passage histories most representative of nontagged fish that migrated to Bonneville Dam in-river (control adults given in parentheses next to year label). All fish were tagged upstream from Lower Granite Dam. Approximate 95% confidence interval for weighted average given in brackets.

Year	Non-trans-ported		Transported all sites	Transported LGR	Transported LGO	Transported LMO
1994	(6)	0.531	(8) [0.178, 1.581]	0.663 (6)	0.211 (1)	0.266 (1)
1995	(1)	0.981	(1) [0.058, 16.710]	(0/287)	(0/66)	10.023 (1)
1996	(5)	0.978	(2) [0.181, 5.279]	0.678 (1)	2.214 (1)	(0/11)
1997	(4)	0.536	(3) [0.115, 2.492]	0.844 (3)	(0/44)	(0/23)
1998	(9)	0.118	(1) [0.014, 0.976]	0.165 (1)	(0/93)	(0/93)
1999	(18)	1.013	(12) [0.475, 2.163]	0.735 (6)	1.343 (4)	0.882 (2)
2000	(41)	0.691	(14) [0.368, 1.296]	0.660 (7)	0.801 (4)	0.613 (3)

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Table 24. Annual estimates of differential post-Bonneville survival (D) for Snake River hatchery steelhead transported from various dams and for weighted average from all sites. Total adult returns are provided in parentheses (when 0 adults in a category, the number of juveniles is given as well). Controls are PIT-tagged fish with passage histories most representative of nontagged fish that migrated to Bonneville Dam in-river (control adults given in parentheses next to year label). All fish were tagged upstream from Lower Granite Dam. Approximate 95% confidence interval for weighted average given in brackets.

Year	Non- trans- ported	Transported all sites	Transported LGR	Transported LGO	Transported LMO
1994	(7)	2.707 (23) [1.140, 6.429]	3.684 (20)	(0/1007)	1.943 (2)
1995	(14)	0.435 (19) [0.214, 0.884]	0.392 (14)	0.996 (5)	(0/88)
1996	(17)	0.294 (4) [0.097, 0.896]	0.446 (4)	(0/353)	(0/94)
1997	(8)	0.968 (10) [0.374, 2.505]	1.615 (10)	(0/158)	(0/119)
1998	(26)	0.326 (7) [0.139, 0.767]	0.374 (5)	0.152 (1)	0.373 (1)
1999	(41)	0.332 (12) [0.171, 0.642]	0.336 (8)	0.457 (4)	(0/250)
2000	(41)	1.051 (14) [0.562, 1.967]	1.291 (13)	(0/102)	0.345 (1)

* In 1994, 1 fish transported from McNary Dam returned as an adult; estimated differential post-Bonneville Dam survival for McNary Dam transport = 0.417.

Temporal SARs for Spring Migrant Fish

The transportation evaluations based on PIT-tagged juvenile fish have provided information on variability in SARs within season. Not only do SARs vary over the course of the outmigration, but timing of the variation changes year to year. The transport group has the most fluctuation. For hatchery and wild spring-summer chinook salmon, SARs of transported fish generally increase as the season progresses, with a significant increase somewhere between mid-April to mid-May (Figures 14 and 15). For wild steelhead, we have only two years of data. Data from 1999 shows the same pattern as for chinook salmon, but results from the 2000 study show the opposite, very high SARs right from the beginning with a dramatic decrease after the first week of May (Figure 16).

The SARs of non-transported fish also vary, but move in a general downward trend as the outmigration progresses (Figures 14, 15, 16). The variation in both transport and non-transport SARs observed during this series of transport studies show that annual T/Is should not be used as the basis for management decisions. During periods when D exceeded the estimated juvenile

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survival of non-transported migrants, transported fish returned at higher rates than non-transported fish.

Temporal D Within Season

Snake River yearling migrants

Combining the temporal variability of SARs from transported and non-transported fish, and the relatively constant within-year survival estimated for non-transported fish, estimates of D vary temporally within season (Figures 17 - 19). During periods when the estimated value of D exceeded the estimated survival of non-transported fish, transported fish had higher return rates.

Upper Columbia River subyearling migrants

In both 1995 and 1996, subyearling chinook salmon transported from McNary Dam generally had higher return rates than non-transported fish when flows at the dam exceeded approximately 6,500 m³/second (approximately 225,000 cfs) and water temperatures remained below 18 °C (Figures 20 and 21). These results suggest that transporting subyearling chinook salmon under conditions of higher water temperatures and lower flows decreases adult return rates compared to returning fish to the river. They also contrast to studies in the early 1980s conducted at the old juvenile facility at McNary Dam, where transported fish returned at 2 to 4 times the rate of fish released to the tailrace of the dam. In 2001 and 2002 we PIT-tagged subyearling chinook salmon at McNary Dam for additional transportation evaluations to determine if results from the 1995 and 1996 studies apply under the apparently improved ocean conditions that began in 1999.

Delayed mortality

We observed estimated annual D values of only 0.5 to 0.6 for wild yearling chinook salmon. This differential mortality of transported fish results in lower return rates of transported fish than expected from their direct survival. Given that estimates of adult return rates for the unmarked population of wild Snake River spring-summer chinook salmon in the last several have averaged nearly 4%, little room exists to presume any additional delayed mortality for the non-transported population. If a higher estimated D existed for transported fish, SARs for the population would increase. A change in transportation operations that increased D by 50% (from 0.55-0.60 to approximately 0.8) would also lead to nearly an equivalent increase in SARs, or to nearly 6% for spring-summer chinook. This value may reach the upper limit of possible adult returns. Any delayed mortality of the non-transported fish would increase this value even further. Thus, our conclusion that non-transported fish not experience delayed mortality (or have very little).

Results from the analyses of PIT-tagged fish with various detection histories in the hydropower system found no differences in return rates for wild chinook salmon or wild steelhead

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from either the 1999 or 2000 outmigrations (Figures 22 and 23). Hatchery adult returns continued to show a negative association with bypass history. For hatchery chinook salmon and steelhead, in several years, fish detected only at LGO, LMO, or MCN had significantly lower adult return rates than non-detected fish (Figures 24 and 25). Wild chinook salmon detected only at LGR in 1998 and 2000 had significantly higher adult return rates than non-detected fish (Figure 25). Juvenile survival estimates within the hydropower system appear nearly the same for wild and hatchery fish (Muir et al. 2001) and subsequent annual survival reports to BPA), indicating that any differential survival of hatchery fish occurred after they migrated below the hydropower system.

However, observations of differential adult return rates does not necessarily provide evidence that some bypass systems have more impact on fish than others or that the act of passing through bypass systems decreases fitness. Zabel et al. (In review) demonstrated that smaller fish are consistently detected at higher rates than larger ones at all three dams and for all fish groups examined (Figures 2 and 3). Coupled with the results from Zabel and Williams (2002) that larger spring-summer chinook salmon smolts return at higher rates than smaller ones, this may, at least partially, explain why multiple-bypassed fish return rates appeared lower than undetected ones in some years (Sandford and Smith 2002). However, the relationship between detection probability and fish length does not appear to bias survival estimates (Figure 4).

Selective Mortality

When we updated the results from Zabel and Williams (2002) by adding more years (1998 through 2000 for Snake River spring/summer chinook) and Snake River steelhead for 1999 and 2000, the main conclusions still held: return rates are strongly influenced by the size of individuals and the timing of their outmigration. Selectivity mortality based on fish length was generally not as strong in 1998 through 2000 as it was in 1995 and 1996 for spring/summer chinook salmon (perhaps due to better ocean conditions), although the level of length-based selective mortality was similar across years for transported wild fish (Figure 26, top plot). For the two years of data on return rates of steelhead, we observed strong length-based selective mortality, with all groups of steelhead incurring greater selective mortality than their chinook counterparts (Figure 26, top plot). Non-transported spring/summer chinook salmon that migrated earlier in the season typically returned at higher rates as demonstrated by negative selection coefficients ($P < 0.05$ for 4 out of 5 years for wild fish and 3 out of 5 for hatchery fish). While the magnitude of timing-based selection varied yearly for non-transported migrants, the pattern of variability was consistent among hatchery and wild chinook and steelhead, with strong selection in 1995, 1998, and 2000 and weaker selection in 1995 and 1999 (Figure 26, bottom plot). Timing-based selection was variable for transported fish, with fish transported early in the season returning at higher rates in some years, and fish transported later returning at higher in other years. Also, there was little consistency between wild and hatchery chinook salmon.

DISCUSSION

Snake River Wild Spring-summer Chinook Salmon

General

By any measure, Snake River spring-summer chinook abundance has increased dramatically in the last few years. We believe this is largely due a shift in ocean conditions, and that variability in ocean conditions is likely the most important driver of temporal patterns of abundance. However, the relative role of the hydropower system in overall stock performance is still uncertain. We do believe that improvements made to the hydropower system over the last three decades were crucial for preventing even more drastic declines during a period of poor ocean conditions and that impacts of the hydropower system are likely more important during poor ocean conditions. Unfortunately, we cannot reliably predict future ocean conditions, and thus we cannot rely on the persistence of good ocean conditions. With predictions of increased global warming in the near future, ocean conditions may actually become worse than any we have experienced. For these reasons, we must continue to assess the impacts of the hydropower system in the context of all impacts, including impacts occurring in both seawater and freshwater habitats.

Studies aimed at understanding the effects of the FCRPS have generally led to conclusions that return rates of fish from the mid-1970s through late 1990s did not meet the 2 to 6% SAR range deemed necessary for recovery of the listed stocks. With the exception of recruit/spawner analyses on the unmarked population that included adult returns through 1997/98, nearly all studies and analyses relied on results from fish PIT-tagged as juveniles and we now have evidence that PIT-tagged fish may return at lower rates than the untagged population. In recent years, a few groupings of PIT-tagged wild spring-summer chinook salmon attained SARs of 2%. From the 1999 and 2000 outmigrations, wild chinook salmon PIT-tagged at traps above Lower Granite Dam had SARs of 2.0 and 2.4%, respectively. Most other groupings of fish had lower returns. Based on estimates of historic SARs (catch + escapement), SARs of wild fish always exceeded those of hatchery fish (Figure 27). Somewhat surprisingly, in recent years estimated SARs of many groups of PIT-tagged hatchery fish have exceeded those of wild fish. For example, wild fish PIT-tagged above and transported from Lower Granite and Little Goose Dams in 1999 and 2000 had average SARs of 2.37 and 1.51%, respectively. For the same years, PIT-tagged hatchery fish had SARs of 2.83 and 2.63%, respectively. We hypothesize this results from PIT-tagging impacts on fish, with wild fish suffering greater impacts than larger wild fish. Within the wild chinook salmon category, evidence of a PIT-tagging effect exists. All SAR estimates for the composite population as a whole (1997 through 2003 complete adult returns) exceed SAR estimates based on PIT-tagged fish from those same years. Lower return rates for PIT-tagged fish compared to production releases were also found for some groups of fish used in the CSS evaluations (2003). Thus, we conclude that although PIT-tagged wild chinook salmon provide useful data when assessing the difference in return rates of different treatment groups, they do not provide good information on absolute adult returns of fish.

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On the other hand, high SAR estimates for the unmarked population should not come as a surprise. As outlined in the introduction, they have varied historically (although we only have empirical estimates for Snake River fish since 1964). Further, unlike data derived from PIT-tagged fish, wild chinook SAR estimates based on the untagged population exceed the SARs of hatchery fish, as expected based on historical relationships. Williams and Matthews (1995) found that conditions in the hydropower system had improved tremendously from those that initially caused large losses of juvenile migrants (Raymond 1979). Williams et al. (2001) also found that survival of yearling Snake River chinook salmon through the present 8 dams of the mainstem FCRPS recently matched or exceeded those estimated to have occurred when the mainstem FCRPS had only 4 dams. Without actual measures of survival, but under the presumption of success from transportation, Raymond (1988) and Williams (1989) predicted that large returns of Snake River spring-summer chinook salmon could once again occur if ocean conditions improved. Based on recent research by Peterson and Schwing (2003), ocean conditions did change for the better in 1999. Already, based on returns in the last decade, the population growth rate $[\ln(\text{brood year } N = \text{escapement over upper dam of the current brood year} / \text{brood year } N-1 = \text{escapement over the upper dam of brood year producing current brood year})]$ has exceeded 1.0 for 6 straight years (the longest stretch since records began in the 1960s) (Figure 28). But, we do not know how long these improved conditions will last. Based on new modeling tools that predict adult returns based on ocean conditions juveniles encountered during their first several months at sea, we do at this time predict good adult returns from the juvenile outmigrations through 2003 (with adults returning through 2006) (Scheuerell In review). As stated, the earlier predictions of good returns depended not only on good ocean conditions, but also depended on favorable transportation of fish. We identified above that on an annual basis transported wild Snake River spring-summer chinook salmon have had return rates similar to fish that migrated through the hydropower system. Thus, they have an equivalent survival as high or higher than stocks that migrated through 4 dams in the hydropower system in the 1960s.

Transportation

As the recent annual survival estimates for Snake River yearling chinook salmon that migrate through the hydropower system have averaged near 50%, and typically 20-30% (sometimes as low as 1%) of the fish arriving at Lower Granite Dam do not get transported, transported fish provide more than 85% of the live smolts arriving below Bonneville Dam. Thus, clearly, the large majority of adult returns come from fish transported as juveniles. The data also clearly show transported fish have a differential survival (D) (they survive at lower rates) downstream of Bonneville Dam compared to fish that migrated through the hydropower system (they survive at higher rates). Further, and but more importantly, the data show the D-value changes throughout the migration season. When the D-value exceeds the estimated survival of fish migrating through the hydropower system, then transportation will return more fish. When it is lower, choosing not to transport fish may provide additional adult returns. Migration timing of transported fish appears the key.

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Yearling chinook salmon transported by barge from Snake River dams arrive to their release point below Bonneville Dam typically in about 1.5 days while those that migrate through the 7 remaining dams take from 3 to 4 weeks early in the migration season to less than 2 weeks by the end of May (Smith 2000a, b, Zabel 2001). Thus, smolts marked at on the same day, but either transported or returned to the river most likely encounter different physical and biological conditions within the estuary and nearshore ocean upon their arrival. The Columbia River estuary and nearby ocean are very dynamic environments. Coastal winds, upwelling, currents, sea surface temperatures, and other physical conditions such as plume structure can change very quickly (Garcia Berdeal 2002). Large changes in biological conditions (such as forage fish abundance and predatory fish abundance) in the plume (Emmett 2000, 2001) and the estuary (R. L. Emmett, NOAA Fisheries, personal communication) have been observed between and within years. Growth and survival of salmonids in their first days and months at sea appear critical in determining overall salmonid year class strength. This is based on the relationship between returns of jack salmon with numbers of adults returning from the same brood class in later years, and between ocean purse seine catches of juvenile salmonids in June and subsequent jack and adult returns (Pearcy 1992).

Since transported fish generally enter the ocean 2 to 3 three weeks prior to non-transported fish, they most likely face greatly differing environmental conditions. Therefore, much of the observed seasonal average delayed mortality for transported fish could simply results from varying ocean conditions at their time of ocean entry. This comports with estimates of *D* observed in the Comparative Survival Study (CSS) where *D* was lowest for the earliest migrating stocks (Lookingglass and Dworshak hatcheries) and highest for the later migrants from McCall and Imnaha River acclimation ponds ((CSS) 2003).

This analysis of seasonal trends in post-Bonneville survival suggests that within-season variation could have important implications for management decisions, and that the implications are missed if this variation is ignored when only a single seasonal estimate of *D* is calculated. If the efficacy of transportation is largely determined by time of ocean entry, then delay of arrival below Bonneville Dam for early migrating stocks should increase their survival. Alternatively, for early migrating hatchery stocks, later hatchery release dates might lead toward a later arrival date at transport dams.

The smoltification process in salmonids causes morphological, behavioral, and physiological changes that affect downstream migration as well as the ability to survive in the marine environment. This process is regulated by developmental stage, photoperiod, and water temperature cues that enable salmonids to migrate when environmental conditions are most favorable for downstream passage and survival in the seawater environment (Folmar 1980, Wedemeyer 1980). The act of migration further stimulates smolt development (Zaugg 1985, Muir et al. 1994). Spring-summer chinook salmon and steelhead migrations in the Snake and Columbia Rivers show the same seasonal patterns each year, beginning in early April and tailing off near the end of May. Zaugg and Wagner (1973) found that gill $\text{Na}^+ - \text{K}^+$ ATPase (an indicator of migratory readiness) and migratory urge declined at water temperatures of 13°C and above.

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Steelhead that migrate too late in the season when water temperatures are above this threshold have a tendency to residualize. Although this same behavior has not been demonstrated in spring-summer chinook salmon, exposure to water temperatures above 13°C has been shown to retard gill $\text{Na}^+\text{-K}^+$ ATPase activity (Muir et al. 1994, Muir 2003). Construction of the FCRPS has altered the timing of smolt migrations. Regardless of when fish arrive at Lower Granite Dam, those not transported most certainly take longer to migrate through the entire FCRPS and arrive later at the ocean than they did historically. Further, transported fish cover the distance more quickly and arrive at the ocean sooner than they would have in an unregulated system.

The hypotheses that transportation induced stress or disease transmission (Budy et al. 2002) causes lower adult returns is not supported by the temporal variability in measured values of D and SARs. If these hypotheses held true, we would not expect to see the much higher SARs and D values later in the season. It appears more likely that early transported fish arrive too soon to the estuary. .

Although D values below 1.0 indicate a differential mortality between transported and non-transported fish, we expect that as some of the fish transported would die due to natural selection if they had continued their downstream migration through the hydropower system. Very low values of D, however, indicate a substantial delayed mortality after release from transportation barges. Aside from a differential mortality between the upper dams on the Snake River from where they were transported (2% assumed), compared to fish that migrated to below Bonneville Dam (ca. 50% mortality), the two groups marked on the same day have substantially different timing to the ocean (a differential ranging from 20-25 days for the earliest fish to 15 days or less for the latest fish). This difference in timing likely accounts for D values greater than 1 often observed nearer the end of the migration period. We presume that the latest migrants leaving Lower Granite Dam miss the “window of opportunity” for the best survival conditions by arriving too late below Bonneville Dam. Thus, on average, when the annual weighted D is matched with the average survival through the hydropower system, overall effective survival of fish downstream of Bonneville Dam meets or exceeds estimated values from the 1960s.

With the low number of adult returns of PIT-tagged fish to date, especially for wild fish, definitive conclusions are not possible. We tentatively conclude that D-values for fish transported from McNary Dam are lower than for dams farther upstream. Combined with the higher survival to Bonneville Dam for fish left in the river at McNary Dam, it appears that a spring transportation program at McNary Dam would provide marginal benefits (at best) to Snake River stocks. There is no evidence that D-values for chinook salmon transported from Little Goose Dam are lower than for fish transported from Lower Granite Dam.

Although annual SARs for fish PIT-tagged above Lower Granite Dam generally exceed those of fish PIT-tagged at Lower Granite, ratios (T/Is) of return rates for the transported compared to non-transported (non-detected) fish are similar. Thus, results from studies with fish PIT-tagged at Lower Granite Dam provide information on the relative differences in return rates

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of transported and non-transported fish in the population. The numbers of wild fish tagged above Lower Granite Dam that are estimated to arrive at the dam are very small, and the vast majority of these fish are bypassed back to the river; therefore, the SARs of transported and non-detected wild fish tagged above Lower Granite Dam have large standard errors. This makes statistical power very low to show differences in return rates among fish with different juvenile migration histories.

If D varies from location to location, a combination of strategies at different locations might maximize survival of migrants. For instance, if D is high for fish transported from Lower Granite Dam, but low for fish transported from dams farther downstream, it might make sense to choose configurations and operations to maximize collection and transportation of smolts at Lower Granite Dam, but to not collect and transport fish at downstream dams. This strategy would involve eliminating spill at Lower Granite Dam and spilling to cap and full bypass operations at all other dams. Options to change collection strategies at dams to potentially benefit spring chinook salmon, of course, may have no effect or negative effect for other species.

Flow, Temperature, and Migration Timing

The first fish PIT-tagged spring-summer chinook salmon to arrive at Lower Granite Dam had tended to have higher migration rates than PIT-tagged fish that arrived later at the dam (Figures 29 and 30). In contrast, these same fish that arrived earliest had lower migration rates through the hydropower system than fish that arrived later. Also the fish that arrived earliest at Lower Granite Dam from traps upstream of the dam took more time to migrate through the hydropower system than fish that arrived more slowly from the traps. In fact, surprisingly and contrary to nearly all previous results, where we have long constant periods within years with relatively steady flow, we found little relationship between migration rates and flow.

Differential Guidance and Implications to Results

The analysis of Zabel et al. (In review) clearly demonstrated a negative relationship between detection probability and fish size for juvenile Snake River spring-summer chinook salmon and Snake River steelhead. Their results show differential propensity for collection of small fish at dams. Thus, collected fish do not represent a random sample of the migrant population. This result coupled with the observation by Zabel and Williams (2002) (see also an update in Tables 25 and 26) that smaller juvenile salmon return at lower rates suggest that fish detected in juvenile bypass systems return at lower rates than non-detected fish. Thus, transportation evaluations of PIT-tagged fish marked above a dam, then collected and barged compared to non-detected fish serving as controls may produce biased results. Also, the observation that, for some years, multiply-detected fish return at lower rates than non-detected ones (Budy et al. 2002, Sandford and Smith 2002) may arise directly from differences in innate survival for different-sized fish passing through different routes at dams. The difference in sizes of fish are most pronounced for steelhead, and somewhat less for chinook.

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Table 25. Sample size (N), mean length (mm) at tagging (standard error in parentheses) for the total tagged population and returning adults of Snake River spring-summer chinook salmon PIT tagged at Lower Granite Dam. δ is the selection coefficient (see text), and the P -value is based on a Monte Carlo test to determine if is greater than zero. If $P < 0.05$, then d is significantly greater than zero at the $\alpha = 0.05$ level.

Release group	Total population		Returning adults		Percent return	δ	<i>P</i> -value
	<i>N</i>	Mean length (s.e.)	<i>N</i>	Mean length (s.e.)			
1995							
Non-transport W	5331	107.37 (0.112)	5	113.80 (3.441)	0.094	0.790	0.039
Non-transport H	21,596	136.55 (0.119)	62	143.95 (2.200)	0.287	0.422	0.001
Transport W	3369	106.84 (0.140)	12	110.17 (2.873)	0.356	0.409	0.079
Transport H	15,583	136.17 (0.139)	93	141.62 (1.301)	0.597	0.315	0.002
1996							
Non-transport W	13,92	109.31 (0.07)	7	115.00 (1.83)	0.050	0.741	0.023
Non-transport H	53,420	139.45 (0.06)	53	146.59 (2.31)	0.099	0.479	0.001
Transport W	8656	110.49 (0.08)	10	113.00 (1.50)	0.116	0.351	0.139
Transport H	36,867	139.62 (0.07)	53	146.30 (2.14)	0.144	0.477	0.001
1998							
Non-transport W	8676	113.01 (0.07)	53	113.75 (0.82)	0.611	0.115	0.208
Non-transport H	61,541	135.72 (0.05)	229	135.43 (0.75)	0.372	-0.02	0.643
Transport W	5476	111.97 (0.09)	33	114.09 (1.13)	0.603	0.306	0.036
Transport H	38,773	135.95 (0.06)	243	136.73 (0.67)	0.627	0.062	0.169
1999							
Non-transport W	11,827	109.38 (0.08)	152	110.20 (0.58)	1.285	0.099	0.106
Non-transport H	61,491	137.82 (0.05)	891	139.29 (0.43)	1.449	0.114	0.001
Transport W	8,113	109.43 (0.09)	172	111.05 (0.56)	2.120	0.196	0.004
Transport H	43,169	138.16 (0.06)	866	138.71 (0.37)	2.006	0.042	0.110
2000							
Non-transport W		110.38 (0.03)	165	111.37 (0.27)	1.410	0.139	0.000
Transport W	15414	109.77 (0.06)	261	111.41 (0.43)	1.693	0.228	0.000

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Table 26. Sample size (N), mean release day of the year (standard error in parentheses) for the total tagged population and returning adults of Snake River spring-summer chinook salmon PIT tagged at Lower Granite Dam. δ is the selection coefficient (see text), and the P -value is based on a Monte Carlo test to determine if is greater than or less than zero. If $P < 0.05$, then d is significantly greater or less than zero at the $\alpha = 0.05$ level.

Release group	Total population		Returning adults		Percent return	δ	P -value (two-tailed)
	N	Mean release date (s.e.)	N	Mean release date (s.e.)			
<u>1995</u>							
Non-transport W	31,766	119.81 (0.10)	63	114.81 (1.94)	0.198	-0.290	0.007
Non-transport H	104,279	121.06 (0.03)	321	118.42 (0.43)	0.308	-0.268	0.000
Transport W	21,359	119.84 (0.10)	78	125.77 (2.07)	0.365	0.410	0.000
Transport H	81,780	120.95 (0.03)	455	122.29 (0.40)	0.556	0.143	0.001
<u>1996</u>							
Non-transport W	14,078	117.62 (0.09)	7	116.43 (4.27)	0.050	-0.112	0.427
Non-transport H	53,976	126.52 (0.04)	53	126.23 (1.97)	0.098	-0.030	0.416
Transport W	8699	117.80 (0.11)	10	114.5 (2.62)	0.115	-0.314	0.167
Transport H	37,027	126.09 (0.05)	53	125.68 (1.41)	0.143	-0.042	0.382
<u>1998</u>							
Non-transport W	8,714	111.93 (0.13)	53	103.79 (1.14)	0.608	-0.687	< 0.001
Non-transport H	61,853	114.55 (0.04)	230	109.17 (0.61)	0.372	-0.481	< 0.001
Transport W	5,496	111.83 (0.16)	34	106.09 (1.44)	0.619	-0.499	< 0.001
Transport H	39,032	114.96 (0.06)	245	116.86 (0.68)	0.628	0.174	0.004
<u>1999</u>							
Non-transport W	11,853	118.79 (0.13)	152	116.65 (0.73)	1.282	-0.148	0.029
Non-transport H	61,742	121.88 (0.04)	892	121.67 (0.29)	1.445	-0.023	0.242
Transport W	8128	119.88 (0.14)	172	121.11 (0.75)	2.116	0.098	0.101
Transport H	43,305	122.74 (0.04)	867	125.37 (0.27)	2.002	0.296	< 0.001
<u>2000</u>							
Non-transport W	43,241	124.55 (0.08)	610	119.29 (0.51)	1.411	-0.331	< 0.001
Transport W	15,535	120.37 (0.13)	261	118.97 (0.89)	1.680	-0.087	0.078

Effects of Changing Ocean Conditions

Increasing evidence points to dramatic changes in the marine ecosystem of the northern Pacific Ocean resulting from shifts in climate over the past 2000 years (Finney et al. 2002, Moore et al. 2002). Throughout this region, changes in ocean-climate conditions have influenced zooplankton, benthic invertebrate, seabird, and fish populations (McGowan et al. 1998). In particular, analyses of data from the last 100 years demonstrate a strong relationship between ocean conditions and the production of Pacific salmon (*Oncorhynchus* spp.) across a range of spatial and temporal scales (Mantua et al. 1997, Beamish et al. 1999). The varied response of salmon to these past environmental changes likely reflects their complex life history and the wide diversity of freshwater and marine habitats that they occupy (Hilborn et al. 2003).

Recent evidence links chinook salmon from the Columbia River basin to cyclic changes in ocean-climate conditions. Modeling exercises directed at explaining the negative effects of various anthropogenic activities on the productivity of Snake River spring-summer (SRSS) chinook salmon identified the estuary and ocean environments as important sources of unexplained variation in stock performance (Kareiva et al. 2000, Wilson 2003). Using catch records from commercial fisheries, Botsford and Lawrence (2002) found reasonable correlations between the inferred survival of Columbia River chinook salmon and physical attributes of the ocean, such as sea-surface temperature and coastal upwelling. Building upon these previous studies, Scheuerell and Williams (in review) found that they could actually forecast changes in the smolt-to-adult survival of SRSS chinook from changes in coastal ocean upwelling over the past 37 years, including the rapid decline in the 1960-70s and the increase in the late 1990s. All of these analyses highlight the important effects of the ocean in determining smolt-to-adult survival, and further support Pearcy's {, 1992 #307} assertion that the primary influence of the ocean on salmon survival occurs early within the first year that juveniles occupy coastal waters.

Diversity

NOAA Fisheries defines a viable salmonid population as “an independent population of any Pacific salmonid (genus *Oncorhynchus*) that has a negligible risk of extinction due to threats from demographic variation, local environmental variation, and genetic diversity changes over a 100-year time frame” (McElhany 2000). Genetic diversity is important because it protects a species by allowing a wider use of environments, protects against short-term spatial and temporal environmental changes, and provides the raw material for surviving long-term environmental change (McElhany 2000). To this end, the NOAA Fisheries believes it necessary to “limit or remove human-caused selection or straying that weakens the adaptive fit between salmonid population and its environment or limits a population’s ability to respond to natural selection” (McElhany 2000). Human-caused selection can occur throughout the salmonid life cycle.

The Independent Scientific Group recommends that “Because the full assemblage of salmonids in the Columbia River basin probably used many migration strategies”, a diversity of management schemes should be used to assist migration. Without diversity of management, there

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is likely to be further stock selection” (ISG 1996). Fish bypass systems, spillways, the use of transportation, flow augmentation, and other management strategies may select for particular stocks or life histories and could therefore reduce diversity if used exclusively. Certainly, for wild spring-summer chinook salmon, early migrants do not appear to fare as well from transportation as later migrants.

Therefore, in their review of transportation, the Independent Scientific Advisory Board concluded that “Spreading the risk of negative outcomes among alternative routes of hydroelectric passage is advisable to prevent a recovery action designed for one listed species from becoming a factor in the decline of another species”, and “in the face of uncertainties associated with potential negative effects of transportation on genetic and life history diversity”(ISAB 1998).

In light of the Hilborn et al. conclusion (2003) that the overall Bristol Bay sockeye salmon population has remained at a high level specifically due to diversity of populations, effects to ensure diversity in listed Columbia River stocks is warranted.

Snake River Steelhead

General

Recent SAR estimates for the non-tagged population of wild Snake River steelhead do not exist. The weighted average SAR for wild fish from the combined 1999 and 2000 outmigrations based on PIT-tag returns from juveniles marked at Lower Granite Dam was 4.0 (NOAA Fisheries unpublished data). These returns were not adjusted for harvest or any potential (but unknown effects of tagging). As indicated above, however, the 2001 to 2003 median return of wild steelhead increased, on average, more than 4-fold over the previous 10 years. The 2000 return (adults from outmigrations in 1998 and 1999) doubled over the previous 10-year average. Thus, presumably, steelhead SARs had similar magnitudes of increase, as no apparent increase in wild smolts occurred over that short period. The median estimated SAR for the composite wild steelhead population (escapement to Lower Granite Dam as basis) for outmigrations from 1990 through 1994 was 1.23% (range 1.05 to 2.38%) (Petrosky 1998 - November 30). Expanding this value based on the ratio of increase in wild adult returns to the Snake River in the most recent 3-years compared to those in the 1990s would result in SAR estimates for recent years in the neighborhood of 5.5%.

The low spawning populations in the 1990s (some the lowest in the last 35 years) produced comparatively low numbers of wild smolts compared the 1960s. Thus, even with the recent large increases in adult returns, total adult returns of wild fish remain at only approximately one-half the level of the 1960s.

Transportation

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As with wild spring-summer chinook salmon, transportation plays a huge role in adult steelhead returns. In general, 85% or more of the wild untagged steelhead smolts get transported. A small percentage migrate through the river. These have only moderate survival. Thus, likely greater than 95% of live steelhead smolts immediately downstream of Bonneville Dam arrived via transportation. As with yearling chinook salmon, timing of transportation makes a difference. However, unlike chinook salmon, steelhead transported early in the season have high return rates, whereas those transported after mid-May in recent years have produced few adults. Thus, measures of annual D have little value. Further, transporting juveniles provides large benefits for steelhead. This likely results to some degree from steelhead choosing not to continue to migrate after they have spent some time within the hydropower system. Thus, decisions to delay initiation of transportation to benefit yearling chinook salmon will probably have large negative consequences for steelhead.

Further, annual estimates of D for hatchery steelhead transported from Lower Granite Dam have consistently been higher than for those transported from locations farther downstream. This suggests that increased transportation of hatchery steelhead from Lower Granite Dam will lead to increased adult returns (compared to fish not transported). There are too few data to predict whether increased transportation of wild steelhead would also lead toward higher return rates.

Flow, Temperature, and Migration Timing

Steelhead also respond to flow differently than yearling chinook salmon (Smith et al. 2002). Their migration responds much more closely to changes in flow. Further, as the migration season progresses, estimates of steelhead survival decrease. This may relate to either an increased loss of steelhead to predators, or a decreased propensity of steelhead to migrate as water temperatures warm. As stated above, the smoltification impacts steelhead migration. Steelhead migrations declined at water temperatures of 13°C and above. Steelhead that migrate too late in the season when water temperatures are above this threshold have a tendency to residualize.

The extremely poor Snake River steelhead survival observed in 2001 was in part due to avian predation, particularly in the Lower Monumental Dam tailrace to McNary Dam tailrace reach. Of the PIT-tagged steelhead smolts leaving Lower Monumental Dam in 2001, more than 21% were later detected on McNary Dam reservoir bird colonies (Table 7). Although flow conditions improved in 2002 and 2003, substantial avian predation on steelhead has continued in this reach (Zabel 2002, Ryan et al. 2003). The steelhead population downstream of Lower Monumental Dam consists almost entirely of PIT-tagged fish, as collection/bypass system have high efficiency rates and most non-tagged fish get transported. Although most PIT-tagged fish get returned to the river at collection facilities, factors affecting downstream PIT-tagged migrants below Lower Monumental Dam have small effects on the aggregate population.

Snake River Fall Chinook Salmon

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General

As with yearling chinook salmon and steelhead, the estimated adult returns of natural origin fall chinook salmon to above Lower Granite Dam have increased in recent years more than 4-fold over levels seen from outmigrations in the 1990s. Total numbers of fall chinook salmon over Lower Granite have also increased tremendously, but much of this increase results from large releases of Lyons Ferry Hatchery fish above the dam. Nonetheless, estimates of wild fish have, to the degree possible, taken into account the large increases in hatchery fish. Total numbers of natural origin fish above Lower Granite dam in recent years have exceeded all levels observed since the completion of the dam in 1975. The two periods are likely not comparable, however, as harvest rates on fall chinook have changed substantially in recent years, owing to ESA listing of some Columbia River fall chinook stocks.

Transportation

Little is known about the effects of transportation on these fish. Studies to evaluate transportation of these Snake River fish began only a couple of years ago. As bypass systems are set to return only PIT-tagged fish to the river, few fish in the general population get transported. The annual adult return of transported fish, with which we could compare non-transported fish, has only averaged about 4 fish since 1995. Thus, comparing percentages of returns has little value. Nonetheless, comparisons of percentages between transported fish (1 fish here, 1 fish there) against non-transported fish indicates little difference in return rates. From these data, we have two general conclusions. First, transportation of fall chinook neither greatly harms nor helps the fish, and thus transportation is consistent with a “spread the risk” strategy. Also, if the T:I ratio is close 1, then an annual estimate of D would approximately equal the survival of non-transported fish (a value that, to date, we have not estimated due to a combination of low numbers of released PIT-tagged fish, low detection efficiencies at dams downstream of McNary Dam, and no operation of the 2-boat trawl in the lower river during the summer). Thus, it appears that the annual value of D used in the Biop (0.2) is reasonable, albeit highly uncertain. As noted below, fall chinook salmon do not have a completed directed migration, so our measure of downstream survival over the reaches possible, only relates to active migrants. We don’t have a good measure of survival for fish that didn’t initially migrate. Thus, it is not clear how an estimated D derived from the actively migration population actually applies to population of fish that do not migrate as quickly. We hope to have much more precise evaluations of transportation in the next few years.

Flow, Temperature, and Migration Timing

Migration of Snake River fall chinook is not as directed as that of spring chinook. Some percentage chose not to migrate until after water temperatures cool in September, while some do not migrate until the next spring. From the population of fish PIT-tagged between 1995 and 2000, 46,773 fish were detected passing either Lower Granite, Little Goose, or Lower

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Monumental Dam prior to 1 September of each year, while 5,301 were detected after 1 September. Of these, those that migrated early produced 142 adult returns, while those that migrated late produced 73, for comparative SARs of 0.32 and 1.29% respectively. Of all fish we PIT tagged over this time period, nearly two-thirds were not detected. Based on CJS survival estimates, a large number apparently died before ever reaching Lower Granite Dam. For fish detected the first time after 1 September, we do not know what proportion of the population the live fish represented. Certainly, they came from some large population.

Snake River Sockeye Salmon

We have little information about these fish with regard to transportation. We did observe in 2003 that survival of juveniles from release to Lower Granite Dam was quite low, as follows:

<u>Hatchery</u>	<u>Release site</u>	<u>Number released</u>	<u>Survival to LGR</u>	<u>Survival to MCN</u>
Sawtooth	Pettit Lake	2,013	0.444 (0.021)	0.308 (0.044)
Sawtooth	Redfish Lake	1,015	0.116 (0.016)	0.068 (0.023)
Bonneville	Alturus Lake	1,481	0.034 (0.017)	0.008 (0.003)
Bonneville	Pettit Lake	1,565	0.345 (0.024)	0.191 (0.047)
Bonneville	Redfish Lake	1,007	0.068 (0.015)	0.023 (0.008)

CONCLUSIONS/SUMMARY

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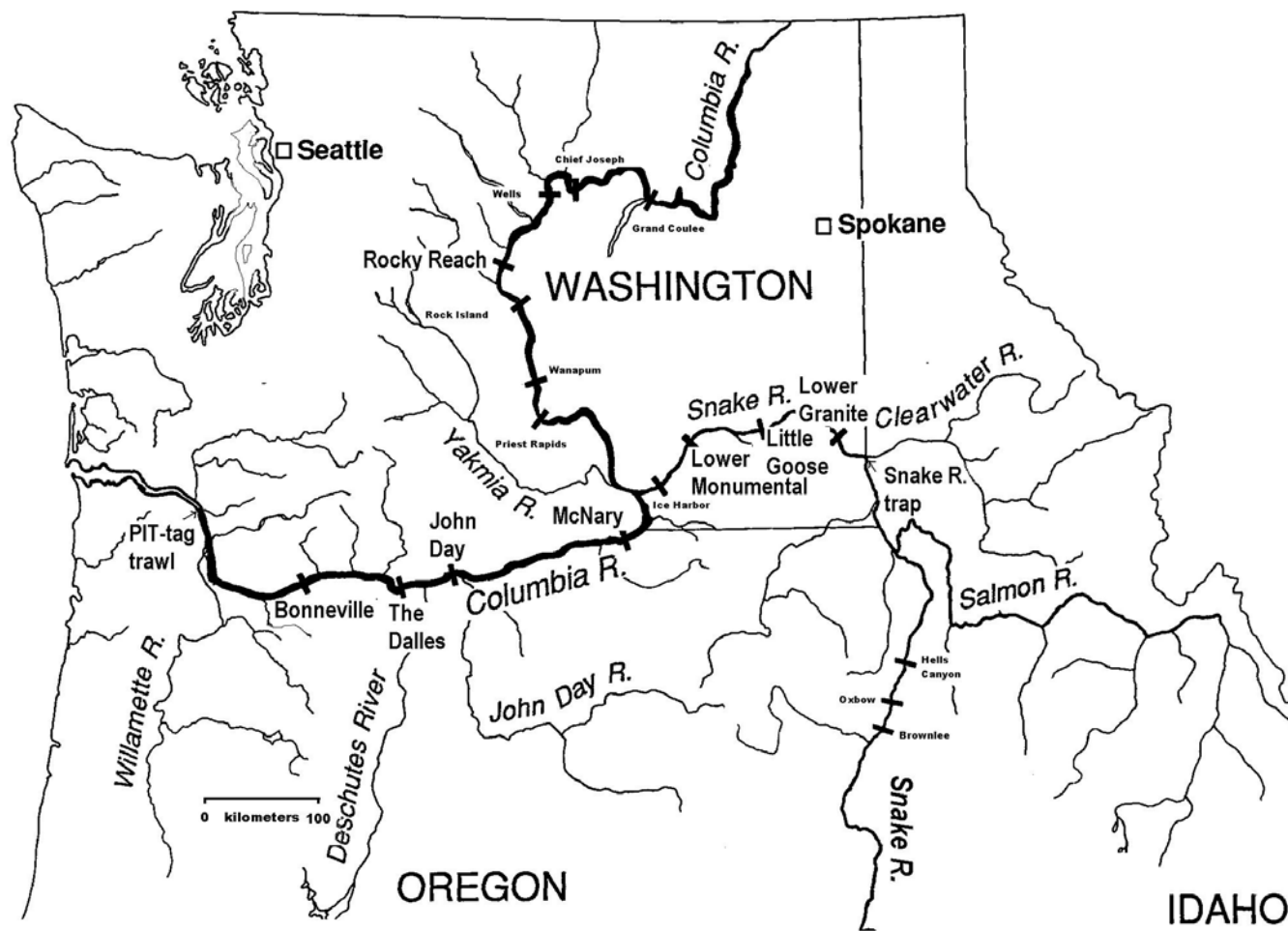


Figure 1. Map of Columbia River basin showing major dams. PIT-tag detection sites at traps, dams, and trawls in large type.

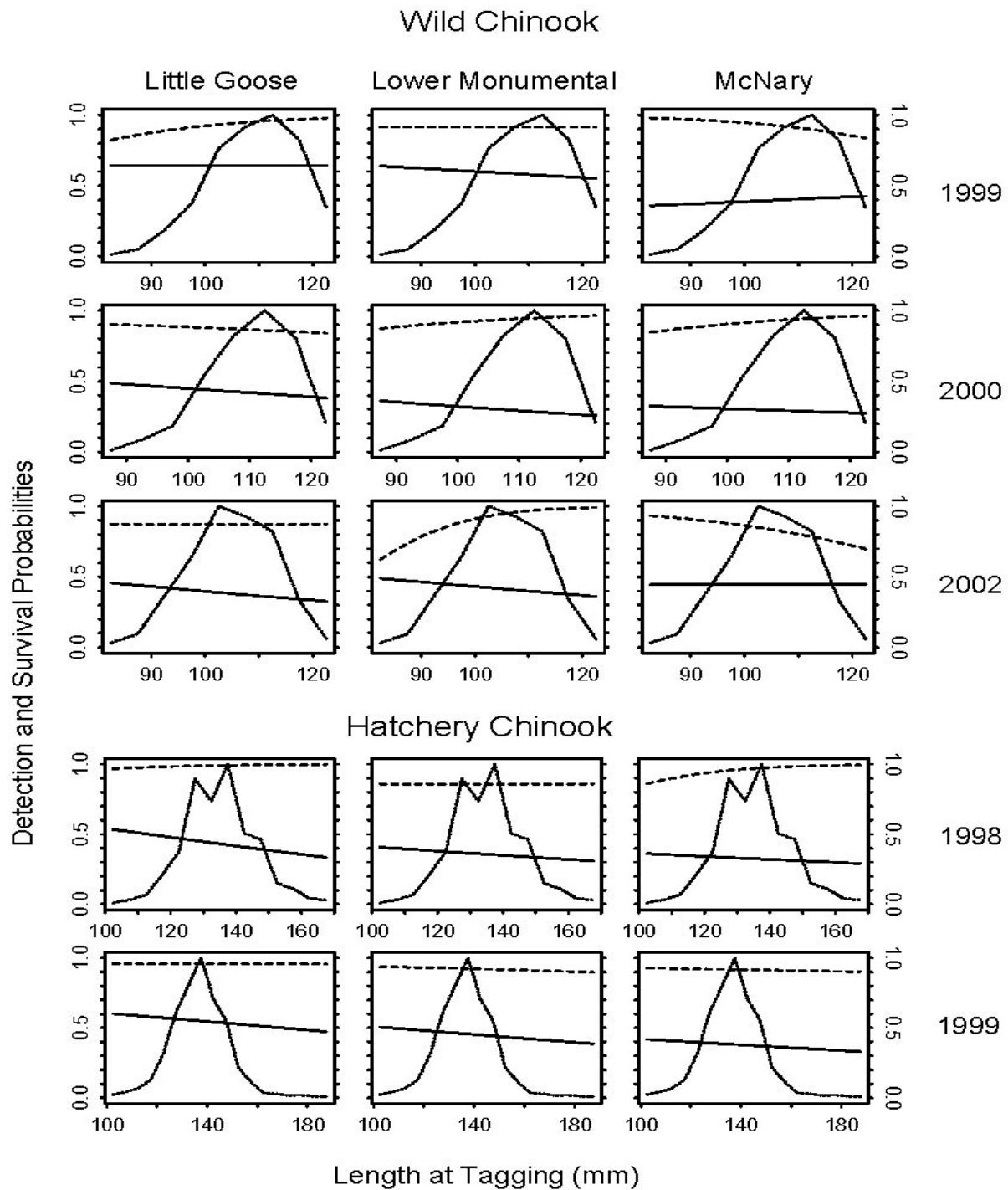


Figure 2. Relationships between detection (solid line) and survival (dashed line) probability and fish length (mm) for Snake River spring/summer chinook salmon released at Lower Granite Dam. The dotted line is the distribution of lengths in 5 mm increments and scaled such that the length class with the most fish is given a value of 1.0. Details of the analysis are provided by Zabel et al. (*In Review*).

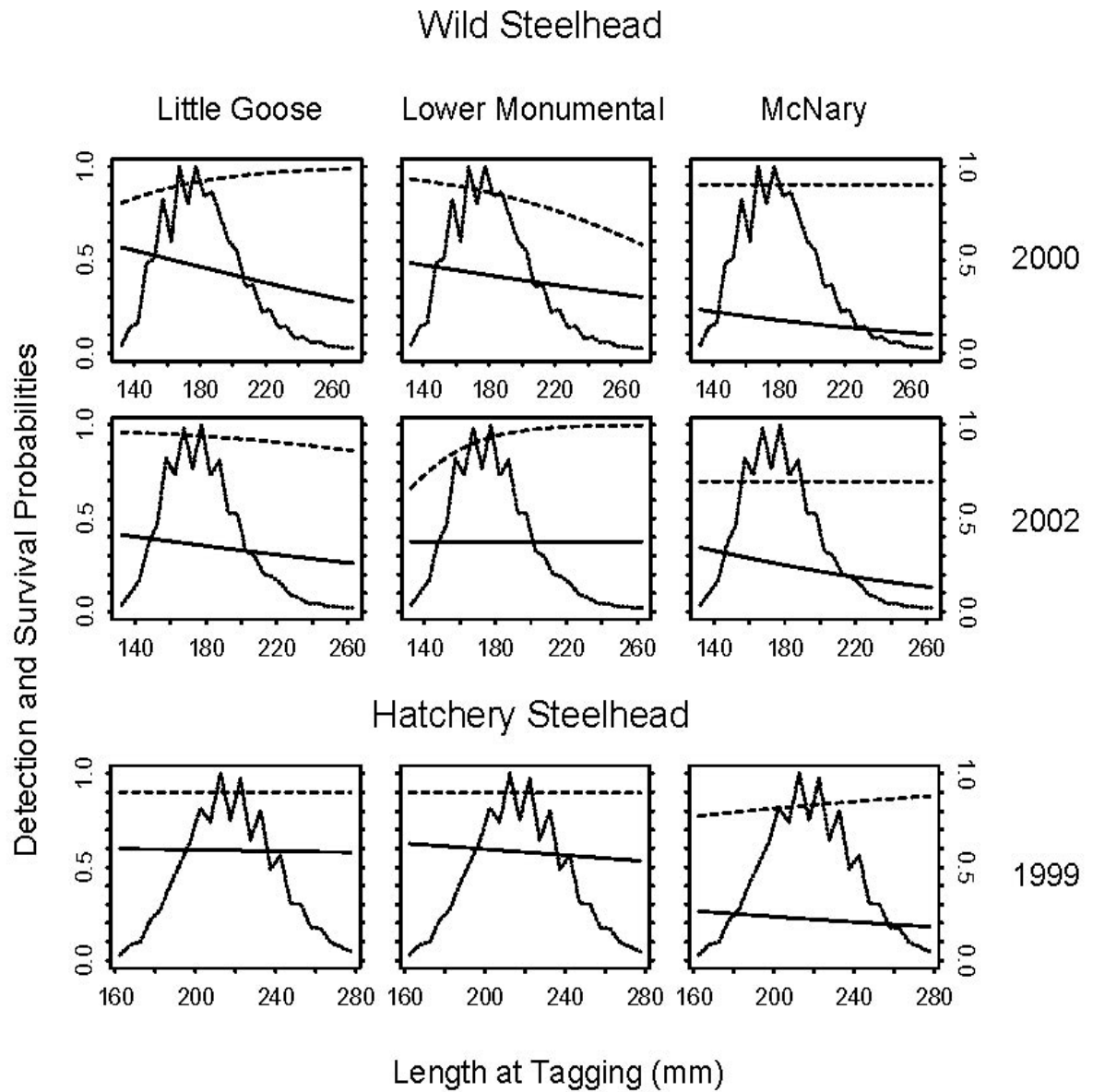


Figure 3. Relationships between detection (solid line) and survival (dashed line) probability and fish length (mm) for Snake River steelhead released at Lower Granite Dam. The dotted line is the distribution of lengths in 5 mm increments and scaled such that the length class with the most fish is given a value of 1.0. Details of the analysis are provided by Zabel et al. (*In Review*).

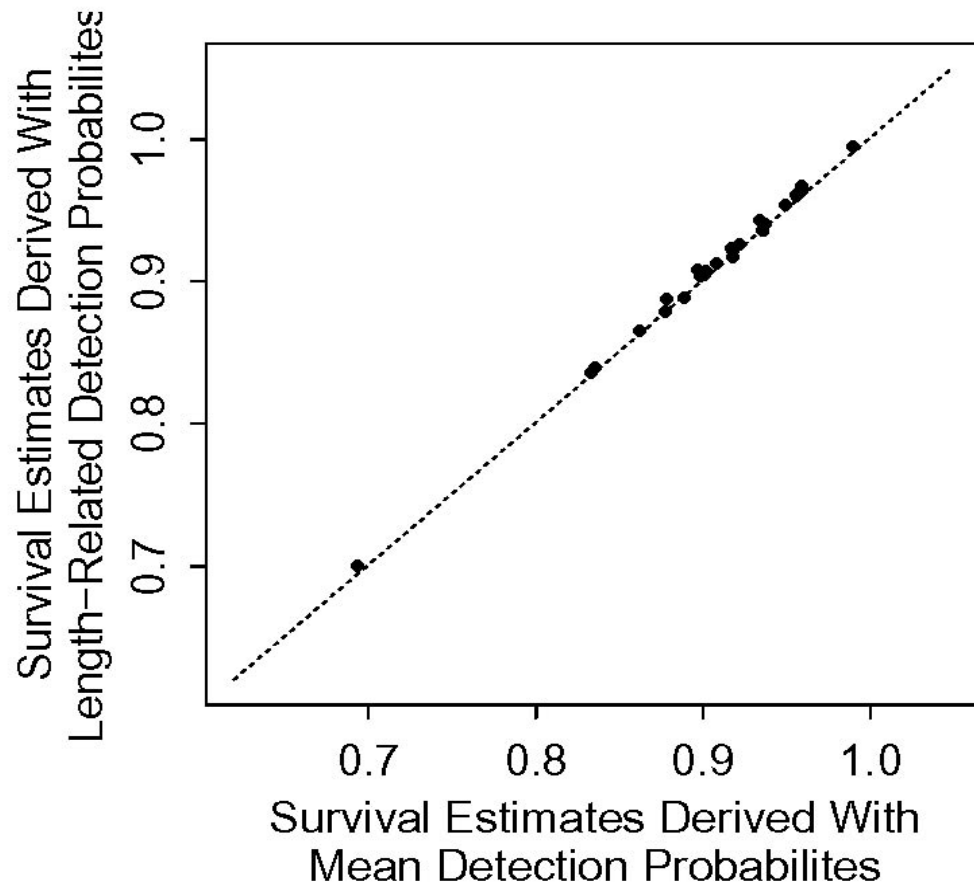


Figure 4. Comparison of survival estimates derived assuming mean detection probabilities (Cormack-Jolly-Seber method) and those using length-related detection probabilities (Zabel et al. *In Review*). Wild and hatchery spring/summer chinook salmon and steelhead were tagged and released at Lower Granite Dam (1998-2002), and survival was estimated from Lower Granite to Little Goose Dam, Little Goose to Lower Monumental Dam, and Lower Monumental to McNary Dam. The dashed line is the one-to-one line.

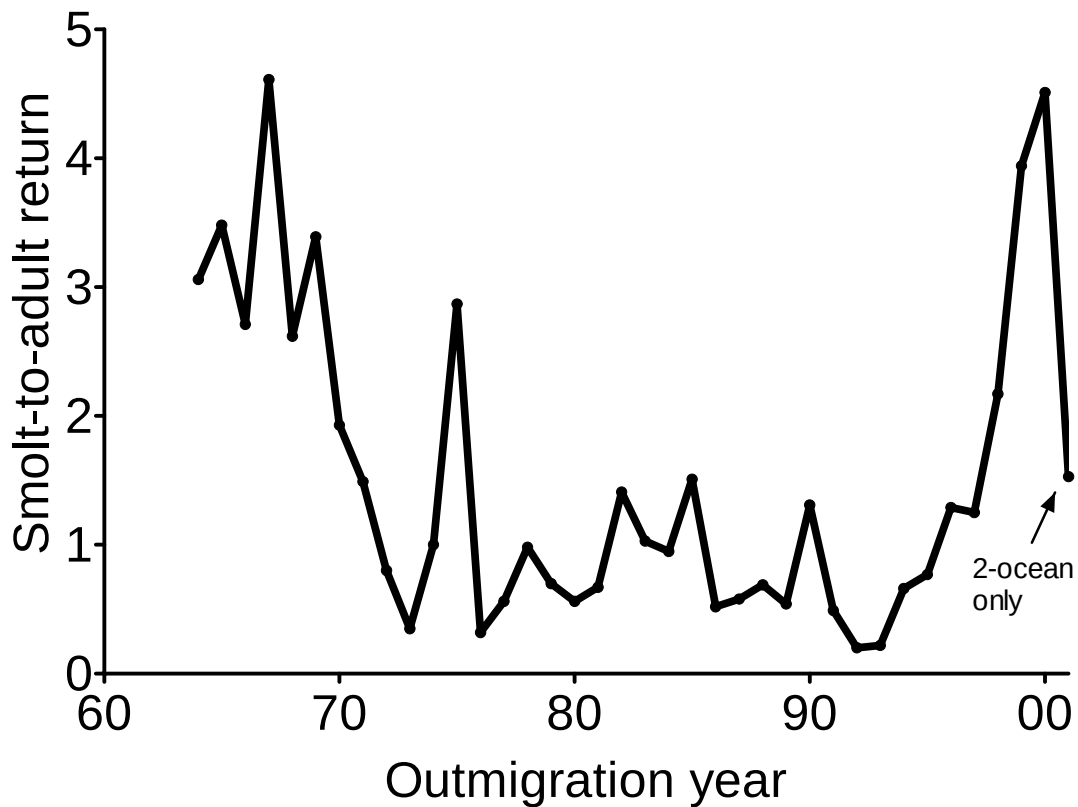


Figure 5. Estimated smolt-to-adult (SAR) return rates from upper dam on the Snake River for the composite marked and unmarked population of wild spring-summer chinook salmon, by juvenile outmigration year. Adults include counts at the upper Snake River Dam (Ice Harbor through 1968, Lower Monumental 1969, Little Goose 1970 - 1974, and Lower Granite 1975 - present) plus the estimated catch in fisheries downstream from the Snake River.

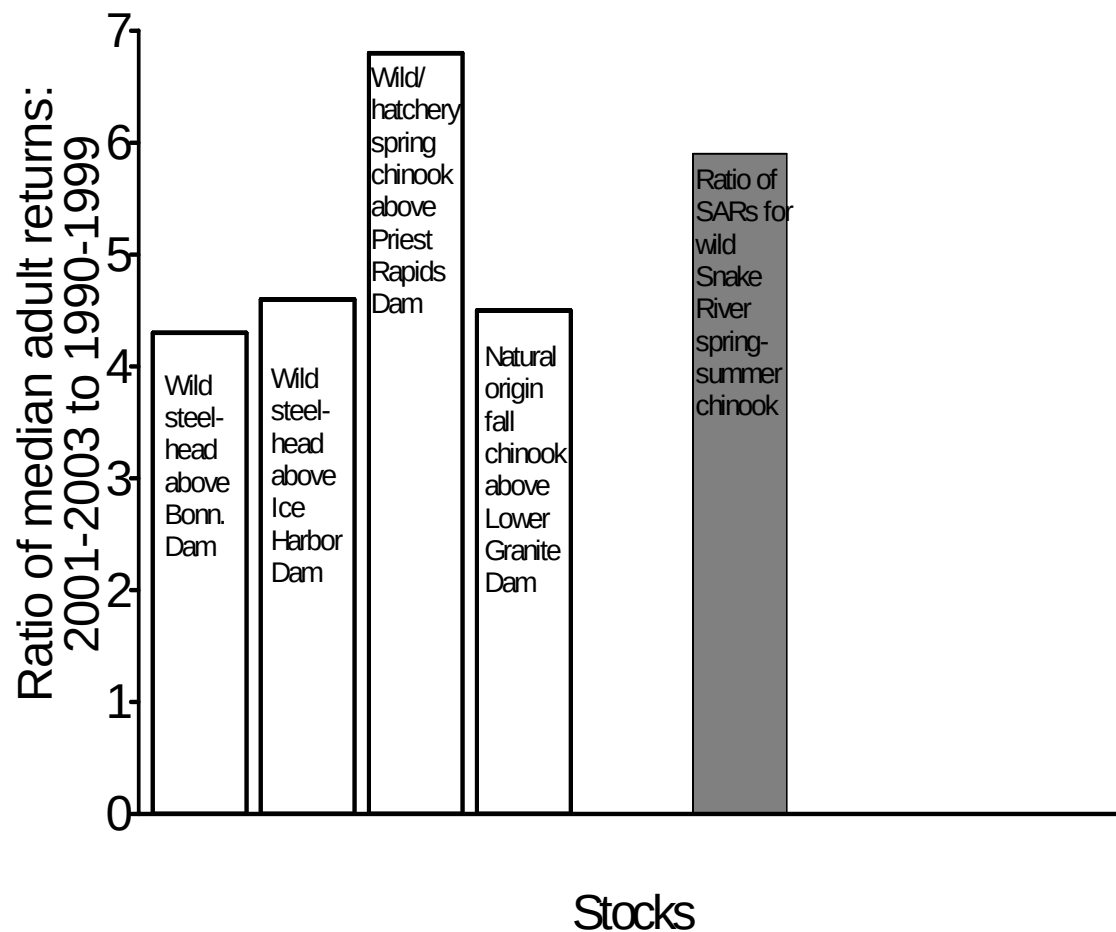


Figure 6. Ratio of median adult return between 2001 and 2003 to median adult return between 1990 and 1999 for several stock groupings of fish above Bonneville Dam compared to the ratio of SARs for wild Snake River spring-summer chinook salmon

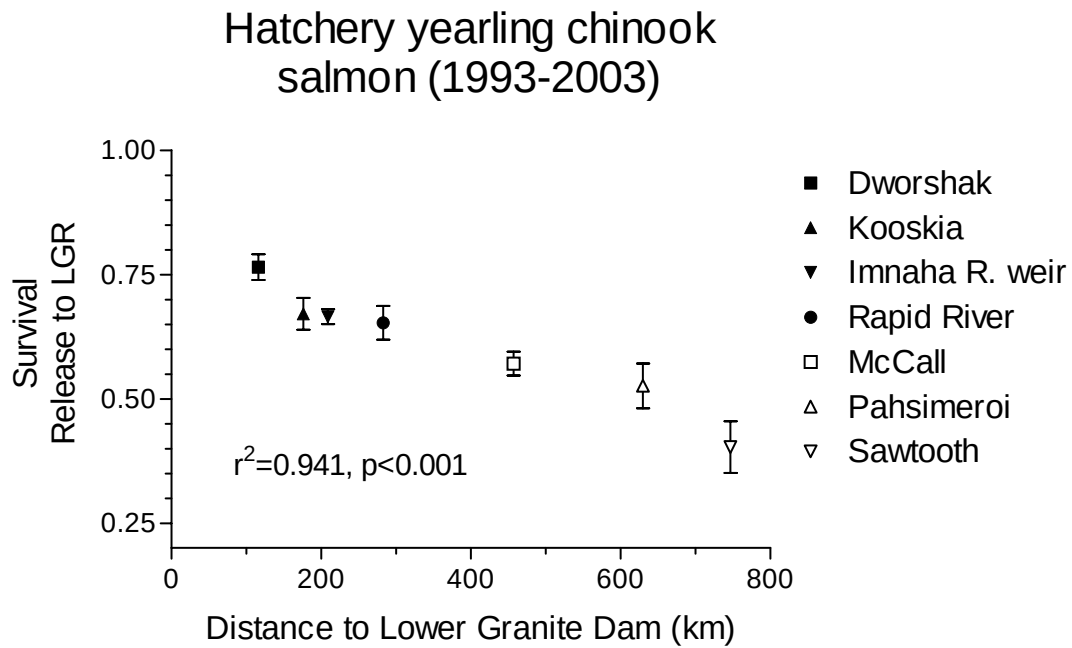


Figure 7. Estimated survival with standard errors from release at Snake River Basin hatcheries to Lower Granite Dam tailrace, 1993-2003 vs distance (km) to Lower Granite Dam. The correlation between survival and migration distance is also shown.

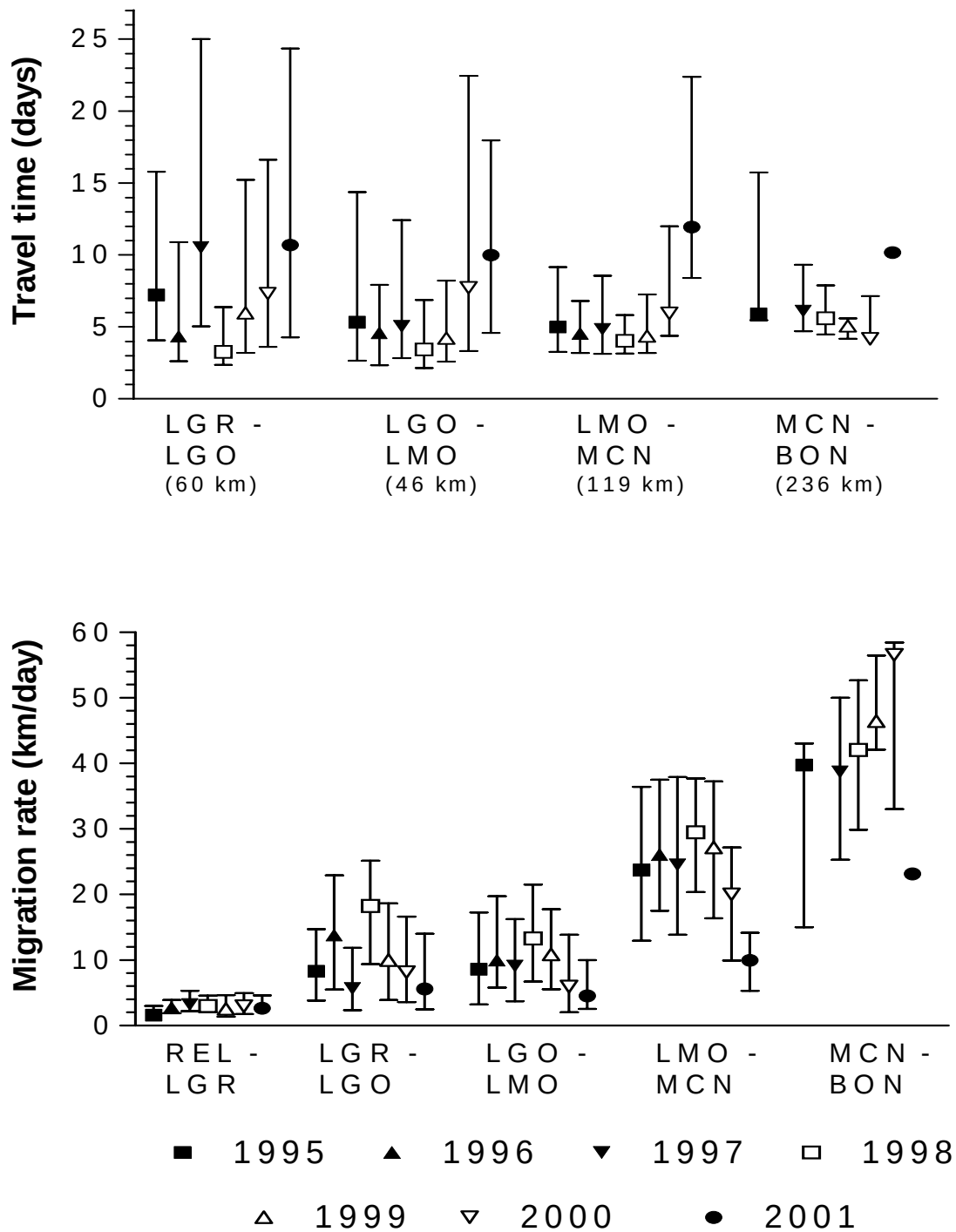


Figure 8. Median travel times and migration rates (with 20th and 80th percentiles) for PIT-tagged hatchery fall chinook salmon, 1995-2001. Rel, release site in the Snake River; LGR, Lower Granite Dam; LGO, Little Goose Dam; LMO, Lower Monumental Dam; MCN, McNary Dam; and BON, Bonneville Dam. The lengths of the reaches are given in parentheses in the upper panel.

Fall chinook salmon

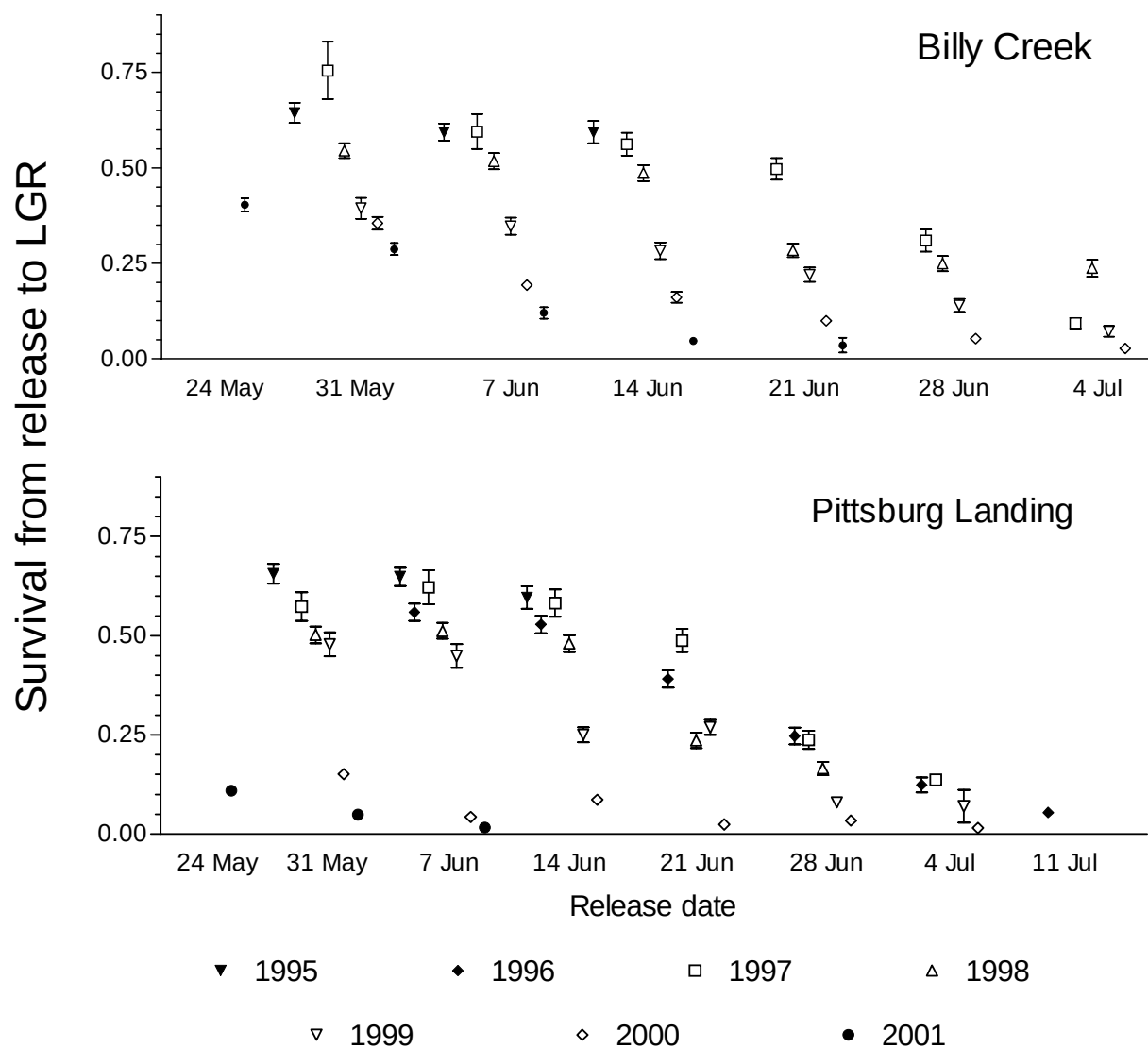


Figure 9. Estimated survival probabilities (with standard errors) from point of release in the Snake River (Billy Creek or Pittsburg Landing) to the tailrace of Lower Granite Dam for PIT-tagged hatchery fall chinook salmon, 1995-2001.

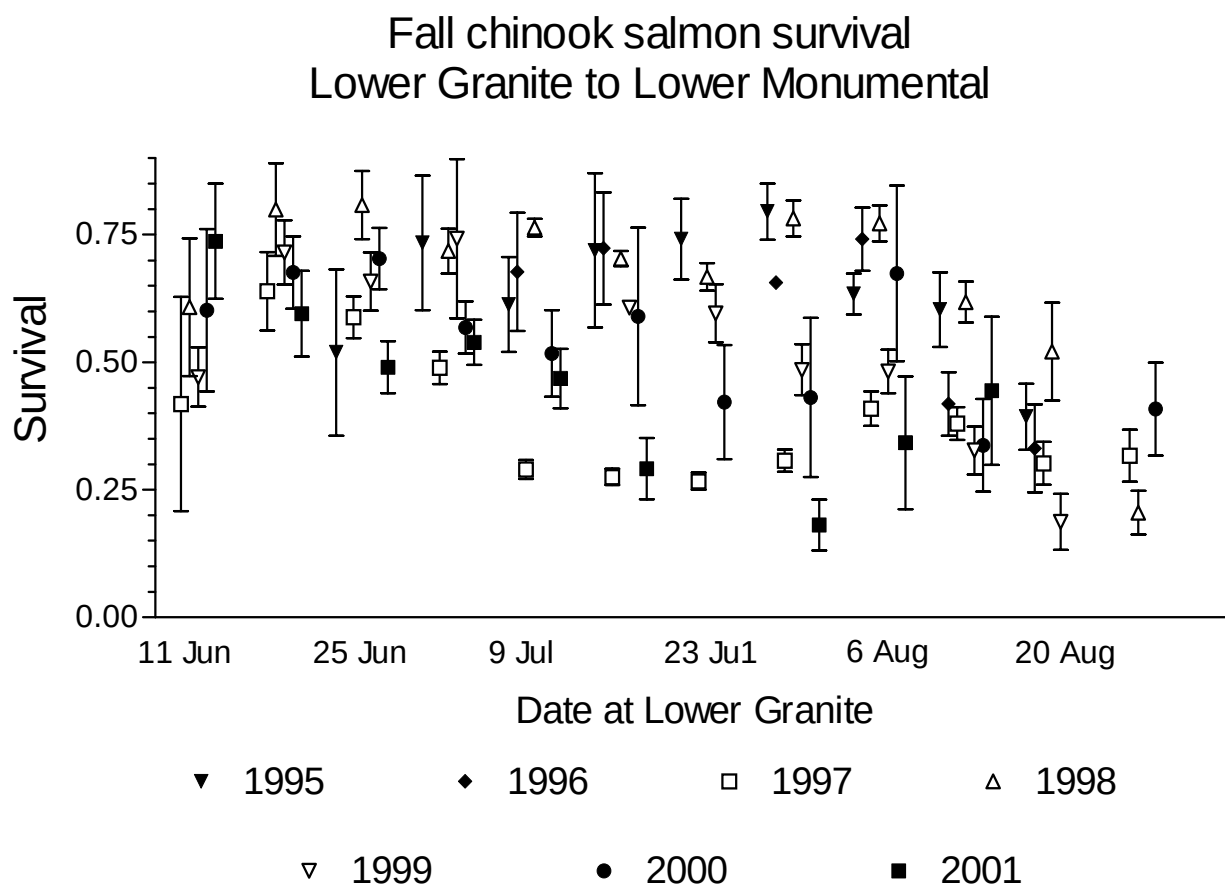
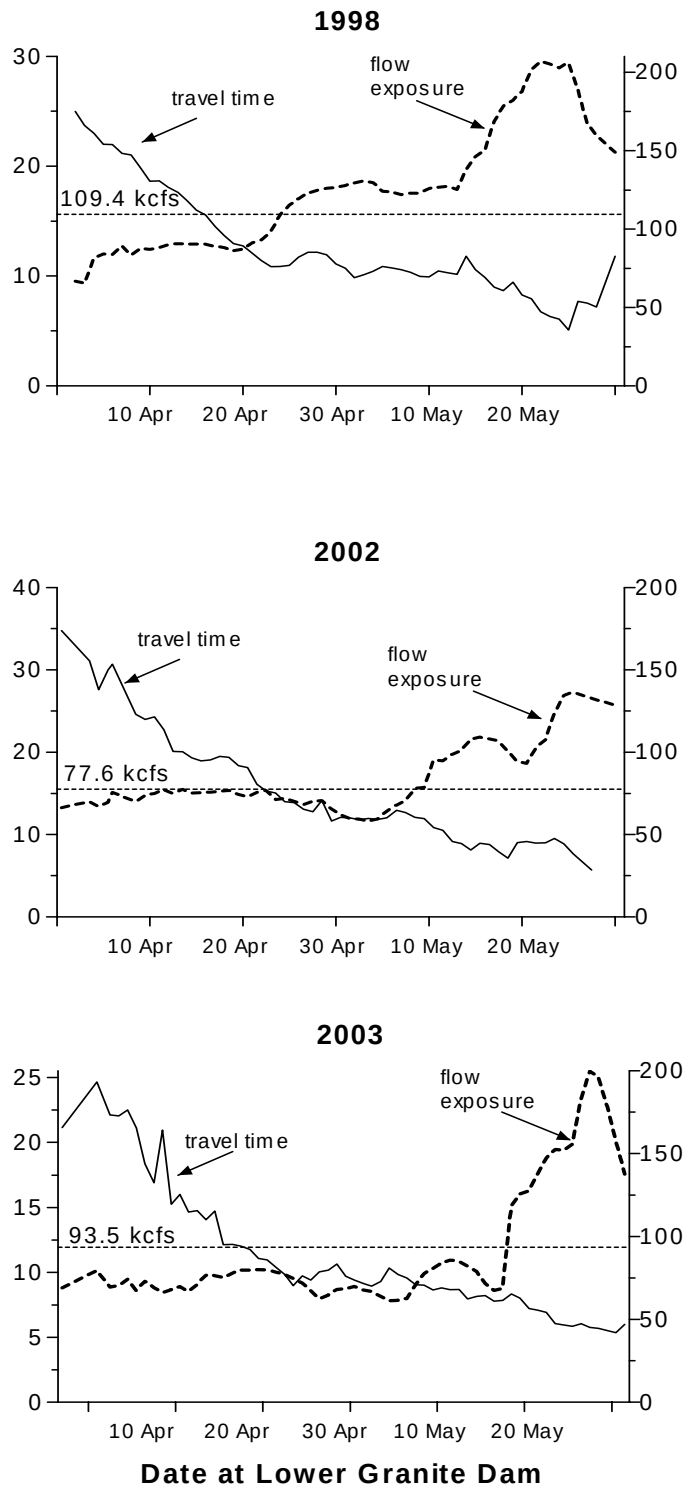


Figure 10. Estimated survival probabilities (with standard errors) to the tailrace of Lower Monumental Dam for PIT-tagged hatchery fall chinook salmon leaving Lower Granite Dam, by week, 1995-2001.

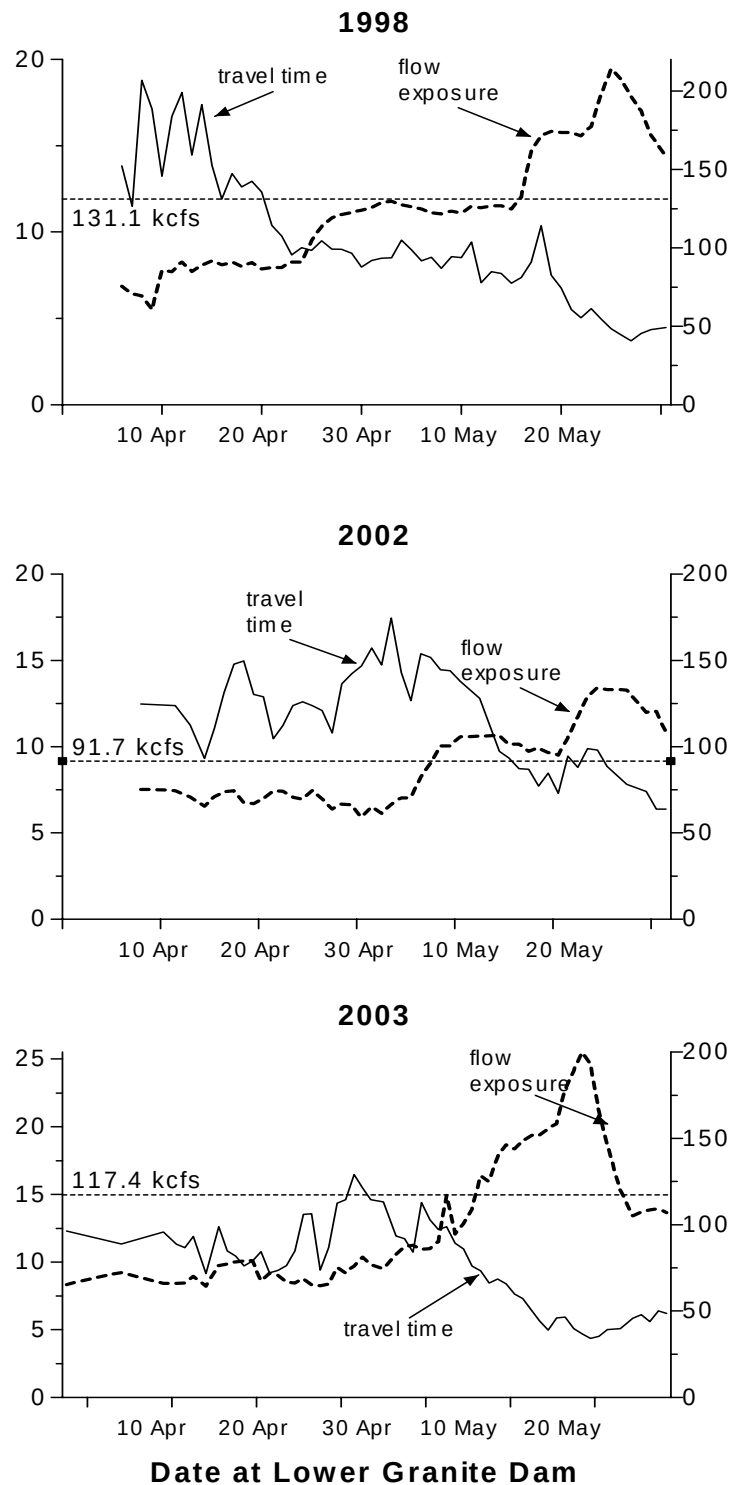
Median travel time LGR-MCN (days)



Flow exposure index (kcfs)

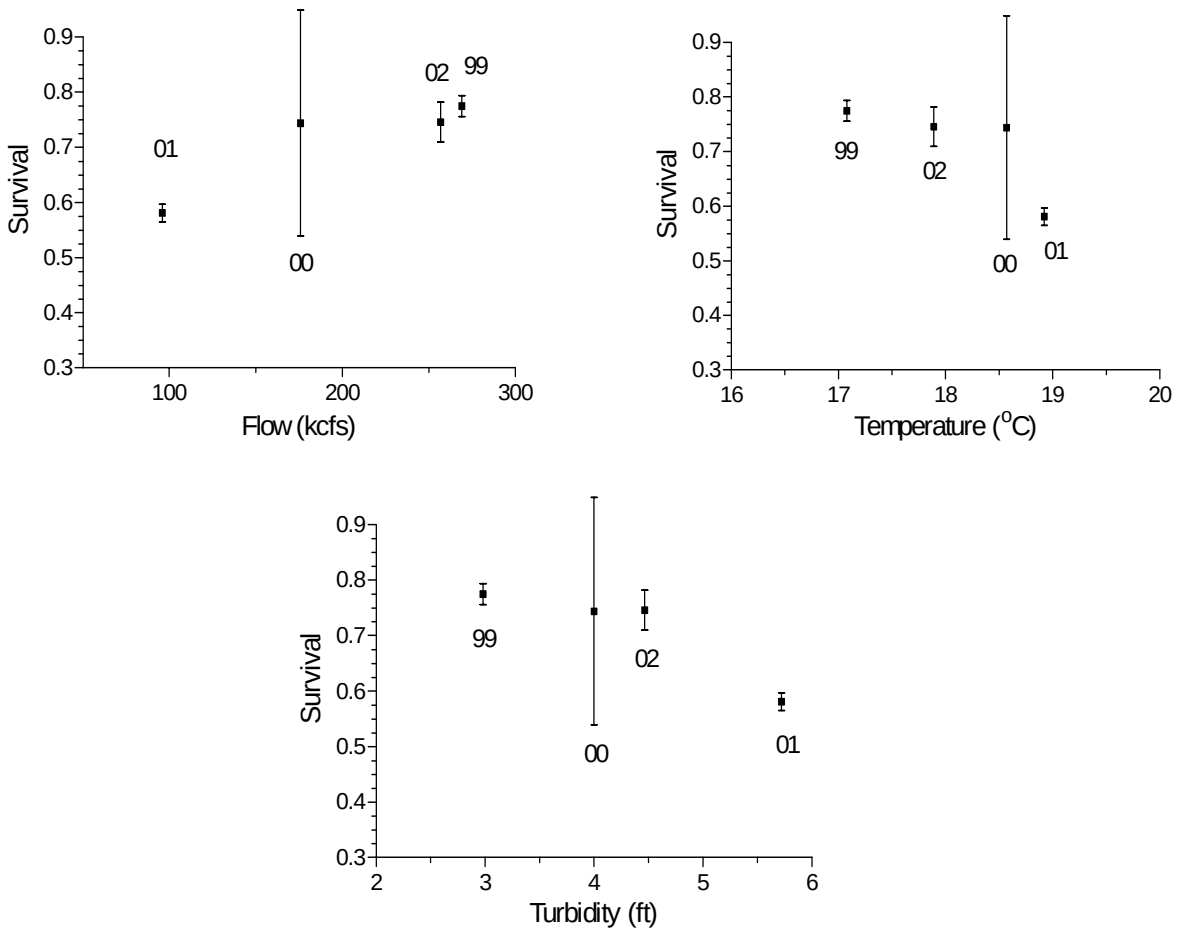
Figure 11. Median travel time and flow exposure index plotted against date for daily groups of yearling chinook salmon leaving Lower Granite Dam, 1998, 2002, and 2003. Dashed horizontal line is weighted average flow exposure index.

Median travel time LGR-MCN (days)



Flow exposure index (kcfs)

Figure 12. Median travel time and flow exposure index plotted against date for daily groups of steelhead leaving Lower Granite Dam, 1998, 2002, and 2003. Dashed horizontal lines are weighted average flow exposure index.



Survival from McNary Dam to John Day Dam

Figure 13. Survival (with standard errors) between the tailraces of McNary and John Day Dams vs. flow (kcfs), water temperature (°C), and turbidity (feet) for PIT-tagged subyearling fall chinook salmon, 1999-2002. Below each survival estimate is the year.

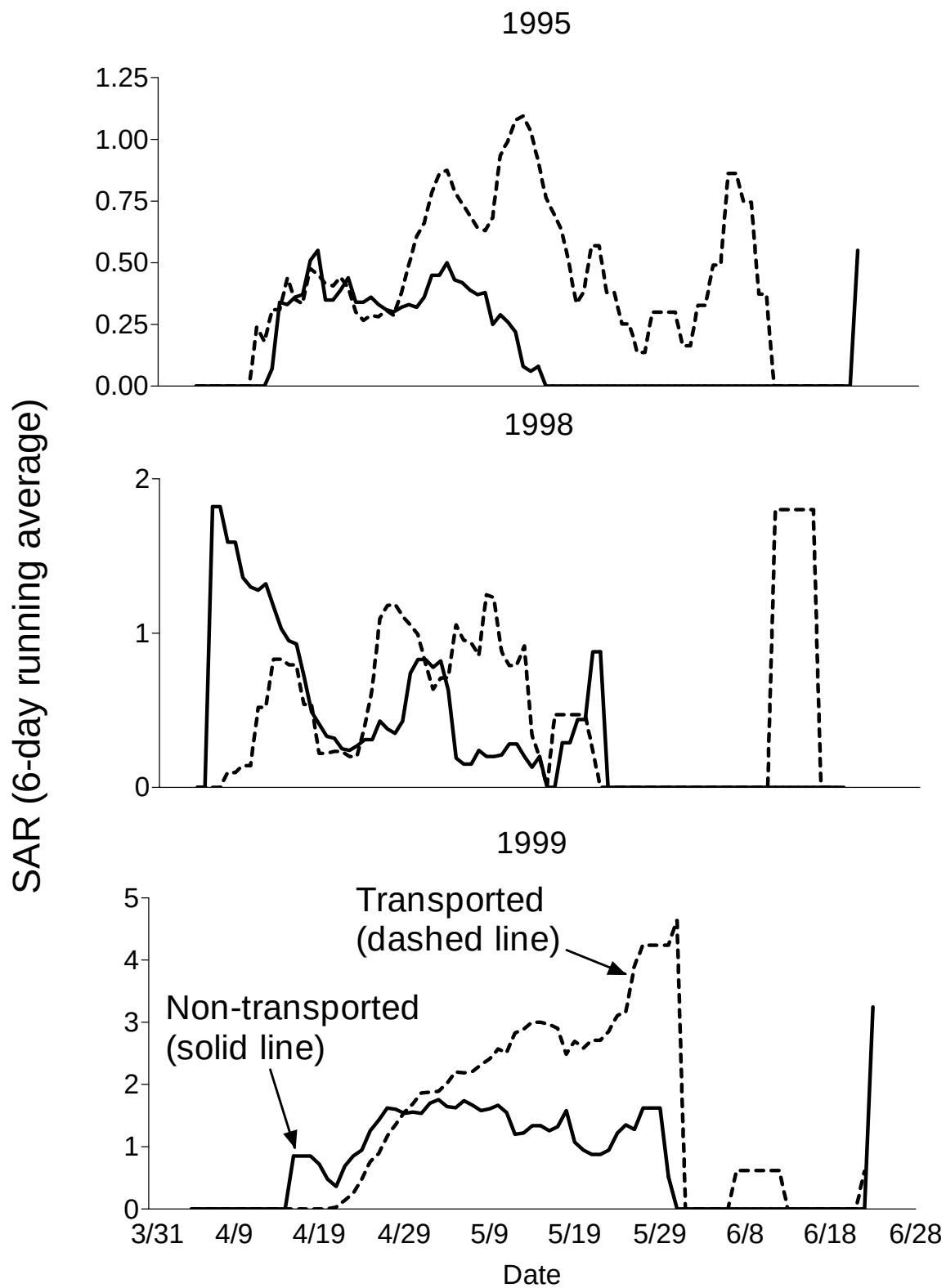


Figure 14. Six-day running average SARs for hatchery spring-summer chinook salmon PIT-tagged and released or transported from Lower Granite Dam.

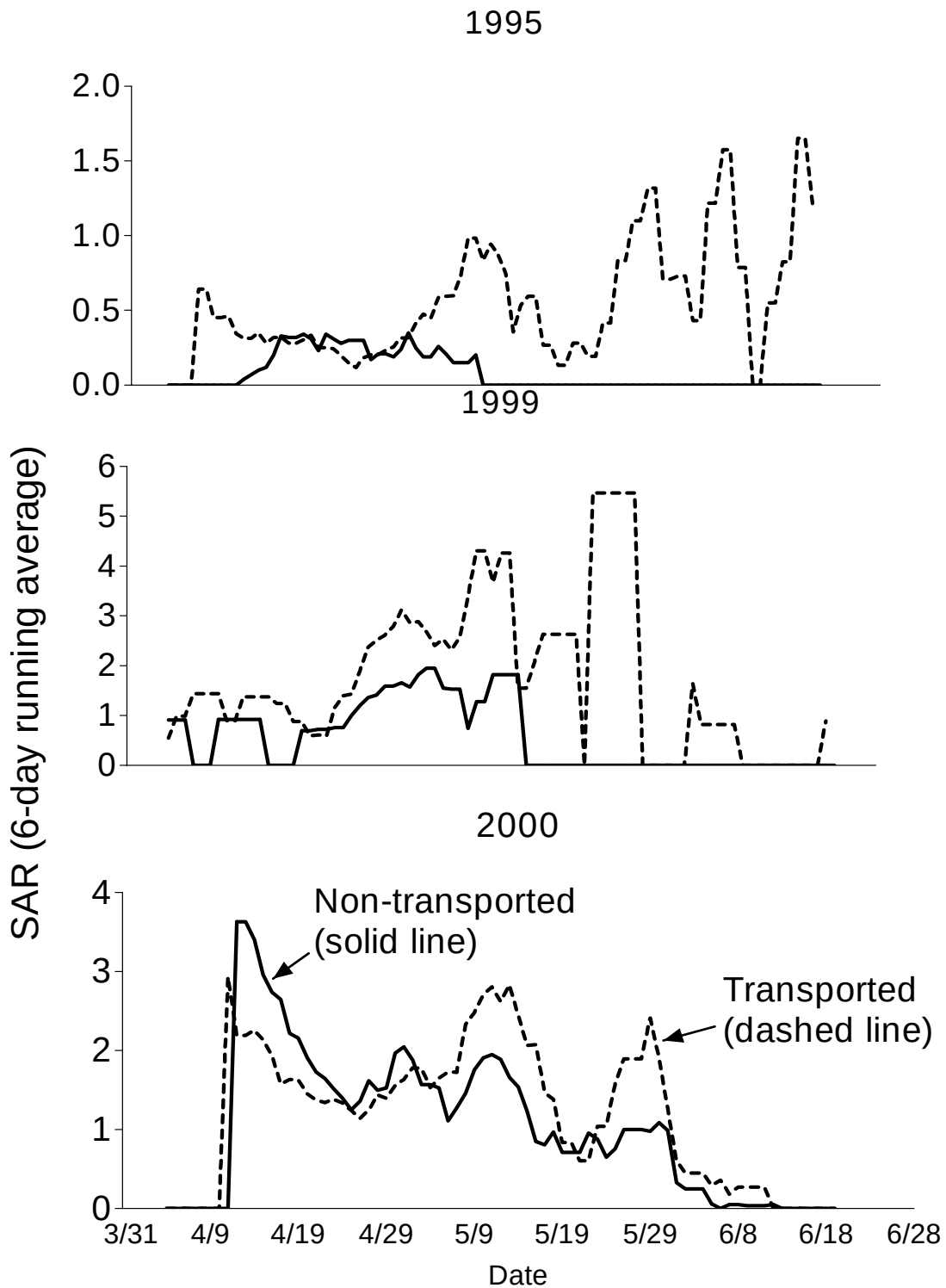


Figure 15. Six-day running average SARs for wild spring-summer chinook salmon PIT-tagged and released or transported from Lower Granite Dam (fish in 2000 transported from Little Goose Dam).

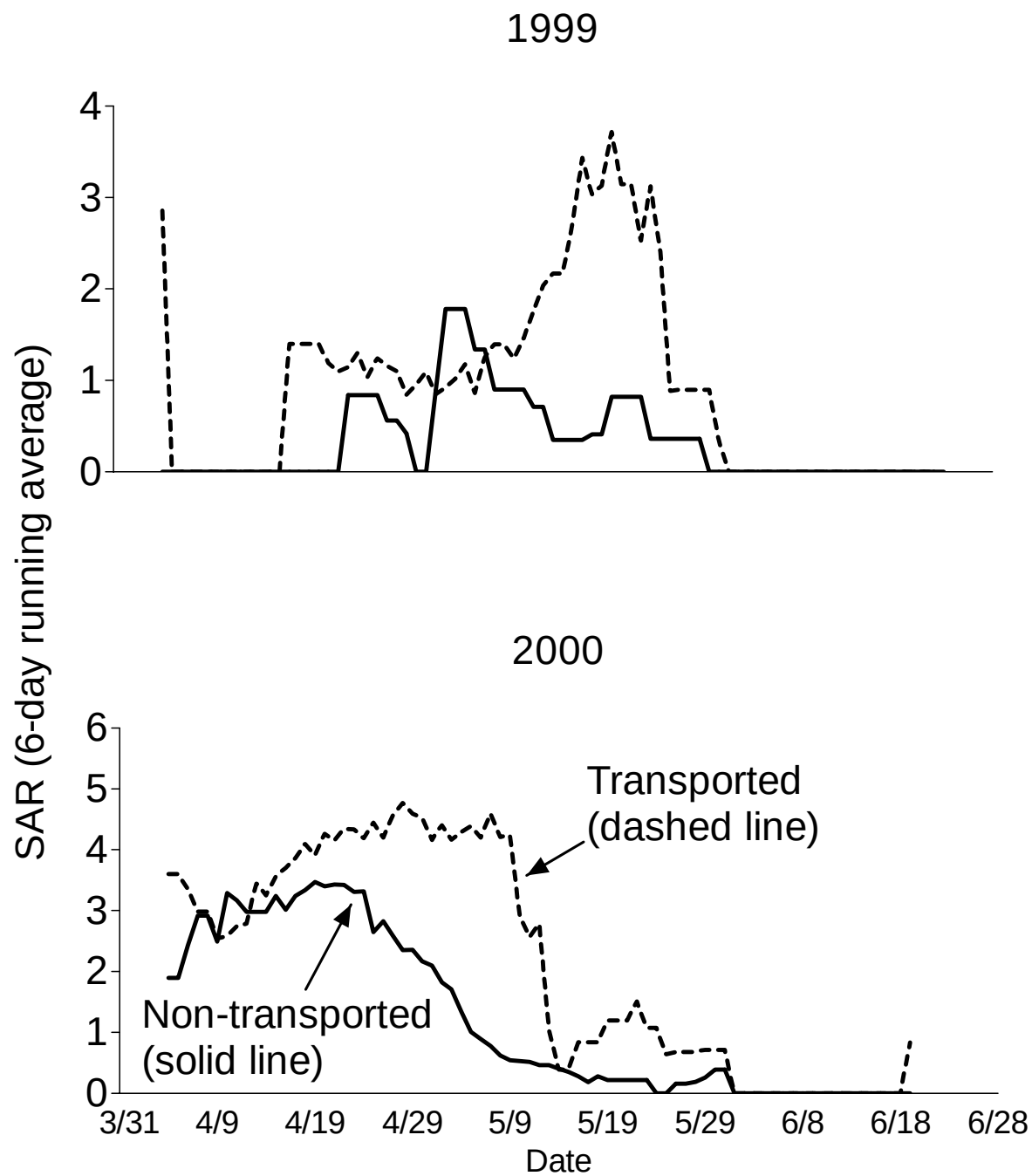


Figure 16. Six-day running average SARs for wild steelhead PIT-tagged and released or transported from Lower Granite Dam (fish transported from Little Goose Dam in 2000).

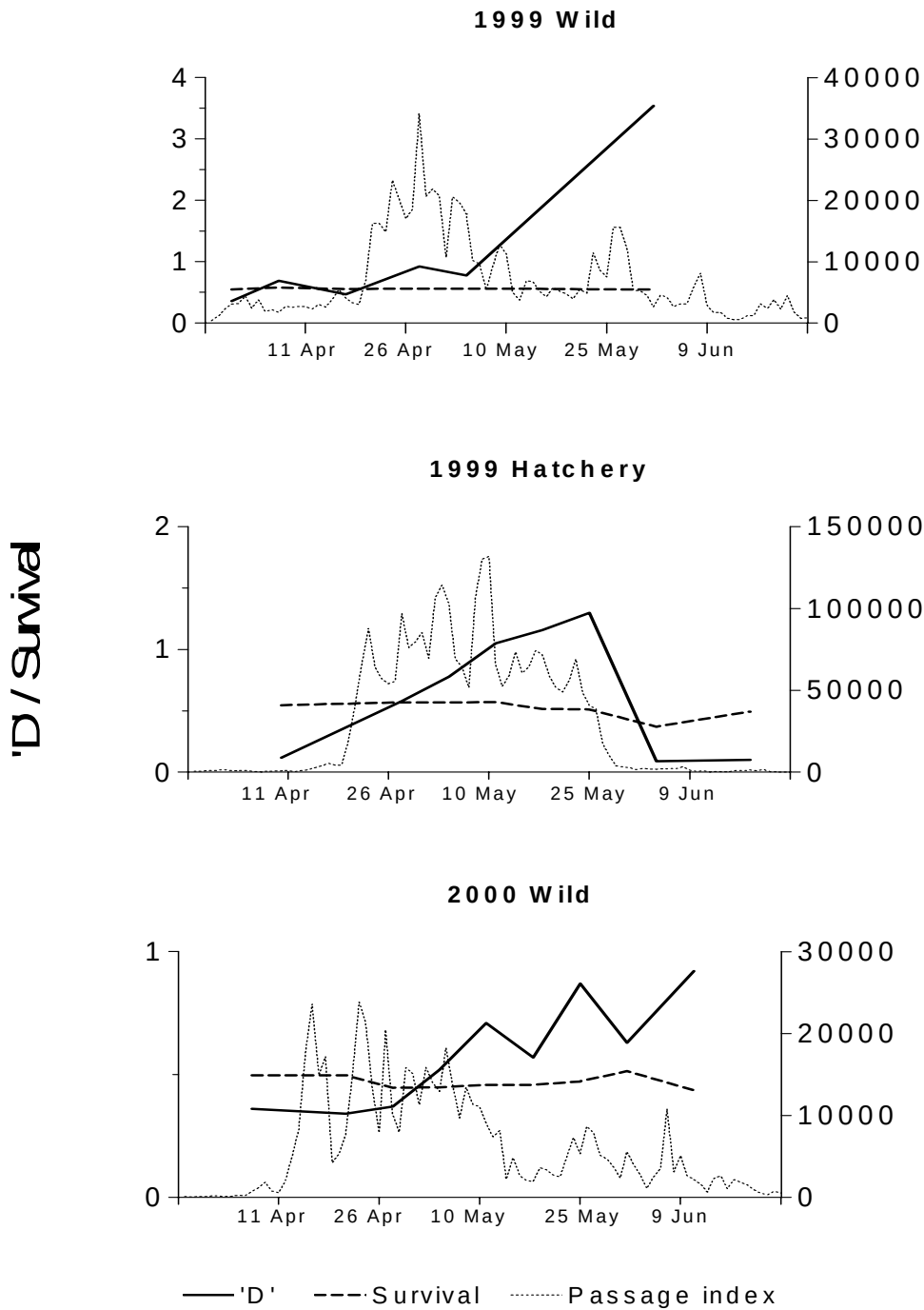
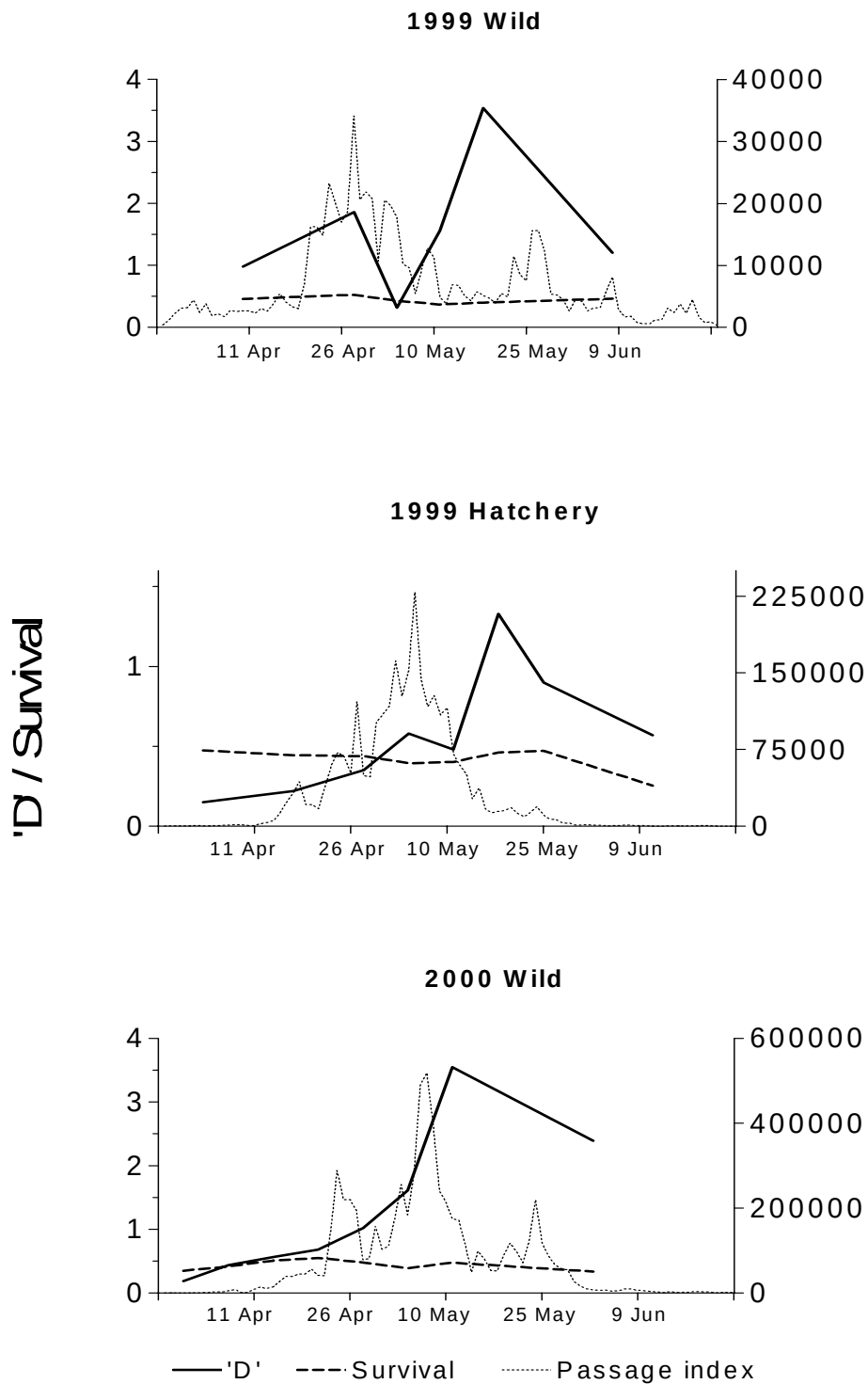


Figure 17. Temporal estimated survival between the tailraces of Lower Granite and Bonneville Dams for Snake River spring-summer chinook salmon, plotted with the temporal D derived from transportation evaluations for fish marked at Lower Granite Dam, 1999-2000.



Passage index at Lower Granite Dam

Figure 18. Temporal estimated survival between the tailraces of Lower Granite and Bonneville Dams for Snake River steelhead, plotted with the temporal D derived from transportation evaluations for fish marked at Lower Granite Dam, 1999-2000.

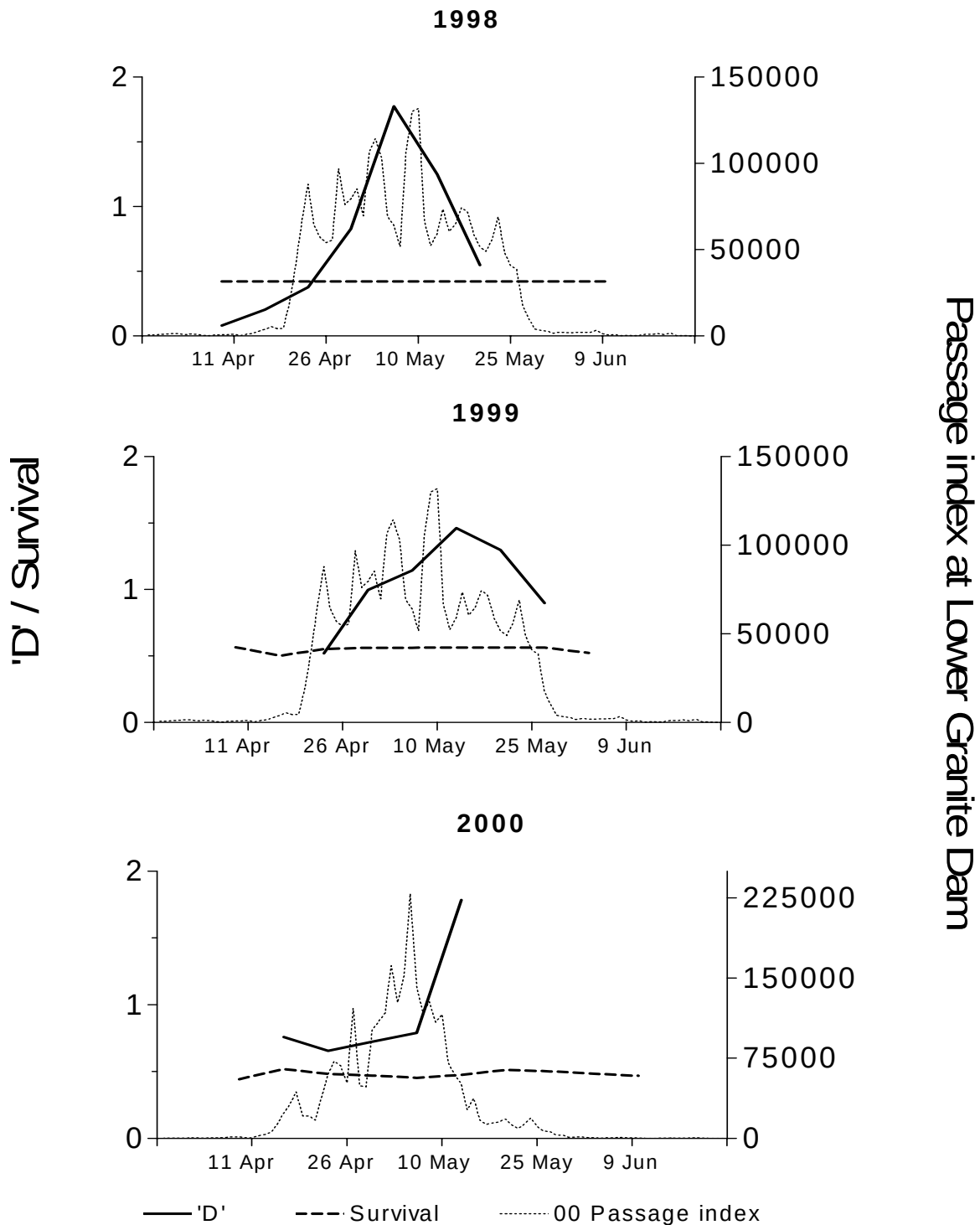


Figure 19. Temporal estimated survival between the tailraces of Lower Granite and Bonneville Dams for Snake River hatchery yearling spring-summer chinook salmon, plotted with the temporal D derived from transportation evaluations for fish marked above Lower Granite Dam, 1998-2000.

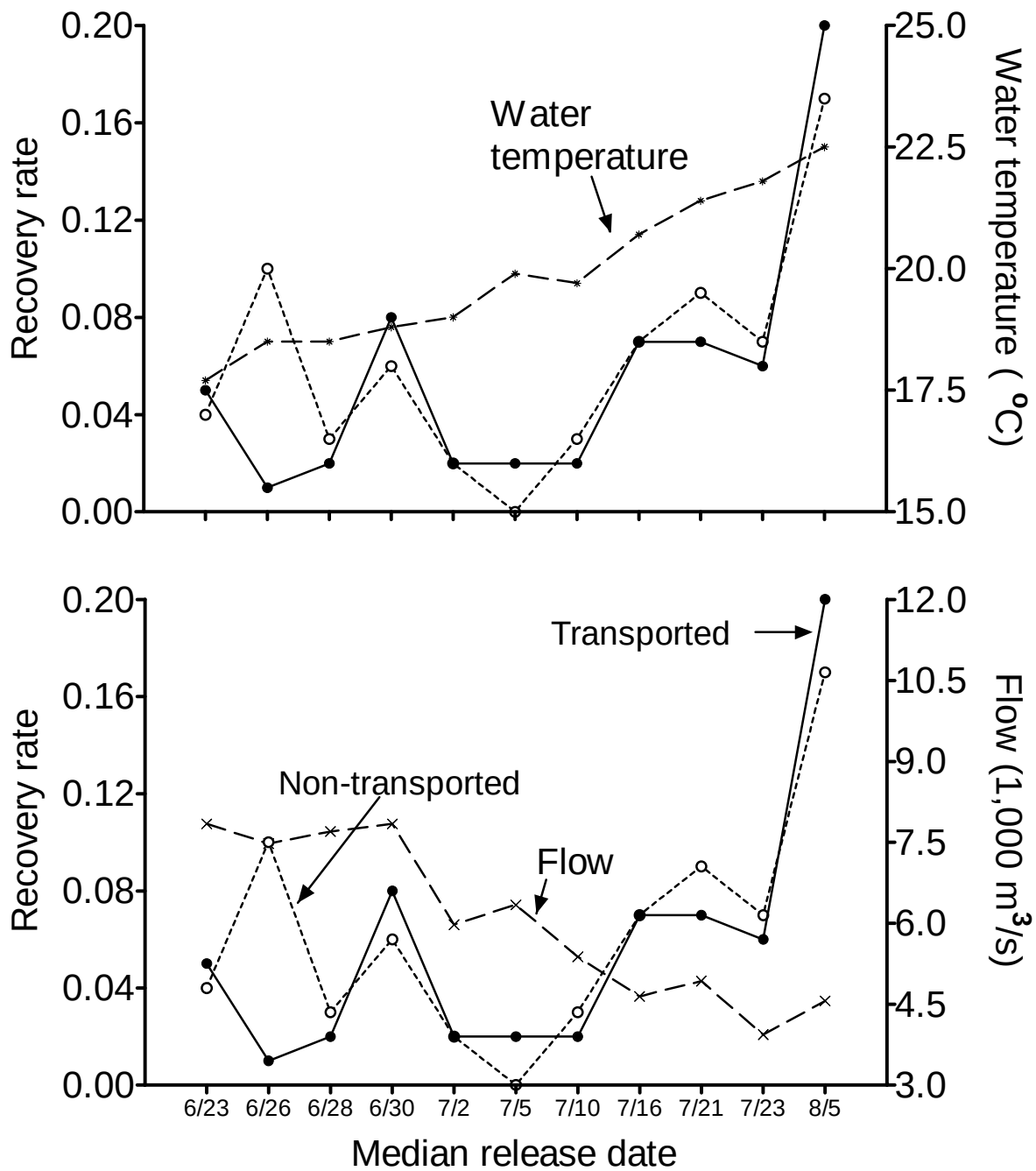


Figure 20. Relative recovery rates of coded-wire tagged (CWT) adult fall chinook salmon recovered from fisheries or at hatcheries from subyearling fall chinook salmon CWT at McNary Dam as juveniles in 1995 and either transported to below Bonneville Dam or released into the tailrace of McNary Dam.

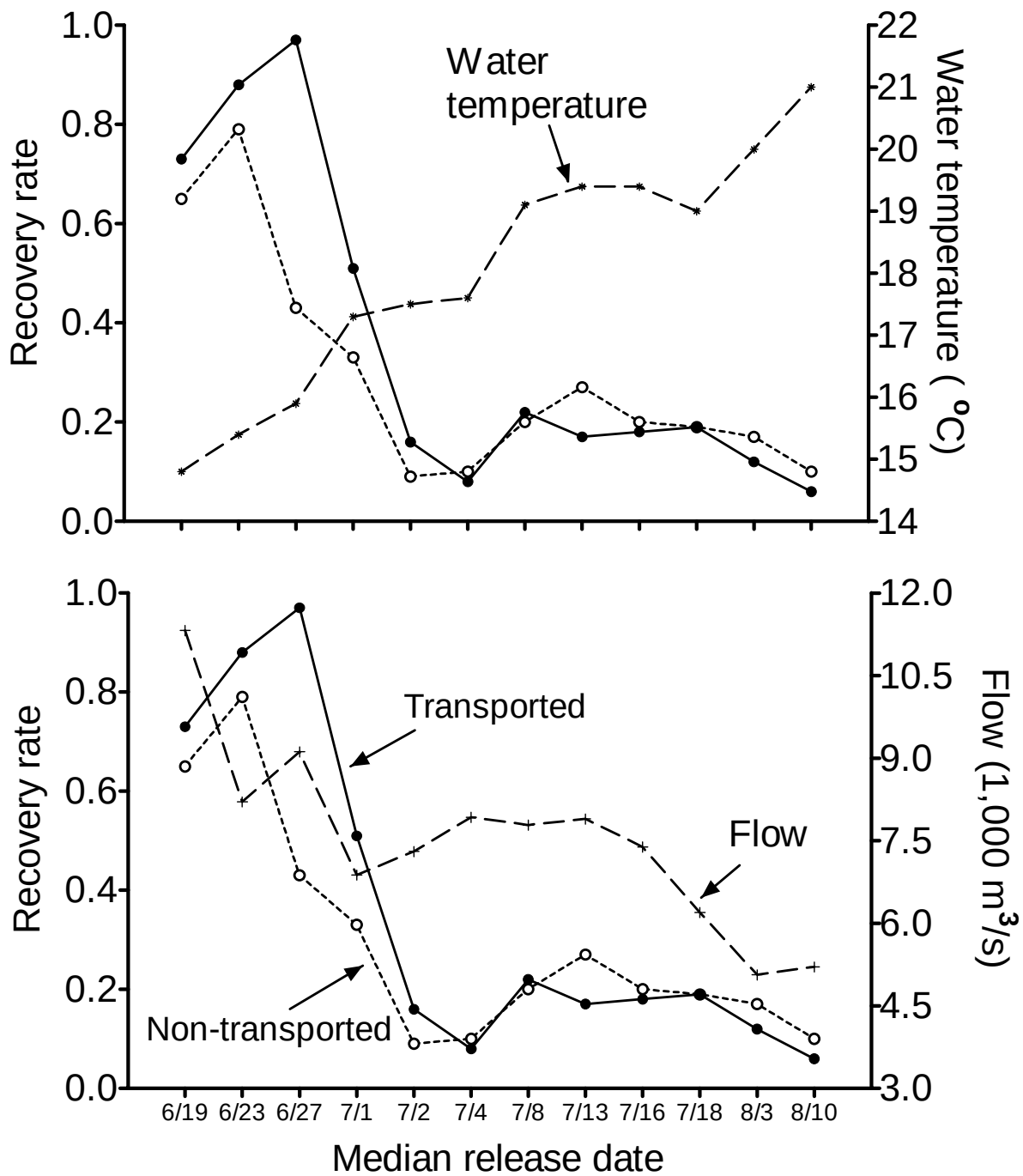


Figure 21. Relative recovery rates of coded-wire tagged (CWT) adult fall chinook salmon recovered from fisheries or at hatcheries from subyearling fall chinook salmon CWT at McNary Dam as juveniles in 1996 and either transported to below Bonneville Dam or released into the tailrace of McNary Dam. .

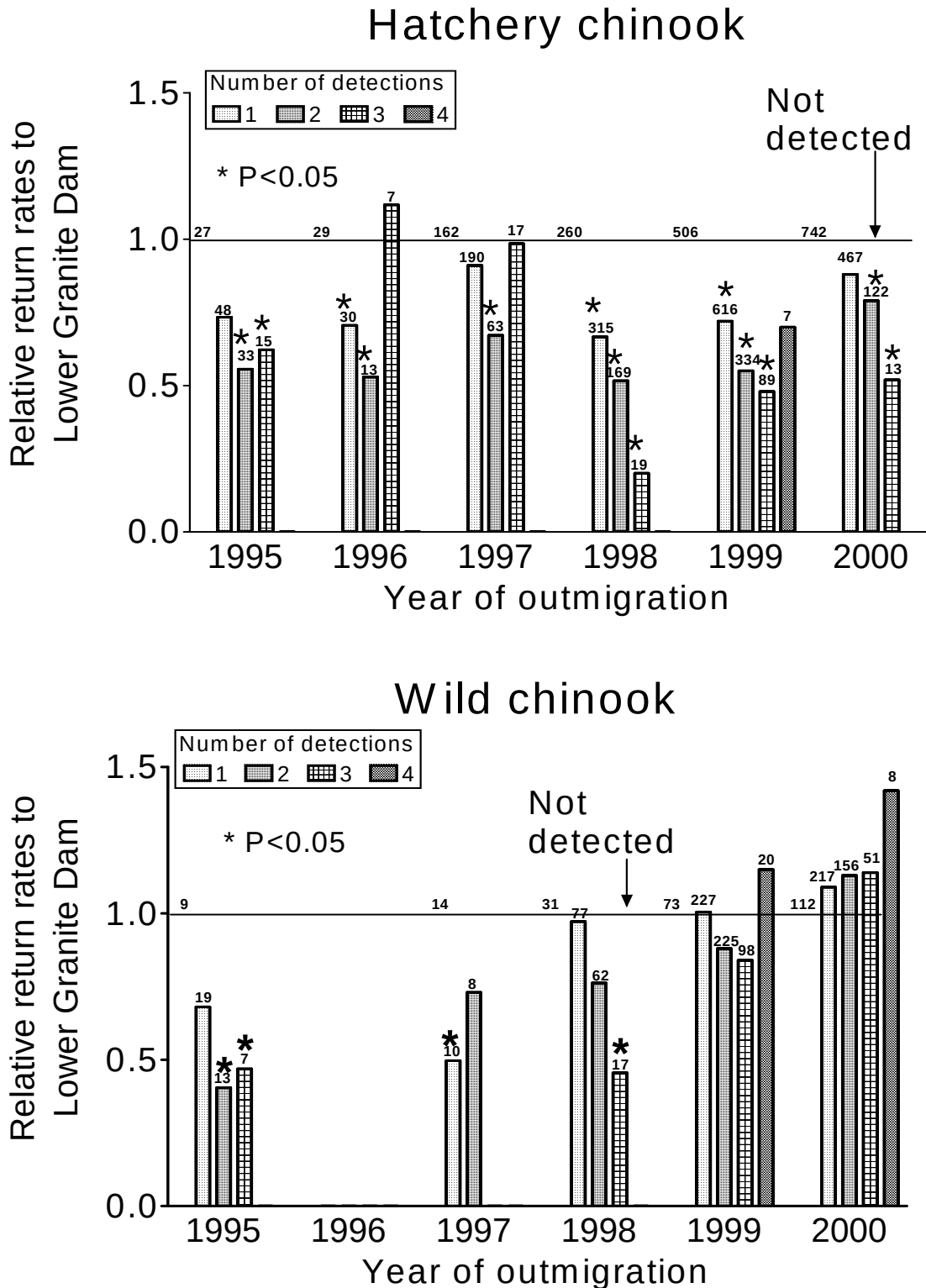


Figure 22. Relative adult return rates of hatchery and wild spring-summer chinook salmon marked above Lower Granite Dam and detected between 0 and 4 times during their migration through Lower Granite, Little Goose, Lower Monumental, and McNary Dams. Fish not detected as juveniles had a relative detection rate of 1.0.

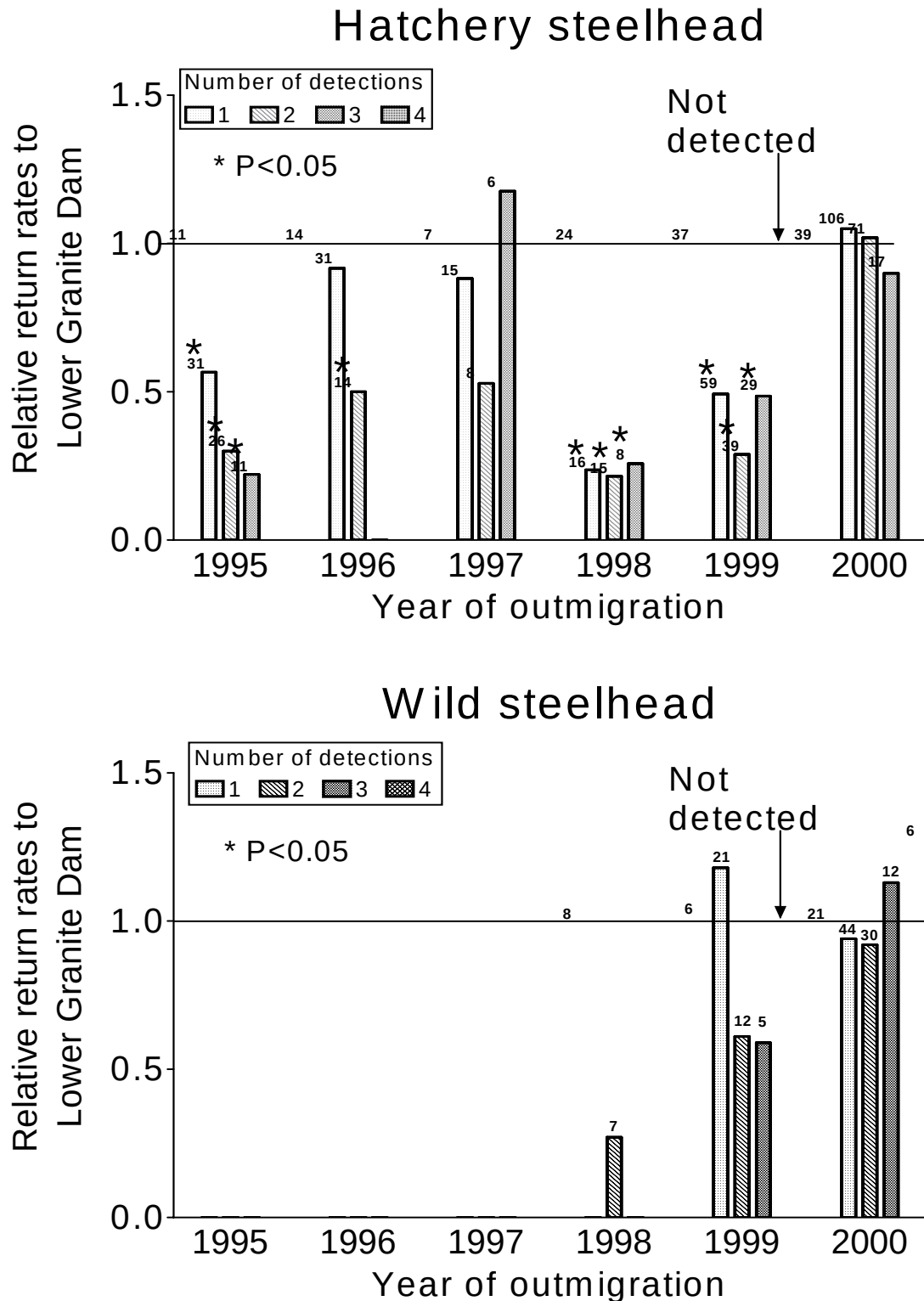


Figure 23. Relative adult return rates of hatchery and wild steelhead marked above Lower Granite Dam and detected 0 to 4 times during their migration through Lower Granite, Little Goose, Lower Monumental, or McNary Dams. Fish not detected as juveniles had a relative detection rate of 1.0.

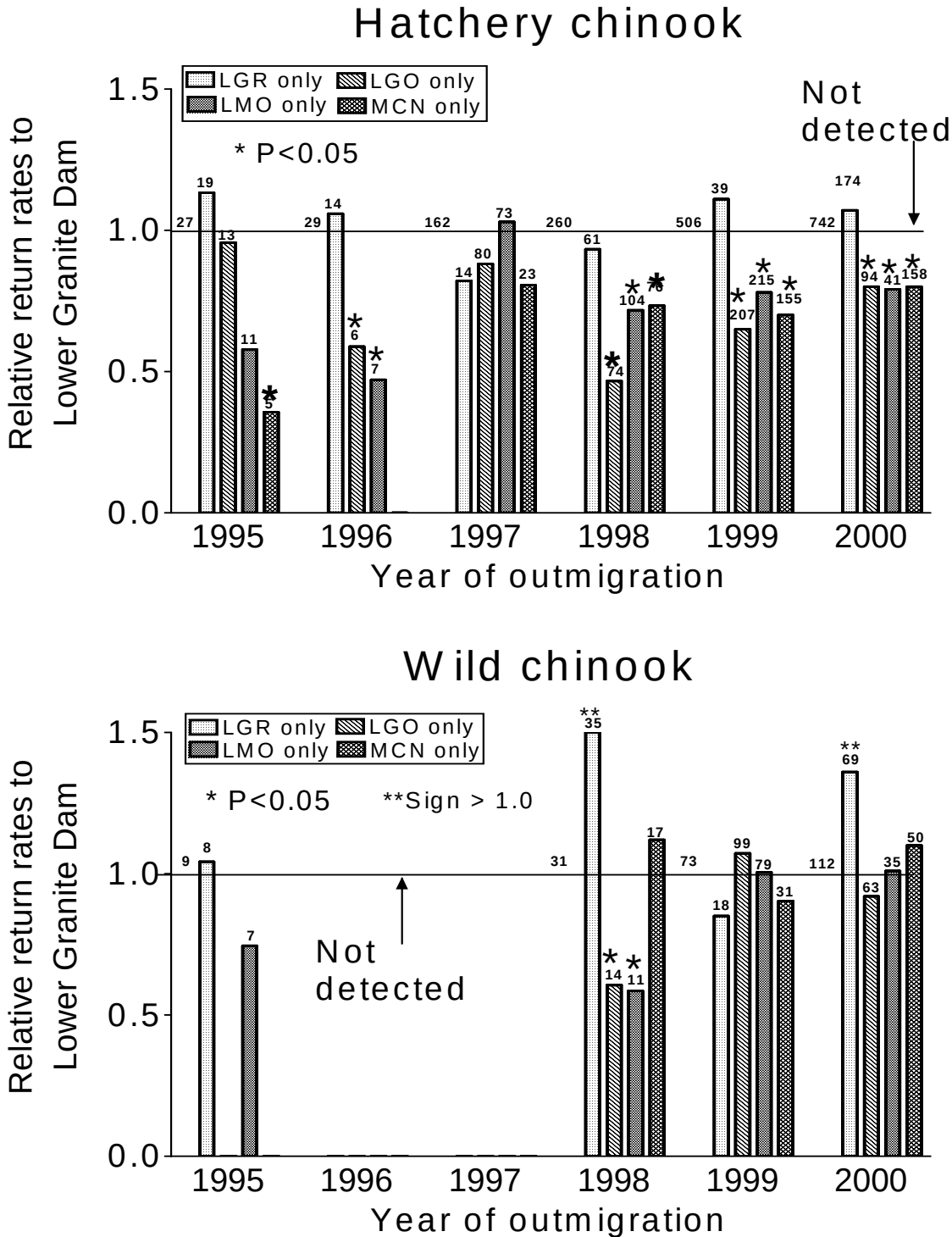


Figure 24. Relative adult return rates of hatchery and wild spring-summer chinook salmon marked above Lower Granite Dam and detected only at Lower Granite, Little Goose, Lower Monumental, or McNary Dam. Fish not detected as juveniles had a relative detection rate of 1.0. **Sign > 1.0 indicates return rate significantly > than the “Not detected” group.

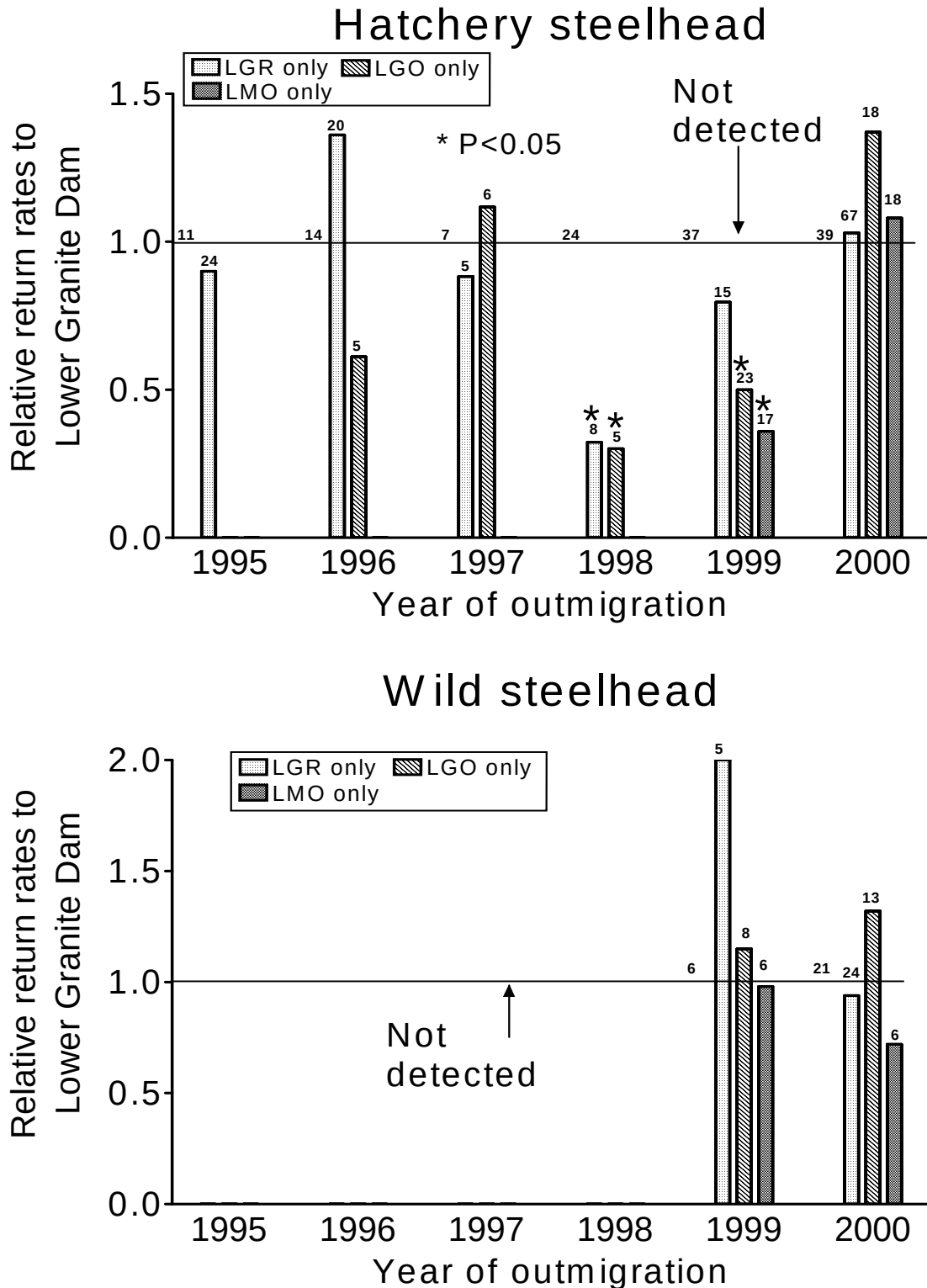


Figure 25. Relative adult return rates of hatchery and wild steelhead marked above Lower Granite Dam and detected only at Lower Granite, Little Goose, Lower Monumental, or McNary Dam. Fish not detected as juveniles had a relative detection rate of 1.0.

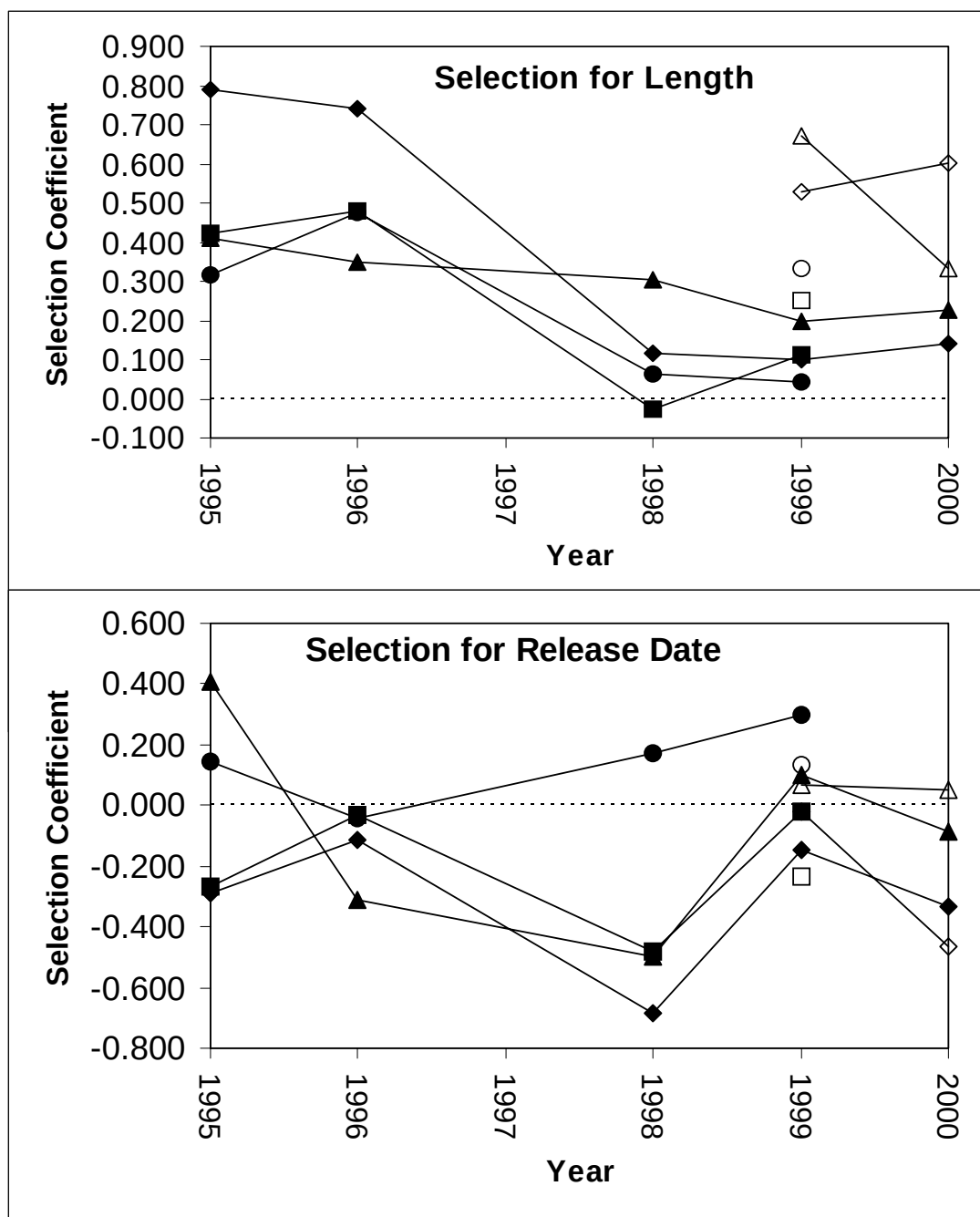


Figure 26. Selection coefficients (see text for details) by year for length at release (top plot) and release date (bottom plot). Abbreviations: Chin – chinook salmon; Steel – steelhead; Inriver – inriver migrants; Transport – transported fish.

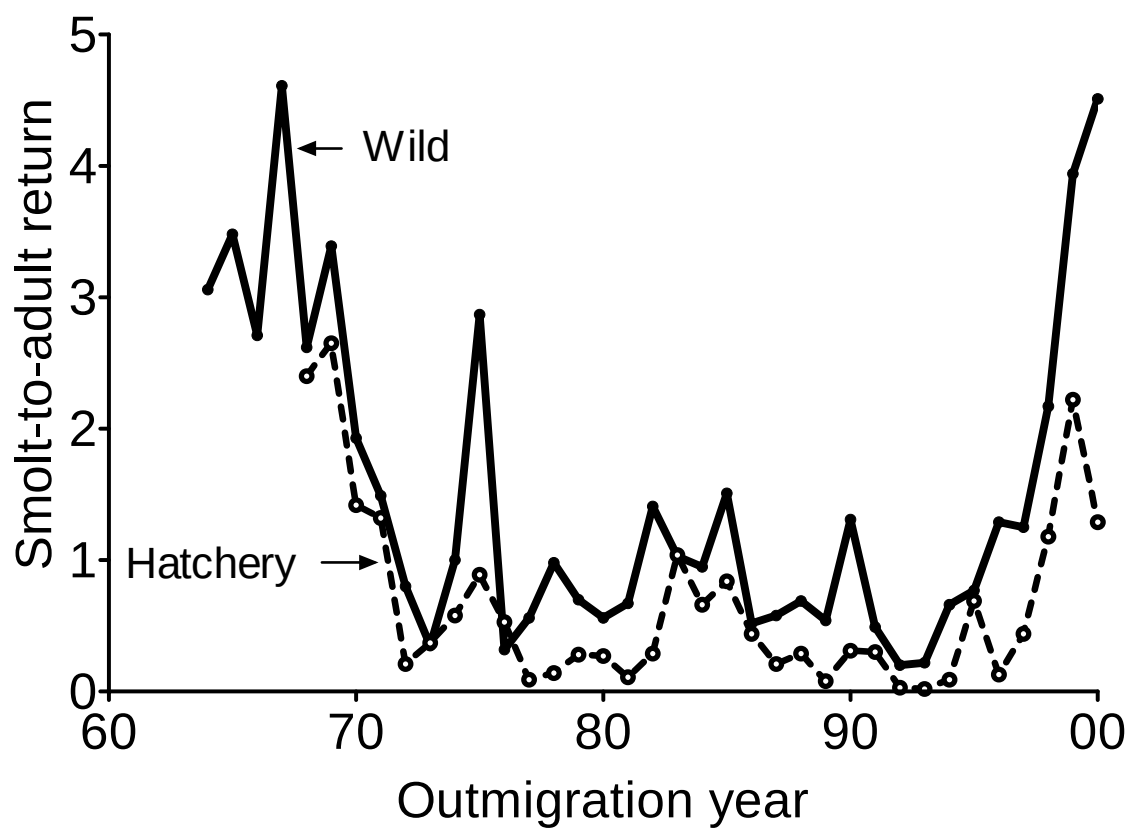


Figure 27. Estimated smolt-to-adult return rates (catch + escapement) of hatchery and wild Snake River spring-summer chinook salmon.

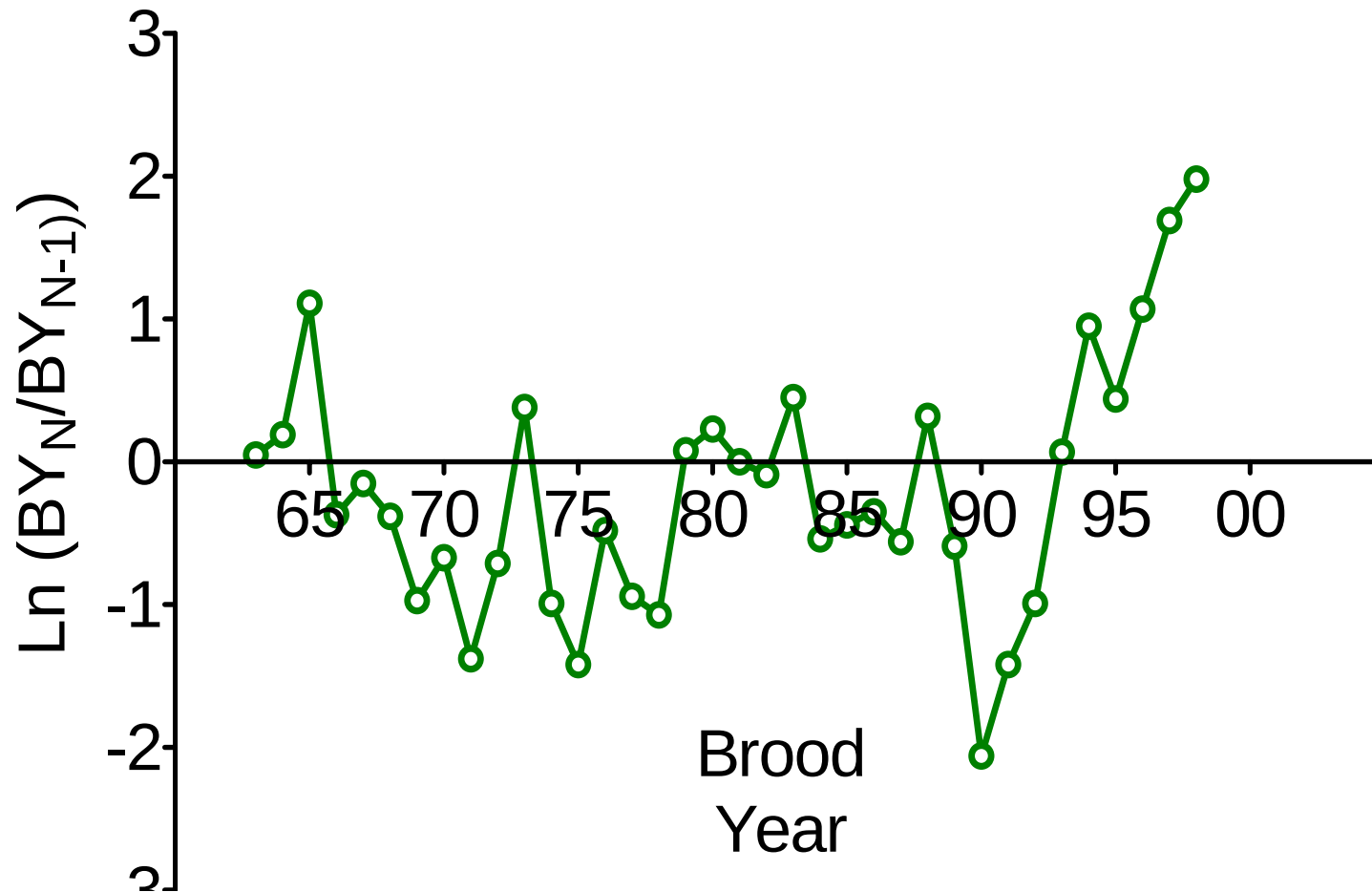


Figure 28. The $\ln(BY_N = \text{escapement over the upper Snake River dam for the current brood} / BY_{N-1} = \text{escapement over the upper Snake River Dam for the brood that produced offspring for current brood})$ for the composite wild spring-summer chinook salmon population in the Snake River Basin above the upper Snake River Dam (Ice Harbor in 1962, Lower Monumental in 1969, Little Goose in 1970, and Lower Granite in 1975).

Lower Granite to McNary Dam Travel Time (days)

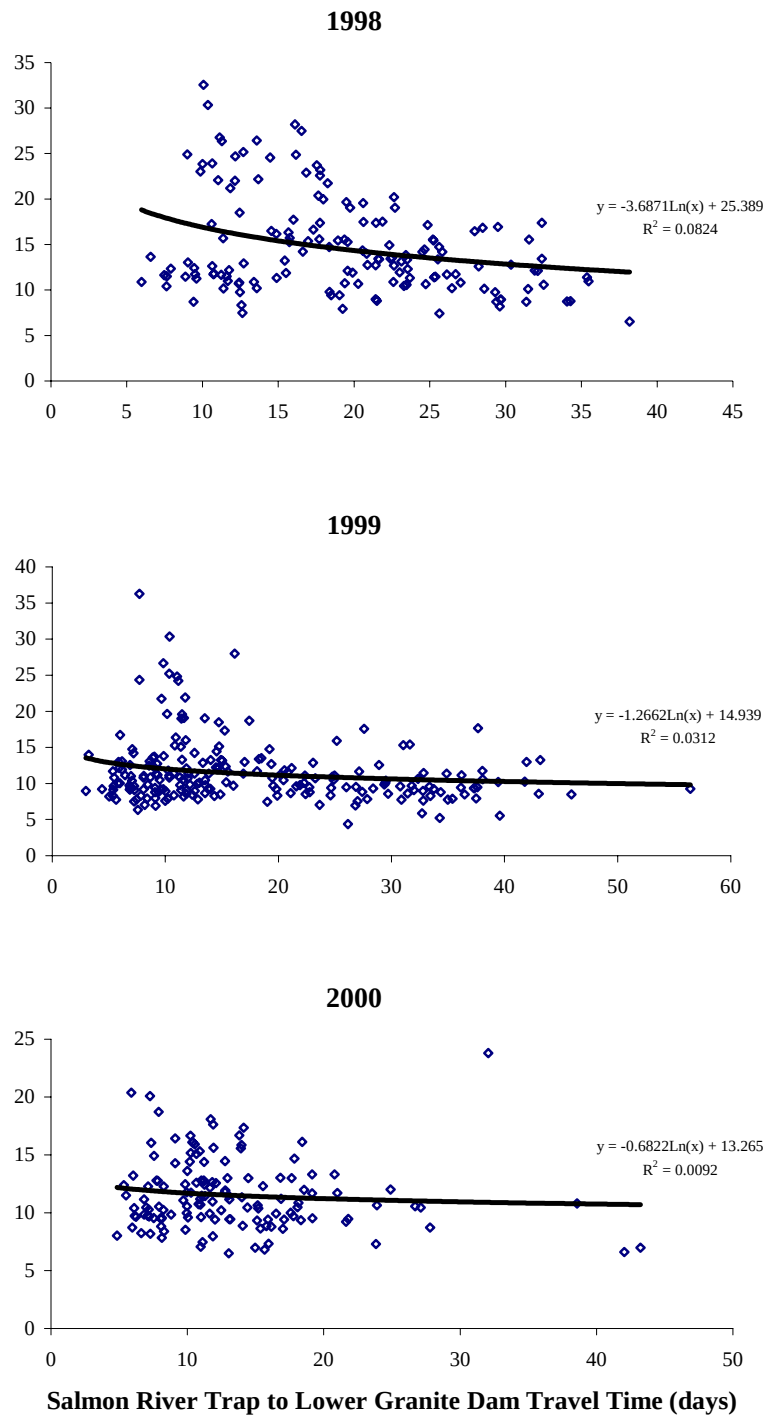


Figure 29. Travel time in days from the Salmon River Trap to Lower Granite Dam plotted against travel time in days from Lower Granite Dam to McNary Dam for PIT-tagged wild yearling chinook salmon from 1998 to 2000.

Lower Granite to McNary Dam Travel Time (days)

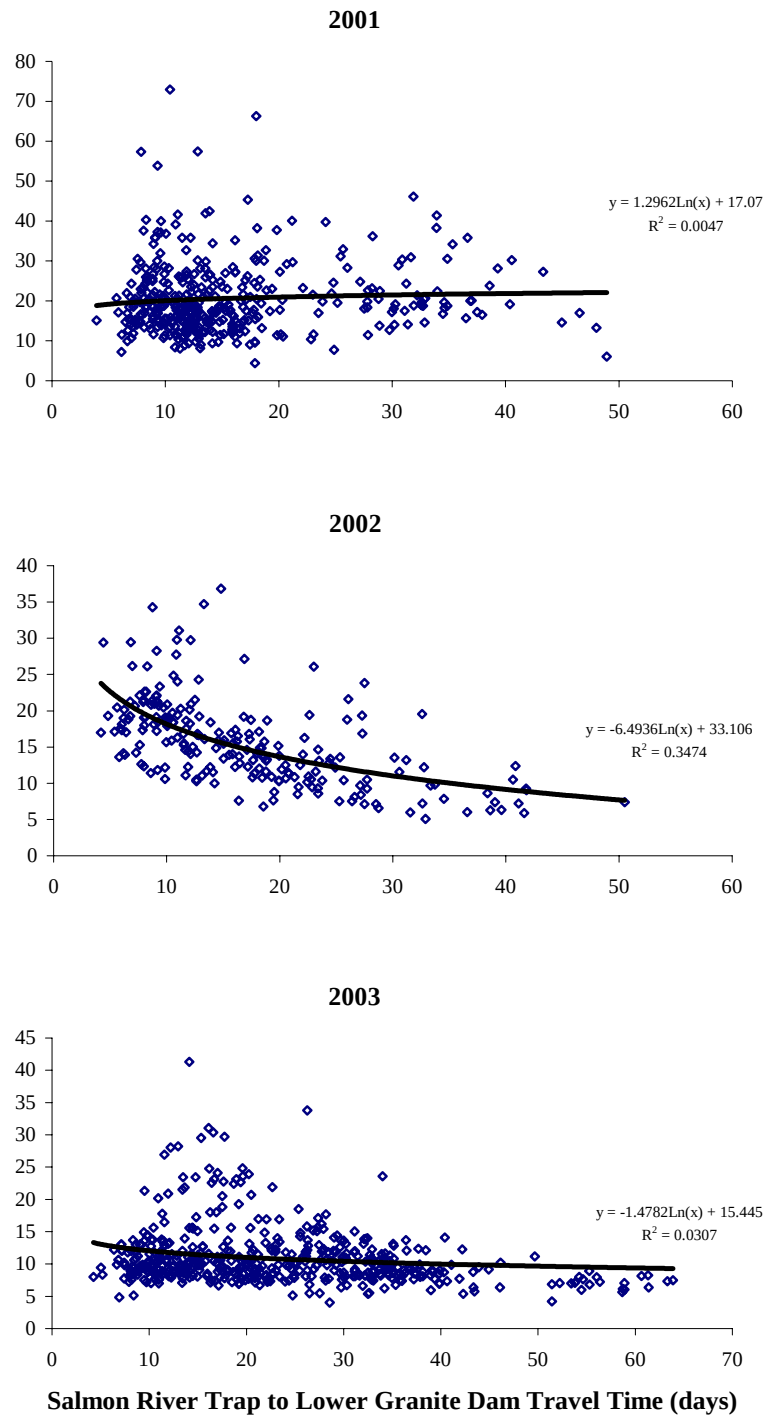


Figure 30. Travel time in days from the Salmon River Trap to Lower Granite Dam plotted against travel time in days from Lower Granite Dam to McNary Dam for PIT-tagged wild yearling chinook salmon from 2001 to 2003.

TECHNICAL MANAGEMENT TEAM

BOR: Tony Norris / John Roache

BPA: Scott Bettin / John Wellschlager

NMFS: Paul Wagner / Chris Ross

USFWS: David Wills / Howard Schaller

OR: Ron Boyce

WA: Cindy LeFleur

ID: Russ Kiefer

MT: Jim Litchfield

COE: Cindy Henriksen / Rudd Turner / Cathy Hlebechuk

TMT MEETING

Wednesday 14 April 2004 0900 - 1200 hours

**Custom House Room 118
Portland, Oregon**

Conference call line: 503-808-5190

NOTE: NEW DAY and PHONE BRIDGE

*All members are encouraged to call Donna Silverberg with any issues or concerns they would like to see addressed.
Please e-mail her at dsilverberg@cnmw.net or call her at (503) 248-4703.*

AGENDA

1. Welcome and introductions.
2. Status of Hanford Reach (Chris Carlson)
3. McNary Operation outside 1%
[\[Monitoring Plan for Operating Turbines at McNary Dam \]](#) 
[\[Biological Information on Juvenile Salmon Related to Operation of McNary \]](#) 
4. Spring Spill at Lower Snake Collector Projects
 - a. Transport Information
 - b. Research at Collector Projects
5. Mid-Columbia Flow
[\[SOR #2004-05 \]](#) 
[\[SOR #2004-05-M -- "NOTE: Modified was not received at the Meeting" \]](#) 
6. Status of Operation
 - a. Reservoirs
[\[Volumes at Dworshak \]](#)  [\[Volumes at Libby \]](#)  [\[Volumes at Hungry Horse \]](#) 
 - b. Fish
 - c. Power System
7. Spring/Summer Update
8. Other
 - Set agenda for next meeting

Questions about the meeting may be referred to Cindy Henriksen at (503) 808-3945, or Rudd Turner at (503) 808-3935, or Cathy Hlebechuk at (503) 808-3942

Monitoring Plan for Operating Turbines at McNary Dam Outside of the 1% Limit in 2004

1. Background

Turbine operating flexibility during the fish passage season at lower Columbia and Snake River dams is limited to within 1% of best efficiency. This restricted operation results in turbine discharge ranges from approximately 7,800 cfs to 12,400 cfs, depending on total project head at McNary Dam. The origin of this operating restriction is based on the hypothesis that fish survival and turbine efficiency are directly related. The 1% operating limit is called for in the NMFS 2000 BiOp and is implemented through the Corps of Engineers' Annual Fish Passage Plan (FPP).

Further analysis of past information and recent biological study results for McNary Dam have led to questions about fish survival through turbines at that project. Bonneville Power Administration (BPA) has suggested that fish survival at higher discharge rates (above the 1% limitation) may not differ from the existing conditions and they have proposed consideration of operating turbine units at McNary outside of the 1% range.

A study for the McNary Modernization Program to test new vertical barrier screens (VBS) and screen guidance efficiency at different turbine discharges was planned and coordinated through the Regional Forum. This study requires operation of 5 units at McNary alternating between the 1% limit and the maximum turbine discharge in 2-day blocks during the 2004 juvenile fish passage season. The BPA proposal is to change operation of the remaining McNary turbines to allow for higher discharge (up to 16,400 cfs) during the spring 2004 fish passage season as well.

In order to assure that no adverse effects to anadromous fish would occur as a result of operating outside of the 1% range, this monitoring plan has been developed. This plan will provide a real-time evaluation and operational decision criteria to minimize impacts to migrating juvenile salmon.

2. Biological Monitoring

According to physical (hydraulic) model study results, increased turbine discharge causes increased gatewell turbulence. Turbulence may cause physical injury and affect the physiological condition of juvenile fish. Debris accumulations in the gatewells may increase the risk to fish either by direct injury or as a result of debris accumulations on the VBSs that cause high-velocity areas that may lead to fish impingement. Biological monitoring criteria are proposed to enable real-time detection of adverse effects on fish resulting from the changed turbine operations. Specifically, fish from the gatewells will be monitored for changes in descaling, physiological condition, and mortality.

Gatewell Descaling:

- Descaling rates will be determined for fish from the existing orifice trap in unit 6 every other day. This unit will be operated within 1% limits during the spring fish passage season (April 10 – about June 30). This information will be compared to the descaling rates for fish collected at the juvenile fish facility. These fish will have passed from units operated above the 1% limit. Washington Department of Fish and Wildlife (WDFW) smolt monitoring crew will perform all descaling assessments at the orifice trap and juvenile fish facility. Early in the monitoring, fish condition in the orifice trap will be compared to fish condition at the fish facility to determine any “correction factor” required to account for differences in fish passage experiences of sampled fish. A differential of 2% (after correction factor is applied) between descaling levels at the orifice trap and sampling facility during the fish passage season will be used as a “trigger” for immediate action. If this occurs, the following actions will be taken:

- request that units be returned to within the 1% limit

- inspect facilities to confirm no apparent mechanical problems exist
- review descaling data from the unit 6 orifice trap and juvenile fish facility
- check upstream fish condition from other projects on the Snake and Columbia River to compare with similar stocks fish arriving at McNary.

If nothing is found that would indicate that higher turbine loading is the cause of higher descaling, units will be returned to the higher load operation. If differentials continue with the next sampling, actions described above will be repeated and the 1% limit will continue until further coordination occurs and the TMT agrees to recommend continuing to operate the turbines above the 1% limit.

In addition, juvenile fish for the VBS evaluation will be dipnetted from the gatewells, sorted, PIT tagged, and released back into A-slot gatewells of units 2, 3, 4, 5, and 9. Approximately 9,300 each of yearling Chinook and sockeye will be released into the bottom of the gatewells (canister releases) during the spring season. These fish will be recovered in the juvenile fish facility sampling system (PITtag sort by-code) and be evaluated for descaling. Descaling will also be compared to levels in the fish facility since test fish will have a known gatewell condition.

If descaling levels at the fish facility increases by 6% (WDFW, personal comm.) over the previous day, the following actions will be taken by Project personnel:

- request that the units be returned to within the 1% limit
- inspect the facilities to confirm no apparent mechanical problems exist
- review the descaling data from the unit 6 orifice trap
- check upstream fish condition from other projects on the Snake and Columbia River to compare with similar stocks fish arriving at McNary

If it is determined that the increased descaling may be the result of the higher turbine loading operation, then the 1% limit will continue until further coordination occurs as described above.

In addition to the two methods described above for monitoring descaling, 9000 Chinook fry will be obtained to further monitor descaling. A portion of the fry (>55mm) will be PIT tagged and released into units 5 and 9 (under varied turbine loading). Fish will be recovered at the juvenile fish facility where fish will be examined. Precision on this test will allow detection of approximately 5% difference in descaling between treatments. This is based on an assumed 60% detection of PIT tagged fish, and using a 1-tailed test. This will allow for an estimation of descaling estimates over a larger range of gatewell conditions. This portion of the monitoring plan will occur April – May.

A portion of the fry will be too small to PIT tag (with existing methodologies) and therefore will be released into the B-slot of unit 6 and recovered using the orifice trap. Fish will be released at both high and low load, for 4 days (2 at high, 2 at low loading). Fish will be released into the gatewell similar to the VBS study described above. These fish will be collected in the orifice trap and evaluated for fish condition. Evaluation will include recapture of fish and “dipping” fish into a dye to assist in visualizing injuries. Fish will then be examined under a binocular microscope to quantify injury and descaling. Descaling standards developed for the Smolt Monitoring Program will be used. This portion of the monitoring will occur at the beginning of or just prior to full powerhouse operation above the 1% limit.

Monitoring of juvenile lamprey will also occur in the spring. Lamprey will be collected from the fish facility at John Day Dam. Fish will be transported to, and released in gatewells at McNary Dam (units 5 and 9). Releases will be made similar to the above described methods for salmonids. There will be 5 releases of about 150 fish per release. Fish will be recovered in the juvenile fish facility and examined for injury, including lacerations, bruising, and scrapes. Fish will be dipped in “dye” to assist in making

injuries more visible prior to examination.

Mortality:

Mortality rates in the fish sampling sites will be monitored. If increased mortality is observed among sampling sites that may be attributable to the turbine operation, then units will be returned to operating within the 1% limit. The turbines will then continue to operate within the 1% limit until further coordination occurs and the TMT agrees to recommend resuming operating the turbines above the 1% limit.

Forebay Delay:

Any unexpected impacts that would contribute to juvenile fish delay in the forebay cannot be evaluated in season without a specific two-treatment test. Such a test is not planned, however, forebay residence time will be monitored during the project survival study (to be conducted with radio telemetry). The results from this study will be reviewed to determine any apparent consequences of the turbine operations.

Project Survival:

Project survival, including by routes of passage, will be evaluated at McNary Dam using radio tag technology during 2004. Although this evaluation is not designed specifically to determine survival differences for fish passing through turbines operated either within or outside the 1% limit, it is possible that the data analysis will reveal useful information. This information, however, will be available after the fish passage season rather than real time.

Adult Fallback:

Reduction in involuntary spill levels may result in an increased number of adult fallbacks passing through the Powerhouse (either through turbines or juvenile fish facility). For several years, data has been reported on total number of adults falling back through the juvenile facility. Under the proposed operation we will continue to monitor numbers of fallbacks in-season and, if unexpectedly high levels of fallback are observed, the information will be immediately provided to the TMT for discussion and recommendations on how to proceed with the turbine operations.

3. Physical Monitoring

Physical monitoring will include debris loads, water temperature and total dissolved gas (TDG).

Gatewell Debris: Debris loads in the gatewell and on the VBSs will likely increase with increased gatewell flow occurring as a result of turbine operation above the 1% limit. Higher debris loads are expected to increase potential for fish injury and risk of damage to the vertical barrier screens. Debris accumulation on VBSs causes increased hydraulic loads that can be monitored by changes in the head differential across the VBSs.

Project personnel will monitor the head differential across the VBSs according to the debris management plan in the FPP. When the head differential approaches or exceeds 1.5 ft, turbine unit operation will be reduced to 40 MW until the VBSs can be pulled up to the forebay deck, cleaned and replaced. To accommodate the potential for increased debris accumulations, the head differential monitoring will be expanded to include using radar transducers in the A-slots of each unit and B-slots of units 2 and 4. The new electronic monitoring system will provide continuous early warning coverage of potential critical debris accumulations on the VBSs throughout the fish passage season. Data from these sensors will be sent directly to the NWW District and Project (biologist and project operations).

To accommodate the expected increased debris load, VBS cleaning and maintenance crews will be expanded and additional manpower will be hired.

Water Temperature:

Although warm water temperatures can be a concern at McNary, this doesn't normally occur until later in the summer season, after the turbine operation above 1% would be over (Proposed operation is for Spring only). According to the Water Management Plan (October 2003), the spring season will be over (likewise the turbine operation above the 1% limit) when ambient water temperatures are above 62°F (17°C). This will be well before any temperature-related concerns would occur. Never the less, water temperature monitoring will occur under the McNary Forebay Temperature Study beginning in May and their information will be available on a real time basis for consideration by project personnel monitoring the turbine operations.

Total Dissolved Gas:

If the turbines are operated above the current 1% limit, more flow will pass through the powerhouse and this will reduce the amount of involuntary spill that occurs at McNary Dam. While the effect on total dissolved gas (TDG) production is uncertain at this time, less involuntary spill will result in less time when TDG levels might exceed water quality limits. The TDG monitoring data will be analyzed at the end of the season to assess how much of a potential TDG change occurred.

Adults Fallback

Adult fallback through the facility will be monitored and reported as part of the post season reporting. It is possible that due to operations of the turbines above 1%, adult salmonids fallback (and kelt passage) may increase through the facility.

4. Reporting

During the spring season, periodic progress reports will be made to the TMT regarding the status of the operations, particularly if there are any issues that arise. If the monitoring program results in the turbine operation being shut down because of criteria not being met, this will be immediately reported to TMT for discussion and resolution.

A written report will be prepared at the end of the season to summarize the real time monitoring program results, including information from other ongoing activities at the project that were considered during the operation. This report will be available by November 2004.

Biological Information on Juvenile Salmon Related to Operation of McNary Turbines Outside the 1% Efficiency Limit

Abstract

NOAA Fisheries' 2000 Biological Opinion (BiOp) for the Federal Columbia River Power System calls for operating turbines within 1% range of best peak efficiency (1% limit) during the juvenile fish outmigration. Bonneville Power Administration (BPA) has requested that this criterion be removed at McNary Dam. This report has been prepared to evaluate the potential effects of the proposed operation for spring of 2004 on anadromous salmonids, particularly those listed for protection under the Endangered Species Act (ESA).

In 2004, operating McNary turbines above the 1% limit will result in more flow going to the powerhouse and decrease the amount of involuntary spill that would otherwise occur by about 2.5% of the total springtime project flows. This change in turbine operation will result in an increased economic benefit. However, this also means that flows will increase through the turbine intakes, past the extended-length fish diversion screens (ESBS) and into the gatewells and that the tailrace environment will be altered, potentially affecting fish egress. These changes will influence juvenile fish passage routes and affect their overall survival at McNary Dam.

Based on our evaluation, we estimate that operating McNary turbines above the 1% limit in the spring of 2004 may decrease the overall project average survival rate by less than 0.2% for yearling Chinook and steelhead. This lower survival rate is attributable to the decreased involuntary spill, because the change in flow distribution will result in about 3.6% of the juvenile fish migrants to be redistributed from the spillway to the powerhouse. Although the impacts to the fish redistributed to the powerhouse under the higher turbine discharge are uncertain, the greatest impact is expected to occur in the gatewells. Therefore, it is necessary to have a comprehensive in-season monitoring plan sufficient to detect increased fish injury in the gatewell environment, thus allowing for in-season management decisions (i.e., reinstate the 1% limit) to minimize potential adverse effects. Absent an adequate gatewell-monitoring program, fish survival may be even lower.

1. Proposed Action

The BPA has proposed eliminating the 1% turbine limit at McNary Dam. This assessment covers the 2004 spring fish migration season (April to approximately mid to late June). The origin of the operating limit is based on a review of fish survival studies under different turbine geometries and operations (Bell 1981). From Bell's analysis, a hypothesis evolved that fish survival and turbine efficiency are directly related. This hypothesis led to development of the 1% limit turbine operating guidelines for the FCRPS projects that have been included in the Corps' Fish Passage Plan (FPP) since 1993 and that are part of NOAA Fisheries' 2000 FCRPS BiOp. When BPA evaluated Bell's (1981) review and the results of a recent biological study at McNary Dam, they concluded that operating McNary turbines above the 1% limit may not be different from the existing conditions and might provide a higher fish survival (Skalski, *et al.*, 2002). This report does not address the BPA proposal to change summer operations it will be covered in a separate analysis at such time that BPA requests.

2. ESA-Listed Fish

Four evolutionarily significant units (ESU) of ESA-listed salmon from the Snake River (sockeye, spring/summer Chinook, fall Chinook and steelhead) and three ESUs from the Columbia River (Upper Columbia River spring Chinook and upper and middle Columbia River steelhead) migrate past McNary Dam as juveniles and adults. Descriptions of these ESUs, including run timing and life histories, are discussed in the NOAA Fisheries' 2000 BiOp. This report does not address summer operations, therefore, ESA listed fall Chinook are not included in this assessment.

3. Hydraulic Effects of the Proposed Action

Under the existing 1% limit, turbine discharge varies from 7,800 cfs to approximately 12,400 cfs, depending on total project head, and the powerhouse hydraulic capacity is about 170,000 cfs. The BiOp calls for nighttime spring spill (1800 to 0600 hours) to improve juvenile fish passage. Spill volume is controlled by the total dissolved gas (TDG) with the maximum allowable spill not to exceed state water quality standards for TDG (“gas cap”). Both Oregon and Washington have issued waivers to their water quality standards that allow TDG levels (measured in the tailrace) of up to 120% of saturation. Under the 50-year average river flows the spill volume that meets these conditions ranges from approximately 150,000 to 180,000 cfs. Because the 50-year average spring flows passing McNary Dam range between 260,000 to 280,000 cfs there are extended periods when flows exceed the powerhouse capacity and voluntary spill gas cap, thereby forcing daytime involuntary spill. The frequency of involuntary spill is further reduced by the current operation that uses the flexibility of forebay to pond water during the day for release at night. This operation eliminates involuntary spill for river flows up to 230,000 cfs.

This year (spring 2004) the April final flow forecast (April – June) predicts river flows will be lower than average. To determine the effect of the forecast on flows at McNary Dam the Weather Service’s model, ensemble stream flow predictor (ESP), was used to model similar historic weather patterns to the current day’s conditions. Based on the modeling of the ESP (1-4) runs, RCC estimated the average springtime flows expected at McNary to be approximately 185,000 cfs (Table 1).

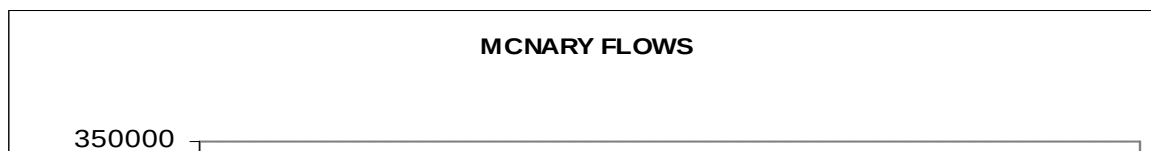
Table 1. Estimated Spring Flows at McNary 2004 Based on the ESP Modeling Runs.

McNary					
	Apr - Aug Runoff Volume at The Dalles	April 10 - 30 June Average Regulated Flow (kcfs)	Spill Assumed from 12 April - 30 June		
			Vol Voluntary Spill (kaf)	Vol of Involuntary Spill within 1% Turbine Limit (kaf)	Vol of Involuntary Spill outside 1% Turbine Limit (kaf)
ESP 1	79.0 MAF	187,600	8585	633	0
ESP 2	78.1 MAF	181,000	8823	267	0
ESP 3	77.2 MAF	186,400	8115	976	6
ESP 4	76.8 MAF	187,700	8564	556	0
Average	78.0 MAF	185,675	8522	608	1
STP		169,400	8523	0	0

Under the average ESP forecast, flows are expected to exceed 230,000 cfs approximately 20% of the spring thereby resulting in no involuntary spill at McNary 80% of the springtime. Flows estimated between 230,000-260,000 cfs are expected 17.4% of the time and 260,000-280,000 cfs 2.5 % of the time (Figure 1).

The proposed turbine operation will allow turbine discharges to increase up to a maximum of 16,400 cfs. In 2004 one unit is anticipated to be unavailable for the duration of the spring season and another unit will be operated at 12,400 cfs for baseline monitoring proposed for the duration of the operation. This will result in a total powerhouse discharge to about 209,000 cfs. This change in turbine discharge will reduce the percentage of daytime involuntary spill. Nighttime BiOp spill operations ranging (140,000 to 180,000 cfs) will remain in effect. At the higher turbine discharge, with estimated 2004 spring flows passing McNary Dam, involuntary day spill will be reduced by an average of 2.5% over the spring season (Table 4).

Figure 1. Range of 2004 Forecasted River Flows (ESP Runs) at McNary (provided by RCC)



4. Biological Effects

An increase in turbine discharge affects the overall project hydraulics both upstream and downstream of the dam. Higher discharges through the turbines will decrease the amount of involuntary spill, increase flows past the extended-length fish diversion screens and into the gatewells, and alter the tailrace environment. These changes will influence juvenile fish passage routes and affect their overall survival at McNary Dam.

a. Spill and Fish Passage Distribution

The proposed increase in turbine discharge will redistribute flows across the project and reduce the involuntary spill volume. Assuming that migrating fish follow flows, they will also be redistributed and, therefore, more would redistribute to the powerhouse and pass either through the turbines or the juvenile fish bypass system. In the spring, approximately 2.5% of the total springtime project flow will be redirected through the turbines. As the percentage of the river spilled changes, the efficiency of spilled flow in passing fish changes (ratio of fish passed to spill; spill effectiveness). Using for each range of flows forecasted for 2004 (Table 4) the estimated change in involuntary spill (Table 2) and the spill effectiveness ratios developed by NOAA Fisheries (Table 3), an average of about 3.6% (weighted average of percentage of flow) of the spring migrants will be redistributed from the spillway to the powerhouse. Fish diverted from involuntary spill may experience longer forebay residence times and increased exposure to predators. However, it is unknown what impact forebay delay has on project survival at McNary.

Table 2. Estimated Involuntary Spill at McNary

Existing Condition	Low Flows	Medium Flows	High Flows
Day	230,000 cfs	260,000 cfs	280,000 cfs
Total River Flow	161,000	209,000	219,000
PH capacity @12,400	161,000	161,000	161,000
Involuntary Spill Level	0	48,000	58,000
Involuntary Spill % of Total Flow	0.0%	23.0%	26.5%
Daytime Spill Effectiveness*	0.0%	36.0%	45.0%
Night			
Total River Flow	299,000	311,000	341,000
PH capacity @12,400	159,000	161,000	161,000
Voluntary Spill Level	140,000	150,000	180,000
Voluntary Spill % of Total Flow	46.8%	48.2%	52.8%
Night Spill Effectiveness*	60.0%	60.0%	60.0%
Night time to the Gas Cap Spill Level	140,000	150,000	180,000
Voluntary Night Spill % of Total Flow	46.8%	48.2%	52.8%
Nighttime Spill Effectiveness 1:1	46.8%	48.2%	52.8%
Increased Turbine Discharge	Low Flows	Medium Flows	High Flows
Day			
Total River Flow	209,000	209,000	209,000
PH capacity @16,400	209,000	209,000	209,000
Involuntary Spill Level	0	0	0
Involuntary Spill % of Total Flow	0.0%	0.0%	0.0%
Daytime Spill Effectiveness*	0.0%	0.0%	0.0%
Night			
Total River Flow	251,000	311,000	351,000
PH capacity @16,400	111,000	161,000	171,000
Voluntary Spill Level	140,000	150,000	180,000
Night time to the Gas Cap Spill Level	140,000	150,000	180,000
Voluntary Night Spill % of Total Flow	55.8%	48.2%	51.3%
Nighttime Spill Effectiveness 1:1	55.8%	48.2%	51.3%
Estimated Change in SPE			
Daytime 12 hr Spill (involuntary)	0.0%	36.0%	45.0%
24 Hour Spill (voluntary and involuntary)	0.0%	18.0%	22.5%

Table 3. Daytime Spill Effectiveness Ratios (Provided by NMFS).

Spill Percentage of Total Flow	Spill Passage Efficiencies	Ratio
10%	10%	1:1
12%	15%	1.25:1
15%	21%	1.4:1
18%	29%	1.6:1
20%	36%	1.8:1
25%	45%	1.8:1
30%	54%	1.8:1
35%	58%	1.65:1
40%	60%	1.5:1

Table 4. Percent Duration of Range of Forecasted Flows for Spring at McNary 2004.

Range of Flows at McNary	Expected Duration (days)	Percent of 2004 Spring Season	Change in Percent Involuntary Spill
185 kcfs to 230 kcfs	277	80%	0%
230 kcfs to 260 kcfs	60	17.5%	-11.2%
260 kcfs to 280 kcfs	7	2.5%	-24.8%
Weighted Mean			-2.5%

b. Fish Guidance Efficiency (FGE)

The FGE is influenced by turbine discharge and vertical distribution of fish as they approach the turbine intakes. A change in turbine operation may alter the intercept point of the fish and, therefore, the number that will be guided into the bypass system. Under existing operations, FGE for yearling Chinook and steelhead is about 87% (Route Specific Survival Estimates compiled by the 2003 Joint Data Review Team and NMFS, personal communication). This means that about 13% of the yearling Chinook steelhead will pass under the extended-length fish screens and through the turbines. It is not known how the proposed change in the turbine discharge will affect FGE. Conversely, a change in FGE may result in a larger percentage of the spring out migration passing through the bypass system to the river. While unresolved, the contribution of bypass at McNary on multiple-bypass delayed mortality may result in decreased system survival for juvenile migrants.

c. Gatewell Environment

Increased flow into the turbine intakes will cause more flow to be intercepted by the extended-length screens and be diverted up into the gatewells. This will increase water velocities along the screen surfaces and through the mesh as well as increase turbulence in the gatewells and increase velocities through the vertical barrier screens (VBSs). These hydraulic changes at the intake screens and in the gatewell have the potential to affect a high proportion of fish passing McNary project. Most fish entering the turbine intakes will be diverted by the extended-length screens into the gatewells where they will pass through orifices to the juvenile fish facility to be returned to the river.

- **Impingement on Intake Screens:** When the turbine units are operating at a higher discharge (16,400 cfs), the velocities passing through the screens are expected to change from approximately 1.9 fps to 2.6 fps. This velocity approaches NOAA Fisheries recommended maximum velocity through screens of 2.75 fps. Higher velocity through the screens will increase the likelihood that weaker (diseased and stressed) and smaller fish (subyearling smolts, sockeye and fry) will come into contact with or be impinged on the screens before entering the gatewells. Presently there is no direct method to measure effects of higher velocities through the extended-length screens on fish at McNary. An in-season monitoring plan to detect increased fish injury in the gatewell environment will allow for in-season management decisions to minimize potential adverse effects.
- **Turbulence:** Data from hydraulic model studies indicate that gatewell turbulence increases with increased turbine flows. High levels of turbulence have the potential to physically injure and physiologically stress fish. Fish spending time in gatewells with higher turbulence levels may fatigue and/or be injured. Fatigue and injury often have latent effects on fish health that may alter their survival rate.

Yearling Chinook descaling evaluations conducted during fish division screen development have

provided mixed results for higher turbine flow conditions. Test data from different diversion screen configurations in 1992 showed that descaling differed under high and lower flows but not significantly (McComas *et al*, 1992). However, results of a 1997 study to assess methods of reducing gateway turbulence indicated that yearling Chinook descaling increased significantly with higher turbine discharges (Brege, *et al.*, 1998).

A recent study conducted at McNary Dam in 2002 showed no increase in descaling and injury for spring Chinook released in gateways under a range of turbine operations up to the maximum turbine discharge (Absolon *et al*, 2003). These studies also indicated that fish exited gateways faster under high flow conditions, which may be a benefit. Long-term effects related to physiological condition and chronic stress impacts were not evaluated. It should be noted that while the gateways at John Day are different than the gateways at McNary, higher gateway flows at John Day Dam unexpectedly contributed to > 20% mortality in Chinook during development of the extended length screens (Brege *et al*, 2001) in units with unmodified vertical barrier screens.

Steelhead gateway descaling information is limited for high turbine discharges. A 1992 turbine diversion screen evaluation comparing steelhead descaling at high and low turbine loads showed no significant difference. Steelhead passage through higher turbulence is expected to be the same or better than for yearling Chinook due to their stronger swimming ability providing better control in higher velocities. The opposite is true for sockeye because they are smaller, comparatively weaker swimmers and they incur higher descaling levels under existing operations. Increased velocities through the extended-length screens and higher turbulence in the gateways may cause increased descaling levels. An in-season monitoring plan to detect increased fish injury in the gateway environment will allow for in-season management decisions to minimize potential adverse effects.

- **Debris:** The VBSs are designed to evenly distribute flows to minimize fish impingement and descaling. Higher flow entering the gateways draws in more debris that increases the risk of fish injury and damage to VBSs. Debris interacts with fish in two ways, by coming in contact with the fish as it tumbles in the turbulent flows and by impinging on the VBSs and causing increased velocities through the screens (and greater risk of fish impingement).

During the yearling Chinook and steelhead outmigration debris loads are generally light, with one or two occasions when spring runoff will flush debris into the river. Because McNary powerhouse operation draws in surface water containing debris, higher turbine loading will increase the debris volume entering gateways. Adverse impacts on fish resulting from debris accumulations can be minimized by closely monitoring gateway conditions (and fish condition) and quickly initiating debris removal actions. A monitoring program has been developed for this purpose (Monitoring Plan, 2004).

The debris detection and removal process poses some fish risk. From the time that monitoring results indicate a VBS must be cleaned until maintenance crews can do so, the unit load is reduced to the low end of the 1% range (40 MW). Generally fish survival is lower under this operation compared with the high end of the 1% range (Normandeau *et al*, 2003). The VBS cleaning process adds to the risk. The first step is to remove fish from the gateway. Then the VBS is slowly raised and debris is washed off and back into the gateway. While the VBS is cleaned, the unit continues to run at 40 MW to flush the debris out of the gateway through the head gate slot. Because the unit is running, fish continue to be guided into the gateway and, since the VBS is not in place, they may continue back into the turbine along with the debris where passage survival is lower than if they were diverted into the bypass system. Although no empirical data exists to quantify the effects of this operation, the cleaning frequency for VBSs will likely increase under the proposed higher turbine discharges.

d. Turbine Passage

Higher turbine discharges are not expected to alter the survival rate for fish passing through turbines

sufficiently to be detected by current research methodology. Based on 2002 biological studies, the differences in yearling Chinook direct turbine survival at several operating points (including points outside of the 1% limit) were not significantly different (Normandeau *et al.*, 2003, Absolon *et al.*, 2003). The highest mean passage survival trends occurred at an operation of 14,400 cfs above the 1% limit. Physical modeling results showed this operating point provided the best alignment of wicket gates to stay vanes and runner blades (termed an open geometry). The operation also provided the most uniform and equally distributed flows through the draft tubes. This latter effect is believed to offer the greatest potential to reduce fish contact with the turbine structures and, therefore, reduce the potential for injury and descaling.

Because the proposed operation is to lift the 1% rule without imposing a new biologically based operating limit, the units will likely be operated more often at the highest level (16,400) rather than at the open geometry operation (14,400 cfs). While the difference in yearling Chinook survival between the two operating levels was not significant, the survival rate for the 16,400 cfs operation was similar to the 12,200 cfs operation, the upper range for the 1% limit (Absolon *et al.*, 2003). Therefore, it is unlikely that the yearling Chinook turbine passage survival rate will change if the units are operated over the 1% limit.

Currently, there are no empirical data available on direct turbine survival for steelhead at different turbine operating points. It is unknown if the small differences in turbine survival observed for yearling Chinook will apply to other species. However, based on the assumption that injuries resulting from the hydraulic forces in the turbine environment are a function of the surface area of the fish, smaller fish are expected to have higher turbine survival. This would suggest that wild steelhead may have a similar probability of injury to yearling Chinook and hatchery steelhead may be slightly lower. Regardless, the differences in turbine survival between existing and higher turbine discharges are expected to be relatively small and undetectable by current research methodologies.

e. Tailrace Egress

Tailrace hydraulic conditions are a function of turbine discharge and spillway operations. Poor tailrace conditions affect the egress of juvenile fish passing through all routes at McNary Dam, including spillways, turbines and the juvenile fish bypass system. Delays in the tailrace increase the risk of predation and exposure to high TDG levels

Increased turbine discharges are expected to alter the tailrace environment. Hydraulic modeling data indicate that higher turbine discharges may provide better egress conditions downstream of the powerhouse by forcing more flow through the tailrace. This is expected to reduce slow moving eddies, thus enabling fish to move downstream through the tailrace more directly and rapidly after passing through the powerhouse. This may reduce the risk of tailrace predation by eliminating areas that piscivorous fish occupy and decreasing exposure to predators (bird and fish), and therefore may increase powerhouse survival.

f. Project Survival

Limited survival data for yearling Chinook at McNary Dam indicate that spill survival (98%) is higher than survival through the turbines (87%) or the juvenile fish bypass system (93%) (NMFS, 2000 Biological Opinion, Appendix D and Route Specific Survival Estimates compiled by the 2003 Joint Data Review Team). Because route specific survival data for steelhead at McNary is limited, yearling Chinook data was used as a surrogate for steelhead (NMFS, personal communication)

To assess the effects of reduced involuntary spill levels on project survival, existing route specific survival estimates were modeled (Table 5).

Table 5. Route Specific Survival at McNary for Spring Chinook and Steelhead

Route Specific Survival	Yearling Chinook and Steelhead
Turbine Survival	0.87
Spill Survival	0.98
Bypass Survival	0.93
FGE	0.87
Diel Percentage	0.5

The seasonal average of 2.5% reduction in involuntary daytime spill is expected to decrease yearling Chinook and steelhead project survival by approximately 0.18% over the spring out migration (Table 6).

Table 6. Project Survival Estimate for the Proposed Spring Turbine Operation for 2004.

Estimated Change in Juvenile Project Survival at McNary 2004 Under Different Flows Conditions

Range of Flows at McNary	Percent of Spring Season	Change in Involuntary Spill	
		Change in SPE	Change in Project Survival
185 kcfs to 230 kcfs	80%	0%	0.0%
230 kcfs to 260 kcfs	17.5%	-18.0%	-0.8%
260 kcfs to 280 kcfs	2.5%	-20.2%	-1.8%
Weighted Mean		-3.6%	-0.20%

It is not known to what degree increased flows through the fish guidance screens, gatewells, turbines, or tailrace may change the project survival. The estimated project survival reductions were based on an assumption that increased turbine discharge does not alter fish survival through turbines, the juvenile fish bypass system and tailrace environment.

g. Other Effects

Adult fish bound for the Umatilla basin have been documented passing McNary dam before falling back to the Umatilla River. Based on radio telemetry data, about 45% of the adult Chinook spawning in the Umatilla River between 1996 and 2002 passed McNary Dam before falling back to the Umatilla (ICFWU, personal communication). Currently, the route of downstream passage with the highest survival for adult fish is assumed to be through spill. Because adult fish usually migrate during the day, a reduction in daytime involuntary spill may result in more adult fish falling back through the powerhouse, and increase the percentage of adults passing through the turbine environment. Based on the results of a 2003 balloon tag pilot study, direct impacts of turbine passage are expected to more detrimental to adult fish when compared to juveniles (Normandeau and Mid Columbia Consultant, 2003). Approximately 10% of the adult fish recovered in the 2002 pilot study were injured; most of the injuries were attributed to mechanical impact. It is unknown if the impact injuries would be reduced under the proposed operations. Under the turbine discharges of 14,400 cfs (above the 1% limit) the alignment of wicket gates to stay vanes and runner blades provide the most open configuration and the most uniform and equally distributed flows through the draft tubes. This may reduce fish contact with the turbine structures and reduce the potential for injury.

5. Physical Effects

a. Water Temperature

Water temperature drives many biological processes in fish. Their physiology and performance is compromised by chronic exposure to thermal stress, leading to increased susceptibility to disease with increases in water temperature. As a result, indirect temperature effects may cause substantial extra and delayed mortality to smolts passing through the juvenile bypass and collection facilities. At this time, the turbine operations outside 1% is being evaluated for the spring migration, which ends when the river is no longer spring like and exceeds 62°F (17°C) water temperatures (Water Management Plan, 2003), so no temperature-related adverse effects to fish are expected.

b. Total Dissolved Gas

As described in Section 4 above, involuntary spill will be reduced under the proposed action.

7. Summary of Potential Effects of the Proposed Operation

The BPA proposal to operate the McNary turbines outside the current 1% guidelines will result in higher powerhouse discharge than the existing turbine operation. Increased flow from the higher discharge will affect fish passage and survival for the following reasons:

- Decreased involuntary spill will route a seasonal average of 3.6% of the juvenile fish away from the spillway and through passage routes with lower levels of survival resulting in a small reduction in project survival (0.2% for yearling Chinook and steelhead) over the spring outmigration.
- Depending on the specific turbine operating point, higher discharges may improve turbine passage survival by providing more open turbine geometry and more uniform flows through the draft tubes, which reduces the likelihood of impact injuries to fish.
- Increasing the flow velocities through the extended-length screens may increase the frequency of fish impingement and injury by an unknown amount as they are guided into the gatewells.
- Increased turbulence and debris in the gatewells may increase the fish injury rate. However, increased flows in the gatewell generally results in fish exiting the gatewells faster which may reduce exposure to turbulent conditions. A comprehensive in-season monitoring program will reduce the risk-associated injuries associated with the gatewell environment.
- Improved hydraulic conditions of the tailrace may reduce the risk of predation on in-river migrants.

The change of the turbine operation to include the above 1% peak of efficiency may reduce McNary project passage survival for listed Snake River spring/summer Chinook and steelhead, and UCR steelhead by approximately 0.2%, due to the redirection of daytime involuntary spill to the powerhouse. A comprehensive in-season monitoring plan sufficient to detect increased fish injury in the gatewell environment, thus allowing for in-season management decisions (i.e., reinstate the 1% limit) to minimize potential adverse effects (Monitoring Plan, 2004). All monitoring information and estimates of fish effects, as well as information from related studies, will be documented in a summary report at the end of the season.

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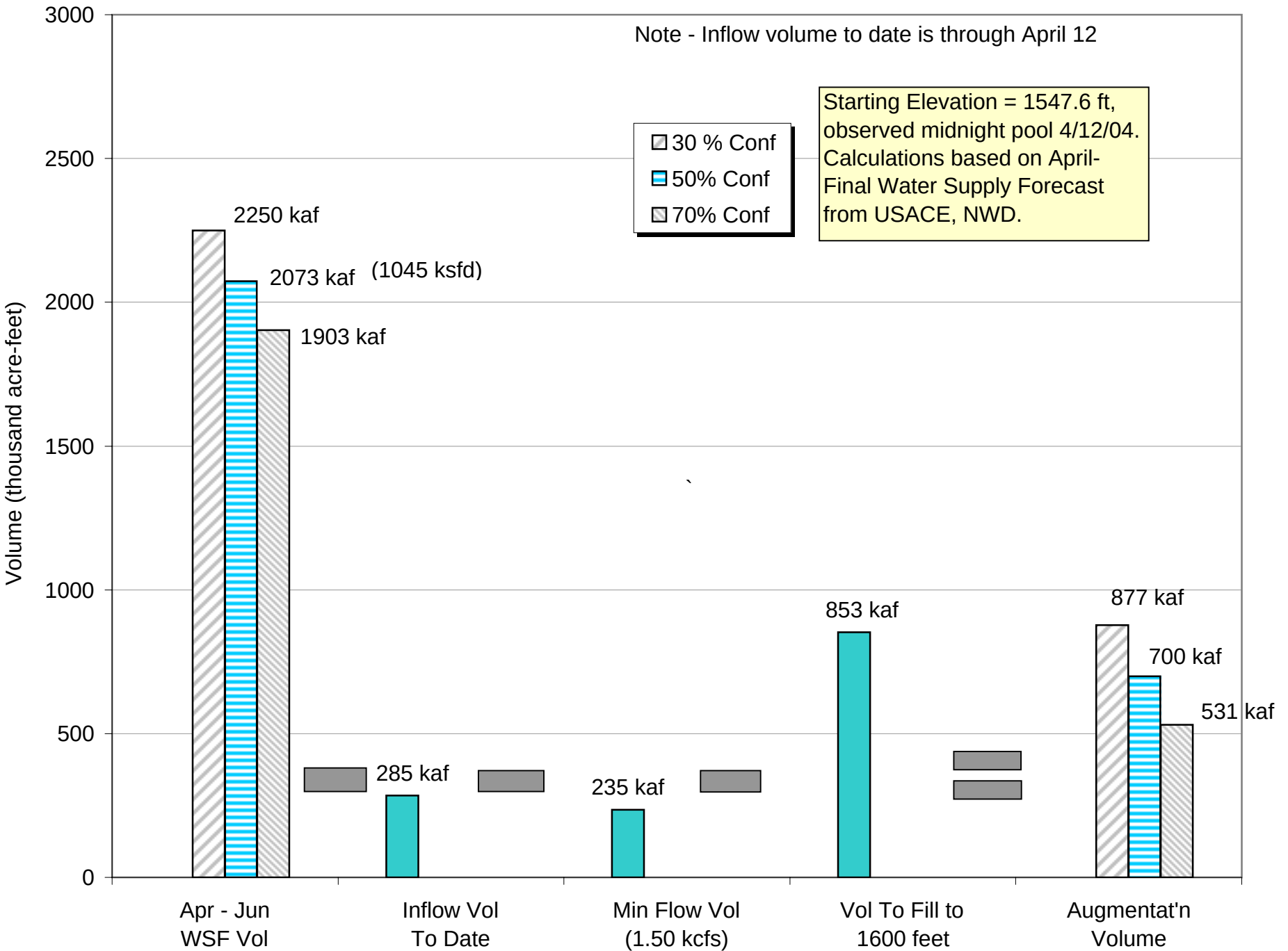
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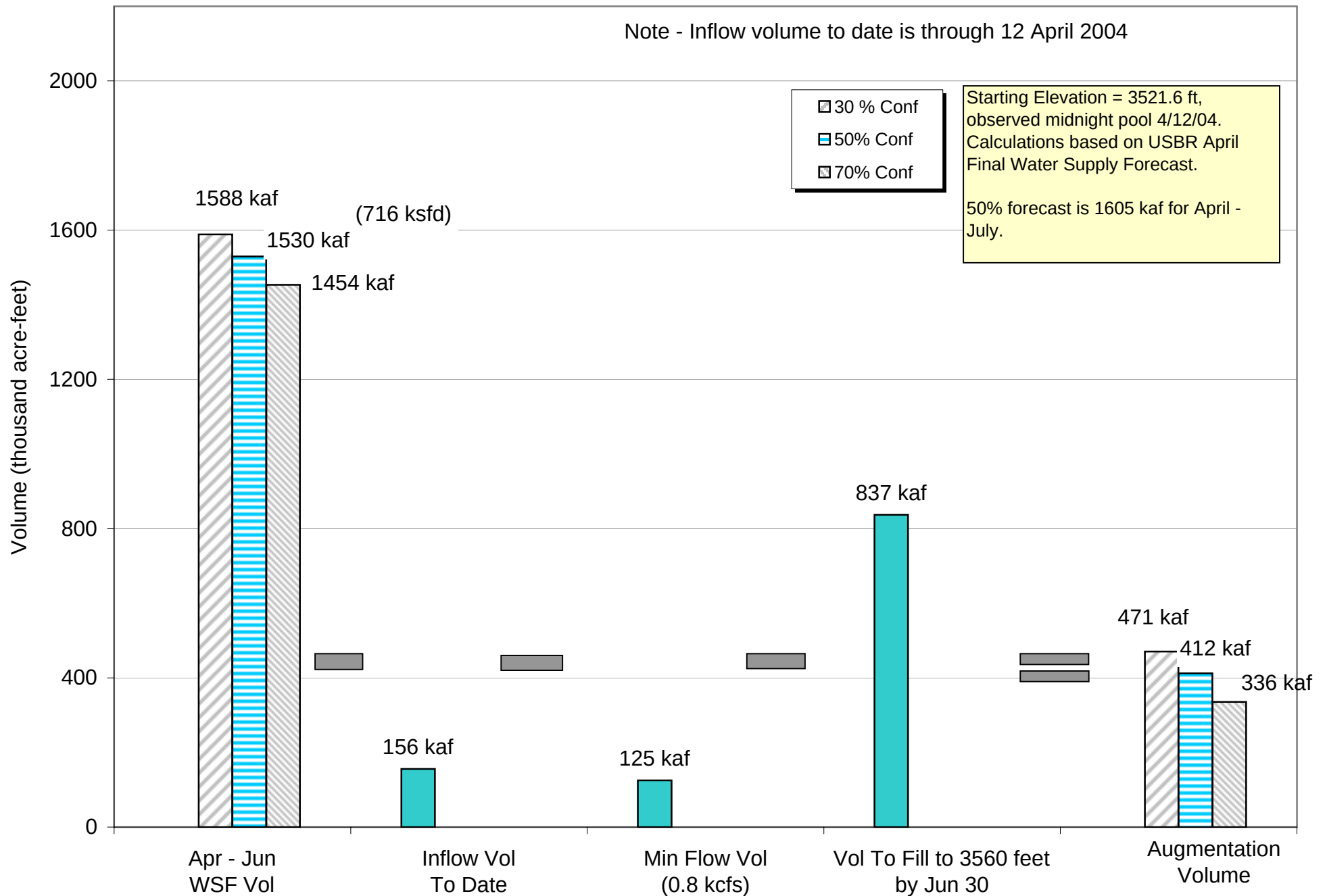
Volumes at Dworshak
1 April Through 30 June

Note - Inflow volume to date is through April 12

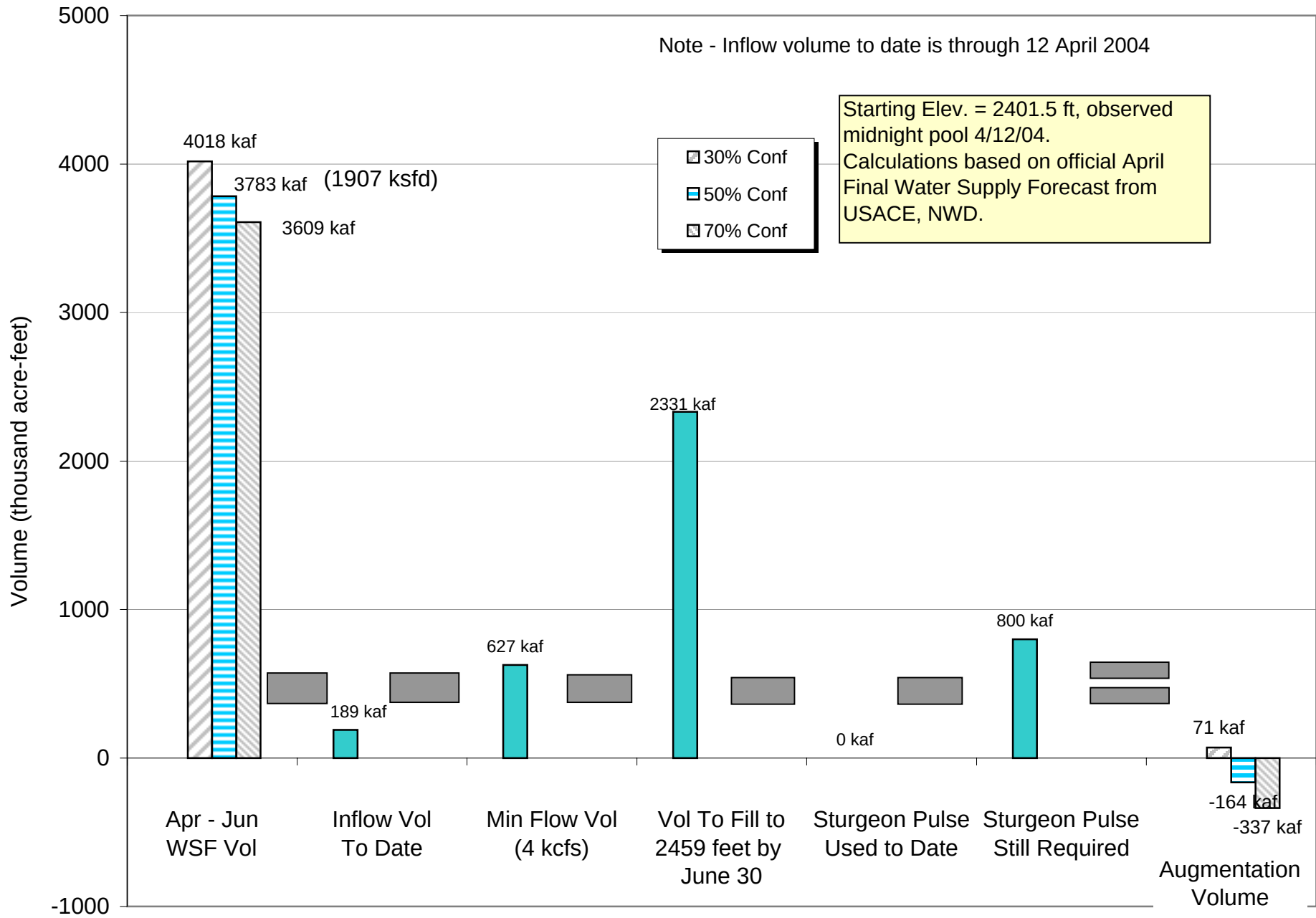


Volumes at Hungry Horse
1 April Through 30 June

Note - Inflow volume to date is through 12 April 2004



Volumes at Libby 1 April Through 30 June



**TECHNICAL MANAGEMENT TEAM
MEETING NOTES
April 14, 2004
CORPS OF ENGINEERS NORTHWESTERN DIVISION OFFICES – CUSTOM HOUSE
PORTLAND, OREGON**

FACILITATOR'S SUMMARY NOTES ON FUTURE ACTIONS

Facilitator: Donna Silverberg

The following notes are a summary of issues that are intended to point out future actions or issues that may need further discussion at upcoming meetings. These notes are not intended to be the “record” of the meeting, only a reminder for TMT members.

Status of Hanford Reach:

Chris Carlson, Chelan County PUD, reported that the weekly average flow for 4/5-4/11 was 71.9 kcfs at Hanford Reach. Operators stayed within the flow bands all week. Emergence has not yet ended, and is still targeted for April 20th. Chris will continue to update the TMT at subsequent meetings.

Spring Spill at the Lower Snake:

The salmon managers brought forth SOR 2004-3 for spring spill at the Lower Snake projects during a TMT meeting on Monday, April 12th. The SOR, relying on NOAA's analysis of Snake River transport studies, proposed that spill be implemented at Lower Granite, Little Goose and Lower Monumental through April 30th and then continue spill as necessary to complete ongoing research at the projects (see the SOR for more details found on the TMT webpage linked to the agenda for the 4/12 meeting). A concern was raised that the salmon manager request was a large departure from the recommendation in the 2000 BiOp to use 85 kcfs flow in the Snake River as the threshold below which spill should not begin and transport should be used instead. Projections show that the seasonal average flow is expected to be below 85 kcfs.

There was no consensus at TMT about whether to recommend and implement the SOR on Monday. Instead, they reviewed more data and asked BPA, NOAA and the COE to coordinate, as recommended in RPA 51. During today's meeting (April 14th) TMT members discussed the SOR and other proposals for Spring spill:

1. Implement SOR 2004-3, which would include spill at all three projects through the end of April and then continue where necessary to complete research.
2. Spill at all three projects through April 23rd; continue spill just at Lower Monumental to support research on the spillway and RSW, likely through the end of May. (This was NOAA's alternative proposal to the SOR.)
3. Continue spill at Lower Granite and Little Goose until April 22nd (this date was selected based on the expected start of the juvenile steelhead migration). Do not begin spill at Lower Monumental. (This was BPA's alternative proposal to the SOR.)
4. The COE discussed a number of alternative operations, including a) re-focus research at Lower Monumental so that research could be completed but would not require spill, or b)

complete the research at Lower Granite through May15. The COE expressed willingness to hear other options such as these. Salmon managers were not supportive of changing the focus of the research at Lower Monumental.

BPA was not able to accept the SOR as written, nor did BPA agree with the other options suggested. Instead, BPA expressed a concern with regards to process of the issue and coordination/consultation requirements and requested that the issue get raised to IT.

TMT developed the following policy questions for an emergency IT meeting on April 15th:

1) Should the region rely on data and analysis from NOAA to make decisions about spring spill in the Lower Snake River to satisfy Action 51, 2000 FCRPS BiOp?

2) Do discussions in the Regional Forum, and TMT specifically, meet the “COE & BPA, in coordination with NMFS through the annual planning process, shall identify and implement appropriate measures” requirements within Action 51?

McNary 1%:

Kim Fodrea, BPA, presented information to support a proposal to remove the 1% efficiency operation constraint at McNary. BPA feels that operating outside 1% does not appear to be more detrimental to the fish than operating within, in fact at times may even provide a benefit to the fish. In addition, this proposal supports BPA’s objective of providing low cost, reliable power. No studies on this were developed by FDDRWG or SRWG, but a monitoring plan was put together. This and BPA’s proposal were presented to TMT today.

Rebecca Kalamasz, Walla Walla COE, provided an overview of the monitoring plan (see handouts linked to today’s TMT agenda). It was noted that, given the low flows this year, there will not be much difference in involuntary spill. Kim Fodrea suggested that removing the 1% constraint would provide a cost savings of \$2.5-6 million. The salmon managers asked whether the savings could be provided through screen research being conducted. While the research could provide some savings, BPA does not feel that the research will resolve the debate and continues to propose removal of the 1% constraint.

Idaho requested information on the ’94-96 poor passage years and NOAA requested temperatures from those years. Oregon would like time to review and discuss the information and proposal. A decision is needed by April 22nd, but if a decision is delayed until then, the monitoring will not include fry.

ACTION: The salmon managers have submitted numerous comments on the proposal, which the COE will respond to prior to a salmon manager discussion at FPAC on Tuesday, April 20th. The salmon managers will review the information and provide comments on the monitoring plan during a follow-up discussion at TMT on Wednesday, April 21st.

Mid-Columbia Flow:

The salmon managers presented SOR 2004-5 on Priest Rapids flows and spill at Bonneville. In light of the recent decrease in the water supply forecast, a lack of fish numbers, and maintenance work by the BOR, the salmon managers requested that water be released from Grand Coulee on April 15th for 7 days a week to provide 110 kcfs flow at Priest Rapids, and continue this

operation until further notice. Once 110 kcfs is reached, do not reduce to 70 kcfs in order to minimize fluctuations. At Bonneville, increase spill to at least 75 kcfs (to the gas cap) until the end of chum emergence or a water event occurs.

BPA supported the SOR with the caveat that the 110 kcfs at Priest Rapids is a weekly average. BPA will ramp up flows over the weekend so the weekly average will stay within the flow band. The salmon managers will look at water and fish conditions to determine when to change from 110 kcfs. The COE agreed to implement the request for operations at Bonneville, with the change from “at least” 75 kcfs to “up to” 75 kcfs (50-75). The action agencies agreed to implement the SOR.

ACTION: BPA will ramp up Grand Coulee/Chief Joseph flow to maintain Priest Rapids outflow up to 90 kcfs over the weekend, and maintain a weekly average of 110 kcfs, keeping in mind the request to minimize fluctuations. The salmon managers will provide the COE with a ratings curve by this afternoon (4/14) relative to TDG and chum compensation coverage at Bonneville.

System Status:

Reservoir operations: Grand Coulee is at elevation 1270.7 and has been filling. Hungry Horse is at 3523’ and filling 1’ per day. There is still some concern about the refill of Snake River projects. Libby is at 2402’ and filling. April 15th flood control is 2443’. It is unclear what will be requested for a sturgeon pulse this year. Dworshak is at 1549’ and filling 1.5’ per day. April 15th flood control is 1548’, so the COE needs to move some water. They will be increasing outflows later this month unless they receive a request for augmentation. The COE might operate Dworshak outflows at full powerhouse for the remainder of the month.

Fish status: Chinook juveniles at Lower Granite have increased since 3/31, and with no spill, indicate that there are more to come. Numbers have increased similarly at McNary, John Day and Bonneville. Steelhead juveniles are at high numbers at Lower Granite, with not as many yet at Little Goose and Lower Monumental. Adult chinook numbers have increased but are lower than previous years.

Spring/Summer Update:

The spring summer update of the Water Management Plan is still being developed. A final DRAFT will be out next week that includes the Hanford Reach agreement (which is also posted on the TMT web page), final water supply forecast, flow objectives, and research papers. TMT will discuss the final draft at the next TMT meeting on April 21st.

Next Meeting, April 21st, 9 am-noon:

Agenda Items:

- McNary 1%
- Dworshak Outflows
- Spring/Summer Update

1. Greeting and Introductions

The April 14 Technical Management Team meeting was chaired by Cindy Henriksen of

the Corps and facilitated by Donna Silverberg. The following is a distillation, not a verbatim transcript, of items discussed at the meeting and actions taken. Anyone with questions or comments about these minutes should call Henriksen at 503/808-3945.

2. Status of Hanford Reach.

Henriksen said last week's Hanford Reach report is now available via the TMT homepage, under the "Proposals" forum. For the week of April 5-11, said Chris Carlson, daily average discharge from Priest Rapids was in the 71-73 Kcfs range; the weekly average flow was 71.9 Kcfs. Flows were generally pretty close to that level, he said; the flow bands were 20 Kcfs and 30 Kcfs, and we were within those bands for the entire week. The chum are at 750 temperature units (TUs) since the end of spawning and at 151 TUs since the start of emergence. We have not yet started to see fish emerge, he said. We are expected to hit the threshold of 800 TUs since the end of spawning within five or six days, Carlson said.

3. McNary Operation Outside 1%.

Kim Fodrea said that, as the TMT is aware, one of BPA's objectives is to meet its fish and wildlife obligations while providing cost-effective power to the region. Bonneville continues to believe that operating McNary outside 1% peak efficiency provides such an opportunity, she said, noting that BPA has been discussing this concept with the region since the spring of 2003. She described some of the research BPA is citing in support of this position, noting that these studies show no significant statistical difference in turbine survival between operations within or outside of 1%. We attempted to develop a monitoring study design that was acceptable to the region, but failed, Fodrea said. BPA is now proposing to proceed with McNary operations outside of 1%, she said; we have developed a monitoring plan to assess the biological impacts of the proposed operation. When it is operated within 1% peak efficiency, McNary's powerhouse capacity is about 170 Kcfs; operating outside 1% would increase that capacity to about 209 Kcfs

Rebecca Kalamasz described the planned monitoring program to be implemented at McNary this spring. We recognize that when you increase discharge through the turbines, that changes hydraulics upstream and downstream of the projects, she said; in the monitoring plan, we have chosen to focus first on the biological effects of the reduction in involuntary spill that would occur as a result of the proposed operation. Kalamasz described some of the model work that has been done in support of this monitoring plan. She then noted that increased turbulence and debris in the gatewell environment are also a concern during operation outside 1%; the monitoring plan will address these issues. The plan will not address changes in survival through the turbine or tailrace environments. The assessment came down, basically, to the expected change in involuntary spill, Kalamasz said; we anticipate a reduction of 2.5% in daytime spill, which is expected to result in a reduction in yearling chinook and steelhead project survival of 0.18% over the course of the spring outmigration.

The group devoted a few minutes of discussion to the specifics of a Corps/BPA white paper, "Biological Information on Juvenile Salmon Related to Operation of McNary Turbines Outside the 1% Efficiency Limits" (available via hotlink from today's agenda on the TMT homepage). Kalamasz noted that, given the anticipated seasonal average flows at McNary in

2004, there isn't expected to be much involuntary spill this year, and the impacts of the reduction in involuntary spill is not expected to have a significant biological impact.

In response to a question, Fodrea said the financial benefit of operating McNary outside 1% is expected to be about \$12 million annually, on average, in additional generation – even in an 82 MAF year like this one, the financial impact of the additional generation is expected to be \$5 million, about half of that accruing in the spring period. In response to another question, Kalamasz replied that what BPA is recommending is not a research project – it is an operational change. This year's planned research would provide some economic benefit, said Fodrea; however, that is not our proposal. Frankly, I've given up on the idea that research is going to solve this debate, she said.

Boyce thanked the action agencies for assembling this information package; he requested some additional time to digest it. When would this operation start? he asked. Given current river flows, we don't need to make a decision today, so I think you probably have some time to evaluate the information, Kalamasz replied. She said that, according to current ESP runs, the total river flow threshold at which operation outside 1% becomes possible will likely be reached some time in the first week in May, depending on precipitation and the shape of the runoff. The fry needed to do the planned biological studies at McNary will not be available before the end of April, added Mark Smith. So when do we need to make a decision on this proposal? Jim Litchfield asked. In my opinion, by April 16, if you want to use smaller fry in the biological evaluation, Smith replied. Boyce said the salmon managers need at least a week to evaluate the information provided at today's meeting. It was agreed to convene a TMT meeting next Wednesday, April 21, to discuss this issue.

Wills encouraged the action agencies to review the comments the salmon managers have previously submitted on this issue, and to attempt to address those concerns prior to next week's TMT meeting. We do intend to respond to those comments, Kalamasz replied. It would be helpful if we could provide your response to the salmon managers' April 2 memo prior to next week's meeting, said Russ Kiefer. We can do that, Kalamasz agreed.

4. Spring Spill at Lower Snake Collector Projects.

On Monday, said Silverberg, the TMT met and discussed spring spill at the Snake River projects; the salmon managers submitted an SOR requesting that spill start. The action agencies agreed to begin spill at Lower Granite and Little Goose Dams on Monday evening, but asked for a bit more time to look at the biological information before making a decision about spill at Lower Monumental. Paul Wagner said he had asked the NOAA Fisheries Science Center to develop a brief summary of the biological information supporting the need for spring spill at the Snake River projects in 2004. He distributed a series of graphs showing Lower Granite chinook SAR information from the 1995, 1999, and 2000 outmigration years.

The implication is that for the 1999 and 2000 outmigration years, chinook that migrated in-river did better during the month of April? Wellschlagel asked. In 1995 and 1999, the results for early-season in-river vs. transported chinook were pretty much a wash, said Wagner; in 2000, the early-season in-river chinook did better, in terms of adult returns.

We understand that you would like to keep a portion of the run in-river, to spread the risk, said Wellschlager. BPA is not proposing that barging replace outmigration forever; our quandary is, is it a better tool to use in 2004, given the conditions? We looked this morning at average tailwater temperature and outflow at Lower Granite in 1999, 2000, and 2004, he said; if you look at average tailwater temperature in 2004, it is significantly higher than in 1999 and 2000, and flow is significantly lower in 2004 compared to 1999 and 2000. Although flows could pick up and water temperatures could go down, during the important period – April – it appears to Bonneville that in-river conditions are significantly worse in 2004 than they were in 1999 and 2000. We are significantly above the 9.6-degree C temperature threshold we have been discussing, Wellschlager said.

This is not the only data we should be looking at, said Boyce – there is a lot of other data indicating no clear-cut survival benefit for transported vs. in-river fish. He noted that the greater proportion of fish are being transported this year. To me, he said, we should be moving toward something closer to a 50-50 split. I don't pretend for a moment that we will change your opinion, said Wellschlager; I'm simply sharing Bonneville's perspective. Russ Kiefer said the 9.5-degree C threshold applies to collected fish – they do better if bypassed when temperatures are below 9.5 degrees C and do better when transported when temperatures are above that threshold. However, overall in the season, there is no clear-cut survival benefit for transported fish vs. uncollected in-river fish – the two groups do about the same. Our conclusion, though, is that over the season, in-river fish do better than transported fish from Lower Granite, hence this request, Kiefer said. And I'm saying Bonneville hasn't reached that conclusion yet, Wellschlager said.

Bonneville cannot accept the SOR as written, said Wellschlager. I think we have compromised quite a bit already by going along with spill at the two projects up to this point. I don't think we can go along with initiating spill at the third project, he said. Will spill continue at Lower Granite and Little Goose? Silverberg asked. I believe that, based on the data, steelhead passage will start picking up at Lower Granite by the April 21 or 22? Wellschlager asked. You can anticipate that happening around the third or fourth week in April, yes, Wagner replied. Based on the last five years of juvenile steelhead passage data, that happens around April 22, said Wellschlager; Bonneville is willing to agree to continue to spill at Lower Granite and Little Goose until April 22, but after that, spill will stop.

Henriksen said that the TMT had talked about the ongoing research at Lower Granite and Lower Monumental; the Corps had planned to test the BGS at Lower Granite this spring, through the end of May. We talked about shortening the test so spill could stop earlier, she said; we also talked about the value and priority of the spill test at Lower Monumental. From the Corps' perspective, we could decide not to do some of that research that year, or at least refocus the Lower Monumental research so that it is done without spill. We talked about alternatives including no spill at Lower Monumental, and the possibility of completing that research with some spill this year if there is agreement that that is a high priority – it would be conducted from April 15-June 15, Henriksen said. That bulk spill study at Lower Monumental would be meaningless without spill, Boyce observed. So spill is scheduled to start tomorrow at Lower Monumental? Litchfield asked. Actually, according to the researchers, the research would begin May 1 and end on May 26, Henriksen said. In response to a question from Boyce, Henriksen said

that, in the Corps' view, all of the research at Lower Granite and Lower Monumental could be postponed to next year.

The group briefly discussed the sunk costs of the planned research at Lower Granite and Lower Monumental (on the order of \$2.2 million at Lower Granite, and \$1.6 million at Lower Monumental). Henriksen reiterated that research could continue at Lower Monumental, even without spill – it would focus instead on survival through the powerhouse, for which little or no data is currently available.

Henriksen said the research data presented so far do not necessarily lead the Corps to the same conclusions as NOAA Fisheries; we have discussed research just at Lower Granite with no spill at Little Goose or Lower Monumental; we also talked about research with spill at Lower Monumental in May, but with no spill at Lower Granite or Little Goose. Another alternative, from the Corps' perspective, is no spill at any of those projects, Henriksen said. Boyce noted that assessing turbine survival at Lower Monumental was never a component of the research proposal for that project in 2004. Part of Ron's concern is that we spent a lot of time discussing which research to fund at SCT this year, and agreed that the research at Lower Monumental was a higher priority than other worthy research projects, Kiefer noted. And it sounds as though, from the Corps' perspective, the Lower Monumental spill research could go forward, Silverberg said.

Wellschlager said it would appear that the TMT is at an impasse, because BPA is unwilling to agree to consider anything beyond what he has already proposed – no spill at any of the Lower Snake projects past April 22. And you're basing that on the historical steelhead passage information? Boyce asked. Yes, and on current conditions in the river, Wellschlager replied. You have noted that this is an abnormal year, said Tom Lorz – if the steelhead are delayed in arriving at Lower Granite, and don't arrive on April 22, would you continue spill until they do arrive? I think from BPA's perspective, we need to lock into a firm date, Wellschlager replied.

The group devoted a few minutes of discussion to the current juvenile steelhead passage indices at Lower Granite.

Boyce reiterated that this is not the only information regarding steelhead outmigration and survival. My interpretation is that it is not a slam-dunk to say that there is a biological benefit to transporting steelhead after they begin to arrive in numbers, said Boyce. Wagner said that, in NOAA Fisheries' opinion, spill should continue through April 23 at Lower Granite, Little Goose and Lower Monumental; also, the Lower Monumental research should go forward for three weeks this spring. We have seen spillway survival problems at that project and we need to get to the bottom of them, he said. Also, the RSW is scheduled to be installed there; if the RSW causes mortality, it would preclude its use, and we need to know that. Another consideration is the energy issue, Wagner said; we could increase Dworshak discharge during the period we are spilling at Lower Monumental, Little Goose and Lower Granite to offset the energy loss, without impacting refill at Dworshak.

Wellschlager reiterated that, unless BPA's proposal is acceptable, in BPA's view, this issue needs to be elevated to the IT. However, it sounds as though we may be relatively close,

said Boyce – NOAA Fisheries is advocating one more day of spill at Lower Granite and Little Goose, plus spill at Lower Monumental beginning tonight and continuing as needed to accomplish the bulk spill test at that project, with additional outflow from Dworshak to offset the generation losses. Could we collect and tag fish at Little Goose rather than Lower Monumental, so that we could begin the Lower Monumental evaluation sooner? Wagner asked. Logistically, that is not feasible, replied Mark Smith. After a few minutes of further discussion, Rebecca Kalamasz said that, after talking directly to the researchers, the duration of the test is 25 days plus 10 days of radio-tracking time. The soonest they could begin tagging fish is April 26, Kalamasz said, but logistically, there is no advantage to collecting and tagging the fish at Little Goose. The bottom line is that, even if the tagging is moved up, spill would have to be maintained for at least 30 days following April 26, Kalamasz said. So the fish releases would continue until about May 20? Henriksen asked. Correct, Kalamasz replied. In response to a question from Kiefer, Tim Wick said it should be possible to get meaningful information from the Lower Granite BGS/RSW test if spill continues at that project through about May 15.

Salmon manager reaction? Silverberg asked. Excluding the NMFS perspective, I think most of us were convinced by the NOAA Fisheries information indicating the importance of spill early in the season – through April 30 – to benefit in-river migration, David Wills replied. I think we also need to have some further discussion about the supposedly negligible impacts of deferring the planned research, he said. If BPA is adamant about no spill at Lower Monumental and stopping spill at Lower Granite and Little Goose on April 22, then we are at an impasse, Wills added.

After a few minutes of additional discussion, Silverberg asked who wants to elevate this issue to the IT. Wellschlager said that, in his opinion, elevating this issue immediately to IT would be in the best interest of everyone involved. Silverberg said IT is on alert that this issue was likely to be elevated, and will be available for a conference call tomorrow. If we take this to IT, what is the question we need to ask them? she asked. It sounds as though the action agencies object to the original SOR as written, Wills replied – perhaps that would be the simplest way to frame the question, making clear the alternative positions and proposals put forward by NOAA Fisheries and the Corps. However, the policy issue is the rejection of the SOR, said Norris. Actually, the policy question is whether the SOR takes us outside the operation mandated by the Biological Opinion, Silverberg observed. I guess the question really is whether the information presented by NOAA satisfies the requirements of BiOp Action 51, and whether the Regional Forum/TMT process meets the annual planning process requirement in Action 51, she added.

It was agreed to elevate this issue to IT for discussion tomorrow. In the interim, it was agreed that spill will continue at Lower Granite and Little Goose. In all likelihood, the IT call will convene at 1 p.m.

5. Mid-Columbia Flow.

On April 13, the action agencies received SOR 2004-5. This SOR, supported by USFWS, IDFG, ODFW, WDFW, NOAA Fisheries and CRITFC, requests the following specific operations:

- Starting April 15, and continuing until further notice, release water at Grand Coulee Reservoir to begin providing flows of 110 Kcfs at Priest Rapids dam seven days per week with minimum hourly flow fluctuations.
- Increase spill at Bonneville Dam to at least 75 Kcfs until either water conditions or the end of chum emergence; allow for spill to the total dissolved gas cap.

The full text of this SOR is available via hotlink from today's agenda on the TMT homepage; please refer to this document for further details and justification.

Wills went briefly through the justification for this SOR. Margaret Filardo noted that WDFW had contacted the Fish Passage Center to say that, once Priest Rapids flows achieve 110 Kcfs, they do not want to see them go back down to the Vernita Bar minimum of 70 Kcfs. Wellschlager said BPA's only comment is that the 110 Kcfs needs to be a weekly, rather than a daily, average, with the understanding that Priest Rapids will operate within the agreed-upon flow bands.

Tom Lorz said CRITFC did not sign onto this SOR because they would prefer to see the project operated within a more stringent flow band. Wagner requested that the action agencies not drop Priest Rapids flow to the Vernita Bar minimum over the weekend. Wellschlager replied that this should not be an issue in the short term.

In response to a question from Tony Norris, Wagner said the next incremental increase in flow at Priest Rapids -- to 135 Kcfs -- will be requested once fish passage numbers warrant such a step. Is there a bottom elevation at Grand Coulee you would like to impose, if tributary flows don't pick up? Norris asked. Because the Bureau is unwilling to go below 1240 at Grand Coulee at this point in the season, he added. We'll monitor that, said Boyce. Norris and Wellschlager said Reclamation and Bonneville have no objection to implementing Part A of SOR 2004-5 as written. In response to a question, Wellschlager said there will be a ramp-up involved in achieving the requested flow level, so 110 Kcfs will be achieved on a week-average basis next week, but not this week.

With respect to Part B of the SOR (Bonneville spill), Henriksen said that according to the Fish Passage Plan, daytime spill at Bonneville is up to 75 Kcfs, and up to the gas cap at night. She noted that depth compensation over the chum redds remains a concern, so the Corps will be monitoring TDG levels at Warrendale. We will implement spill up to the gas cap (120% at Warrendale, 115% at Camas/Washougal) at night, she said, and will provide spill up to 75 Kcfs during the day. Given a 15-foot tailwater depth at Bonneville, is there a particular TDG level we should be targeting at Warrendale at which concerns about the effects on the chum redds would trigger a curtailment of spill? Jim Adams asked. Is the 115% TDG level we might expect to see at Warrendale at 75 Kcfs spill acceptable to the salmon managers? We will discuss that and provide a ratings curve by this afternoon, Boyce replied.

6. Status of Operations.

Norris said Grand Coulee is currently at elevation 1270.7; it has been filling, but as soon

as we go to 90 Kcfs, it will start drafting. Hungry Horse is currently at elevation 3523 and filling a foot per day, inflows are still climbing. We should not have any problems filling Hungry Horse by June 30, but we're still worried about a couple of our Upper Snake projects, he said. Wellschlager noted that, according to BPA water supply staff, the region is in the second-lowest four-year period on record.

Libby is currently at elevation 2402, 41 feet below its flood control elevation, said Henriksen. Outflow continues on minimum, and inflows are picking up due to snowmelt – the project is filling 4/10 of a foot per day. And is there a sturgeon pulse planned this year? Wagner asked. My understanding is that they are planning a different operation this year – a fry release, Wills replied. I'm not sure about the sturgeon pulse in 2004, and will have to get back to you, he said. Based on a 5.3 MAF water year, added Henriksen, we would be at the first tier – 800 kaf – of Libby flow augmentation in 2004. Libby is right on the cusp of refilling by June 30, she added.

At Dworshak, the current elevation is 1549 feet; the project is filling 1.5 feet per day, and, given the fact that the April 30 flood control elevation at that project is 1548 feet, we need to move some water, said Henriksen. Can we shift flood control to Grand Coulee? Wagner asked. That would not affect the April 30 flood control point, Henriksen replied – we were anticipating some flow augmentation from Dworshak during the month of April. Absent any further discussion, she said, we plan to increase Dworshak outflow some time later this month, although we have no specific plan or proposal at this time.

In response to a question from Litchfield, Henriksen said Dworshak might need to increase outflow to up to 12 Kcfs in order to maintain its current elevation through the end of the month. We plan to go to 9.5 Kcfs outflow – full powerhouse capacity – on Friday and continue that through the end of the month, Henriksen said; we would prefer to avoid spill at Dworshak if possible. The total April 12-June 30 flow augmentation volume (the volume above that needed to refill the project to elevation 1600) at Dworshak is currently estimated at 531 kaf (70% confidence of June 30 refill) to 877 kaf (30% confidence of refill). Wagner observed that this translates into about 350 Ksfd, or 35 days at 10 Kcfs – perhaps we can discuss that further at the April 21 TMT meeting. The April final water supply forecast at Dworshak, April-July, is 2.2 MAF, Henriksen added.

The group looked briefly at the most recent chinook and steelhead passage indices. At Lower Granite, said Wagner, yearling chinook indices have increased steadily to the 35,000 range; indices have been slower, but showing a similar trend, at Little Goose and Lower Monumental. There are good numbers at John Day and Bonneville as well. Steelhead indices at Lower Granite are on the order of 7,000 fish per day, he added, about one-fifth of the chinook passage, currently. With respect to adult passage, Wagner said passage has picked up considerably in recent days, but passage is still below the 10-year average for this date. The difference is that we're not seeing a strong five-year-old component in this year's run, Boyce observed.

7. Spring/Summer Update.

Henriksen said the final draft of the spring/summer update to the 2004 WMP should be available by next week. She briefly described some of the items that have been updated within the update, including water supply forecast data and planned research. Boyce said that, in his opinion, until the discussions on the Snake River spring spill and McNary 1% issues are completed, the spring/summer update cannot be finalized.

8. Next TMT Meeting date.

The next meeting of the Technical Management Team was set for Wednesday, April 21. Meeting summary prepared by Jeff Kuechle.

TMT Participant List

April 14, 2004

Name	Affiliation
Donna Silverberg	Facilitation Team
Tony Norris	USBR
Jim Litchfield	Montana
David Wills	USFWS
Russ Kiefer	IDFG
John Wellschlager	BPA
Cindy Henriksen	COE
Ron Boyce	ODFW
Mike O'Bryant	CBB
David Benner	FPC
Russ George	WMCI
Tim Heizenrater	PPM
Rudd Turner	COE
Laura Hamilton	COE
Jim Adams	COE
Robin Harkless	Facilitation Team
Nic Lane	BPA
Bruce MacKay	Consultant
Kevin Nordt	PGE
Paul Ocker	COE

Tina Lundell	COE
Steve Haeseker	USFWS
Dave Ryan	PPM
Tom Haymaker	PNGC
Lee Corum	PNUCC
Paul Wagner	NOAAF
Dan Bedbury	EWEB
Glenn Traeger	Avista
Chris Carlson	Grant County PUD
Mike Buchko	Powerex
Tom Le	PSE

TECHNICAL MANAGEMENT TEAM

BOR: Tony Norris / John Roache

BPA: Scott Bettin / John Wellschlager

NMFS: Paul Wagner / Chris Ross

USFWS: David Wills / Howard Schaller

OR: Ron Boyce

WA: Cindy LeFleur

ID: Russ Kiefer

MT: Jim Litchfield

COE: Cindy Henriksen / Rudd Turner / Cathy Hlebechuk

TMT MEETING

Thursday 15 April 2004 1200 hours

NOAA's 1st Floor conference room

Portland, Oregon

Conference call line: 503-326-7672

NOTE: NEW DAY and PHONE BRIDGE

*All members are encouraged to call Donna Silverberg with any issues or concerns they would like to see addressed.
Please e-mail her at dsilverberg@cnnm.net or call her at (503) 248-4703.*

ISSUE FROM TMT TO IT

April 15, 2004

1. Welcome and introductions.
2. Issue Elevated from TMT to IT

[\[Columbia River Regional Form Implementation Team \]](#)



[\[SOR #2004-03 \]](#)



3. Other

- As discussed at the TMT meeting April 14, and the IT meeting April 15, the Corps agreed to distribute a decision on spring spill. Attached please find the decision paper. It will be posted to the TMT web page on Monday, April 19. Any follow up questions can be addressed at the TMT meeting, Wednesday, April 21.

[\[Corps of Engineers Decision - 2004 Spring Spill at Lower Snake River Projects \]](#)



- Set agenda for next meeting

Questions about the meeting may be referred to Cindy Henriksen at (503) 808-3945, or Rudd Turner at (503) 808-3935, or Cathy Hlebechuk at (503) 808-3942

COLUMBIA RIVER REGIONAL FORUM

Implementation Team

Issue Elevated from TMT to IT

ISSUE: 1) Should the region rely on data and analysis from NOAA to make decisions about spring spill in the Lower Snake River to satisfy Action 51, 2000 FCRPS BiOp?
2) Do discussions in the Regional Forum, and TMT specifically, meet the “COE & BPA, in coordination with NMFS through the annual planning process, shall identify and implement appropriate measures” requirements within Action 51?

BACKGROUND: The salmon managers brought forth SOR 2004-3 on spring spill at the Lower Snake projects during a TMT meeting on Monday, April 12th. The SOR, relying on NOAA’s analysis of Snake River transport studies, proposed that spill be implemented at Lower Granite, Little Goose and Lower Monumental through April 30th and then continue spill as necessary to complete ongoing research at the projects (see the SOR for more details found on the TMT webpage linked to the agenda for the 4/12 meeting). A concern was raised that the salmon manager request was a large departure from the recommendation in the 2000 BiOp to use 85 kcfs flow in the Snake River as the threshold below which spill should not begin and transport should be used instead. Projections show that the seasonal average flow is expected to be below 85 kcfs.

There was no consensus at TMT about whether to recommend and implement the SOR on Monday. Instead, they reviewed more data and asked BPA, NOAA and the COE to coordinate, as recommended in RPA 51. On Wednesday, April 14th TMT members met and discussed the SOR and other proposals for Spring spill:

1. Implement SOR 2004-3, which would include spill at all three projects through the end of April and then continue where necessary to complete research.
2. Spill at all three projects through April 23rd; continue spill just at Lower Monumental to support research on the spillway and RSW, likely through the end of May. (This was NOAA’s alternative proposal to the SOR.)
3. Continue spill at Lower Granite and Little Goose until April 22nd (this date was selected based on the expected start of the juvenile steelhead migration). Do not begin spill at Lower Monumental. (This was BPA’s alternative proposal to the SOR.)
4. The COE discussed a number of alternative operations, including a) re-focus research at Lower Monumental so that research could be completed but would not require spill, or b) complete the research at Lower Granite through May 15. The COE expressed willingness to hear other options such as these. Salmon managers were not supportive of changing the focus of the research at Lower Monumental.

BPA was not able to accept the SOR as written, nor did BPA agree with the other options suggested. Instead, BPA expressed a concern with regards to process of the issue and coordination/consultation requirements and requested that the issue get raised to IT.

TMT developed the above policy questions for an emergency IT meeting on April 15th at **NOON** in NOAA’s 1st Floor conference room. The call in number is 503-326-7672.

**Corps of Engineers Decision
2004 Spring Spill at Lower Snake River Projects**

The NOAA 2000 Biological Opinion (BiOp) has provisions for spill when seasonal average Snake River flows are projected to be above 85,000 cfs (RPA 40). April final runoff volume forecast is for seasonal average Snake River flows to be about 77,000 cfs, well below the threshold for spill. As a result, the BiOp calls for maximizing fish collection and transportation in the Snake River. Recent transport research results have raised questions about the benefits of transporting yearling Chinook salmon in April (as opposed to leaving them to migrate inriver) and NOAA Fisheries has been proposing reconsideration of the transportation criteria for early season migrants (RPA 51). As a result, two System Operation Requests have been issued, requesting spill in the Lower Snake for Spring 2004. On April 14, 2004 the Technical Management Team (TMT) met to discuss these Spring Spill operations in the Lower Snake River. Because TMT could not reach agreement, it was elevated to the Implementation Team (IT) on April 15.

Based on the discussions at IT, the Corps has decided to provide spill at Lower Granite and Little Goose until 23 April to provide inriver passage for yearling Chinook prior to the steelhead juvenile migration. In addition, subject to further consideration by the Study Review Work Group regarding the design of the modified spill research at Lower Monumental, up to 18 days of spill will be initiated there for early inriver passage and for the study. Three days of spill will be available prior to 26 April and 15 days will be available beginning 26 April and provided per the research design. Although the study is not considered the premier study, other valuable research can be gathered and the sunk costs are not lost. The Lower Granite behavioral guidance structure testing planned for 2004 will be postponed until April 2005.

TECHNICAL MANAGEMENT TEAM

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BPA: Scott Bettin / John Wellschlager

NMFS: Paul Wagner / Chris Ross

USFWS: David Wills / Howard Schaller

OR: Ron Boyce

WA: Cindy LeFleur

ID: Russ Kiefer

MT: Jim Litchfield

COE: Cindy Henriksen / Rudd Turner / Cathy Hlebechuk

TMT MEETING

Wednesday 21 April 2004 0900 - 1200 hours

**Custom House Room 118
Portland, Oregon
Conference call line: 503-808-5190**

*All members are encouraged to call Donna Silverberg with any issues or concerns they would like to see addressed.
Please e-mail her at dsilverberg@cnnm.net or call her at (503) 248-4703.*

AGENDA

1. Welcome and introductions.
2. Status of Hanford Reach (Chris Carlson)
[\[Hanford Reach Fish Protection Program: Week of April 12-18, 2004\]](#)
3. Mid-Columbia Flow Objectives
[\[SOR #2004-5-Modified\]](#)  [\[PRD & GCL\]](#) 
4. McNary Operation outside 1%
5. Dworshak Operation in April (Corps)
6. Spring/Summer Update (Corps)
7. Lower Snake Spill Decision (Corps)
[\[Corps of Engineers Decision - 2004 Spring Spill at Lower Snake River Projects\]](#) 
8. Status of Operation
 - a. Reservoirs
 - i. [\[April-Final - Volumes at Dworshak\]](#) 
 - ii. [\[April-Mid Month - Volumes at Dworshak RFC\]](#) 
 - iii. [\[Volumes at Libby\]](#) 
 - iv. [\[Volumes at Hungry Horse\]](#) 
 - b. Fish
 - c. Power System
9. Other
 - Set agenda for next meeting

Questions about the meeting may be referred to Cindy Henriksen at (503) 808-3945, or Rudd Turner at (503) 808-3935, or Cathy Hlebechuk at (503) 808-3942

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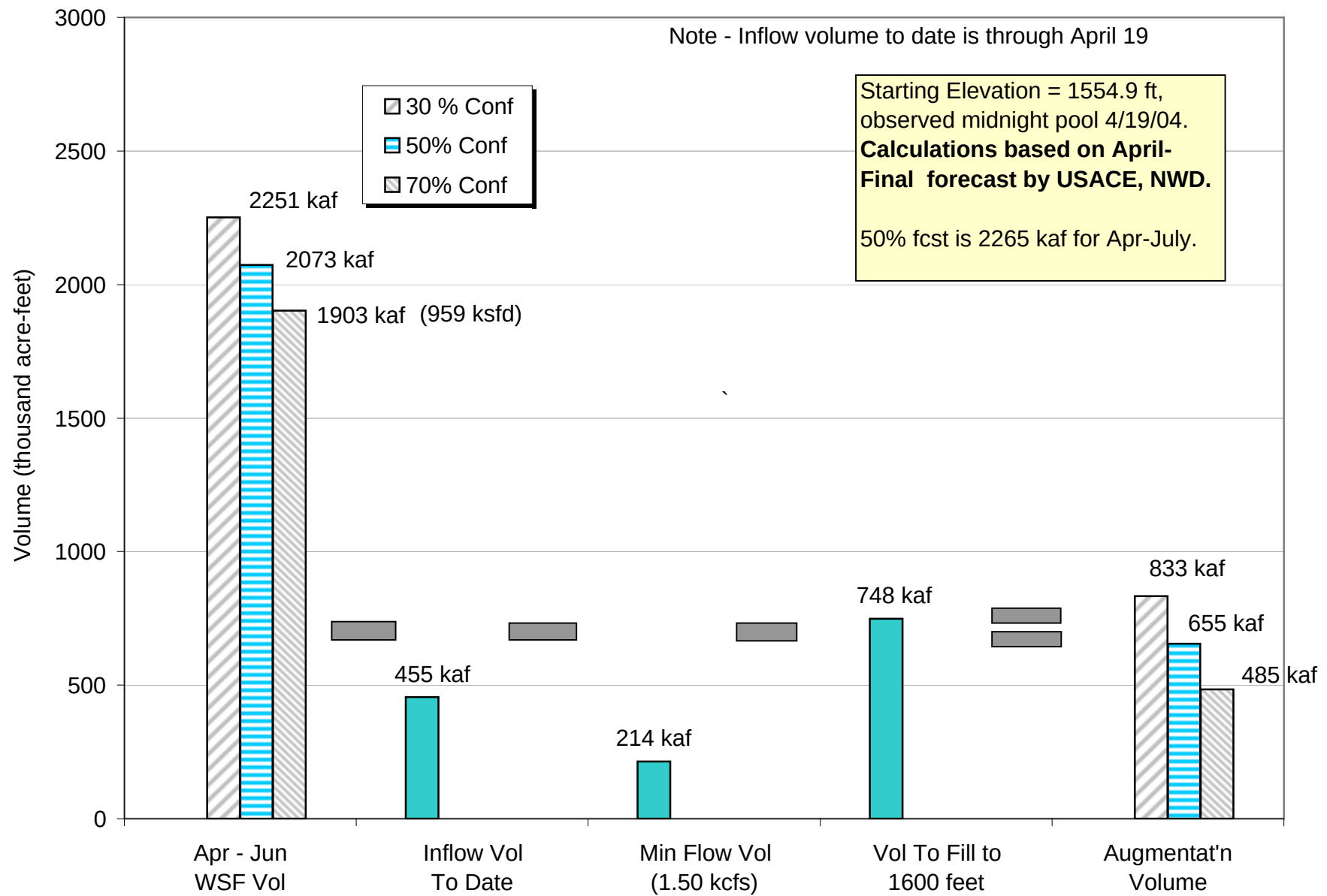
COE: Cindy Henriksen / Rudd Turner / Cathy Hlebechuk

TMT SUMMER SPILL ANNOUNCEMENT

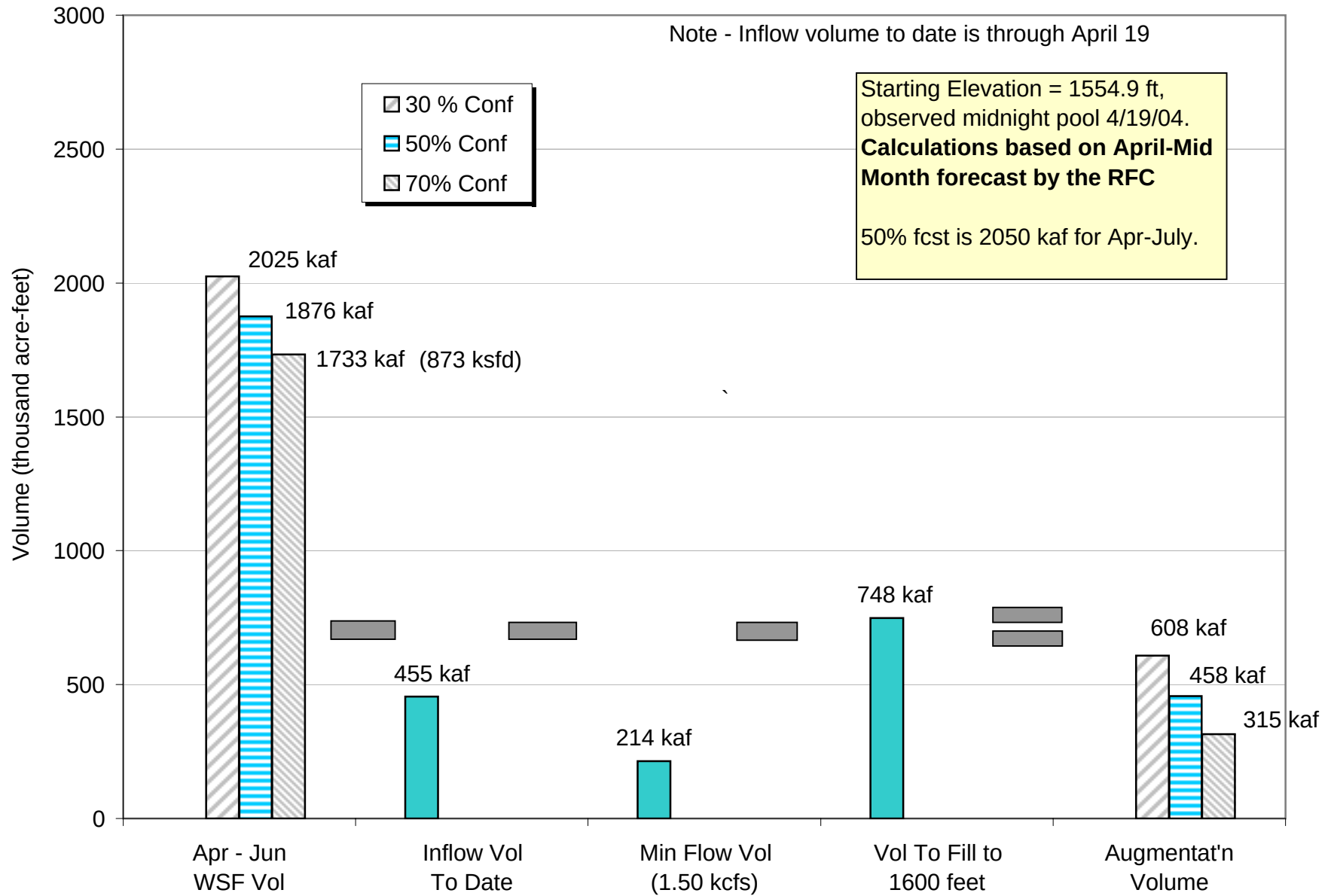
April 21. The Bonneville Power Administration and the U.S. Army Corps of Engineers said today they will take more time to make a decision on summer spill. A meeting with Regional Executives scheduled for April 23 has been postponed until BPA and the Corps can provide an amended proposal that will provide a full set of offsets with equal or better protections for salmon and steelhead. A press release is available at:

http://www.salmonrecovery.gov/docs/summer_spill/Summer_Spill_Proposal_Delayed_Again_PR.pdf

Volumes at Dworshak
1 April Through 30 June

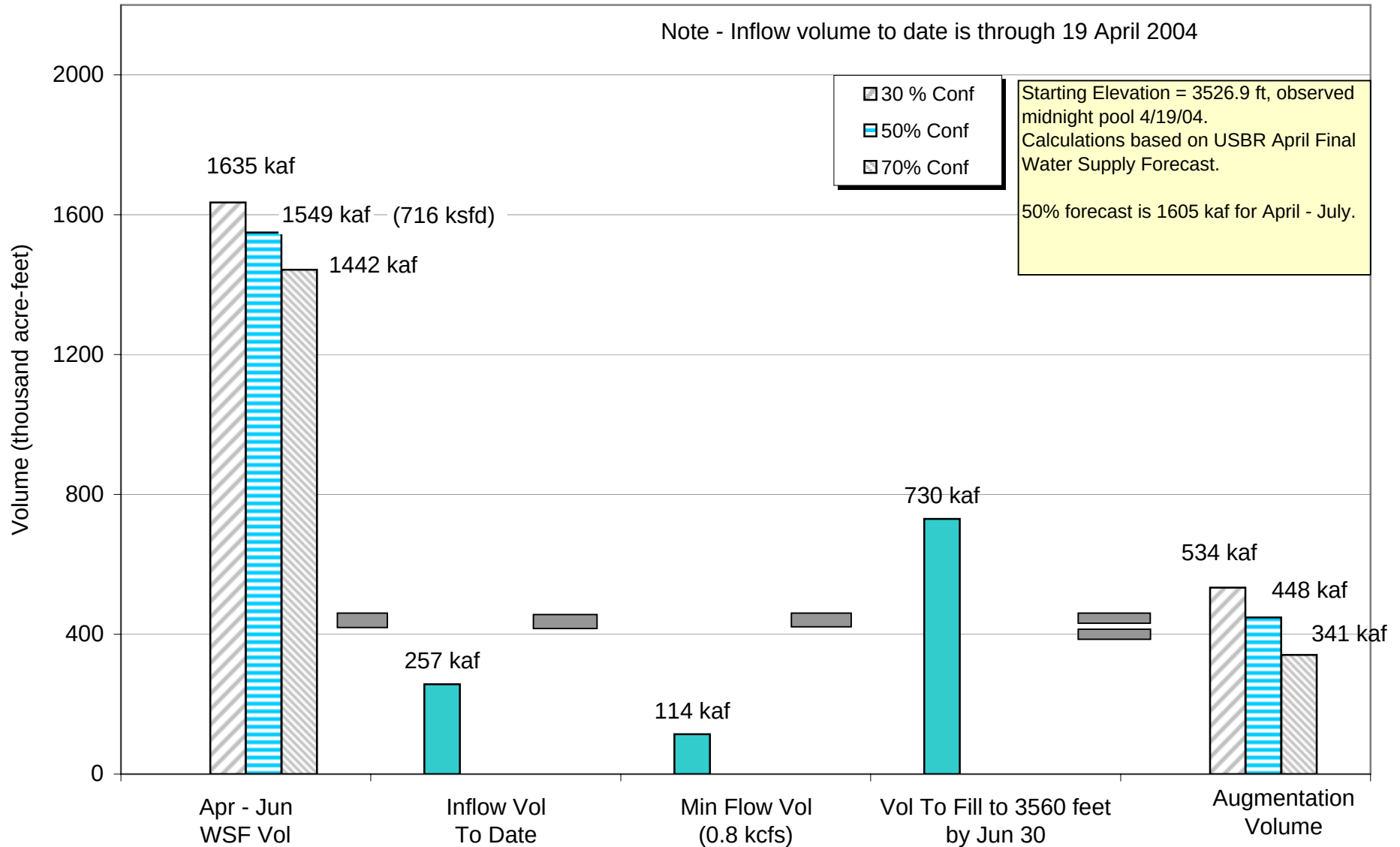


Volumes at Dworshak
1 April Through 30 June

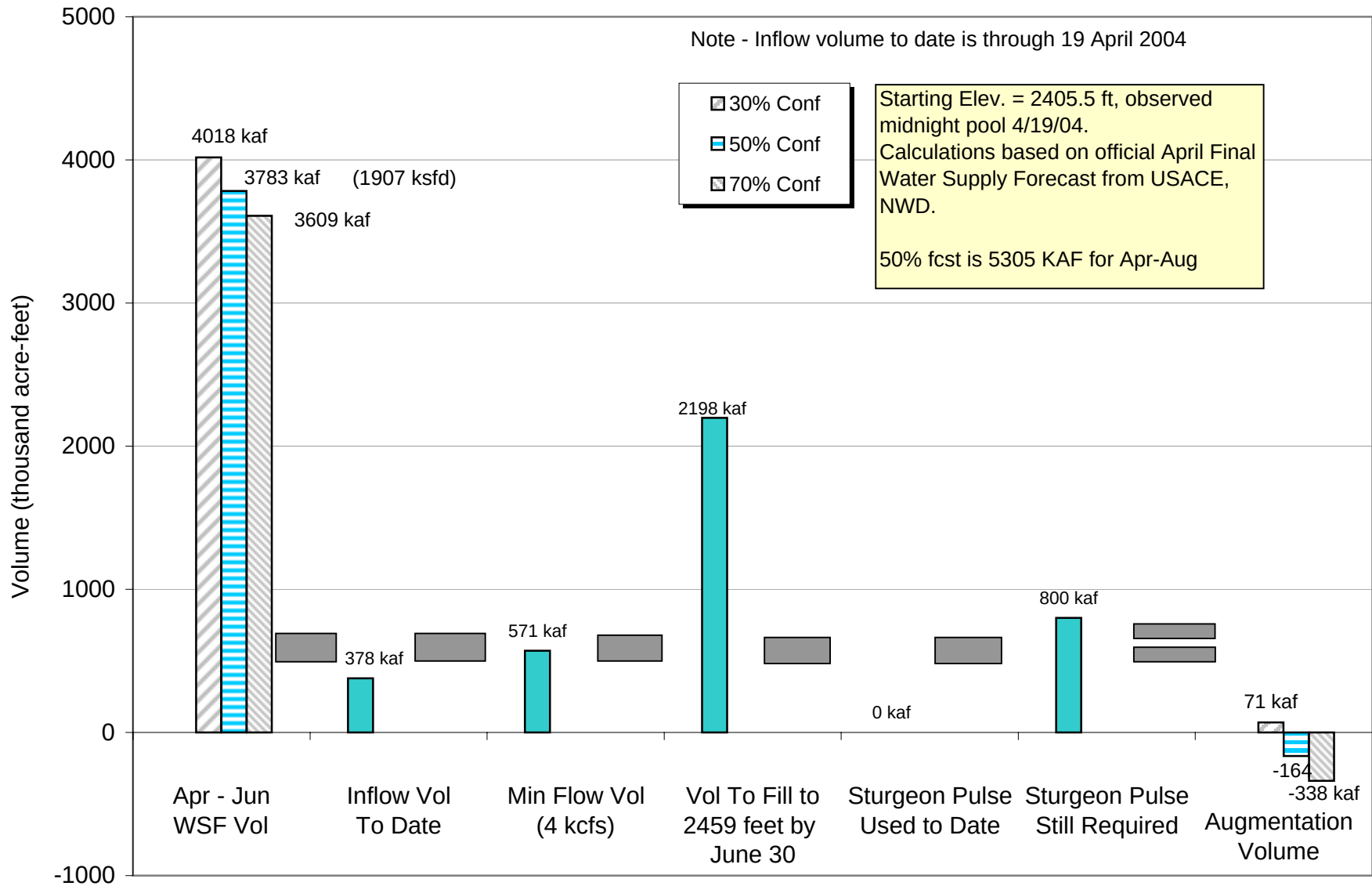


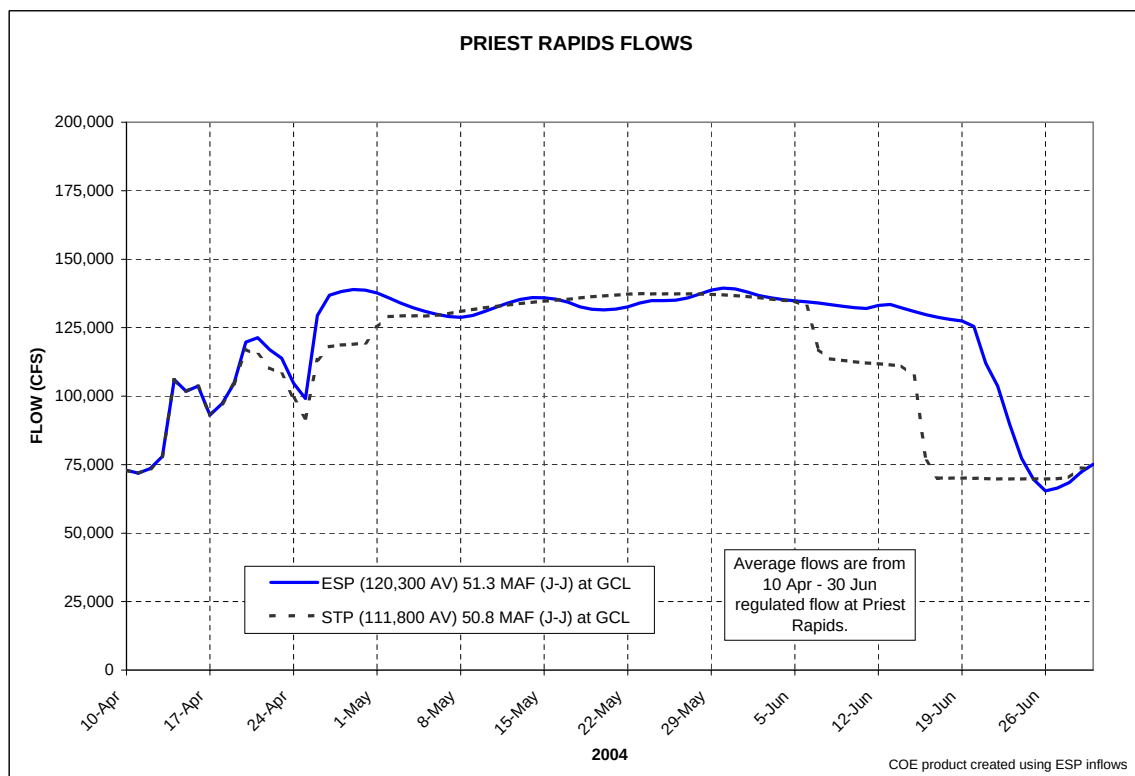
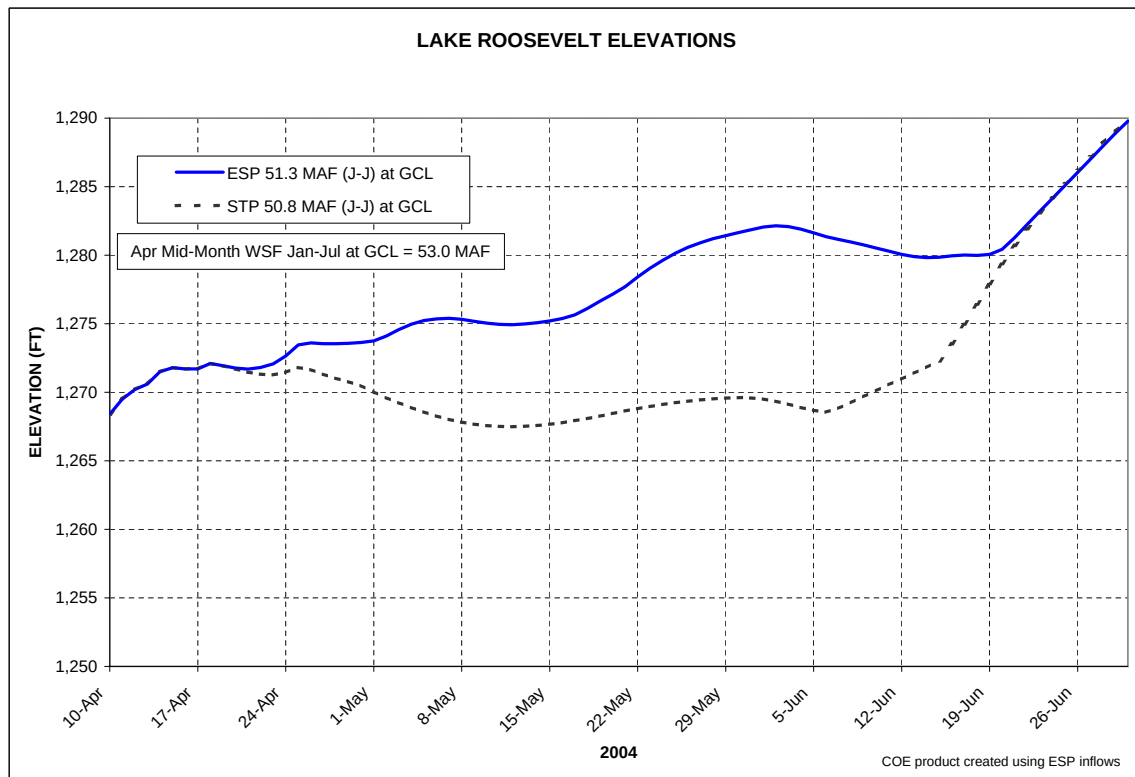
Volumes at Hungry Horse 1 April Through 30 June

Note - Inflow volume to date is through 19 April 2004



Volumes at Libby 1 April Through 30 June





COLUMBIA RIVER REGIONAL FORUM

TECHNICAL MANAGEMENT TEAM

April 21st, 2004

FACILITATOR'S SUMMARY NOTES ON FUTURE ACTIONS

Facilitator: Donna Silverberg

The following notes are a summary of issues that are intended to point out future actions or issues that may need further discussion at upcoming meetings. These notes are not intended to be the "record" of the meeting, only a reminder for TMT members.

Status of Hanford Reach:

Chris Carlson, Grant County PUD, reported on the weekly average flows at Hanford Reach for April 12-18th. Miscommunication between the PUD and BPA led to the operation going outside the flow band constraints. Chris offered that it would be helpful if the PUD received 24-hour notice for week day operations and 48-hour notice for weekend operations. The PUD will make best efforts to improve the operation for the rest of the season. BPA also noted that they will make best efforts to improve operations.

Mid-Columbia Flow Objectives (SOR 2004-5 modified):

Cindy Henriksen, COE, reported that SOR 2004-5 presented by the salmon managers at the April 14th TMT meeting was modified to include their oral request for: daily average flow of 110 kcfs at Priest Rapids, and nighttime spill at Bonneville up to the gas cap ("at least" 75 kcfs.) The salmon managers requested that the action agencies increase flows at Bonneville at night, which have been holding steady at 75 kcfs, when possible without exceeding the gas cap. The COE agreed to make every effort to meet the request. John Wellschlager, BPA, will look at the operation and notify TMT by the end of tomorrow (4/22) whether they agree to implement nighttime spill above 75 kcfs at Bonneville. BPA reiterated from last week their response to the 110 kcfs flow at Priest Rapids to be a weekly, not daily, average.

McNary Operations Outside 1%:

The salmon managers are in the process of reviewing the information presented by BPA and the COE at last week's TMT meeting, and expect to provide comments at the April 28th TMT meeting. Steve Haeseker, USFWS, reported that monitors from the smolt monitoring program observed distinct differences in patterns of descaling during operations outside 1% vs. operations within 1%. Mark Smith, Walla Walla COE, will look further into this observation and will follow-up with TMT next week. BPA's Kim Fodrea reported that after re-evaluating the numbers presented at the last TMT meeting, the projected revenue gain of operating the non-test units at McNary outside 1% is much lower this year than previously expected, so BPA has decided to withdraw the proposal to remove the 1% constraint at McNary for this year.

ACTION: The salmon managers will continue their review of the proposal and monitoring plan and respond with comments at the next TMT meeting, April 28th. They will use the information from the monitoring plan/proposal presented at the last TMT

meeting, along with other data, to inform decisions in future years about operating outside 1% at McNary. It was clarified that the COE previously had agreed to implement the salmon managers' SOR 2004-2, requesting that operations at the non-test units do NOT go outside 1% efficiency at McNary, until/unless a change in the decision occurred. Because BPA has withdrawn its proposal, the COE will continue to implement the SOR this year. BPA will respond to Idaho's request from last week for information on the '94-96 passage years.

Dworshak Operation in April:

Subsequent to the April 14th TMT meeting, the COE found new information including that the mid-month water supply forecast was lower than the forecast presented at TMT, so did not release 9.5 kcfs out of Dworshak as planned. Instead, 7.4 kcfs was released last week. The COE updated the volume prediction graphs with the new forecast to predict available flow augmentation through the end of June. In light of the new data and a request from Idaho and Nez Perce to conserve water now for May and June, the COE plans to release ~6.6 kcfs this week through the end of April, and continue to monitor and manage the operation as new information is available. The salmon managers agreed with the COE's current operating plan, and noted that their goal is to fill the reservoirs for June.

WMP Spring/Summer Update:

A draft spring/summer update will be available at the next TMT meeting, April 28th. The COE's Scott Boyd expressed a hope to have a "final update" completed two weeks after that.

Lower Snake Spill Decision:

Cindy Henriksen reported that the COE decision on Lower Snake spill, made after regional discussions at TMT and IT, was distributed and linked to the TMT web page on Monday, April 19th. The decision was to: continue spill at Lower Granite and Little Goose until April 23rd; implement a modified spill study at Lower Monumental based on recommendations from SRWG; allow up to 18 days of spill at Lower Monumental; and initiate spill for three days at Lower Monumental prior to the start of the study. Marvin Shuttles reported that the SRWG recommends a bulk vs. no spill test at Lower Monumental, starting at 6am on April 30th and ending at 6am on May 14th. The salmon managers who prefer BiOp spill recommended that, in addition to the test, the COE should implement nighttime spill (6pm-6am) using the large gate opening for six days prior to the start of the study (April 24th start if the above spill study schedule is implemented).

ACTION: The COE will distribute further information on the spill study when available to be certain that the nighttime spill requested for prior to the study is scheduled to begin at the appropriate time/date.

System Status:

Reservoirs: Libby is at elevation 2406' and filling. The COE is expecting a tier one sturgeon operation; the COE and USFWS are scheduled to meet and discuss the sturgeon operation on Tuesday, April 27th. Libby remains on the cusp of possible refill. Grand

Coulee is at elevation 1271' and drafting. Drum gate maintenance at the project will not be completed this year in order to assure refill. It was noted that there is a risk involved in not doing the annual maintenance, and the BOR will plan to do it next year. The COE provided graph data on Priest Rapids and Lake Roosevelt elevations as requested; TMT will review Priest Rapids flows next week.

Fish: High numbers of yearling chinook were observed at Lower Granite, trending upward at the dam as well as at Little Goose. The spring migration is in an early stage and underway. Steelhead numbers are picking up, with ~30,000/day observed at Lower Granite, not yet seen at Little Goose or Lower Monumental. Trends appear to be similar to previous years. Adult chinook numbers are in line or exceeding the 10 year average, with 10,000 observed at Bonneville on April 16th and 12,500 observed yesterday. Seining catches at Ives Island are showing record numbers of chum juveniles. Adult numbers are low. Chinook are still emerging; so far numbers are high. Cindy LeFleur reported that WDFW is currently gathering information about timing of runs for different stocks of spring chinook, which could inform future operations decisions.

Next Meeting, April 28th, 9am:

Agenda Items:

- Hanford Reach/Mid-Columbia Flows
- Report on Bonneville Nighttime Spill to Meet TDG Cap
- Salmon Managers' Comments on McNary 1%
- Spring/Summer Update Draft
- Specifics on Lower Monumental Study
- System Status Reports

TECHNICAL MANAGEMENT TEAM

BOR: Tony Norris / John Roache

BPA: Scott Bettin / John Wellschlager

NMFS: Paul Wagner / Chris Ross

USFWS: David Wills / Howard Schaller

OR: Ron Boyce

WA: Cindy LeFleur

ID: Russ Kiefer

MT: Jim Litchfield

COE: Cindy Henriksen / Rudd Turner / Cathy Hlebechuk

TMT MEETING

Wednesday 28 April 2004 0900 - 1200 hours

**Custom House Room 118
Portland, Oregon
Conference call line: 503-808-5190**

*All members are encouraged to call Donna Silverberg with any issues or concerns they would like to see addressed.
Please e-mail her at dsilverberg@cnnm.net or call her at (503) 248-4703.*

AGENDA

1. Welcome and introductions.
2. Status of Hanford Reach (Chris Carlson) [\[Priest Rapids Operations\]](#)
3. Mid-Columbia Flow Objectives
4. Salmon Managers' Comments on McNary 1% Monitoring Plan [\[Joint Technical Staff Letter\]](#) [\[MCN Descaling Info\]](#) 
5. Bonneville Nighttime Spill to TDG Limit (Corps) [\[Summary of Spill Operations for Bonneville Chum Redds\]](#) 
6. [Spring / Summer Update](#)  (Corps)
7. Lower Monumental Study Design (Corps)
8. [SOR 2004-6](#) 
9. [SOR 2004-C01](#) 
10. Status of Operation
 - a. Reservoirs, April - June Volume Forecasts
 - i. [Dworshak \(USACE\)](#) 
 - ii. [Dworshak \(RFC\)](#) 
 - iii. [Hungry Horse](#) 
 - iv. [Libby](#) 
 - b. Fish
 - c. Power System
11. [TMT Guidelines](#) 
12. Other
 - a. Set agenda for next meeting

Questions about the meeting may be referred to Cindy Henriksen at (503) 808-3945, or Rudd Turner at (503) 808-3935, or Cathy Hlebechuk at (503) 808-3942

SUMMARY OF SPILL OPERATIONS FOR THE BONNEVILLE CHUM REDDS

4/12/04 – 4/16/04 Spill began at Bonneville with a spill limited to 50 kcfs/24hours as requested in the SOR 2004-4.

4/16/04 – 4/21/04: Spill limited to 75 kcfs/24hours

4/21/04 – Today: Nighttime Spill according a prepared table of total flow vs. spill levels. The spill table was developed using several graphs and other various pieces of information including:

1. Bonneville Project Tailwater and Outflows graph from the Bonneville Water Control Manual
2. Spillway Discharge to TDG Saturation graph from the DGAS studies
3. Bonneville Tailwater Elevation and % TDG graph developed from the 2000 NMFS Biological Opinion standard of 105% TDG saturation over the Redds.
4. Actual % TDG, spill, total flow and tailwater elevation data as stored on the Corps real-time operations database (CWMS)
5. The spill change guidance document that outlines how spill changes are made

Summary of Changes of Nighttime Spill based on the Total Flow vs. Spill Table

4/21/04 - 4/25/04: The following table was used. Nighttime flows persisted in the 180 to 200 range so 125 kcfs was spilled for nine hours each night. For the most part, TDG levels stayed within the acceptable range of TDG vs. tailwater elevation (105% TDG at the reds elevation) until 4/25 when the allowable TDG levels exceeded the tailwater elevation for 9 hours on 4/25/04.

Total Flow Range	Spill Level
125 - 140	50
140 - 160	88
160 - 180	110
180 - 200	125
>200	gascap

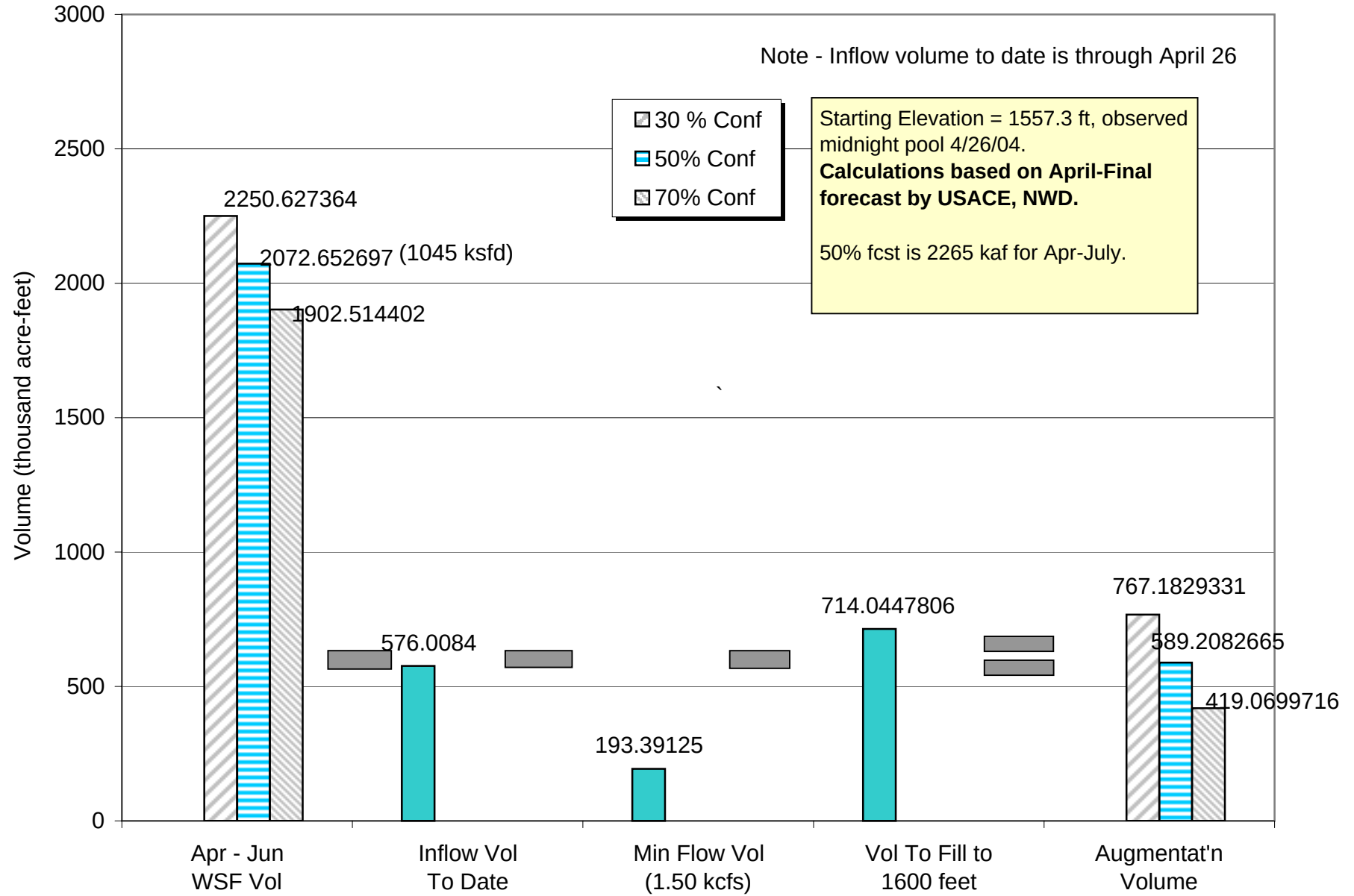
(Gascap was set at 135 kcfs)

4/25/04 – 4/26/04: Nighttime flows persisted in the 180 - 200 range so 100 kcfs was spilled for 9 hr April 25, which didn't generate the maximum amount of TDG for the available tailwater elevation.

4/26/04 – Present: Flows persisted in the 180 to 200 range at night so 110 kcfs was spilled for nine hours which generated the slightly more TDG than what was allowable for the tailwater elevation available. Upon consultation with NOAA, Fisheries, a 12-hour or a 24-hour average approach could be used.

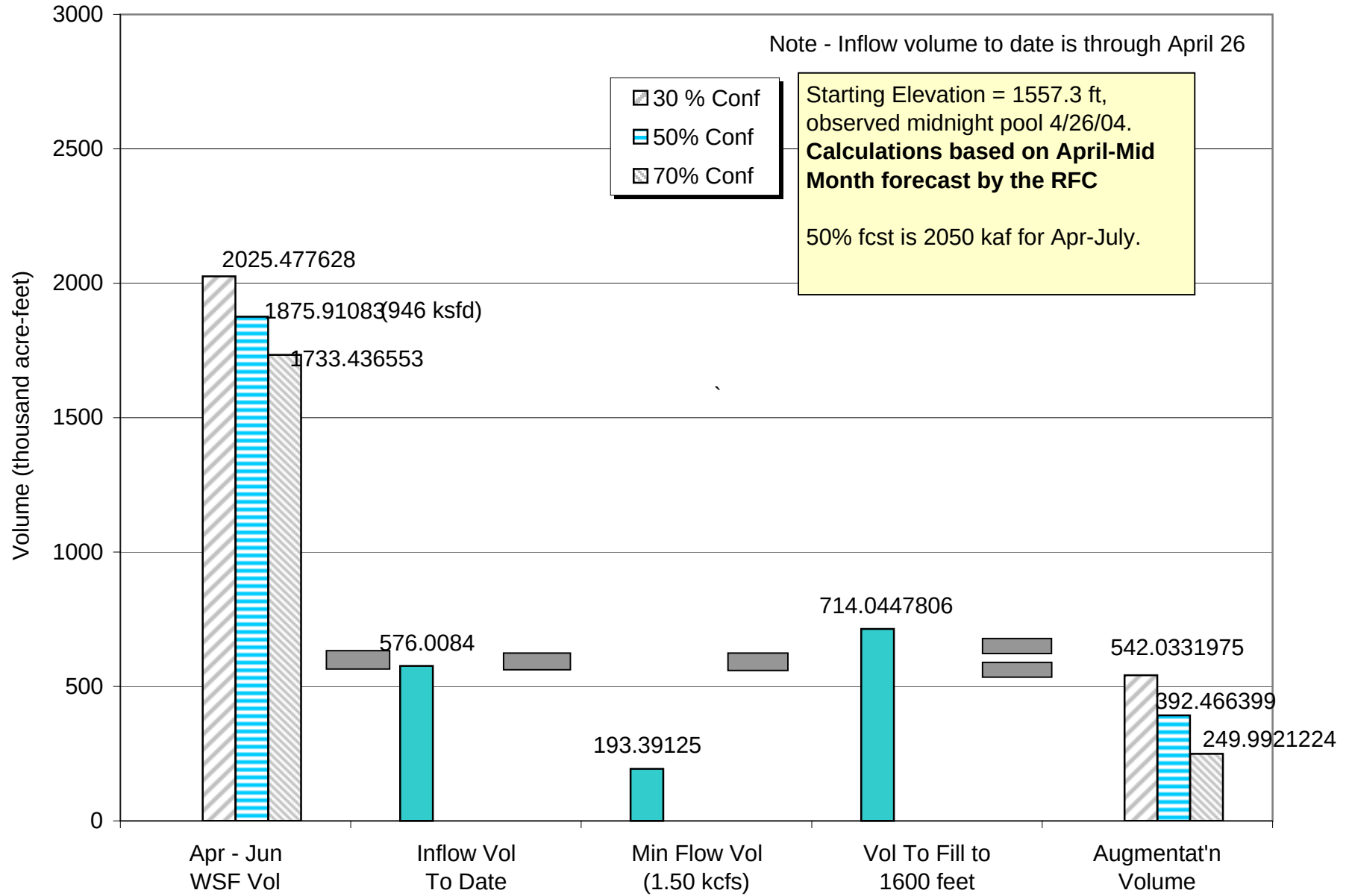
Total Flow Range	Spill Level
125 - 140	50
140 - 160	75
160 - 180	90
180 - 230	110
>230	gascap

Volumes at Dworshak
1 April Through 30 June



Volumes at Dworshak
1 April Through 30 June

Note - Inflow volume to date is through April 26



GUIDELINES FOR TECHNICAL MANAGEMENT TEAM

DRAFT--May 2003

I. Introduction

The National Marine Fisheries Service's (NMFS) Biological Opinion on the "Reinitiation of Consultation on Operation of the Federal Columbia River Power System (FCRPS), Including the Juvenile Fish Transportation Program, and 19 Bureau of Reclamation Projects in the Columbia Basin", dated December 21, 2000, and the U.S. Fish and Wildlife Service's (USFWS) Biological Opinion on the "Effects to Listed Species from Operations of the FCRPS", dated December 20, 2000, call for the utilization of a Technical Management Team (TMT) to advise the operating agencies on dam and reservoir operations, thus optimizing passage conditions for juvenile and adult anadromous salmonids and resident fish. These guidelines are adopted in accordance with those Opinions.

The TMT is one of several technical teams within the Columbia River Regional Forum established by the NMFS, USFWS, the U.S. Army Corps of Engineers (COE), the U.S. Bureau of Reclamation (BOR), and the Bonneville Power Administration (BPA). The Regional Forum provides for regional discussion and recommendation on the operation and configuration of the FCRPS. Its goal is to develop consensus among the various members on these recommendations. The TMT's mission is specifically to ensure broad technical participation and use of the best available technical information, and to encourage consensus in recommendations on operating the FCRPS. When consensus is not achieved, the TMT ensures that the basis for participants' recommendations and Federal decisions is fully explained and documented. In such situations, questions can be elevated to the Implementation Team (IT) for resolution if requested by a TMT member.

The TMT operates under the Guidelines and Procedures approved November 7, 2002, for the Columbia River Regional Implementation Forum. The following more specific guidelines supplement the Forum's procedures for TMT operations. As the Forum procedures are refined, these guidelines may be revised.

II. Scope

The focus of the TMT is to implement the NMFS and USFWS Biological Opinions on operation of the FCRPS while considering the provisions of (and effects on) the Northwest Power Planning Council's (NPPC) Fish and Wildlife Program, other biological opinions, State and Tribal plans and programs, and other relevant operational requirements. Specifically, the TMT should explore operational scenarios under the Biological Opinions that would serve to protect other fish and wildlife in the Columbia River Basin and promote coordination and consistency with these other objectives to the extent possible.

III. Membership

See Forum Guidelines and Procedures.

The members and alternates of the TMT are listed in Attachment 1. Initial confirmation of membership, designation of representatives, and any changes in representation should be provided in writing to the NMFS Implementation Team Chair.

IV. Roles and Responsibilities

The TMT is responsible for discussion and recommendations to the Action Agencies (COE, BOR, and BPA) on hydro system flows at designated control points and expected project operations to implement the Biological Opinions for listed salmon, steelhead, sturgeon, and bull trout species within the Columbia River basin while taking into account the needs of (and effects on) other listed and non-listed species.

The TMT is to engage in joint decision-making that works toward consensus within the recognized authorities and management jurisdictions of its participating members. Specifically, the State, Tribal and Federal salmon managers (Salmon Managers) recommend the flows at the control points that best meet the needs of salmon and steelhead. These may include specific project operations, but this does not foreclose TMT consideration of alternative means of providing the same operating condition. Other participants (e.g., Resident Fish Managers) may also make recommendations consistent with the scope of these guidelines. The vehicle for communicating a river or project condition, which will benefit salmon/steelhead/sturgeon migrations or resident fish, is a system operational request (SOR). See Section V(d). All parties submitting SORs are encouraged to coordinate with other participants to the extent possible.

The Salmon Managers are responsible for the management of anadromous and resident fish in the basin. The COE and BOR are responsible for decisions on operation of the FCRPS projects; and the COE and BPA are responsible for Treaty agreements with Canada regarding storage in Canada and other Treaty-related matters. The participation of other affected sovereign and non-sovereign entities is intended to ensure that decision-makers have the broadest possible source of information upon which to base their decisions. All parties are encouraged to succinctly present their views regarding biological or operational recommendations. Input can provide alternative options for the appropriate authority to consider when making their decisions, but authority for implementing the request remains with the appropriate agencies.

The TMT is a year-round technical body. Winter planning will consist of development of a Water Management Plan and updating the 1-year and 5-year Biological Opinion Implementation Plans. The purpose of in-season management is to implement the Biological Opinions and the Water Management Plan. Post-season review will consist of a review of the previous year's activities and performances, and updating operating procedures as needed. Throughout the year the COE, BOR, and BPA will coordinate planning and operational decisions that may affect salmon and other species, through the TMT (e.g., yearly agreement on Non-Treaty Storage Agreement spring/summer operation, the 5-year

Idaho Power Company Agreement, and the Libby/Arrow swap). The COE, BOR and BPA will specifically use the TMT as a forum for the coordination and consideration of potential effects on salmon, steelhead and other species prior to a final decision. Idaho Power Company, the Mid-Columbia Public Utility Districts, and other non-sovereign participants are also encouraged to use TMT as a forum for coordination of planning and operational decisions throughout the year.

V. Operating Procedures

a) Annual Water Management Plan

By April 15 each year, the TMT will finalize an annual Water Management Plan based on the run-off forecast and other factors specific to that year. A complete draft, subject to refinement based on the April 1 forecast, should be available for review no later than March 10 each year. All interested parties may participate in the plan development and will be given an opportunity to review and comment on the draft plan. In general, the Salmon Managers will provide information on salmon and salmon operational requirements to be included in the plan. Resident Fish Managers will provide information on resident fish needs. The Action Agencies will provide information on reservoir status; planned project operations (and operating constraints); flow forecasts; anticipated special operations for research and other purposes; turbine outage and maintenance plans; and operating agreements and contracts that may affect annual operations. Priorities among competing needs should be resolved within the context of the scope of these guidelines.

b) Summary of In-season Management Key Events

Monday	Begin implementing operations based on last week's decision.
Tuesday (9 a.m.)	The COE posts or otherwise distributes flow projections to TMT members for Priest Rapids, McNary and Lower Granite, along with resulting reservoir operations and elevations, and current dissolved gas and temperature data. Salmon Managers will post or otherwise distribute biological information.
Tuesday (4 p.m.)	TMT Members (or others) submit SORs to the Reservoir Control Center (RCC) and send (fax) hard copies to TMT members and participants. The Salmon Managers will fax SORs to all project owners for which an operation is requested. The Salmon Managers will post the SOR to the Fish Passage Center web page, or an electronic version of any SOR will be simultaneously sent to the Corps so that it is available for the TMT web page as soon as possible.
Wednesday 9 a.m.	The TMT meets bi-weekly, with conference call on alternate weeks if needed, to discuss in-season management data and SORs, document operations, and recommend the following two week's operations. By the start of the meeting all SORs and the disposition will be posted to the TMT web page for use by members who can not attend the

meeting. If necessary, the TMT frames the issue(s) to be raised to the IT before 12 a.m.

Thursday (3 p.m.)	In case of impasse, disputes are resolved through the IT.
Friday (noon)	In the event an issue has been raised to the IT and the IT has resolved the issue, the Action Agencies document the operation to begin on the following Monday. This decision, and rationale, should be documented before the next regularly scheduled TMT meeting and sent to the Chair of TMT, who will post it on the TMT homepage
Friday (p.m.)	The TMT draft meeting notes are posted or otherwise distributed

c) In-season Management Data

The TMT will use the National Weather Service's River Forecast Center's (RFC) streamflow forecast for the Columbia River Basin. This forecast (and the basic reservoir operations that are assumed when producing it) is the official forecast to be used for the decision-making process. The BPA forecast may be used as supplemental information. The COE will use the RFC forecast to prepare flow projections for Priest Rapids, McNary and Lower Granite. By 9 a.m. (or as early as possible after that) on Tuesday, the flow projections and resulting reservoir operations will be distributed to TMT members. The Action Agencies will also provide dissolved gas, temperature, and other physical monitoring data available for decision-making.

During the anadromous fish migration period, the Salmon Managers will provide biological information on salmon and steelhead numbers, migration timing and condition, for both the current year and historically. The USFWS, and others as appropriate, will provide relevant information on other fish and wildlife resources. These data will be posted by NMFS and USFWS each Tuesday by 4 p.m.

d) System Operational Requests

TMT members will provide recommendations to the TMT on hydro system flows and/or expected project operations consistent with the scope of these guidelines. Non-TMT members may also submit recommendations for consideration. These recommendations will be in the form of system operational requests (SORs) stating the flow objective(s) sought (e.g., keep flows at a location X in a W-Z range). Expected project operations may also be added. Each SOR will include the biological basis for the recommendation. Each SOR will also indicate whether the request is to implement a NMFS or USFWS Biological Opinion, NPPC Fish and Wildlife Program, or other Federal, State or Tribal program. Non-TMT members may also submit SORs for special operating purposes for TMT consideration.

All SORs will be submitted by 4:00 p.m. on Tuesday via fax to the action agencies, or any other project owner that may be required to deliver a specified operation, provided that the flow projections were available by 9 a.m. that day. Electronic submittal through the Proposal Submission/Review form on the TMT homepage may also be used. TMT and

public comments on the proposal can also be appended via the Internet form. If proposals are incomplete, or are not received in time for sufficient review, the TMT may choose to delay action, but lack of an SOR should not preclude discussion of relevant matters at the meeting.

SORs should list members of the agencies who have reviewed and support the request.

The SOR will be outlined for description on the TMT SOR disposition web page. The SOR will be posted to the disposition page prior to the start of the TMT meeting so that telephone participants can follow the meeting.

When an SOR has been properly submitted, the Action Agencies (COE, BOR, BPA) should be prepared at TMT to describe the operational options and implications of meeting the request.

e) Meetings

Between the last week of March and up to at least August 31 the TMT will meet every other Wednesday, or more often if necessary, to conduct in-season management. All meetings will be open to interested parties. A conference line will be available for those who cannot attend in person.

An agenda for each meeting will be distributed at least two business days prior to the meeting (the preceding Monday in the case of the regularly scheduled in-season meetings). The principal purpose of the meetings and standing agenda items during the migration season is to review the status of the preceding week's SOR and operations, biological data, new SORs and project operating data, and to reach informed decisions on FCRPS operations for the following week(s). As other items are brought forward for TMT consideration they will be added to the agenda for future discussion, but lack of an agenda item will not preclude discussion of relevant matters at the meeting.

The discussion of SORs at TMT meetings will include distinct segments dealing with both biological and operational issues. Biological questions associated with an SOR will be addressed to ensure that the biological basis of the SOR is clear, and to allow the TMT to consider any additional biological information that may be made available at the meeting. The meeting will then move on to a discussion of operational alternatives to meet the SOR by the Action Agencies and members of the TMT. The Chair should ensure that adequate time is allotted to each segment of the meeting.

The Chair should also ensure that the support or opposition of each TMT member for an SOR and a final decision by the Action Agencies are noted in the minutes.

f) Meeting Facilitation

Meetings of the TMT will be facilitated by an impartial facilitator, who will allow all TMT members the opportunity to fully participate in discussions and to help members resolve conflicts as they arise. The meeting facilitator shall serve at the will of all members of TMT

and should have skills as a meeting manager and conflict resolver. The meeting facilitator's role will include:

- Assisting the chair and TMT members in the development of meeting agendas
- Managing the meeting agenda in a balanced and even-handed fashion so that all members have an opportunity to speak and be heard
- Helping the group stay focused on the agenda and prioritize items that need action and further discussion
- Enforcing the ground rules established by the TMT (see Attachment 2)
- Helping the group reach consensus on decisions
- Helping the group resolve conflicts that may arise in the course of discussion
- Highlighting any decisions the group may reach
- Working with members between meetings to clarify issues, resolve disputes, and seek potential solutions to impasses
- Assisting members to develop opportunities that may resolve conflicts and increase the overall satisfaction with the TMT process in the long term, and
- Helping the group maintain a sense of humor

TMT members may give feedback directly to the facilitator or to the chair if they have concerns with the manner by which meetings are managed. The facilitator will be replaced if, after discussion with the facilitator, members believe he or she is not remaining impartial in the delivery of service.

g) In-season Decision making

On Wednesday morning the TMT will decide on operations for the following two weeks based on the available information and any pending SORs. These operating decisions will be made by consensus whenever possible. Consensus is defined as lack of a strong objection that would prompt one or more of the TMT members to elevate the issue to the IT. In the absence of consensus, the decision will be referred to the IT in accordance with the dispute resolution process described below. Objections to decisions that are not strong enough to prompt one or more TMT members to elevate the issue will be documented in the minutes of the TMT meeting.

If the recommendation is to implement the SOR or a modification of the SOR as agreed to by the TMT, then this should be documented for the minutes, and the SOR (and the Biological Opinion, Council's program or other plan on which it is based) may form the basis for the decision. If the Action Agencies do not agree to implement an SOR, they will describe for the minutes both the intended operation and the basis for that decision. The basis for the decision could include that the proposed operation is inconsistent with a Biological Opinion, that operational constraints prevent its implementation, that cost is prohibitive beyond that already included in the so-called "Fish Cap", or that the Action Agency has an alternative view of the best available biological information. If the Action Agencies believe the best available biological information supports a position that differs from that of the SOR sponsor(s), then the explanation should acknowledge this difference and should provide a clear, succinct written explanation of the data, analysis or judgment

that supports the alternative view. In each case, a full explanation will be provided by the Action Agencies to the TMT and IT.

The final decision made by the COE and BOR on the following week's operation will be made at the meeting whenever possible. The TMT will try to avoid making decisions outside the established process. In-season FCRPS operating decisions made through a separate process, such as those under the Action Agencies' authority for emergency situations, will be explained and documented as soon as possible, but in any case no later than Friday following the TMT meeting.

h) Documentation

Minutes of all TMT meetings will be prepared in accordance with Regional Forum procedures and approved by the TMT. Every effort will be made to post the draft meeting notes to the TMT home page by close of business Friday afternoon following the meeting. Comments will be due by the following meeting.

The TMT meeting minutes will be used to keep track of the decision-making process. The minutes will include the substance of any SOR, the decision, the decision-maker, and the basis for the decision. The minutes will also include: (1) documentation of consensus or a listing of members objecting to an SOR or a final decision; and (2) when an SOR is not implemented, clear documentation of the reasons provided by the decision-maker.

If a decision is elevated to the IT and therefore not made at the weekly TMT meeting, documentation on the final decision reached will be provided separately in writing by the IT and will include the same information noted above. This documentation of the decision should happen before the next regularly scheduled TMT meeting and be sent to the Chair of TMT, who will post it on the TMT homepage.

Each member is responsible for reviewing the decision documentation and the meeting minutes, especially if the agency he/she represents is one of the decision-makers.

Interested parties may request copies of the minutes if they have no access to the TMT homepage.

i) Distribution of Information

Meeting notes and material will be made available to TMT participants throughout the year. These materials will be made available through the TMT home page and may be reproduced on other Internet home pages where available. They will also be faxed to members and participants that request such services. Regular mail may be used for materials when time permits.

j) Public Participation

The public may comment on an issue at the end of the discussion on that issue or at the end of the meeting, based on the discretion of the group and the facilitator. They may also comment outside the TMT process.

VI. TMT Dispute Resolution Process

In the event that the TMT is unable to reach consensus on an issue, any member may request that the item be elevated to the IT. Every effort should be made to ensure that the issue is raised at least one week in advance of the monthly IT meeting (first Thursday of the month).

If, despite all efforts to the contrary, the TMT finds at its Wednesday morning meeting that it is unable to resolve a weekly in-season management dispute, and the decision cannot await consideration at the next regularly scheduled meeting, the IT will meet by conference call at 3:00 on Thursday afternoon. In the event that such a meeting is necessary, the TMT will prepare, and agree to, a brief summary of the issue(s) and a short description of the opposing viewpoints. This document will be given to the IT members by 1:00 p.m. on Thursday afternoon.

The IT will attempt to reach consensus. If the IT is unable to reach a consensus, then a final recommendation will be made by the appropriate agency (e.g., NMFS or USFWS if the issue relates to implementation of a Biological Opinion, or NPPC if the issue relates to implementation of the Fish and Wildlife Program). The member with the authority for the action will then make the decision and explain the rationale in writing. Whether IT acts by consensus, or the member with the authority for the action makes the decision to resolve a TMT conflict, it should be documented before the next regularly scheduled TMT meeting and sent to the Chair of TMT, who will post it on the TMT homepage.

VII. Emergency Meetings.

Any member of the TMT may call a meeting when an emergency situation requires action of the TMT.

ATTACHMENT 1

TECHNICAL MANAGEMENT TEAM (TMT) MEMBERS

ORGANIZATION	REPRESENTATIVE	ALTERNATES
National Marine Fisheries Service	Paul Wagner	Chris Ross
U. S. Army Corps of Engineers	Cindy Henriksen	Rudd Turner
Bonneville Power Administration	Scott Bettin	John Wellschlagel
U.S. Bureau of Reclamation	Tony Norris	John Roache
U.S. Fish & Wildlife Service	David Wills	Stever Haeseker
State of Washington	Cindy LaFleur	
State of Oregon	Ron Boyce	
State of Idaho	Russ Kiefer	
State of Montana	Jim Litchfield	
Confederated Tribes of the Colville Indian Reservations	Jerry Marco	Kirk Truscott
Shoshone-Bannock Tribes of Fort Hall	Keith Kutchins	
ELIGIBLE ORGANIZATION WITH NO OFFICIALLY DESIGNATED MEMBER	CONTACT PERSON	ALTERNATE
Kootenai Tribe of Idaho		
Confederated Tribes of the Umatilla Indian Reservation		
Confederated Salish & Kootenai Tribes of the Flathead Reservation		
Confederated Tribes of the Warm Springs Reservation		
Yakama Indian Nation		
Shoshone-Paiute Tribes of Duck Valley Reservation		
Burns Paiute Tribe		
Kalispel Tribe		
Spokane Tribe of Indians	Deanne Pavlik	Chuck Lee
Nez Perce Tribe of Idaho	Dave Statler	Greg Haller
Coeur d'Alene Tribe of Idaho		
State of Alaska		

ATTACHMENT 2.

MEETING GROUND-RULES & EXPECTATIONS

The following meeting ground-rules and expectations were discussed and agreed to by all members present at the _____ meeting of the TMT. They may be changed at the request of the Team.

I. Ground-Rules

Meetings will start and end on time unless members agree otherwise.

Members will treat each other with respect, which includes:

- Separating the people from the problem
- Listening to what others have to say
- No interruptions
- Monitoring your own air time
- No side conversations
- Letting the facilitator or chair know when you would like to speak
- Being mindful of tone when speaking directly to others
- Remembering that members are representing agencies, not stating individual opinions

During in-season management, each member agency/group will have one primary TMT representative who will sit at the table during meetings. Alternates or technical resource staff are welcome to attend and provide input through their primary representative, or when called on by TMT members. All are welcome to sit at the table --with preference for the primary representatives if there is a space limitation.

Any issues elevated from the TMT to the Implementation Team (IT) will be thoroughly discussed at TMT. TMT members will agree on the “issue statement” for the IT. The TMT Chair will then present the issue at the IT meeting. All TMT members will brief their agency IT representative on the issue prior to the IT meeting.

The meeting facilitator may make process comments in order to keep the group on track, focused and productive.

II. Expectations

Members are expected to come prepared to participate in the meetings. This means, they will provide necessary input to discussions and work towards making decisions based on information they have gathered from their respective agencies between meetings.

Members are expected to keep their agencies and staff apprised of decisions or important meeting discussions.

Members are expected to attend all meetings or send an alternate. If an alternate attends the meeting, a briefing, both before and after the meeting, is expected of the primary representative. The group will not revisit information for members who were absent from or late to a meeting.

Members are expected to follow through on assignments to which they agree, or are given by other team members, on a timely basis. This includes requests for comments on information or reports from other team agencies.

The meeting facilitator is expected to keep the group on track and focused on agenda items. Additionally, the group expects the facilitator to assure equal participation, highlight any decisions that the group reaches, and maintain a sense of humor.

People who listen in on the telephone are expected to “sign-in” as they call in on the conference telephone line.

Group members may contact the facilitator at any time to make process suggestions, raise concerns or request additional assistance at or between meetings.

Volumes at Hungry Horse 1 April Through 30 June

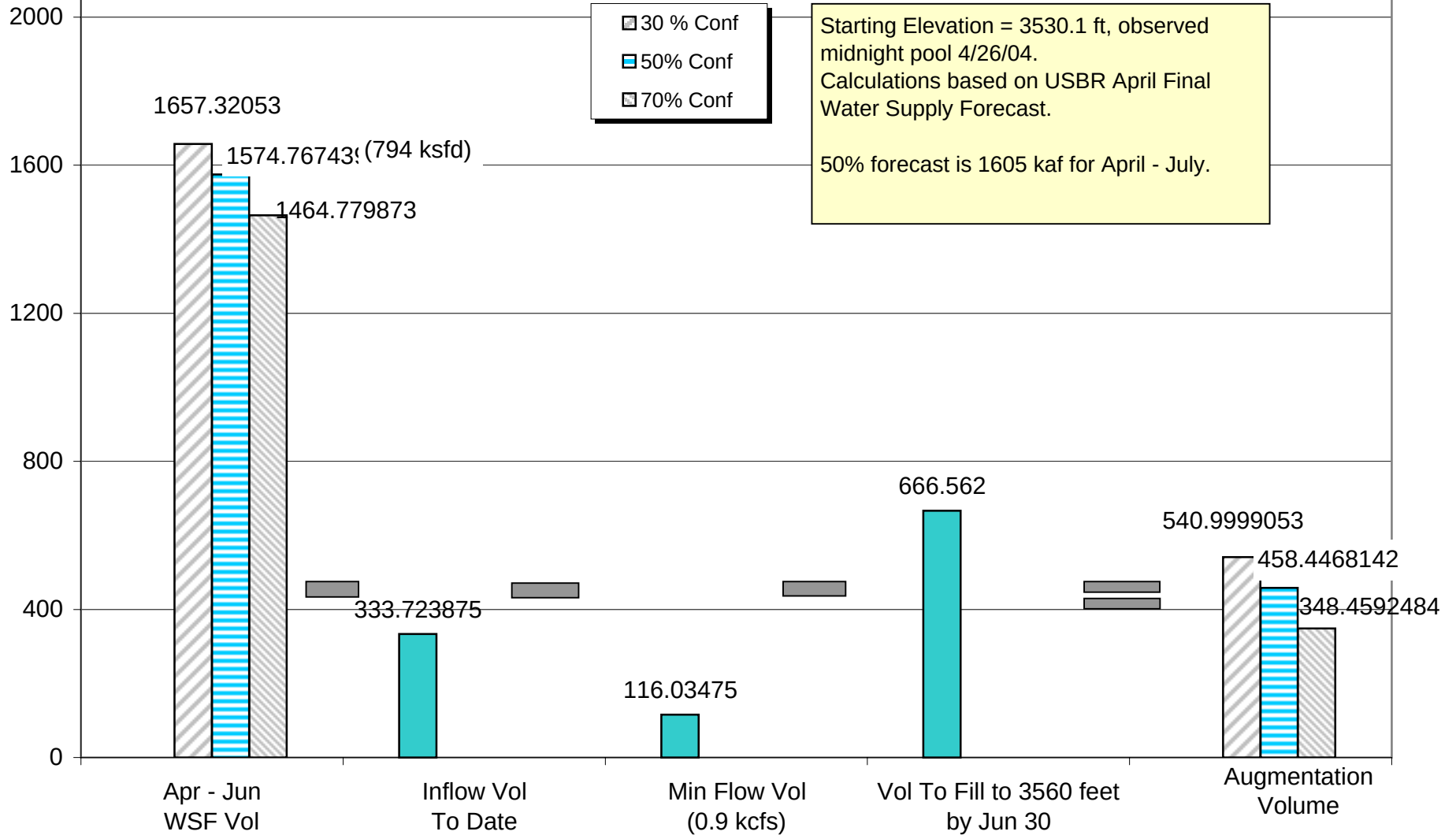
Note - Inflow volume to date is through 26 April 2004

30 % Conf
50% Conf
70% Conf

Starting Elevation = 3530.1 ft, observed
midnight pool 4/26/04.
Calculations based on USBR April Final
Water Supply Forecast.

50% forecast is 1605 kaf for April - July.

Volume (thousand acre-feet)



State, Federal and Tribal Fishery Agencies Joint Technical Staff

*Columbia River Inter-tribal Fish Commission
Idaho Department of Fish and Game
Oregon Department of Fish and Wildlife
US Fish and Wildlife Service
Washington Department of Fish and Wildlife*

April 27, 2004

Rebecca Kalamasz
USACE
Walla Walla District
201 N. 3rd Street
Walla Walla, WA 99362-1876

Dear Ms. Kalamasz:

We have reviewed the proposed monitoring plan associated with the USACE and BPA proposal to eliminate the 1% of peak efficiency operation requirement of the 2000 NMFS Biological Opinion. We have previously reviewed and summarized the expected impacts of operations outside of 1% in Joint Technical Staff letters on May 29, 2003 and April 2, 2004. The available data summarized in these letters strongly indicate that operations outside of 1% will reduce fish survival. In the April 2, 2004 letter we listed six mechanisms, which could reduce the immediate and delayed survival rates of fish encountering operations outside of the 1% limits at McNary Dam. The mechanisms that were listed include:

- increased turbine mortality,
- increased stress and mortality associated with turbulent gatewell environments,
- reduced numbers of fish passed via the spillway passage route,
- increased delayed mortality due to the increased number of guided fish,
- increased descaling rates, and
- increased forebay delay due to reductions in spill volumes.

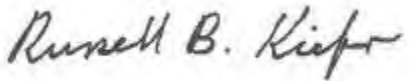
The monitoring plan presented by the USACE examines only one of these six mechanisms (i.e., descaling in gatewells). Therefore, we find that the monitoring plan is inadequate for assessing the range of potential consequences of operations outside of 1% on survival of fish at McNary Dam.

We view the USACE and BPA proposals to reduce summer spill and eliminate the 1% limits at McNary Dam similarly in terms of expected reductions in fish survival. It is generally accepted that both operations will reduce survival rates of fish that encounter these operations. However, the difference between these two proposals is that mitigation measures have been presented for the summer spill reduction proposal, but are not even being discussed in the context of allowing turbines to operate outside the 1% operating criteria of the Biological Opinion. If removing the

1% limit is pursued in the future, we believe that appropriate mitigation measures to offset any and all reductions in survival should be included in any proposal to do so. Failing to provide mitigation would reduce the probability of recovering ESA-listed fish, and unjustly burden sport, tribal, and commercial fishers with reduced harvest opportunities for non-listed fish.

Thank you for providing the opportunity to comment on this proposal and monitoring plan. We hope that the USACE and BPA will take our concerns seriously when entertaining proposals to operate outside of the 1% limits in the future.

Sincerely,

A handwritten signature in cursive script that reads "Russell B. Kiefer".

Russ Kiefer, IDFG

A handwritten signature in cursive script that reads "Raymond R Boyce".

Ron Boyce, ODFW

A handwritten signature in cursive script that reads "Bob Heinith".

Bob Heinith, CRITFC

A handwritten signature in cursive script that reads "Rodney W Woodin".

Rodney Woodin, WDFW

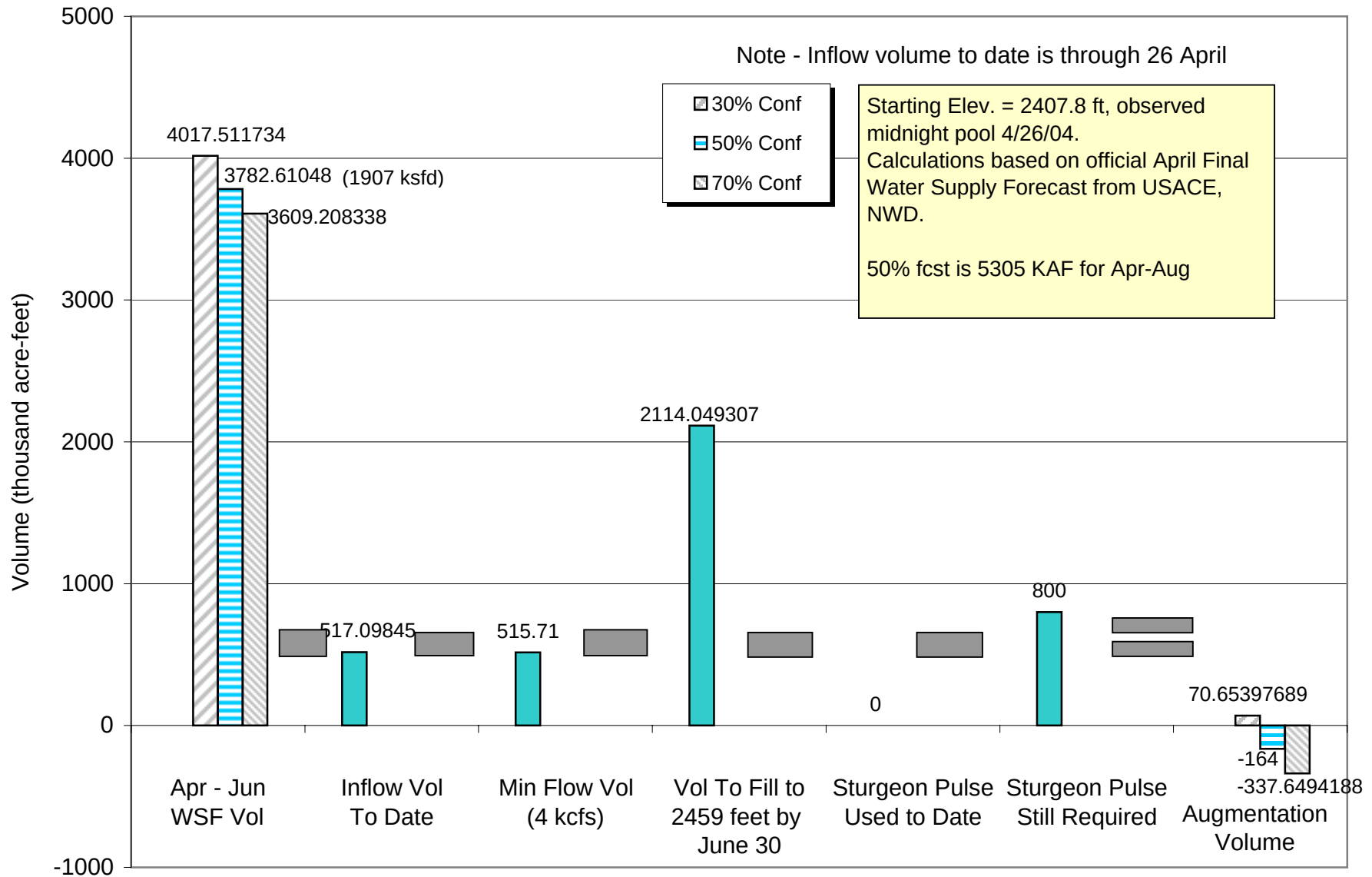
A handwritten signature in cursive script that reads "David W Wills".

Dave Wills, USFWS

Cc: Cindy Henriksen, COE

Volumes at Libby 1 April Through 30 June

Note - Inflow volume to date is through 26 April



Percent Daily Descaling at McNary Dam, 2004, Estimated at the JFF. (NOTE: estimated descaling is for the 24 hour period prior to sampling)

Date	treatment	Yearling Chinook	Sub-Yr Chinook	Steelhead Hatchery	Steelhead Wild	Sockeye/Kokanee Hatchery	Sockeye/Kokanee Wild	Coho	Total Facility
1-Apr									
2-Apr									
3-Apr	low	6.5	0	33.3	7.1	---	0	---	6.9
4-Apr	low								
5-Apr	low	4	0	0	7.1	---	0	---	4.2
6-Apr	low								
7-Apr	low	4.8	0	0	0	---	0	0	3.7
8-Apr	low								
9-Apr	low	4.1	0	0	3	0	0	---	3.6
10-Apr	low								
11-Apr	low	2.3	0	0	0	---	0	0	2
12-Apr	low								
13-Apr	low	2.4	0	0	2.2	---	0	0	2.3
14-Apr	low								
15-Apr	low	1.2	0	0	1.6	---	0	0	1.2
16-Apr	high	0	---	---	---	---	---	---	0.0
17-Apr	high	1.6	0	0	1	0	0	4.5	1.6
18-Apr	low								
19-Apr	low	3	0	8.9	5.4	0	33.3	0	3.7
20-Apr	high								
21-Apr	high	5.3	0.0	3.3	5.3	0.0	33.3	0.0	5.0
22-Apr	low								
23-Apr	low	2.9	0	2.9	5.9	0	0	0	2.9
24-Apr	high	1.7	0	2	0	0	0	---	1.5
25-Apr	high	6.6	0	2.3	1	13.6	16.7	0	6.0
26-Apr	low	6.3	0	5.3	2.5	0	0	---	5.9
27-Apr	low	5.7	0	8.3	17.6	0	12.5	---	6.1

PRELIMINARY VBS FISH CONDITION EVALUATION RESULTS

Release date	Release location	Number released	Number detected*	Number recaptured	Number descaled	Number mortality	Percent descaling	Percent mortality	Percent recaptured
25-Apr	2A	200	184	137	0	0	0	0	69
	3A	195	183	153	3	1	2	0.7	78
	4A	153	142	112	1	2	0.9	1.8	73

*detected by at least one PIT tag detector in McNary system (exited gateway)

**TECHNICAL MANAGEMENT TEAM
MEETING NOTES
April 28, 2004
CORPS OF ENGINEERS NORTHWESTERN DIVISION OFFICES – CUSTOM HOUSE
PORTLAND, OREGON**

FACILITATOR'S SUMMARY NOTES ON FUTURE ACTIONS

Facilitator: Donna Silverberg

The following notes are a summary of issues that are intended to point out future actions or issues that may need further discussion at upcoming meetings. These notes are not intended to be the “record” of the meeting, only a reminder for TMT members.

Status of Hanford Reach:

Chris Carlson, Grant County PUD, reported on the weekly average flows at Hanford Reach for April 19-25th. Operations went outside the flow band on the 19th, but improved later in the week. Chris reported reaching 852 temperature units at the end of last week. The end of emergence has not yet occurred. Chris will continue to update TMT at subsequent meetings.

Mid-Columbia Flow Objectives:

The salmon managers requested that current flows be maintained this week until the next water supply forecast is out (the May early bird is due out tomorrow 4/29) and increases in steelhead numbers are observed. The COE will run a QAdjust using the April final forecast. BPA needs 1-2 days to make operational changes during the week, and 2-3 for weekend operational changes.

McNary Operations Outside 1%:

As promised at the last TMT, the salmon managers provided a joint letter to the COE with comments on the COE's monitoring plan and BPA's proposal to lift the 1% constraint at McNary. The salmon managers found that the monitoring plan was limited in scope and suggested that additional monitoring be done on turbine mortality, descaling, delayed mortality and other areas (for a complete list see the 4/27 letter). Mark Smith, Walla Walla COE, provided some information on descaling monitoring underway at McNary. A handout was provided and can be found on the TMT web as a link to today's agenda. Nothing ‘out of the ordinary’ has been observed as of yet. This information can be found on the Fish Passage Center website.

Bonneville Nighttime Spill to TDG Limit:

Laura Hamilton, COE, described operations at Bonneville over the previous two weeks: 75 kcfs spill for 24-hr period from 4/16-21st; went to nighttime gas cap spill 4/21-28th (spill ranged from 100-125 kcfs during this time period). The COE found that 125 kcfs was too high, 100 kcfs was too low, and 110 kcfs went just over the TDG cap. NOAA said that, because it is nearing the end of chum emergence and start of juvenile migration, and because conservation was built into the TDG cap, it is acceptable to be close to the cap (even if slightly over). Chum emergence is expected to be complete around May 3rd.

ACTION: The salmon managers will discuss this issue during an FPAC meeting on May 4th, then will send an email to the COE by 11 am (including Laura Hamilton and Jim Adams) with biological information and recommended operations for next week.

ACTION: The COE will spill to 11.5' depth compensation for chum redds through May 3rd. If the COE does not hear from the salmon managers by noon on May 4th, they will plan to switch operations to "up to the gas cap" on the eve of May 4th.

Water Management Plan Spring/Summer Update:

Scott Boyd, COE, requested that TMT members provide any comments to the spring/summer update by May 5th so that it can be finalized by May 12th. A draft was provided to TMT members today and is linked to today's agenda on the TMT web page. The action agencies requested that TMT members look particularly at the research section and help fill in any gaps. Contact Scott Boyd (COE) or Nic Lane (BPA) with additional information. A suggestion was made to include just the specifics of the operation of the Hanford Reach agreement and link the rest of the agreement to the web. Also, a suggestion was made for TMT to review the specifics so that everyone understands the operation. Sturgeon pulse operations are still being negotiated for this year. Dave Wills, USFWS, will provide an update on this as it becomes available.

ACTION: TMT members will provide comments to the COE by May 5th for inclusion in the May 12th draft.

Lower Monumental Study Design:

Mark Smith, COE, reported that the COE had coordinated with SRWG and NOAA on the study design at Lower Monumental. As a result, nighttime spill was implemented from 6pm-6am, and is scheduled to end on April 30th, followed by survival studies (of radio-tagged fish) of 24-hour bulk spill for 15 days and then no spill for 15 days. Some issues have been identified with bulk spill and fish barge loading – the COE is doing tests to find a solution for this.

SOR 2004-6:

The salmon managers presented an SOR which recommended that Snake River spill continue at Lower Granite and Little Goose until steelhead are predominant in fish collection numbers. Steelhead numbers have not yet predominated chinook numbers for three days. Some salmon managers wished to re-open the discussion because of the new steelhead information. However, the COE responded to the specifications in the SOR: Spill at the Lower Snake projects ended on April 23rd after a COE decision based on regional input at TMT and IT, and a desire to balance power and fish needs in the region. To the second specification, it was unclear to the COE what was meant by "improvement" to flow conditions. To the third specification: BiOp spill at Ice Harbor will continue as per written in the BiOp. The official COE response/decision about spill was circulated last week and put on the TMT web page. The COE does not plan to change that decision.

SOR 2004 C-01:

Kyle Martin, CRITFC, presented an SOR for a spring treaty fishery to start next week (Tuesday May 4th at 6am through Thursday May 6th at 6pm). The request included: Operate Bonneville pool within 1' from full (76.5-75.5'), the Dalles pool within 1' (159.5-158.5'), and John Day

within 1' (264.5-263.5'), to allow for a treaty fishery of adult spring chinook. Kyle noted that this may be the only SOR for spring treaty fishing this year.

The COE is working to operate within 1' from full at the BON pool as a soft constraint, with a hard constraint of 1.5'. The minimum tailwater at The Dalles will work well with the request, which will be operated within 1' as a soft constraint. John Day will continue to operate at 1.5' from full as a hard constraint per the BiOp. Kyle Martin will report the results to TMT after the fishery.

System Status:

Reservoirs: Grand Coulee is at elevation 1268.8'. Hungry Horse is at 3531' and filling a little over .5' a day. Libby is at 2408', filling, and releasing 4 kcfs/day. The COE is anticipating an operation request for sturgeon pulse. Libby remains close to filling by June 30.

ACTION: The COE will do QAdjust runs for operations after June 30 at Libby and provide them at the next TMT meeting.

Dworshak is at elevation 1558', releasing 6 kcfs/day weekdays and 5.2 kcfs/day weekends. The COE will continue a 6.6 kcfs/day average release through this week, and plans to reduce outflows to just over 4 kcfs/day average to conserve water for later in the season.

Fish status: Paul Wagner, NOAA, reported on current fish status. Yearling chinook numbers increased substantially at Lower Granite and Little Goose on April 25th. Lower Monumental saw a slight increase in numbers. Steelhead numbers at Lower Granite went from ~58,000 on April 25th to ~221,000 on April 28th. Little Goose saw a slight increase in steelhead numbers over the week. Timing for spring chinook and steelhead migration on the Lower Snake is similar to previous years. The Mid-Columbia numbers are slightly lower at this time. There have been lower adult counts at Bonneville now than in 2002, but it was noted that this could be a late run year similar to 2002.

Power system: The system is running to meet load.

TMT Guidelines:

The TMT guidelines were last updated in May 2003 during a special TMT process meeting at which some changes to the guidelines were made, but they were never finalized. The latest draft was distributed to TMT today (and posted on the TMT web page). TMT members were asked to review the guidelines and share any suggested changes with the facilitation team prior to the May 12th TMT meeting for finalization at that meeting. Particularly, members are asked to look at the updated member list and provide any additional names that might be missing from the list. The TMT guidelines, when finalized, will be posted on the web page.

ACTION: TMT will review the guidelines and advise the final changes by May 7th.

TMT Meeting Schedule:

A conference call will be held on **Wednesday, May 5th at 9:00am**. Agenda items include:

- Priest Rapids Flows
- Spill at Bonneville
- ESP Runs – COE

TMT will have another conference call on **Wednesday, May 12th from 9-10am**. Agenda items include:

- Final WMP Spring/Summer Update
- TMT Guidelines
- Mid-Columbia Flows

The next face-to-face TMT meeting will be held on **Wednesday, May 26th, from 9am-noon**. An agenda will be circulated and posted on the TMT web page prior to the meeting.

1. Greeting and Introductions

The April 28 Technical Management Team meeting was chaired by Cindy Henriksen of the Corps and facilitated by Donna Silverberg. The following is a distillation, not a verbatim transcript, of items discussed at the meeting and actions taken. Anyone with questions or comments about these minutes should call Henriksen at 503/808-3945.

2. Hanford Reach Update.

Chris Carlson said that, for the week ending April 25, the Priest Rapids flow band ranged between 30 and 40 Kcfs; daily average flows ranged between 104.7 Kcfs and 149.1 Kcfs, and the weekly average was 117.9 Kcfs. The flow bands were significantly exceeded on only one day: April 19, when the daily variation in flows was 103.8 Kcfs, more than triple the 30 Kcfs flow band in place that day. The high flows resulted from what was happening the week before, including the Chief Joseph flow estimates and side flows that made flow calibration difficult; the rest of the week was better, he said. We still have not seen the end of chum emergence, Carlson said; we were at 852 temperature units from the end of spawning by the end of the week.

3. Mid-Columbia Flow Objectives.

David Wills said the salmon managers discussed this issue yesterday; we would like to maintain the current 110 Kcfs average flow a little longer, until we see higher steelhead numbers and have a chance to look at the next water supply forecast, he said. The group briefly discussed pre-scheduling and the timeline for making changes to the Mid-Columbia operation.

4. Salmon Managers' Response to McNary 1% Monitoring Plan.

Wills said the salmon managers had reviewed the monitoring plan for the proposed McNary 1% operation, although the understanding is that McNary will not be operated outside 1% this year, with the exception of the four test units. The bottom line is that the salmon managers did not feel that the monitoring plan had the breadth or scope necessary to monitor the effects of operating the project outside 1%, Wills said; if this concept is put forward in the future, there are a number of specific areas within the monitoring plan where improvement is needed. Wills distributed a joint technical letter from USFWS, IDFG, ODFW, USFWS and WDFW, dated April 27, which lays out the salmon managers' recommendations. This document is available via hotlink from today's agenda on the TMT homepage.

Henriksen distributed a summary of the percent descaling at McNary Dam for the period April 1-April 27. Mark Smith noted that, since the McNary modernization study began on April

16, descaling has ranged between 1.5% and 6.1%. We're keeping a very close eye on this, said Smith; what we're seeing so far doesn't seem to be out of the ordinary, based on results from past years. In terms of descaling results at the facility and for the direct PIT-tag releases, the results seem OK so far, although the smolt monitoring personnel are noting some fish in what they characterize as poor condition, Smith said. The bottom line is that, to date, we're not seeing anything out of the norm, said Smith. The descaling summary, again, is available via hotlink from today's agenda on the TMT homepage. Margaret Filardo noted that the descaling summary is updated daily on the Fish Passage center homepage.

5. Nighttime Spill to TDG Limit at Bonneville.

Laura Hamilton said spill at 50 Kcfs started as requested in SOR 2004-4 on April 12. On April 16, spill at Bonneville was increased to 75 Kcfs, 24 hours per day. We continued spilling 75 Kcfs 24 hours a day until April 21, she said, at which point a table of flow and TDG values was used to determine nighttime spill levels up to the gas cap. With nighttime flow levels in the 180-200 Kcfs range, said Hamilton, we were spilling 125 Kcfs during nighttime hours. She noted that there were some problems with hitting the gas cap; some nights spill and TDG levels were somewhat too high, and some nights they were too low; nighttime spill during the period April 25-present have ranged between 100 Kcfs and 110 Kcfs. At 110 Kcfs, Hamilton said, we're seeing highest 12-hour-average TDG of 115.9%, somewhat higher than expected; over 24 hours, however, average TDG is closer to 115%, so we're in the ballpark.

After a brief discussion, it was noted that chum emergence is now winding down; May 3 is the tentative date by which chum emergence is expected to be complete, although Ron Boyce said that, given the fact that chinook emergence is still in full swing, in his opinion, the current operation should continue for at least the next two weeks. It was agreed that FPAC will discuss this issue at its meeting next Tuesday, May 4, and will develop a recommendation on continued spill at Bonneville. This recommendation will be communicated either via email or at a TMT conference call next Wednesday.

To clarify, then, the current Bonneville operation will continue at least through Monday night, May 3, said Henriksen; we will plan to possibly shift the operation by the evening of May 5, based on what the salmon managers recommend.

6. Spring/Summer Update.

Scott Boyd said a new draft of the spring/summer update is now available; he went briefly through some of the new content included in the draft. He said that, ideally, he would like to finalize this document within two weeks; this is the last chance to provide comments on this document, preferably by May 5, so that the TMT can discuss them. Boyd noted that the primary change was his insertion of April final water supply forecast data into the document.

In response to a request from Boyd, Wills said that the current discussion of the 2004 sturgeon pulse operation continues; it is a work in progress at this point, mainly because they're struggling with the changing water supply forecast.

7. Lower Monumental Study Design.

Boyd said his understanding is that Lower Monumental will continue spilling at night, beginning at 6 p.m., until April 30; then the spill test will begin, using the bulk spill pattern, 24 hours a day, starting on Friday. We're still working through some problems with barge loading caused by the bulk spill pattern, Boyd said; under the new pattern, even 20 Kcfs may be too high while barge loading is going on. We're looking at 14 days of bulk spill up front, followed by 14 days of no spill, added Mark Smith, although 15 days is still under discussion.

8. SOR 2004-6.

On April 22, the action agencies received SOR 2004-6. This SOR, supported by USFWS, IDFG, WDFW, CRITFC, the NPT and ODFW, requests the following specific operations:

- Continue Snake River spill at Lower Granite and Little Goose Dam transport collector projects until steelhead predominate in fish collection numbers at Lower Granite Dam for at least three consecutive days. A similar request would be made for Lower Monumental; however 15 days of spill will be implemented during early May for a spill study, which will provide protection for this early portion of the juvenile migrants.
- If flow conditions improve later this season, a request to continue spill at the transport collector projects will be considered to provide a spread-the-risk management approach
- Biological Opinion spill for fish passage at Ice Harbor Dam is to continue through the spring and summer migration periods.

Wills provided an overview of this SOR, which is available via hot-link from today's agenda on the TMT homepage. Please refer to this document for full details and justification.

Wills noted that, since the SOR was submitted in response to the discussion at last week's TMT meeting, in the last two days, steelhead have begun to predominate in the collection facility at Lower Granite; it was noted that spill at Little Goose and Lower Granite actually stopped at 6 a.m. on April 23, as per the discussion at the April 21 TMT meeting. Henriksen noted that the decision that was made, after considerable discussion at TMT and IT, was an attempt to balance competing regional fish and financial needs.

With respect to the second bullet of the SOR, Wills clarified that this was based on the hope that flows would improve; it was not intended for implementation after steelhead begin to predominate at Lower Granite. We mainly wanted to get some closure, in the form of a formal response to this SOR, on our request, said Boyce. He noted that steelhead numbers, while increasing, have not yet predominated for three consecutive days. He requested additional discussion of this point at TMT. Henriksen said the response the Corps attached to last week's TMT meeting is the Corps' formal response to the salmon managers' request. That document is also available via hotlink from the April 21 TMT agenda. Boyce requested a formal action agency response to SOR 2004-6. Henriksen replied that the previously-referenced Corps document responds to the first bullet; the second bullet, which references only "improving" conditions, is somewhat nebulous, and with respect to the third bullet, spill continues at Ice Harbor.

Margaret Filardo clarified that the IT decision on SOR 2004-3 was based on historical steelhead passage information; the salmon managers' point is that steelhead passage numbers had not begun to predominate in 2004 by the date specified for the end of spill. However, her understanding, based on the Corps' response, is that because of low Snake River flows in 2004, the Corps' decision was irrevocable, no matter what the fish passage data said.

9. SOR 2004-C1.

On April 27, the action agencies received SOR 2004-C1. This SOR, supported by CRITFC, requests the following specific operations:

- Implement the following operations as a hard constraint:
- May 4, 6 a.m., through 6 p.m. May 6: operate Bonneville Pool within 1.0 foot of full pool (msl elevation 76.5-75.5); operate The Dalles (Celilo) Pool within 1.0 foot of full pool (msl elevation 159.5-158.5); operate John Day pool within 1.0 foot (msl elevation 264.5-263.5).

Martin provided an overview of the SOR, which is in support of the spring treaty fishery. The full text of the SOR is available via hotlink from today's agenda on the TMT homepage; please refer to this document for additional details.

After a brief discussion, Henriksen said the Corps always tries to keep Bonneville pool as steady as possible at this time of year. She said the Corps is trying to get this set up for next week, with a soft constraint in place at 76.5-75.5 feet. John Day pool is operating within a two-foot range, and The Dalles is operating generally in a 1.5-foot range. In general, she said, conditions look positive for implementing the tribal request. Anything the corps and Bonneville can do will be greatly appreciated, Martin said. The group briefly discussed the current outlook for the 2004 adult chinook run, and how that compares with the pre-season run estimate; it was noted that it now appears that the run will be somewhat smaller than originally estimated. The group also discussed how harvest allocations are developed.

10. Status of Operations.

Norris reported that Grand Coulee was at elevation 1268.8 feet this morning, with inflows in the 90 Kcfs range. Hungry Horse is now at 3531 feet, with inflows on the rise, driven by recent warm weather in the area. In response to a question, Norris said the Columbia Falls minimum flow is 3.5 Kcfs, and the current Columbia Falls flow is in excess of 15 Kcfs. Chris Ross noted that there appears to be some excess volume at Hungry Horse, and asked when it will be coming out. Some time in June, when we get closer to full at that project, Norris replied. Henriksen said Libby is currently at elevation 2408 and filling; inflows to that project are increasing, and it is releasing 4 Kcfs. The April-August water supply forecast at Libby is still 5.3 MAF, she said, which still puts us in the Tier 1 sturgeon flow range in 2004. Henriksen said that, even factoring in the anticipated sturgeon pulse, Libby is on the cusp of June 30 refill. Any idea what the projected July-August flow from Libby will be? Wagner asked. Somewhere between 7 Kcfs and 25 Kcfs, Henriksen replied; the default operation is a 20-foot draft by August 31. The bull trout minimum flow is 7 Kcfs, Henriksen noted; that would kick in once the sturgeon operation is complete and before salmon augmentation flows begin in July. As always, we will try to avoid a double peak at that project.

Moving on to Dworshak, Henriksen said the current elevation is nearing 1558 feet; outflow is 6.6 Kcfs weekdays and 5.2 Kcfs weekends. The 6.6 Kcfs average outflow will continue at least through this week; Dworshak is filling somewhat. She noted that, based on the April mid-month water supply forecast of 2 MAF (April-July), the expected flow augmentation volume at Dworshak has fallen from 419 kaf to 250 kaf, compared to the volume forecast based on the April final WSF. Based on that fact, we will probably be reducing outflow at Dworshak to about 4 Kcfs starting next week, she said. Henriksen

added that the Corps will develop some additional flow augmentation volume estimates for Dworshak based on the lower STP forecast.

Moving on to current fish passage information, Wagner said yearling chinook index numbers have increased dramatically at Lower Granite in the past few days, in part due to the cessation of spill at that project. Little Goose shows a similar trend. At McNary, numbers are also increasing; the index numbers are holding steady at John Day and Bonneville. Steelhead numbers have also increased dramatically at Lower Granite, where the majority of the run is collected, Wagner noted; at the Lower Columbia projects, early index numbers remain fairly low, but are tracking with pre-season run timing estimates, based on the past 10 years of data. He added that water temperatures at Lower Granite have begun to climb, and are currently at the 105-11-degree C range in the Lower Granite tailrace. Temperatures will likely continue to climb toward their summer peak, Wagner said. With respect to adult passage counts, Wagner noted that adult chinook counts peaked earlier in April at Bonneville, and have since receded; however, in 2002, at least, a similar early-season pattern was seen, followed by a dramatic increase in adult passage during May. The chinook run to date at Bonneville is just under 100,000 fish, lower than the counts for by this date for 2000, 2001 or 2003. We're in the high drama of waiting for the fish, Wagner said.

John Wellschlager said the power system continues to run to meet load; there are no significant problems to report at this time.

11. TMT Guidelines.

Silverberg noted that the TMT guidelines available on-line are the 2001 guidelines; it was discovered that, while there was some discussion of the guidelines at TMT last year, the group never finalized the May 2003 draft guidelines. We don't have to finalize these today, Silverberg said, but I would ask the TMT membership to review the May 2003 draft guidelines and come to next week's meeting prepared to finalize them. If you see anything that needs to be changed, she said, please let me know prior to next Wednesday. That way, she said, we can get the correct version of the guidelines up on the website.

12. Next TMT Meeting Date.

The next Technical Management Team meeting was set for Wednesday, May 5, a conference call to check in on Priest Rapids flows and spill at Bonneville.

TMT Attendance List April 28, 2004

Name	Affiliation
Cindy Henriksen	COE
Tony Norris	USBR

Steve HAeseker	USFWS
David Wills	USFWS
Kyle Martin	CRITFC
Bruce MacKay	Consultant
Ruth Burris	PGE
Tom Haymaker	PNGC
Tim Heizenrater	PPM
Scott Boyd	COE
Donna Silverberg	Facilitation Team
Robin Harkless	Facilitation Team
Mary Karen Scullion	COE
Kevin Nordt	PGE
Paul Wagner	NOAAF
Chris Ross	NOAAF
Russ George	WMCI
Nic Lane	BPA
John Wellschlager	BPA
Mike O'Bryant	CBB
Laura Hamilton	COE
Tina Lundell	COE
Russ Kiefer	IDFG
Ron Boyce	ODFW
Chris Carlson	GCPUD
Jiong Ji	Avista Energy
Bruce Suzumoto	NPCC
Ken Pinnacle	PSE
Lee Corum	PNUCC
Denny Rohr	D. Rohr & Associates
Dave Ryan	PPM
Mike Buchko	Powerex

Mark Smith	COE
Amy Reece	COE

TECHNICAL MANAGEMENT TEAM

BOR: Tony Norris / John Roache

BPA: Scott Bettin / John Wellschlager

NMFS: Paul Wagner / Chris Ross

USFWS: David Wills / Howard Schaller

OR: Ron Boyce

WA: Cindy LeFleur

ID: Russ Kiefer

MT: Jim Litchfield

COE: Cindy Henriksen / Rudd Turner / Cathy Hlebechuk

TMT CONFERENCE CALL

Wednesday 05 May 2004 0900 - 1200 hours

**Custom House Room 118
Portland, Oregon
Conference call line: 503-808-5190**

*All members are encouraged to call Donna Silverberg with any issues or concerns they would like to see addressed.
Please e-mail her at dsilverberg@cnnm.net or call her at (503) 248-4703.*

AGENDA

1. Welcome and introductions.
2. Status of Hanford Reach (Chris Carlson, Grant PUD).
3. Priest Rapids flow objectives.

[\[Summary of May 2004 QADJ Model Runs \]](#)  [\[QADJ PRD Detail \]](#)  [\[ESP Model Results \]](#)  [\[SOR #2004-7 \]](#) 

4. Bonneville spill update.
5. McNary modernization study update. [\[Status of McNary Modernization Studies at McNary Dam as of April 29, 2004 \]](#) 
6. Status of Operation
 - a. Reservoirs
 - i. [Dworshak](#) 
 - ii. [Hungry Horse](#) 
 - iii. [Libby](#) 
 - iv. [Lower Granite - ESP](#) 
 - b. Fish
 - c. Power System
 - d. Water Quality
- [\[Average percent TDG for 12 highest hours - May 2004 \]](#)
7. WMP spring/summer update comments.
8. Other
 - a. Set agenda for next meeting

Questions about the meeting may be referred to Cindy Henriksen at (503) 808-3945, or Rudd Turner at (503) 808-3935, or Cathy Hlebechuk at (503) 808-3942

QADJ STUDY
5-May-04

PRIEST RAPDS
REGULATED FLOW - cfs

CENPD-ET-WP
05/03/04

		JUNE ADJ		season avg		seas avg, adj for	
MAY	JUN	FOR BANKS L	YEAR	4/10-6/30	banks lake		
134994	138672	122672	29-29	128378	122524		
134944	103785	87785	30-30	115595	109742		
135087	136946	120946	31-31	127781	121928		
134920	159040	143040	32-32	135801	129948		
134932	120800	104800	33-33	121816	115962		
150327	160137	144137	34-34	142027	136174		
135037	129324	113324	35-35	124974	119120		
145227	169323	153323	36-36	143460	137606		
134989	144377	128377	37-37	130463	124609		
134938	166719	150719	38-38	138618	132764		
136762	141891	125891	39-39	130224	124370		
135785	149709	133709	40-40	132715	126861		
135018	131156	115156	41-41	125637	119783		
135019	124507	108507	42-42	123205	117351		
134984	116983	100983	43-43	120439	114585		
134939	136386	120386	44-44	127521	121667		
135026	173168	157168	45-45	141010	135157		
137247	160009	144009	46-46	137036	131182		
145598	152019	136019	47-47	137270	131416		
135049	172535	156535	48-48	140787	134934		
171018	156103	140103	49-49	148374	142520		
138285	114703	98703	50-50	120853	114999		
136279	146881	130881	51-51	131867	126013		
150642	145633	129633	52-52	136840	130986		
140598	132485	116485	53-53	128233	122379		
135051	109661	93661	54-54	117786	111932		
135086	100711	84711	55-55	114524	108671		
142862	168235	152235	56-56	142168	136314		
171048	164105	148105	57-57	151313	145459		
161539	165754	149754	58-58	148321	142467		
135017	143446	127446	59-59	130133	124279		
143071	129861	113861	60-60	128208	122354		
134953	187909	171909	61-61	146376	140522		
134968	138459	122459	62-62	128290	122436		
134949	129428	113428	63-63	124979	119125		
134914	131971	115971	64-64	125896	120042		
135022	152420	136420	65-65	133418	127564		
134945	128070	112070	66-66	124480	118627		
134989	156940	140940	67-67	135059	129206		
140625	113671	97671	68-68	121360	115506		
154784	158432	142432	69-69	143089	137235		
135049	175438	159438	70-70	141850	135996		
136787	161966	145966	71-71	137578	131724		
134909	136167	120167	72-72	127429	121575		
135058	148295	132295	73-73	131923	126069		
136377	142107	126107	74-74	130157	124304		
136875	150034	134034	75-75	133246	127392		
135017	111720	95720	76-76	118526	112672		
134958	126254	110254	77-77	123821	117967		
134986	146356	130356	78-78	131186	125332		
162540	150316	134316	79-79	143051	137198		
160730	167211	151211	80-80	148548	142695		
135866	133730	117730	81-81	126899	121046		
135046	147058	131058	82-82	131465	125612		
136596	133136	117136	83-83	126958	121104		
143076	129226	113226	84-84	127977	122124		
158259	176534	160534	85-85	151025	145171		
134953	162806	146806	86-86	137192	131338		
169763	147720	131720	87-87	144832	138979		
140649	144210	128211		132542	126688	AVG	
135051	144377	128377		130486	124633	MEDIAN	

Status of McNary Modernization Studies at McNary Dam as of April 29, 2004

Problem

Mark Smith was at McNary Dam on the 29th (Thursday) and noticed dead fish in gatewells of unit 2. Dave Hurson, Brad Eby (Project Biologist), Rosanna Tudor and Rod Woodin (Washington Department of Fish and Wildlife) confirmed what was being seen. We also saw fish being “pinched” on the traveling VBS (test screen) in the A slot of unit 4. WDFW reported that facility sampling that morning estimated fish descaling about 14%, and mortality was 2.5%. Both of these metrics are consider above any “normal” range. At this time, unit 2, 3, 4 and 5 were operating at maximum discharge for McNary Modernization biological testing. Discussions with the Project Biologist led to an immediate lowering of test units to within the 1% operating limit. This decision was made because the operation at maximum discharge was a significantly different action from the previous day, which had a lower estimate of fish descaling. The MCN Moderization study for gatewell fish condition has been temporally postponed while we investigate descaling conditions at the facility. Testing was stopped as a first measure (as coordinated in the study plan) while other possible causes are investigated.

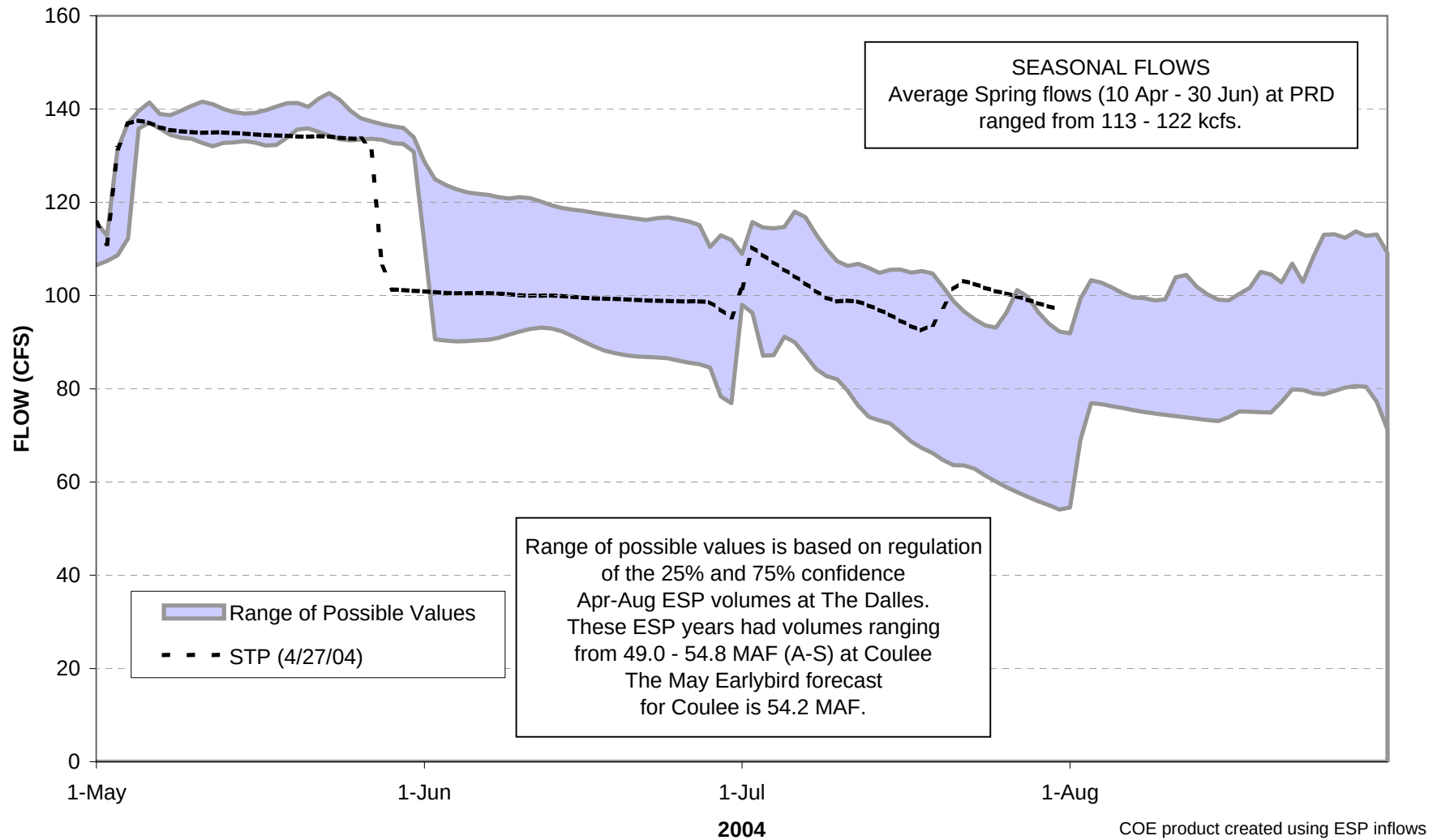
Immediate Action Taken

All turbine units are running within the 1% operations limits. Project staff is determining the need for cleaning debris off trashracks, inspecting gatewells and Vertical Barrier Screen and cleaning screens if required, and inspecting the fish collection facility. District Staff is investigating methods to modify the traveling VBS to reduce potential for fish pinching as observed on the 29th. Coordination with regional fish managers is on-going.

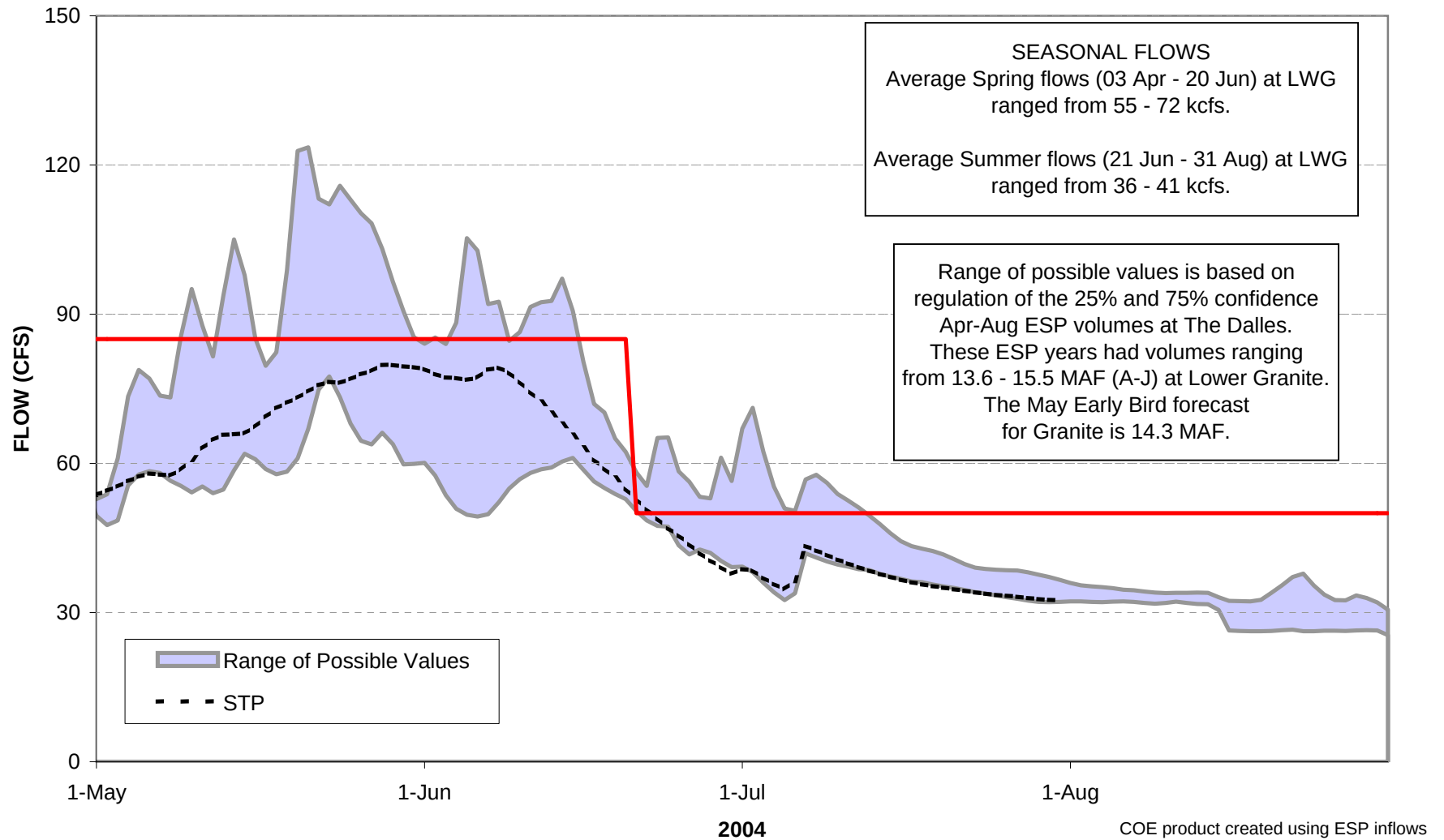
Recommended Further Action:

Continue operation of all units within 1% limits until 0500, Saturday, May 8th. Smolt monitoring will examine fish passing the facility during this operation on May 1st, May 3rd, May 5th, and May 7th. Smolt monitoring can only be conducted every other day at McNary this year due to study design for the transportation study. From 0500, May 8th to 0500 May 10th, Units 2,3,4 and 5 will be operated at Maximum discharge. Along with normal facility collection, releases of PIT tagged fish will be made in the test units. Examination of fish sampled during this period will occur on the morning of May 9th. If descaling and mortality are similar among these samples, we will recommend continuation of the MCN Modernization studies as designed. If descaling estimates are higher on the 10th than the previous two sampling days, we will consult with regional fish managers regarding continuation/modification of the study design.

FORECASTED PRIEST RAPIDS FLOWS



FORECASTED LOWER GRANITE FLOWS



**TECHNICAL MANAGEMENT TEAM
MEETING NOTES
May 5, 2004
CORPS OF ENGINEERS NORTHWESTERN DIVISION OFFICES – CUSTOM
HOUSE
PORTLAND, OREGON**

FACILITATOR’S SUMMARY NOTES ON FUTURE ACTIONS

Facilitator: Donna Silverberg

The following notes are a summary of issues that are intended to point out future actions or issues that may need further discussion at upcoming meetings. These notes are not intended to be the “record” of the meeting, only a reminder for TMT members.

Status of Hanford Reach:

Chris Carlson, Grant County PUD, reported on the weekly average flows at Hanford Reach for April 26th- May 2nd. Operations stayed within the flow band on all days except slightly outside on May 26th and 28th. 919 temperature units were reached at the end of last week. Emergence is expected to end around May 10th, at which point the PUD will begin operating to 400 temperature units, expected to be reached a month later. Chris will continue to update TMT at subsequent meetings.

ACTION: Cindy LeFleur, Washington, will share information about a WDFW monitoring project at Priest Rapids at a future TMT meeting.

Priest Rapids Flow Objective:

The COE ran a QAdjust model using the May early bird water supply forecast, which was slightly lower than the April final. The run projected May flows of 140.6 kcfs and June flows of 128.2 kcfs at Priest Rapids. Lower Granite was modeled at 85 kcfs. A question was raised about what average flow could be met 100% of the time in the model – the COE reported that the lowest flow during the 59-year period in the model was 84 kcfs.

The COE also ran a new model, “ESP”, which showed Priest Rapids flows ranging from 113-122 kcfs. The COE noted that there is a good deal of uncertainty with the models, and yet they still provide some idea of what might happen. The COE requested feedback from the TMT on the ESP model. The salmon managers said the model is very helpful and would like to see it continued to be used. The COE will produce this model, which is labor-intensive, every two weeks.

ACTION: TMT members will provide the COE with specific requests for input to the new ESP model, prior to the May 26th TMT meeting. Paul Wagner suggested the model be run for Grand Coulee.

SOR 2004-7: Dave Wills, USFWS, said the objective of SOR 2004-7 is to maintain steady flows at Priest Rapids during May and June. The salmon managers requested that: flows increase at Grand Coulee to provide a day average flow of 120 kcfs at Priest Rapids by this Friday, May 7th. Then, increase flows at Grand Coulee to meet 135 kcfs at

Priest Rapids on May 10th, and maintain until further notice while monitoring the water supply forecast. Also, minimize fluctuations at Priest Rapids. This SOR was put forth in an effort to support steelhead and fall chinook migrations.

ACTION: The action agencies will implement the SOR, starting with a ramp-up at Grand Coulee to meet 120 kcfs at Priest Rapids by May 7th. The COE recommended that TMT members continue to monitor the water supply and fish numbers, and consider both when making operational decisions.

Lower Granite Mortalities:

The Walla Walla COE reported that mortalities at Lower Granite increased from a typical .04-1.5% to just under 2% yesterday, May 4th. The COE is investigating the reason for this, and at this point think it is likely due to a blocked orifice (from debris) at the project. A unit was down for awhile at the project, but the operators did not feel this was the cause of increased mortalities as the timing of the two occurrences did not match up. The operation stayed within 1% efficiency. The salmon managers were asked what their preferred operation would be in the event that units go out of service at Lower Granite – operate outside MOP or spill? Paul Wagner, NOAA, said that if too many fish are collected and units are down, operate outside MOP (as stated in the Fish Passage Plan, FPP); then, if needed, spill. Other salmon managers offered that if there are too many collected fish, spill and collect them at Little Goose. Dave Wills, USFWS, clarified that the salmon managers are concerned with the FPP recommendations on barging and spill, and expect to provide a different view in the plan regarding operations for early migration in the future.

ACTION: Project operators at Lower Granite will continue to monitor the project, and do not expect any more outages. If more fish are collected than can be transported, fish will go through the bypass system.

ACTION: If spill is needed, TMT will be convened to discuss the issue. TMT members will check on the position of their respective executives regarding spill during emergency situations such as the one described above.

***UPDATE:** The following is an excerpt of an email message from Rudd Turner, COE, to the TMT sent on Thursday, May 6th: “Actual operation: LWG biological staff informed the control room that raceway 9 was beginning to fill at 1500 hours Wednesday May 5 and RSW spill began at 1510 hours, continuing until 0600 hours today, Thursday May 6. A spill level of 100 kcfs was provided at Bonneville last night and early today, during the regular nighttime spill hours.”

Bonneville Spill Update:

Jim Adams, COE, reported that some TDG exceedances occurred at Bonneville this week. The salmon managers requested (via email to the COE) that chum protection operations continue through May 6th, and that gas cap operations start on May 7th, to coincide with increased flows at Grand Coulee. It appears that the chum emergence is near if not over. The salmon manager request will be implemented.

McNary Modernization Study Update:

Mark Smith, COE, provided a status summary of the McNary modernization study. His report can be found as a link to today’s TMT agenda. The test units were reduced to within 1% due to increased mortality at the project. The test will begin again over the upcoming weekend, the design of which will be discussed with the salmon managers

during a conference call later today (5/5). The COE will continue to monitor and coordinate with the region on this study.

Status of Operations:

Reservoir operations: As of yesterday, Bonneville flows were at 222 kcfs on 5/4, with 115 kcfs spill. McNary inflows were 206.9 kcfs and Lower Granite inflows increased to 70.4 kcfs. Dworshak was at elevation 1564.9' and releasing 5 kcfs/day, with 15 kcfs/day in. Libby was at elevation 2413.2' and releasing 4 kcfs, with 2.3 kcfs in. Albeni Falls was at elevation 2056.4'. Hungry Horse was at 3537' and filling 1'/day. Grand Coulee was at 1270.7' and filling.

The water supply forecast is showing a continual decline. The May early bird shows The Dalles at 76% of normal; Lower Granite at 66% of normal; and the COE May final forecast shows Dworshak at 78% of normal.

The USFWS is planning a sturgeon pulse operation at Libby that may look something like the following: beginning the last week in May, release 10-15 kcfs for one week; then ramp up to 15-18 kcfs and maintain for three weeks; followed by a gradual ramp-down for bull trout operations.

Fish status: 200,000+ juvenile spring chinook were observed at Lower Granite; numbers are picking up at McNary and John Day. 130,000 steelhead were seen; numbers are expected to increase in the next few days. Steelhead show a similar migrating trend to spring chinook. Overall, the timing of the juvenile runs is consistent with previous years. Adult numbers spiked over the last few days, with 125,000 counted to date. Paul Wagner described the adult run as 'above the 10-year average, below expectations'. Cindy LeFleur, WDFW, reported that the projection for the total adult run was reduced from 360,000 to 200,000 for this year.

The tribal fishery is expected to end tomorrow, May 6th. Kyle Martin, CRITFC, will update the group on the results of this year's spring fishery at a future TMT meeting.

Water quality: The COE reported some TDG exceedances at Ice Harbor, likely due to the bulk spill study at Lower Monumental. It was noted that the TMT agenda has a link to the average percent TDG for the 12 highest hours for anyone interested in getting more detail on this.

BPA requested that the spill priority list be changed to shift the focus to the Lower Columbia projects, by moving the Snake River projects to the bottom of the list.

ACTION: The COE will change the list to reflect what is written in the WMP. The salmon managers will send feedback on the updated list to the COE by Friday, May 7th. Rudd Turner, COE, will then send an email out to TMT with an update on the status of the list.

Water Management Plan Spring/Summer Update:

The COE would like to finalize the spring/summer update by next Wednesday, May 12th. CRITFC will provide comments early next week and the USFWS will provide information about sturgeon pulse operations.

TMT Meeting Schedule:

A conference call will be held on **Wednesday, May 12th from 9-10am**. Agenda items include:

- Final WMP Spring/Summer Update
- TMT Guidelines
- Mid-Columbia Flows
- May Final Water Supply Forecast

The next face-to-face TMT meeting will be held on **Wednesday, May 26th, from 9am-noon**. An agenda will be circulated and posted on the TMT web page prior to the meeting.

1. Greeting and Introductions

The May 5 Technical Management Team meeting was chaired by Rudd Turner of the Corps and facilitated by Donna Silverberg. The following is a distillation, not a verbatim transcript, of items discussed at the meeting and actions taken. Anyone with questions or comments about these minutes should call Turner at 503/808-3936.

2. Status of Hanford Reach.

For the week ending May 2, said Chris Carlson, weekly average flow at Priest Rapids was 110.2 Kcfs; the flow band ranged from 30 to 40 Kcfs. Day-average flows were within or very close to the flow bands every day, exceeded by no more than 5 Kcfs. As of May 2, said Carlson, we were at 919 temperature units since the end of spawning; the end of emergence has not yet occurred. Carlson added that the calculated minimum flow over the weekend was 100 Kcfs; that minimum flow was met on both Saturday and Sunday. Carlson added that he calculates that the end of emergence will occur on May 10, at which point the clock will start running on the 400 TUs until the flow restriction ends. It should take about a month to reach that threshold, given the slightly higher water temperatures we're seeing in 2004, Carlson said, adding that it now appears that WDFW is doing some biological monitoring in the Hanford Reach this year, using leftover funds from last year's contract. Cindy LeFleur said she will provide further information at next week's TMT meeting

3. Priest Rapids Flow Objectives/SOR 2004-7.

Turner provided an overview of recent Corps model runs, produced in response to a request at a previous TMT meeting. The first is a Q-adjust model run based on the May early-bird forecast, which has declined slightly from the April final forecast. It shows average Priest Rapids flows of 140.6 Kcfs and 128.2 Kcfs in May and June, respectively (adjusted for Banks Lake pumping). At Lower Granite, the new Q-adjust run shows average flows of 79 Kcfs and 69 Kcfs in May and June, respectively. At McNary, the

average flow in May and June is projected to be 205 Kcfs and 180 Kcfs, respectively (again adjusted for Banks Lake pumping). Mary Karen Scullion noted that these runs assume refill at Grand Coulee by June 30.

Why are these results different from what STP has been running? Paul Wagner asked. The STP has a lower volume, Julie Ammann replied. That's a good segue, said Turner; the second modeling handout is called "ESP Modeling Results." This shows a range of flows, as well as a comparison to the STP results, Ammann said. This shows we won't be able to hold 135 Kcfs at Priest Rapids for quite as long, Ammann said; however, it shows June flows in the same range as the STP results. She added that, based on an assumed runoff of 54.2 MAF at Grand Coulee, April 10-June 30 average flows at Priest Rapids Dam ranged from 113 Kcfs to 122 Kcfs. According to the ESP results, it will be possible to maintain the 135 Kcfs weekly average flow at Priest Rapids only through the first few days of June. And which of these forecasts do you have the most confidence in – QAdjust, STP or ESP? Wagner asked. Ammann replied that there is no way to know which is more accurate, at this point, although in her opinion, QAdjust and ESP are more accurate than STP.

Turner said any comments the TMT might have regarding the usefulness of the ESP information as a tool for managing flow would be helpful to the Corps.

On May 4, the action agencies received SOR 2004-7. This SOR, supported by USFWS, IDFG, ODFW, WDFW, NOAA Fisheries and CRITFC, requests the following specific operations:

- Increase flows at Grand Coulee Dam to provide a day-average flow of 120 Kcfs by Friday, May 7 at Priest Rapids Dam.
- Further increase flows at Grand Coulee on May 10 to provide a weekly average flow of 135 Kcfs at Priest Rapids.
- Weekly average flows should be maintained at 135 Kcfs after May 10 until further notice; the salmon managers will review the available water supply information on a weekly basis and make flow recommendations for Priest Rapids Dam accordingly.
- Reduce flow fluctuations at Priest Rapids Dam to the greatest extent possible.
- The goal of this operation is to provide relatively steady flows during the months of May and June. If the operators believe that this goal cannot be accomplished, a discussion of what flows are likely to be sustainable is required.

David Wills provided an overview of the SOR, the full text of which is available via hotlink from today's agenda on the TMT homepage. Please refer to this document for full details.

We were thinking you would make this call earlier in the week, said John Wellschlager; would it be OK to start these flows a little sooner? The sustainability of these flows in May and June is the issue, Paul Wagner replied – will that be a problem? Our perception is consistent with the Corps', in terms of what their models are showing, Wellschlager replied – that sustainability is within the bandwidth described in the STP and QAdjust model runs. Our concern is maintaining 135 Kcfs for as long as possible, Wills said. We understand that objective, Scott Bettin replied; we can't guarantee to nail

it every week. Under a worst-case scenario, we may not be able to hold 135 Kcfs at Priest Rapids through the end of the Hanford Reach rearing period, if, as Chris Carlson said, that should occur around June 10, Bettin said. After that, my understanding is that we will need to begin Grand Coulee refill, Tony Norris added.

Isn't May the most important month to maintain 135 Kcfs at Priest Rapids, in order to protect migrating steelhead? Wellschlager asked. That's correct, said Wills, but maintaining the 135 Kcfs target for as long as possible into June will benefit both steelhead and fall chinook. We understand that we're working with a reduced water year, said Wills, but we're trying to meet both needs here.

We're fine with waiting until May 10 to start the weekly average flow regime of 135 Kcfs, said Wellschlager; we could go to 120 Kcfs a day or two earlier, if that's OK with you. After a brief discussion, Wills said the salmon managers would not have a problem if BPA and the Corps want to begin this operation a day or two early. In response to a question, it was agreed that the weekly average flow is calculated on a Monday-Sunday basis; the 135 Kcfs weekly average operation at Priest Rapids will begin on May 10.

So we'll target an average flow of 120 Kcfs on Friday, said Turner – will flows then drop over the weekend? Weekend flows will be no less than 100 Kcfs, Norris replied. In response to a question, Turner said the action agencies will plan to implement the bullets in the SOR relating to flows at Priest Rapids, providing 120 Kcfs by Friday and averaging 135 Kcfs next week. We will provide the discharge from Grand Coulee needed to meet that target, he said, recognizing that juvenile passage is on the rise. However, he said, we would caution the TMT to bear in mind the water supply outlook in weighing biological priorities in May and June – we may have to reduce flows at some point. Understood, Wills replied – we're just as concerned as you are.

4. Bonneville Spill Update.

Jim Adams said the Corps has continued to operate Bonneville to spill up to the gas cap for any flows over 230 Kcfs, with spill of 110 Kcfs for flows between 180 Kcfs and 230 Kcfs. We started to see some exceedences last week, Adams said; that meant that spill was being dictated by the spill caps. The situation has now moderated, he said, and we are planning to increase nighttime spill at Bonneville beginning tonight, perhaps up to 130 Kcfs.

Turner noted that, at last week's TMT meeting, the Corps asked the salmon managers to develop an operational recommendation regarding the chum protection operation; they asked us to extend the chum protection operation through this Friday. Wills said ODFW believes that chum emergence is pretty much over; we felt holding the chum protection operation through the end of this week would be prudent. We then recommend that we start spilling up to the gas cap starting this weekend, given the increased flows from Grand Coulee, he said. And that's NOAA Fisheries' recommendation as well? Turner asked. Yes, Wagner replied. The Corps agreed to implement the operation as requested by the salmon managers. Beginning Friday morning, we'll go to 75 Kcfs spill during the day and up to the gas cap at night,

regardless of tailwater elevation, said Adams. With the understanding that, this weekend, we will have a 30 Kcfs powerhouse minimum at Bonneville, which may make it hard to spill up to the gas cap, Bettin noted.

5. McNary Modernization Study Update.

Turner directed the group's attention to the one-page written summary describing recent descaling and mortality problems at McNary Dam. On April 29, project personnel noticed dead fish in the gatewells of Unit 2; WDFW estimated descaling at 14% and mortality at 2.5%. We immediately ended the test and reduced unit loading to within 1%, he said; that operation has continued ever since. Smith noted that project personnel observed fish being "pinched" on the traveling VBS (test screen) in slot A of Unit 4. Descaling is now down to 5-6%, but mortality is still running 2.5%, said Smith. The plan is to continue normal inspections, then re-start the test at 5 a.m. this Saturday, May 8, again monitoring closely, Smith said, with four units operating outside 1%, although that may be reduced to two or three units. We'll keep you informed, Smith said.

6. Current System Status.

Turner said Bonneville hit 222 Kcfs yesterday, with 115 Kcfs spill. McNary's day-average flow was 206.9 Kcfs yesterday, up from 165 Kcfs earlier in the week. At Lower Granite, yesterday's day-average flow was 70.9 Kcfs; it is expected to exceed 80 Kcfs today; Lower Snake flows are expected to decline after that. At Dworshak, the current elevation is 1564.9 feet, with 5 Kcfs outflow during the day and 1.5 Kcfs at night (a day-average flow of 4 Kcfs). With inflows on the order of 15 Kcfs, the project is filling a foot a day. Libby is at elevation 2413.2, with 4 Kcfs outflow and 23 Kcfs inflow; the project is filling a foot per day. Albeni Falls is at elevation 2065.4 feet, currently; the objective is to fill the project slowly to elevation 2058 by May 31. Hungry Horse is at elevation 3537, filling a foot per day, with 14 Kcfs inflow, said Norris. Columbia Falls is running 25 Kcfs and should go higher over the next few days. Grand Coulee is currently at elevation 1270.7 and filling, with inflows of 150 Kcfs.

The May early-bird forecast is now available, said Turner; at The Dalles, it shows 81.6 MAF, 76% of average, down slightly from the April final. At Lower Granite, the May early-bird forecast shows an April-July volume of 14.3 MAF, 66% of normal, also down slightly from the April final. At Dworshak, the forecast is now 2.06 MAF, 78% of normal, down from 86% of normal in the April final.

Will Dworshak continue to release 4 Kcfs? Wagner asked. Probably for at least another week, Julie Ammann replied, with 2.2 Kcfs day-average outflow out on the weekend and 4 Kcfs during the week; after that, we will re-evaluate that operation. We need to fill the project, but not too quickly, Ammann said.

With respect to the sturgeon operation, Turner said he had discussed this issue with Bob Hallock. With water temperatures rising more rapidly than normal, the Fish and Wildlife Service is expected to request that the sturgeon operation begin during the last week in May, with 10-15 Kcfs outflow from Libby for the first week, followed by flows of 18-20 Kcfs for the next three weeks.

With respect to smolt data, Wagner reiterated that the yearling chinook passage index hit almost 300,000 at Lower Granite yesterday and should exceed that today, up from 200,000 during the past few days. At McNary, counts are picking up as well, from about 30,000 last week to 60,000+ in recent days. For steelhead, the numbers at Lower Granite are expected to increase sharply today. The Rock Island index has also picked up, to 130,000 yesterday, up from about 60,000 over the past few days. In terms of adult passage at Bonneville, said Wagner, counts picked up over the weekend, to the 8,000 fish-per-day range; counts have since declined to about 4,000 fish per day. The run to date is about 125,000 chinook, slightly in excess of the 10-year average, but far below the pre-season prediction of 361,000 for the season. Cindy LeFleur noted that the total 2004 run size has recently been downgraded to about 200,000 adult chinook. The fishery below Bonneville has accounted for about 30,000 fish, she added. Kyle Martin said the tribal fishery is scheduled to continue through tomorrow night.

Bettin said there are no power system problems to report at this time.

Adams noted that there were a number of water quality exceedences last week at Lower Monumental, probably as a result of the bulk spill pattern. He said Mike Schneider has since modified the algorithms in his SYSTDG model to factor in powerhouse entrainment from bulk spill, and the Corps is waiting to see how well they function.

Revisiting the spill priority list question, after a brief discussion, there was no TMT objection to making the Lower Columbia projects the first priority, starting with McNary; the Lower Snake projects would then move lower on the list, with Lower Granite the last priority. This is mainly a what-if, said Bettin – it is highly unlikely that we will have to use the spill priority list in 2004, unless a major generation or transmission system outage occurs. Wagner said the salmon managers will review this list with the other salmon managers and will let the action agencies know if there are any objections to the change. If there are no objections, the revised spill priority list will go into effect on Friday, May 7.

Turner also drew the group's attention to the most recent version of the "Volumes at Dworshak" graph, dated May 3. This shows a volume of 349 kaf available for flow augmentation at Dworshak, assuming 50% confidence of refill, between now and June 30. That compares to an estimated volume of 589 kaf in last week's graph. He noted that the graphs for Libby have also been updated; the May final water supply forecast for Libby is expected to be available tomorrow, after which this graph will be updated again. Turner added that an updated ESP model run is also available for Lower Granite. Again, any comments about the usefulness of this information would be appreciated, said Turner. They are quite useful, Wagner replied; Wills agreed.

7. Comments on 2004 WMP Spring/Summer Update.

Boyd noted that no comments have been received on this document since the last TMT meeting; Martin said CRITFC will provide its comments next week. Wills said the Fish and wildlife Service will also be providing comments. Boyd said he will plan to

produce a final draft of the spring/summer update prior to next week's TMT meeting, and will append any comments received once that is produced.

8. Other.

A. Mortality at Lower Granite Dam. Turner said there was a situation for some hours at Lower Granite yesterday, when dead fish were showing up in the raceways during the mid- to late morning period. They're trying to figure out what the cause was, and what protective measures we can undertake, Turner said. Dave Hurson said that it looks as though about 700,000 fish were collected in the last 24 hours, which makes it the high day of the year so far, up from a previous high of 416,000 on April 27. Mortality has been running less than 1%, he said; between 8 and 11 a.m. yesterday, we saw just under 2% mortality. We'll likely be between 1% and 1.5% mortality for the day, he said, and that's where we are right now. They are unsure of the cause, although they found one blocked orifice (debris) in one of the turbine units and immediately switched to the second orifice. Overall, he said, we saw about 4,000 mortalities yesterday. Did the project operate outside 1% yesterday? Margaret Filardo asked. No, Dick Hammer replied. And what's the hydraulic capacity at Lower Granite with five units operating? Filardo asked. About 100 Kcfs, Turner replied.

Where do we go from here? Silverberg asked. We're continuing to monitor the orifices every two hours, Hammer replied, as well as watching unit generation closely. Turner noted that Lower Granite flows averaged 70 Kcfs yesterday and are about 82 Kcfs, currently. Bettin noted that, if units are lost this time of year, the operational options would include filling outside of MOP, spilling or operating outside 1%. Does the TMT have a preference? I would prefer to run the RSW, said Wills. We would prefer to bypass fish, in order to avoid spill, said Bettin. If you're looking for preferences, we would prefer that you pass them through the RSW as well, Wagner said. If you're collecting too many fish to transport, we would prefer to pass them via the RSW, if units are out of service, Wagner said. That's acceptable, said Bettin – however, if all the units are running, the protocol is to bypass the excess fish.

Turner noted that the Fish Passage Plan discusses the fish density limits allowed in the raceways and barges, as well as the bypass protocol. If units go down, however, we'll need to have an emergency TMT conference call to discuss it, said Turner – I can't agree, without discussion with the Corps executives, to put spill back onto the table as a default option. We would need to convene a TMT emergency call, Turner said. He added that this is unlikely to be a major issue in 2004, unless units go out unexpectedly; we may be at the flow peak for Lower Granite for the year.

Still, I think what all of the salmon managers are saying is that, if we collect too many fish to transport at Lower Granite, the best thing to do, biologically, would be to spill the excess fish, said Russ Kiefer. The executives made the decision to transport the fish rather than spill them this year, but if they cannot transport all of the listed fish arriving at Lower Granite, it would be better to spill what cannot be transported. Mechanically collecting and bypassing the fish would be a bad decision, biologically. Wagner replied that NOAA Fisheries stands by the Fish Passage Plan, in terms of its recommendation that excess collections be bypassed as long as flows do not exceed

hydraulic capacity and all units are operating at Lower Granite. If units go down, he said, that's when spill becomes an option. We are expecting to have five units available at Lower Granite for at least the next week, added Hammer, with the caveat that there appears to be a ground fault problem when Units 3 and 4 are started in a certain sequence. Given the fact that Units 3 and 4 are now up and running, and will continue to run until flows recede, however, this is unlikely to cause problems for the foreseeable future.

Silverberg summarized by saying that, while there does not appear to be complete consensus on this issue, NOAA Fisheries supports the operation outlined in the Fish Passage Plan, which is to bypass fish collected in excess of transportation capacity unless units go down, in which case the excess fish will be spilled via the RSW. She suggested that the salmon managers discuss this issue further. Wills replied that the split among the salmon managers is probably smaller than it appears; we remain concerned that the fish that are handled have lower SARs than the fish that pass via spill. We'll look forward to discussing this issue further at a future TMT meeting, Wills said. Bettin clarified that the first option, if units go down at Lower Granite, will be to fill Granite pool outside of MOP; after that, we will spill. With the understanding that we will convene an emergency TMT call to discuss the situation as soon as possible, Turner added. It was further agreed that the TMT will reconsider the current spill priority list.

9 Next TMT Meeting Date.

The next Technical Management Team meeting was set for Wednesday, May 12. Meeting summary prepared by Jeff Kuechle.

TMT ATTENDANCE LIST May 5, 2004

Name	Affiliation
Rudd Turner	COE
Donna Silverberg	Facilitation Team
Robin Harkless	Facilitation Team
Tony Norris	USBR
Mike O'Bryant	CBB
Russ George	WMCI
Kevin Nordt	PPL
Tim Heizenrater	PPM
Scott Boyd	COE
Tina Lundell	COE
Ruth Burris	PGE

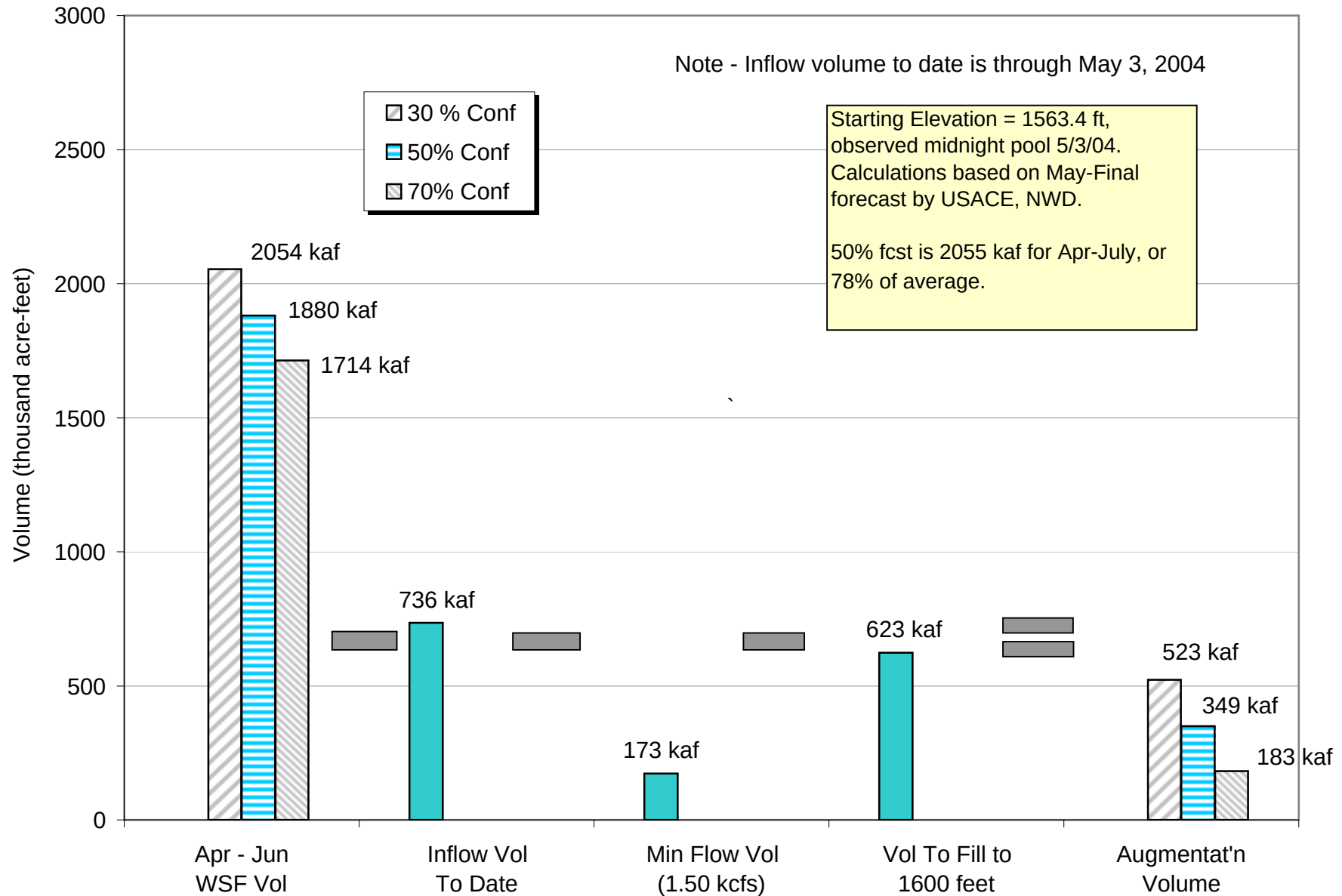
Kyle Martin	CRITFC
Jim Adams	COE
Paul Wagner	NOAAF
Scott Bettin	BPA
Julie Ammann	COE
Dan Bedbury	EWEB
Margaret Filardo	FPC
Chris Carlson	GCPUD
Russ Kiefer	IDFG
Amy Reece	COE
Dave Hurson	COE
John Wellschlager	BPA
Nic Lane	BPA
Tom Le	PSE
Cindy LeFleur	WDFW
David Benner	FPC
Ed Mount	PRM
David Wills	FPC
Richelle Beck	D. Rohr & Associates
Mike Buchko	Powerex
Tom Haymaker	PNGC
Bruce MacKay	Consultant

Volumes at Dworshak
1 April Through 30 June

Note - Inflow volume to date is through May 3, 2004

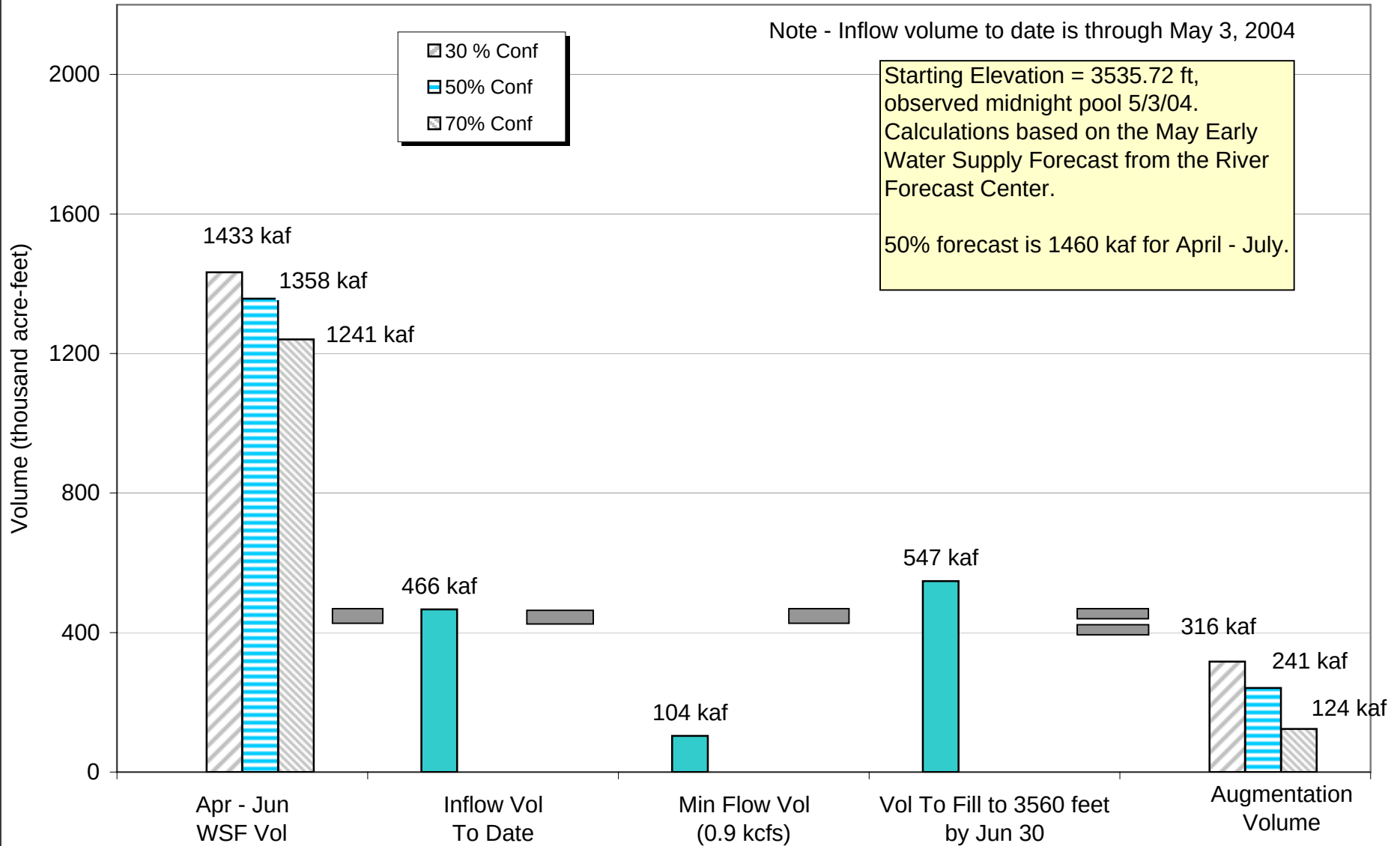
Starting Elevation = 1563.4 ft,
observed midnight pool 5/3/04.
Calculations based on May-Final
forecast by USACE, NWD.

50% fcst is 2055 kaf for Apr-July, or
78% of average.

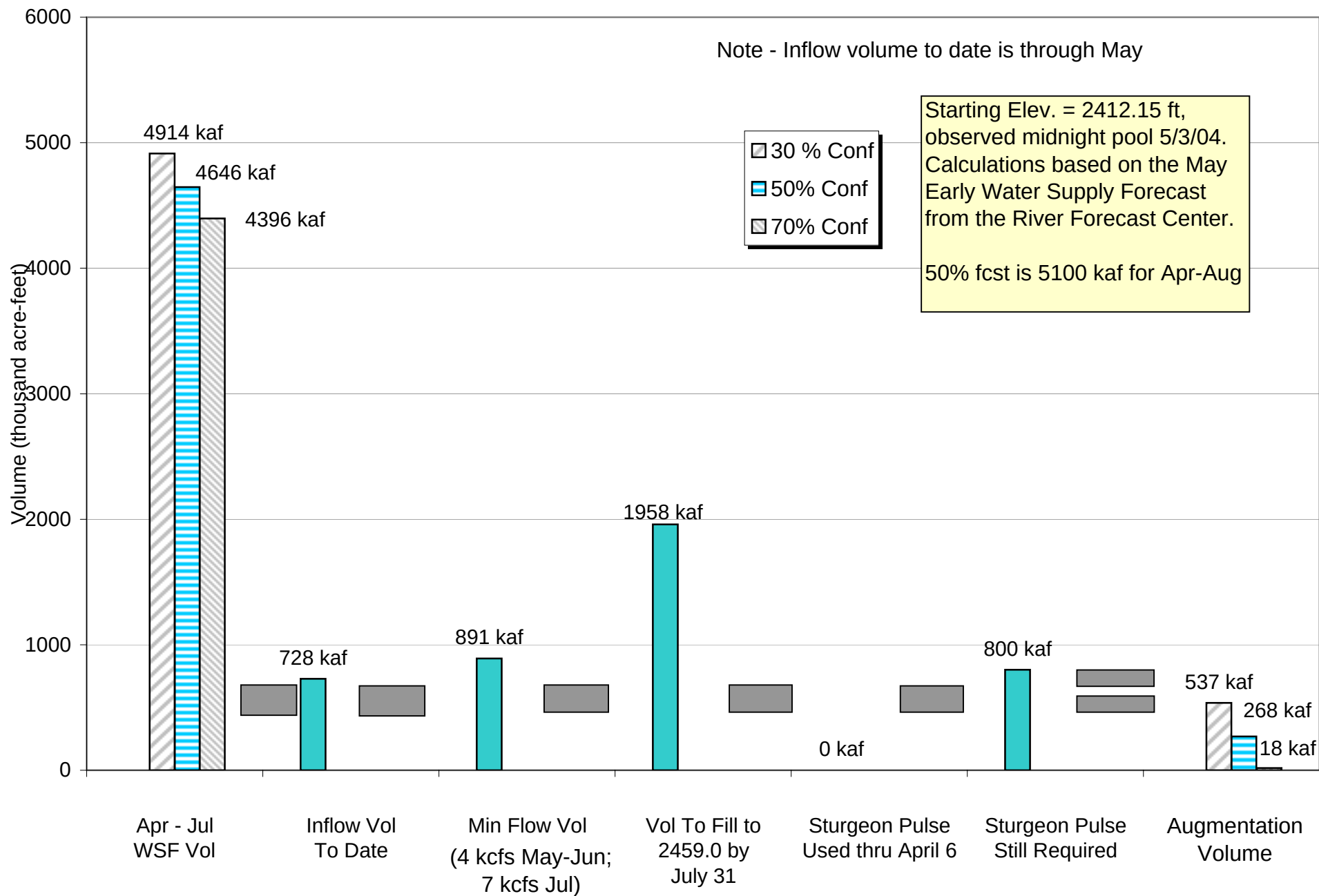


Volumes at Hungry Horse 1 April Through 30 June

Note - Inflow volume to date is through May 3, 2004



Volumes at Libby 1 April Through 31 July



Assumptions:

- * Streamflows were adjusted to the May Early Final Water Supply Forecast for the period of May thru August of 59.5 MAF at The Dalles and shaped 59 different ways based on observed historical runoff.
- * Starting elevations were observed data from April 29, 2004.
- * Grand Coulee operates to meet Priest Rapids flow objective of 135 kcfs from May 1-31, then tries to refill by June 30. Grand Coulee drafts no lower than 1243 ft by 31 May, and no more than 1 to 1.5 feet/day (for bank stabilization) when operating to meet Priest Rapids flow objectives.
- * Hungry Horse targets elevation 3554 feet by 31 May with a minimum flow of 900 cfs, meets minimum flow of 3500 cfs at Columbia Falls, targets full in June, and drafts to 3540 ft by 31 Aug.
- * Brownlee targets 2077 ft by 31 May, 2076 ft by 30 June, 2070 ft by 31 July, and 2057 ft by 31 August.
- * Dworshak targets elevation 1590 feet by May 31 with a maximum release of 13 kcfs from May thru June. DWR targets full in June with a minimum flow of 1.5 kcfs, releases a maximum of 13 kcfs in July - August to meet LWG flow objectives, and targets 1520 ft by 31 Aug.
- * Libby targets 13.9 kcfs in May and 9.4 kcfs in June for Sturgeon, based on an Apr-Aug forecast of 5.1 MAF and a Tier 2 required pulse of 0.80 MAF. Minimum flow for bull trout in July and August is 7,000 cfs. Libby drafts to elevation 2449 ft by 31 July and 2439 ft by 31 Aug.

Results:

Priest Rapids Meets Flow Objectives of 135 kcfs from May 1 - Jun 30.

Month	Occurrences out of 59 Years	Average Flow for 59 Years (kcfs)	Priest Rapids Adjusted for Banks Lake Pumping (kcfs)
May	59	141	140.6
Jun	39	144	128.2

*Note: the current QADJ model does not account for Banks Lake Pumping. ESP estimates 7.5 kcfs in May and 8.5 kcfs in June for Banks Lake, for a total of 16 kcfs. QADJ tries to meet 135 kcfs at PRD, so May flow at PRD will not change, but the GCL elevation will be decreased by the pumping volume, and will translate to a lesser flow in June to meet GCL refill. Adjusted June flow at PRD correlates to ESP flow in June with this logic.

Lower Granite Meets Flow Objectives of 85 kcfs in May, 73.3 kcfs in June, and 50 kcfs in Jul - Aug:

Month	Occurrences out of 59 Years	Average Flow for 59 Years (kcfs)
May	21	79
Jun	22	69
Jul	4	42
Aug 15	0	36
Aug 31	0	22

Project Elevations - May 31

	Average (feet)	Median (feet)
Libby	2424	2423
Hungry Horse	3552	3554
Grand Coulee	1276	1279
Dworshak	1590	1590

McNary Meets Flow Objectives of 220 kcfs from May 1 - Jun 30 and 200 kcfs from Jul 1 - Aug 31:

Month	Occurrences out of 59 Years	Average Flow for 59 Years (kcfs)	McNary Adjusted for Banks Lake Pumping (kcfs)
May	12	205	205
Jun	8	196	180
Jul	0	148	
Aug 15	0	136	
Aug 31	0	111	

Projects Refill by 30 June:

	Occurrences out of 59 Years	Average Elevation on 30 Jun for 59 Years
Libby	13	2453
Hungry Horse	59	3560
Grand Coulee	59	1290
Dworshak	59	1600

QADJ Period Average Flows (kcfs) (Not adjusted for Banks Lake Pumping)

	MAY 1-31	JUN 1-30	JUL 1-31	AUG 1-15	AUG 16-31
LIB	14	10	19	16	13
HGH	2	4	6	5	4
GCL	120	118	104	98	88
PRD	141	144	116	104	93
DWR	5	5	14	14	6
BRN	15	10	9	13	8
LWG	79	69	42	36	22
MCN	205	196	148	136	111
TDA	218	205	153	140	114
BON	220	206	155	142	116

SYSTEM OPERATIONAL REQUEST: #2004-7

The following State, Federal, and Tribal Salmon Managers have participated in the preparation and support this SOR: U.S. Fish & Wildlife Service, Idaho Department of Fish and Game, Oregon Department of Fish and Wildlife, the Washington Department of Fish and Wildlife, National Marine Fisheries Service and the Columbia River Inter Tribal Fish Commission.

TO:	B. G. Grisoli	COE-NWD
	William Branch	COE-Water Management
	Cindy Henriksen	COE-RCC
	Witt Anderson	COE-P
	LTC Charles S. Markham	COE-Portland District
	LTC Kertis, Jr.	COE-Walla Walla District
	J. William McDonald	USBR-Boise Regional Director
	Stephen J. Wright	BPA-Administrator
	Greg Delwiche	BPA-PG-5
	Tim Culbertson	Grant County PUD



FROM: David A. Wills, Chairperson, Salmon Managers

DATE: May 4, 2004

SUBJECT: Flows at Priest Rapids Dam

SPECIFICATIONS:

- Increase flows at Grand Coulee Dam to provide a day average flow of 120 Kcfs by Friday, May 7, 2004 at Priest Rapids Dam.
- Further increase flows at Grand Coulee Dam on May 10, 2004 to provide a weekly average flow of 135 Kcfs at Priest Rapids Dam.
- Weekly average flows at Priest Rapids should be maintained at 135 Kcfs after May 10, 2004 until further notice; the Salmon Managers will review available water supply information on a weekly basis and make flow recommendations for Priest Rapids Dam accordingly.
- Reduce flow fluctuations at Priest Rapids Dam to the greatest extent possible.¹
- The goal of this operation is to provide relatively steady flows during the month of May and June. If the operators believe that this goal cannot be accomplished a discussion of what flows are likely to be sustainable is requested.

JUSTIFICATION:

Water Supply forecasts at Rock Island Dam have been decreasing throughout the spring period (Table 1). Several different flow-forecasting models are available (STP, ESP, and QADJ), most

¹ CRITFC and USFWS believe that flows at Priest Rapids should not fluctuate by more than plus or minus 20 kcfs around the requested daily average flow to reduce the stranding potential for Handford Reach fall chinook.

of which provide varying outlooks on flows in May and June of 2004. After reviewing past timing of steelhead at McNary and Rock Island (following paragraphs) and given the uncertainty of flows in May and June in the mid-Columbia, the Salmon Managers have decided on the operation outlined in the specifications above.

Table 1. Water Supply forecasts at Rock Island Dam; February Final to the May Early-Bird.

	Rock Island WSF (Jan-July) (Kaf)
February Final	66000
February Mid-Month	64300
March Early-Bird	62100
March Final	61200
March Mid-Month	61000
April Early-Bird	58000
April Final	58900
April Mid-Month	58200
May Early-Bird	57600

A review of steelhead timing data at McNary Dam has included comparison of passage timing for run-at-large wild steelhead as well as timing of wild steelhead PIT-tagged at Rock Island Dam (see figures 1 through 4 and tables 2 through 4). While the run-at-large wild fish timing shown in Table 2 had an average 50% passage date of May 10 based on the years 1995 to 1999, the average timing of PIT-tagged fish marked at Rock Island Dam had a 50% passage date of May 17 based on data from 1989 to 2002. Also, 2004 is shaping up to be a relatively low flow year, and comparing the wild steelhead timing during other low flow years suggests that the migration may well be delayed a week or more. For example in 1993, a moderately low flow year (mid-Columbia), the 10% passage date for PIT-tagged fish from Rock Island occurred on May 15, and in another low flow year; 2001, it occurred on May 12. It is likely that McNary timing of wild steelhead will be delayed in 2004 based on low flows to date and low passage indices are consistent with the late migration pattern seen in other low flow years.

Hatchery release timing of steelhead in the Mid-Columbia River in 2004 was compared to releases in the years 1999 to 2003. In general releases this year appear to be a few days ahead of other recent years. However, because releases are volitional it is hard to pinpoint when the bulk of fish leave the acclimation ponds or other facility. But using the middle of release as a guideline, releases in the Methow River appear a week to two weeks earlier than other recent years with the middle of the release date range between April 22 and 29. Similarly, releases in the Wenatchee River appear 4 to 7 days earlier than in other recent years with the mid-release date for two releases occurring on April 24, whereas other recent years the mid-point of releases occurred between April 28 and May 7. On the other hand releases from Ringold Hatchery are the latest in recent years with the middle date of release falling on April 16 in 2004, while releases in other years were a few days to 3 week earlier.

By delaying the start of increased flows at Priest Rapids until May 10th, 2004, and then ramping down flows after the end of May, if necessary, we are able to provide higher flows to subyearling chinook in June. Under the present run-off volume forecast this approach adds additional volume

in June. It also provides some assurance of avoiding extremely low flows in June, in the event that flow forecasts are again adjusted downward. Subyearling chinook passage indices at McNary Dam show that nearly 50% of the passage occurs in June, with the average 50% date occurring on July 2 (based on the years 1995 to 2003) Table 5.

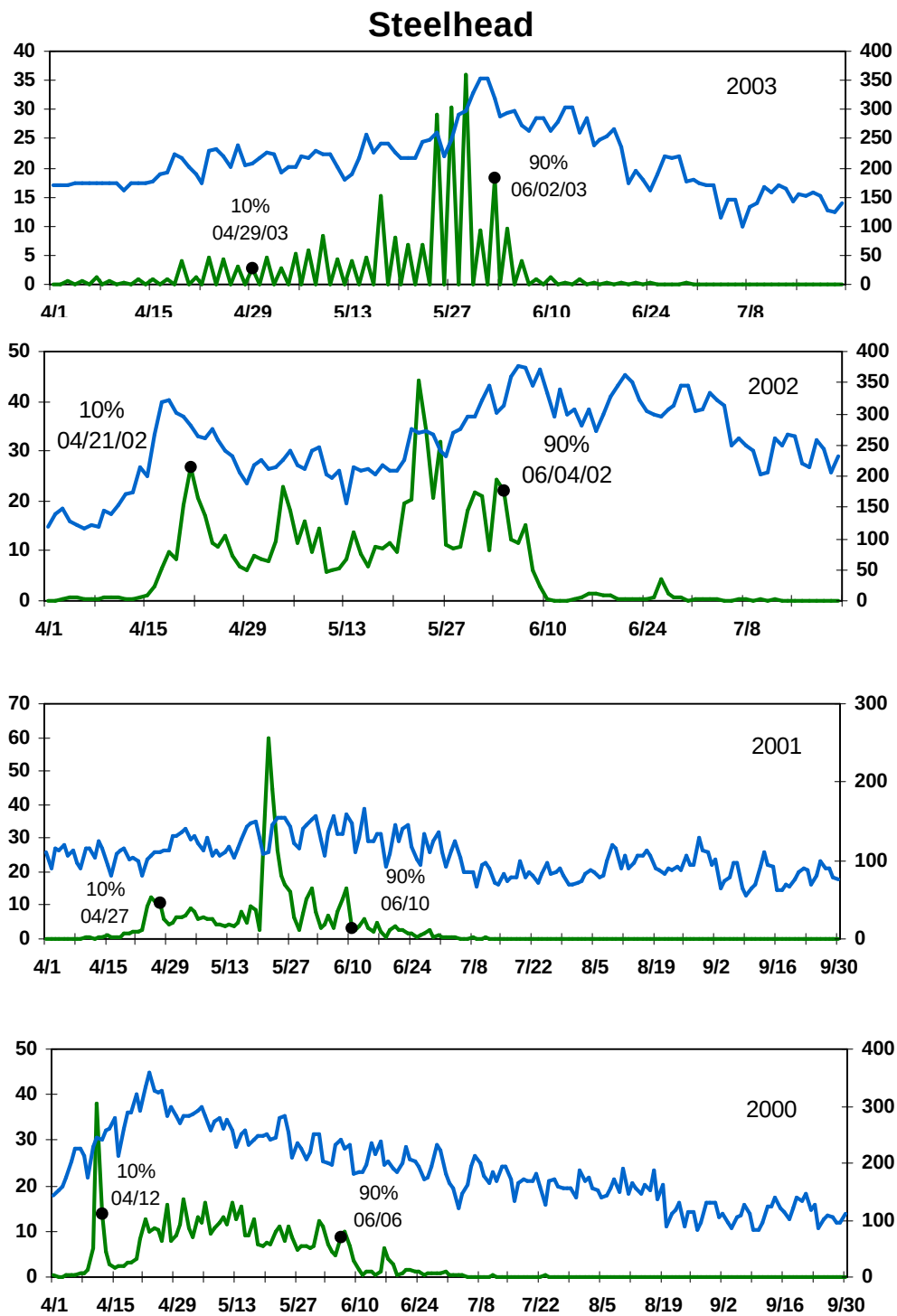


Figure 2. Combined Steelhead Timing at McNary Dam 2000 to 2003.

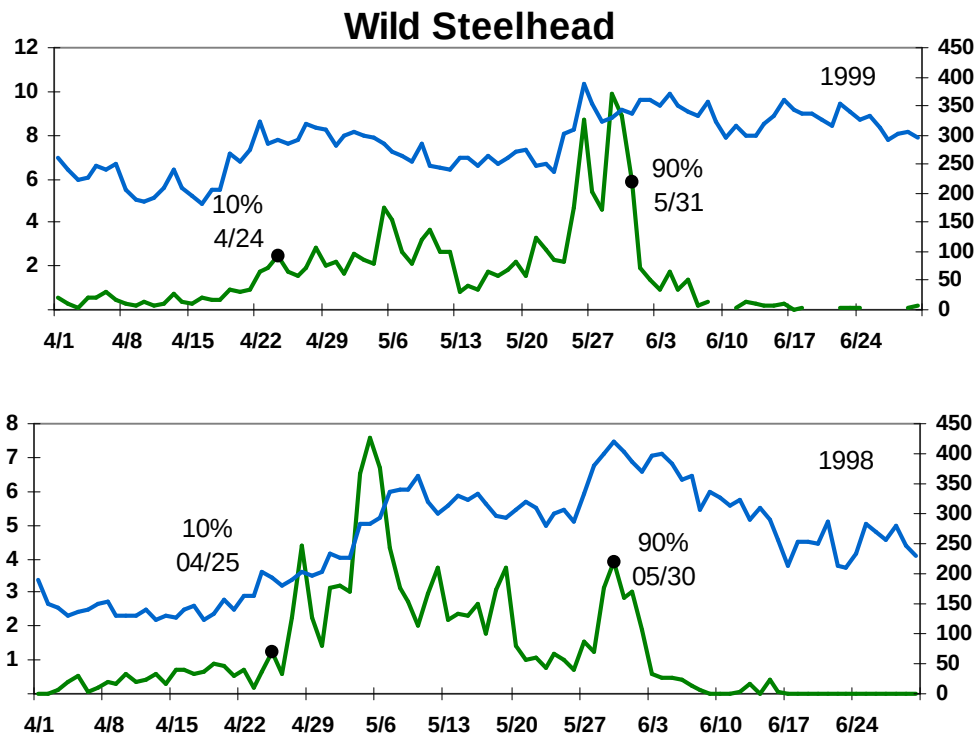


Figure 3. Wild Steelhead Timing at McNary Dam 1998 and 1999.

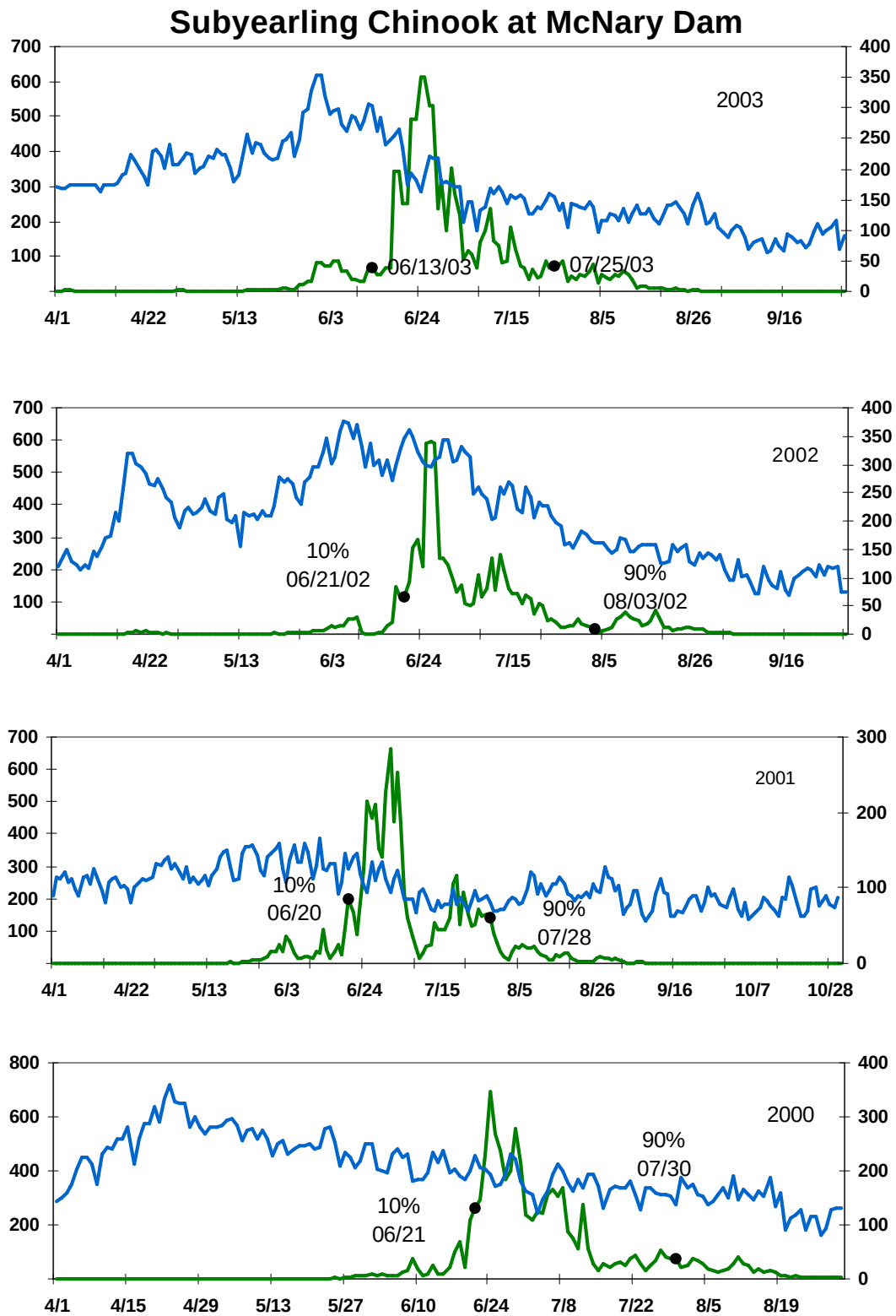


Figure 4. Subyearling Chinook Timing at McNary Dam 2000 to 2003.

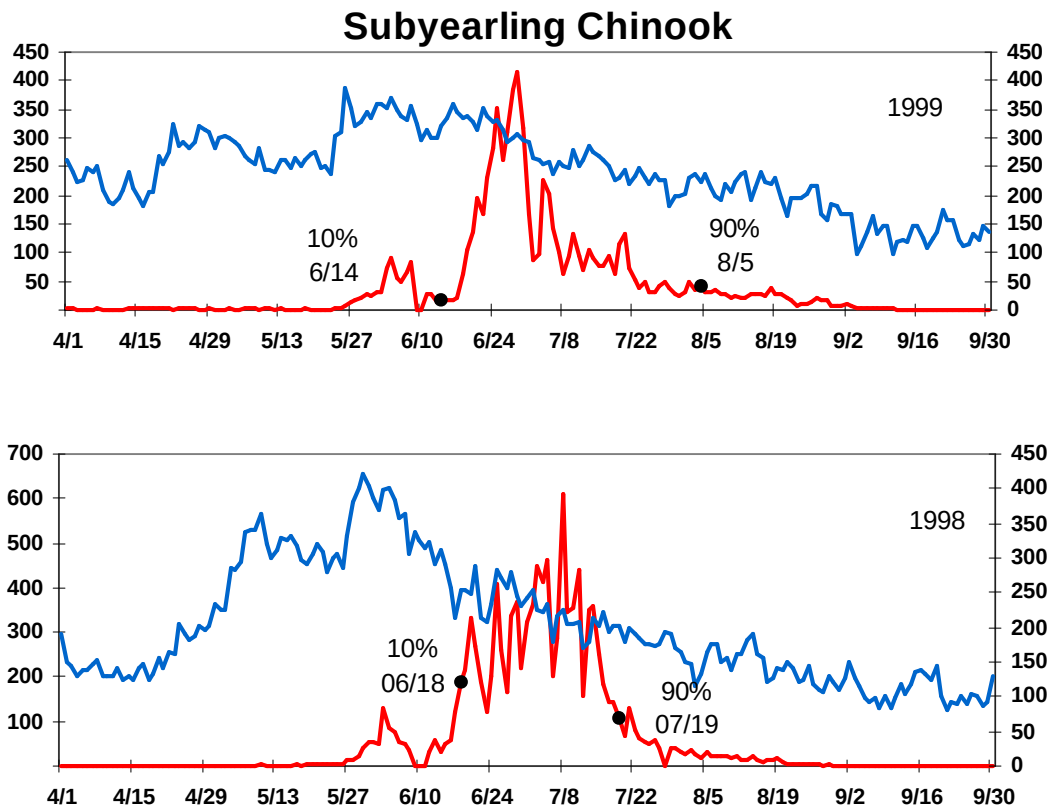


Figure 5. Subyearling Chinook Timing at McNary Dam 1998 and 1999.

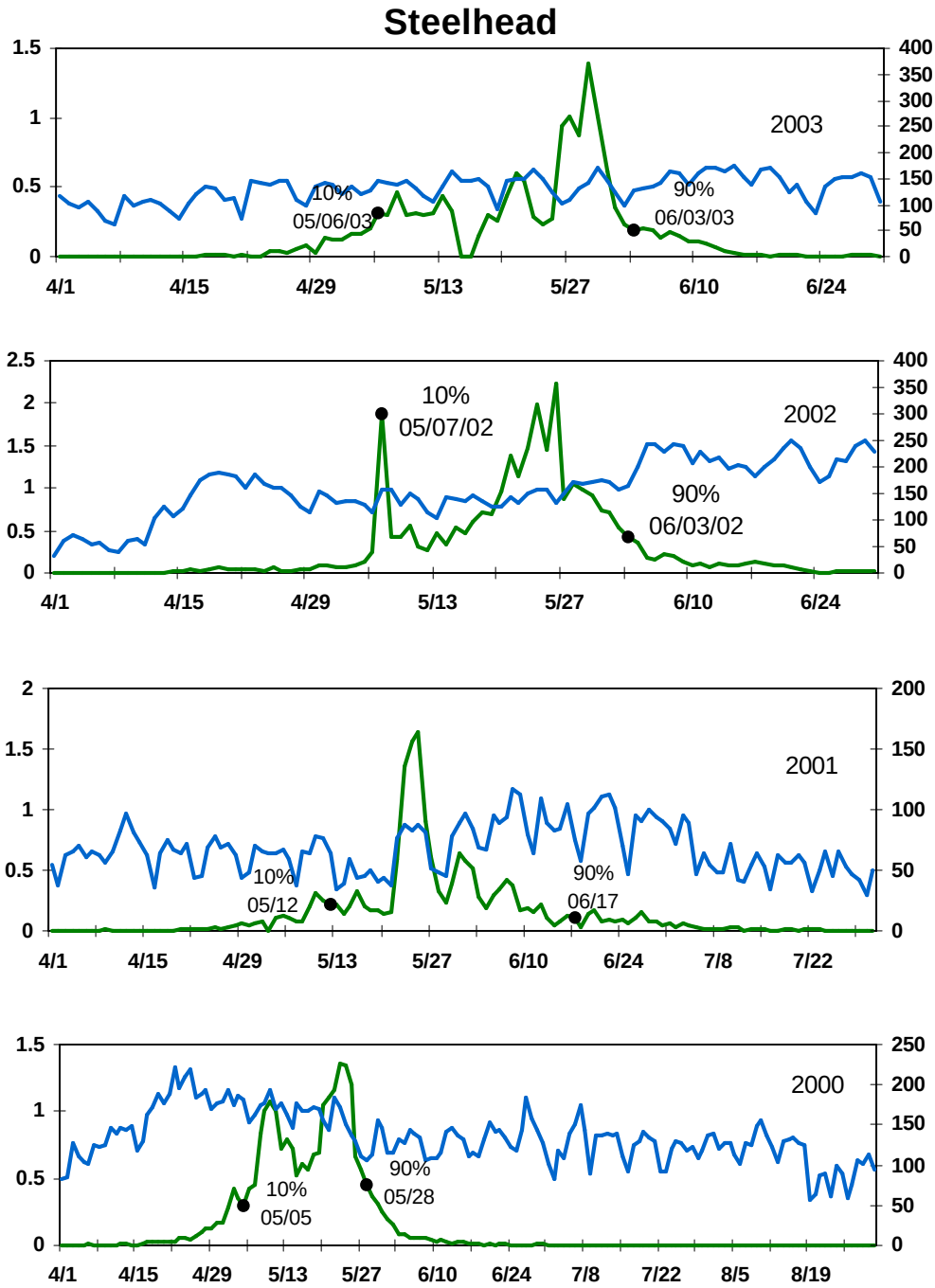


Figure 6. Combined Steelhead Timing at Rock Island Dam 2000 to 2003.

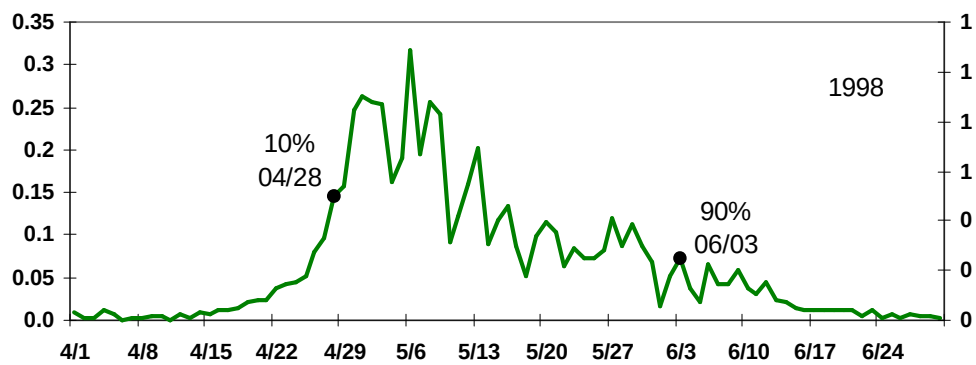
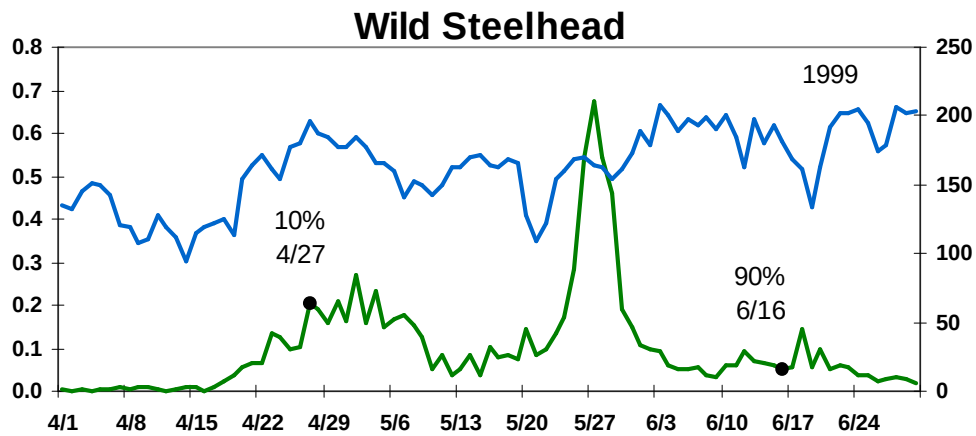


Figure 7. Wild Steelhead Timing at Rock Island Dam 1998 to 1999.

Table 2. Wild Steelhead Timing at McNary Dam 1995 to 1999.

Year	5%	50%	95%
1995	04/19	05/14	06/02
1996	04/21	05/05	05/31
1997	04/18	05/07	06/01
1998	04/17	05/08	06/01
1999	04/17	05/19	06/04
Avg	04/18	05/10	06/01

Table 3. Hatchery Steelhead Timing at McNary Dam 1995 to 1999.

Year	5%	50%	95%
1995	04/24	05/16	06/01
1996	04/22	05/12	06/01
1997	04/23	05/09	06/01
1998	04/20	05/10	06/01
1999	04/01	05/22	06/03
Avg	04/18	05/22	06/03

**Table 4. Combined Steelhead Timing
At McNary 2000 to 2003**

Year	5%	50%	95%
2000	4/11	5/10	6/12
2001	4/25	5/23	6/19
2002	4/20	5/20	6/7
2003	4/23	5/25	6/4

**Table 5. Subyearling Chinook Timing
At McNary Dam.**

Year	5%	50%	95%
1995	06/03	07/04	07/25
1996	05/30	07/04	08/18
1997	05/24	07/05	08/18
1998	06/05	07/04	07/29
1999	06/04	06/30	08/18
2000	06/17	06/30	08/11
2001	06/11	07/02	08/08
2002	06/25	06/30	08/16
2003	06/06	07/01	08/07
Average Date 1995 to 2003	06/06	07/02	08/10

TECHNICAL MANAGEMENT TEAM

BOR: Tony Norris / John Roache

BPA: Scott Bettin / John Wellschlager

NMFS: Paul Wagner / Chris Ross

USFWS: David Wills / Howard Schaller

OR: Ron Boyce

WA: Cindy LeFleur

ID: Russ Kiefer

MT: Jim Litchfield

COE: Cindy Henriksen / Rudd Turner / Cathy Hlebechuk

TMT EMERGENCY CONFERENCE CALL

Friday 07 May 2004 1500 - 1600 hours

**Custom House Room 118
Portland, Oregon
Conference call line: 503-808-5190**

*All members are encouraged to call Donna Silverberg with any issues or concerns they would like to see addressed.
Please e-mail her at dsilverberg@cnnm.net or call her at (503) 248-4703.*

AGENDA

1. Lower Snake special project operations to pass large numbers of juvenile fish.
2. Spill swap for energy-neutral operations.

Questions about the meeting may be referred to Cindy Henriksen at (503) 808-3945, or Rudd Turner at (503) 808-3935, or Cathy Hlebechuk at (503) 808-3942

**TECHNICAL MANAGEMENT TEAM
CONFERENCE CALL NOTES
May 7, 2004
COE RESERVOIR CONTROL CENTER - CUSTOMS HOUSE
PORTLAND, OREGON**

1. Greeting and Introductions

The May 7 Technical Management Team conference call was chaired by Rudd Turner of the Corps and facilitated by Donna Silverberg. The following is a distillation, not a verbatim transcript, of items discussed at the meeting and actions taken. Anyone with questions or comments about these minutes should call Henriksen at 503/808-3945.

2. Lower Snake Project Operations to Pass Large Numbers of Fish.

Turner said the Corps had requested this conference call to discuss the issue of how to pass the large numbers of juvenile fish now moving down through the Lower Snake system. He noted that there was a special RSW operation at Lower Granite on Wednesday night; spill was reduced during nighttime hours at Bonneville by 25 Kcfs, to 100 Kcfs, in consideration of energy equivalency.

On Thursday, fish numbers at Lower Granite were low enough to allow them to transport the fish, so no spill operation took place last night, Turner continued. Fish numbers have now increased again, said Turner, and we wanted to discuss the most appropriate operations for fish and power at Lower Granite, Little Goose and the Lower Columbia projects. There was a conference call this morning concerning this issue, said Turner; we were unable to reach consensus, and so we wanted to bring this issue before the full TMT.

Dave Hurson provided an overview of current passage conditions in the Lower Snake. Hurson noted that there is a difference in how the small and large fish are treated at Little Goose; at Lower Granite, the fish are all just lumped together. We have four barges available, of either 50,000 or 23,000 pound fish capacity. At Lower Granite, they've just started to fill the third of 10 raceways – the numbers aren't really coming in yet. At Little Goose, we can load up to 40,000 pounds of fish today; we can then hold any additional fish over until the next barge arrives tomorrow. I'm going on the assumption that the Lower Granite barge will be filled tonight, he said; the question is, what happens if we collect so many fish at Little Goose that they exceed the capacity of today's barge and tomorrow's barge?

The group discussed loading numbers and raceway capacity (60,000 pounds at Little Goose). Hurson noted that, even if fish are held over beyond the day's barge capacity, they would only stay in the raceways for a total of 24 to 36 hours. He said he isn't worried about raceway capacity at Little Goose. Dave Statler said he is concerned with transporting these fish at maximum capacity, given the stresses they have already undergone. And are you making sure that the last fish you're collecting are the ones that are held over until the next day? David Wills asked. Yes, Hurson replied, and they will be the first fish on the barge the next day.

How is the species composition running between steelhead and chinook? Bob Heinith asked. At Lower Granite, we collected 603,000 smolts today, about 360,000 of which were hatchery and wild steelhead, Hurson replied. Yesterday, it was three-quarters chinook and one-quarter steelhead at Lower Granite and two-thirds chinook and one-third steelhead at Little Goose. Today, they collected about 175,000 chinook and 157,000 steelhead at Little Goose, said Margaret Filardo -- the split is now closer to 50-50. The group devoted a few minutes of discussion to how the fish at Little Goose are treated according to size; Hurson said the large and small fish are held and loaded separately. In response to a question from Turner, Filardo said the number of steelhead collected at the Lewiston trap has increased tenfold in recent days, which gives some indication of the steelhead numbers currently moving down the Clearwater system into Lower Granite pool.

In response to a question from Henriksen, Hurson said his concern is that fish will arrive in such large numbers at Little Goose that they will take up more than two days' barge capacity -- we've only seen 1.8 million of the 8 million+ steelhead that are estimated to be moving down the Snake River this year, he noted. Hurson said that, in his opinion, the Lower Granite plan worked well the other day. My suggestion is that, when we hit the 40,000 pounds of fish collection for the day, we begin spill at Little Goose -- 16 Kcfs of bulk spill at 8 Kcfs per bay, he said.

Wills said the salmon managers discussed this issue earlier this afternoon and developed a quick SOR laying out a recommended strategy to handle large numbers of fish at Little Goose. That recommendation is to use a trigger -- the one Dave has described would work -- to begin spill at Little Goose, following the BiOp criteria for fish passage, since this is an emergency. Specifically, we recommend initiating the BiOp spill pattern during these emergencies, in order not to exceed the capacity of the collection and holding facilities at Little Goose. We feel that the federal agencies have an obligation to fulfill their BiOp requirements and do what is best for fish, Wills said.

From NOAA's perspective, said Paul Wagner, we did not sign off on this SOR, primarily because we're willing to live with something less than the BiOp spill operation, in part because of the action agencies' insistence that this be revenue-neutral. I'm not sure how that concept got introduced into this equation, said Wagner; the Regional Forum process is focused on BiOp implementation, and I'm not sure why revenue neutrality should be an overriding concern.

John Wellschlager replied that, to BPA's knowledge, an emergency does not yet exist. With respect to revenue neutrality, it creates problems for Bonneville to suddenly reduce generation, in terms of meeting load and in terms of financial hardship. We thought the operation we arrived at during Wednesday's TMT meeting worked well, he said; if doing an exchange hour per hour isn't acceptable, perhaps we could make it up by reducing spill over the next couple of days at John Day or another project. I understand, said Wagner, but the BiOp is intended to maximize survival, and a no spill condition at the Snake River projects would be detrimental at this point in the passage season. He added that he has analyzed the financial impact of Wednesday's Lower Granite operation, and it was very small -- about \$35,000. Wellschlager replied that energy prices go up significantly when BPA has to replace lost generation on very short notice.

The group discussed the offsets that were provided following the 2001 power emergency. Scott Bettin noted that all of these projects have functioning bypass facilities; why, all of a sudden, aren't we using them? Why not collect to a certain point, then use the bypass system, then, once that capacity is exceeded, spill? The best available science, based on adult return rates, tells us that spill passage returns more adults than bypass, replied Russ Kiefer. Right now, based on the flow year we're in, we've agreed that maximum transport is the best option for fish. But at a time when we're overloading our transport capacity, available science indicates that spill is better for the fish than collection and bypass, Kiefer said. The bottom line is that, by this weekend at Little Goose, they will be collecting more fish than they can safely transport. The question is, can we use adaptive management to do what's best for fish and spill then, rather than collecting and bypassing them? Kiefer said.

My perception is that, while we were able to craft an operation that worked for everyone on Wednesday night, people have come to this meeting asking for something more, said Wellschlager. The problem is that, while Bonneville wants to make this revenue-neutral, the salmon managers would like to make this biologically neutral, Kiefer said. And we have proposed adjusting spill at other projects in the coming days, Wellschlager replied. I appreciate that, and in that spirit, perhaps some sort of an agreement can be worked out, said Kiefer.

So the Corps has proposed that, as soon as fish collections at Little Goose reach 40,000 pounds in a day, spill would begin at Little Goose at a volume of 16 Kcfs, over two bays, and would continue until 6 a.m. the following morning Silverberg observed. Is that acceptable? The salmon managers have submitted an SOR requesting spill up to the BiOp level, which would be about 45 Kcfs, Wills replied. Doesn't that BiOp spill volume apply only when we're spilling 100% of the fish? Wellschlager asked. It wouldn't be 100%, Wagner replied. But it would be significantly more than the fish numbers that are currently passing via spill? Wellschlager asked. Correct, Wagner replied.

Everyone is aware that the salmon managers' request is for BiOp spill volumes – 45 Kcfs – at Little Goose? Ron Boyce asked. Yes, Silverberg replied – we're just trying to find a compromise that works, given the constraints everyone is under. Boyce reiterated that, from the salmon managers' perspective, given the fact that we are within the fish passage plan criteria, the BiOp spill operation has the best chance of avoiding a detrimental situation for fish, without the need for this operation to be revenue-neutral. Statler said the Nez Perce Tribe agrees with Oregon's perspective. Boyce suggested that revenue neutrality is a policy issue, not one that can be decided at TMT. Wills agreed, saying that the salmon managers, BPA and the Corps have laid out their recommendations; he suggested that this issue be elevated to IT as soon as possible.

Turner noted that, in the absence of TMT consensus on this issue, the operation laid out in the fish passage plan is to bypass fish once collections begin to overwhelm the capacity of the collection and transport systems. Cindy Henriksen reiterated that a state of emergency does not yet exist; it is not an emergency if the raceways fill up with fish – that happens almost every year. She noted that the salmon managers had reviewed and agreed with the operations laid out in the Fish Passage Plan. Statler replied that the salmon managers have put forward their recommendations in the spirit of adaptive management, based on the best available science.

The group discussed whether or not an emergency actually exists at this point; Turner said that, in his view, it does not, because project personnel are not seeing unusual levels of fish mortality. We convened this call because we're trying to get contingency procedures in place, because we see a potential problem, he said. And given the good fish passage conditions we currently have in the Snake River, and the numbers of fish currently moving down through the system, we would like to keep the fish in the river, said Wills – this is not a normal year.

So what is the action agencies' response to the SOR? Boyce asked. At this point, there are three options on the table, and we do not have consensus, said Silverberg. That means it's up to the action agencies to make the call. Again, the fallback position is to follow the Fish Passage Plan and bypass the fish if raceway capacity is exceeded at Little Goose, Turner said. Actually, I think I've heard that all of the salmon managers, and even BPA, agree that some level of spill would be best for those fish, said Kiefer – even Bonneville has agreed that they might be willing to provide some volume of spill, as long as the operation is revenue-neutral. I would hate to see the Corps discard that consensus and bypass the fish, he said. In the absence of an agreement at TMT, we would have no choice, Turner said.

The discussion continued in this vein for some minutes. Ultimately, Henriksen asked whether BPA is willing to provide the requested spill. Given the fact that we have a contingency plan in place, and can't reach resolution on the revenue neutrality issue, I would have to answer no, Wellschlagler replied. Given that fact, is there a desire on anyone's part to elevate this issue to the IT? Silverberg asked. The salmon managers unanimously agree that the issue of revenue neutrality is inappropriate in a situation such as the one we're in, Wills said. With respect to what happens over this weekend, he said, there is no disagreement that it is up to the Corps to make the operational decision.

The discussion returned to the question of what constitutes an emergency. Silverberg observed that, although BPA may disagree, the salmon managers clearly feel that an emergency exists in the sense that there is the potential for serious harm to the fish this weekend. Hurson reiterated that procedures are in place to deal with an emergency, even if it occurs over the weekend; again, he said, we're seeing 0.25% mortality at Little Goose, currently, and it's one of our safest facilities for bypassing fish. Project personnel are monitoring the situation closely, he added, and will continue to do so.

Ultimately, the Wills said the Fish and Wildlife Service would like to elevate this issue. The TMT framed the issue to be elevated to the IT as follows: "Are adaptive management strategies for improved fish survival not identified in any plan required to be revenue-neutral if they are to be implemented? Also, is it appropriate for technical personnel, rather than policy-level personnel, to make such decisions?" Silverberg said she will put this question in written form and will distribute it to the TMT and IT membership for discussion at IT as early as possible next week.

So to summarize, said Silverberg, there is consensus among the salmon managers that spill would be the best strategy for fish, if the fish numbers arriving at Little Goose exceed the capacity of the collection and transportation facilities at that project, but there is not consensus

on the volume or duration of that spill, nor is there consensus that this operation should be revenue-neutral to Bonneville. In the absence of this consensus, Corps personnel at Little Goose will closely monitor the situation over the weekend and, if an emergency arises, take the input received at today's meeting into account, and take the steps they consider appropriate.

With that, today's conference call was adjourned. Meeting summary prepared by Jeff Kuechle.

TMT PARTICIPANT LIST
May 7, 2004

Name	Affiliation
Richelle Beck	D. Rohr & Associates
Donna Silverberg	Facilitation Team
Paul Ocker	COE
Paul Wagner	NOAAF
Rod Woodin	WDFW
Robin Harkless	Facilitation Team
John Wellschlager	BPA
Nic Lane	BPA
Scott Bettin	BPA
Tony Norris	USBR
David Wills	USFWS
Dave Statler	NPT
Bob Heinith	CRITFC
Russ Kiefer	IDFG
Margaret Filardo	FPC
Dave Hurson	COE
Cindy LeFleur	WDFW
Rudd Turner	COE
Cindy Henriksen	COE
Ron Boyce	ODFW
Liz Hamilton	NWSFA

TECHNICAL MANAGEMENT TEAM

BOR: Tony Norris / John Roache

BPA: Scott Bettin / John Wellschlager

NMFS: Paul Wagner / Chris Ross

USFWS: David Wills / Howard Schaller

OR: Ron Boyce

WA: Cindy LeFleur

ID: Russ Kiefer

MT: Jim Litchfield

COE: Cindy Henriksen / Rudd Turner / Cathy Hlebechuk

TMT MEETING

Wednesday 12 May 2004 0900 - 1000 hours

**Custom House Room 118
Portland, Oregon
Conference call line: 503-808-5190**

*All members are encouraged to call Donna Silverberg with any issues or concerns they would like to see addressed.
Please e-mail her at dsilverberg@cnnm.net or call her at (503) 248-4703.*

AGENDA

1. Welcome and introductions.
2. Status of [Hanford Reach](#) (Chris Carlson and Cindy LeFleur)
3. Mid-Columbia Flow Objectives
[\[QAdjust Results\]](#)
4. Final Spring / Summer Update
[\[Final Spring / Summer Update to the 2004 Water Management Plan 05-12-04\]](#) 
5. Final TMT Guidelines
6. Status of Operation/May Final Water Supply Forecast
 - a. Reservoirs
 - i. [Dworshak \(USACE\)](#) 
 - ii. [Hungry Horse](#) 
 - b. Fish
 - c. Power System
 - d. Water Quality
[\[Average percent TDG for 12 highest hours - May 2004\]](#)
7. CRITFC [SOR C-2](#) 
8. Other
 - a. Set agenda for next meeting

Questions about the meeting may be referred to Cindy Henriksen at (503) 808-3945, or Rudd Turner at (503) 808-3935, or Cathy Hlebechuk at (503) 808-3942

**TECHNICAL MANAGEMENT TEAM
CONFERENCE CALL NOTES
May 12, 2004
COE RESERVOIR CONTROL CENTER - CUSTOMS HOUSE
PORTLAND, OREGON
COLUMBIA RIVER REGIONAL FORUM**

FACILITATOR'S SUMMARY NOTES ON FUTURE ACTIONS

Facilitator: Donna Silverberg

The following notes are a summary of issues that are intended to point out future actions or issues that may need further discussion at upcoming meetings. These notes are not intended to be the "record" of the meeting, only a reminder for TMT members.

Status of Hanford Reach:

Chris Carlson, Grant County PUD, reported on the weekly average flows at Hanford Reach for May 3-9th. Discharge ranged from 107-137 kcfs, with a 121.1 weekly average. End of emergence occurred on May 10th, so the PUD started operating toward 400 temperature units on May 11th. End of emergence was slightly later than most years, but not out of the ordinary.

Mid-Columbia Flows:

The QAdjust model was updated with the May final water supply forecast. The model showed that to meet Priest Rapids flow objectives of 135 kcfs in May, the project would operate at an average of 91 kcfs in June (lower than last week's projections) to allow refill at Grand Coulee by June 30. The STP model projected a slightly different result, with Priest at 135 kcfs through June 5th, then down to 100 kcfs average through the rest of June. The numbers of fish at Rock Island have increased significantly. TMT will revisit this issue next week.

Final WMP Spring/Summer Update:

The spring/summer update will be posted on the TMT web page. Scott Boyd, COE, reported that some new numbers were included to finalize the document, and that no new comments were received as of today.

TMT Guidelines:

No additional comments were made to the TMT guidelines. The final document will be posted on the TMT web page, as an appendix to the WMP.

System Status Review:

Reservoirs: Grand Coulee is at elevation 1273.7'. Hungry Horse is at 3542.75' and expecting to refill by the end of June. Libby is at elevation 2419', releasing minimum outflows and filling slightly. The COE and USFWS are engaged in preliminary discussions about a sturgeon pulse operation. The USFWS expects to have an SOR out for discussion at the 5/19 TMT meeting. Dworshak is at elevation 1575', with outflows ranging from 2.2-4 kcfs. Outflows may be reduced *slightly* on Monday to ensure refill by June 30.

Water supply: The May final forecast shows: Lower Granite April-June at 61% of normal; Grand Coulee April-August at 84% of normal; and The Dalles at 73% of normal.

Fish status: Spring chinook have hit their peak migration, with 800,000/day counted at Lower Granite last week and this week down to ~100,000/day. Steelhead numbers were at 500,000 early in the week, then reduced to 250,000/day. It is likely that the steelhead numbers will continue to decline, but there is a slight chance for an increase in numbers. The total adult size projection has been further reduced from last week to 189,000. It is unclear yet why the numbers are so much smaller than previously expected.

Water quality: Spill has stayed below the gas caps, save for a few minor exceedances in The Dalles forebay and one at Camas/Washougal.

SOR C-2:

Kyle Martin, CRITFC, presented an SOR for a treaty fishery May 11-14th, requesting that Bonneville, The Dalles and John Day pools hold steady and within 1' from full. The SOR included information on the number and location of the nets. The COE will operate Bonneville at 1.5' hard constraint, and 1' soft constraint. The Dalles will not be held to a 1' hard constraint, but typically operates within about a 1' range at a lower elevation. The John Day pool will be operated at the BiOp recommended 1.5' range.

IT Update:

A TMT conference call was held on Friday, May 7th, to discuss operations for a very high number of migrating fish in the Snake River and approaching Little Goose. At the end of the conference call there was not a consensus about the best operation due to a contingency on revenue-neutrality. Dave Wills, USFWS, requested that the issue of a revenue neutral requirement be raised to the IT level. The group agreed to the following question for IT:

Do adaptive management decisions for possible improved fish survival that are not identified in any 'plan' require a constraint of revenue neutrality in order to be implemented? Does the policy level want the technical team to make this type of decision?

IT members met on Tuesday, May 11th, to discuss this issue. The outcome of that discussion was that for the future, revenue-neutrality should not be a constraint, but that in unique situations such as the one described above, operations should be managed to benefit fish and be 'cost effective'. TMT should not make trade-offs for fish protection measures, since this occurs in other plans and processes. There was disagreement on whether this was an 'emergency'. TMT was encouraged to work through FPOM and TMT to resolve technical issues. The IT representatives concluded that this particular situation was handled appropriately.

TMT Meeting Schedule:

A conference call will be held on **Wednesday, May 19th from 9-11am**. Agenda items include:

- Priest Rapids Flows
- Hanford Reach Status
- Sturgeon SOR

The next face-to-face TMT meeting will be held on **Wednesday, May 26th, from 9am-noon**. An agenda will be circulated and posted on the TMT web page prior to the meeting.

1. Greeting and Introductions

The May 12 Technical Management Team conference call was chaired by Cindy Henriksen of the Corps and facilitated by Donna Silverberg. The following is a distillation, not a verbatim transcript, of items discussed at the meeting and actions taken. Anyone with questions or comments about these minutes should call Henriksen at 503/808-3945.

2. Status of Hanford Reach Operations.

Chris Carlson said that, for the week ending May 9, average flows at Priest Rapids ranged from 107 Kcfs to 137 Kcfs; the week-average flow was 121.1 Kcfs. The flow band ranged between 30 Kcfs to 40 Kcfs. On May 3, the flow band was exceeded by 17 Kcfs; on the other days, flows were within or very close to the flow band. What was driving the spike in flows we saw on Monday, May 10? Kyle Martin asked. I'm not sure what happened upstream, Carlson replied – inflows were higher than expected, and Priest Rapids was full – we had more water than we could pass through the powerhouse.

Carlson noted that the end of emergence occurred on May 10; the count toward 400 temperature units that will mark the end of the fish protection program started on May 11. Once that is achieved, the 2004 flow fluctuation restriction and fish protection operation will end. In response to another question from Martin, Carlson said that, in 2003, the end of emergence occurred on April 27; in 2002, on April 25; in 2001, on May 10, and in 2000, on May 2. We're a little later than normal this year, in other words, Carlson said.

3. Mid-Columbia Flow Objectives.

Henriksen said the Corps has updated its Q-Adjust run to include the May final water supply forecast. She noted that, in trying to meet 135 Kcfs at Priest Rapids in May, the run shows an average flow of only 91 Kcfs at Priest Rapids in June, as Grand Coulee refills. This is significantly lower than the average June flow shown in the last Q-Adjust run, she said, and we wanted to be sure the TMT was aware of this. And that's holding 135 Kcfs at Priest Rapids through May 31? Chris Ross asked. Correct, Henriksen replied. Ross noted that the STP run shows flows of about 100 Kcfs at Priest Rapids in June. It could be that the STP run has a slightly different shape to it, Julie Ammann replied. John Wellschlager noted that when BPA ran this scenario, it assumed a monthly average flow at Priest Rapids of 131 Kcfs in May, given the fact that the 135 Kcfs flow target didn't

kick in until the second week in May. Ammann agreed that the 4-5 Kcfs difference between the BPA and Corps runs might come out in June.

So this is essentially a heads-up for the TMT, so that they can discuss the Priest Rapids operation and make any adjustments they feel necessary? Silverberg asked. Correct, Henriksen replied. We'll obviously talk about this issue next week at FPAC, said David Wills, and will update the TMT at its May 19 meeting.

4. Final Spring/Summer Update.

Scott Boyd said Wills had provided the only additional comments to the spring/summer update; those comments were incorporated and the final spring/summer update is now available via the TMT website. Any additional comments will be added to the web page, he said.

5. Final TMT Guidelines.

Silverberg said no additional comments have been received on the TMT guidelines; she suggested that the group agree to make the guidelines final so that they can be posted to the website. We can always modify them later if necessary, she said. Martin said he had contacted Keith Kutchins at the Shoshone-Bannock tribes to see whether the Sho-Bans want to appoint a TMT representative; he has not yet received a reply. No TMT objections were raised to designating the TMT guidelines as final, and posting the guidelines as an appendix to the annual Water Management Plan on the TMT homepage.

6. Status of Operations/May Final Water Supply Forecast.

Norris said Grand Coulee is at 1273.7 feet, currently; Hungry Horse is at 3542.75. Will Hungry Horse be filling into June? Ross asked. Yes, Norris replied. Hungry Horse is currently releasing 4.5 Kcfs-5 Kcfs during the week and less on the weekend. Henriksen said Libby is at elevation 2419 and releasing minimum outflow, filling somewhat. We have been discussing the sturgeon operation with the Fish and Wildlife Service, she said. We expect to bring a draft SOR to TMT next week, said Wills. The May final water supply forecast at that project is 4.9 MAF, which means a sturgeon pulse of 800 kaf above minimum flow, probably beginning in late May, Henriksen said. After the sturgeon operation is complete, she said, we need to decide whether to reduce outflow to the bull trout minimum until flow augmentation begins some time in July, or to try to maintain a flat flow to avoid a double peak.

Moving on, Henriksen said Dworshak is currently at elevation 1575, with outflow in the 2.2 Kcfs-4 Kcfs range. The May final Dworshak water supply forecast is 2.1 MAF; we're expecting that we will need to reduce Dworshak outflow in order to refill by June 30, she said, probably beginning on Monday, May 17. Ross asked whether it would be possible to delay that reduction in Dworshak outflow and begin refill at Dworshak on May 20; that would be preferable from a fish migration standpoint, he said. We'll update the storage volume graphs to see what can be done, Henriksen replied. She noted,

however, that the planned reduction in Dworshak is small – to about 3.5 Kcfs as a week-average, rather than 4 Kcfs. That works, said Wagner.

Henriksen said the Lower Granite April-July water supply forecast is down to 13.5 MAF, from 15.6 MAF in the April final. The May final forecast was 50.8 MAF for the April-August period at Grand Coulee, 84% of average; at Lower Granite, 61% of average. The May final forecast at The Dalles is 68.4 MAF, 73% of average. Bear in mind that the January final water supply forecast was in the 95-98% of average range across the basin, said Henriksen, so this represents quite a significant reduction.

With respect to fish passage, Wagner said the peak of the spring chinook migration has now passed Lower Granite; we're now seeing about 100,000 yearling chinook per day pass that project. The steelhead outmigration peaked at about 500,000 fish per day four days ago at Lower Granite; they are now down to about 250,000 fish per day, although steelhead numbers could still spike again if we see another increase in flow. With respect to adult passage, Cindy LeFleur said it is not a pretty picture; the run size has been downgraded from 200,000 upriver spring chinook at the mouth of the Columbia to 189,000. That's about half the pre-season estimate, she said. We don't know where the fish are and why they didn't show up, she said – everyone is wondering the same thing. About 2,000 adult chinook per day are passing Bonneville, currently, she said.

Wellschlager said there is no change to report in the status of the power system. Jim Adams added that there is little to report with respect to water quality, currently; there have been just a few minor exceedences, because overall river flows are low. Most projects are unable to spill to the gas caps, he said, because there simply isn't enough total river flow.

7. CRITFC SOR C-2.

On May 7, the action agencies received SOR 2004 C-2 from the CRITFC tribes. This SOR requests the following specific operations:

- For the period Tuesday, May 11, 6 a.m. through Friday, May 14, 6 p.m.
- Bonneville pool: operate pool within 1 foot from full pool (msl elevation 76.5-75.5)
- The Dalles (Celilo) pool: operate the pool within 1 foot (msl elevation 159.5-158.5)
- John Day pool: operate the pool within 1 foot (msl elevation 264.5-263.5)

Kyle Martin went through the details of this SOR, the full text of which is available via hot-link from today's agenda on the TMT homepage. He noted that 114 of the 227 nets deployed last week were in Bonneville pool; 71 were in The Dalles pool and 91 were in John Day pool. For that reason, he said, we hope the Corps will do whatever it can to keep pool elevations stable at all three sites and meet the requested elevations.

We have already issued a teletype to keep Bonneville pool within 1.5 feet as a hard constraint and 1 foot as a soft constraint, said Henriksen; there is a fairly narrow

operating range at The Dalles, the project at which we have been meeting CRITFC's requested operating range the highest percentage of the time, and the operating range at John Day is 262.5 to 264 feet. The elevation requested by CRITFC at John Day is actually somewhat higher than the range specified in the BiOp, she said. The group discussed why the planned operating elevation is different than that requested by CRITFC; in response to a question, Martin said the most important priority, from CRITFC's perspective, is stable pool elevations. If you can keep the pools stable and at the elevation we requested, that would be optimum, he said. In response to a question from Wellschlager, LeFleur said the tribal harvest from last week's fishery totaled about 3,200 fish.

8. Other.

A. Outcome of Issue Elevated to IT. Silverberg said the TMT had asked the IT to weigh in on the question elevated at Friday's TMT meeting (read the statement); the answer was that revenue neutrality should not be the constraint, but that the TMT should attempt to find fish-neutral or fish-beneficial but cost-effective operational alternatives. The IT was not supportive of the TMT making operational tradeoffs among different listed species, she said, such as trading spill at the Snake River projects for spill at one of the Lower Columbia projects. There was not complete agreement that Friday's situation was an emergency, she said; however, there was general support for the idea of letting project biologists do their jobs. The IT also asked TMT to work with FPOM to develop protocols and guidelines for use in similar unique situations in the future. She added that the IT had encouraged the action agencies to include the cost of the upriver fish themselves, in terms of habitat, hatchery and other funding investments, in the assessment of cost effectiveness. Wellschlager said BPA's position is to consider such operations on a case-by-case basis.

8. Next TMT Meeting Date.

The next meeting of the Technical Management Team was set for Wednesday, May 19. Meeting summary prepared by Jeff Kucehle, BPA contractor.

TMT PARTICIPANT LIST May 12, 2004

Name	Affiliation
Donna Silverberg	Facilitation Team
Paul Wagner	NOAAF
Russ Kiefer	IDFG
Ron Boyce	ODFW
Chris Ross	NOAAF
Robin Harkless	Facilitation Team

Cindy Henriksen	COE
John Wellschlager	BPA
Scott Boyd	COE
Laura Hamilton	COE
Maria Van Houten	
Jim Adams	COE
Tim Heizenrater	PPM
Dave Ryan	PPM
Russ George	WMCI
Mike O'Bryant	CBB
Tine Lundell	COE
Kyle Martin	CRITFC
Tony Norris	USBR
David Wills	USFWS
Cindy LeFleur	WDFW
Bruce MacKay	Consultant
Caroline Fitzgerald	COE
Nic Lane	BPA
Ruth Burris	PGE
David Benner	FPC
Margaret Filardo	FPC
Chris Carlson	GCPUD
Lee Corum	PNUCC
Richelle Beck	D. Rohr & Associates
Tom Le	PSE
Hanna Miles	PSE

Assumptions:

- * Streamflows were adjusted to the May Final Final Water Supply Forecast for the period of May thru August of 54.6 MAF (69%) at The Dalles and shaped 59 different ways based on observed historical runoff.
- * Starting elevations were observed data from Apr 30, 2004.
- * Grand Coulee operates to meet Priest Rapids flow objective of 135 kcfs from May 1-31, then tries to refill by Jun 30.
- * Hungry Horse targets elevation 3554 feet by May 31 with a minimum flow of 900 cfs, meets minimum flow of 3500 cfs at Columbia Falls, targets full in June, and drafts to 3540 ft by Aug 31.
- * Brownlee targets 2077 ft by May 31, stays full in June, and drafts to 2070 ft by Jul 31, and 2057 ft by Aug 31.
- * Dworshak targets elevation 1590 ft by May 31, full by June 30 with a minimum flow of 1.5 kcfs. The project releases a maximum of 13 kcfs in July - August to meet LWG flow objectives, and targets 1520 ft by Aug 31.
- * Libby begins releasing sturgeon pulse water the last week of May and targets 13.2 kcfs in June for Sturgeon, based on discussions with USFWS. Minimum flow for bull trout in July and August is 7,000 cfs. Libby drafts to elevation 2449 ft by Jul 31 and 2439 ft by Aug 31.

Results:

Priest Rapids Meets Flow Objectives of 135 kcfs from May 1 - Jun 30.

Month	Occurrences out of 59 Years	Average Flow for 59 Years (kcfs)
May	57	136
Jun	2	91

Lower Granite Meets Flow Objectives of 85 kcfs in May, 73.3 kcfs in June, and 50 kcfs in Jul - Aug:

Month	Occurrences out of 59 Years	Average Flow for 59 Years (kcfs)
May	1	63
Jun	5	59
Jul	0	37
Aug 15	0	34
Aug 31	0	19

McNary Meets Flow Objectives of 220 kcfs from May 1 - Jun 30 and 200 kcfs from Jul 1 - Aug 31:

Month	Occurrences out of 59 Years	Average Flow for 59 Years (kcfs)
May	3	198
Jun	0	147
Jul	0	135
Aug 15	0	127
Aug 31	0	103

Project Elevations - May 31

	Average (feet)	Median (feet)
Libby	2434	2433
Hungry Horse	3547	3547
Grand Coulee	1258	1252
Dworshak	1590	1590

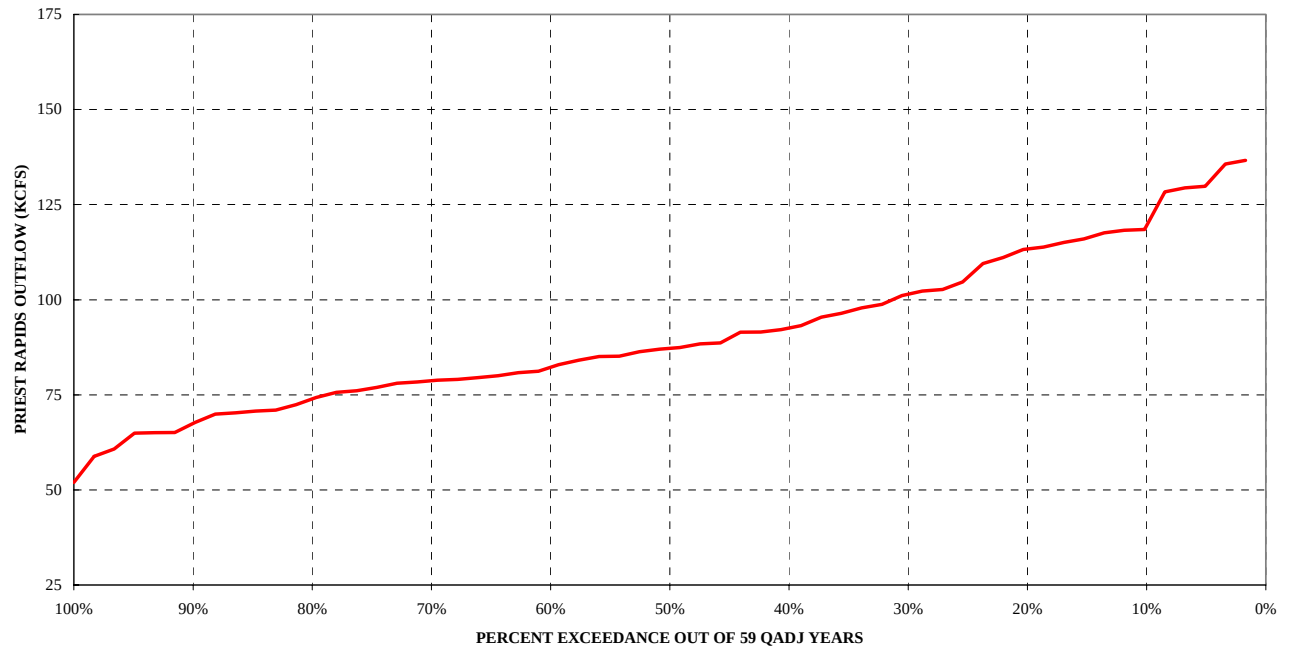
Projects Refill by 30 June:

	Occurrences out of 59 Years	Average Elevation on 30 Jun for 59 Years
Libby	15	2454
Hungry Horse	58	3560
Grand Coulee	59	1290
Dworshak	59	1600

QADJ Period Average Flows (kcfs)

	MAY 1-31	JUN 1-30	JUL 1-31	AUG 1-15	AUG 16-31	May-Aug WSF (maf)	WSF % of Norm
LIB	6	14	18	15	13	4.3	75%
HGH	4	3	6	5	4	1.2	69%
GCL	131	83	98	94	85	42.5	80%
PRD	136	91	100	94	85		
DWR	4	5	14	14	5	1.4	68%
BRN	10	10	8	12	7	1.9	38%
LWG	63	59	37	34	19	10.3	57%
MCN	198	147	135	127	103		
TDA	210	155	140	131	107	54.6	69%
BON	212	157	142	133	108		

**PRIEST RAPIDS OUTFLOW
REGULATED JUNE FLOW TO FILL COULEE**





COLUMBIA RIVER INTER-TRIBAL FISH COMMISSION

729 N.E. Oregon, Suite 200, Portland, Oregon 97232

Telephone (503) 238-0667

Fax (503) 235-4228

www.critfc.org

SYSTEM OPERATIONAL REQUEST: 2004 C-2

TO: Brigadier General W.T. Grisoli
William Branch
Cindy Henriksen, Rudd Turner
Witt Anderson
LTC Edward Kertis, Jr.
LTC. Charles Markham
J. William McDonald
Steven Wright
Greg Delwiche
Stan Speaks, Keith Hatch

COE-NWD
COE-NWD-NP-Water Management
COE-NWD-NP-WM-RCC
COE-NWD-CM-F (Fish Management Office)
COE-Walla Walla District
COE-Portland District
USBR--Pacific Northwest Regional Director
BPA Administrator
BPA-PG-5
BIA, Portland Area Office

FROM: Olney Patt, Jr., *Executive Director*

DATE: May 7th, 2004

SUBJECT: **Operation of the Lower Columbia Pools for the Spring 2004 Treaty Fishery**

The Columbia River Inter-Tribal Fish Commission, on behalf of its member tribes the Nez Perce Tribe, the Yakama Nation, the Confederated Tribes of the Umatilla Reservation, and the Confederated Tribes of the Warm Springs Reservation, requests the following reservoir operations in Zone 6 (Bonneville to McNary dams) during the 2004 spring Treaty fishery. Implement the following hydro-system operations during the ceremonial, subsistence, and commercial Treaty fishery times as established by the tribes and the Columbia River Compact.

SPECIFICATIONS: Implement the following operations as a hard system constraint as follows:

May 11th, 2004, 6 am, Tuesday, through 6 pm, May 14th, 2004, Friday.

Bonneville Pool: Operate the pool within 1.0 foot from full pool (msl elevation 76.5 – 75.5).

The Dalles (Celilo) Pool: Operate the pool within 1.0 foot (msl elevation 159.5 - 158.5).

John Day Pool: Operate the pool within 1.0 foot (msl elevation 264.5 - 263.5).

JUSTIFICATION:

The 2004 spring Treaty fishing season is of critical importance to CRITFC's member tribes. The escapement of an estimated **164,400** adult spring Chinook and lower catch efficiencies will give limited harvest opportunities to tribal fishers for the rest of May. As of May 5th, 227 nets were in the Zone 6 pools, as follows: 114 in Bonneville, 71 in The Dalles, and 92 in John Day. Many fishers will be exercising their treaty rights by participating in this harvest. Many cultural and religious ceremonies and practices will occur with the harvest of these salmon.

During a meeting at CRITFC's Law Enforcement Division in Hood River on September 2, 1999, tribal fishers explained the impacts of unstable pools and pools below full to the Treaty fishery to Colonel Mogren and Lt. Colonel Harshbarger. The tribal fishers explained that a pool fluctuation of 1.0 foot or more disrupts tribal fishery operations. Specific problems include: (1) increased local currents that sweep debris into fishing nets, (2) rapid 1-2 hour drops in water level will lead to entanglement of nets, (3) boat access problems, and (4) nets torn from their anchors. Nets and gear are costly to replace. Any delays or disruptions to tribal fishing operations caused by the excessive pool fluctuations in Zone 6 negatively impacts tribal incomes, food resources and cultural practices.

The fishers also stressed to Corps officials that the loss of fishing opportunity during the extremely limited treaty fishery cannot be replaced. Much of the tribal fishers' income and food is generated during the brief treaty fishing season, thus, any delays or disruptions to their fishing operations caused by the excessive pool fluctuations in Zone 6 negatively impacts tribal incomes, food resources, and cultural practices.

Implementing this request will insure that the Federal operating agencies meet their federal trust responsibilities to the Columbia Basin treaty tribes. If this SOR cannot be accommodated, CRITFC's member tribes request a detailed written response from the federal operators, with justification, by Friday, May 14th, 2004.

TECHNICAL MANAGEMENT TEAM

BOR: Tony Norris / John Roache

BPA: Scott Bettin / John Wellschlager

NMFS: Paul Wagner / Chris Ross

USFWS: David Wills / Howard Schaller

OR: Ron Boyce

WA: Cindy LeFleur

ID: Russ Kiefer

MT: Jim Litchfield

COE: Cindy Henriksen / Rudd Turner / Cathy Hlebechuk

TMT MEETING

Wednesday 19 May 2004 0900 - 1100 hours

**Custom House Room 118
Portland, Oregon
Conference call line: 503-808-5190**

*All members are encouraged to call Donna Silverberg with any issues or concerns they would like to see addressed.
Please e-mail her at dsilverberg@cnnm.net or call her at (503) 248-4703.*

AGENDA

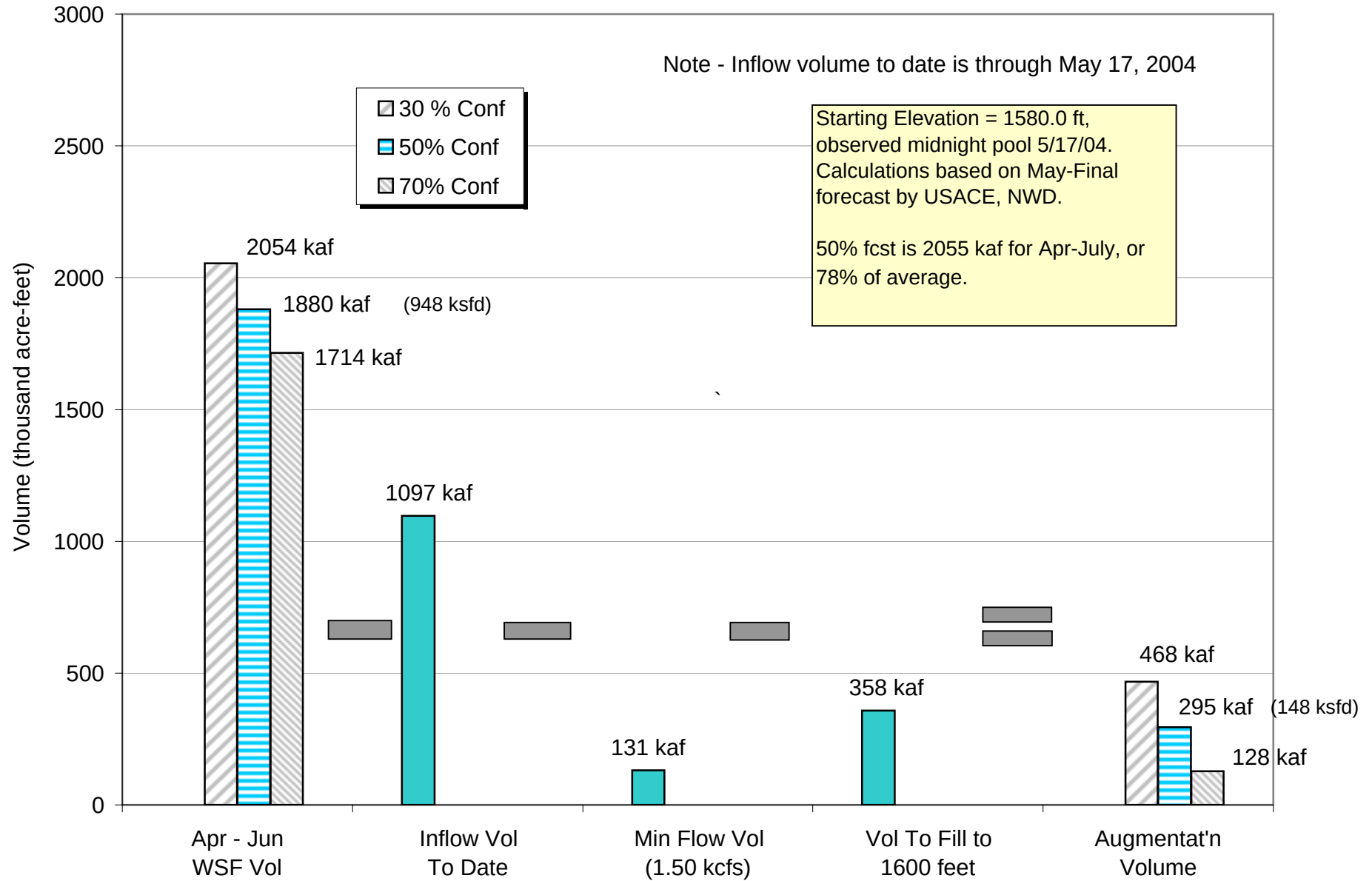
1. Welcome and introductions.
2. Status of Hanford Reach (Chris Carlson)
[\[Technical Management Team \(TMT\) Online Discussion Forum \]](#)
3. Mid-Columbia Flow Objectives
4. Surgeon SOR (USFWS)
[\["SOR #2004-FWS1 Received May 20, 2004" \]](#) 
5. Status of Operation
 - a. Reservoirs
 - i. [Dworshak \(USACE\)](#) 
 - ii. [Hungry Horse](#) 
 - b. Fish
 - c. Power System
 - d. Water Quality
[\[Average percent TDG for 12 highest hours - May 2004 \]](#)
6. CRITFC
[\[SOR C-3 May 17, 2004 \]](#) 
7. SOR #2004-10 May 18, 2004

[\[Implementation of Full BIOP Spill and Compensation for Reduced BIOP Spill at The Dalles and John Day Dams. \]](#) 
8. SOR #2004-11 May 18, 2004

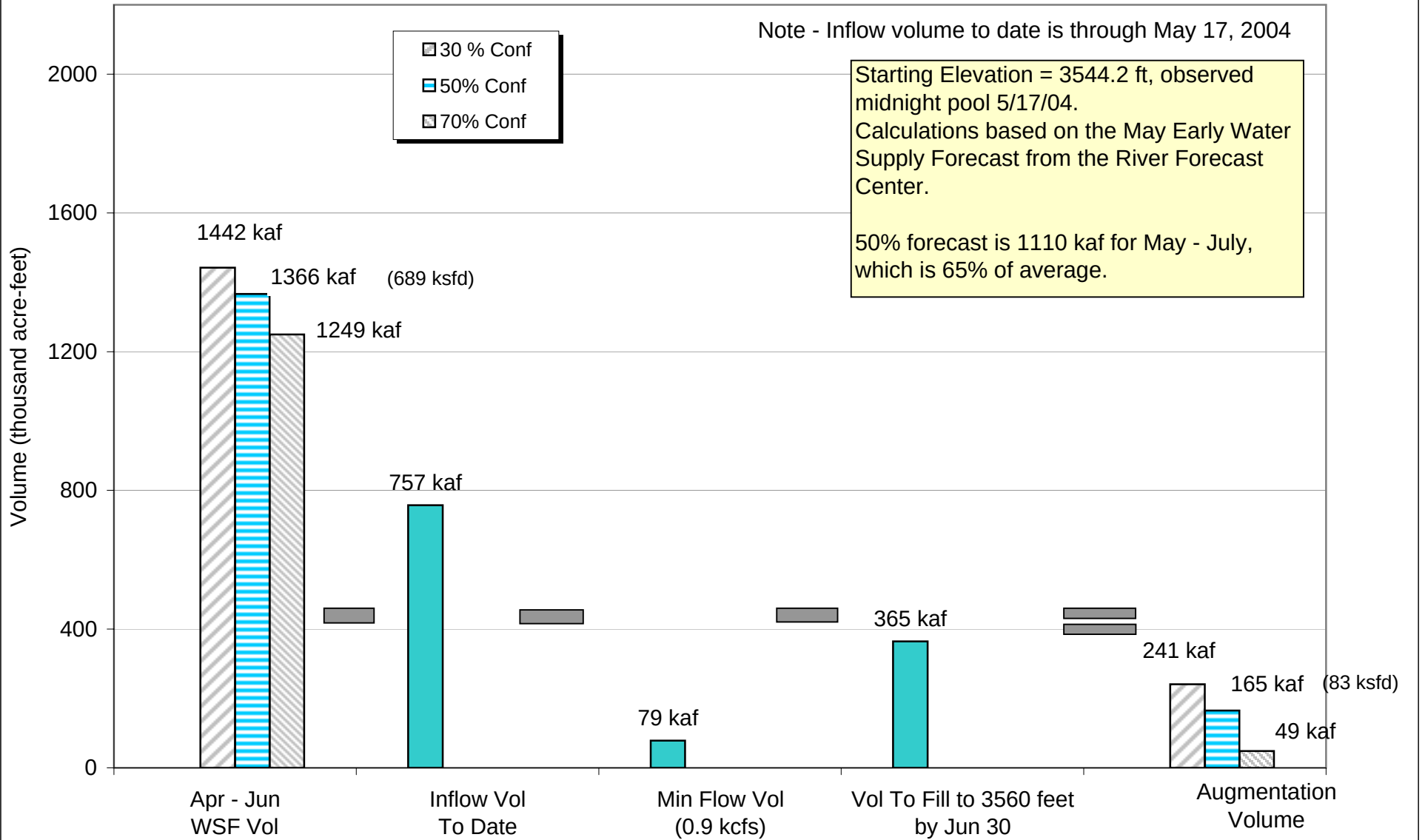
[\[McNary Turbine Operations \]](#) 
9. Other
 - a. Set agenda for next meeting

Questions about the meeting may be referred to Cindy Henriksen at (503) 808-3945, or Rudd Turner at (503) 808-3935, or Cathy Hlebechuk at (503) 808-3942

Volumes at Dworshak
1 April Through 30 June



Volumes at Hungry Horse 1 April Through 30 June



COLUMBIA RIVER REGIONAL FORUM

TECHNICAL MANAGEMENT TEAM

May 19th, 2004

FACILITATOR'S SUMMARY NOTES ON FUTURE ACTIONS

Facilitator: Robin Harkless

The following notes are a summary of issues that are intended to point out future actions or issues that may need further discussion at upcoming meetings. These notes are not intended to be the "record" of the meeting, only a reminder for TMT members.

Status of Hanford Reach:

Chris Carlson, Grant County PUD, reported on the weekly average flows at Hanford Reach for May 10-16th. The average daily discharge for the week was 139.3 kcfs. End of emergence occurred on May 10th, so the PUD started operating toward 400 temperature units on May 11th. They were at 65 tu's as of May 16th. Chris will provide another update on the status on Hanford Reach at next week's TMT meeting.

Mid-Columbia Flows:

The COE continues to operate to meet 135 kcfs flow objectives at Priest Rapids and will provide TMT with ESP runs at the next TMT meeting to aid in discussions on this issue next week.

CRITFC SOR C-3:

Kyle Martin presented a request for a spring treaty fishery from 6 am today, May 19th, until 6 pm Friday, May 21st. CRITFC requested that Bonneville, The Dalles and John Day pools be operated at 1' from full, and stable. Kyle noted that this should be the last fishery for the season. Cindy Henriksen, COE, said that a teletype has been issued to operate Bonneville at 75-76.5' as a hard constraint and 75.5-76.5' as a soft constraint; The Dalles at a 3' pool (but noted that the pool generally remains stable); and John Day at the BiOp 1.5' range, from 262.5-264'. Kyle will present a review of the spring treaty fishery at next week's TMT meeting.

System Status Review:

Reservoirs: Libby is at elevation 2423', releasing 4 kcfs out, and has a water supply forecast of 4.9 MAF (just above a tier one flow volume for sturgeon). Libby is filling about .5'/day. Hungry Horse is at elevation 3544.3', releasing a weekly average of 3.9 kcfs and operating to fill by June 30. Grand Coulee is at elevation 1272.3'. Dworshak is at elevation 1581' (19' from full). The COE is doing some load shaping at this time, and provided bar graphs of volumes projections for Dworshak and Hungry Horse to show refill possibilities at the projects. The COE plans to maintain current outflows at Dworshak and go to minimum flow in early June.

Flows for May 10-16th averaged 139 kcfs at Priest Rapids; 65 kcfs at Lower Granite; and 230 kcfs at Bonneville.

Fish status: Lower Granite and Lower Monumental are seeing a downward trend in yearling chinook numbers. McNary, John Day and Bonneville are showing high yearling chinook numbers (~100,000 at McNary on 5/15). Steelhead numbers likely peaked at Lower Granite earlier in the week, and not many numbers have been seen yet at McNary and John Day. Subyearling chinook numbers are similar to previous years, with the migration not yet occurring at this time. The trend for yearling and steelhead is lower than previous years, possibly due to full transport. Adult numbers this year are expected to reach 189,000, with a daily count last week of 1,500-2,500.

Water quality: Jim Adams, COE, reported that, due to low flows in the system, there has been spill to the gas caps only at McNary and Bonneville, and no exceedances. The COE is using the SYSTDG model this year, and has found recently that it tends to be an “over-predictive” model. Thus the COE, over the last two days, has raised the target to attempt to get closer to the gas cap. It was noted that many criteria are used to make these predictions, and that SYSTDG is one of many tools in the tool box. It is an on-going, interactive process that is updated daily.

Sturgeon SOR:

Bob Hollock, USFWS, described a forthcoming SOR from the USFWS for a sturgeon pulse operation. The trigger to start this operation would be the first spawning event at Hemlock. When this trigger occurs, increase flows out of Libby to 13 kcfs, 14 kcfs, 15 kcfs, and 16 kcfs (ramp up one kcfs per week) for a total four week operation. A second trigger would be if spawning occurs at Bonner’s Ferry, and the requested operation would be the same as above. Alternatively, if no spawning occurs, the request for a sturgeon pulse operation will no longer be put forth and the USFWS recommendation will be for a ramp down to Bull Trout BiOp operations.

A question was raised whether the SOR has a contingency for not refilling Libby, to which Bob responded no, not as written. TMT discussed some alternative operations for the potential of refilling Libby at a lower flat flow after the end of the sturgeon operation. This may need further discussion. NOAA requested that the SOR fully acknowledge both salmon and bull trout needs. Montana noted that there seems to be an opportunity for a win-win operation for sturgeon and bull trout. TMT agreed that they need to look at the SOR before agreeing to fully implement it, and agreed to allow the start of operations if the spawning trigger occurs.

ACTION: Bob Hollock will send the SOR to TMT as soon as possible. He will be the contact point for biologists on the river, and will contact Cindy Henriksen if/as soon as the spawning trigger occurs. Cindy will then send an email notification to TMT members. TMT will have further discussions on sturgeon operations at next week’s TMT meeting.

SOR 2004-10:

The salmon managers presented a request to implement full BiOp spill at John Day and The Dalles, as well as provide mitigation for not spilling to 40% at The Dalles and 60% at John Day earlier this year. Paul Wagner noted that NOAA signed on to the SOR in an attempt to open a discussion of why the COE was not able to implement to the

percentage of spill at the two projects. The Dalles has physical limitations with the positioning of the gates, so have operated up to 40% spill, recognizing that the objective is to reach BiOp spill levels as often as possible. Relative to John Day, again the COE has been operating up to 60% spill, and offered that there may be room to adjust the stops in order to get closer to the 60%. The salmon managers recognized that they may need to revisit and re-write the FPP in order to more clearly characterize the objective of meeting the spill percentages as much as possible, rather than spilling up to the percentages.

Relative to the compensation piece of the request, the COE was not prepared to grant mitigation spill operations for the salmon managers' estimated differences between planned and actual spill. BPA was not available to respond to the SOR.

ACTION: The COE will send out a teletype that reinforces the objective of meeting the respective 40% and 60% spill objectives at The Dalles and John Day. They will work with project operators and BPA schedulers to find adjustments to operate closer to 60% at John Day. The salmon managers will request a response from BPA on the compensation piece of the SOR at the next TMT meeting.

SOR 2004-11:

The salmon managers presented SOR 2004-11, to operate McNary within 1% and stop the McNary modification test immediately in order to meet that objective. The justification for this was the concern for higher mortality and de-scaling that has occurred at the project. NOAA, while not signing on to the SOR, noted that they share the concern and also are interested in continuing the test, so would like to further investigate the situation before ending the test.

FFDRWG planned to discuss this issue during a meeting today in Walla Walla. While all TMT members shared an interest in hearing the outcome of that discussion, there was disagreement about whether the test should be stopped until a final decision could be made by TMT on this matter, or whether FDRWG should decide whether to continue the test given this new knowledge. (The test was scheduled to continue today, then stop and re-start on Sunday, May 23rd.)

ACTION: Mark Smith, Walla Walla COE, will send a summary of the FFDRWG discussion to TMT members for their next discussion on this issue. The project biologists will be alert to the salmon managers' concerns and will stop the test if they see an increase in mortalities or descaling. If deemed necessary, Dave Wills will call an emergency TMT meeting (by first calling Cindy Henriksen who will forward the notice on to all TMT members) on Friday, May 21st. Otherwise, TMT will revisit this issue at their next regularly scheduled meeting on Wednesday, May 26th.

Next Meeting, Wednesday May 26th, 9-noon:

Agenda Items:

- Status of Hanford Reach
- Mid-Columbia Flows/ESP analysis
- Review Spring Treaty Fishery
- Sturgeon SOR

- Response from BPA re: 2004-10 SOR
- McNary 1% Update
- System Status Review

1. Greeting and Introductions

The May 19 Technical Management Team meeting was chaired by Cindy Henriksen of the Corps and facilitated by Robin Harkless. The following is a distillation, not a verbatim transcript, of items discussed at the meeting and actions taken. Anyone with questions or comments about these minutes should call Henriksen at 503/808-3945.

2. Status of Hanford Reach.

Chris Carlson reported that, for the week ending May 16, the average Priest Rapids flow was 139.3 Kcfs. The flow band ranged between 40 and 60 Kcfs, and was significantly exceeded only on Monday, May 10, when the flow band was 40 Kcfs and the actual change in flows was 84.1 Kcfs. He added that a total of 65 temperature units have been recorded since the end of emergence on May 10; the fish are accumulating approximately 11 TUs per day.

3. Mid-Columbia Flow Objectives.

Henriksen noted that last week's Mid-Columbia flow objective was 135 Kcfs; the actual weekly flow observed at Priest Rapids Dam was 139.3 Kcfs. Paul Wagner said the salmon managers would like to maintain 135 Kcfs as the Priest Rapids target through the end of next week – the end of May, essentially. Henriksen said the Corps will be re-running its ESP model using the most recent flow and volume forecast data, and will provide this information to the salmon managers prior to next week's TMT meeting.

4. Sturgeon SOR.

Bob Hallock said the 2004 sturgeon SOR has been prepared, but has not yet been signed by Fish and Wildlife Service management and sent to the action agencies. The SOR recognizes that there is not a great deal of water available in 2004; we're attempting to move the sturgeon to the best available spawning area, he said. The SOR will request that, as soon as spawning behavior is observed (either eggs recovered or female sturgeon observed heading downstream), Libby outflow be increased to 13 Kcfs for one week, then 14 Kcfs for a week, then 15 Kcfs for a week, and finally to 16 Kcfs for a week. The operation could start as soon as this weekend, but again, will be triggered by biological indicators.

Hallock noted that there have been some instances of spawning on the mats and gravel near Bonners Ferry, and if eggs are seen there, that would also trigger the start of the operation. If no sturgeon spawning behaviors are observed, we will not continue with this SOR, Hallock said. If the sturgeon pulse is provided this year, once it is complete, we

would expect the action agencies to ramp Libby outflow down to the bull trout minimum flow, Hallock said.

Jim Litchfield said there has been some discussion in Montana of the possibility of providing something above the bull trout minimum flow from Libby, in order to avoid a double peak in Libby outflow this summer. And you expect Libby to refill this year? Cathy Hlebechuk asked. Henriksen replied that, according to the most recent Corps model runs, given a sturgeon operation similar to the one Hallock just described, followed by a flat 15 Kcfs outflow, the closest Libby will come to refill in 2004 is 9 feet from full. Hallock observed that a flat Libby outflow of 9 Kcfs, rather than 15 Kcfs, would get Libby closer to refill in 2004. That's something we do need to look at more carefully, Litchfield observed – I can see a real win-win opportunity here, in terms of providing a stable flow from Libby through the entire summer period. Litchfield added that the State of Montana will be advocating a full 20-foot draft from Libby this summer, extending into September. Wagner replied that NOAA Fisheries may have a different opinion on that operation, because any water released from Libby in September will not reach the lower river in time to help migrants there. Wagner said it would be nice if the sturgeon SOR referenced the 2000 BiOp salmon augmentation operation. It is acknowledged in the SOR, Hallock replied.

When we modeled this, said Henriksen, we were thinking the operation might start as soon as May 24 – any idea how much lead time we may have? We would like flows to come up as soon as possible once the biological triggers are observed, Hallock replied – we have people following these fish every day. Henriksen said the Corps would prefer to have two days of warning prior to the onset of the sturgeon operation; Litchfield noted that there will be a couple of days of ramp-up, given the fact that Libby is currently releasing minimum outflow. The sooner you can notify the Corps, the sooner we can provide the water, Henriksen said. It was agreed that Hallock will contact Henriksen directly as soon as the biological trigger is seen by the field crews. In the meantime, Hallock said he will provide the signed sturgeon SOR to the TMT by the end of this week.

So is it likely that the sturgeon operation will start next week? Ron Boyce asked. Yes, Hallock replied – water temperatures are already in the correct range. The operation could start as soon as today, given the ripe condition of the females, Scott Bettin noted. Henriksen observed that, procedurally, it is somewhat awkward for the TMT to approve an SOR it has not yet seen. I understand, said Hallock, and will get that to you as soon as possible. Boyce asked that the TMT have some more detailed discussion of operations after the sturgeon SOR is complete; it was agreed to place this topic on the next TMT agenda. Henriksen said the Corps will model a range of operational scenarios for Libby, showing a range of potential operations once the sturgeon operation is complete. Is the TMT comfortable with starting this operation even if we don't have a signed SOR? Harkless asked. I'm not comfortable doing that, Litchfield replied – I think we need to at least run the SOR through an email loop before the TMT signs off on this operation. I'll get it signed as soon as possible and will email it to Cindy, said Hallock. It was agreed that Henriksen will distribute the SOR to the TMT members via email and that any comments or concerns should be provided to her as soon as possible.

5. Status of Operations.

Henriksen said Libby continues to release 4 Kcfs; Libby's current water supply forecast is 4.9 MAF, just above the Tier 1 flow volume for sturgeon – 800 kaf. Libby's current elevation is 2423 – 36 feet from full – and filling about 0.5 feet per day, with inflows in the 14 Kcfs range, down from a high of 25 Kcfs last week. Mary Mellama from Reclamation said Hungry Horse was at 3544.3 feet as of midnight last night, with 3.9 Kcfs out and 5-6 Kcfs in. The project is filling slowly and is expected to refill by June 30. At Grand Coulee, the current elevation is 1272.3 feet, with inflows of 110 Kcfs. The elevation hasn't changed much over the past week, she said.

Dworshak is at 1581 feet, 19 feet from full, releasing 4.2 Kcfs during the week and 2.2 Kcfs on the weekend, Henriksen said. She drew the group's attention to the most recent "Volumes at Dworshak" graph, showing the volume the Corps expects to be able to release from that project above minimum outflow between now and June 30. At a 50% confidence of refill, that volume is now 295 kaf, Henriksen said, noting that this graph has been updated to reflect the May final water supply forecast. It was agreed to maintain the current outflow regime from Dworshak through at least the end of Memorial Day weekend, after which the project will go to minimum outflow (1.3 Kcfs). Henriksen said last week's average flow at Lower Granite was as high as 73 kcfs and as low as 55 Kcfs, with an average of 64 Kcfs. At Bonneville, for the week ending May 16, flows ranged between 257 and 108 Kcfs, with a weekly average flow of about 230 Kcfs.

With respect to current fish status, Wagner said yearling chinook passage at Lower Granite has fallen from more than 700,000 on May 6 to a current index of about 17,000. Numbers continue to be stronger at Little Goose and McNary Dams. With respect to steelhead, Wagner said that, at Lower Granite, the peak of more than 480,000 fish occurred on May 8; index numbers have since receded. Wagner also touched briefly on current subyearling chinook passage data. He then moved on to cumulative passage index graphs for various Snake and Columbia River projects, noting that steelhead passage indices, in particular, are lagging behind historic passage timing.

Scott Bettin said there are no current power system problems to report. Jim Adams said low system flows have kept spill volumes low, with most projects unable to hit their TDG cap limits due to minimum generation requirements. He noted that the Corps' SYSTDG model appears to be running slightly on the conservative side, predicting somewhat higher TDG levels than what is being seen in the actual data. That's something we need to take a look at, Adams said, adding that the Corps will be developing a comprehensive post-season review of SYSTDG's performance. And the current nighttime spill volume at Bonneville is? Wagner asked. Tonight it will be 140 Kcfs, Adams replied, adding that the 120% TDG limit at McNary will be 185 Kcfs of spill tonight.

6. CRITFC SOR 2004 C-3.

On May 17, CRITFC submitted SOR 2004 C-3. This SOR requests that, for the period 6 a.m. May 19 through 6 p.m. May 21, the action agencies maintain the following pool elevations in support of the tribal treaty fishery:

- Bonneville: 1.0 feet from full pool (msl elevation 76.5-75.5)
- Celilo (The Dalles): operate pool within 1 foot of full pool (msl elevation 159.5-158.5)
- John Day: operate the pool within 1 foot (msl elevation 264.5-263.5)

Kyle Martin went briefly through the contents of this SOR, the full text of which is available via hot-link from the TMT homepage. Martin said this is likely the last treaty fishery of the 2004 spring season.

Henriksen said the Corps has already sent a teletype to Bonneville Dam, specifying elevation 75-76.5 as a hard constraint and 76.5-75.5 as a soft constraint. The Dalles will operate within a 3-foot range but the actual operating range will likely be much narrower; John Day pool will be operated in a 1.5-foot range per the BiOp – in essence, the same operating ranges we have provided during the previous two treaty fisheries, Henriksen said. Do you think you'll be able to keep the pools relatively steady during the fishery? Martin asked. We have seen no additional special requests that would cause pool elevations to fluctuate, Henriksen replied.

7. SOR 2004-10.

On May 18, the action agencies received SOR 2004-10. This SOR, supported by USFWS, IDFG, ODFW, WDFW, NOAA Fisheries, the Shoshone-Bannock Tribes and CRITFC, requests the following specific operations:

- Assure spill at John Day and The Dalles Dams is provided to the full BiOp levels (40% of total flow at The Dalles and 60% of total flow for 12 hours at John Day)
- Compensate for spill below the BiOp levels between April 12, 2004 and May 17, 2004 at John Day (295 kaf) and The Dalles Dam (106 kaf). In order to “true up” the difference in planned and actual spill volumes provided, extend the spill interval at John Day to a 12-hour spill program (6 p.m. to 6 a.m.) until the planned and actual spill volumes are equal.

Wills and Wagner provided an overview of this SOR, the full text of which is available via hot-link from today's agenda on the TMT homepage. Wills noted that, after May 15, spill at John Day is cut back to 11 hours per night, rather than 12 hours, hence the suggestion that 12 hours of spill be provided at that project as a potential mitigation measure. The group devoted a lengthy discussion to this SOR, its analytical basis, and the logistical difficulties, in terms of spill gate settings, in providing precise spill volumes. In response to a question, Wagner said the analysis underlying this SOR does not factor in the days when spill was curtailed at John Day because the project was at the gas cap. It's been at the gas cap 38% of the time this year, Scott Boyd noted.

Wagner said NOAA Fisheries does not necessarily agree with ODFW's contention that 40% spill at The Dalles is a guideline, not a ceiling. Still, there is nothing to prevent the Corps from being right at 40% spill at The Dalles, said Boyce. Yes there is, Adams replied – the physical limitations on our ability to finely control the percent of river flow spilled.

The group also discussed spill operations at John Day Dam. Ultimately, Henriksen said it may be possible to increase some of the spill gate stops at John Day to provide some additional spill; she said the RCC will send out a teletype reminding the John Day project operators that 60 percent of total river flow is the goal during nighttime hours. Rudd Turner noted, however, that, overall, the percentage of spill provided at The Dalles and John Day is quite high in 2004, in comparison to some previous years. Again, we will reiterate the 60% objective at John Day, Henriksen said. With respect to spill operations at The Dalles, said Henriksen, we have heard that, in their opinion, the 40% spill number is a ceiling, not to be exceeded, so we will continue to do our best to provide as close to 40% of total river flow as possible, 24 hours a day.

What about the proposal the some additional spill be provided to make up for loss of spill and the impacts of that lost spill on fish passage and survival? Boyce asked. Typically we have not provided this type of compensation, and TMT has had this discussion in the past and decided as a group that it would be counterproductive to count every single lost Kcfs or megawatt, Henriksen said. After a few minutes of additional discussion, Henriksen said that, without all of the TMT representatives at the table (Scott Bettin having had to sign off), the Corps is unable to agree to provide the type of compensation or mitigation the SOR requests.

Wagner noted that reminding the action agencies of their obligation to hit the BiOp spill targets at The Dalles and John Day is the most important component of this SOR. Will you bring this SOR back to TMT next week? Henriksen asked. We haven't yet heard a response from Bonneville, Wagner replied; the response we heard from the Corps today is that they will try to do better at John Day, and that operations will likely be unchanged at The Dalles. In response to a question, Wagner said he would still like to get a response from Bonneville on this SOR, in particular, on the question of whether or not the spill operations provided in 2004 will help the action agencies achieve their BiOp performance standard obligations. I would also like to hear BPA's response to the compensation issue, said Boyce.

8. SOR 2004-11.

On May 18, the action agencies received SOR 2004-11. This SOR, supported by USFWS, IDFG, ODFW, WDFW, the Shoshone-Bannock Tribes and CRITFC, requests the following specific operations:

- Operate all McNary turbine units within the 1% peak efficiency range during spring and summer 2004 as described in RPA Measure 58 in the 2000 Biological Opinion
- Immediately terminate Vertical Barrier Screen tests, which require turbine units outside the 1% peak efficiency range.

Again, Wills provided an overview of this SOR, the full text of which is available via hot-link from today's agenda on the TMT homepage. Please refer to this document for full details and justification. Wills noted that this SOR was submitted in response to the increased rates of mortality and descaling observed this year when McNary turbine

units have been operated outside 1%. We feel that the VBS test is detrimental to fish passage at McNary, said Wills, and agree that the test should be terminated immediately. Wagner noted that, while NOAA Fisheries shares those concerns, they also support the McNary modernization program, and would like the VBS testing to continue for a little longer in order to obtain additional information as to why the descaling and mortality problems are occurring. NOAA Fisheries did not sign SOR 2004-11, Wagner said.

Boyce noted that while ODFW also supports the McNary modernization program, tests such as the 2004 McNary VBS test must be conducted wisely – it's a balance between obtaining the information we need and taking care of the juvenile migrants, said Boyce. Research is secondary to the primary goal of ensuring good fish passage conditions, Boyce said.

After a brief discussion, it was noted that the Walla Wall District FFDRWG group is discussing the McNary modernization test today; there was general agreement that it would be best to wait until FFDRWG weighs in before making a final TMT recommendation on this SOR. It was agreed to revisit this topic at next Wednesday's TMT meeting, once the outcome of today's FFDRWG discussion is known. It was further agreed to ask Mark Smith to summarize that discussion for TMT next week. Wills asked that the Corps postpone the next test period outside 1%, which is due to begin on Sunday, until after TMT can discuss this issue again next week – in other words, he said, let's err on the side of fish. Litchfield said that, to him, it makes more sense to continue the study as designed in order to maximize data collection. Henriksen added that project personnel are already empowered to shut down operation outside 1% if increased descaling and mortality are seen.

The group discussed how best to proceed with this issue. Ultimately, it was agreed that the TMT will have an opportunity to provide any comments they may have on FFDRWG's conclusions; in the meantime, said Wills, I would be comfortable leaving the current test operation in place until next week's TMT meeting, with the stipulation that an emergency TMT conference call may be needed on Friday if additional concerns arise following today's FFDRWG meeting.

9. Next TMT Meeting Date.

The next meeting of the Technical Management Team was set for Wednesday, May 26. Meeting summary prepared by Jeff Kuechle.

TMT PARTICIPANT LIST

May 19, 2004

Name	Affiliation
Robin Harkless	Facilitator
Cindy Henriksen	COE

Jim Litchfield	Montana
Kyle Martin	CRITFC
David Benner	FPC
Tim Heizenrater	PPM
Jim Adams	COE
Rudd Turner	COE
Scott Boyd	COE
Tom Haymaker	PNGC
Tina Lundell	COE
Cathy Hlebechuk	COE
Kevin Nordt	PGE
Ken Corum	PNUCC
Laura Hamilton	COE
Mike O'Bryant	CBB
Paul Wagner	NOAAF
Ron Boyce	ODFW
Ruth Burris	PPL
David Wills	USFWS
Mary Mellama	USBR
Russ Kiefer	IDFG
Cindy LeFleur	WDFW
Chris Carlson	GCPUD
Margaret Filardo	FPC
Russ George	WMCI
Chris Ross	NOAAF
Glenn Traeger	Avista
Martin Hatscher	SCL
Richelle Beck	D. Rohr & Associates
Tom Le	PSE

TECHNICAL MANAGEMENT TEAM

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TMT MEETING

Wednesday 26 May 2004 0900 - 1200 hours

**Custom House Room 118
Portland, Oregon
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[\[SOR #2004-FWS1 Received May 20, 2004 \]](#) 
5. Spring Treaty Fishery (CRITFC)
[\[SOR #2004-C4 \]](#) 
6. McNary 1% Test Operation (Feedback from FFDRWG)
[\[Summary of FFDRWG discussion of MCN Modernization Studies and SOR #2004-11 \]](#) 
7. BPA Response to SOR 2004-10
8. BPA (Steven B. Barton, P.E.) - [\[Within-Hour Operations and Their Impacts to Spill Accounting - Power Point \]](#)
9. Libby Operational Scenerios
 1. [\[Aug2439 Flat \]](#) 
 2. [\[Aug2439 Peak \]](#) 
 3. [\[Sep2439 Flat \]](#) 
 4. [\[Sep2439 Peak \]](#) 
10. Status of Operation
 - a. Reservoirs [\[Hungry Horse \]](#)  [\[Dworshak \]](#) 
 - b. Fish
 - c. Power System
 - d. Water Quality
[\[Average percent TDG for 12 highest hours - May 2004 \]](#)
11. Other
 - a. Set agenda for next meeting

Questions about the meeting may be referred to Cindy Henriksen at (503) 808-3945, or Rudd Turner at (503) 808-3935, or Cathy Hlebechuk at (503) 808-3942

Within-Hour Operations and Their Impacts to Spill Accounting

Wednesday, May 26, 2004



Scheduling Timeline



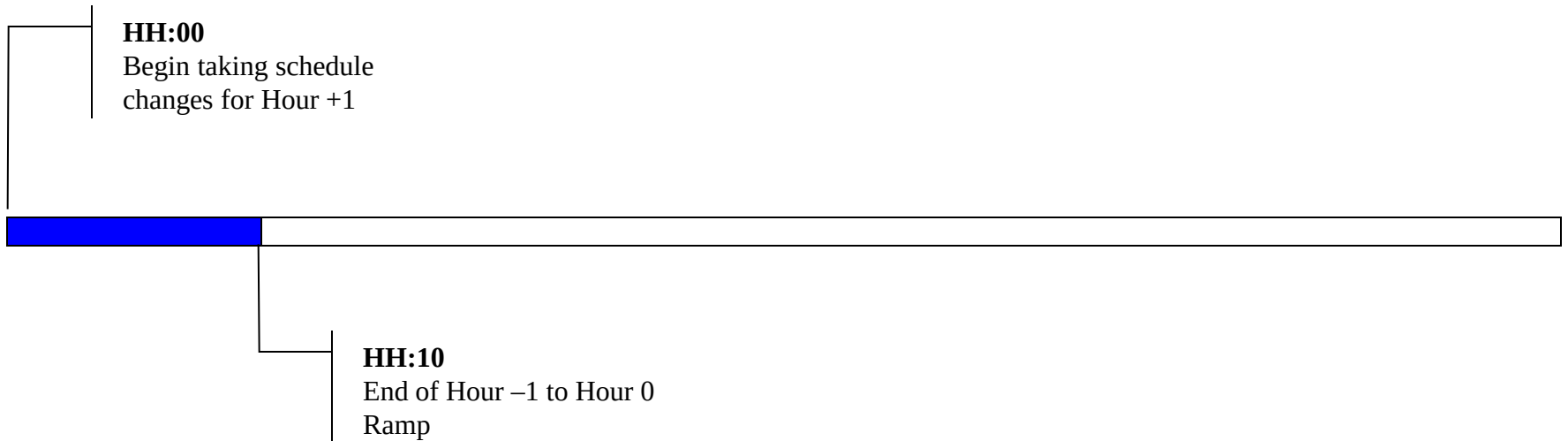
Scheduling Timeline

HH:00

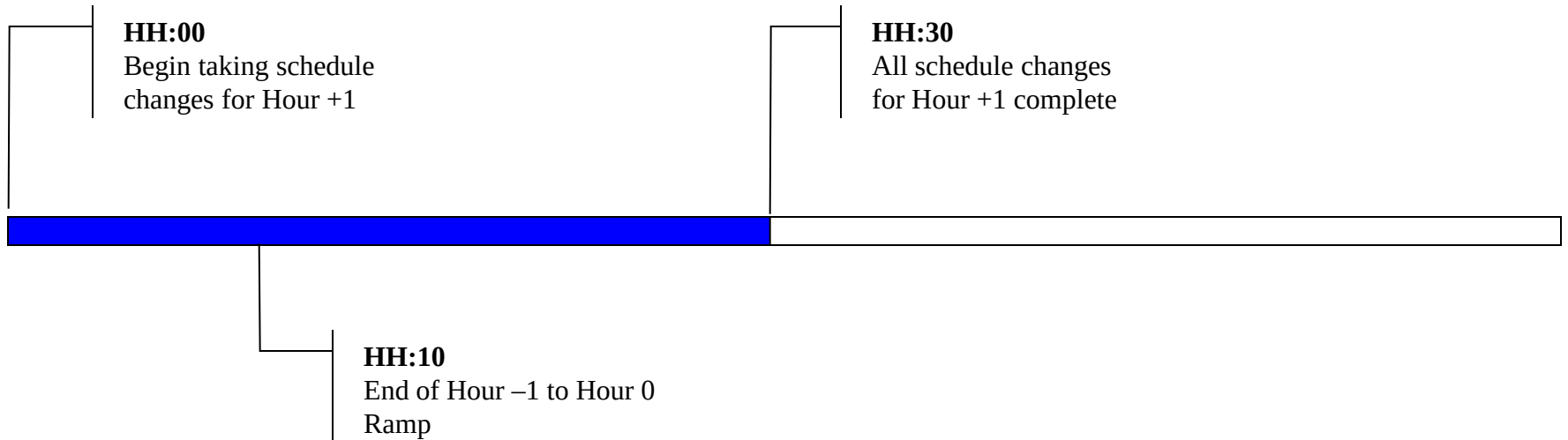
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changes for Hour +1



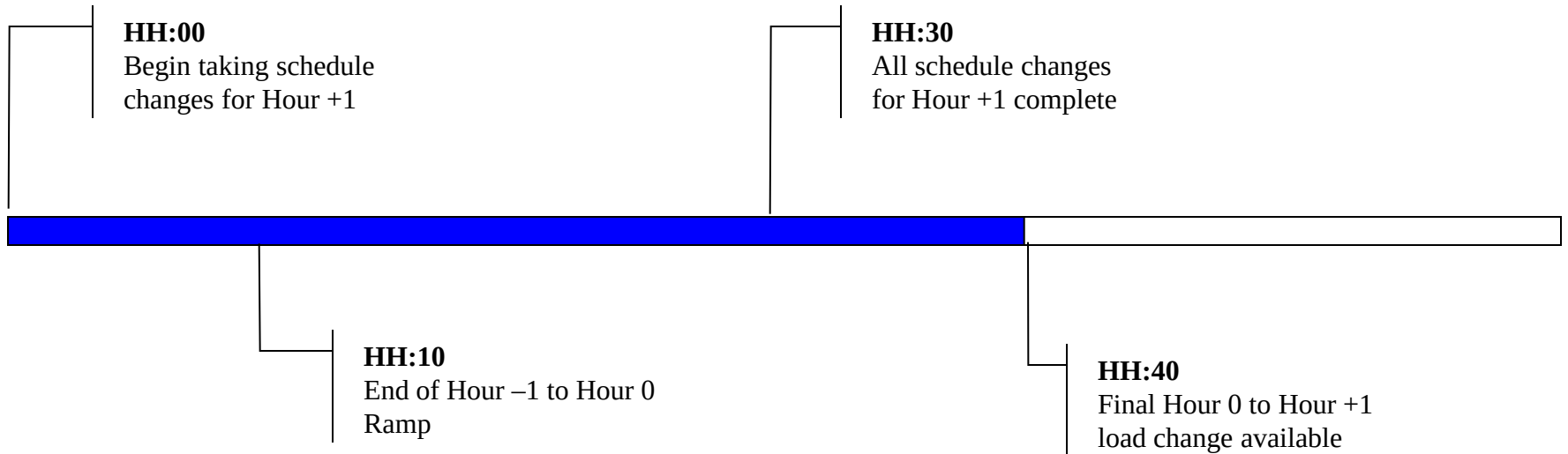
Scheduling Timeline



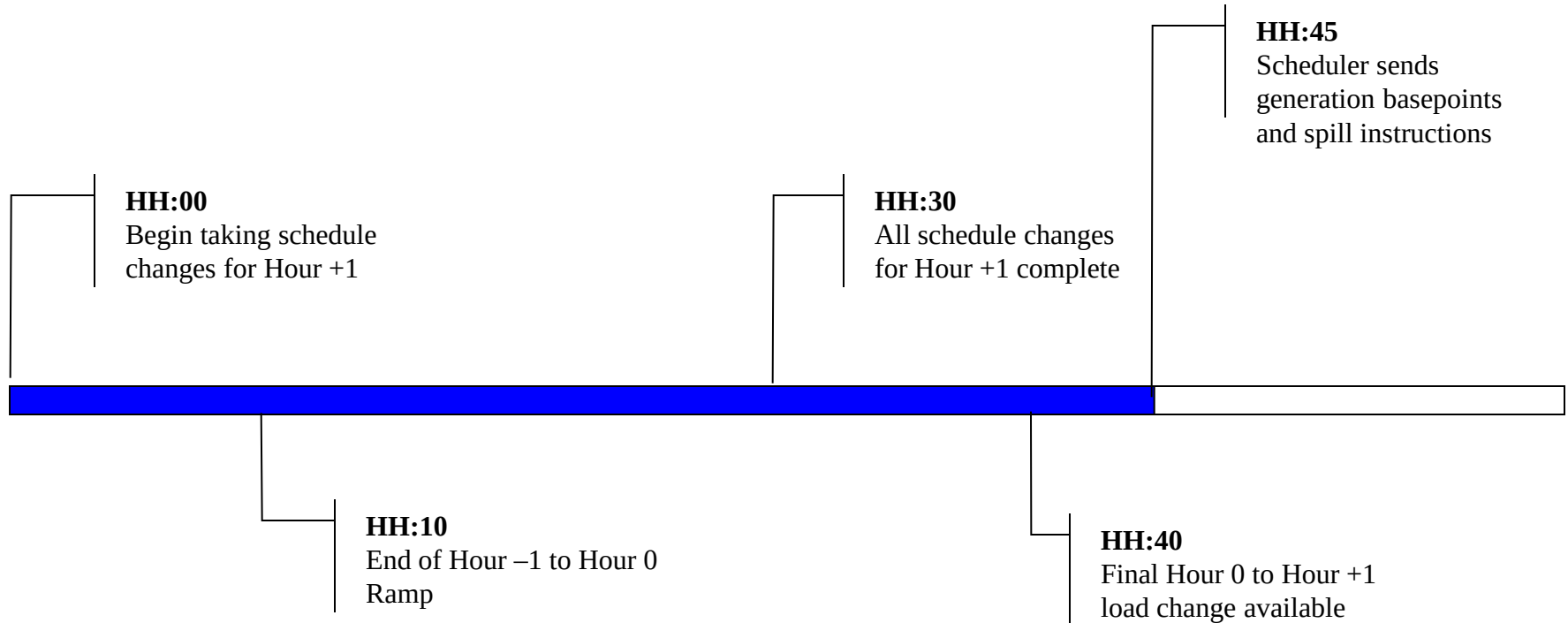
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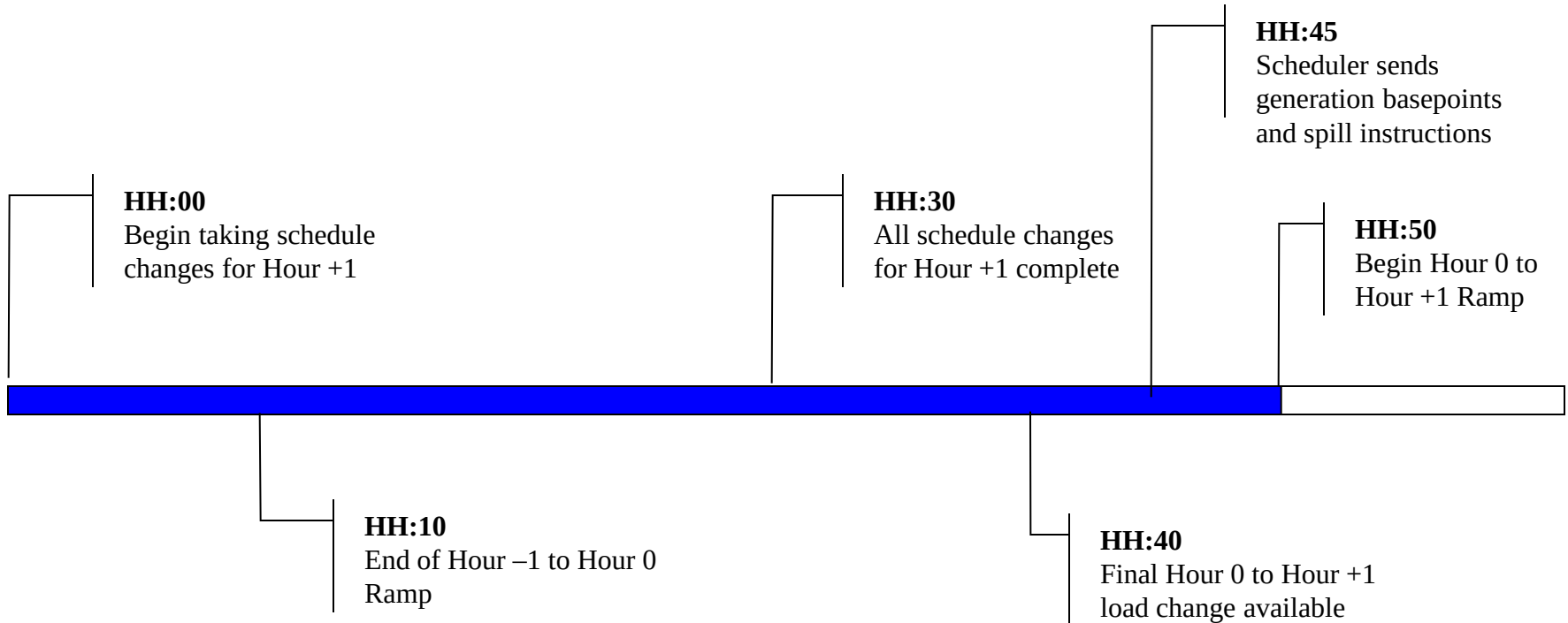
Scheduling Timeline



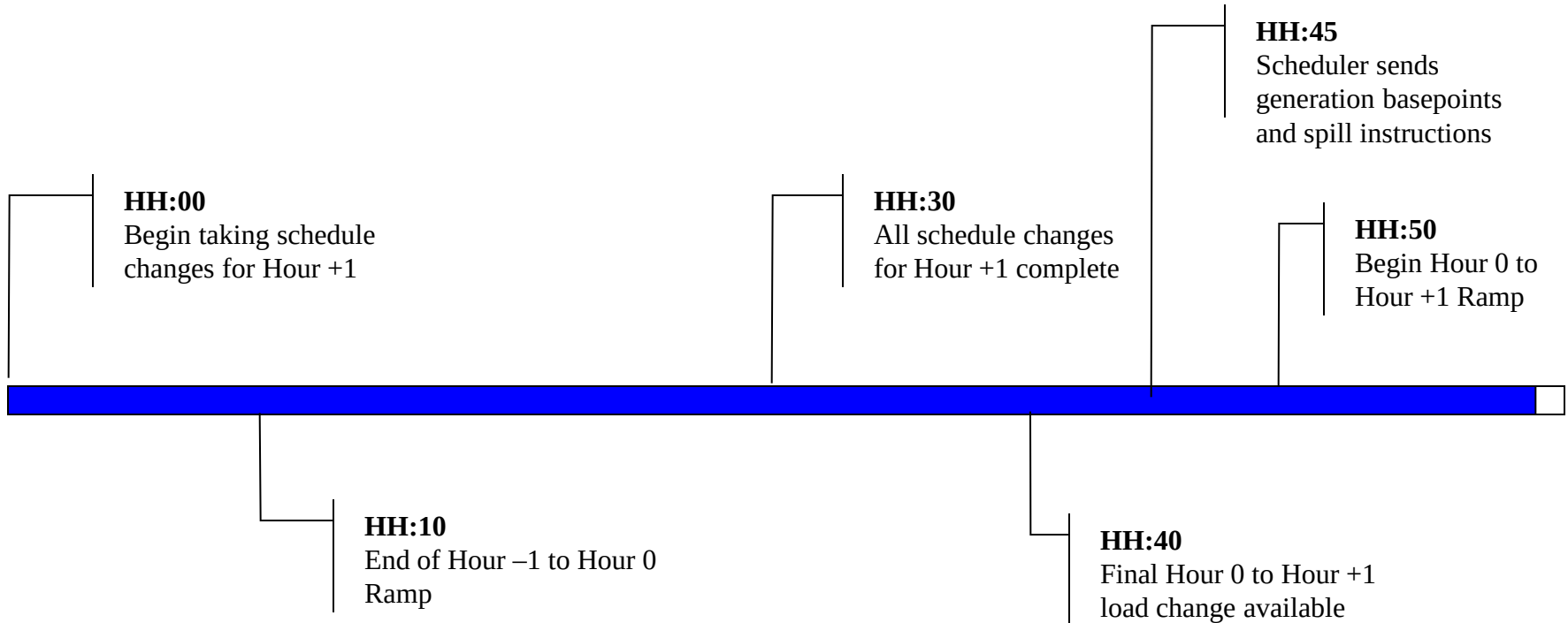
Scheduling Timeline



Scheduling Timeline



Scheduling Timeline



Within-Hour Considerations



Within-Hour Considerations

Minimum generation requirements for voltage control



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- ◆ May limit a project's flexibility to control forebay and discharge using turbine discharge



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- ◆ May elevate “operational” minimum generation value



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Between-Hour Considerations



Between-Hour Considerations

Hourly Ramp



Between-Hour Considerations

Hourly Ramp

- ◆ 20-minute ramp between HH:50 and HH:10



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- ◆ 20-minute ramp between HH:50 and HH:10
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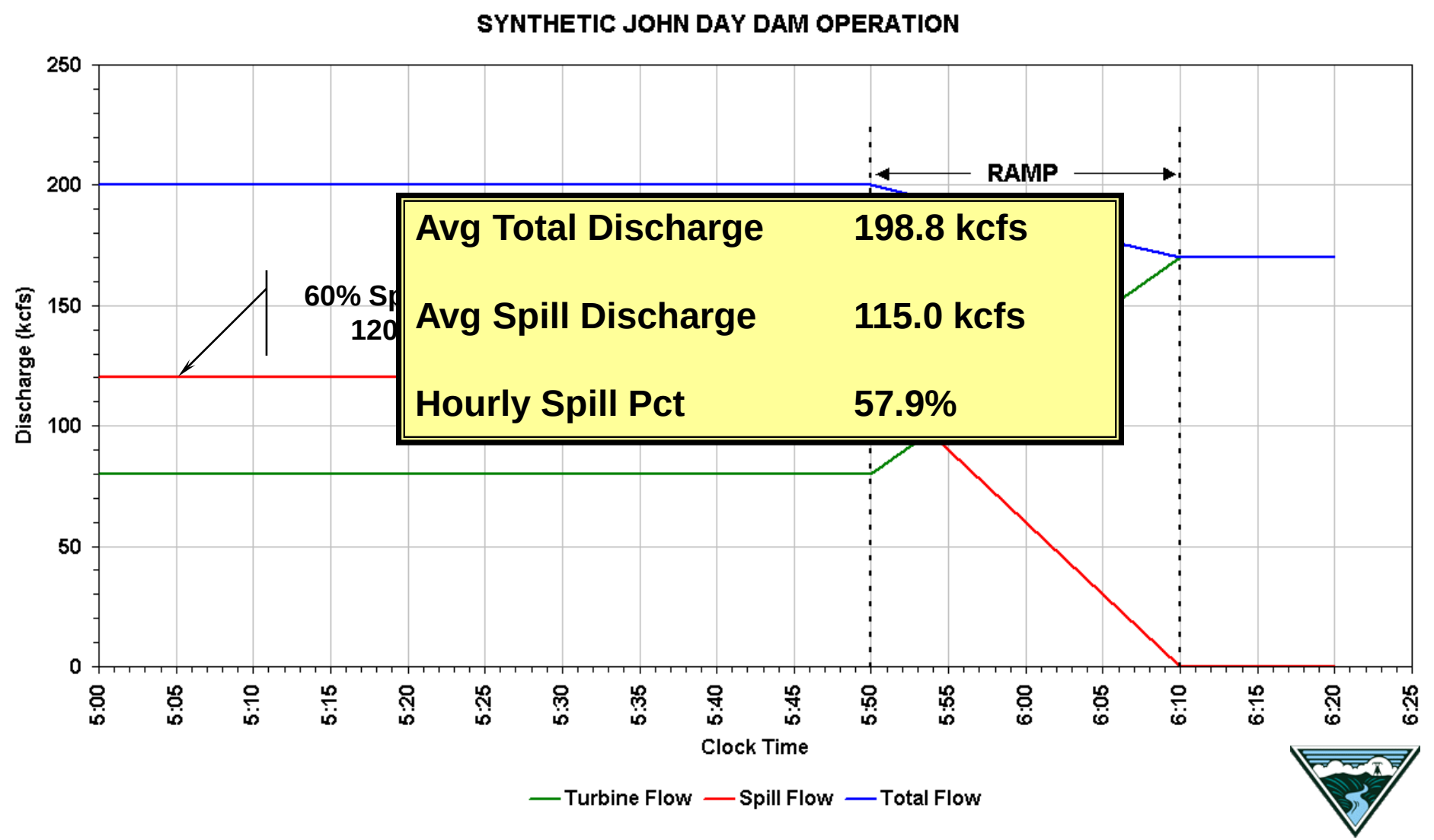
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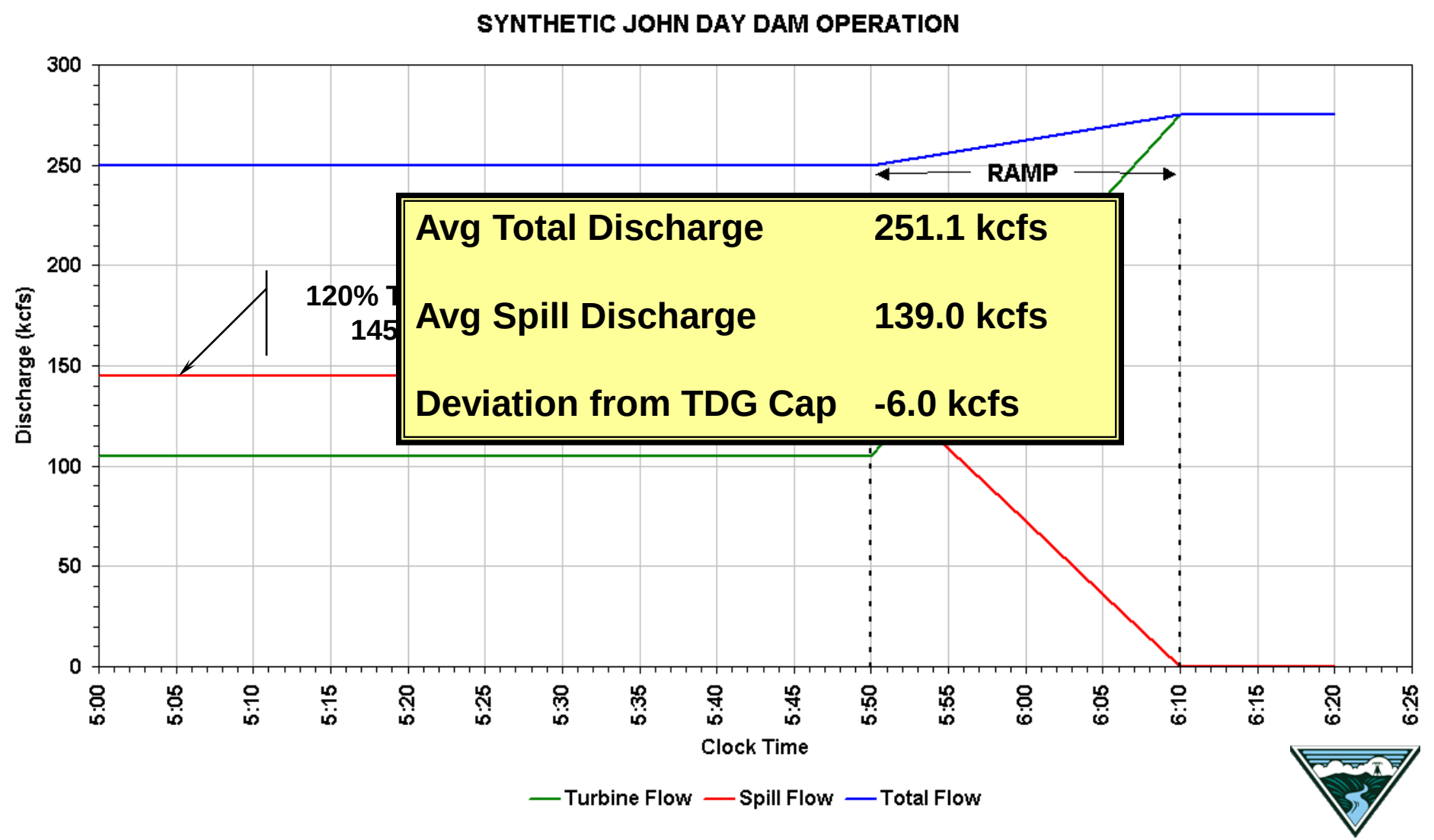
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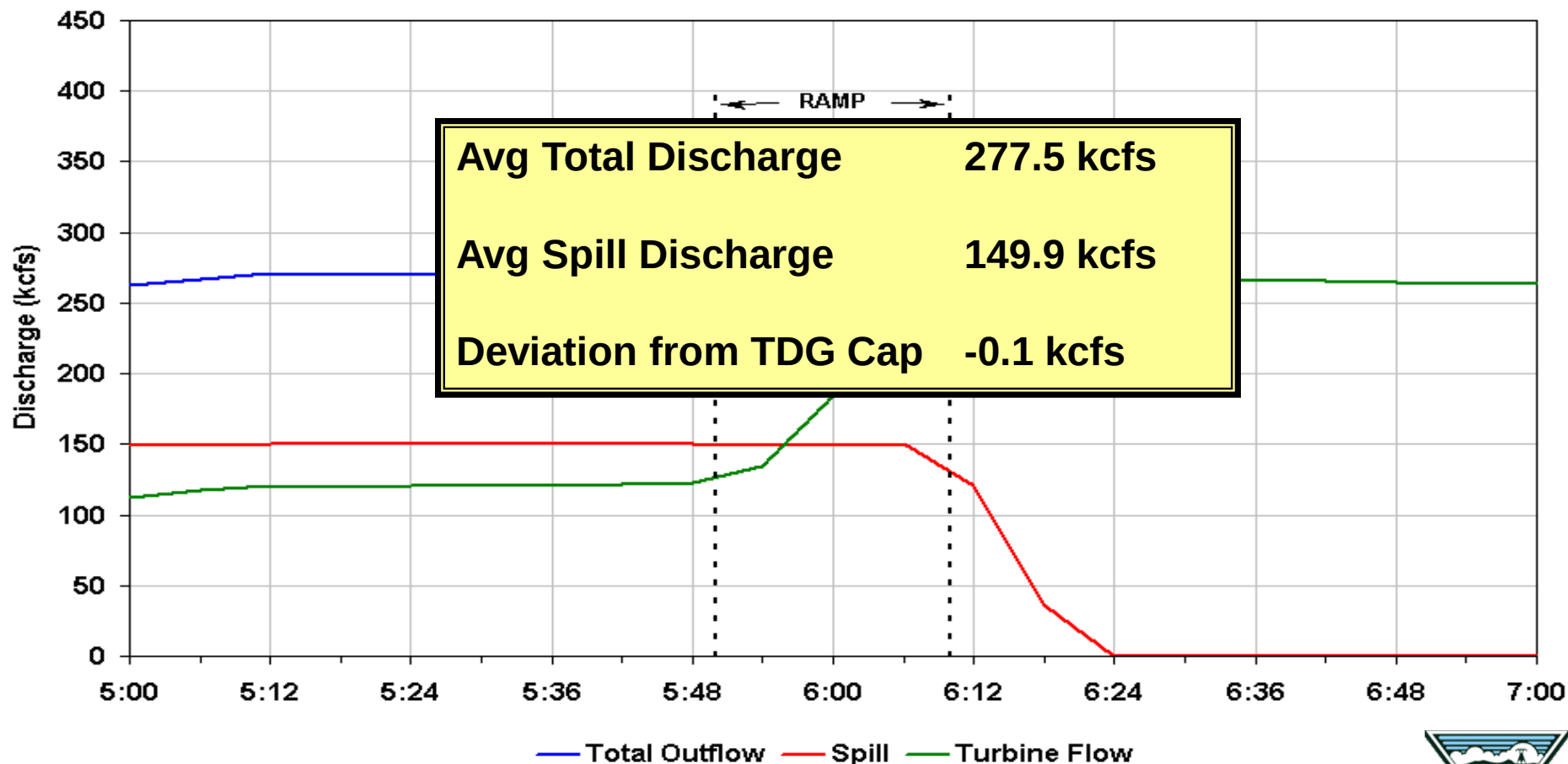


Between-Hour Considerations

JOHN DAY DAM OPERATION

05:00 - 07:00 PDT Monday, May 24, 2004

Condition: Limited by 120% TDG Cap

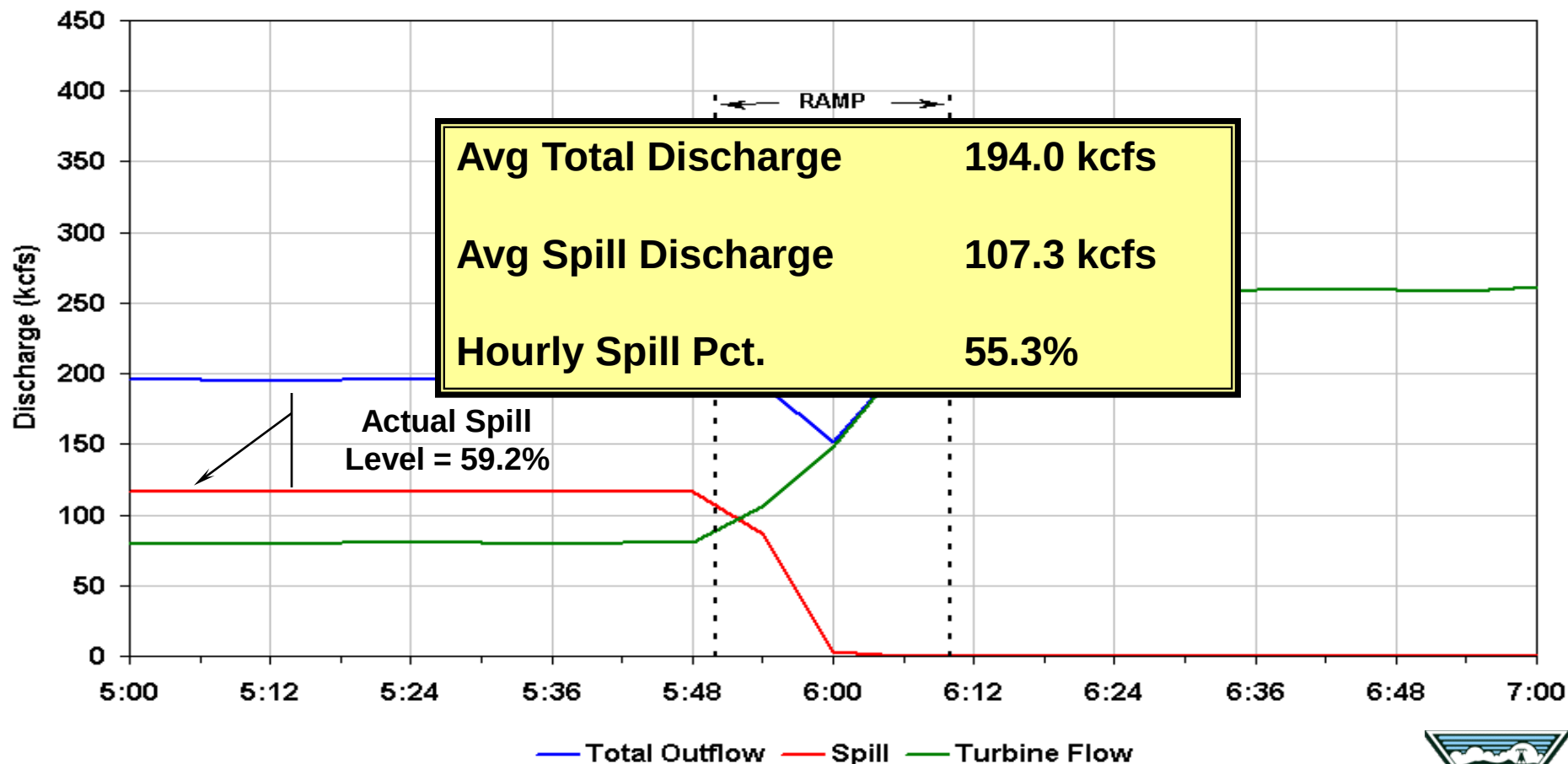


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Within-Hour Operations and Their Impacts to Spill Accounting

Wednesday, May 26, 2004



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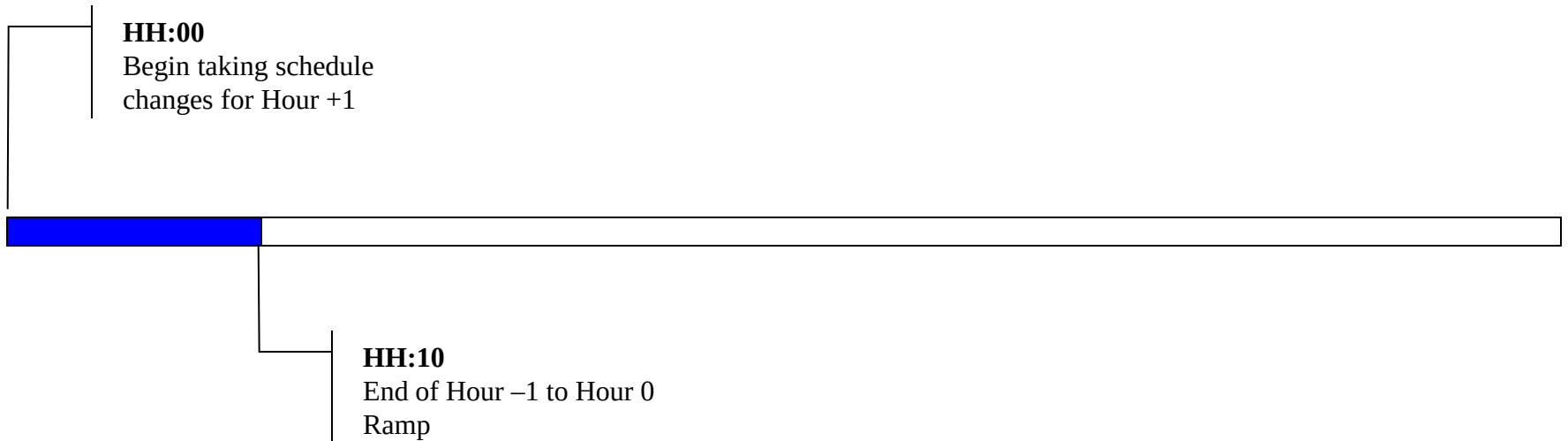
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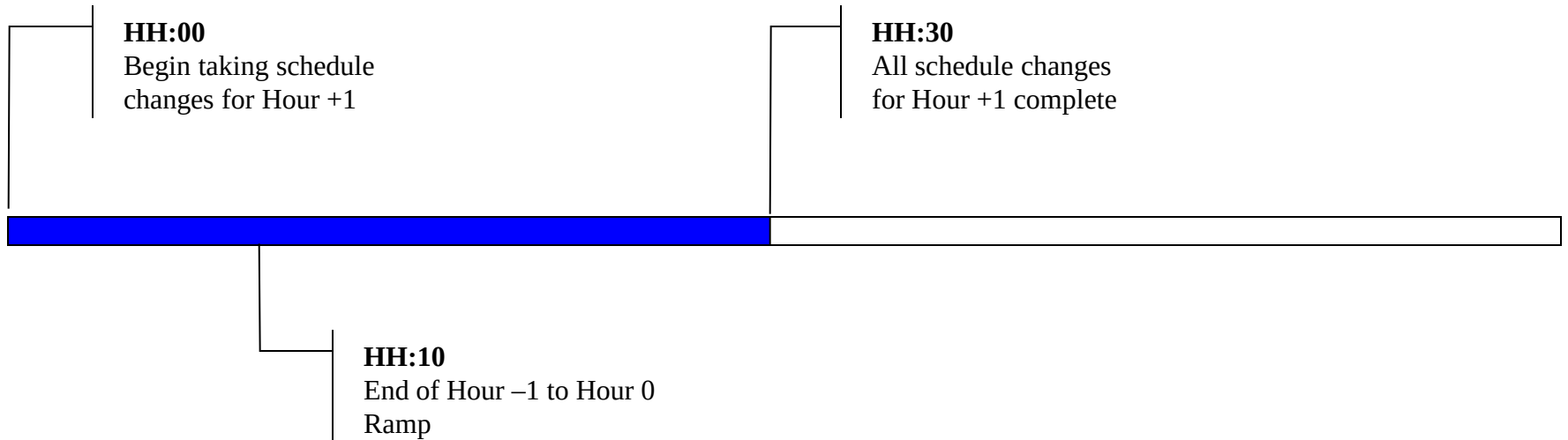
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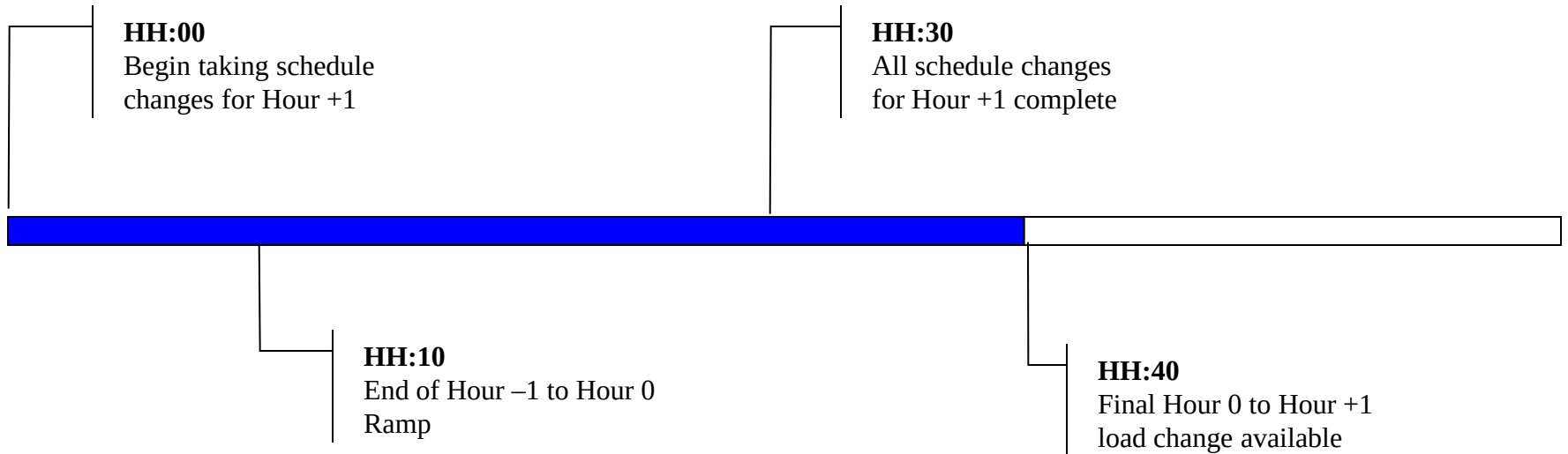
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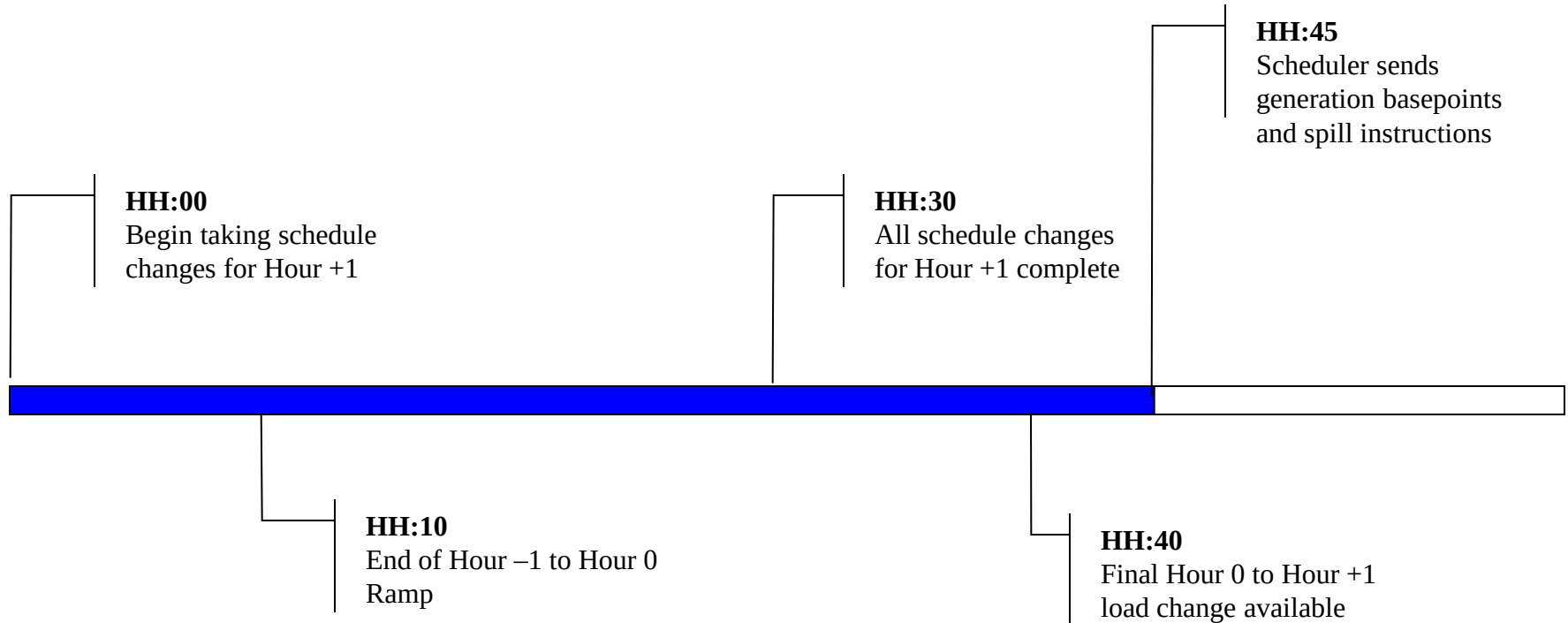
Scheduling Timeline



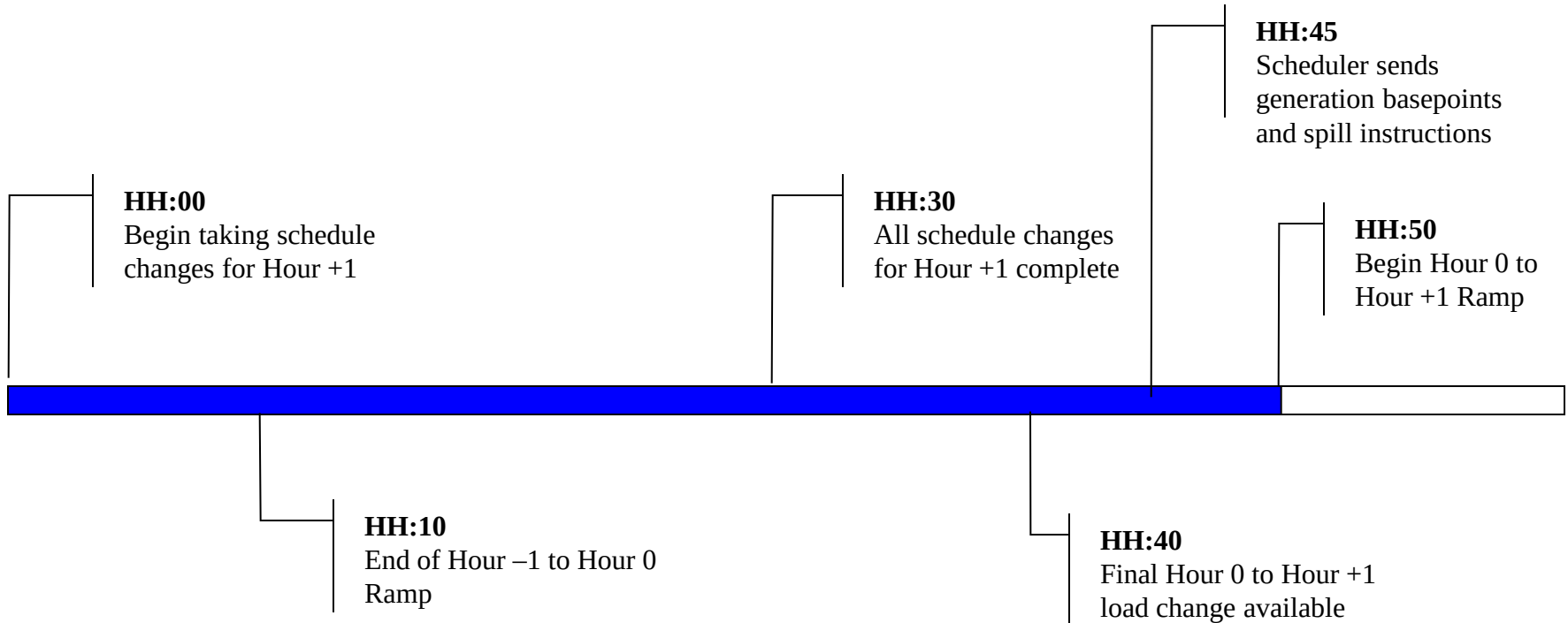
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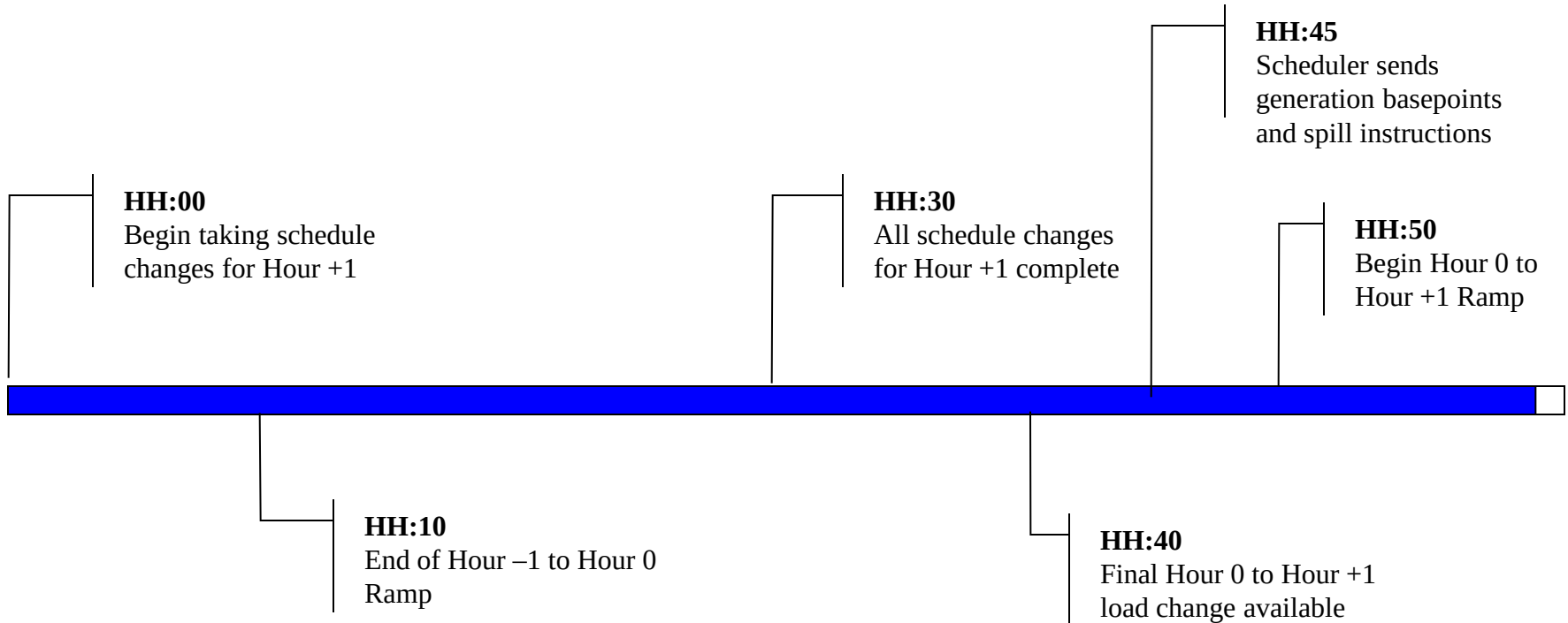
Scheduling Timeline



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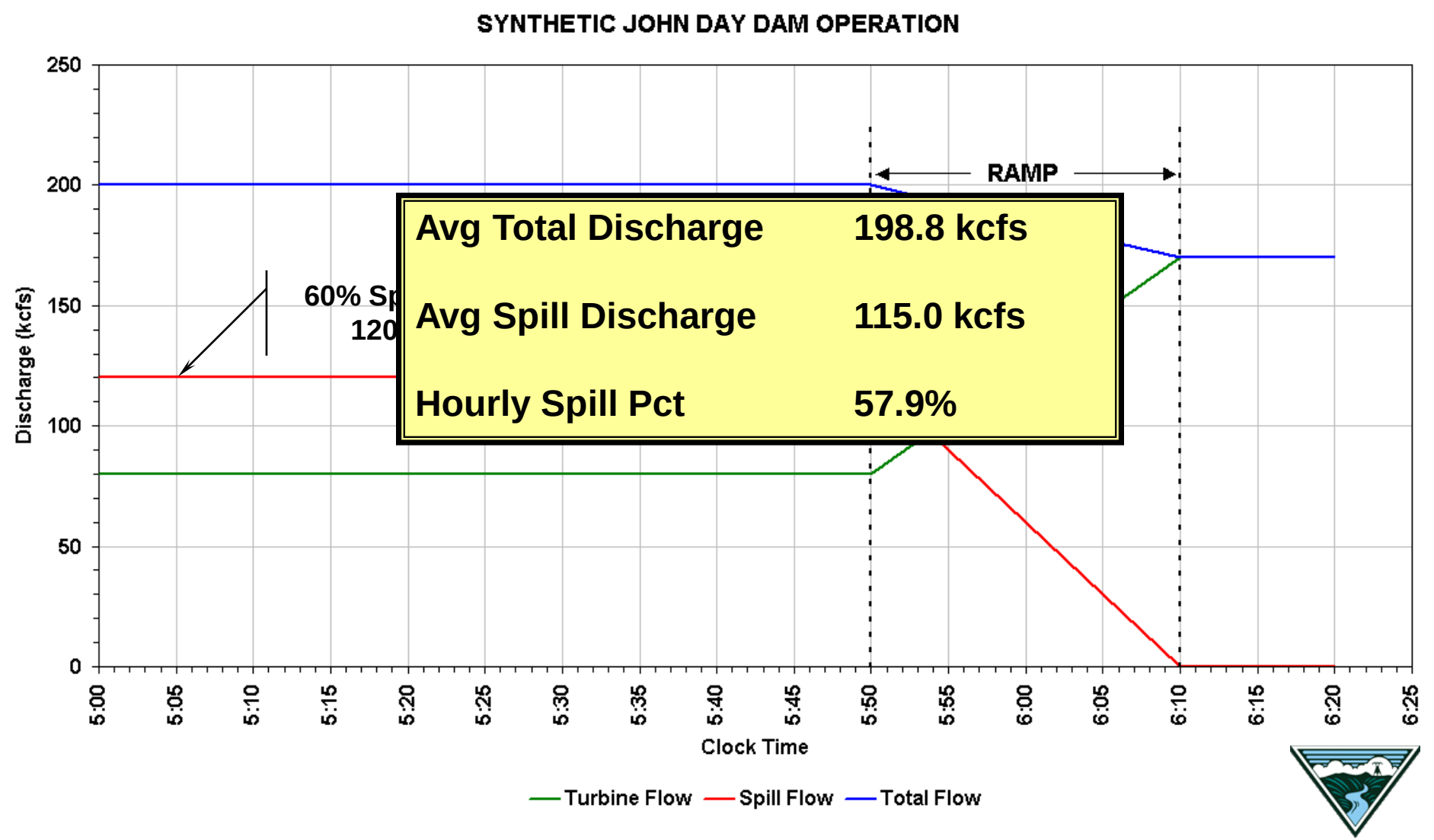
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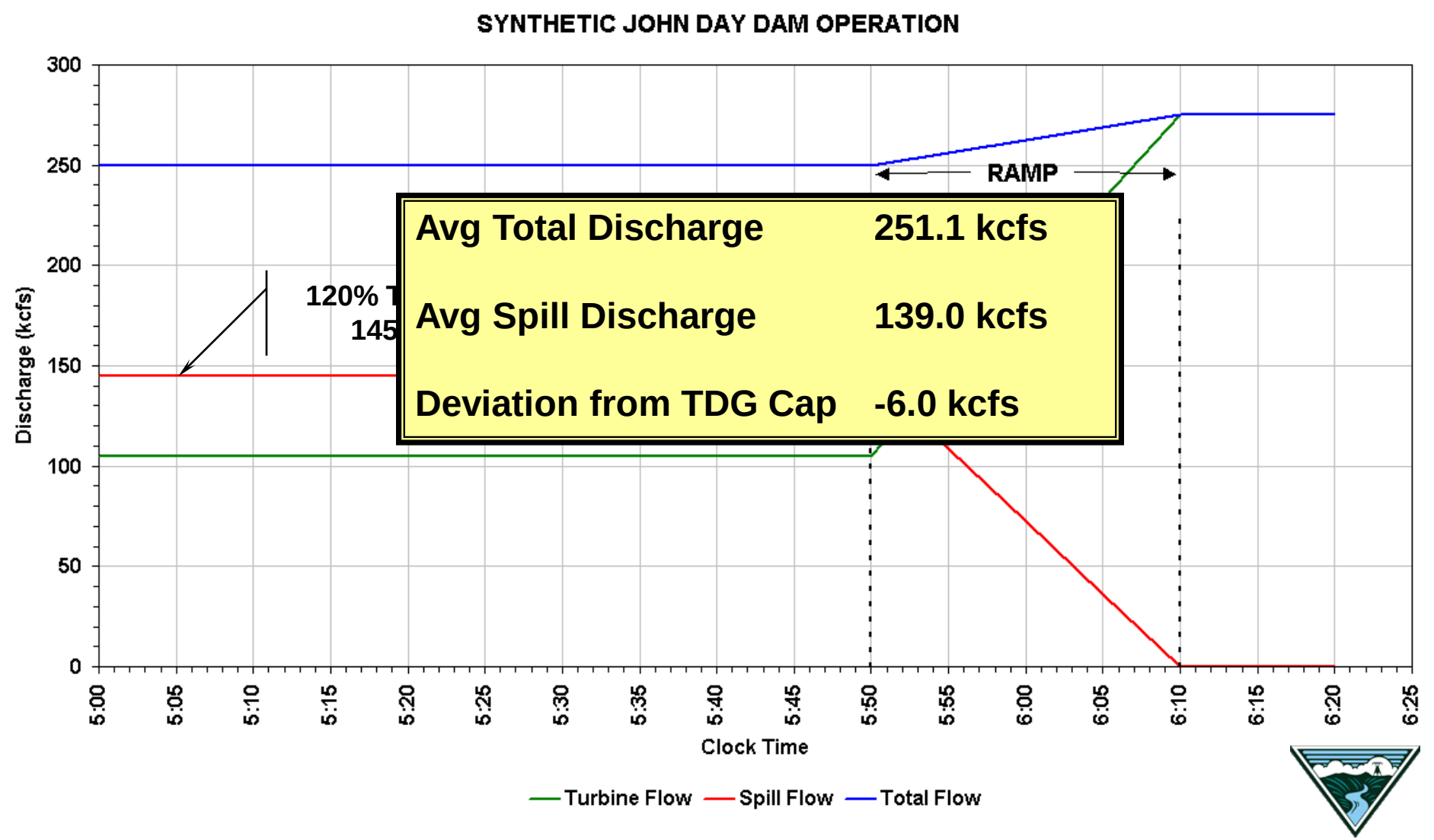
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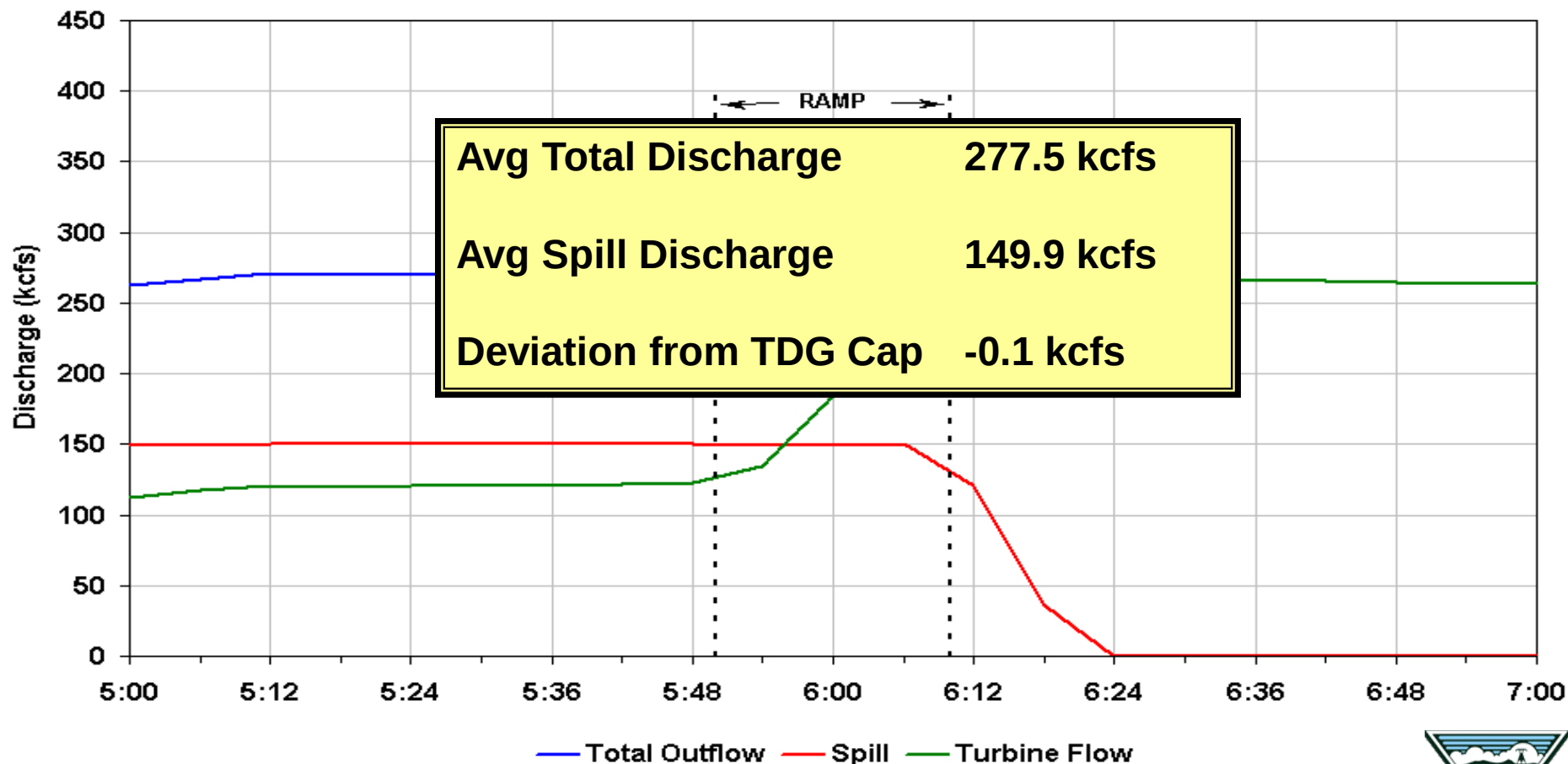


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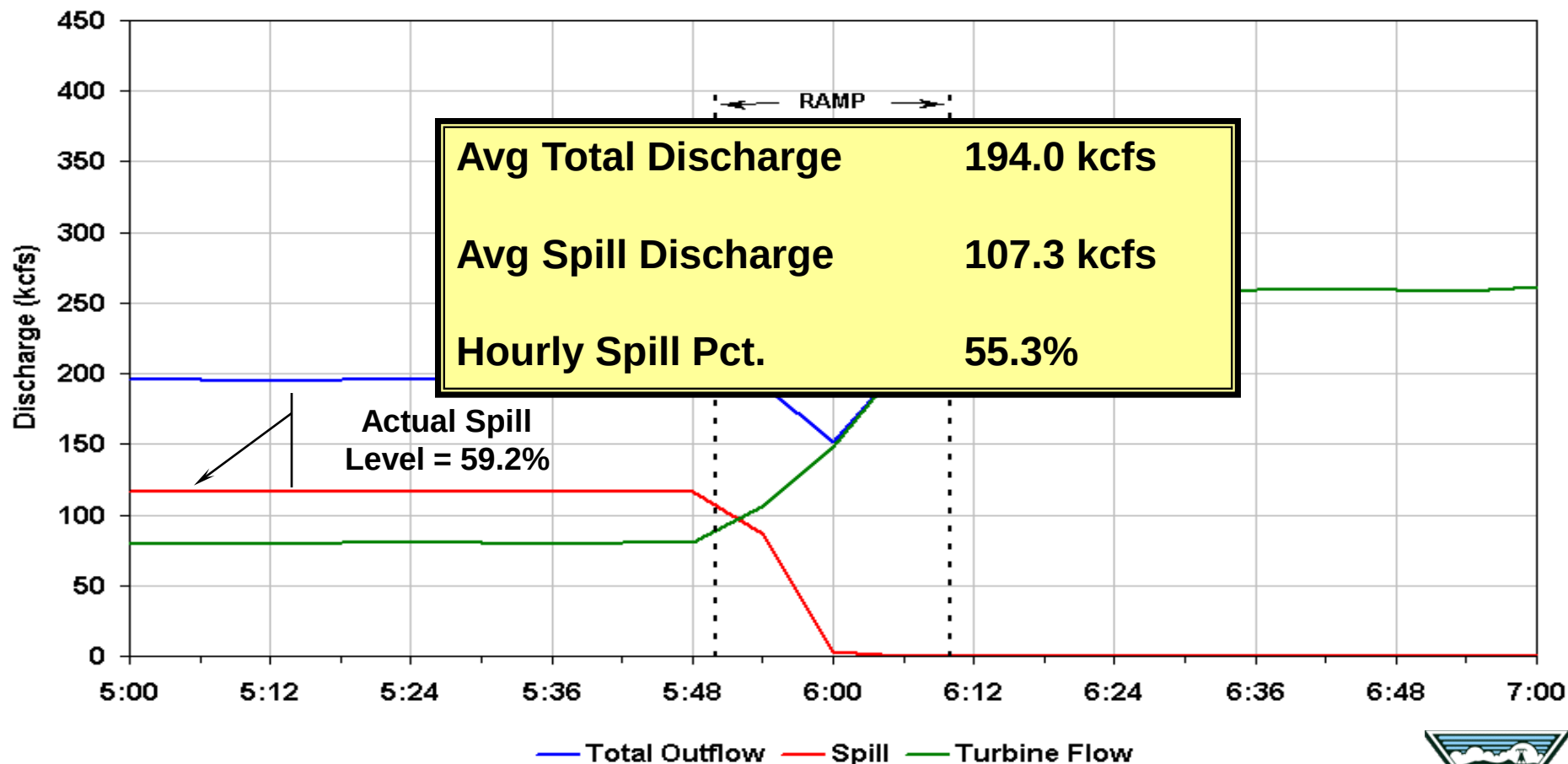


Between-Hour Considerations

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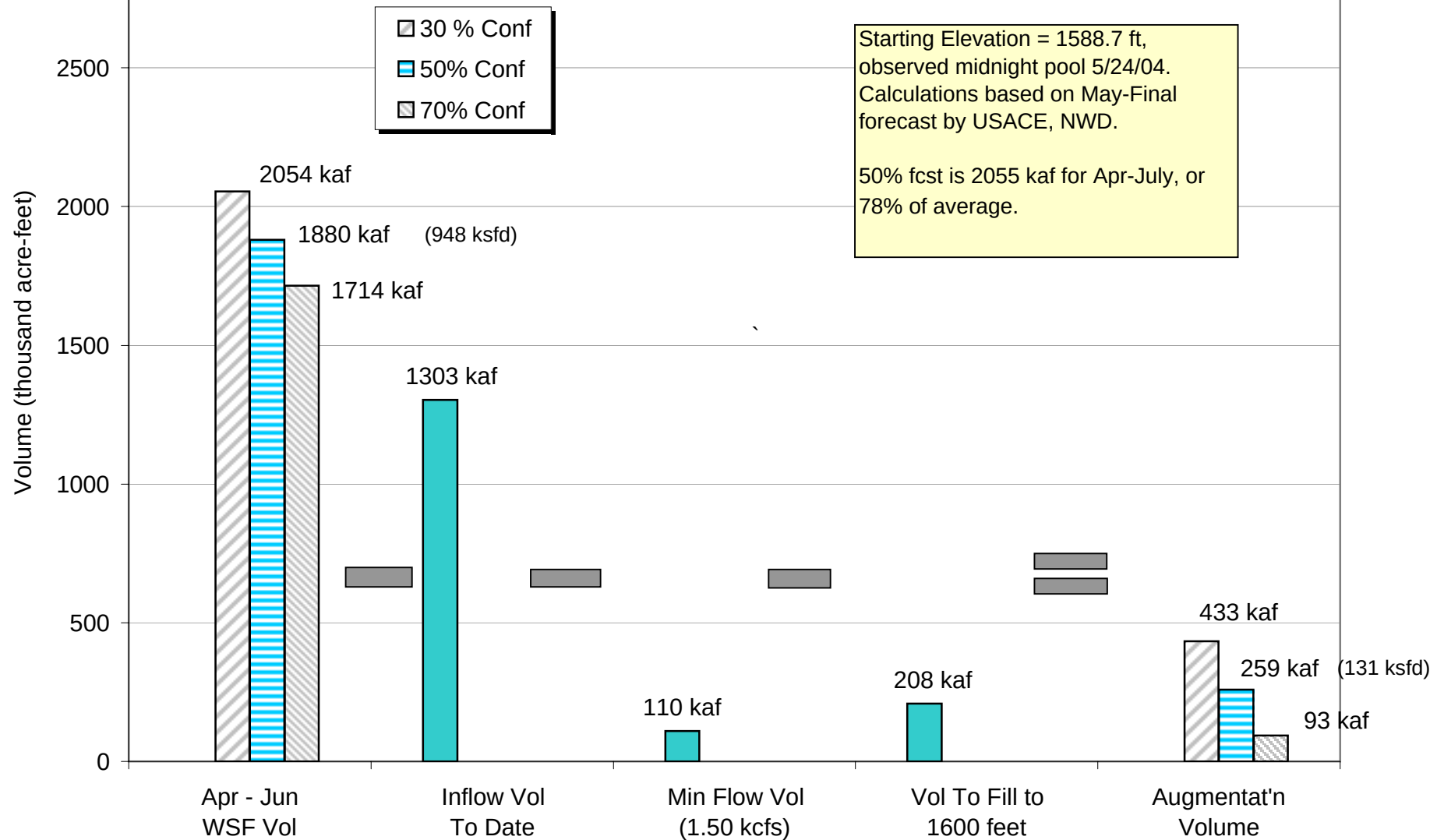
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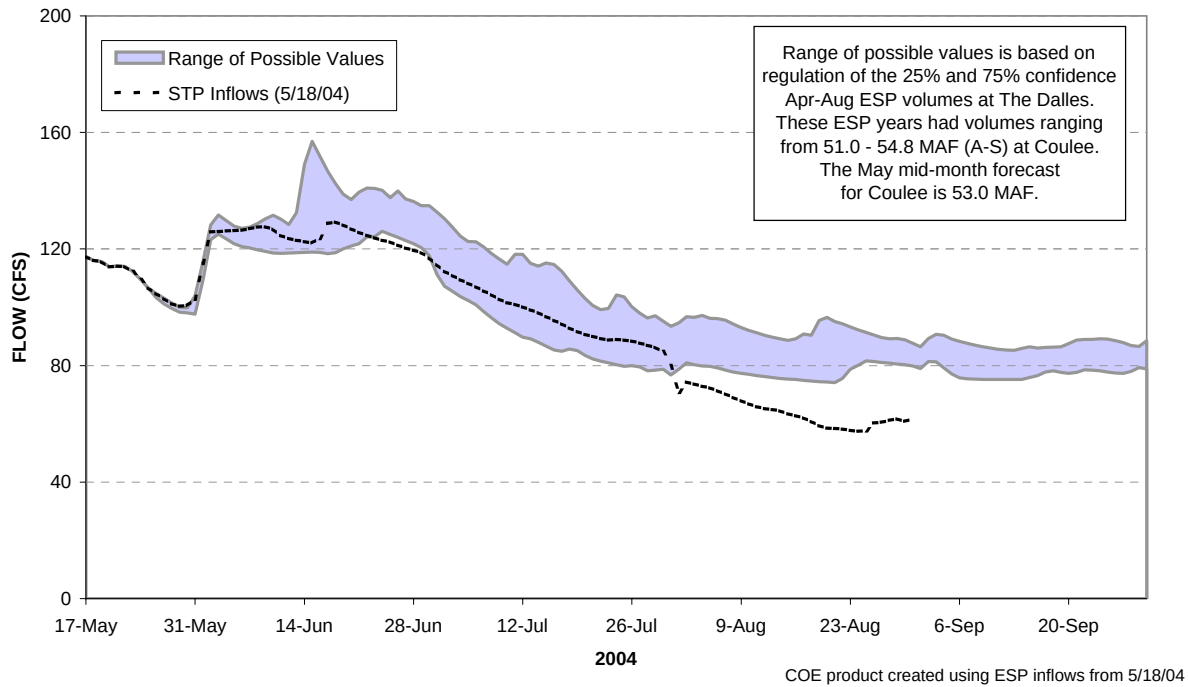


Volumes at Dworshak
1 April Through 30 June

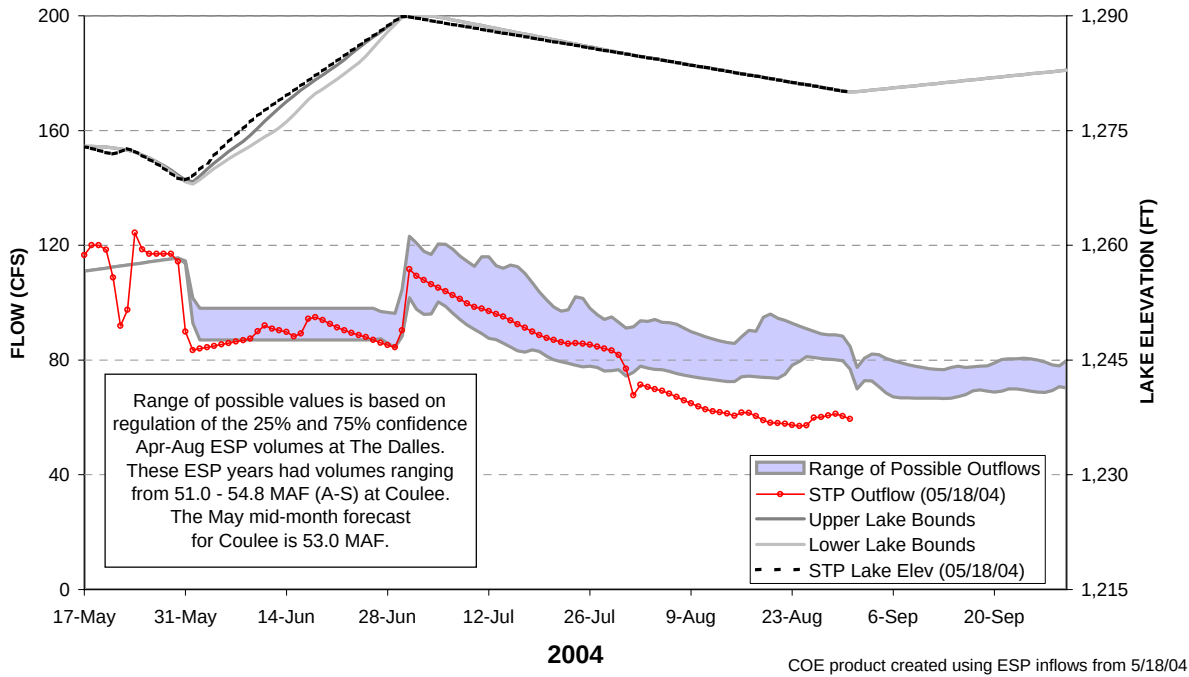
Note - Inflow volume to date is through May 24, 2004



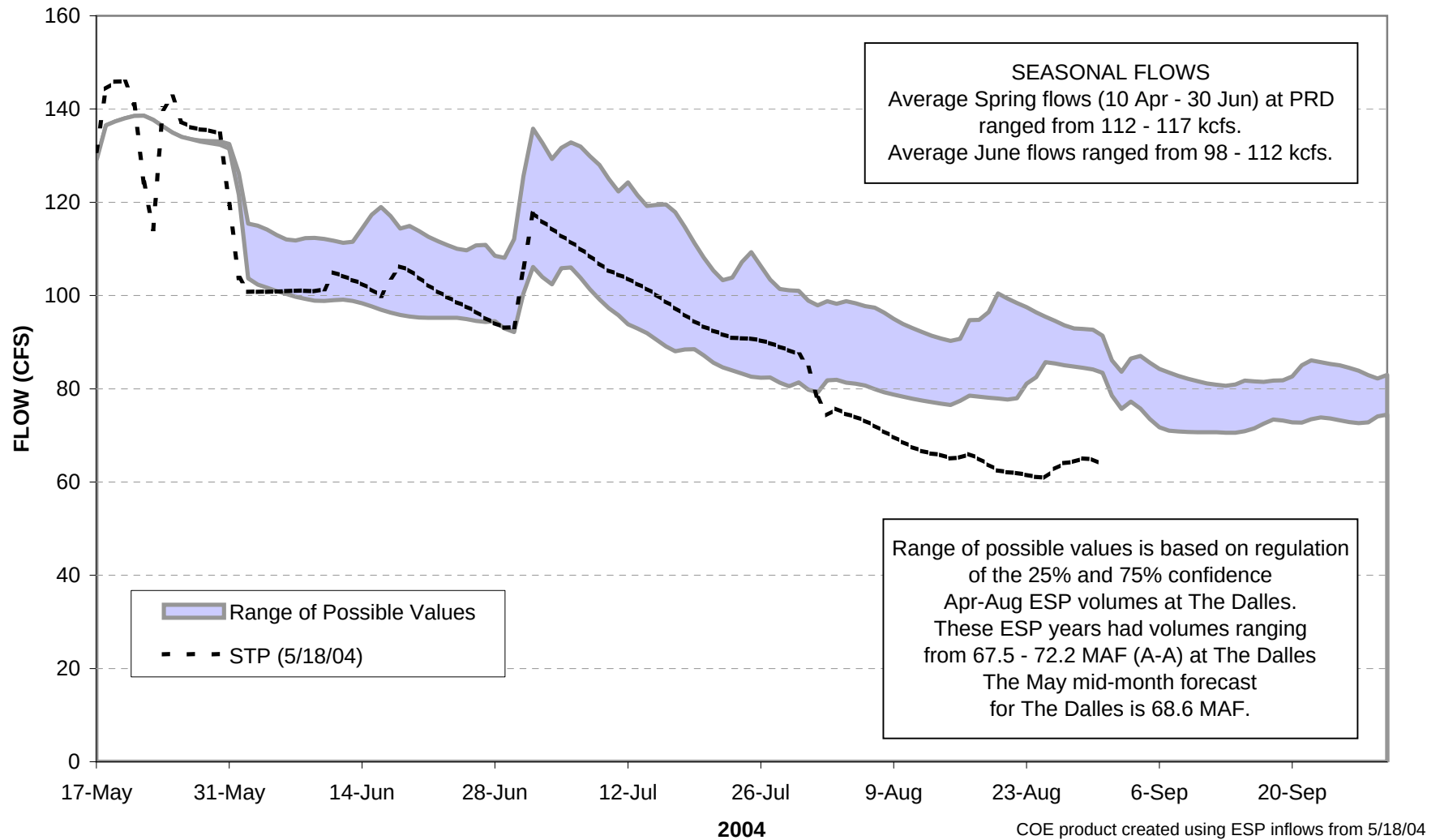
FORECASTED GRAND COULEE INFLOWS



FORECASTED GRAND COULEE OUTFLOWS AND LAKE LEVELS



FORECASTED PRIEST RAPIDS FLOWS



Summary of FFDRWG discussion of MCN Modernization Studies and SOR #2004-11

Walla Walla District Fish Facility Design Review Workgroup (FFDRWG) was held on May 19th and 20th in Walla Walla. At the request of the Technical Management Team (TMT), discussions of System Operation Request #2004-11 were conducted. This SOR was presented at the May18 TMT meeting by the Salmon Managers.

The SOR was summarized by David Wills (USFWS). Based on the analysis in the SOR, the concerns of the salmon managers were:

1. Facility mortality rates for yearling Chinook and steelhead in 2004 were significantly higher than the 1999-2003 average. (SOR figure 1)
2. Facility descaling in 2004 was the highest it has been in several years. (SOR figure 2)
3. Fish mortality, as measured at the juvenile fish facility, is increased when units are at maximum discharge. Mortality rates appear to increase with the number of units operated at maximum discharge. (SOR figure 3).

Discussion followed regarding data used in this analysis. Data used included all fish sampled at McNary fish facility. This includes the normal 24 hour samples as well as samples collected for research, which are 3-hour, 100% samples. The validity of using the 3-hour sampling was questioned since those samples are collected using a different methodology and consistently has higher descaling and mortality rates than the 24 hr samples. It was suggested that only the 24-hour sample be used for this analysis since the 3-hour sample might have some inherent bias in estimates due to sampling methodology.

During the meeting, salmon managers conducted the descaling and mortality analysis using only the 24-hour sampling with the following results.

Number of units operated at Maximum discharge	Number of samples	Percent descaling	Percent mortality
0	12	4.6	0.3
1	3	3.9	0.1
2	2	7.5	0.3
4	4	7.0	0.4
4*	3	5.0	0.4

*estimate removes sampling of 4/29 which had a known high trashrack debris load for the test units.

This updated analysis showed less increase in mortality and descaling than the original analysis, however the salmon managers still requested the termination of the planned studies that include operations of any units at maximum discharge. Corps of Engineers

led a discussion of these results and suggested that the levels of descaling are similar to past years and are not of great concern. However, the Corps did explain that due to initial testing, only 1-2 units were being considered for further testing, and based on the above analysis, risks to the run at large were low. The study proposal included testing up to 4 units above 1% to evaluate 3 new vertical barrier screens developed for higher turbine discharge. Initial tests led to a decision to lower load on 2 of the test units.

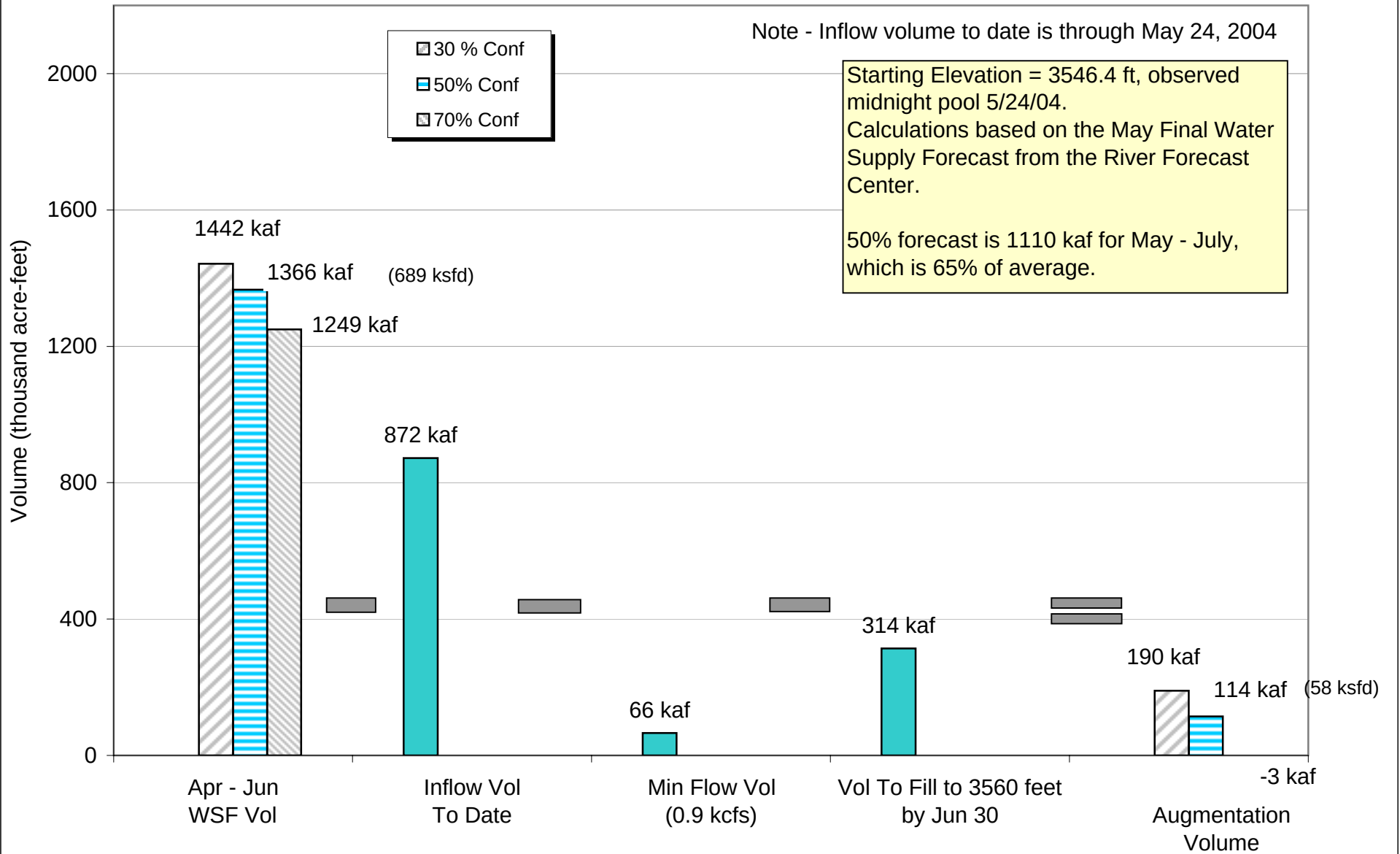
FFDRWG discussions then centered on resolution of descaling mechanisms at McNary. Testing of the gatewells using PIT tagged fish does not indicate a descaling problem related to higher turbine loadings. It was pointed out by NMFS that the designed PIT tag tests may not account for all possible areas of concerns. While this test was designed to look at conditions in the gatewells, it may be that the mechanism of descaling is upstream of the gatewells. Descaling could be occurring on the trash racks, extended screens (ESBS), or in the throat area of the gatewell. The Corps are inspecting VBS (and cleaning if required) and have raked trash from the trashracks in all units. Debris load on the trashracks was minimal. Corps is pursuing methods of video inspection of the ESBS.

To assist in resolving these issues, a modified test was proposed using an existing fish trap in unit 6B. Unit 6 will be run for 48hrs within 1%, fish will be sampled (3 samples) using the orifice trap at 3 varied times during operation. Unit 6 will then be dipped to remove fish from the gatewell, and increased up to maximum discharge for 48 hrs. Fish will be sampled 3 times during this operation.

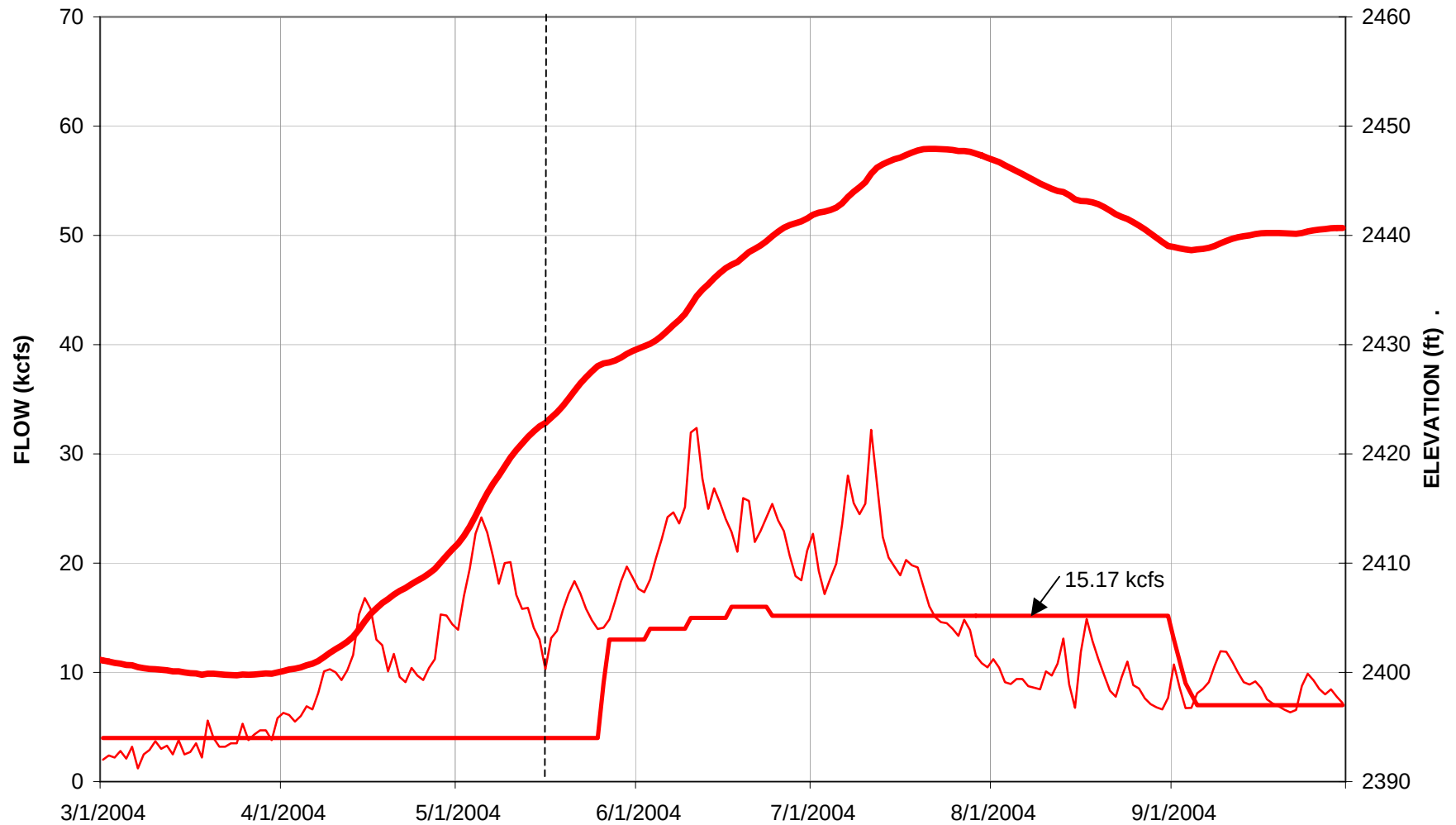
Descaling estimates will be compared for these operations to assist in making informed decisions on further testing for McNary modernization. Estimates of descaling at MCN vary daily and therefore establishing a criteria for decision making is difficult. Descaling estimates at McNary this season have ranged from 1.2 to 9.0% on days when all units are operated within the 1% limit. This is an 8.8% range in daily estimates. The Corps proposes using a 5% difference between treatments (unit 6 descaling tests) to make a recommendation regarding testing in 2004. If the difference between the treatments are less than 5%, Corps will recommend continuation of the McNary Modernization studies to a limited degree (testing in 1 or 2 units). This information is critical in estimation of effects of turbine operation on fish guidance. A future step may include moving one test vertical barrier screen to unit 6 for testing under high loads using the orifice trap to collect fish for sampling. Discussion of need and possibility of moving the VBS are underway.

When this initial testing in unit 6 is completed (Thursday pm) a conference call will be conducted with the salmon managers, Corps of Engineers, and BPA. Based on that discussion, The Corps will make a decision on testing for the remainder of 2004. A follow up meeting of the FFDRWG McNary Modernization subgroup will occur in early June to lay out a plan for future studies at McNary.

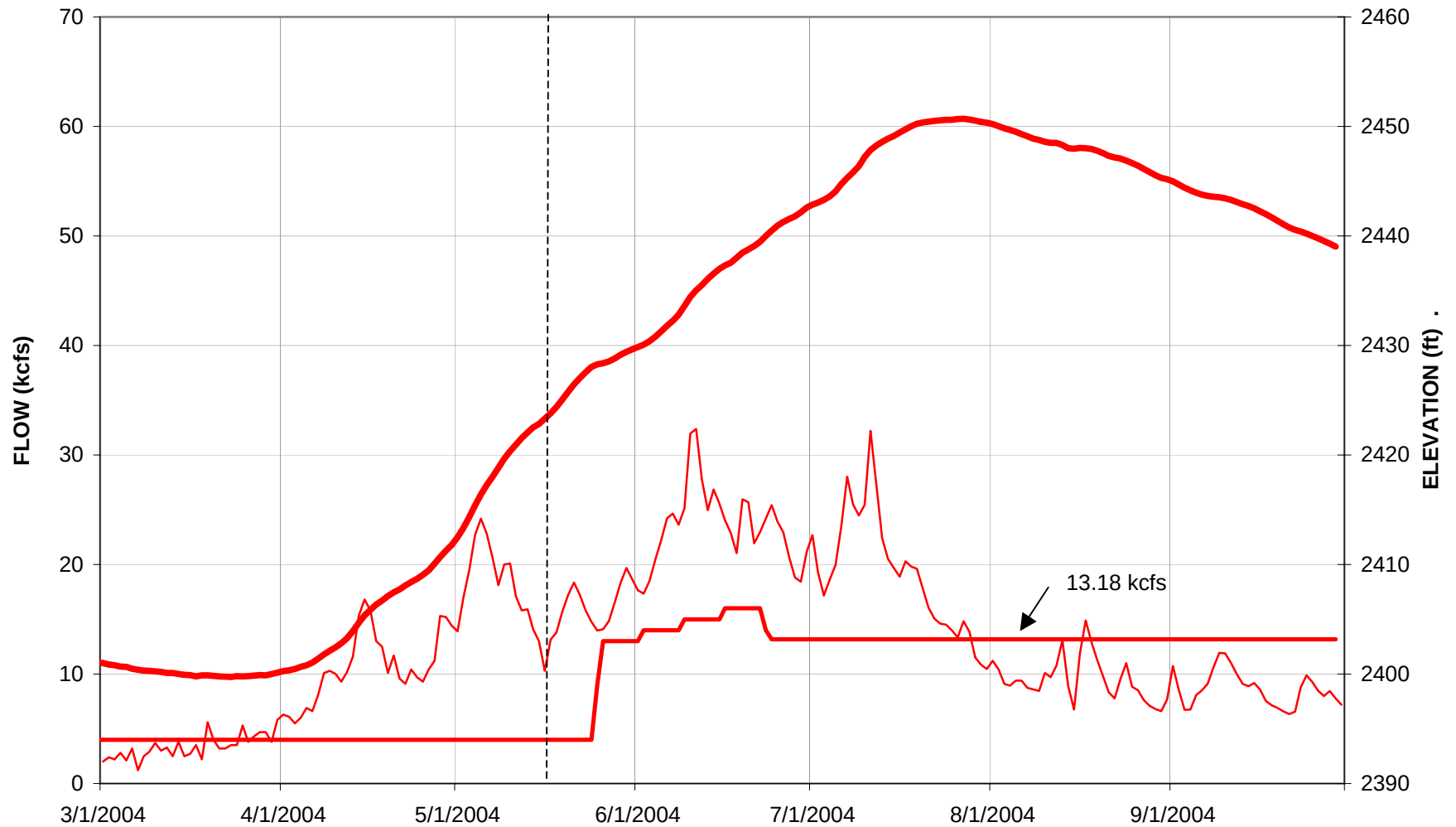
Volumes at Hungry Horse 1 April Through 30 June



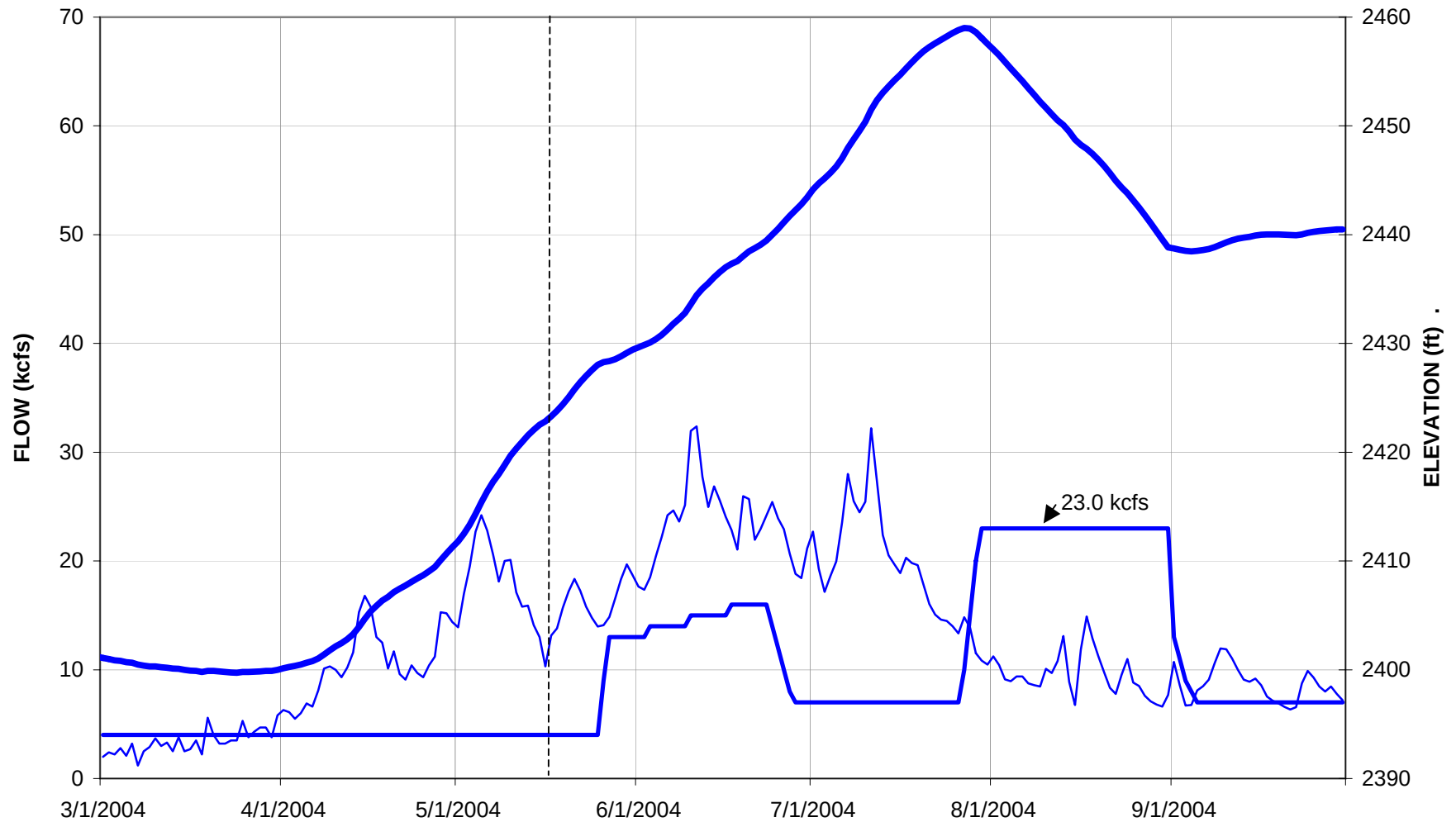
LIBBY OPERATION - 2439' on 8/31
Apr-Aug Vol of 4.83 MAF (1978 temp/precip)



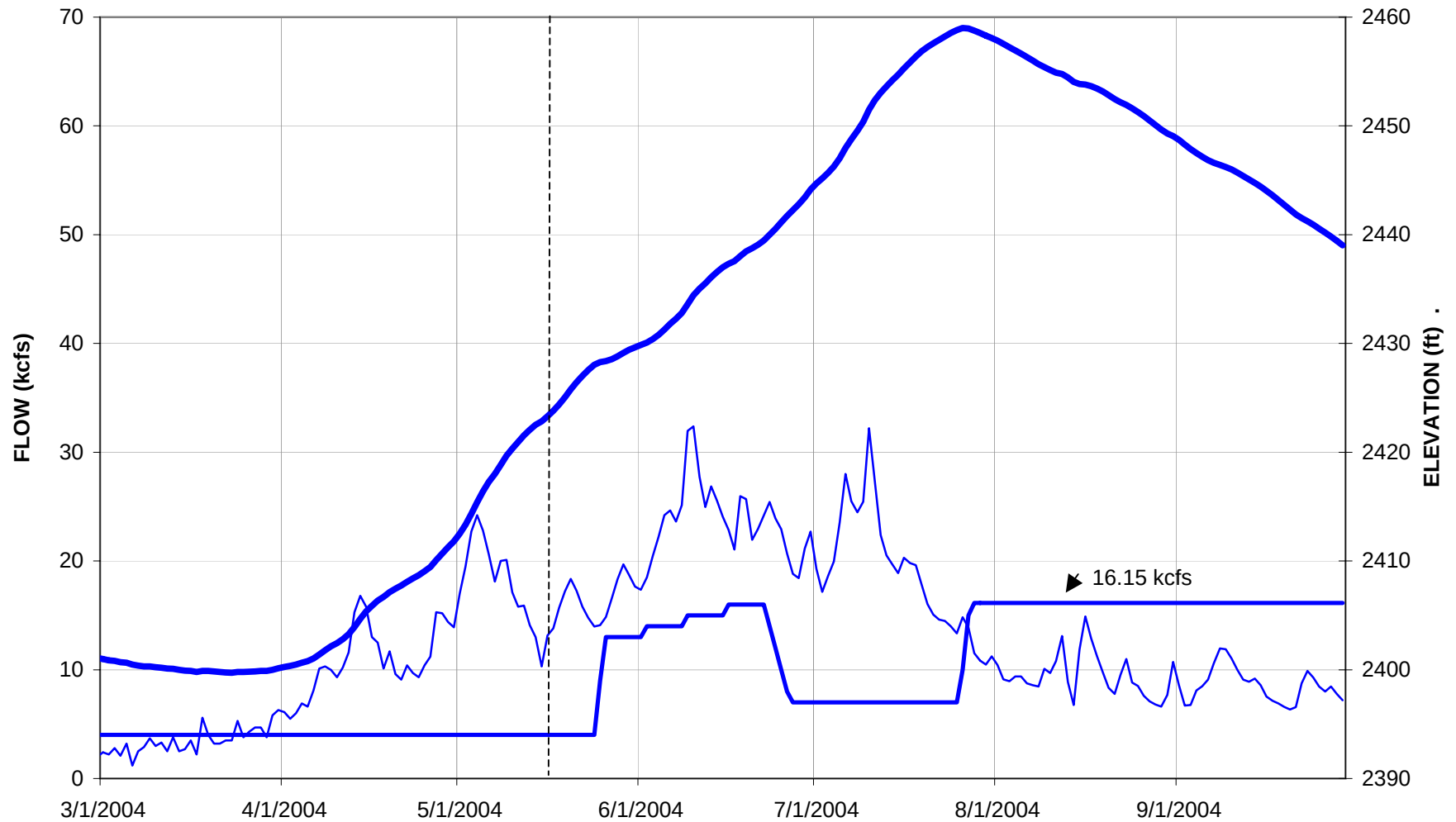
LIBBY OPERATION - 2439' on 9/30
Apr-Aug Vol of 4.83 MAF (1978 temp/precip)



LIBBY OPERATION - 2459' in July, 2439' on 8/31
Apr-Aug Vol of 4.83 MAF (1978 temp/precip)



LIBBY OPERATION - 2459' in July, 2439' on 9/30
Apr-Aug Vol of 4.83 MAF (1978 temp/precip)



COLUMBIA RIVER REGIONAL FORUM

TECHNICAL MANAGEMENT TEAM

MEETING NOTES

May 26, 2004

**CORPS OF ENGINEERS NORTHWESTERN DIVISION OFFICES – CUSTOM HOUSE
PORTLAND, OREGON**

TMT Internet Homepage: <http://www.nwd-wc.usace.army.mil/TMT/index.html>

DRAFT

FACILITATOR'S SUMMARY NOTES ON FUTURE ACTIONS

Facilitator: Donna Silverberg

The following notes are a summary of issues that are intended to point out future actions or issues that may need further discussion at upcoming meetings. These notes are not intended to be the “record” of the meeting, only a reminder for TMT members.

Status of Hanford Reach:

Chris Carlson, Grant County PUD, reported on the weekly average flows at Hanford Reach for May 17th-23rd. 146 temperature units have been reached since the May 10th end of emergence; the targeted 400 tu's are expected to be reached around June 12th. Chris will provide another update on the status on Hanford Reach at next week's TMT meeting.

Mid-Columbia Flow Objectives:

The COE posted an ESP run for Priest Rapids flows, which showed a projection of 98-112 kcfs in June. The difference between this graph and the STP run (which projected higher flows for June) was likely caused by higher than expected precipitation in May. The April-September water supply forecast at Grand Coulee is 51-54.8 MAF, and the May mid-month showed inflows of 53 MAF. Grand Coulee is targeted to fill to 1280' by the end of August, and 1283' by the end of September. Remembering that no forecast is always “accurate”, the COE suggested that TMT rely on ESP as a more accurate long term prediction tool, and that the STP is a good short term (10 day) tool. In the ESP model, Libby was assumed to meet 1239' at the end of August using a flat flow, including the sturgeon pulse operation expected for this year.

SOR 2004-12:

The salmon managers presented SOR 2004-12, recommending a 125 kcfs week average flow at Priest Rapids starting on June 1st and continuing until further notice. The salmon managers were interested in protecting out-migrants now *and* maintaining flows at Priest Rapids for late June subyearling migration. After a caucus, the salmon managers reached a consensus to revise the SOR, recommending a minimum operation of 125 kcfs as a hard constraint and making every effort to get as close to (without exceeding) 135 kcfs, while not jeopardizing refill at Grand Coulee.

ACTION: For May 31-June 6, the action agencies will operate Priest Rapids at a hard constraint minimum of 125 kcfs and look for available water to provide up to a 135 kcfs weekly average while meeting Grand Coulee refill objectives. There is flexibility around the start date of this operation but the salmon managers prefer higher flows through Monday, May 31st. TMT will revisit this issue during a conference call on **Friday, June 4, at 1:30 pm.**

SOR 2004-FWS1:

SOR 2004-FWS1 was presented by the USFWS today. Sturgeon were found in spawning areas as of May 25th; if spawning occurs on or before the weekend, Bob Hallock will contact the COE to start the sturgeon pulse requested in SOR 2004-FWS1. If spawning occurs over the weekend, the field biologists will contact the COE. The COE agreed to notify TMT if/when the sturgeon pulse operation occurs. The COE provided models of Libby operation scenarios at the request of Montana. Montana expressed a preference for stable flows through the summer months at Libby and requested that the salmon managers consider this as they identify best operations for the protection of salmon.

ACTION: Prior to the June 9th TMT meeting, the USFWS will send an email to TMT about paragraph two from the SOR (under specifications), clarifying the priority for the sturgeon pulse operation: 18 kcfs at Leonia gauge or releases from Libby?

UPDATE: An email message was sent out by the COE's Cathy Hlebechuk on Tuesday, June 1 – spawning occurred and Libby was ramped up for the sturgeon pulse on Saturday, May 29th.

SOR 2004-C-4:

Kyle Martin, CRITFC, presented this SOR for a spring treaty fishery May 26th at 6 am through May 28th at 6 pm. Similar to the last SOR, the tribes requested that the COE operate the Bonneville, The Dalles and John Day pools within a 1' range. There were 130 nets in the river as of May 20th, and about 1,000 fish left in the allocation. The COE issued a teletype to operate the Bonneville pool at a 1.5' hard constraint operating range. The COE agreed to keep in mind the request, and will operate The Dalles and John Day to meet BiOp requirements. Kyle will provide a review of the spring treaty fishery at the June 9th TMT meeting.

McNary 1% Test Operation:

Mark Smith, Walla Walla COE, provided a summary of last week's FFDRWG discussion on the McNary modernization test. Using information that all FFDRWG members felt was relevant, the updated analysis showed less impact of operating outside 1% on mortality and descaling than originally thought. While the COE felt that descaling levels were similar to past years, they did agree to change the study to test two units instead of four outside of 1%. Unit 6 will be operated within 1% so the fish can be tested and compared to those who pass units operating outside 1%. If there is less than 5% difference in treatments, the COE will continue with the modernization study. If the difference is more than 5%, the COE will consider discontinuing the study. The test will be completed on Thursday, June 3, after which the subgroup will hold a conference call to discuss the results. TMT will be updated on this issue at the June 9th TMT meeting.

BPA Response to SOR 2004-10:

John Wellschlager, BPA, expressed an apology that BPA was not available during the last TMT meeting to discuss the salmon managers' SOR 2004-10. He congratulated COE and BPA operators for their precision in meeting spill targets so closely during the season and

acknowledged the COE and salmon managers' desire to be even more precise in the future. He suggested that a subgroup of TMT get together to discuss spill precision and reach some resolution that can be brought back to the larger group at the June 9th TMT meeting.

Steve Barton, BPA, presented information to TMT about spill determinations, communication and timing issues. He noted that scheduling constantly changes throughout the hour, and that there are many between hour operating considerations so that there is some "noise" when reading hourly data. Steve's presentation can be found on the TMT web page as a link to today's agenda. He suggested that the TMT sub-group consider what is happening at the projects within and between hours and discuss whether there is some flexibility around management practices.

ACTION: The salmon managers will discuss and notify John Wellschlager of who should be part of the subgroup to meet and discuss this issue with BPA and the COE before the June 9th TMT meeting.

System Status Update:

Reservoirs: McNary is releasing 215 kcfs; Lower Granite is releasing 68 kcfs; Dworshak was expected to fill about 4' over the weekend with full powerhouse out on Monday morning. Libby is at elevation 2427.9' with 14 kcfs in and 4 kcfs out. Hungry Horse is at 3546.6', which is 13' from full. The project is expected to fill by the end of June.

The May mid-month water supply forecast is: The Dalles – 79.7 MAF; Lower Granite – 14.2 MAF (66% of normal); Dworshak – 2.19 MAF (83%); Libby – 4.72 MAF (76%); and Grand Coulee – 51.5 MAF (82%).

Fish status: Yearling chinook migration at Lower Granite is nearly complete, as expected. Steelhead saw a second wave of migration at Lower Granite, due to higher flows. Adults are at 167,000 at Bonneville, with a total projection of 190,000. This estimate is about half of the pre-season forecast.

Power status: The system is operating to meet load, and 135 kcfs at Priest Rapids.

Water quality: Exceedance tracking and high 12-hour TDG averages reports can be found on the TMT web page. NOAA congratulated the COE on their attempts to meet spill volumes at Bonneville and McNary.

TMT Meeting Schedule:

There will be a conference call on **Friday, June 4 at 1:30 pm** to discuss Mid-Columbia Flow Objectives.

The next face to face TMT meeting will be held on **Wednesday, June 9th, 9am-noon**. Agenda items include:

- Hanford Reach
- Sturgeon Operations (including "priority" email from USFWS – see SOR 2004-FWS1 discussion above)
- CRITFC Treaty Fishing
- McNary 1% Test
- Spill Management Subgroup Report

- Mid-Columbia Flows
- System Status Review

Meeting Minutes

1. Greeting and Introductions

The May 25 Technical Management Team meeting was chaired by Rudd Turner of the Corps and facilitated by Donna Silverberg. The following is a distillation, not a verbatim transcript, of items discussed at the meeting and actions taken. Anyone with questions or comments about these minutes should call Turner at 503/808-3935.

2. Status of Hanford Reach.

Chris Carlson reported that, for the week ending May 23, the average flow at Priest Rapids Dam was 132.3 Kcfs. The flow band was 60 Kcfs on Monday, May 17 and 40 Kcfs for the remainder of the week. The flow band was exceeded slightly on May 18, 19 and 21, but flows were within the band on the other days. As of May 23, the fish have accumulated 146 temperature units since the end of emergence, again working toward a target of 400 temperature units, at which point the 2004 Hanford Reach fish protection operation will end. Grant County PUD now estimates that this will occur on or around June 12. The group briefly discussed the reasons for the large drops in Priest Rapids flow seen on the morning of Monday, May 24; Grant County's Greg Lange explained the reasons for this operation.

3. Mid-Columbia Flow Objectives.

Turner drew the group's attention to the forecasted Priest Rapids and Grand Coulee flows graphs, dated May 18. He explained how these ESP runs were generated, noting that they were based on last week's flow data. The Dalles was used as an indicator of overall basin conditions, noting that the May mid-month water supply forecast at that project was 68.6 MAF. During the early part of June, according to this run, Priest Rapids outflow will range between 98 Kcfs and 112 Kcfs, depending on runoff shape and volume. Paul Wagner noted that the most recent STP run shows 120 Kcfs to 125 Kcfs during the month of June. Turner replied that precipitation is running above-average so far in May, which has caused a slight rebound in some of the mid-month forecasts. He noted that the ESP run provides a somewhat conservative view of the overall situation.

At Grand Coulee, said Turner, based on a mid-month forecast of 53 MAF, inflows are forecast to run in the 120 Kcfs range during June; outflows are forecast to run in the 80 Kcfs-100 Kcfs range during June; Grand Coulee would fill by June 30 and draft to 1280 by August 31. Grand Coulee is currently at elevation 1276, with inflows of 125 Kcfs? Wagner asked. Correct, Turner replied. Can we then set this graph aside? Wagner asked. Again, it is based on last week's information, Turner replied, and conditions have changed over the past week – precipitation so far in May is running 115% of normal for the Grand Coulee basin. There are signs that runoff may be more robust than anticipated last week. Wagner asked about the relative forecast

accuracy of ESP and STP procedures. Julie Ammann, COE, said that ESP seems to be a better long-term predictor of flows, while the STP is a good short term (10 day) tool. In the ESP model, Libby was assumed to meet 1239' at the end of August using a flat flow, including the sturgeon pulse operation expected for this year. Kyle Martin noted that the forecast over the next few weeks is for much wetter and colder weather than normal. In response to a question, Turner said the Corps will provide an updated ESP run at the June 9 TMT meeting (later agreed to provide this for the June 4 TMT conference call).

With respect to Mid-Columbia flows during the coming weekend, John Wellschlager said BPA would prefer to begin the rampdown from 135 Kcfs at Priest Rapids on Memorial Day, this Monday. After a brief caucus break to discuss the new water supply and flow forecast information, Wills said the salmon managers would like to revise the recommendations in the SOR: they would like to see 125 Kcfs as a hard constraint minimum flow, with the opportunity to go above that if precipitation continues – asked the action agencies to provide additional flow up to 135 Kcfs at Priest Rapids as long as this does not detrimentally impact Grand Coulee refill. So through June 1, you're requesting 125 Kcfs minimum, 135 Kcfs maximum, and trending toward the higher flow, at Priest Rapids, with Grand Coulee refill as the highest priority? Wellschlager asked. Correct, with the understanding that we also don't want to see Mid-Columbia flows drop to 70 Kcfs during the June refill period, said Wagner. And we'll follow this up with a TMT conference call next week, added Wills. It was agreed that the Corps will provide the most recent STP run in time for discussion at that meeting. It was agreed that the TMT conference call will take place on Friday, June 4 at 1:30.

In summary, said Turner, the action agencies will operate the system from May 31-June 6 to provide a hard minimum flow of 125 Kcfs at Priest Rapids, with a soft constraint of 135 Kcfs, providing flows above 125 Kcfs as a weekly average, if above-average precipitation allows for the release of additional water over and above that needed to assure Grand Coulee refill by June 30.

4. Sturgeon SOR.

On May 20, the action agencies received SOR 2004-12 from the U.S. Fish and Wildlife Service. This SOR, which covers sturgeon and bull trout flows from Libby Dam, requests the following specific operations:

- Beginning when the first evidence of sturgeon spawning is observed in the Canyon reach of the Kootenai River (estimated to occur during the last week in May) target a flow of 18 Kcfs measured at the Leonia gauge for four consecutive weeks. Based on ESP runs of comparable runoff years, this may be achieved by consecutive increasing releases of 13 Kcfs during the first week, 14 Kcfs during the second week, 15 Kcfs during the third week and 16 Kcfs during the fourth week.
- If the start date occurs during the third week in May, the target would be increased to 19 Kcfs, but the actual releases from Libby would remain as above. Alternatively, if the start date occurs during the first week of June, the target would be 17 Kcfs at the Leonia gauge, and again the actual releases from Libby would remain as above.
- Evidence of sturgeon spawning to trigger initiation of sturgeon flows may include either the capture of sturgeon eggs, or the abrupt and rapid downstream movement of a radio-tagged female. This is a characteristic movement of a post-spawning female white sturgeon.
- A second and equal trigger to initiate augmentation flows would be capture of eggs on mats placed over gravel substrate in the immediate vicinity of Bonners Ferry.
- The Fish and Wildlife Service will directly contact the RCC to request that flows be ramped up for sturgeon flows immediately when any of the above triggers is to be activated.
- In the event that neither of the above triggers is activated, there will be no request for sturgeon flows. This possibility would occur when the Fish and Wildlife Service determines that there are no more females remaining and expected to spawn over gravel substrates, and little likelihood remains of capturing any additional females for transport. This determination would not likely occur before the third week in June, and again USFWS will directly contact the RCC when this determination is made.
- Should this latter situation (no sturgeon flows) occur, it is recommended that, after coordination with USFWS, flows be immediately ramped up to meet the tiered minimum flow for bull trout identified in the 2000 BiOp.
- Otherwise, sturgeon augmentation flows should be followed by a rampdown to the tiered bull trout minimum flow. Greater flows may occur during this period depending on recommendations from NOAA Fisheries.
- If at the end of the fourth week of sturgeon augmentation flows, additional water is available without compromise of refill, we recommend splitting that additional volume equally to extend the duration of the current target sturgeon incubation flow, and to achieve a higher tiered bull trout flow through July.

The full text of this SOR is available via hotlink from today's agenda on the TMT homepage; please refer to this document for full details and justification.

David Wills provided an overview of the sturgeon SOR, noting that there are currently two female sturgeon known to be in the spawning areas. Once evidence of spawning is observed, Bob Hallock will contact the RCC directly to initiate the increase in Libby outflow. Turner said everything is in place to allow this SOR to be

implemented; he added that Libby Dam is currently at minimum outflow, and will remain there until the sturgeon pulse begins.

The group briefly discussed the ramp-up and ramp-down rates associated with this operation, as well as the specifics of the requested flows; it was agreed that the Fish and Wildlife Service will provide a clarifying email explaining its rationale.

The group then discussed the four model runs the Corps has produced regarding various Libby operational scenarios. In the first scenario, once the sturgeon pulse is complete, Libby would release a flat 15.17 Kcfs through August 31, targeting an elevation of 2439 feet on that date. The project would then release the bull trout minimum (7 Kcfs) through September 30. In Scenario 2, following the conclusion of the sturgeon pulse, the Corps modeled a flat flow of 8 Kcfs from the last week in June through the last week in July, followed by a ramp-up to 23 Kcfs, again targeting elevation 2439 on August 31. In Scenario 3, following the sturgeon pulse, the Corps modeled a flat Libby outflow of 13.18 Kcfs through the end of September, targeting a September 30 Libby elevation of 2439. Under Scenario 4, following the sturgeon operation, Libby would release 8 Kcfs through the last week in August, followed by a ramp-up to 16.15 Kcfs through the end of September, again targeting elevation 2439 by September 30.

How has precipitation been in the Libby Basin recently? Wills asked. Below average, Turner replied – 75% of normal for May. The Corps' May final water supply forecast for Libby was 4.95 MAF, but the May mid-month forecast from the River Forecast Center fell slightly to 4.72 MAF, 76% of average.

Litchfield noted that the State of Montana would prefer to avoid a double peak in Libby outflow, so they would rather concentrate on Scenarios 1 and 3, despite the fact that Libby would not completely refill in 2004. There may be some flexibility to work on a declining hydrograph if the water supply forecast continues to decline, Litchfield said, but at this point, Montana would prefer Scenario 3 – that would allow us to do something for sturgeon, something for bull trout and something for salmon.

5. Spring Treaty Fishery (SOR 2004 C-4).

On May 25, CRITFC submitted SOR 2004 C-4, covering the fourth spring treaty fishery in Zone 6. This SOR requests that the action agencies maintain the following pool elevations in support of the tribal treaty fishery (during the period 6 a.m. May 26 through 6 p.m. on May 28):

- Bonneville: 1.0 feet from full pool (msl elevation 76.5-75.5)
- Celilo (The Dalles): operate pool within 1 foot of full pool (msl elevation 159.5-158.5)
- John Day: operate the pool within 1 foot (msl elevation 264.5-263.5)

Kyle Martin went briefly through the contents of this SOR, the full text of which is available via hot-link from the TMT homepage. Martin said there are about 68 nets in

the Bonneville pool, 31 in The Dalles pool and 31 in John Day pool. This will be the last spring treaty fishery of the 2004 season, he added.

Turner said the Corps has already sent a teletype to Bonneville Dam, specifying elevation 76.5-75 as a hard constraint and 76.5-75.5 as a soft constraint during the treaty fishery period. The Dalles will operate within a 3-foot range but the actual operating range will likely be much narrower; John Day pool will be operated in a 1.5-foot range – in essence, the same operating ranges we have provided during the previous three treaty fisheries, Turner said. Martin said he will provide a review of the 2004 spring treaty fishery at the June 9 TMT meeting.

6. McNary 1% Test Operation.

Turner said the Corps prepared a memo (available via hotlink from today's meeting) summarizing the discussion of this topic at last week's FFDRWG meeting in Walla Walla. Mark Smith provided a brief overview of this discussion and FFDRWG's recommendations; essentially, a re-analysis of the data provided by the salmon managers showed a lesser impact in terms of descaling and mortality. He noted that a significant amount of trash was removed from the trash rack of the test unit where a high incident of descaling and mortality was seen earlier in the season; descaling and mortality was subsequently reduced at that unit. He noted that the analysis is very sensitive to the number of samples, and many of the salmon managers' conclusions were based on a very small number of samples.

We developed a plan to use Unit 6, where we can collect fish in an orifice trap, before they pass through the entire system, he said. Beginning tonight, we will be collecting data on fish under maximum discharge at the test unit to get a more distinct comparison between the maximum discharge and normal unit operations. Once we have the data from that test, he said, we will instigate a conference call to discuss it, and if, as anticipated, descaling and mortality is within the normal range, the Corps would like to continue the modernization study as planned, but using two test units rather than four, said Smith. He added that a FFDRWG subgroup will be convened soon to discuss McNary modernization test plans for the remainder of 2004 and 2005. And we'll plan to get an update on planned test operations for the remainder of 2004 at the June 9 TMT meeting, said Silverberg.

7. BPA Response to SOR 2004-10.

Wellschlager apologized for not being present at last week's meeting when this issue was discussed. He said Bonneville has looked at the data provided in the SOR; he congratulated the Corps and BPA schedulers for doing an outstanding job in meeting the spill threshold targets – we have come within 0.6% of meeting the target so far this spring. However, we have heard from the salmon managers that they would like us to do better, he said, and share that goal, as does the Corps. It would be helpful if we could see the data underlying the salmon managers' analysis. Wellschlager suggested that a TMT subgroup be formed to investigate ways to improve the action agencies' spill target performance. The subgroup could then bring its recommendations to the full TMT. To me, that would make more sense than trying to discuss this issue here, said Wellschlager.

Turner noted that the Corps has made some changes, particularly during the ramp-up and ramp-down phase at John Day, starting spill a little earlier and ending it a bit later. There was general agreement that the spill management subgroup would be useful, and should be convened sooner, rather than later.

8. BPA Spill Compliance Presentation.

BPA's Steven Barton provided a presentation titled "Within-Hour Operations and Their Impacts to Spill Accounting." This presentation is available via hot-link from today's agenda on the TMT homepage; please refer to this document for details on this topic.

In the course of this presentation, Barton responded to a variety of clarifying questions and comments regarding the technical details of project and power system operations. At the conclusions, the TMT thanked Bonneville for a very informative presentation.

9. Libby Operational Scenarios.

This topic was discussed during Agenda Item 4, above.

10. Status of Operation.

Turner said McNary outflow was at 215 Kcfs yesterday; Lower Granite was at 86.7 Kcfs yesterday, up from 69 Kcfs last week. Lower Granite flows are expected to remain in that range for the next few days. At Dworshak, the project filled four feet over the weekend; Dworshak outflow was increased to full powerhouse discharge (9.6 Kcfs) on Monday morning. Project elevation was 1589.1 feet last night. The Corps is projecting that they will need to continue to release full powerhouse discharge from Dworshak through the end of May in order to avoid spill, but with more precipitation in the forecast, spill is a possibility at Dworshak this spring, said Turner. Libby was at 2429 feet last night and releasing 4 Kcfs. Albeni Falls has filled slightly more than a foot over the past week to elevation 2059.2; it is releasing 43 Kcfs with inflows in the 50 Kcfs range.

Reclamation reported that Hungry Horse was at 3546.6 feet as of midnight last night, releasing 4.7 Kcfs on a weekly average with inflows in the 7-8 Kcfs range. Hungry Horse is expected to refill by June 30.

With respect to the mid-month water supply forecast, Turner said there was no percentage change at The Dalles a 79.6 MAF volume. At Lower Granite, the mid-month forecast was 14.2 MAF, 66% of average, up 5% over the May final forecast of 13.1 MAF. At Dworshak, the mid-month forecast is now 2.19 MAF, up 7% over the May final forecast. The Libby forecast dropped to 4.72 MAF, down 3% from the May mid-month forecast of 4.95 MAF. At Grand Coulee, the forecast is now 51.5 MAF, down slightly from the May final. May precipitation in the Mid-Columbia and Snake River Basins is running 117-118% of normal, Turner added.

With respect to fish passage, Wagner said things are following their expected path; the spring chinook outmigration is now almost finished at Lower Granite. The big news is a double peak last week in steelhead outmigration at Lower Granite, no doubt in response to the higher flows we're seeing through the Snake River, Wagner said.

11. Next TMT Meeting Date.

The next Technical Management Team meeting was set for Friday, June 4 at 1:30 p.m. (a conference call) with the next face-to-face meeting scheduled for May 9. Meeting summary prepared by Jeff Kuechle, BPA contractor.

TMT Participant List

May 26, 2004

Name	Affiliation
Rudd Turner	COE
Donna Silverberg	Facilitation Team
Jim Litchfield	Montana
Michael Schilmoeller	NWPPC
Paul Wagner	NOAAF
Robin Harkless	Facilitation Team
Ron Boyce	ODFW
John Wellschlager	BPA
Cindy LeFleur	WDFW
David Wills	USFWS
Nic Lane	BPA
Julie Ammann	COE
Steve Barton	BPA
Scott Boyd	COE
Tom Haymaker	PNGC
Tina Lundell	COE
Tim Heizenrater	PPM
Lee Corum	PNUCC
Russ George	WMCI

Kyle Martin	CRITFC
Michele DeHart	FPC
Mary Mellima	USBR
Lance Elias	PPL
Chris Carlson	GCPUD
Greg Lange	GCPUD
Ruth Burris	PGE
Glenn Traeger	Avista
Cindy Reece	COE
Mark Smith	COE

TECHNICAL MANAGEMENT TEAM

BOR: Tony Norris / John Roache

BPA: Scott Bettin / John Wellschlager

NMFS: Paul Wagner / Chris Ross

USFWS: David Wills / Steve Haeseker

OR: Ron Boyce

WA: Cindy LeFleur

ID: Russ Kiefer

MT: Jim Litchfield

COE: Cindy Henriksen / Rudd Turner / Cathy Hlebechuk

TMT CONFERENCE CALL

Friday 04 June 2004 1330 - 1500 hours

**Custom House Room 118
Portland, Oregon
Conference call line: 503-808-5190**

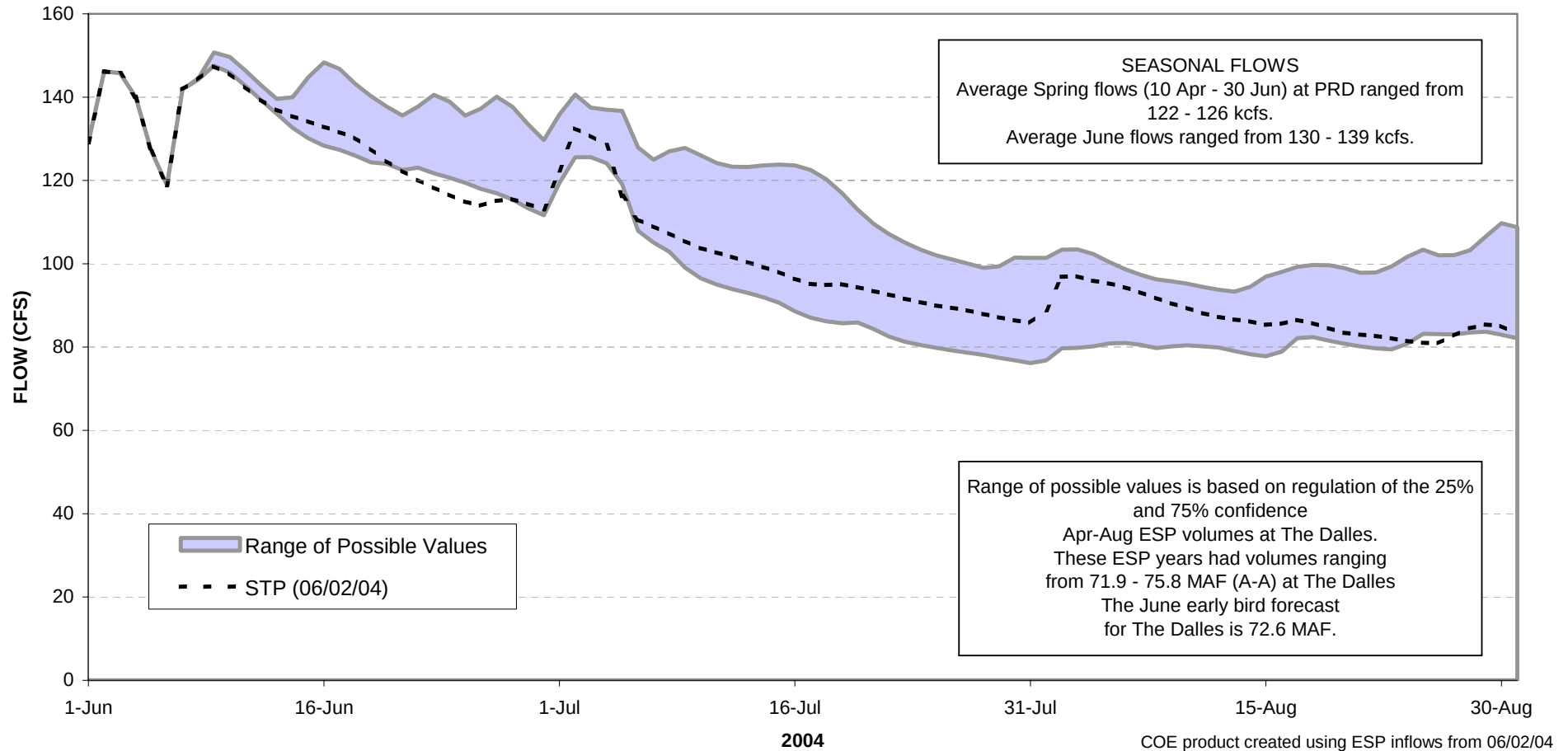
*All members are encouraged to call Donna Silverberg with any issues or concerns they would like to see addressed.
Please e-mail her at dsilverberg@cnnm.net or call her at (503) 248-4703.*

AGENDA

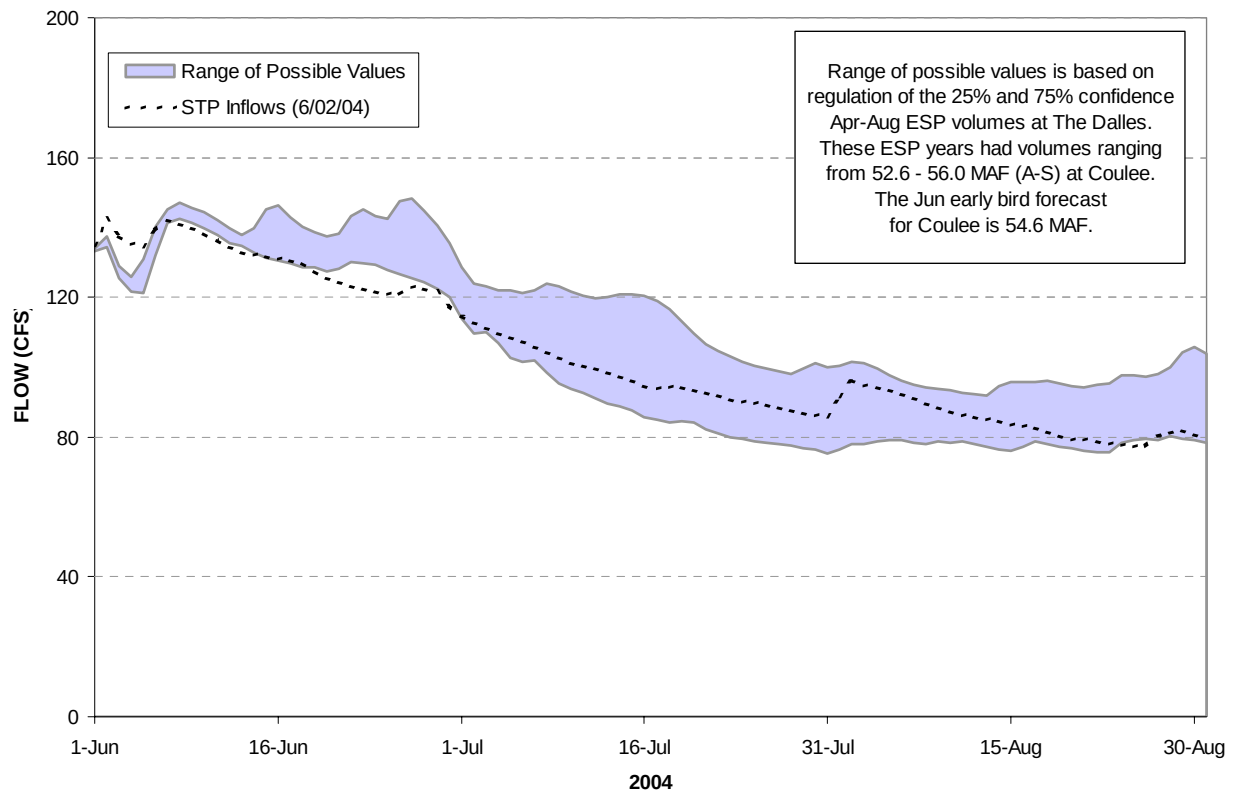
1. Welcome and introductions.
2. Mid-Columbia Flow Objectives
[\[\(ESP analysis: Corps\) \]](#) 
3. Sturgeon and Libby operations update (USFWS, COE).
4. John Day and The Dalles spill management (COE).
5. Other
 - a. Set agenda for next meeting

Questions about the meeting may be referred to Cindy Henriksen at (503) 808-3945, or Rudd Turner at (503) 808-3935, or Cathy Hlebechuk at (503) 808-3942

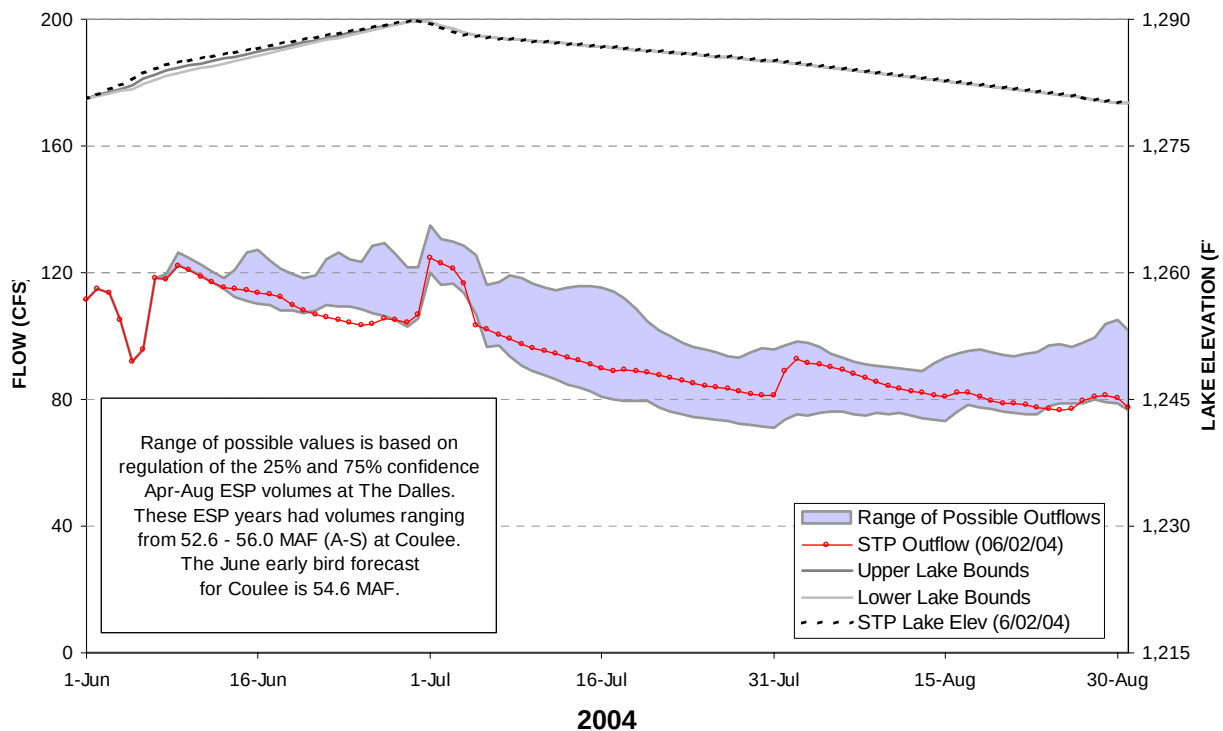
FORECASTED PRIEST RAPIDS FLOWS



FORECASTED GRAND COULEE INFLOWS



FORECASTED GRAND COULEE OUTFLOWS AND LAKE LEVELS



COLUMBIA RIVER REGIONAL FORUM

TECHNICAL MANAGEMENT TEAM MEETING NOTES

June 4, 2004

**CORPS OF ENGINEERS NORTHWESTERN DIVISION OFFICES – CUSTOM
HOUSE
PORTLAND, OREGON**

TMT Internet Homepage: <http://www.nwd-wc.usace.army.mil/TMT/index.html>

DRAFT

FACILITATOR'S SUMMARY NOTES ON FUTURE ACTIONS

Facilitator: Donna Silverberg

The following notes are a summary of issues that are intended to point out future actions or issues that may need further discussion at upcoming meetings. These notes are not intended to be the “record” of the meeting, only a reminder for TMT members.

Mid-Columbia Flows:

The COE provided an updated ESP analysis, which is posted on the TMT web page. The forecast for average spring flows is higher than the forecast presented last week, due to recent rain events. Forecasted flows for June range from 130-139 kcfs, and BPA forecasted a 127 kcfs week average for Priest Rapids. Given all this, the participants at FPAC recommended that operations continue as last week: 125 kcfs minimum at Priest Rapids, and up to 135 kcfs while maintaining refill objectives at Grand Coulee.

ACTION: The COE will continue with the recommended operation for June 7-13: Operate Priest Rapids at a hard constraint minimum of 125 kcfs and look for available water to provide up to a 135 kcfs weekly average while meeting Grand Coulee refill objectives. TMT will check in on this issue at the June 9th TMT meeting.

Sturgeon and Libby Operations Update:

Movement of the sturgeon downstream (which indicates spawning) prompted the start of the sturgeon pulse operation as requested in SOR 2004-FWS1. Libby began ramping up to 13 kcfs on Saturday, May 29th, and will ramp up further to 14 kcfs on June 6th at 6 pm. Libby is at elevation 1432', filling ~.2'/day, with inflows of 17 kcfs. The current operation is on target with the USFWS request.

John Day/The Dalles Spill Management:

After discussions at the previous two TMT meetings on SOR 2004-10, a spill management subgroup met to discuss spill management at John Day and The Dalles. Rudd Turner, COE, emailed a summary of the discussion and recommendation to the

TMT. The subgroup recommended that the projects be operated to target 60% and 40% spill, rather than operate to maximums of 60% and 40%. The COE will make every effort to stay within 1% of these targets (plus or minus), with a priority of a day by day, then within week, then week by week basis. NOAA agreed to this recommendation, as did the rest of the participating members of TMT.

ACTION: The COE and BPA will implement the subgroup recommendation beginning this afternoon. John Wellschlager and Rudd Turner will communicate this with their respective project schedulers and operators, and provide an update of this decision to TMT next week (some TMT members were not available for today's call).

Other:

Dave Statler, Nez Perce, noted that Dworshak is near full, there have been good flows in the Clearwater, and this translates to good flows at Lower Granite. From the tribes' perspective, this is a positive condition.

Next Meeting, June 9, 9am-noon:

Agenda items:

- Hanford Reach
- Sturgeon Operations (including "priority" email from USFWS – see SOR 2004-FWS1 discussion above)
- CRITFC Treaty Fishing
- McNary 1% Test
- Spill Management Subgroup Report
- Mid-Columbia Flows
- System Status Review

Meeting Minutes

1. Greeting and Introductions

The June 4 Technical Management Team conference call was chaired by Rudd Turner of the Corps and facilitated by Donna Silverberg. The following is a distillation, not a verbatim transcript, of items discussed at the meeting and actions taken. Anyone with questions or comments about these minutes should call Turner at 503/808-3936.

2. Mid-Columbia Flow Objectives.

Turner said there is a new ESP analysis now available; it can be downloaded via hotlink from today's TMT agenda on the TMT homepage. He noted that these graphs show outflows and reservoir elevations for Grand Coulee and Priest Rapids, and run through August 31. This run captures several recent rain events, and shows an average flow of 122-126 Kcfs for the spring period at Priest Rapids, and 130-139 Kcfs for June average flows at that project. The June early-bird forecast at The Dalles, 72.6 MAF, is a bit higher than the May final forecast for that project, said Turner.

In response to a question from Woodin, Turner noted that ESP and STP are separate modeling tools, so differences between their outputs are not unusual. And the bottom line is that we're looking at about a 20 Kcfs increase in average flows between the most recent ESP run and the last one? Paul Wagner asked. That's correct, Turner replied. For the period May 31-June 6, we agreed to operate Priest Rapids with 125 Kcfs as a minimum outflow, shooting for higher flows, with a maximum flow of 135 Kcfs and keeping Grand Coulee refill in mind, he added. So we'll see an average flow of about 130 Kcfs at Priest Rapids this week? Wagner asked. That's pretty close, John Wellschlager replied. Has Grand Coulee continued to fill? Woodin asked. Yes, Tony Norris replied – it is filling incrementally, and is at 1281.0, currently.

We discussed this at FPAC, and our feeling is that the current operation should continue, said Wagner – 125 Kcfs as a minimum flow, higher if possible without jeopardizing Grand Coulee's June 30 refill. And that's through the week ending June 13? Turner asked. Correct, Wagner replied. We'll do what we can, given the need to refill Grand Coulee by June 30, said Turner – it's still a below-average water year, despite the recent rain events. Bear in mind also that what we're trying to avoid is a sudden drop-off to 70 or 80 Kcfs during the last week in June, said Wagner. In response to a question, Wagner said Oregon, Idaho, Washington, CRITFC, the Fish and Wildlife Service and NOAA Fisheries participated in Tuesday's FPAC call, at which Mid-Columbia flows were discussed. BPA and Reclamation said they have no problem with the proposed operation.

3. Sturgeon and Libby Operations Updates.

Turner said that, last Saturday, May 29, the Corps then got a call saying the Fish and Wildlife Service had observed radio-tagged females heading downstream, so that was accepted as a trigger for the sturgeon operation. Libby has been releasing 13 Kcfs since Sunday; outflow will be increased to 14 Kcfs as of 6 p.m. Sunday, June 6, to 15 Kcfs as of 6 p.m. Sunday, June 13 and to 16 Kcfs as of 6 p.m. Sunday June 20. The current elevation at Libby is 2432 feet, filling 2/10 of a foot per day, with 17 Kcfs inflow, although inflow to the project has declined somewhat in recent days.

4. John Day and The Dalles Spill Management.

You'll recall that, at the last TMT meeting, we received a presentation on how spill is calculated from BPA, said Turner; at that meeting, it was also suggested that a spill operations subcommittee be formed. That group met on June 2; Turner said he had sent out an email describing what was discussed by the group, including the recommendations it reached. The memo also included an operational recommendation for TMT approval, Turner said. What we found was that we have come extremely close to meeting the 60% at John Day; at The Dalles, we found an underrun of 135 kaf. Our plan at The Dalles is to work on an hourly, nightly and weekly basis to ensure that the full 40% is delivered, said Turner. Woodin noted that the Mid-Columbia projects true-up their spill operations a day at a time, shorting spill slightly the following day if the target was exceeded on the previous day, and vice-versa. That's more or less what we were thinking, said Turner. BPA would also agree, said Wellschlager. Wagner suggested that it may make sense to revisit this topic next Wednesday, once a broader range of TMT representatives is available to discuss it. It was agreed that, since this topic was covered

under SOR 2004-11, implementation of the revised spill protocol can proceed immediately. That's fine with Bonneville, said Wellschlager.

5. Next TMT Meeting Date.

The next meeting of the Technical Management Team was set for Wednesday, June 9 at 9 a.m. at the Corps' Customs House offices in Portland, OR. Meeting summary prepared by Jeff Kuechle.

TMT Participant List

June 4, 2004

Name	Affiliation
Rudd Turner	COE
Tony Norris	USBR
Ruth Burris	PGE
Mike O'Bryant	CBB
John Wellschlager	BPA
Nic Lane	BPA
Rod Woodin	WDFW
Donna Silverberg	Facilitation Team
Paul Wagner	NOAAF
Kyle Martin	CRITFC
Cindy LeFleur	WDFW
David Benner	FPC
Dan Bedbury	EWEB
Jiong Ji	Avista Energy
Cathy Hlebechuk	COE
Scott Boyd	COE
Kevin Nordt	PGE
Russ George	WMCI
Ray Gonzalez	COE

Richelle Beck	D. Rohr & Assoc.
Denny Rohr	D. Rohr & Assoc.
Mike Buchko	Powerex
Dave Statler	NPT

TECHNICAL MANAGEMENT TEAM

BOR: Tony Norris / John Roache

BPA: Scott Bettin / John Wellschlager

NMFS: Paul Wagner / Chris Ross

USFWS: David Wills / Steve Haeseker

OR: Ron Boyce

WA: Cindy LeFleur

ID: Russ Kiefer

MT: Jim Litchfield

COE: Cindy Henriksen / Rudd Turner / Cathy Hlebechuk

TMT MEETING

Wednesday June 9, 2004 0900 - 1200 hours

**Custom House Room 118
Portland, Oregon
Conference call line: 503-808-5190**

*All members are encouraged to call Donna Silverberg with any issues or concerns they would like to see addressed.
Please e-mail her at dsilverberg@cnnm.net or call her at (503) 248-4703.*

AGENDA

1. Welcome and introductions.
2. Sturgeon SOR and operations. (USFWS, COE)

Note: The following model runs are for your information and are meant to describe a range of possible operation scenarios.

- a. [\(LIBBY SOR 2004-FWS1 OPERATION WITH 2439 e.o. AUG - May 01, 2004 to September 30, 2004\)](#)

- b. [\(LIBBY SOR 2004-FWS1 OPERATION WITH 2439 e.o. SEP - May 01, 2004 to September 30, 2004\)](#)

- c. [\(LIBBY: STOP PULSE IN JUNE, BULL TROUT FLOWS, 2439 e.o. AUG - May 01, 2004 to September 30, 2004\)](#) 
- d. [\(LIBBY: STOP PULSE IN JUNE, BULL TROUT FLOWS, 2439 e.o. SEP - May 01, 2004 to September 30, 2004\)](#) 
- e. [\(LIBBY: STOP PULSE IN JUNE - FLAT FLOW TO 2439 e.o. AUG - May 01, 2004 to September 30, 2004\)](#) 
- f. [\(LIBBY: STOP PULSE IN JUNE - FLAT FLOW TO 2439 e.o. SEP - May 01, 2004 to September 30, 2004\)](#) 
3. Status of Hanford Reach. (Chris Carlson)
4. Mid-Columbia Flow Objectives.
5. Review Spring Treaty Fishery.(CRITFC) -
[\(Impact of Pool Fluctuations on the 2004 Spring Treaty Fishery\)](#) 
6. McNary 1% Test Operation. (COE)
7. McNary transport start.
8. The Dalles and John Day spill management - subgroup report. (COE, BPA)
9. Status of Operation
 - a. Reservoirs

- b. Fish
- c. Power System
- d. Water Quality
 - a. Spill Information

- i. [\[AVERAGE % TDG FOR 12 HIGHEST HOURS May 24 - Jun 6, 2004 \]](#) 

- ii. [\[EXCEEDANCE TRACKING May 24 - June 6, 2004 \]](#) 

- b. Average percent TDG for 12 highest hours - [\[June 2004 \]](#)

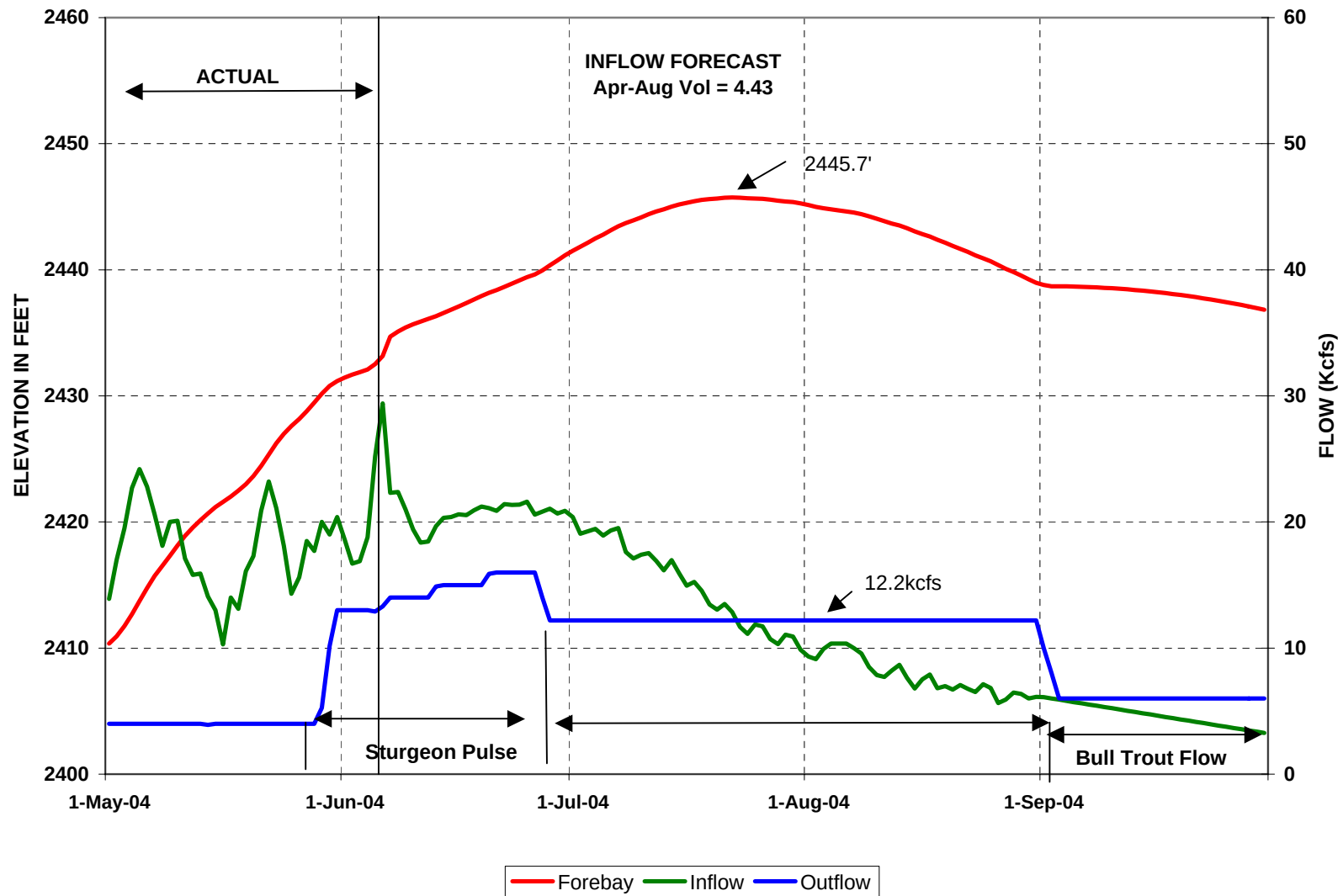
- c. McNary Tailwater Temperatures - [\[June 2004 \]](#) 

10. Other

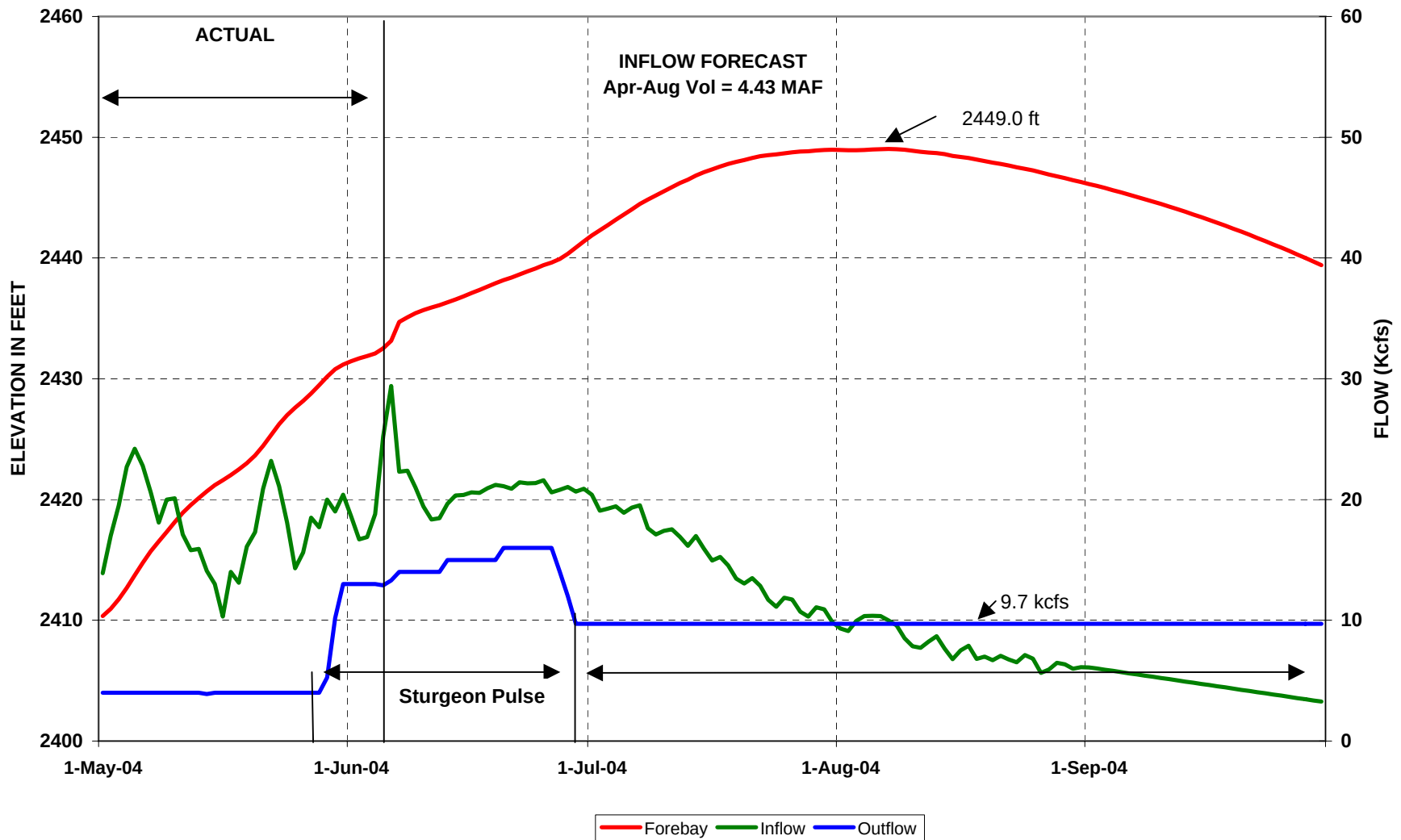
- a. Set agenda for next meeting

Questions about the meeting may be referred to Cindy Henriksen at (503) 808-3945, or Rudd Turner at (503) 808-3935, or Cathy Hlebechuk at (503) 808-3942

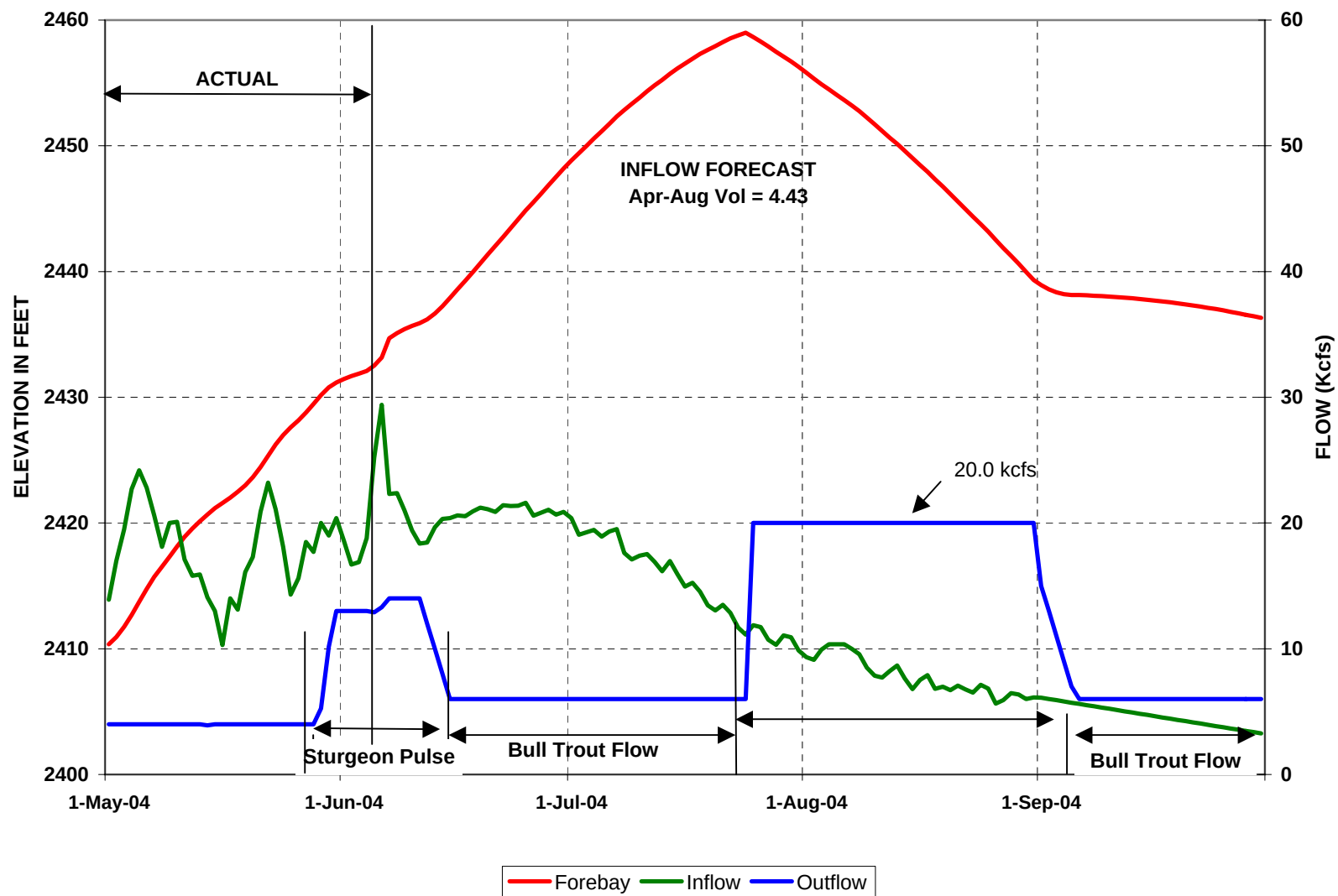
LIBBY SOR 2004-FWS1 OPERATION WITH 2439 e.o. AUG
May 01, 2004 to September 30, 2004



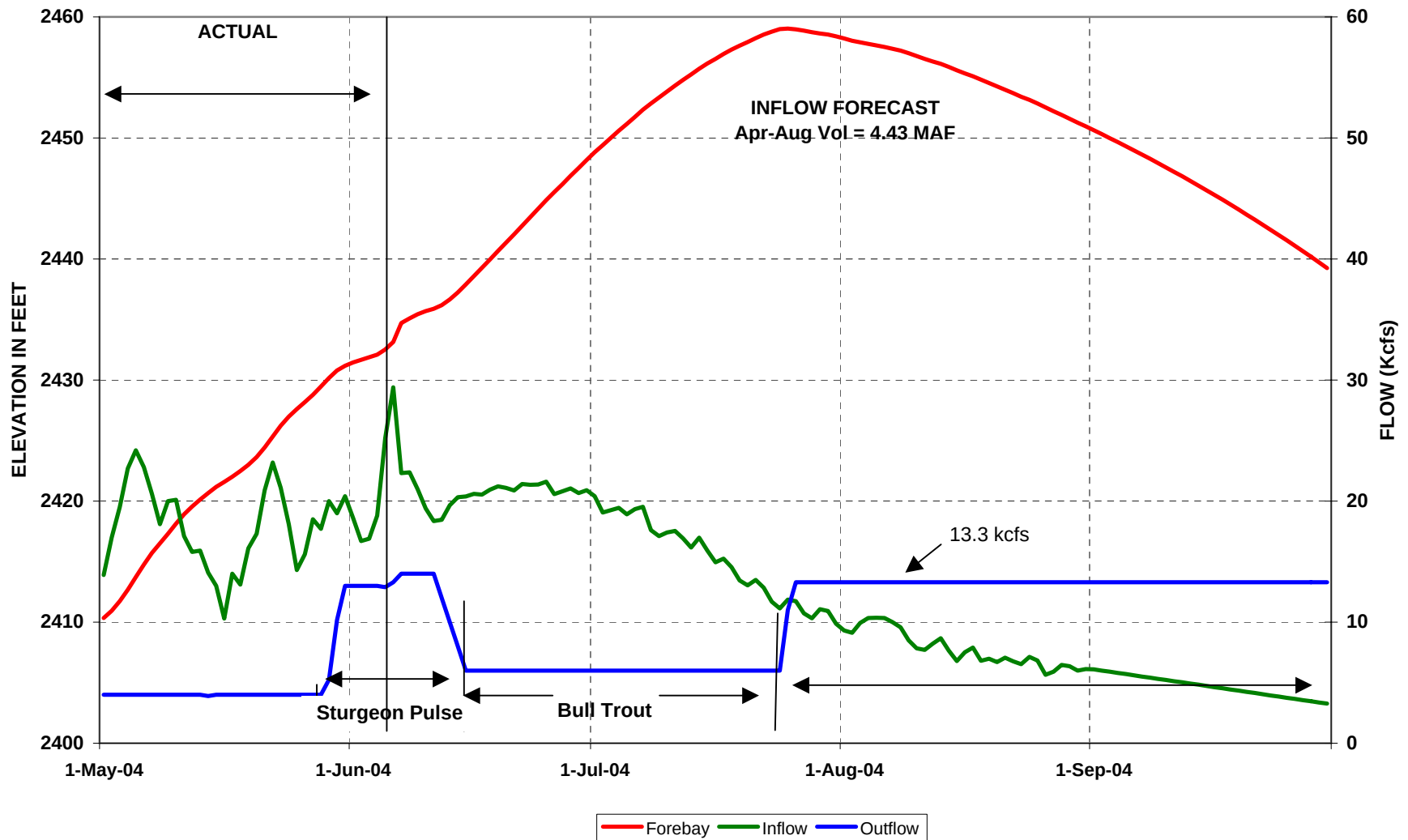
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May 01, 2004 to September 30, 2004



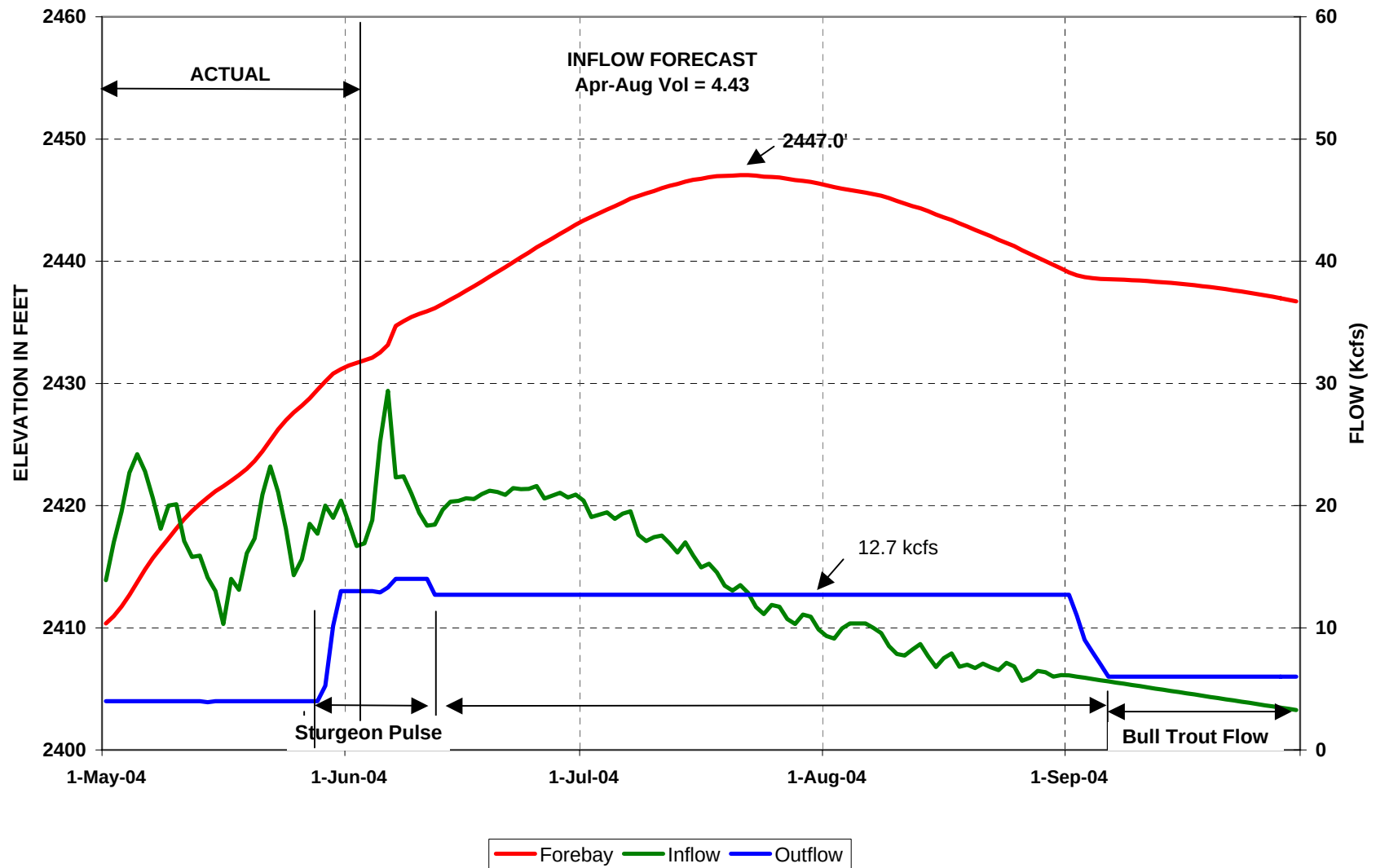
LIBBY: STOP PULSE IN JUNE, BULL TROUT FLOWS, 2439 e.o. AUG
May 01, 2004 to September 30, 2004



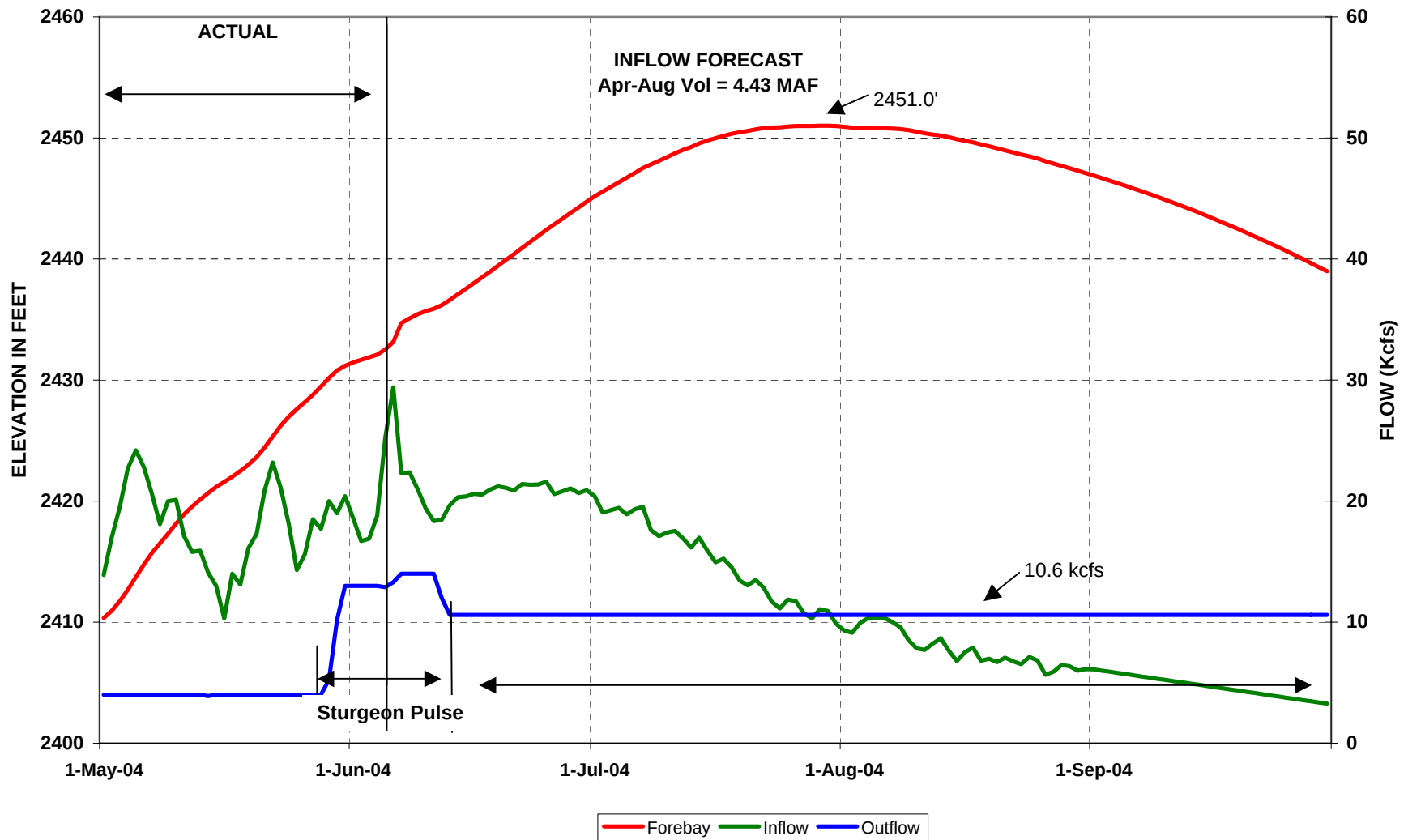
LIBBY: STOP PULSE IN JUNE, BULL TROUT FLOWS, 2439 e.o. SEP
May 01, 2004 to September 30, 2004



LIBBY: STOP PULSE IN JUNE - FLAT FLOW TO 2439 e.o. AUG
May 01, 2004 to September 30, 2004



LIBBY: STOP PULSE IN JUNE - FLAT FLOW TO 2439 e.o. SEP
May 01, 2004 to September 30, 2004





COLUMBIA RIVER INTER-TRIBAL FISH COMMISSION

729 N.E. Oregon, Suite 200, Portland, Oregon 97232

Telephone (503) 238-0667

Fax (503) 235-4228

www.critfc.org

TO: Technical Management Team (TMT)
FROM: Kyle Martin, *Senior Hydrologist*, CRITFC Hydro Program
DATE: June 9, 2004

SUBJECT: Impact of Pool Fluctuations on the 2004 Spring Treaty Fishery

CRITFC submitted four System Operation Requests (2004-C1 through 2004-C4) via the NMFS' TMT forum to support spring treaty fishing. The CRITFC requests asked for (1) specific elevations and (2) stable pool elevations during each week of treaty fishing. The total Tribal harvest was ~17,050 fish.

Criterion #1 asked to operate the pools as a hard constraint within a one-foot specified elevation range. The Corps replied with a commitment as a hard constraint to a 1.5-foot range, or 1-foot as a soft constraint, as they have done so since 1996.

The table shows the hourly compliance of CRITFC's elevation range criteria, as well as the Corps' criteria, during the treaty fishery. Averages from the 2003 spring season are also shown.

2004	Bonneville Pool	The Dalles Pool	John Day pool
1 foot range (CRITFC):	75.5 - 76.5 ft	158.5 -159.5 ft	263.5 - 264.5 ft
MAY 4 - 6	62%	70%	23%
MAY 11 - 14	91%	66%	24%
MAY 19 - 21	77%	84%	28%
MAY 26 - 28	79%	59%	34%
average:	77%	70%	27%
2003 average:	53%	59%	35%
1.5 foot range (COE):	75 - 76.5 ft	158 -159.5 ft	263 - 264.5 ft
MAY 4 - 6	97%	100%	92%
MAY 11 - 14	95%	76%	73%
MAY 19 - 21	97%	95%	80%
MAY 26 - 28	100%	82%	87%
average:	97%	88%	83%
2003 average:	98%	91%	80%

Pool elevation data is a good objective measure as to the absolute pool fluctuations (Criterion #2) as shown in Figures 1 through 12. Bonneville pool saw 1.0 – 1.6 foot swings (compared to 0.8 - 1.7 foot swings in spring 2003). The Dalles pool saw 1.0 – 2.4 foot swings (compared to 0.7 - 2 foot swings in spring 2003). John Day pool saw 0.5 – 1.7 foot swings (compared to 0.8 - 1.2 foot swings in spring 2003). CRITFC would like to understand the cause of this season's worst pool fluctuations and what the Corps can do to prevent future fluctuations.

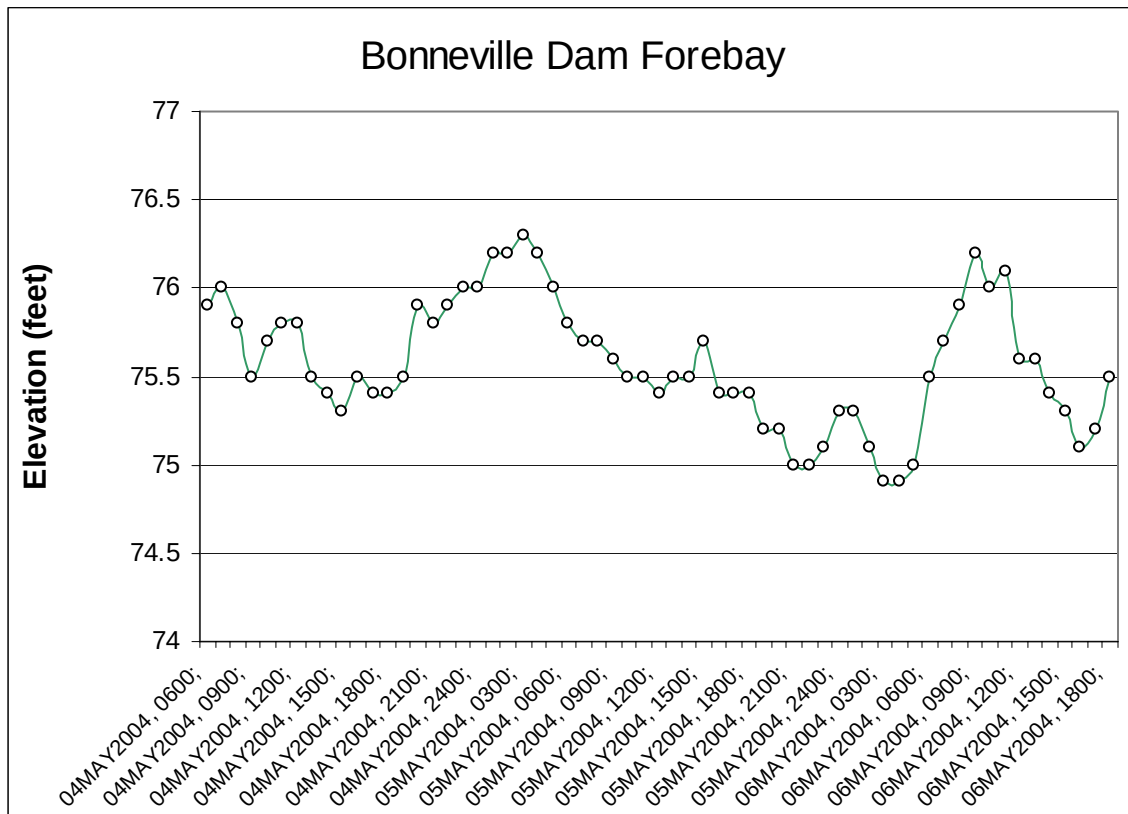


Figure 1. Observed pool elevations during May 4-6, 2004 spring treaty fishing (BON pool).

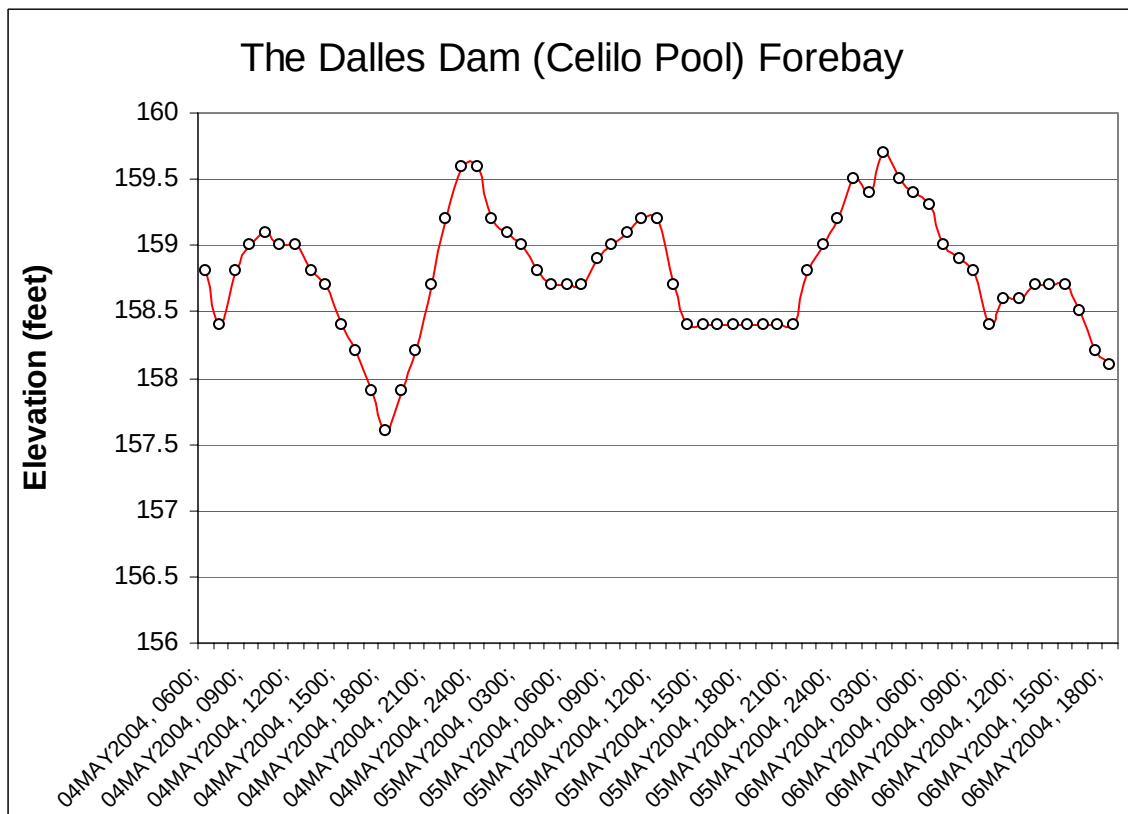


Figure 2. Observed pool elevations during May 4-6, 2004 spring treaty fishing (TDA pool).

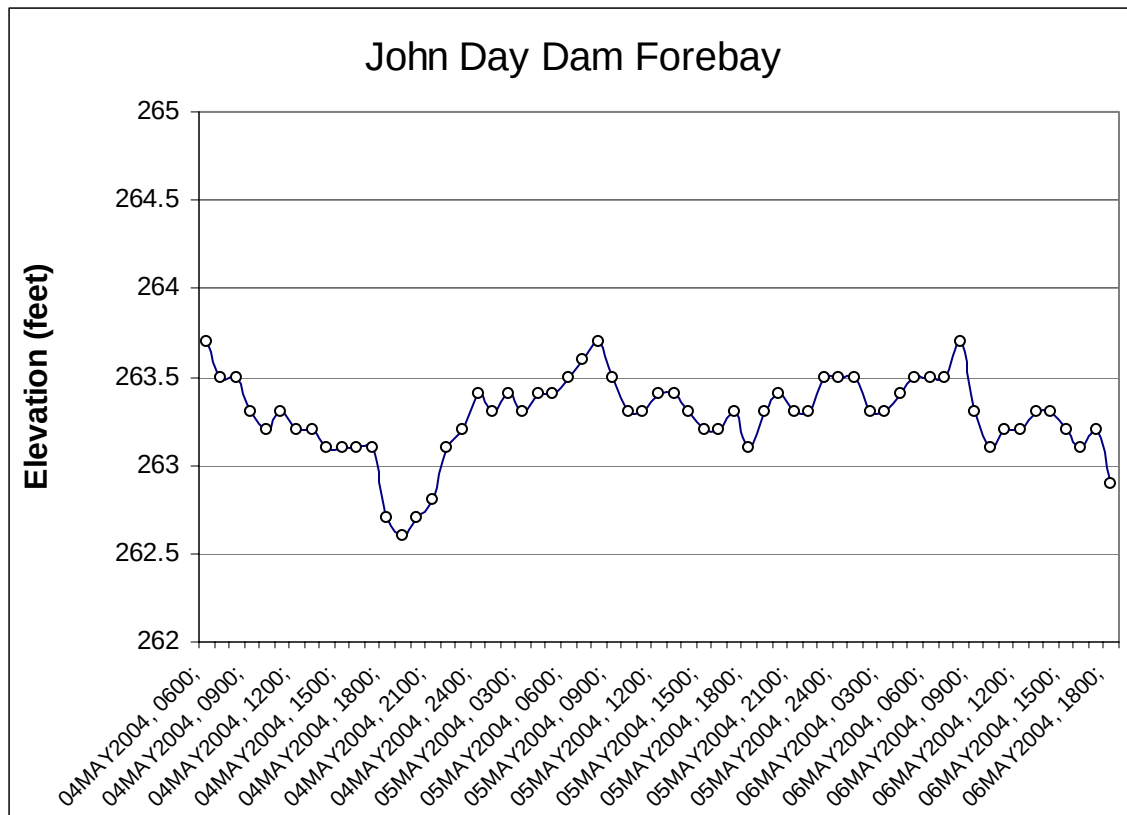


Figure 3. Observed pool elevations during May 4-6, 2004 spring treaty fishing (JDA pool).

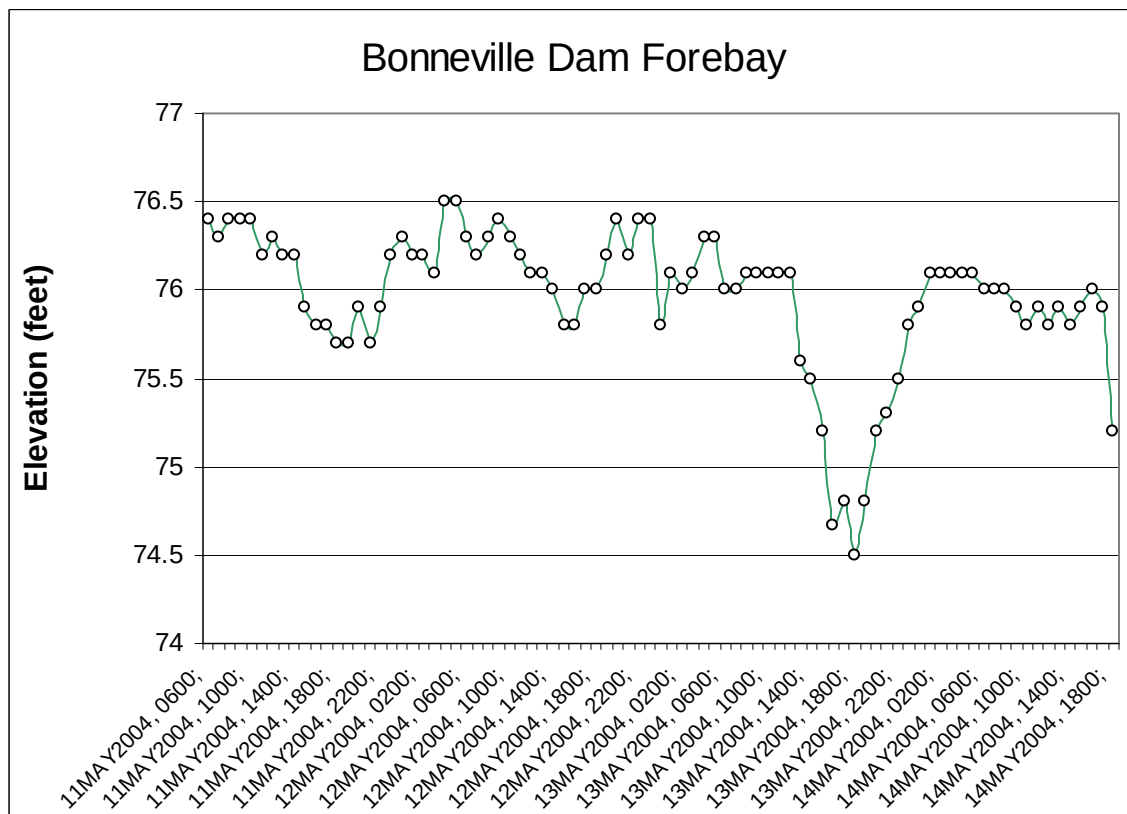


Figure 4. Observed pool elevations during May 11-14, 2004 spring treaty fishing (BON pool).

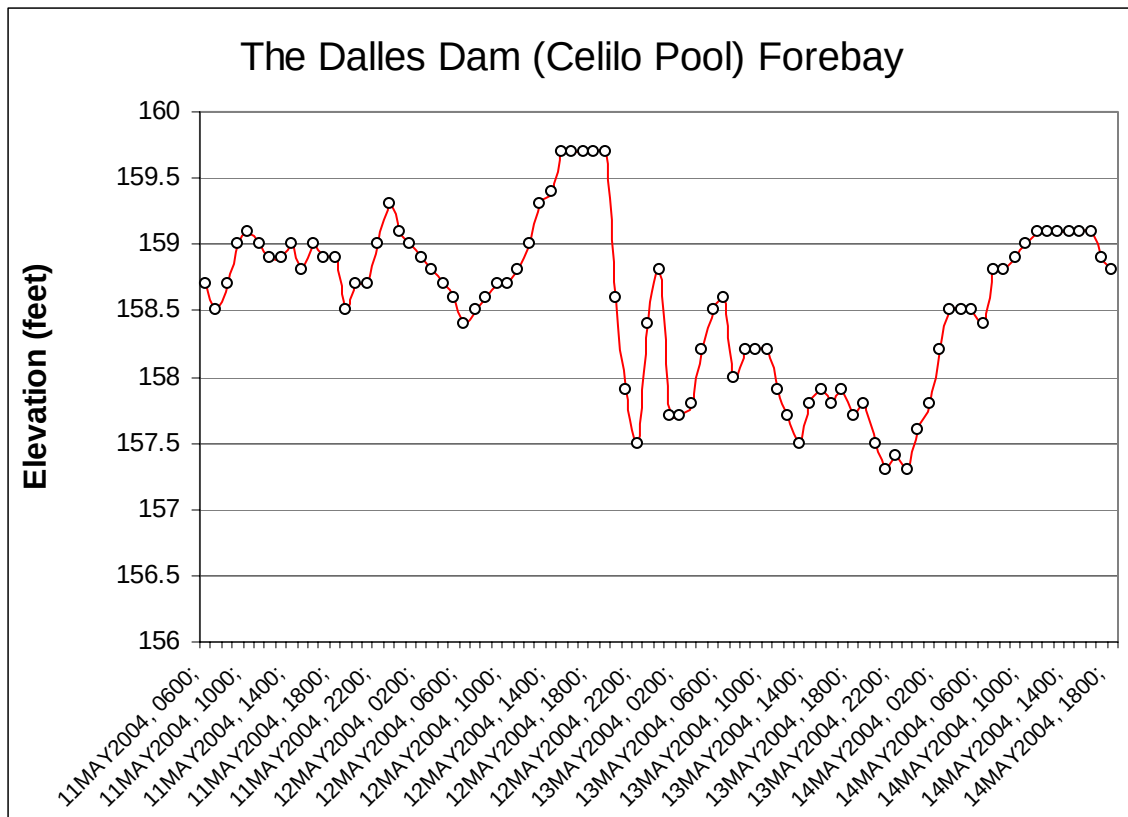


Figure 5. Observed pool elevations during May 11-14, 2004 spring treaty fishing (TDA pool).

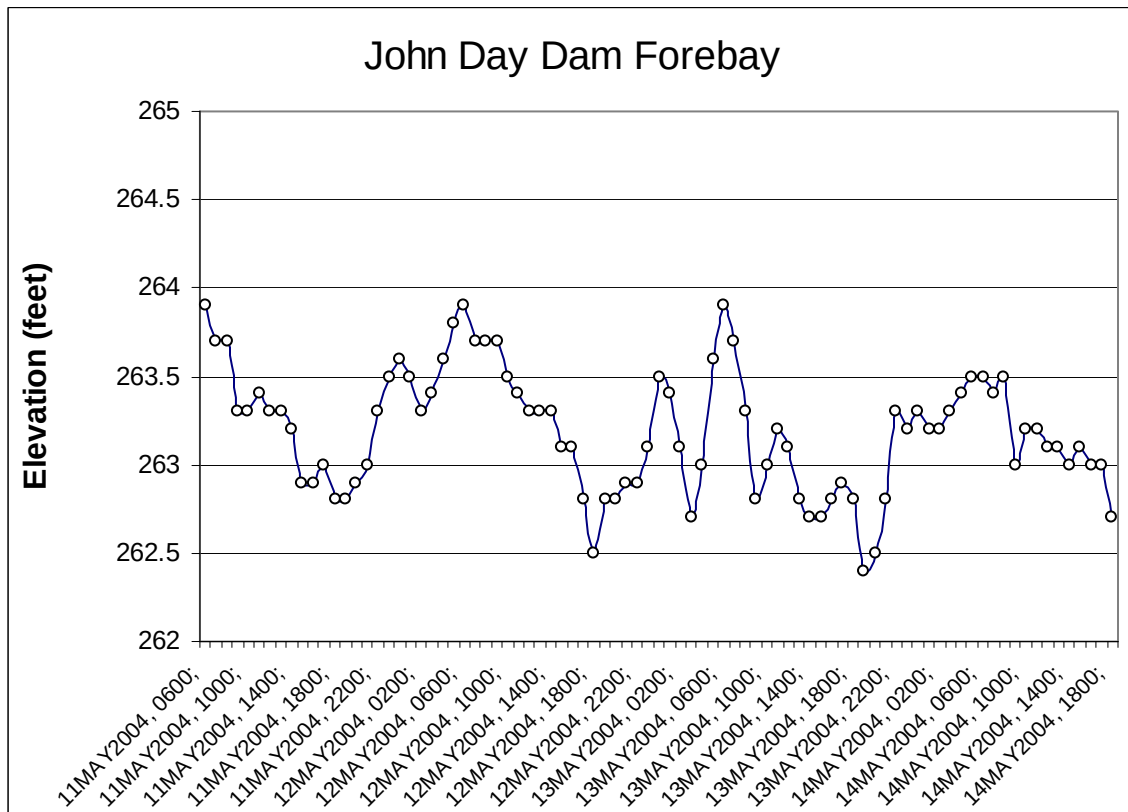


Figure 6. Observed pool elevations during May 11-14, 2004 spring treaty fishing (JDA pool).

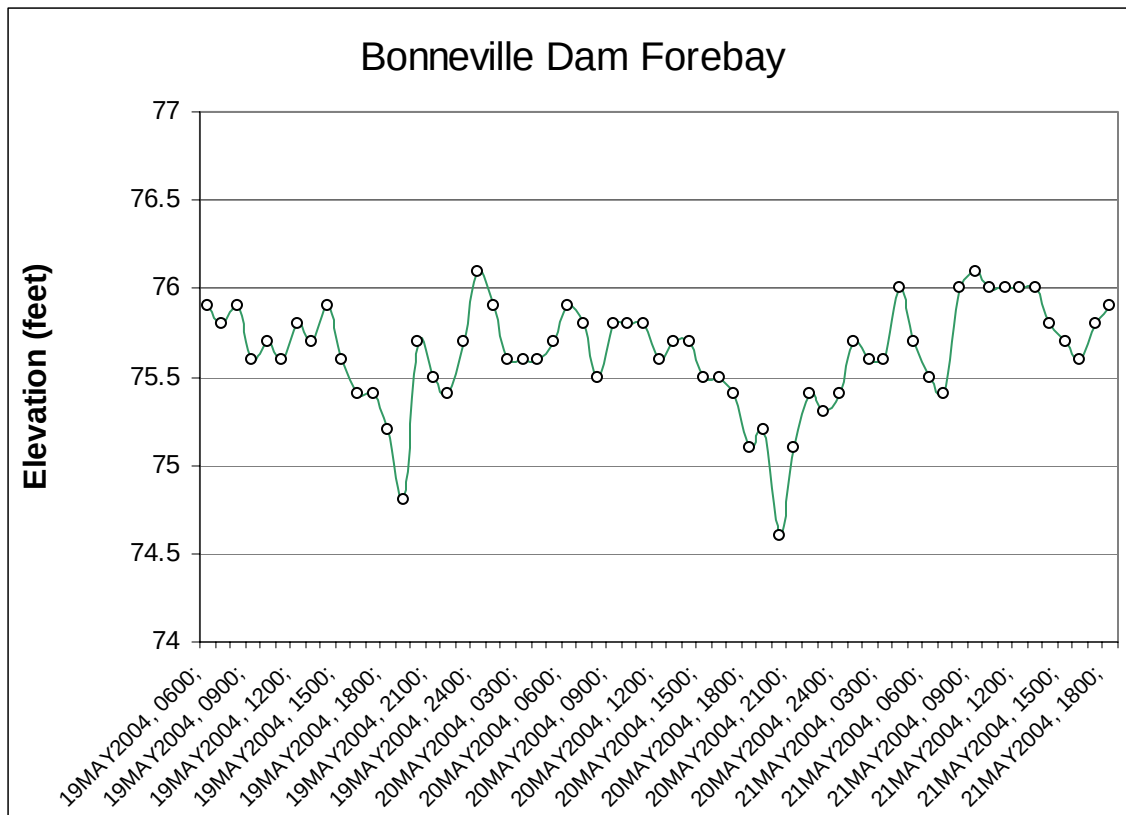


Figure 7. Observed pool elevations during May 19-21, 2004 spring treaty fishing (BON pool).

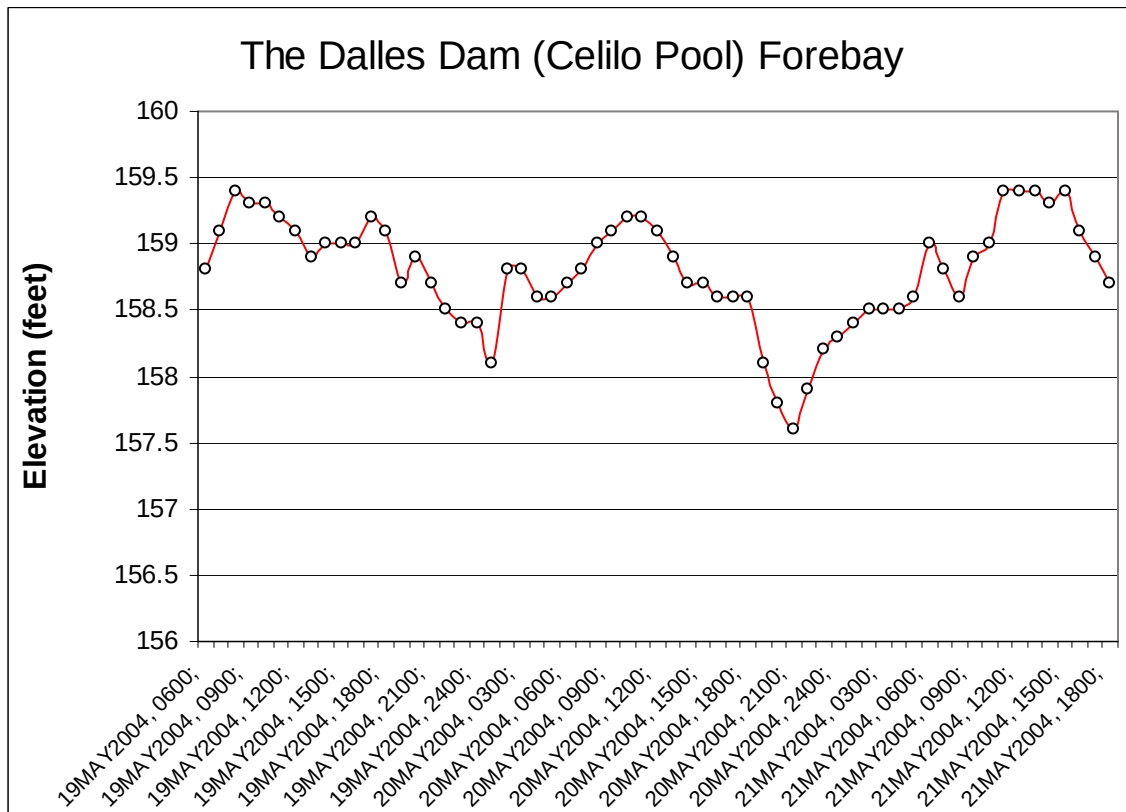


Figure 8. Observed pool elevations during May 19-21, 2004 spring treaty fishing (TDA pool).

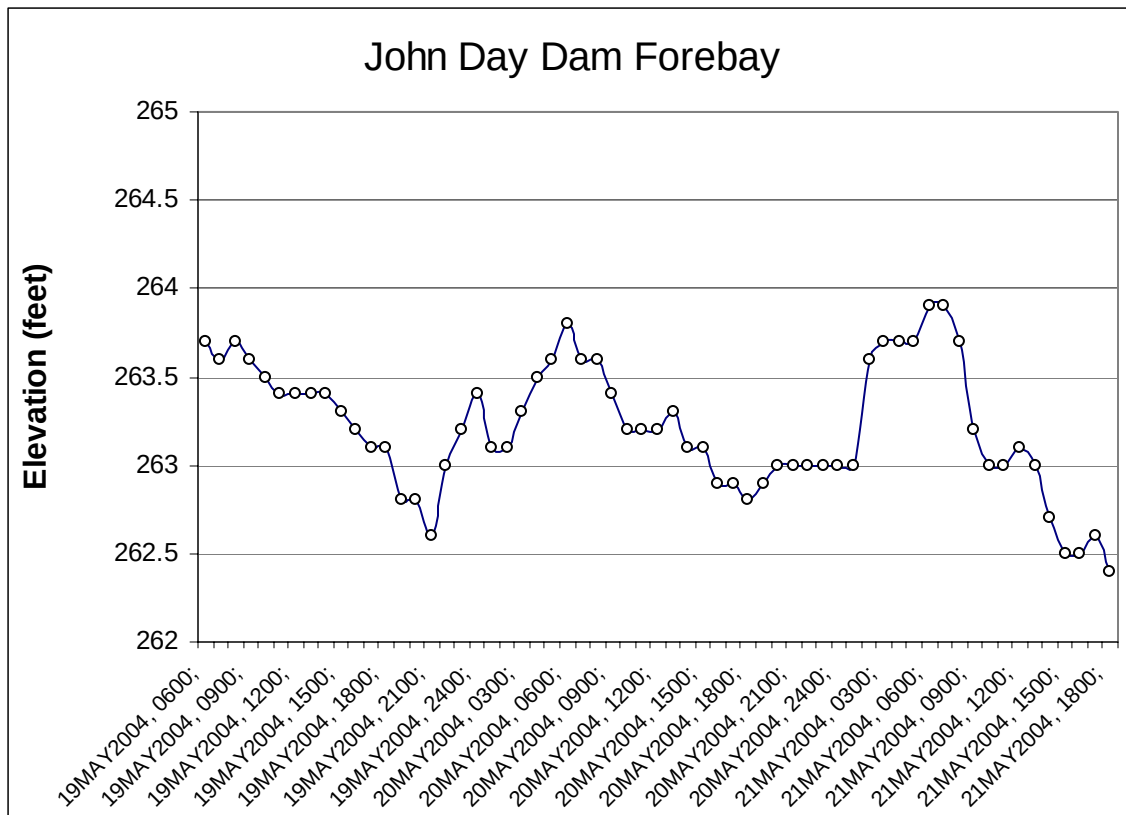


Figure 9. Observed pool elevations during May 19-21, 2004 spring treaty fishing (JDA pool).

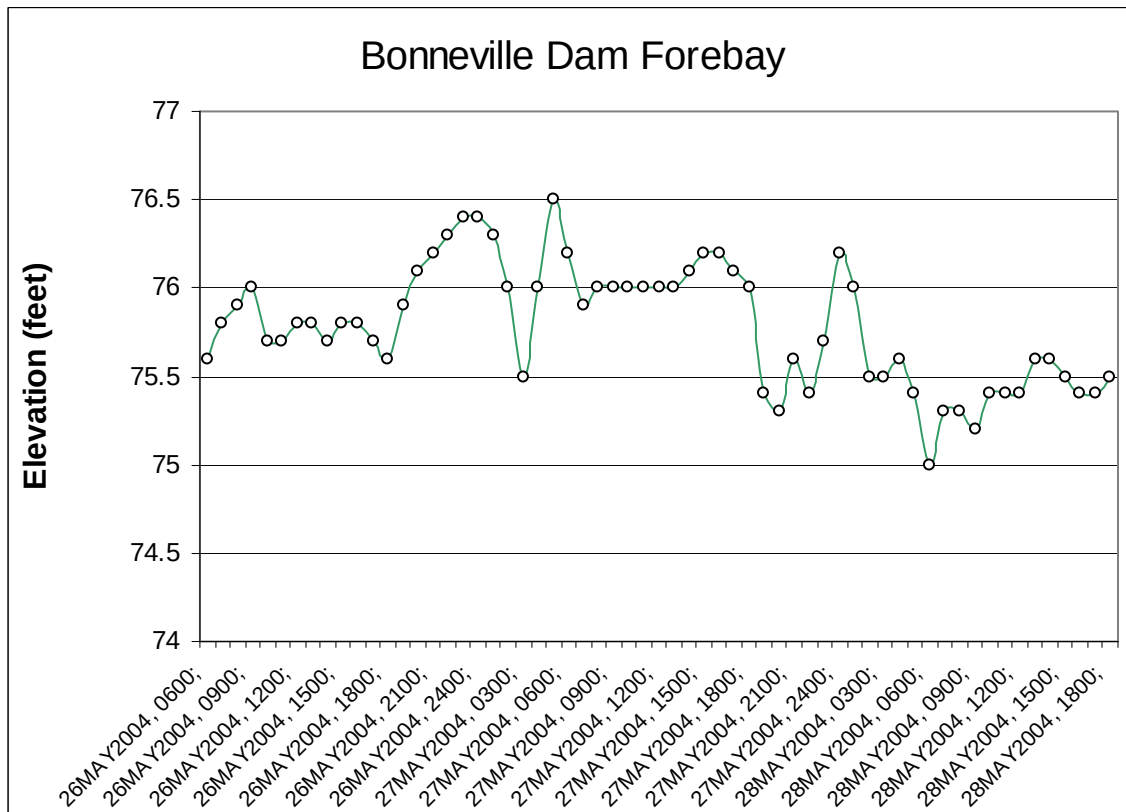


Figure 10. Observed pool elevations during May 26-28, 2004 spring treaty fishing (BON pool).

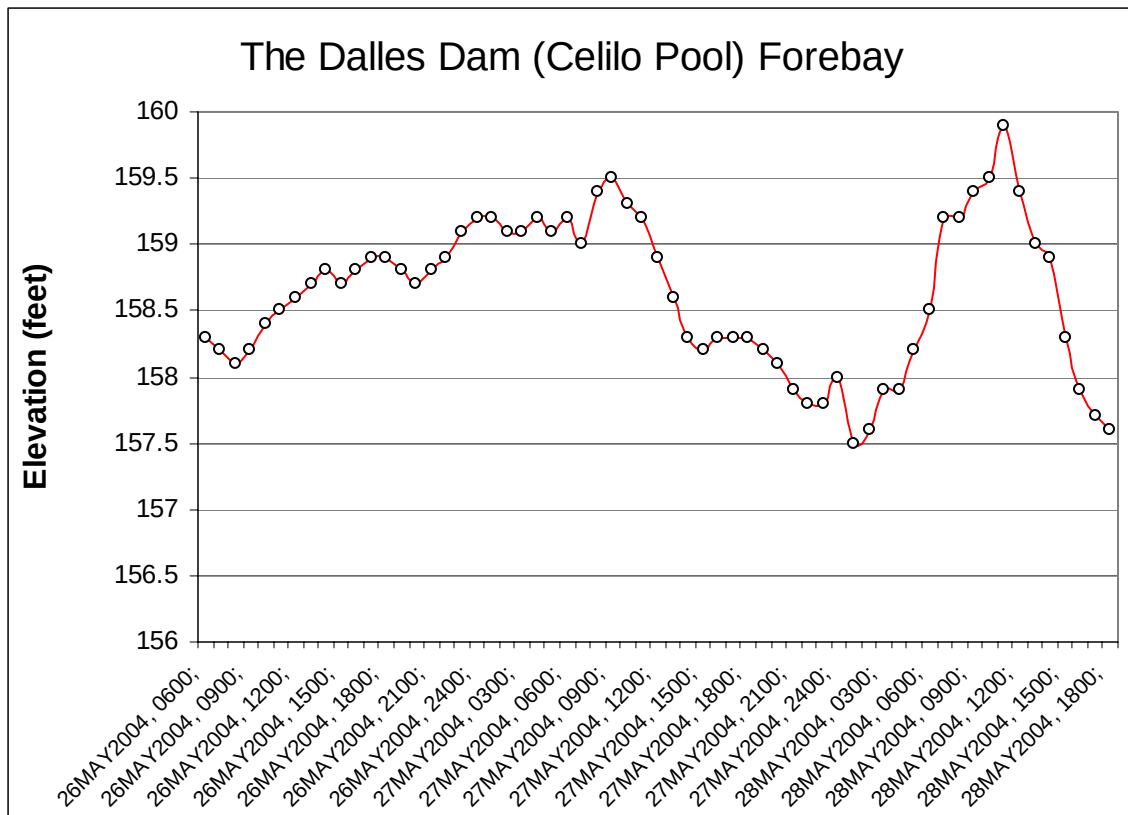


Figure 11. Observed pool elevations during May 26-28, 2004 spring treaty fishing (TDA pool).

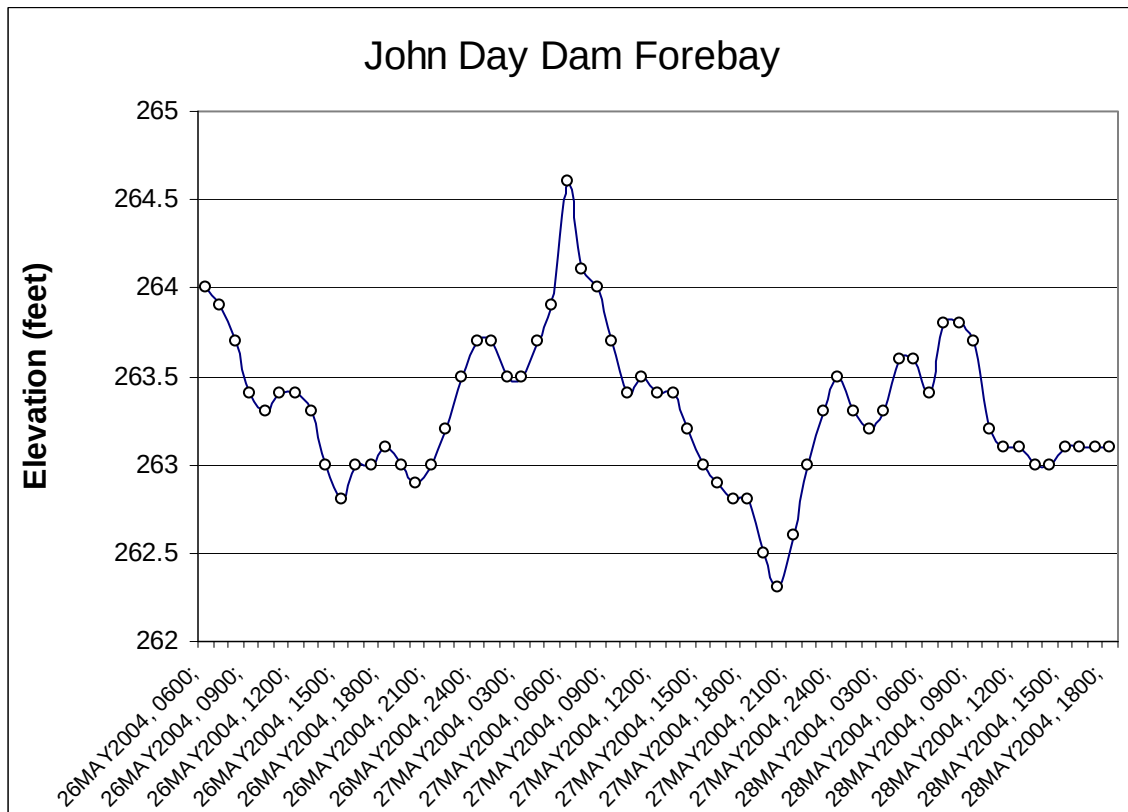
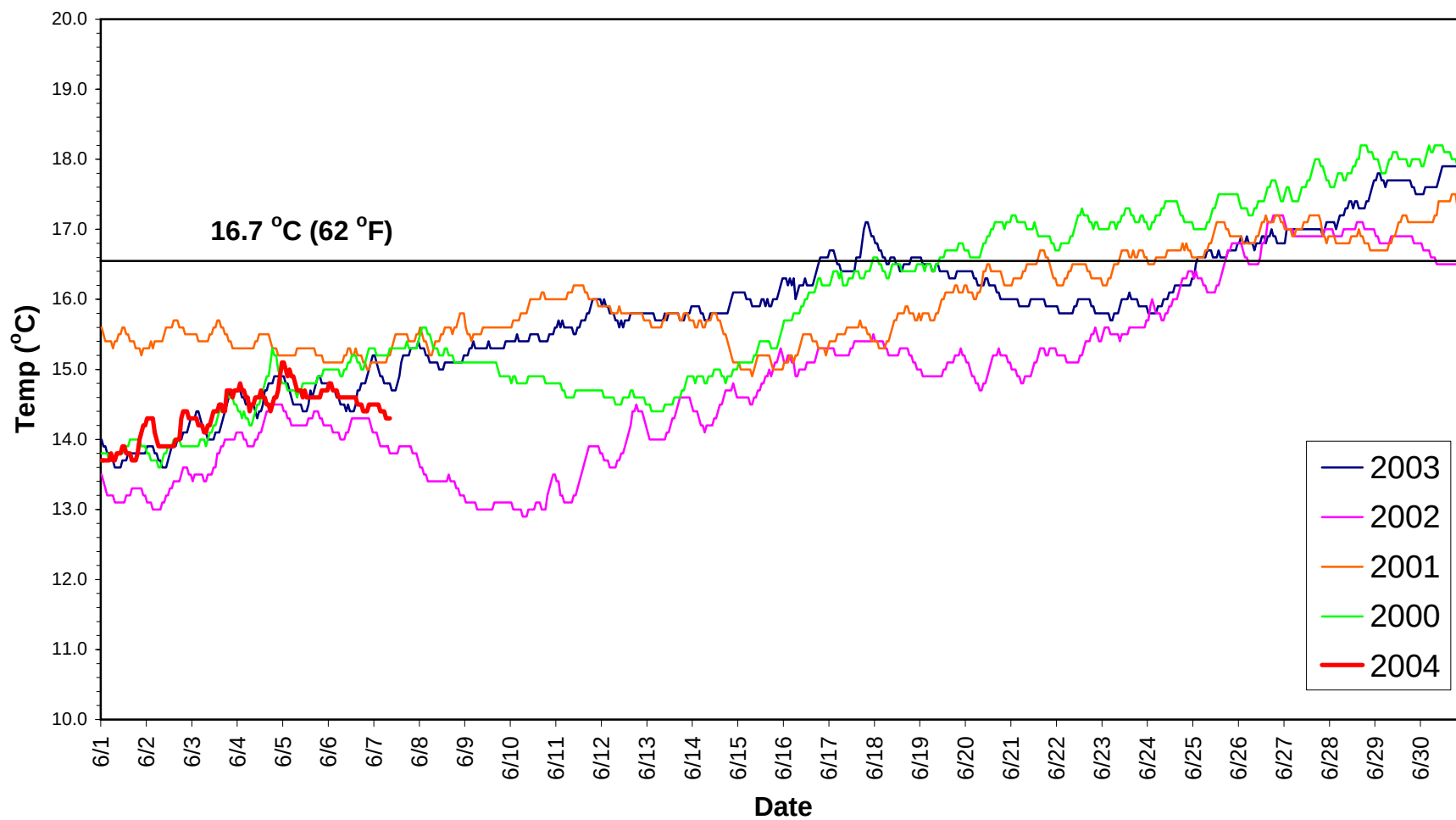


Figure 12. Observed pool elevations during May 26-28, 2004 spring treaty fishing (JDA pool).

McNary Tailwater Temperatures in June



COLUMBIA RIVER REGIONAL FORUM

TECHNICAL MANAGEMENT TEAM

MEETING NOTES

June 9, 2004

**CORPS OF ENGINEERS NORTHWESTERN DIVISION OFFICES – CUSTOM
HOUSE
PORTLAND, OREGON**

TMT Internet Homepage: <http://www.nwd-wc.usace.army.mil/TMT/index.html>

DRAFT

FACILITATOR'S SUMMARY NOTES ON FUTURE ACTIONS

Facilitator: Donna Silverberg

The following notes are a summary of issues that are intended to point out future actions or issues that may need further discussion at upcoming meetings. These notes are not intended to be the “record” of the meeting, only a reminder for TMT members.

Sturgeon SOR and Libby Operations:

Greg Hoffman, COE, reported on Libby operations. The COE is working to optimize temperatures from Libby to help sturgeon spawning behavior. There have been fluctuating temperatures this spring, which has affected spawning. To help minimize these fluctuations, the COE has been experimenting with withdrawals to within 30' of the reservoir surface. Temperatures downstream of Libby were at 48.6°, and 48.9° at Bonners Ferry. The top 30' of water is mixed; the COE will be looking at temperatures of this water this summer because 3° fluctuating temperatures have an effect on hatchery fish: They stop spawning/reproduction. There is a desire to be prepared with warmer water in the event that temperatures begin to change. The focus of the sturgeon pulse at this point is incubation, since spawning may be over.

The COE provided a number of model runs of flow options for Libby operations relating to sturgeon, bull trout and salmon. The model runs are attached to today's TMT agenda. Runs A and B are based on the sturgeon SOR, with a 4-week pulse operation. Models C-E show a two-week pulse operation, followed by a ramp down to bull trout minimums. NOAA noted that there does not appear to be a large difference in water elevations with a two-week vs. four-week sturgeon pulse operation. Overall, the biological concern is to avoid a high reservoir peak, which affects food sources that exist in warmer areas (by pushing the sources up, followed by de-watering, the food is lost). Montana's preferred alternative is to be ~10' below full, avoid a peak and have water to use in September.

ACTION: The COE will continue to implement the SOR, so they will ramp Libby up to 15 kcfs on Sunday, 6/13 through 6/19, then ramp up to 16 kcfs on Sunday, 6/20. TMT will revisit Libby operations, with emphasis on operations after the sturgeon pulse, at the 6/23 TMT meeting. The issue to consider over the next two weeks is how to shape water in July and August, and how to manage the water in September. A question was asked about a Libby/Arrow swap with the Canadians, or passing water through the Kootenai. BPA responded that, at this point, there does not seem to be an interest from the Canadians in either operation. Negotiations are underway.

Hanford Reach:

Chris Carlson, Grant County PUD, reported on Priest Rapids operations for May 24-29, and May 31-June 6. Operations looked good except for on June 5, when the project went outside of the flow bands due to flows going up on Friday and then dropping off to very low on Saturday. As of today's meeting, 327 temperature units had accumulated; 400 are expected around 6/12. Chris will give a final report/season wrap-up at the June 23 TMT meeting.

Using information from last Friday's TMT conference call, the COE will continue to operate at 125 kcfs minimum at Priest Rapids, 135 kcfs maximum, and an objective of meeting Grand Coulee refill, for the two-week period 6/14-27. It was noted that smooth flows at the end of the operation are preferred.

Tribal Treaty Fishery:

Kyle Martin, CRITFC, reported on the spring treaty fishery. Approximately 17,050 fish were harvested. He noted that there was good implementation of the tribes' request at Bonneville and The Dalles pools, and not quite as good at John Day. CRITFC would like to work with the COE to minimize fluctuations in the future, and suggested that the following language be added to future teletypes: "The desired goal is for a stable pool and minimal fluctuations."

CRITFC is contemplating a summer fishery during the first or second week of July. The COE and BPA noted that the net placement information from CRITFC was helpful in making operational decisions, in that appropriate changes could be made at projects depending on where the nets were. It would also be helpful to know if there is a day/night change in net placement. Overall, there was an improvement this year from everyone's perspective.

ACTION: The COE will provide a draft of the new teletype re: treaty fishery operational goals at the June 23 TMT meeting.

McNary 1% Test Operation:

Greg Hoffman, COE, reported that the McNary test is still underway – there was a conference call scheduled for later today at 2:00 pm with FFDRWG and SRWG members to discuss the next steps for summer fish (spring runs at this point have passed).

McNary Transport Start:

TMT has an interest in planning ahead for the start of transportation at McNary, per criteria listed in RPA 43. Typically, transportation begins between June 20-27; June 20 is the action agencies' planned end of spill to the gas cap in the Snake River and at McNary. Oregon stressed the importance of looking at conditions in the river and emerging biological information on the benefits of transporting fish at McNary. The action agencies' two-week operation will be: BiOp spill will end on June 20 while involuntary spill will continue for in-river bypass. TMT will discuss when to begin transportation at McNary during the June 23 TMT meeting.

The Dalles and John Day Spill Management Subgroup:

The subgroup met last Wednesday to look at operations at The Dalles and John Day, and agreed to revise the management strategy so that the percentages (40%, 60%) are targets rather than maximums. The COE and BPA have been operating with this strategy since Friday, June 4, following a TMT conference call and agreement. At The Dalles, this has resulted in a 39.8% (targeting 40%) spill percentage so far, with the goal to be within 1%. Everyone agreed that this was a very useful exercise which has added confidence and comfort, especially with operations at The Dalles.

System Status Review:

Reservoirs: McNary released 225-280 kcfs over the past week. Lower Granite released 100.6 kcfs yesterday, and is spilling (including the RSW). Dworshak is at elevation 1593.5'. Discharge out of Dworshak decreased to 17 kcfs as of yesterday. The project filled 35' in May. Libby is at 2435.5', releasing 14 kcfs and filling. Albeni Falls is at elevation 2061.1'. Hungry Horse is at elevation 3554.5', with inflows of 15 kcfs. Grand Coulee is at 1284', with inflows of 140 kcfs. The BOR is expecting about 300 kcfs of Snake River flow augmentation this year, starting around July 1.

The June final water supply forecast was issued on Monday, June 7: The Dalles is at 85.1 MAF (79% of normal); Grand Coulee is at 53 MAF (84% of normal); and Lower Granite is at 15.4 MAF (71% of normal, up 10% from the last forecast.)

Fish status: The final spring adult count for Upper Columbia chinook was 193,600. Juvenile yearling chinook numbers continue to decline, with about 3,000/day at Lower Granite. It appears that this is the end of the spring migration. Subyearling numbers are up at Lower Granite, to 47,000. Steelhead numbers peaked a few weeks ago – about 7,000/day are being observed at Lower Granite, with the same trend at downstream projects. Rock Island and McNary counts are down for yearlings compared to previous years. Steelhead and yearling chinook at Bonneville are also down in numbers, possibly due to the corner collector.

Power system: Lines have tripped due to lightning. Line overloading occurred in the Snake River basin, causing a slight increase in spill at Little Goose and Lower Monumental. Lightning is expected in the Libby/Hungry Horse region.

Water quality: TDG exceedances occurred at Ice Harbor and McNary, due to temperature swings and wide fluctuations in gas levels coming down the system. John Day has been spilling to the gas cap. Dworshak, when at 11.4 kcfs had 118-119% TDG;

and when at 7.4 kcfs, TDG was 115-116%. Jim Adams noted that the COE provided a demonstration of SYSTDG, the system the COE uses to make forecasts for spill caps and temperatures, to the WQT yesterday.

Other: The Dalles will undergo spill curtailment sometime next week (Monday or Tuesday) to install a pipe at the project. (**Note:** A teletype on this was issued by the COE on Thursday, 6/10.)

Next Meeting, June 23rd, 9am-noon:

Agenda Items:

- Libby Operations
- Hanford Reach Update
- Mid-Columbia Flow Objectives
- Revised Treaty Fishery Teletype
- McNary 1% Test
- McNary Transport (possible TMT check-in on June 16)
- Dworshak Summer Operations

Meeting Minutes

1. Greeting and Introductions

The June 9 Technical Management Team meeting was chaired by Rudd Turner of the Corps and facilitated by Donna Silverberg. The following is a distillation, not a verbatim transcript, of items discussed at the meeting and actions taken. Anyone with questions or comments about these minutes should call Turner at 503/808-3935.

2. Sturgeon and SOR Operations.

Turner said that this agenda item would include a report on selective withdrawal at Libby, followed by a biological update, then a discussion of the Libby operational scenarios the Corps has modeled. Greg Hoffman said that, with respect to selective withdrawal, the weekly sturgeon call took place last week, and it was determined that it was time to optimize temperatures from Libby Dam. So far this year, we've seen fluctuating temperatures that often preclude spawning activities; as a result of yesterday's talk, we decided to experiment with a shallower withdrawal depth in order to increase water temperatures somewhat. The project has now installed withdrawal gates 37 feet from the surface, rather than the 50-foot depth that were being used. We're putting in another row of gates that will allow us to withdraw water from 26 feet from the surface, Hoffman said. At 37 feet, the water temperature is 51 degrees; the downstream temperature at Bonners Ferry is 48.9 degrees F. As the project fills, we anticipate being able to withdraw water from a 30-foot depth, he added -- using the reservoir to provide warmer water is just something we're looking at this spring.

Bob Hallock said water temperatures dropped by three degrees over the weekend,

impacting hatchery operations; one of the female sturgeon that was injected over the weekend failed to ovulate, likely do to cold water temperatures. The reduced temperature also slows down egg incubation, he said, so cold temperatures are a concern. The other problem is that sturgeon flows are much lower this year than in past years, which increases retention time to Bonners Ferry. The bottom line is that we've got a situation that is slowing down sturgeon activities. The female spawners are believed to have left the Bonners Ferry/Shorty's Reach area by now; however, other sturgeon released upstream are believed to have successfully spawned, and the current sturgeon operation is geared toward maximizing the successful incubation of those eggs, added Hallock.

The group discussed the purpose of the current Libby sturgeon operation; Hallock emphasized that its intent is to provide good incubation conditions, rather than to trigger the spawning event itself. If you look at the model runs, on two of them, you have flat flows after the sturgeon pulse, said Brian Marotz – GB2 has a longer sturgeon pulse, GB-6 has higher flows after the sturgeon pulse ends. Well, for 13 years we've been unable to prove we have a swim-up larvae, replied Hallock – we have a bottleneck following incubation. That's why we were tempted to extend the pulse for another week, to ensure that we provide the best possible incubation conditions, Hallock explained. He noted that there is a broader issue – this is a poor water year; there is little hope of meeting all of the salmon measures people would like to see this year; if we fail to refill Libby under VARQ, that will be a political strike against VARQ. From a federal tradeoff standpoint, some might call this an irresponsible operation, from the standpoint of all of the listed species in the basin. We may need to step back and look at the broader regional perspective, said Hallock, in order to avoid detrimentally impacting the augmentation flows for anadromous salmon later in the summer.

The discussion then turned to the Corps' most recent Libby model runs. Turner noted that the first run – A – models the sturgeon pulse as requested, then drafts Libby to elevation 2439 feet by August 31 at a flat 12.2 Kcfs. Alternative B also provides the sturgeon flows requested in the SOR, then releases a flat 9.7 Kcfs through the end of September, at which point elevation 2439 will be achieved. Alternatives C, D, E and F would stop the sturgeon pulse after two weeks at 13 Kcfs the first week and 14 Kcfs the second week. Under Alternative C, Libby would go to a bull trout flow of 6 Kcfs from July 1 through August 2, then to 20 Kcfs through August 31, then to 6 Kcfs through September 30. Under Alternative D, the project would go to 6 Kcfs through July 27, then to a flat 13.3 Kcfs through September 30. Under Alternative E, Libby would release a flat 12.7 Kcfs through August 31, followed by a rampdown to 6 Kcfs through September 30. Under Alternative F, following the two-week sturgeon pulse, the project would release a flat 10.6 Kcfs through the end of September.

Turner noted that, under Alternatives C and D, Libby would refill to elevation 2459 by late July. Under the other scenarios, the project would not refill in 2004. Under Alternative A, the project would fill only to elevation 2445.7 feet; under the other alternatives, it would reach a slightly higher elevation, up to 2451 feet under Alternative F. Turner noted, however, that both Alternatives C and D include a double peak in Libby outflow.

Marotz observed that, in his view, Alternative A would produce a low peak reservoir elevation, which would not reach the littoral zone. What happens in the reservoir elevations is that, when you flood the substrate, it takes about 5 weeks for the substrate to become productive,

he explained. When you have a sudden strike toward full, the area that has been wetted the longest suddenly becomes dark and cold; you move the sunlit zone above the areas of maximum larval production, and that zone goes into winter hibernation mode, reducing the food available to insectivorous fish. An operation where the reservoir doesn't quite fill, while not optimal, is better, from a food production standpoint, he said.

Marotz added that he would be concerned about a sudden drop in Libby outflow following the sturgeon pulse from the standpoint of the incubating sturgeon downstream; he noted that, at 9 Kcfs, all of the riffle areas downstream are wetted – 9 Kcfs appears to be the magic number, from a productivity standpoint. If we can maintain river production by providing salmon flows at a flat rate, that would be preferred over a double-peak operation, he said.

The group devoted a few minutes of discussion to the topic of the preferred Libby operation following the sturgeon pulse. Ultimately, Silverberg noted that the TMT does not need to make a decision on this issue today; rather, it will be made at the group's June 23 meeting. We do need to decide about the sturgeon pulse itself at today's meeting, said Turner – the next flow increase is scheduled to take place this Sunday. Do we want to continue to ratchet upward, or should we stay at 14 Kcfs? After looking at information from the Leonia gauge in the Kootenai River, it was agreed that the increase to 15 Kcfs outflow should take place as scheduled this Sunday, June 13 at 6 p.m. Libby outflow will then be increased to 16 Kcfs at 6 p.m. Sunday, June 20.

Marotz said that, from Montana's perspective, Alternative B (the sturgeon pulse followed by a flat 9.7 Kcfs through the end of September) would be preferable. In response to a question, Scott Bettin said BPA has been exploring the possibility of both a Libby/Arrow swap and a Kootenai lake pass-through agreement with the Canadians; however, they have shown little interest in such an agreement in 2004.

3. Status of Hanford Reach.

Chris Carlson reported that, for the week ending May 30, average Priest Rapids discharge was 127 Kcfs; the flow band ranged between 40 and 60 Kcfs, and the flow bands were slightly exceeded on May 24, 25 and 27. The fish had accumulated 224 temperature units as of May 30. For the week ending June 6, average Priest Rapids flow was 131 Kcfs; the flow band ranged between 30 and 60 Kcfs, and the bands were significantly exceeded only on June 5. As of June 6, the fish had accumulated 327 temperature units since emergence. Again, the target at which the Hanford Reach fish protection operation will end is 400 temperature units, Carlson said.

4. Mid-Columbia Flow Objectives.

Turner said the Corps has not updated its ESP analysis since last Friday's TMT conference call; the plan at this point is to continue the current operation – 125 Kcfs minimum flow at Priest Rapids with a 135 Kcfs maximum, with the goal of refilling Grand Coulee by June 30. We would like to propose this as a two-week operation, ending on June 27, he said. And again, the objective is to refill Grand Coulee as smoothly as possible, and to avoid a sudden drop-off in Mid-Columbia flows in late June, said Paul Wagner. Understood, Turner replied. No

TMT objections were raised to this proposed operation.

5. Review Spring Treaty Fishery.

Kyle Martin provided a memo titled “Impact of Pool Fluctuations on the 2004 Spring Treaty Fishery.” Martin noted that tribal fishers harvested just over 17,000 fish this spring. He went briefly through the contents of the memo, which related actual pool elevations at Bonneville, The Dalles and John Day to the elevations requested in the various CRITFC SORs.

The bottom line is that, at Bonneville pool, actual pool elevations were within the requested criteria 77% of the time in 2004, up from 53% in 2003, Martin said. At The Dalles pool, actual pool elevations were within the requested criteria 70% of the time in 2004, up from 59% in 2003. At John Day pool, actual pool elevations were within CRITFC’s requested range 27% of the time, down from 35% of the time in 2003. Martin noted, however, that there were a number of sharp changes in reservoir elevations over the course of the fishing season; he asked why those occurred. It was an operational issue that occurred in one night, Scott Bettin replied; we straightened it out the following morning. Bettin added that the problem was due to operator miscommunication. Martin said he had spoken with tribal enforcement personnel, who reported that 2004 was a safe fishing season, with no accidents or injuries reported; he added, however, that there was some grumbling on the river about the pool fluctuations that occurred. Martin suggested that language to the effect of “Desired goal is for a stable pool and minimal fluctuations” be added to the Corps’ teletype instructions to the project operators during future tribal fisheries.

Martin added that a one- or two-week summer tribal fishery is being contemplated for late July. Overall, he complemented the Corps and BPA on their efforts to keep pools stable during the spring treaty fishery, noting that kudos are due all around.

6. McNary 1% Test Operation.

Turner said this test is ongoing; Units 2, 3, 4 and 6 are being operated at the upper end of 1% starting this morning 6 a.m. through 2 p.m. tomorrow. The purpose is to obtain another descaling sample for baseline FGE data, added Mark Smith. A conference call is scheduled for this afternoon to discuss the future of the McNary 1% test operation, in particular, what we want to do as far as a test using summer migrants, he said. In other words, he said, there isn’t much new to report. Smith added that he will provide a further update at the June 23 TMT meeting.

7. McNary Transportation Start.

Turner said June is the traditional time, under BiOp Action 43, to consider the initiation of collection at McNary as “springlike” conditions transition to summer conditions, with declining flows and higher water temperatures – once McNary flows drop below 220 Kcfs at McNary and temperatures reach 62 degrees F. Turner said flows at McNary are currently about 229 Kcfs. Jim Adams said water temperatures are still well below the 62-degree threshold; generally, that threshold is exceeded some time in the last two weeks in June. So we’ll need to make a decision on the maximum transport issue at our next meeting? David Wills asked.

Correct, Bettin replied – we would ask the TMT to consider this issue and come to the next meeting prepared to make a decision.

Turner noted that spill ended on June 20 in 2003. In 2004, there will likely continue to be involuntary spill after June 20. Ron Boyce said he will provide some new biological information to go with the river condition data to be discussed at the June 23 meeting.

Does the BiOp say that both the flow and temperature thresholds must be met before “springlike” conditions are deemed to be at an end? Cindy LeFleur asked. That has been a topic of extensive TMT conversation in recent years, Wagner replied; the BiOp says that both thresholds must be crossed, but in practice, the decision is up to the TMT’s discretion. It was agreed that maximum transportation will not be initiated prior to TMT discussion June 23. And can we also agree that the requirement for BiOp spill up to the gas cap will end on June 20, as per the BiOp planning date? Bettin asked. After a few minutes of discussion, it was so agreed, with the understanding that involuntary spill up to about 70 Kcfs will be continuing around the clock at McNary after June 20. And we will discuss this question at FPAC as well, added Wills. Ron Boyce observed that, in his view, it is likely that TMT will need to discuss this issue on June 23.

8. The Dalles and John Day Spill Management Subgroup Report.

Turner said this subgroup met last Wednesday to discuss spill management at The Dalles and John Day; we looked at BPA’s analysis of the actual spill performance at those two projects, he said. The group agreed that the action agencies were very close to providing the BiOp spill volumes at John Day for the season – within about 4 kaf. At The Dalles, what we found was that the project was operating at 40% spill as a not-to-exceed maximum, said Turner; as a result, we agreed, at that meeting, to revise the way we’re managing spill at the two projects to consider 60% and 40% spill as targets rather than not-to-exceed maxima, at John Day and The Dalles, with true-up to follow within 24 hours or at least weekly. We discussed that recommendation with TMT at a conference call on Friday; TMT agreed to implement that recommendation, and since then, spill at The Dalles has been extremely close to the target. The corps and BPA are now using +/- 1% as an operational goal at both projects, Turner added, and that’s working out very well so far.

9. Status of Operation.

Yesterday’s flow at McNary was 229 Kcfs, said Turner; at Lower Granite, it was 100.6 Kcfs, declining from 110 Kcfs the day before. We have been spilling at Lower Granite using the RSW, he added. At Dworshak, the elevation was 1593.5 Kcfs as of last night; Dworshak is currently releasing 17 Kcfs. The project filled 35 feet in the month of May; the project is operating to meet flood control requirements and to refill by June 30. Libby was at elevation 2435.5 feet as of midnight last night and releasing 14 Kcfs; inflow Monday was 37 Kcfs and increasing. Libby is now filling about one foot per day. Albeni Falls was at elevation 2061.1 feet as of midnight last night; the project is releasing 39 Kcfs. Albeni Falls is filling slowly toward 2062.5 feet by the end of June; it has filled a foot over the last week.

Tony Norris reported that the current Hungry Horse elevation is 3554.5 feet, with inflows of 15 Kcfs; Reclamation intends to fill the project by June 30. Grand Coulee is at 1284 feet, with 140 Kcfs inflow. With respect to Upper Snake flow augmentation, we're expecting about 300 kaf to be available in 2004, Norris said. Flow augmentation above Milner is expected to start around July 1.

Turner said the June final water supply forecast is now available; it shows an increase in most basins. The current January-July forecast at The Dalles is 85.1 MAF, up 5% over the May final. The June final forecast shows 53 MAF at Grand Coulee, 84% of normal, up 1% over the May final forecast. At Lower Granite, for the April-July period, the June final forecast is 15.4 MAF, 71% of normal, up 10% over the May final. In general, said Turner, the forecast is improving, but still below normal. At Dworshak, the Corps' forecast is now 2.3 MAF, up 9% over the May final; at Libby, the Corps' forecast is 4.4 MAF, down 8% from the May final of 4.95 MAF.

Moving on to the status of the migration, LeFleur said the final Bonneville Dam adult spring chinook count is about 193,000 fish; the summer chinook and sockeye counts are looking pretty good at this point. Wagner said that, on the juvenile front, yearling chinook indices have declined sharply at the Lower Snake projects in recent weeks; at McNary, John Day and Bonneville, numbers are decreasing as well. Essentially, we're getting to the end of the yearling chinook outmigration, he said. Subyearling chinook numbers are increasing sharply at the Lower Snake projects. At McNary, the indices have been pretty steady in the 40,000 range, Wagner said; those numbers will increase as we head into July. Juvenile steelhead numbers have shown a decreasing trend throughout the system. The cumulative yearling chinook numbers have been right in the range expected at Lower Granite; cumulative steelhead numbers show the same pattern. Cumulative subyearling numbers are running ahead of the curve at Lower Granite, to date; Billy Connor has reported that he has never seen so many subyearling chinook in his traps at this point in the season, Wagner said. He added that the cumulative yearling chinook and steelhead counts at Rock Island, McNary and Bonneville Dams have been significantly below the pre-season estimates, although some of these numbers have not been corrected to reflect transportation or the impact of the B2 corner collector.

With respect to the power system, Bettin noted that there have been many lightning strikes in the Libby area recently, which have not yet affected the transmission system; there was also a line overload problem that caused some additional spill for a few hours at Lower Granite recently.

Moving on to water quality, Jim Adams noted that there have been several TDG exceedences recently at Ice Harbor and McNary Dams, as well as a few temperature-related TDG exceedences at Camas/Washougal. In general, however, things are going well from a water quality standpoint. He noted that TDG below Dworshak reached 118%-119% during the peak spill of 11.4 Kcfs. Adams added that the Water Quality Team had a seminar yesterday on the SYSTDG modeling program, which went well.

10. Other.

There is the potential for a three-hour [actually 6-hour] curtailment of spill at The Dalles to allow for research equipment installation on Monday or Tuesday of next week, said Bettin.

11. Next TMT Meeting Date.

The next face-to-face Technical Management Team meeting was set for Wednesday, June 23, although a conference call is likely on June 16. Meeting summary prepared by Jeff Kuechle.

TMT Participant List

June 9, 2004

Name	Affiliation
Rudd Turner	COE
Scott Bettin	BPA
Tony Norris	USBR
David Wills	USFWS
Nic Lane	BPA
Cindy LeFleur	WDFW
Kyle Martin	CRITFC
Russ George	WMCI
Bruce MacKay	Consultant
Tim Heizenrater	PPM
Dave Ryan	PPM
Donna Silverberg	Facilitation Team
Robin Harkless	Facilitation Team
Tina Lundell	COE
Paul Wagner	NOAAF
Jim Adams	COE
Laura Hamilton	COE
Lee Corum	PNUCC
Brian Marotz	Montana
Greg Hoffman	COE
Amy Reece	COE

Bob Hallock	USFWS
Ron Boyce	ODFW
Ruth Burris	PGE
Mike O'Bryant	CBB
Chris Carlson	GCPUD
Russ Kiefer	IDFG

TECHNICAL MANAGEMENT TEAM

BOR: Tony Norris / John Roache

BPA: Scott Bettin / John Wellschlager

NMFS: Paul Wagner / Chris Ross

USFWS: David Wills / Steve Haeseker

OR: Ron Boyce

WA: Cindy LeFleur

ID: Russ Kiefer

MT: Jim Litchfield

COE: Cindy Henriksen / Rudd Turner / Cathy Hlebechuk

TMT CONFERENCE CALL

Wednesday June 16, 2004 0900 - 1100 hours

**Custom House Room 118
Portland, Oregon
Conference call line: 503-808-5190**

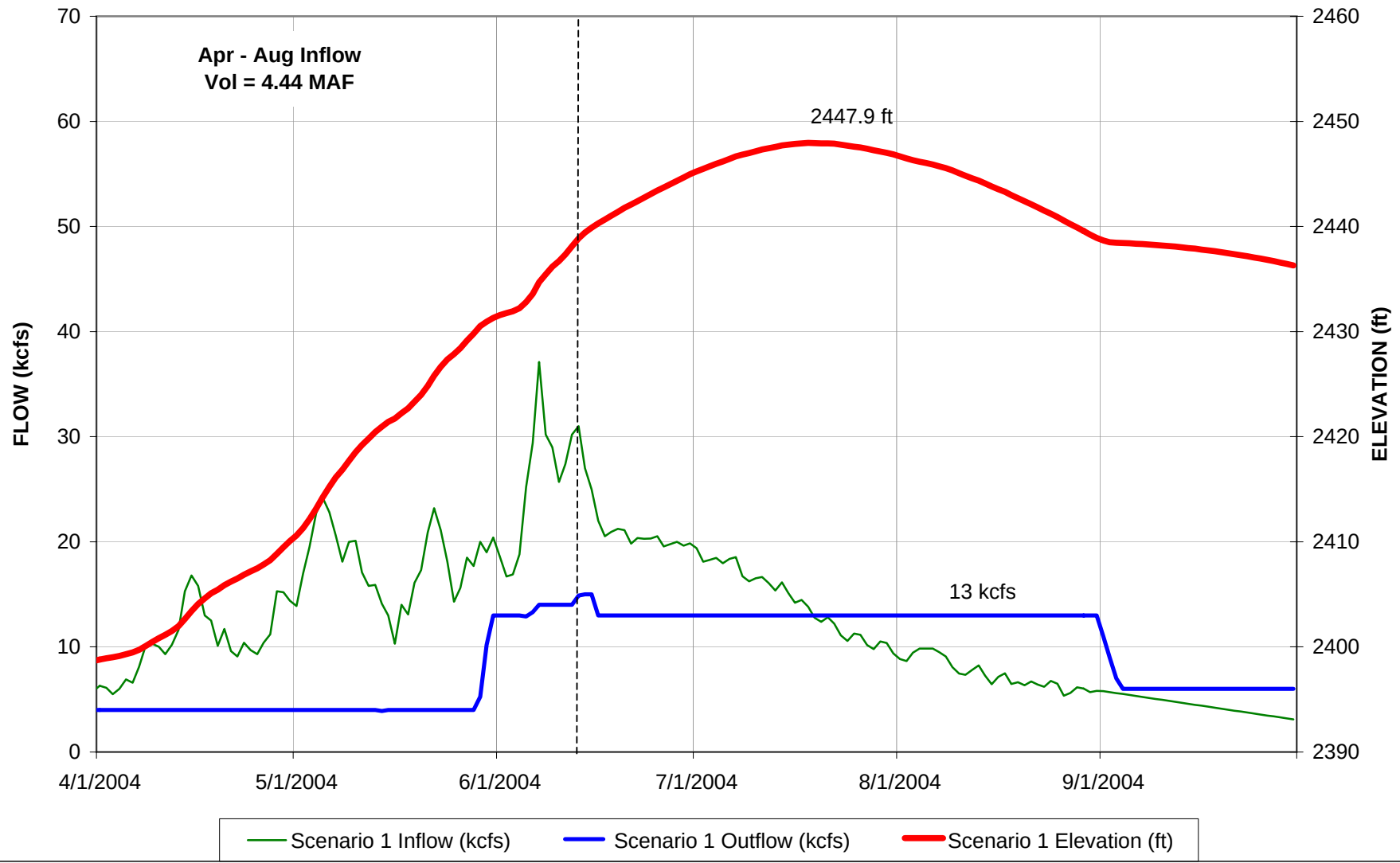
*All members are encouraged to call Donna Silverberg with any issues or concerns they would like to see addressed.
Please e-mail her at dsilverberg@cnnm.net or call her at (503) 248-4703.*

AGENDA

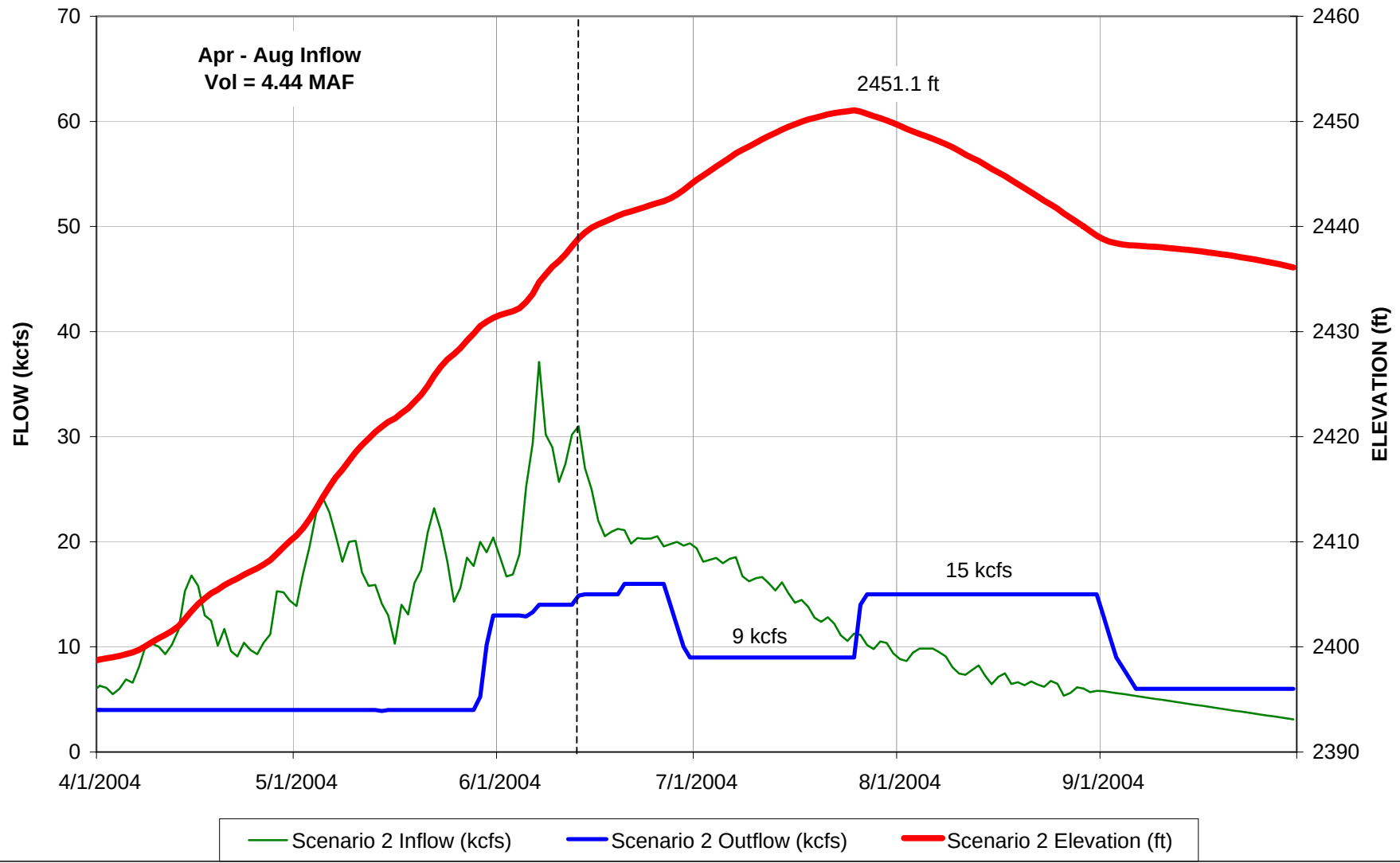
1. Welcome and introductions.
2. Sturgeon and Libby operations ([SOR # 2004-MT-1](#))  (MT, USFWS, COE).
 - a. libby model runs:
[\(SOR 2004-MT-1\)](#)  [\(USFWSBull9\)](#)  [\(USFWSBull8\)](#)  [\(USFWSBull7\)](#) 
[\(USFWS2454\)](#) 
3. McNary operations. ([SOR # 2004-13](#)) 
4. Other
 - a. Set agenda for next meeting

Questions about the meeting may be referred to Cindy Henriksen at (503) 808-3945, or Rudd Turner at (503) 808-3935, or Cathy Hlebechuk at (503) 808-3942

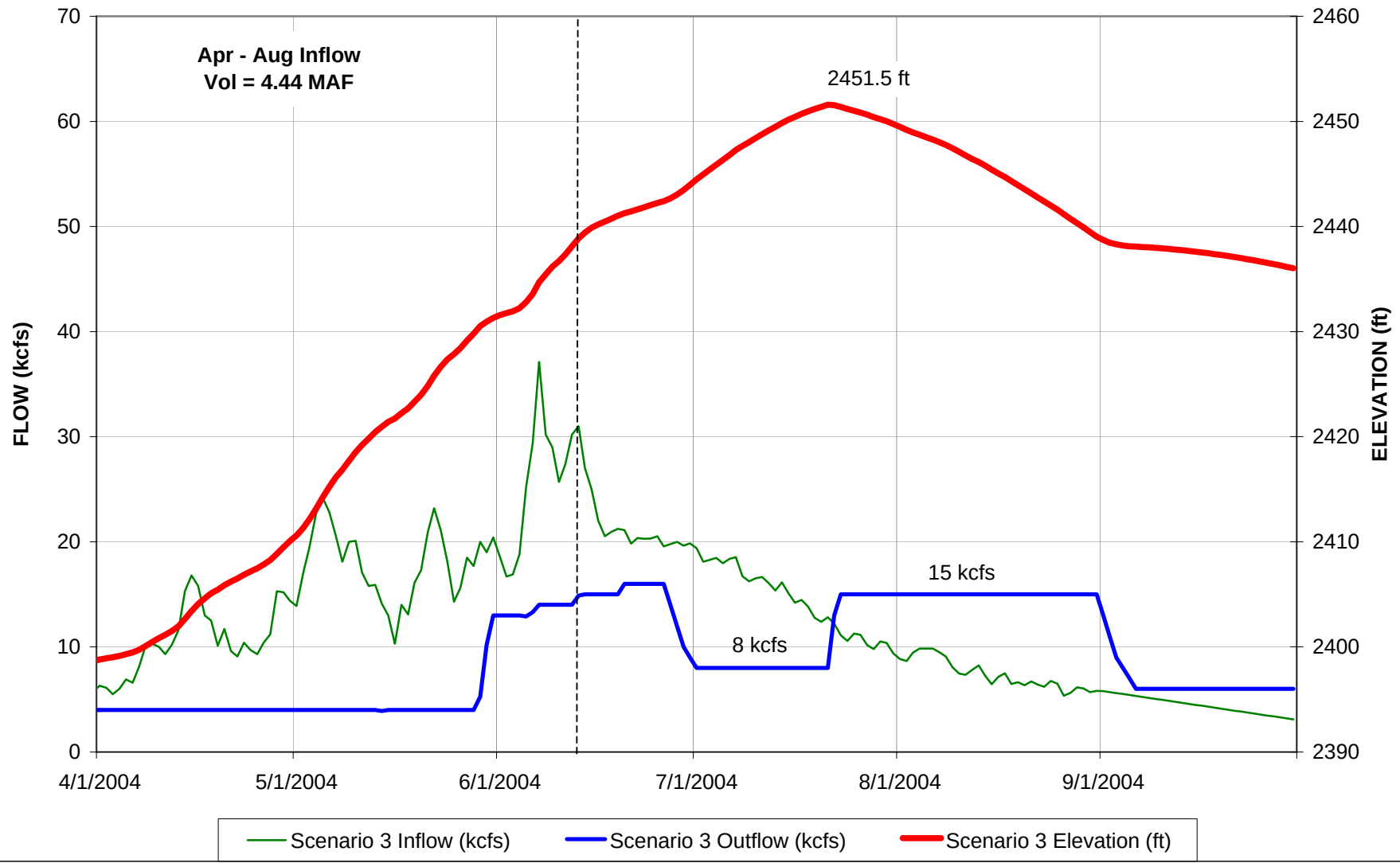
LIBBY OPERATION
(Scenario 1: Montana SOR - Flat flow to reach 2439 ft by 31 Aug)



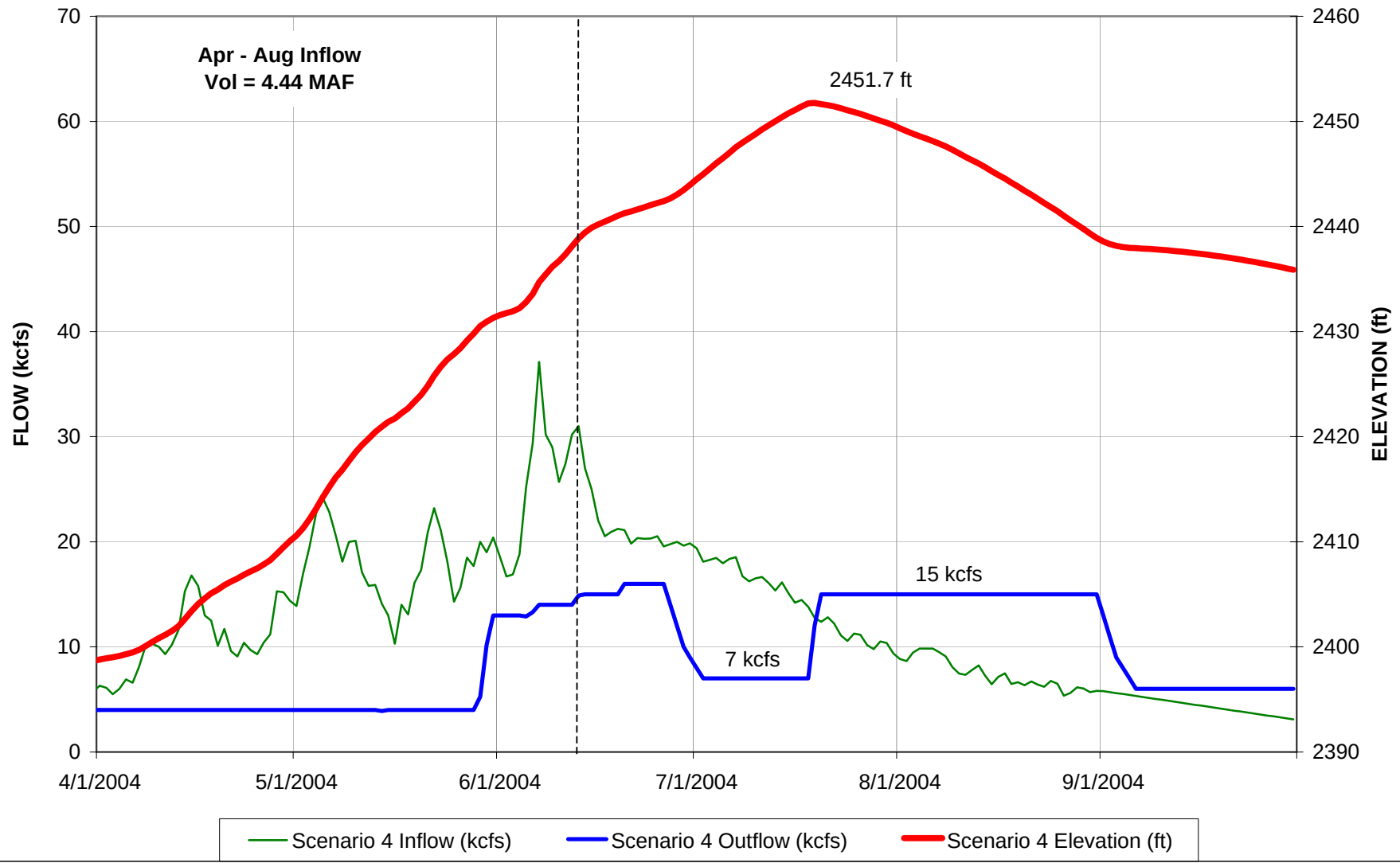
LIBBY OPERATION
(Scenario 2: Bull Trout flow of 9 kcfs, draft to 2439 ft by 31 Aug with 15 kcfs max flow)



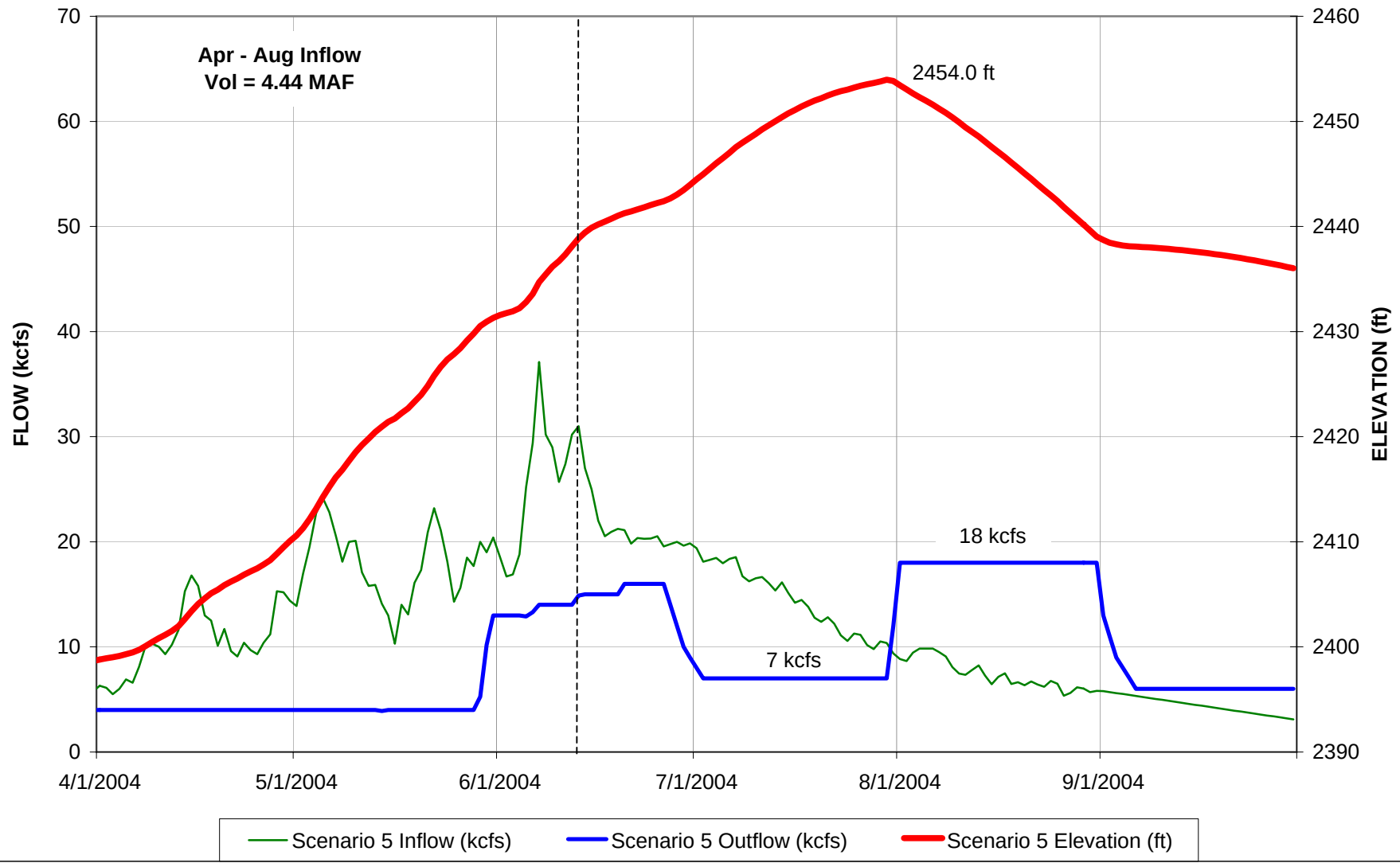
LIBBY OPERATION
(Scenario 3: Bull Trout flow of 8 kcfs, draft to 2439 ft by 31 Aug with 15 kcfs max flow)



LIBBY OPERATION
(Scenario 4: Bull Trout flow of 7 kcfs, draft to 2439 ft by 31 Aug with 15 kcfs max flow)



LIBBY OPERATION
(Scenario 5: Bull Trout flow of 7 kcfs, refill to 2454 ft and draft to 2439 ft by 31 Aug)



COLUMBIA RIVER REGIONAL FORUM

TECHNICAL MANAGEMENT TEAM

June 16th, 2004

FACILITATOR'S SUMMARY NOTES ON FUTURE ACTIONS

Facilitator: Donna Silverberg

The following notes are a summary of issues that are intended to point out future actions or issues that may need further discussion at upcoming meetings. These notes are not intended to be the “record” of the meeting, only a reminder for TMT members.

SOR 2004-MT-1:

Libby is currently at 2440.2' elevation with water supply forecasts of 4.44 and 4.78 MAF, per the COE and RFC June finals. The sturgeon pulse operation is in its third week – Libby is operating at 15 kcfs out, and inflows are at 27.9 kcfs.

Given the decrease (from May) in the water supply forecast, Montana requested to ramp down the sturgeon operation and provide stable flows around 12-13 kcfs for the rest of June, then July and August. Montana believes this operation could enhance survival conditions for both sturgeon and bull trout. Also, continue to monitor conditions, as summer inflows remain uncertain. If inflows rise, release more water, with stability as the goal.

A number of scenarios were presented by the COE today at the request of Montana and the USFWS. Scenario “5” is the closest to VARQ, but goes over 15 kcfs outflows, and so, from the USFWS' perspective, is not as good as scenario “4”.

Bob Hallock, USFWS, reported that two female sturgeon have spawned (fish 5 and 6 since 1991). The reason for adding 1 kcfs ramp-up is to keep flows stable as inflows in-river recede so as to avoid dewatering the sturgeon eggs. The USFWS supports salmon and sturgeon operations, both listed species, over bull trout, during this low water year. When asked about the flow ramp-up in August, the response was that it has been done in the past to support down-river salmon flows.

ACTION: After further discussion, TMT supported continuing with the sturgeon pulse operation laid out in the USFWS SOR (so ramp up to 16 kcfs on Sunday, June 20), and discuss July and August flow strategies (after the sturgeon pulse ends) at the TMT meeting next Wednesday, June 23. While Montana did not object to this, they believe a more conservative approach should be taken given the poor water conditions and uncertainty about sturgeon biology.

SOR 2004-13:

The salmon managers discussed transport and spill at McNary and reached a consensus to recommend that BiOp spill continue to the gas cap until June 30, so long as flows are above 220 kcfs and temperatures are below 62°. If conditions change before June 30, begin collection for transportation at that time.

The COE suggested a thorough vetting of the transportation data this year. The data at this point is preliminary, so from the COE's perspective, the BiOp criteria for transport should be relied on. Oregon offered that in the interim, take a more balanced approach – so do not transport as many fish.

NOAA said that the SOR is consistent with the BiOp, and suggested using the tailwater monitor to gauge temperatures.

ACTION: The COE and BPA agreed that the BiOp could be interpreted the way the salmon managers described it for this SOR, and agreed to link the end of BiOp spill with the end of spring-like conditions at McNary. To clarify the transportation strategy, when spill ends (even if before June 30), the fish will be collected and transported.

Next Meeting, June 23rd, 9am-noon:

Agenda Items:

- Libby Operations
- Hanford Reach Update
- Mid-Columbia Flow Objectives
- Revised Treaty Fishery Teletype
- McNary 1% Test
- McNary Transport
- Dworshak Summer Operations

TECHNICAL MANAGEMENT TEAM

BOR: Tony Norris / John Roache

BPA: Scott Bettin / John Wellschlager

NMFS: Paul Wagner / Chris Ross

USFWS: David Wills / Steve Haeseker

OR: Ron Boyce

WA: Cindy LeFleur

ID: Russ Kiefer

MT: Jim Litchfield

COE: Cindy Henriksen / Rudd Turner / Cathy Hlebechuk

TMT MEETING

Wednesday June 23, 2004 0900 - 1200 hours

**Custom House Room 118
Portland, Oregon
Conference call line: 503-808-5190**

*All members are encouraged to call Donna Silverberg with any issues or concerns they would like to see addressed.
Please e-mail her at dsilverberg@cnmm.net or call her at (503) 248-4703.*

AGENDA

1. Welcome and introductions.
2. Libby operations. (USFWS, MT, COE)
 - i. [\[Flat flow to reach 2439 ft by 31 Aug \]](#)  Summer Flows at Libby- [\[SOR 2004-14 \]](#) 
 - ii. [\[Draft to 2439 ft by 31 Aug with steady decreasing flows \]](#) 
3. Status of Hanford Reach. (Chris Carlson, Grant PUD)
4. Mid-Columbia flow objectives.
5. Zone 6 Treaty fishery; revised teletype [\(SOR 2004-C5\)](#)  (COE, CRITFC).
6. McNary 1% test operation. (COE)
7. McNary end of fish spill and start of transport.
8. Dworshak summer operations.
 - i. [\[BiOp Operation \]](#) 
 - ii. [\[Nez Perce Tribe - Idaho \]](#)  [\[Modeling of Dworshak Modeling of Dworshak Summer 2004 Operations \]](#) 
 - iii. [\[2003 Operation \]](#) 
 - iv. [\[LWG - LGS - LMN - IHR - "Weather" \]](#) 
9. Status of Operation
 - a. Reservoirs
 - b. Fish
 - c. Power System
 - d. Water Quality
 - a. Spill Information
 - i. [\[AVERAGE DAILY SPILL - June 07 - 20, 2004 \]](#) 
 - ii. [\[EXCEEDANCE TYPES - June 07 - 20, 2004 \]](#) 
 - b. Average percent TDG for 12 highest hours - [\[June 2004 \]](#)
 - c. McNary Tailwater Temperatures - [\[June 2004 \]](#) 
10. The Dalles Spill Outage. (COE)

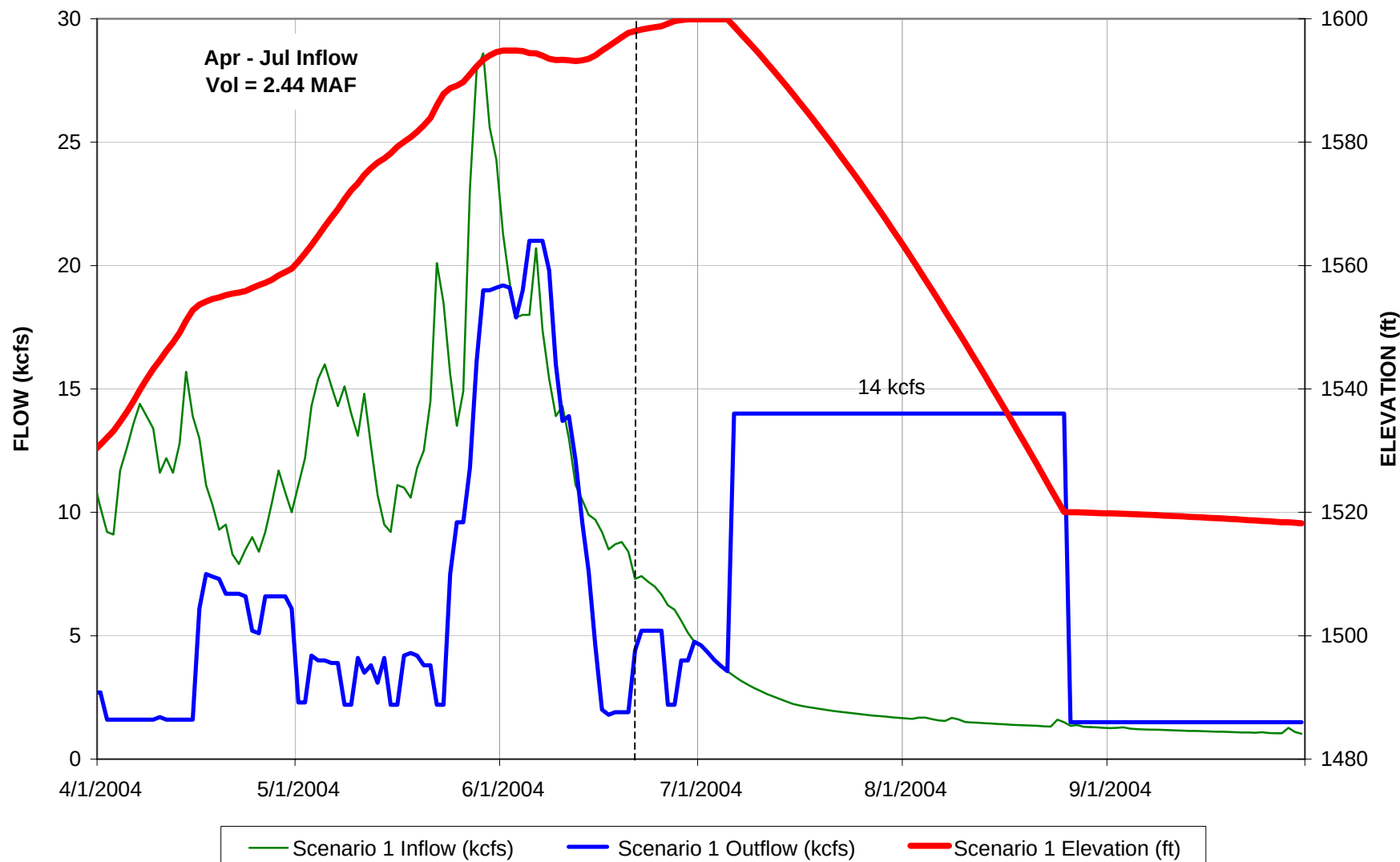
11. Lower Columbia River Summer Spill Program - [\[SOR 2004-15\]](#) 

12. Other

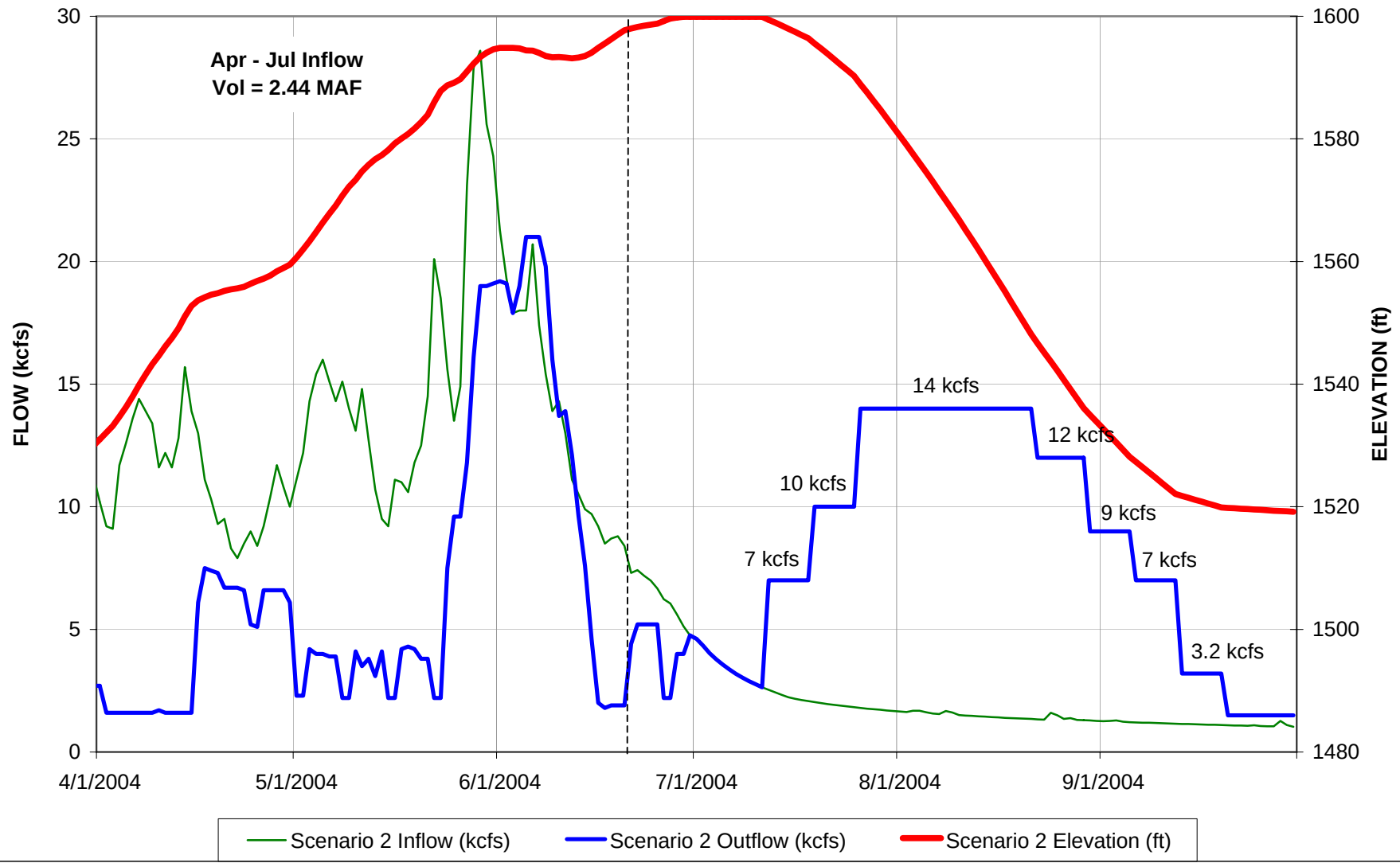
a. Set agenda for next meeting

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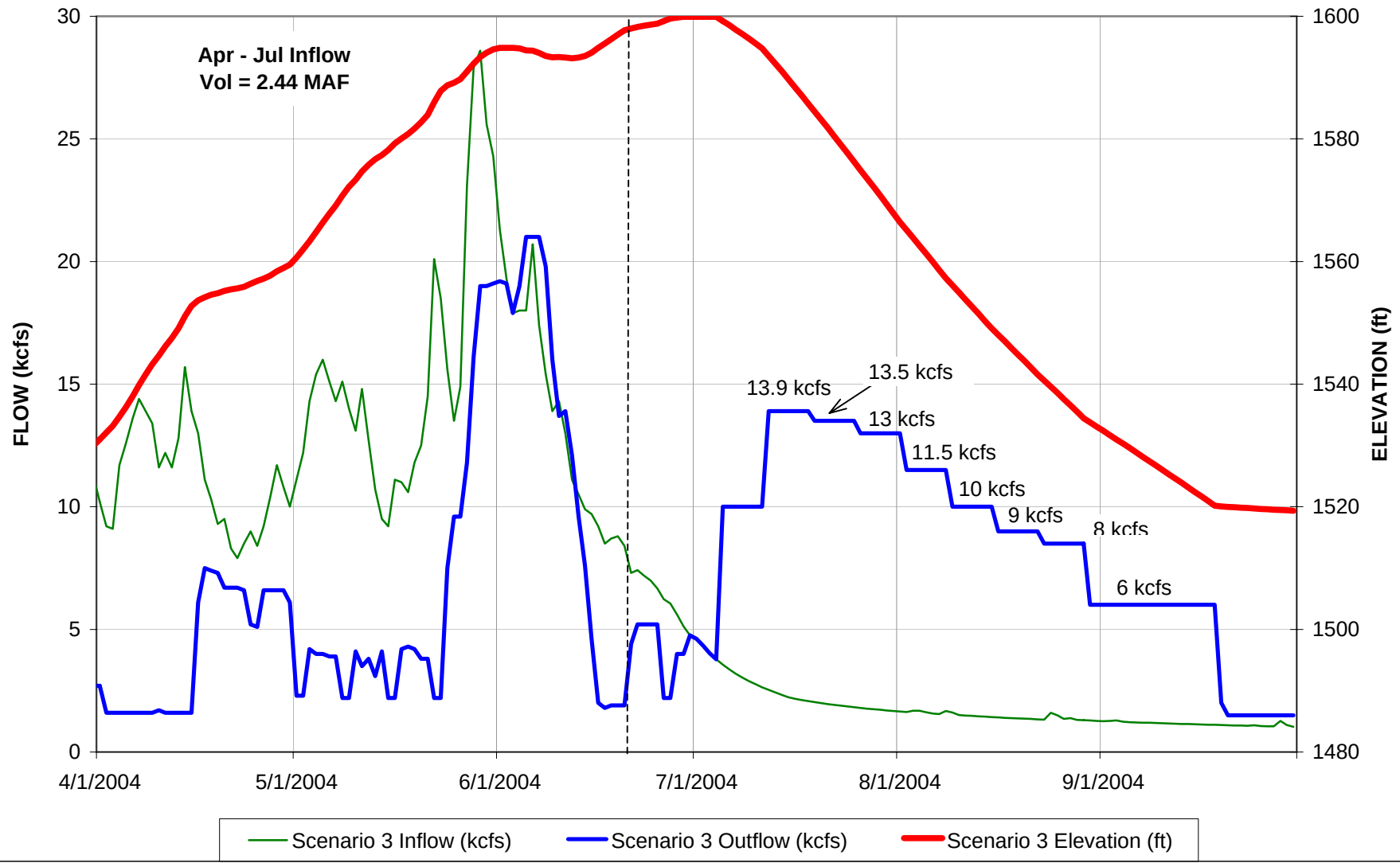
DWORSHAK OPERATION (Scenario 1: BiOp Operation)



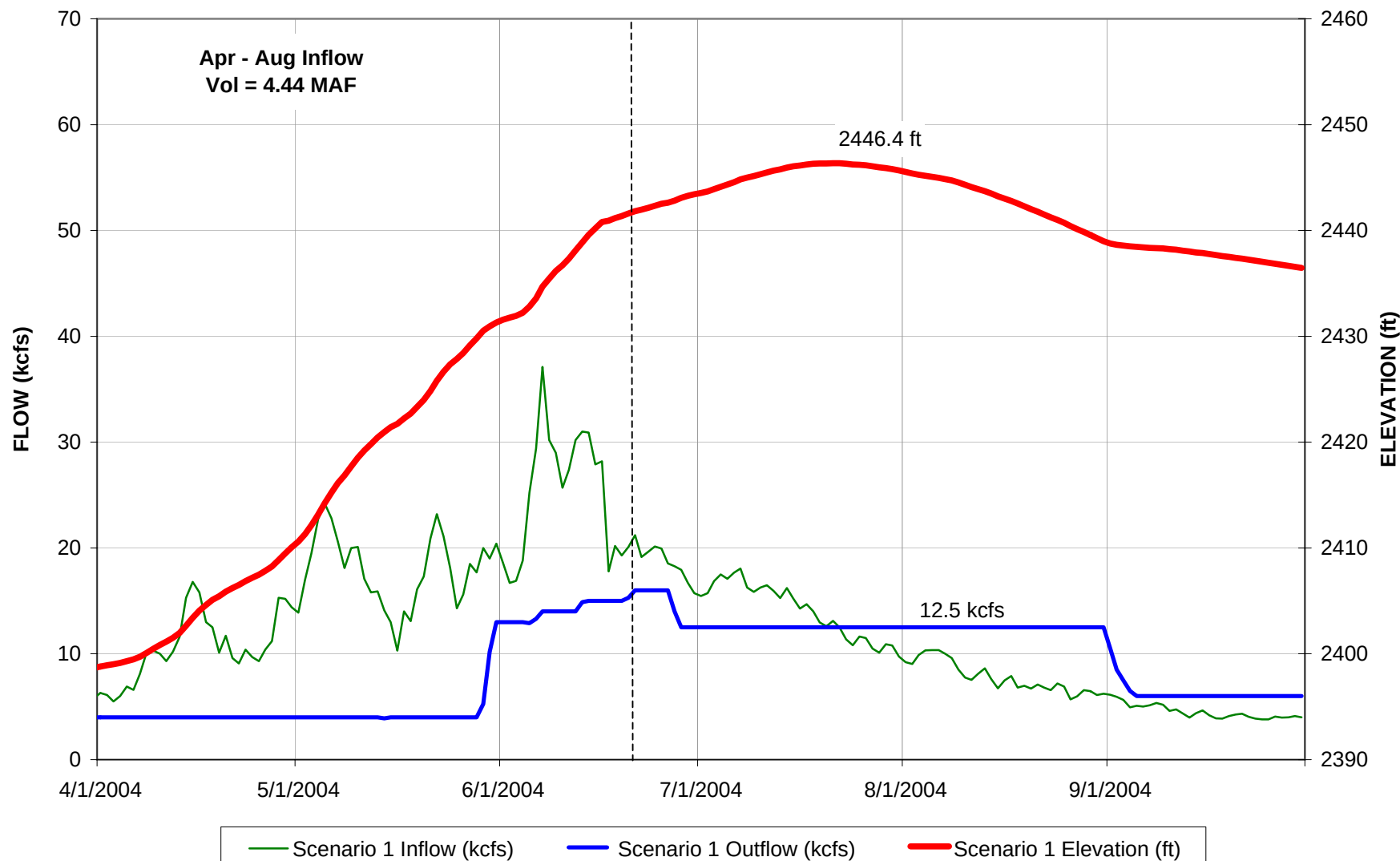
DWORSHAK OPERATION
(Scenario 2: Nez Perce Tribe - Idaho Recommendation)



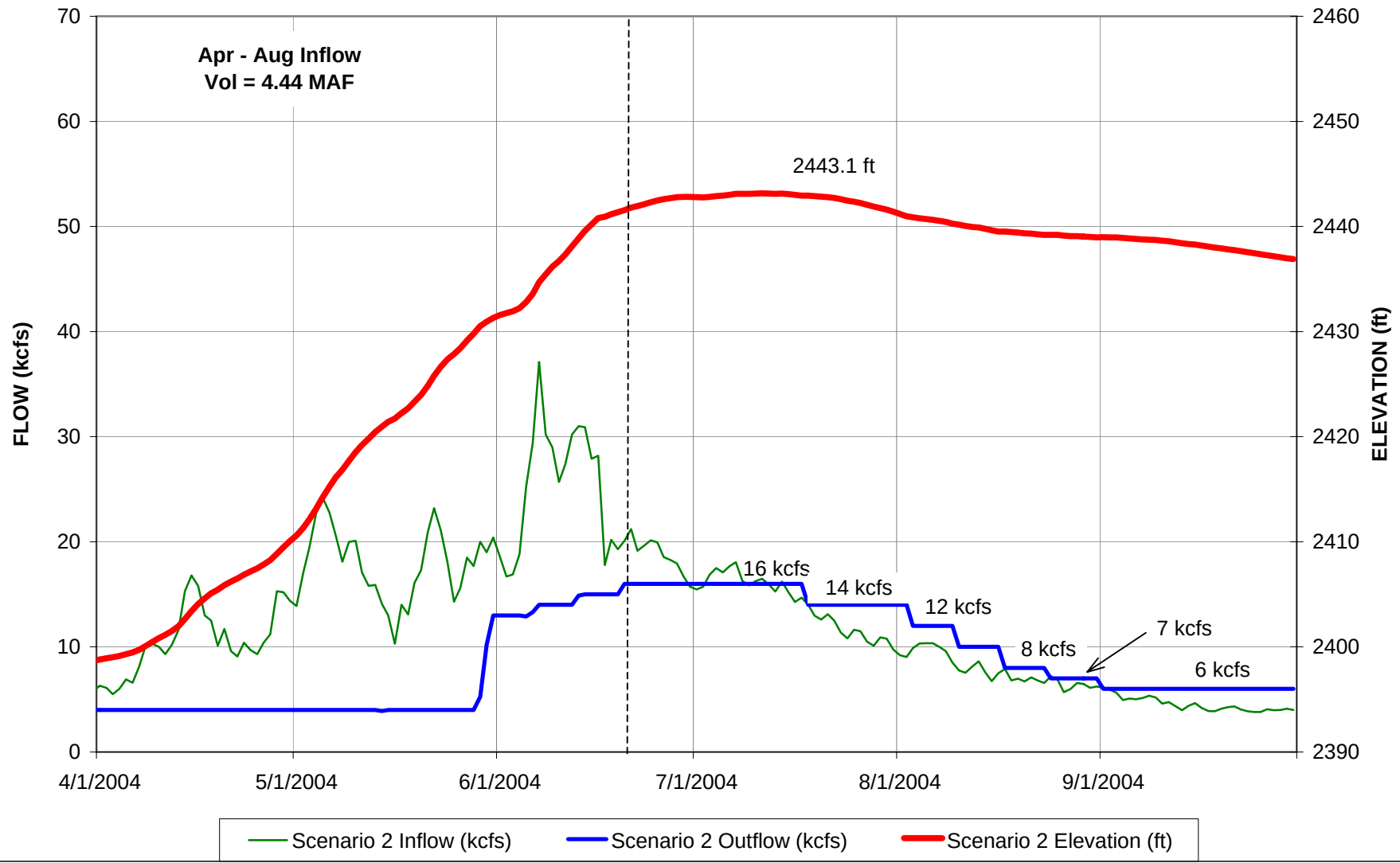
DWORSHAK OPERATION (Scenario 3: 2003 Operation)



LIBBY OPERATION
(Scenario 1: Flat flow to reach 2439 ft by 31 Aug)

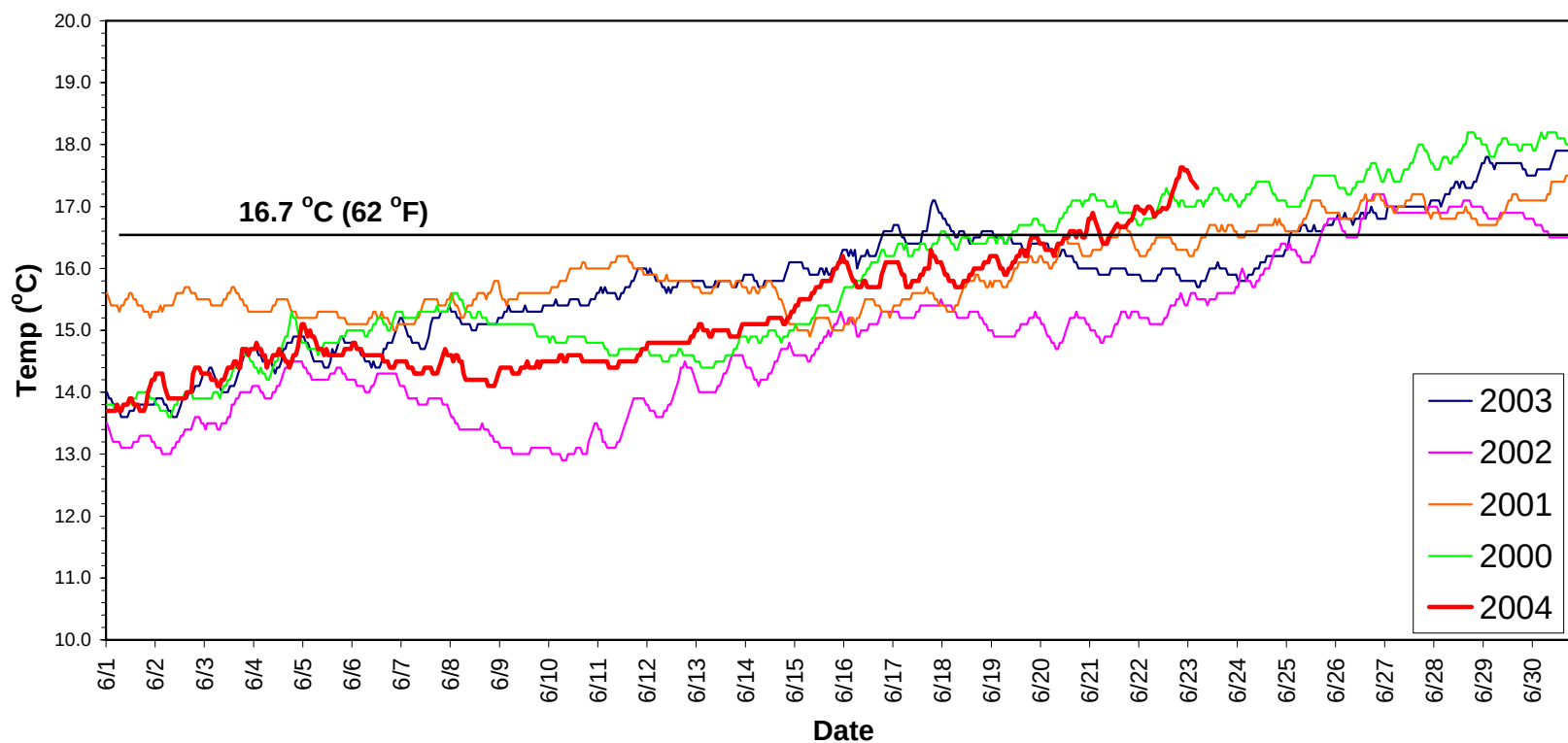


LIBBY OPERATION
(Scenario 2: Draft to 2439 ft by 31 Aug with steady decreasing flows)



McNary Tailwater Temperatures in June

(as of 0500 hrs 23 June 2004)



Modeling of Dworshak Summer 2004 Operations



Kyle Martin

Senior Hydrologist

June 23, 2004

Columbia River Inter-
Tribal Fish Commission

Introduction



- Goal: Model Dworshak flows and elevations from summer operation proposals. Evaluate impacts on elevation, water temperature, recreation, refill.
- GENESYS Hydro model: multi-year impacts on spring refill, lake levels, etc.
- CRITFC's Hydro spreadsheet: outflows & elevations. Inflows are given by NOAA's River Forecast Center.
- EPA's RBM-10 model: water temperature. Assumes 1979, 1991, and 1994 composite meteorology, 2000 Dworshak and Brownlee water temperatures, and 1988 tributary inflows.

Weather Assumptions



Lewiston air temperature	MAY	JUN	JUL	AUG	SEP
1979	59.15	67.12	76	74.95	68.95
Departure	1.0	1.5	2.3	3.1	5.5
1991	55.85	60.28	72.27	75.08	65.53
Departure	-2.8	-6.6	-1.8	1.5	1.6
1994	61.53	66	77.76	75.15	67.42
Departure	2.9	-0.8	3.7	1.5	3.5
average:	0.4	-2.0	1.4	2.0	3.5
	MAY	JUN	JUL	AUG	SEP
2004 departure	0	-1			
Assumption: "PDO-warm / ENSO-neutral"					
OCT 2003 - MAY 2004:	PDO = 0.58 (+/- 0.18)			MEI = 0.34 (+/- 0.19)	

Highlights of Proposals



- Nez Perce Tribe - Idaho (NPT-ID) Plan.
- TMT-2003 Plan.
- 2000 Biological Opinion Plan.

GENESYS Modeling Results

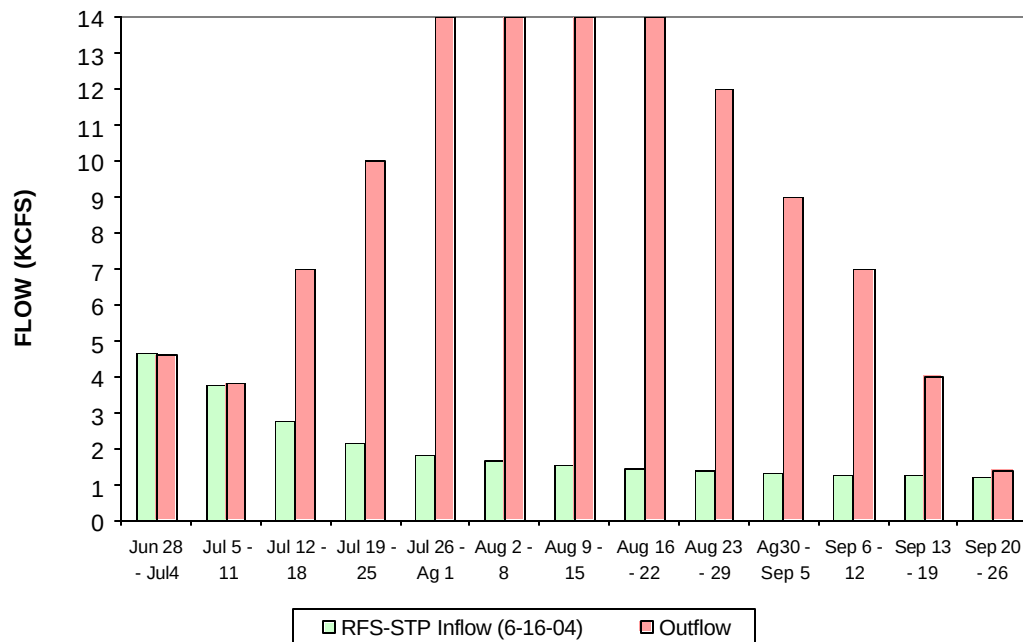


MODEL RESULTS (average of Water Years 1929 through 1978)			
DWR Outflows (cfs):	NPT-ID	TMT-2003	Biological Opinion
July	8360	12070	14000
August 1-15	13800	11200	13850
August 16-31	12350	8450	7700
September	4600	4150	1300
DWR Elevations (feet):	NPT-ID	TMT-2003	Biological Opinion
31-Jul	1582	1568	1560
15-Aug	1559.4	1549	1535
31-Aug	1535	1533	1520
30-Sep	1520	1520	1520
June refill misses:	NPT-ID	TMT-2003	Biological Opinion
(> 1599 feet)	13	13	13
(> 1595 feet)	10	10	10

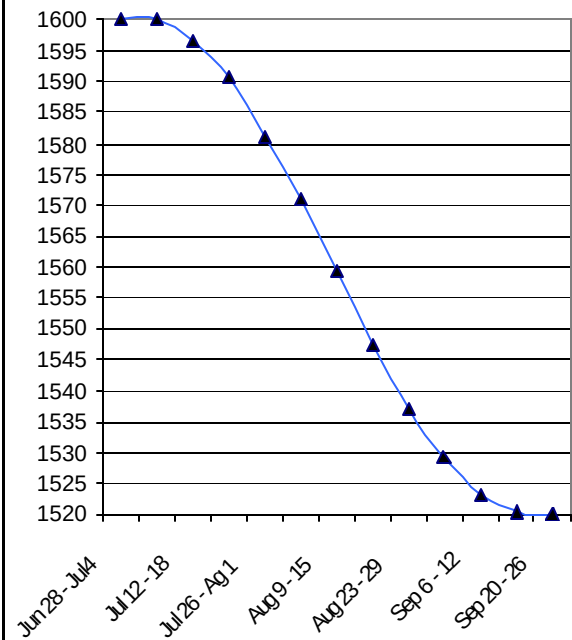
NPT-Idaho Plan



DWORSHAK SEASONAL FLOWS: NEZ PERCE TRIBE-ID PLAN



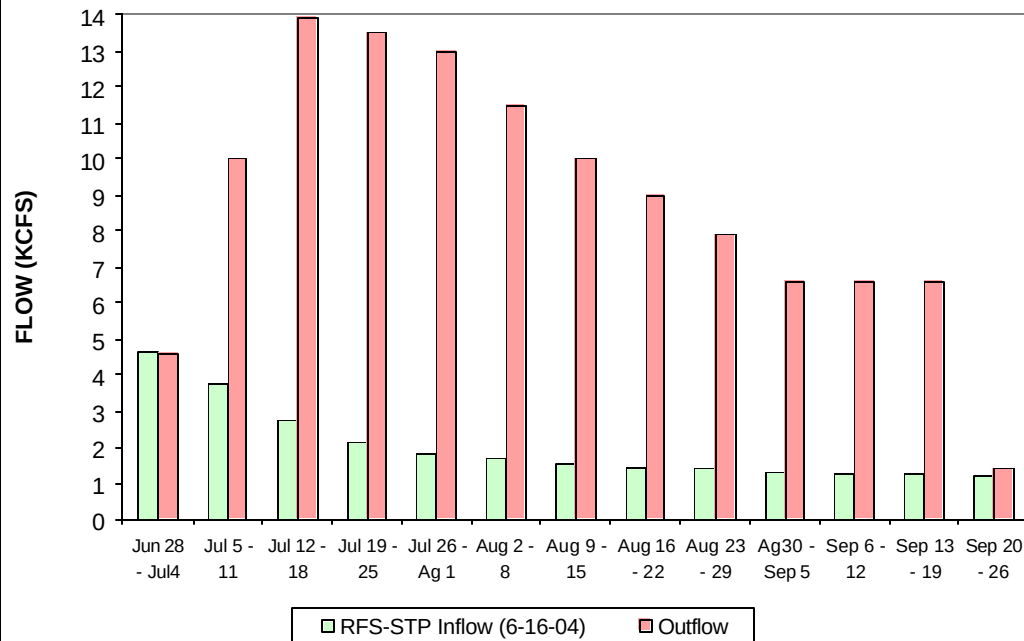
DWORSHAK POOL ELEVATIONS



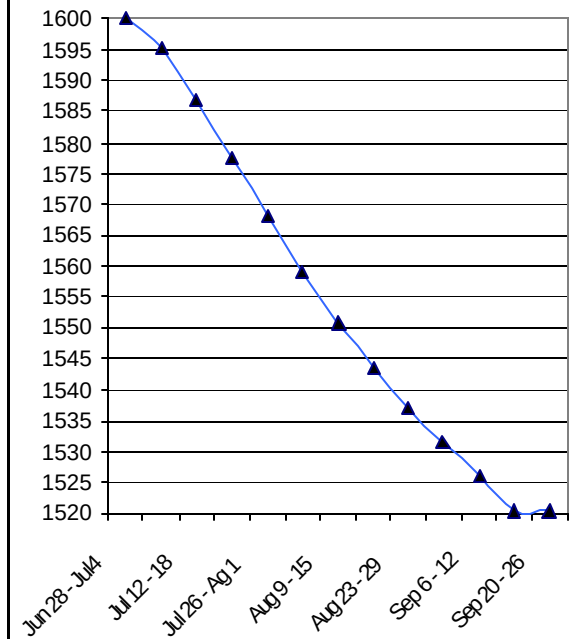
TMT-2003 Plan



DWORSHAK SEASONAL FLOWS: TMT-2003 PLAN



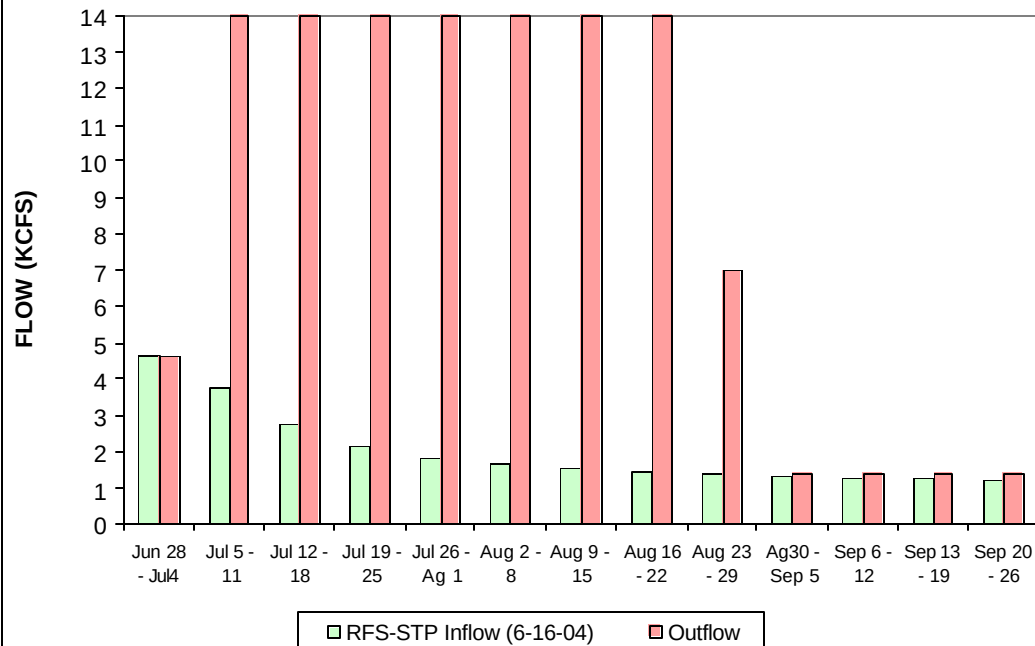
DWORSHAK POOL ELEVATIONS



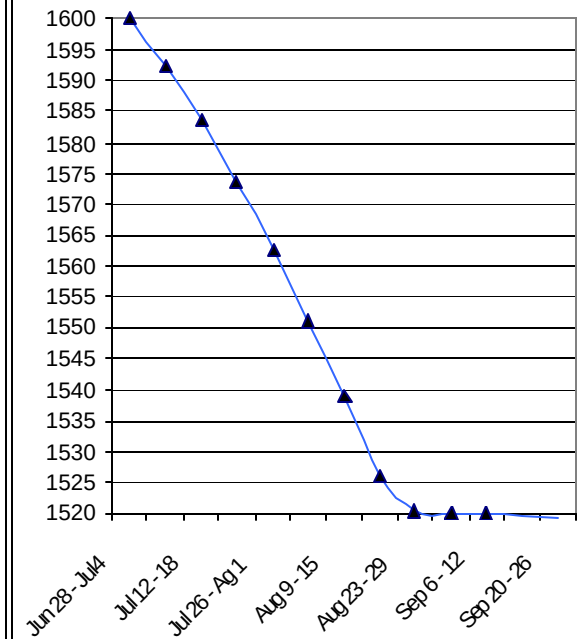
Biological Opinion Plan



DWORSHAK SEASONAL FLOWS: 2000 BIOLOGICAL OPINION



DWORSHAK POOL ELEVATIONS



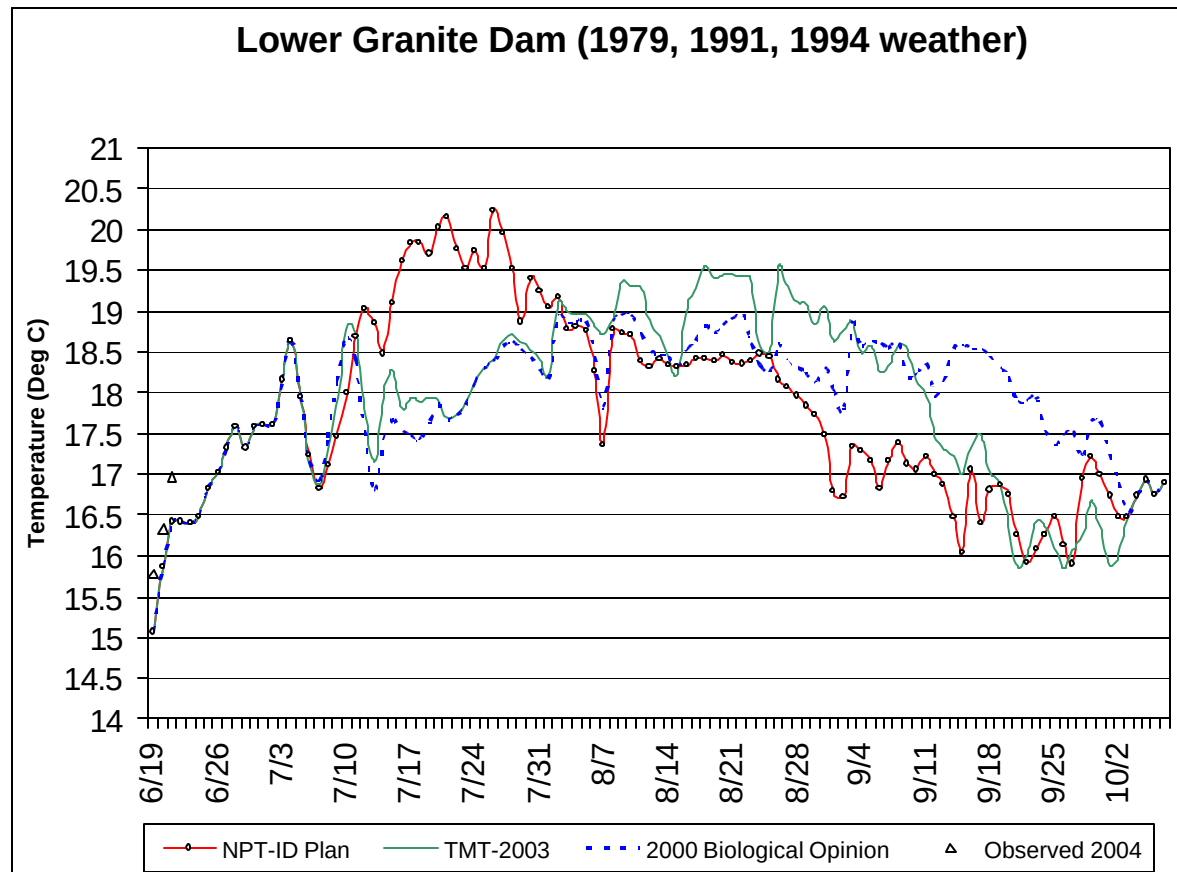
CRITFC Modeling Results



CURRENT (June 16, 2004) CRITFC MODEL FORECAST RESULTS			
Dworshak Outflows (cfs):	NPT-Idaho	TMT-2003	Biological Opinion
July 1-15	4900	9600	11500
July 16-31	10900	13400	14000
August 1-15	14000	10900	14000
August 16-31	12500	8200	9350
September	5100	5200	1400
SEP DWR Augmentation (KaF):	200	200	0
Lower Granite Outflows (cfs):	NPT-Idaho	TMT-2003	Biological Opinion
July 1-15	35000	39600	41500
July 16-31	35400	37900	38500
August 1-15	39400	36300	39400
August 16-31	32800	28700	29800
September	21600	21700	17900
Dworshak at 1570 ft:	8-Aug	30-Jul	27-Jul
EPA: Days > 20 degC at LWG:	NPT-Idaho	TMT-2003	Biological Opinion
July	2	0	0
August 1-15	0	0	0
August 16-31	0	0	0
September	0	0	0

Water Temperature

(Courtesy of Ben Cope, EPA-Seattle)

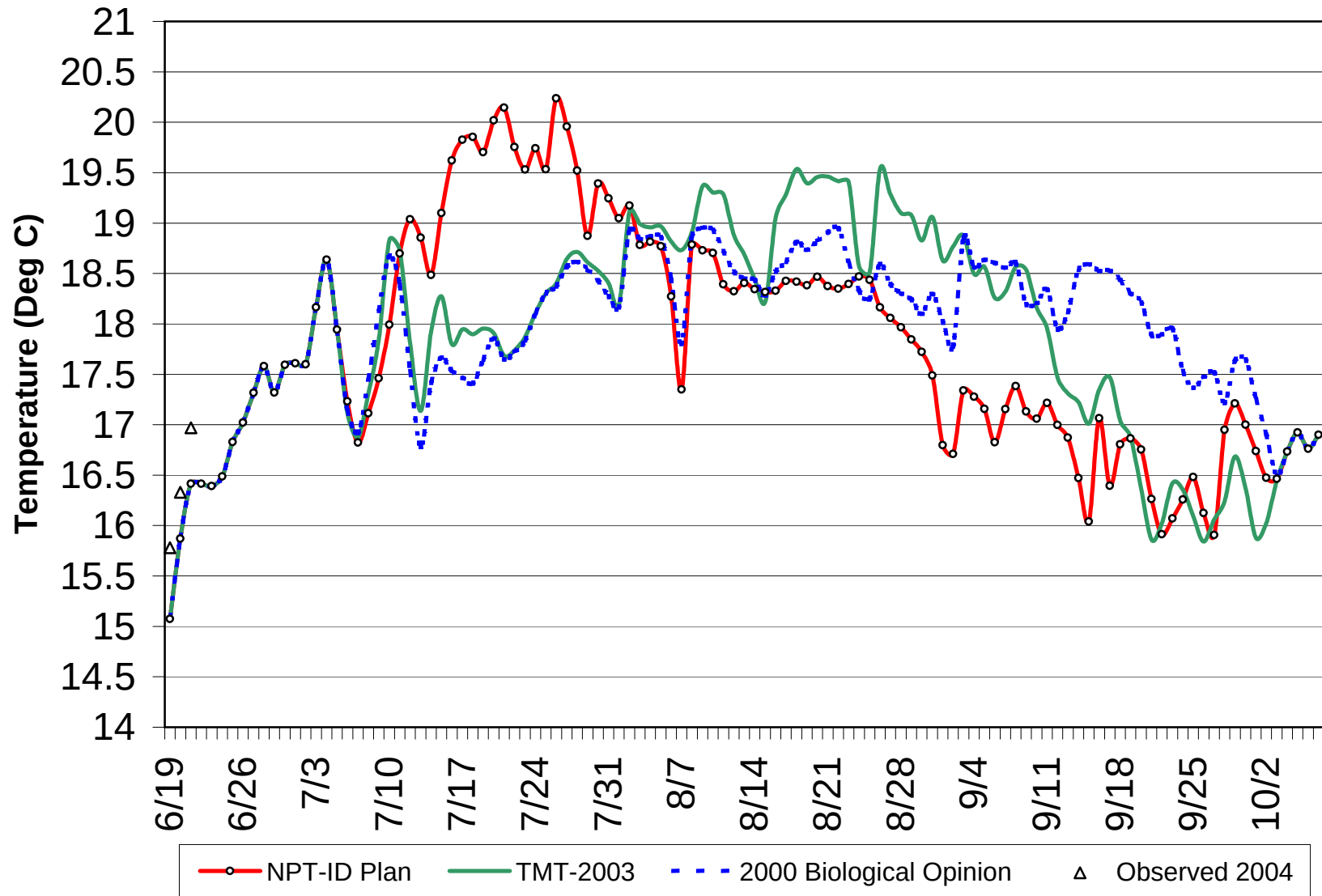


Conclusions

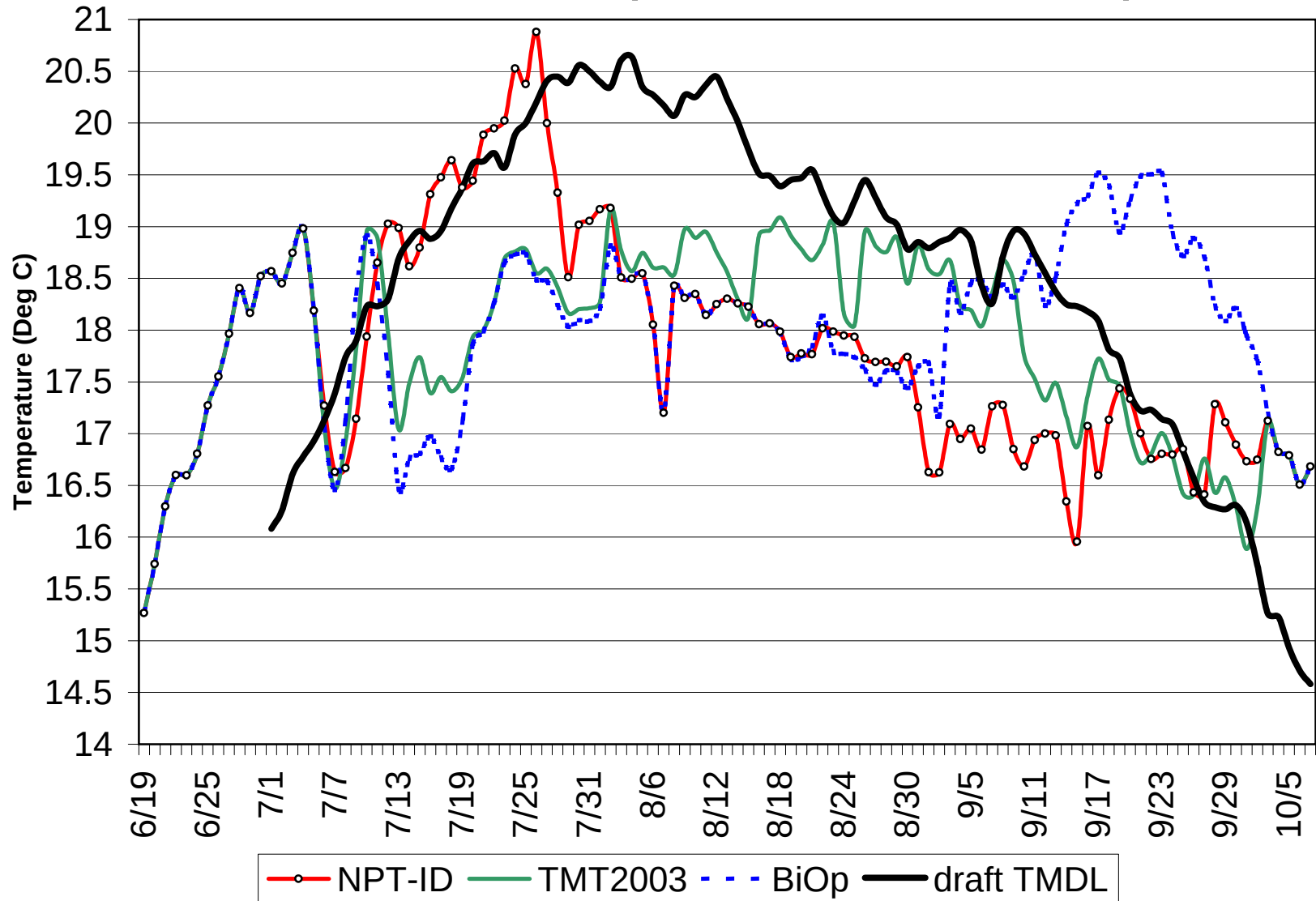


- Biological Opinion Plan: drafts in July will lower lake levels at the fastest rate. High outflows in early July will slow juvenile salmon growth. Benefits lower Snake flows in July. Impacts late migrating Clearwater stocks and adults.
- TMT-2003 Plan: drafts in July will lower lake levels, but not as fast. Sharp rise in mid-July flows is followed by a step-wise reduction. September has a 200 KaF carryover from summer flows, as prescribed in the NPT-ID Plan.
- Nez Perce Tribe-Idaho Plan: better timed outflows benefit juvenile and adult salmon while providing cooler water for lower Snake through Sept. Lake levels stay higher, longer.

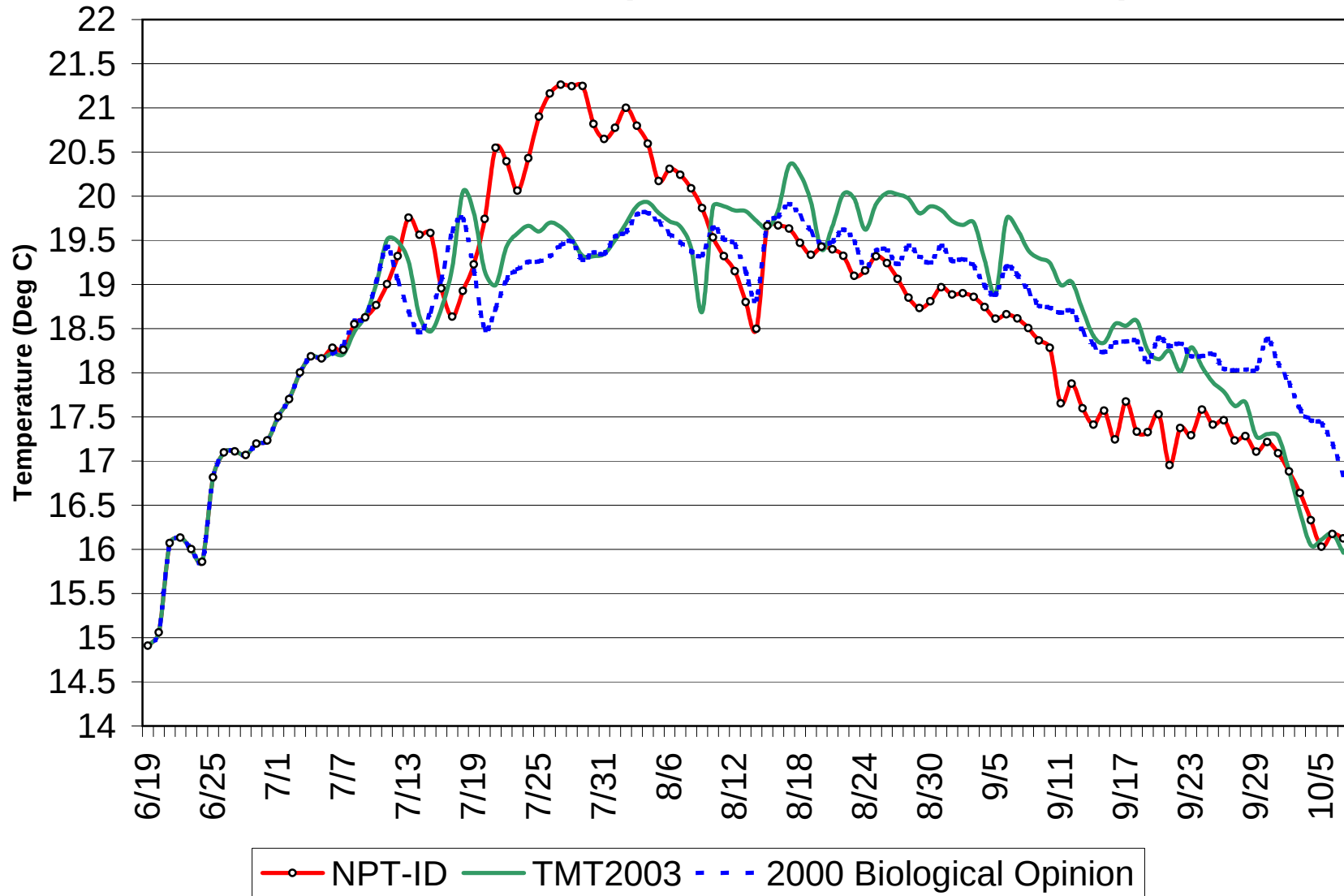
Lower Granite Dam (1979, 1991, 1994 weather)



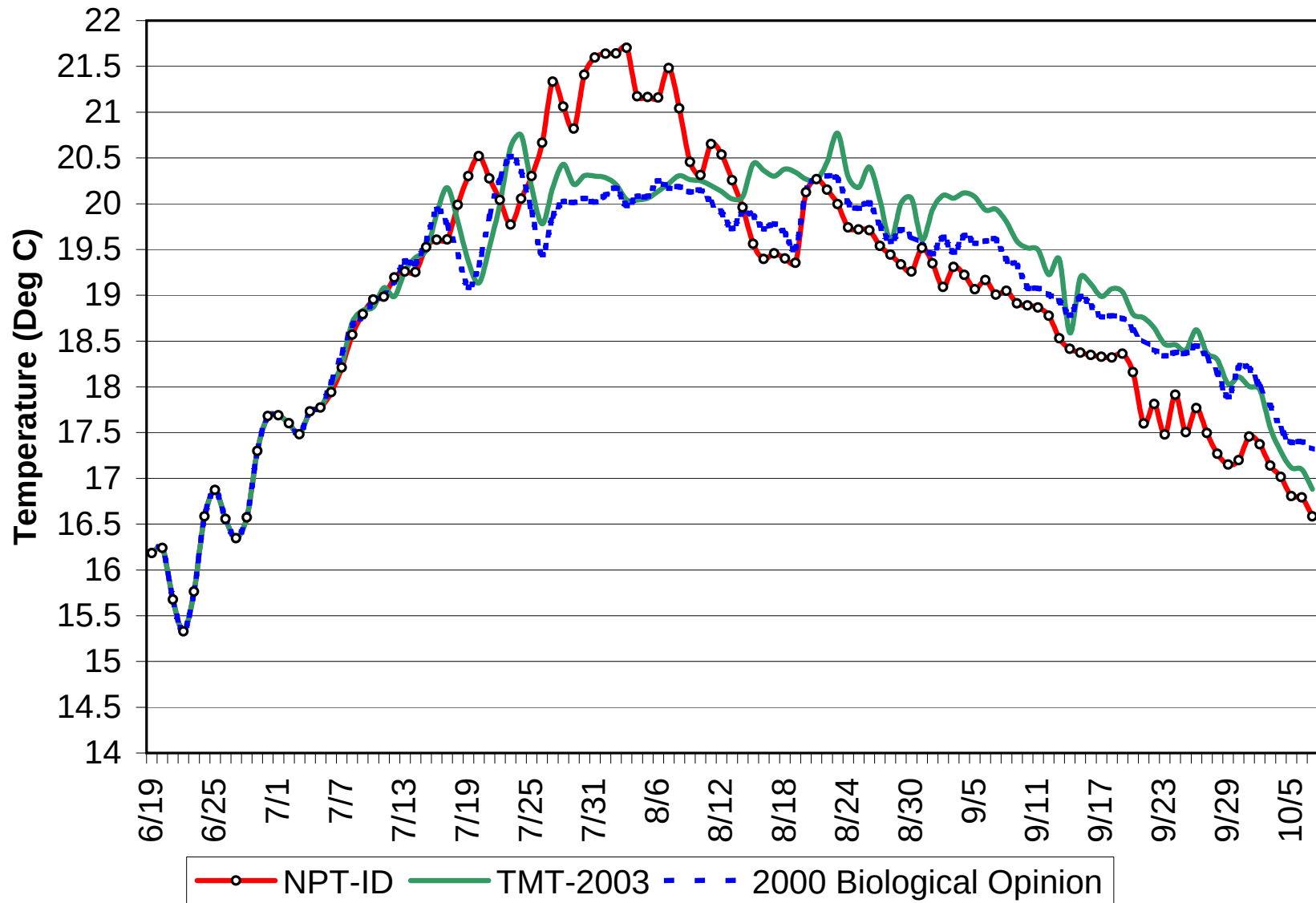
Lower Granite Dam (1979, 1991, 1994 weather)



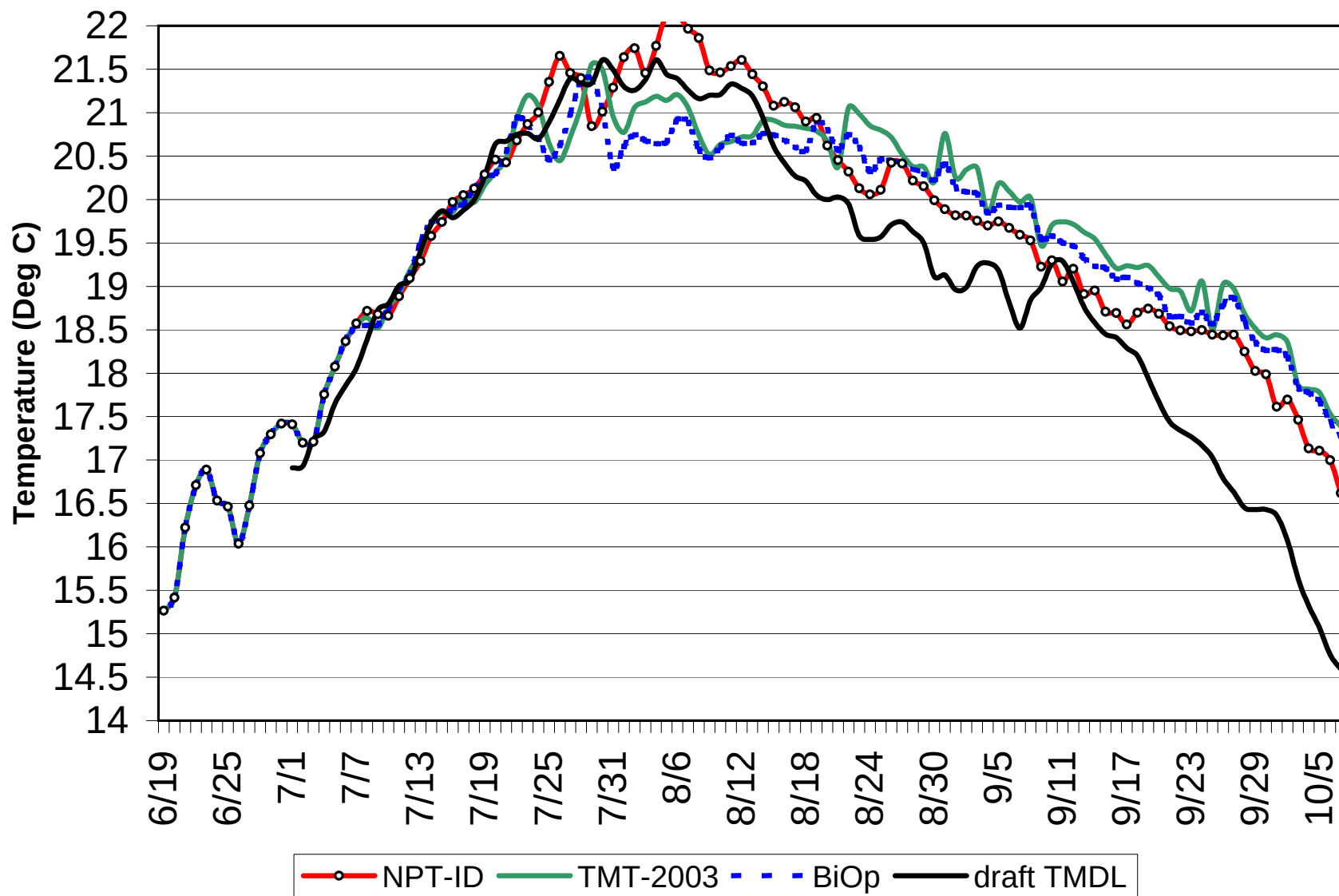
Little Goose Dam (1979, 1991, 1994 weather)



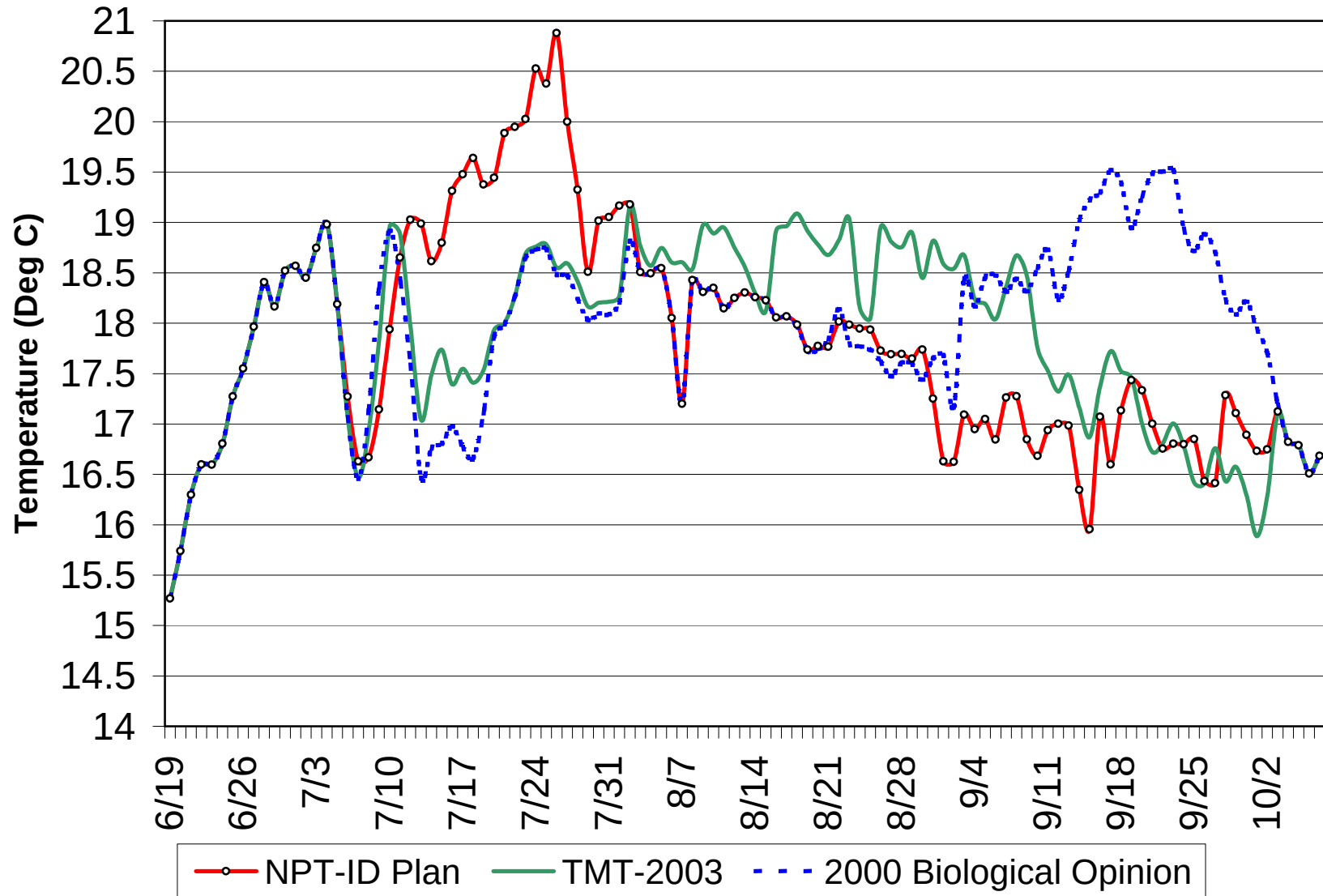
Lower Monumental Dam (1979, 1991, 1994 weather)



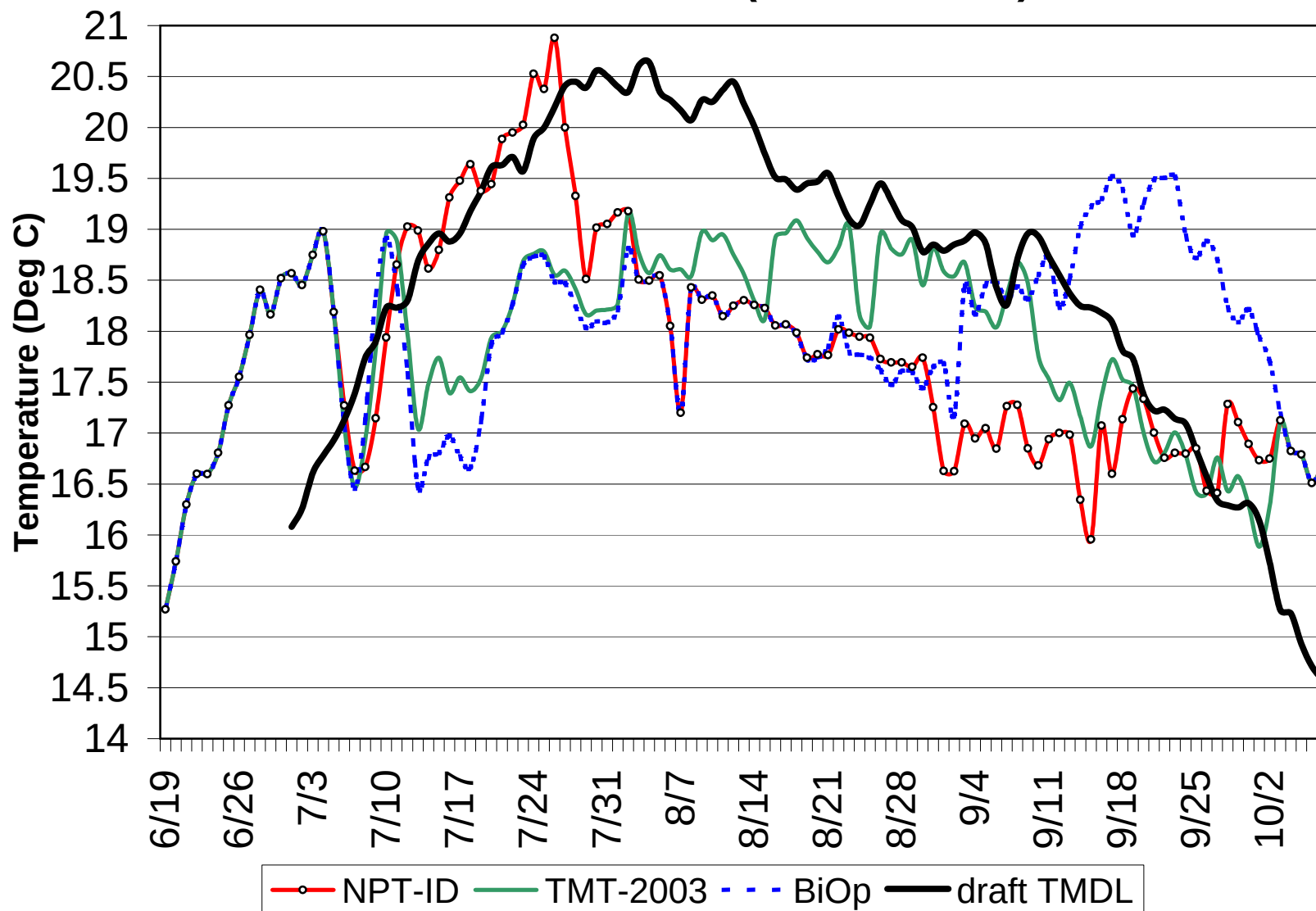
Ice Harbor Dam (1979, 1991, 1994 weather)



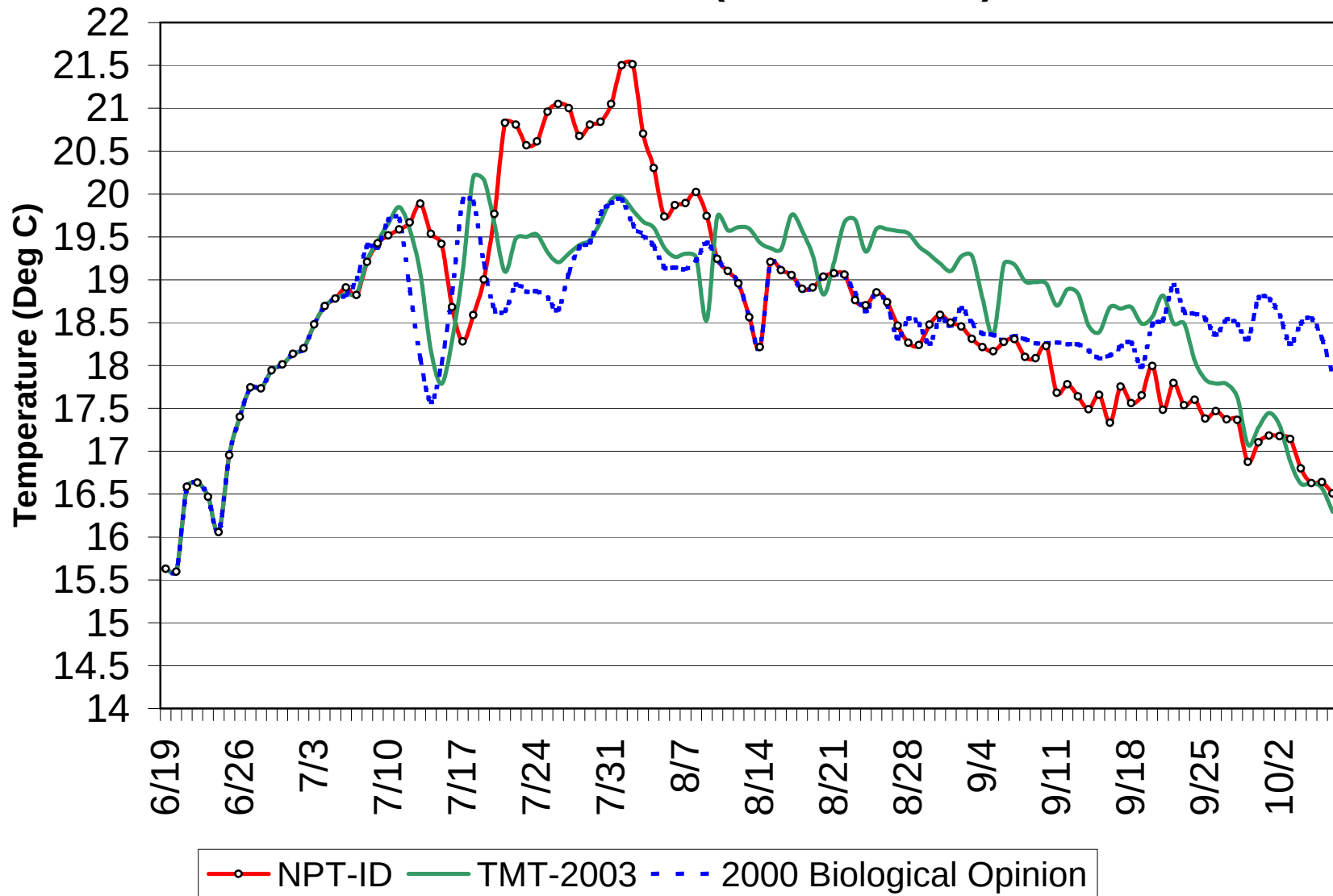
Lower Granite Dam (1979 weather)



Lower Granite Dam (1979 weather)



Little Goose Dam (1979 weather)



Lower Monumental Dam (1979 weather)

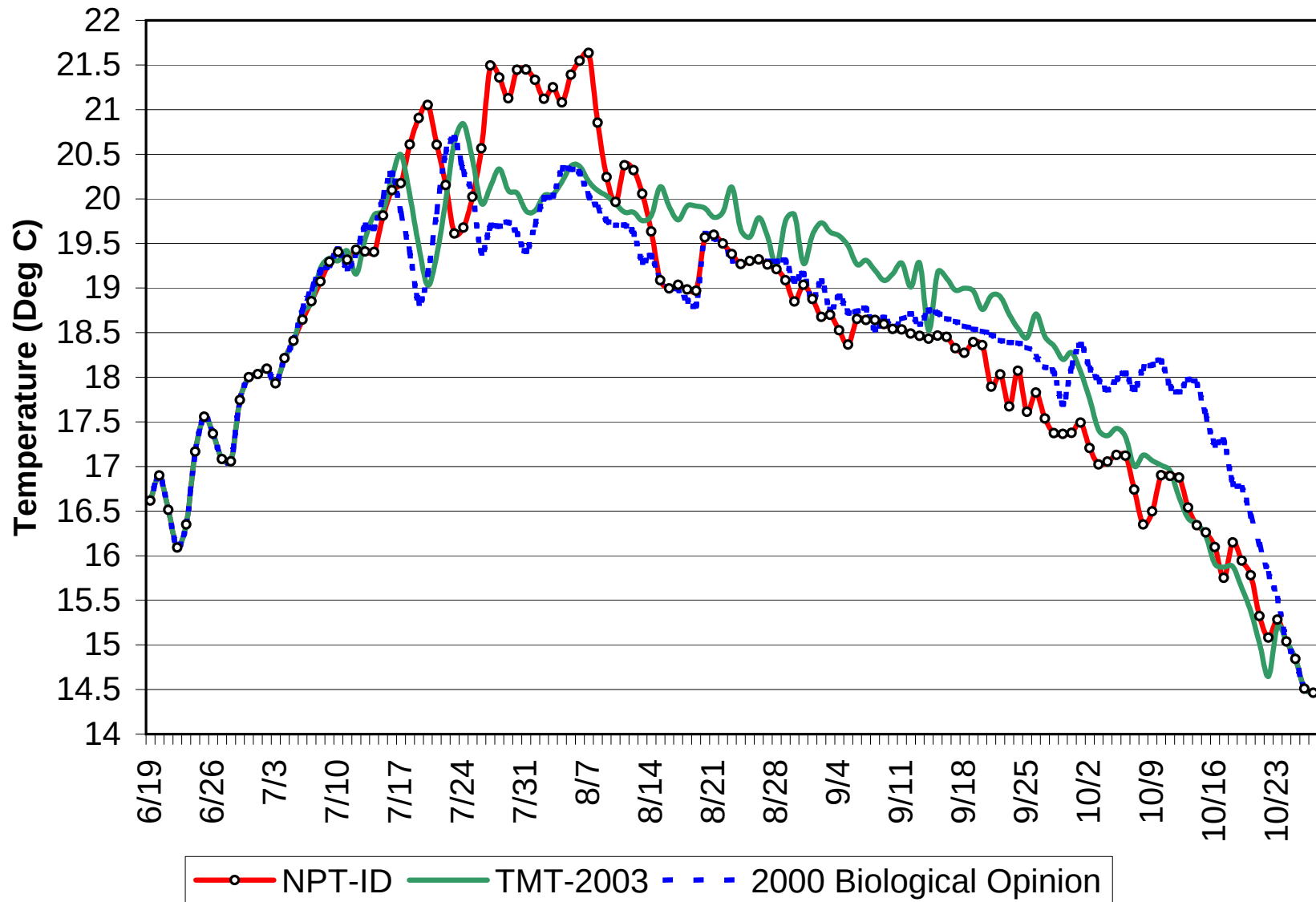
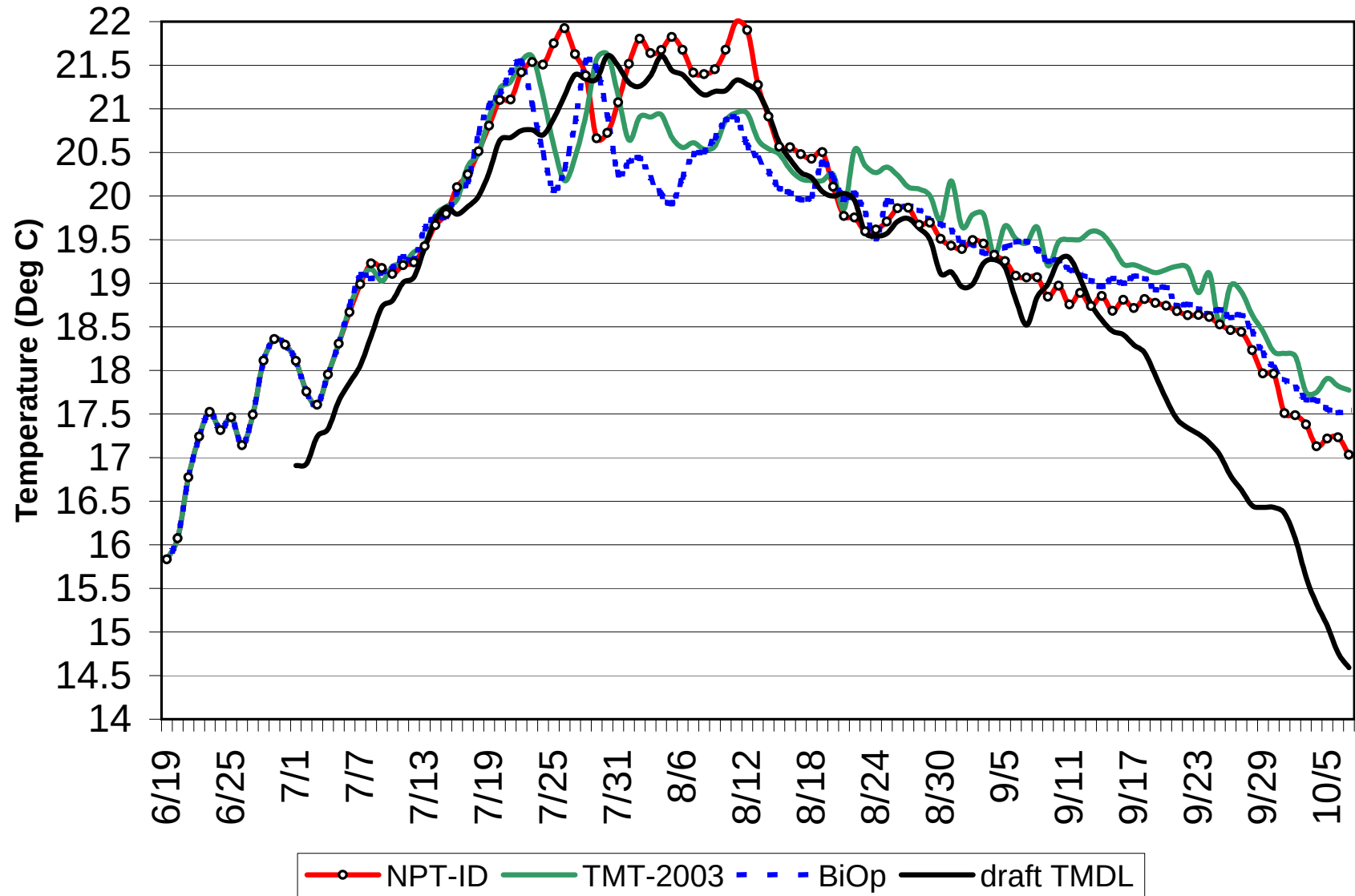
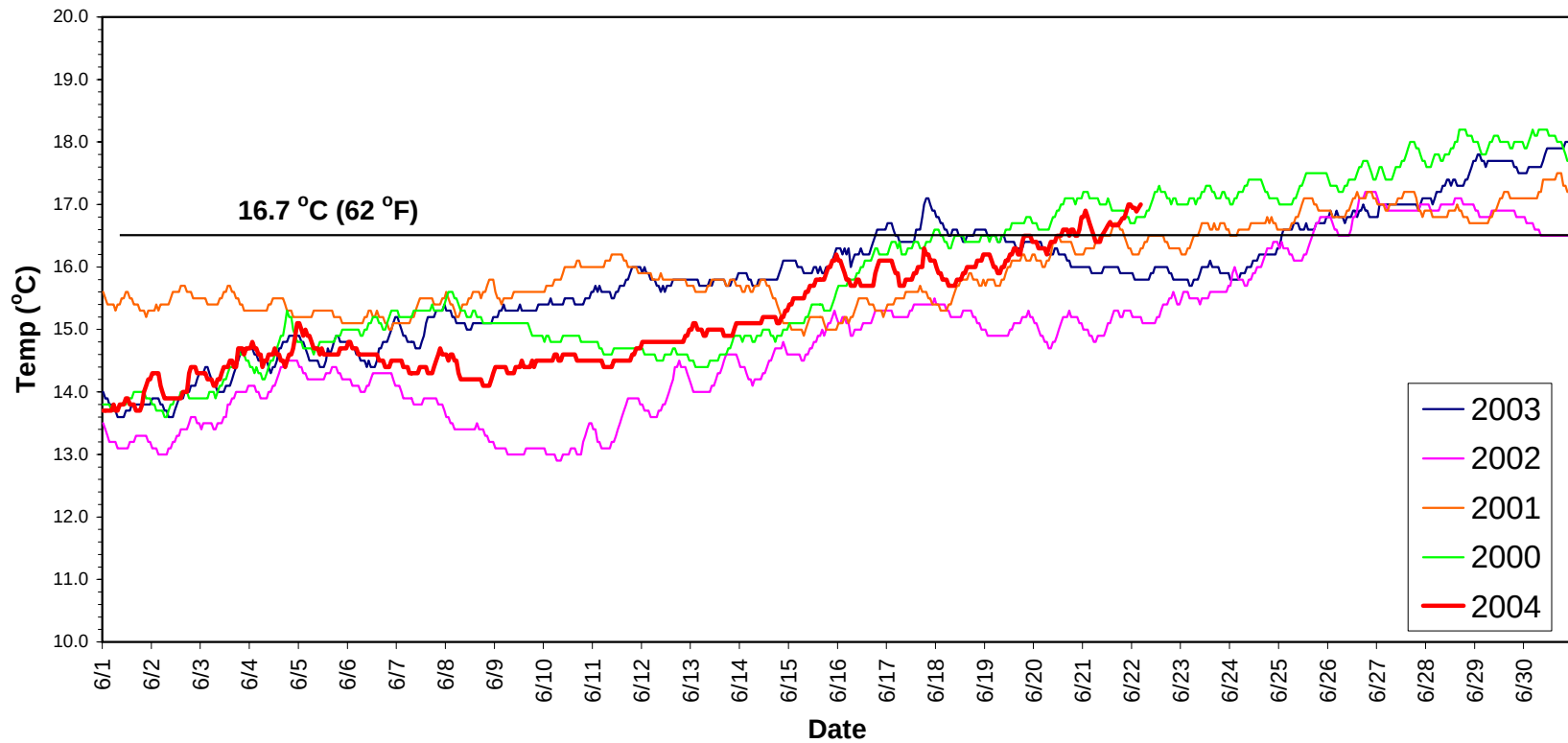


Figure 6: Ice Harbor Dam (1979 weather)



McNary Tailwater Temperatures in June



**TECHNICAL MANAGEMENT TEAM
MEETING NOTES
June 23, 2004
CORPS OF ENGINEERS NORTHWESTERN DIVISION OFFICES – CUSTOM
HOUSE
PORTLAND, OREGON**

FACILITATOR’S SUMMARY NOTES ON FUTURE ACTIONS

Facilitator: Donna Silverberg

The following notes are a summary of issues that are intended to point out future actions or issues that may need further discussion at upcoming meetings. These notes are not intended to be the “record” of the meeting, only a reminder for TMT members.

Hanford Reach Summary:

Chris Carlson, Grant County PUD, gave a summary report of operations in the Hanford Reach. On April 5th, the agreement began with multiple agencies which sought to hit a series of targets and bands for operations in Hanford Reach and Vernita Bar. Related to Hanford Reach, Chris said compliance with the agreement is a balancing act of a number of issues which need managing. This is not an exact science because water flows drop off over the weekend. As load on Monday increases significantly so does the flow, the PUD tries to stay within the band width but it is not required on Mondays.

March 21-June 12 was a protection period. This year, there have been many differences from previous years, including a four week period during which flows were at a minimums over the weekend. Of the 84-day period, 75 days were within the criteria. Hourly, the PUD stayed within the band percentage 97.1% of the time. The PUD believes this year has been the most successful yet.

ACTION: Chris Carlson’s year end report will be forwarded to the COE for inclusion on the TMT website.

Libby Operations for Summer:

Following up on last week’s call, the salmon managers had discussions, looked at modeling and put together SOR 2004-14: After the sturgeon operation, provide stable flows to reach elevation 2439’ by August 31. In September, maintain stable flows for Montana needs by drafting to flood control early or through a Canadian swap (Scenario 1 from the COE).

Montana expressed appreciation for consideration for and attempts to meet Montana’s request. The SOR looks very similar to what Montana is seeking. The goal is to have as flat of flows as possible and end at the target elevation. If the action agencies can get an agreement with Canada, Montana would like to come back with a modified operation. Until then, Montana is supportive and appreciative of the salmon managers’ SOR.

ACTION: The following two-week operation will be implemented: Complete the

sturgeon pulse on 6/27, then ramp down using bull trout ramp rates to near 12.5 kcfs, and hold steady until further notice. The COE will use Scenario 1 as the base case for discussion with Canada about a swap.

A question was raised about the feasibility of shifting flood control early to allow stable flows in September. The COE responded that this is possible, and that a lot of variables will need to be considered such as the other multi-purpose uses of the river.

Mid-Columbia Flow Objectives:

The action agencies reported that they are on course for refill of Grand Coulee to begin on 6/30. Grand Coulee is expected to refill to 1289' on 7/5.

SOR 2004 C-5 – Zone 6 Treaty Fishing:

SOR 2004 C-5 was distributed today, and requested the following operation: From 6/23 at 6 am to 6/25 at 6 pm, hold the pools at Bonneville, The Dalles and John Day within 1' of full. The tribes are expecting somewhere in the top 3-5 years of fish numbers since the 1950's! There are an estimated 40% of the nets in the Bonneville pool, 30% in John Day and 30% in The Dalles pool. Kyle will let the COE know where the nets are distributed as soon as possible.

Request for Action: At an August TMT meeting, Cindy LeFleur (WDFW) and Kyle Martin (CRITFC) will bring numbers and an analysis of fish age class to make initial thoughts on the effect of the 2001 low flow year on returning adults.

ACTION: The COE sent out the following teletype: Hold the pools within 75-76.5' as a hard constraint. The COE sent a goal statement to the operators as requested by CRITFC and provided a copy for Kyle at today's meeting.

McNary End of Spill and Start of Transport:

Flows at McNary have been below 220 kcfs for 6 days. The tailwater gauge at McNary has been showing temperatures above 62° since Monday, 6/21. As such, the COE is prepared to collect and transport fish at McNary today. Spill ended this morning and will not resume this evening unless it is involuntary spill. Oregon responded that they understand the criteria and accept the operation. Oregon would also like continued and in-depth discussions about new transportation data as soon as it is no longer preliminary so TMT can be responsive and adaptive in its on-going management role.

Dworshak Summer Operations:

TMT began discussions of possibilities for summer operations at Dworshak. The COE and CRITFC did model runs to assist the conversation. Kyle's information used: 1979, '91, and '94 weather information, 2000 Dworshak and Brownlee water temperatures and 1988 tributary inflows. The goals were to model Dworshak flows and elevations from summer operation proposals, and evaluate impacts on elevation, water temperature, recreation and refill.

Regarding the hatchery: In recent discussions, the hatchery managers have said that 45-

48° is an acceptable temperature range, and that they do not want the water to be too cold for migrating fall chinook.

ACTION: The following new models will be presented at the next TMT meeting, per requests from today:

- A full powerhouse model until elevation 1520 is reached.

Dave Statler, Nez Perce, suggested that when TMT begins tracking the natural hydrograph, be sure to add cooling water at the beginning of July to help cool the system a bit sooner.

Further modeling will be done and more discussion will occur at FPAC on the biological implications of the model runs. There will be a June 30 face to face TMT meeting to review the models and have further discussions about Dworshak operations. June 30 will be the end of refill so a new operation will need to start on July 1. Paul Wagner, NOAA, suggested that this week's operation should begin building cooler water, so perhaps move from 52° to 50°. The Nez Perce want to hold 58-60° in the Clearwater for juveniles, so Dave Statler suggested that when the temperatures start to go above 60°, then step down to 50°. Russ Kiefer, Idaho, suggested holding off on using the cooler water until absolutely necessary, in the interest of conserving the cool water. The COE suggested reviewing the cool temperature mass/volume/elevation information next week.

After discussion with the COE's water quality people, TMT agreed that beginning to move the water now will help with the early July temperature peak at McNary.

ACTION: The COE will do their best to get to 50° temperatures out of Dworshak, and per Nez Perce's suggestion, err on the warmer side for the migrants.

Status of Operations:

Reservoirs: Libby is 17' from full and will reduce to 12.5 kcfs as per the discussion from earlier today (see above). Grand Coulee is around 1285.5-1286'. Hungry Horse is within 1' from full and will avoid fill and spill. Upper Snake augmentation: Boise is releasing 300 cfs out and expecting 300 kaf out, although this is uncertain. Dworshak is 1.6' from full and filling, expected to fill on 6/30. Lower Granite is releasing 50 kcfs.

Fish status: Subyearlings at Lower Granite are high in numbers, arriving at an average 30,000/day. McNary numbers jumped from 48,000 to 600,000 in 6 days! Yearling steelhead numbers saw a plateau a few weeks ago and are meeting expectations at Lower Granite.

Water quality: There were a number of exceedances on 6/22, attributed to high air temperatures influencing TDG. Things are back under control now.

The Dalles Spill Outage:

Rock Peters, Portland District COE, described a situation involving significant erosion at a spill apron at The Dalles. A diver needs to go in to assess the damage, which will

require a 4 hour outage tomorrow (6/24). Rock listed a range of options for operations if needed:

- Reduce spill to 30%;
- Spread spill across the entire spillway; and
- Stop spill.

TMT agreed to the following operation: From 8 am-noon (plus or minus), stop spill for the diver. Kyle Martin will inform the tribal fishers of the operation. Once the diver has done the assessment, move forward keeping in mind that structural and safety concerns are top priorities. There may be a follow-up discussion with the region on Monday 6/28, at 10 am. TMT will also discuss this at the June 30 TMT meeting.

SOR 2004-15:

The salmon managers put forth SOR 2004-15, requesting that BiOp spill begin on 7/1 – this SOR clarifies the salmon managers’ position with regards to Bonneville. They requested to go through the differences of the test and the requested operations. Rock Peters will meet with FPAC after the report on survival tests is released. The discussion is expected to occur around mid-July. Oregon noted that the salmon managers do not agree on the type of study and welcome conversation on this. There will be a FDRWG meeting on 7/9 to discuss the McNary 1% test, at NOAA at 9 am in the first floor conference room. There will be no more operations above 1% at McNary.

Next Meeting, June 23rd, 9am-noon:

Agenda Items:

- Dworshak Operations
- The Dalles Spill Outage Update

1. Greeting and Introductions

The June 23 Technical Management Team meeting was chaired by Cindy Henriksen of the Corps and facilitated by Donna Silverberg. The following is a distillation, not a verbatim transcript, of items discussed at the meeting and actions taken. Anyone with questions or comments about these minutes should call Henriksen at 503/808-3945.

2. Libby Operations.

David Wills said the salmon managers had submitted an SOR in response to the discussion at the last TMT meeting. This SOR (2004-14), supported by the Fish and Wildlife Service, IDFG, ODFW, WDFW, Montana FWP, the Nez Perce and Shoshone-Bannock Tribes and CRITFC, requests the following specific operations:

- Maintain stable outflows from Libby after the sturgeon pulse operation while drafting Libby to elevation 2439 by August 31.
- Provide stable flows during September to meet Montana’s request for a reduced varial zone during the productive summer months by either drafting early toward the January 1 flood control elevation or by pursuing an agreement with Canada (ie Libby/Arrow swap

or passage of September releases through Kootenay Lake).

Henriksen said the Corps had modeled this operation; it shows that a flat flow of 12.5 Kcfs following the sturgeon pulse would draft the project to elevation 2439 by August 31. The Corps modeled a second scenario, under which flows would gradually be stepped down from 16 Kcfs to 6 Kcfs by August 31, again ending with Libby at elevation 2439 on that date.

Jim Litchfield said the flat flow scenario is very close to what the State of Montana has in mind; we would like to keep outflow as flat as possible, and end at 2439 by August 31, he said. Litchfield said Montana will continue to pursue a Libby-Arrow swap in 2004, however, which could, if successful, change the operation to something closer to the gradually-declining outflow shown in Scenario 2. John Wellschlager noted that BPA believes that a Libby-Arrow swap is unlikely in 2004. Brian Merotz said Canada is supportive of the flat flow operation.

Henriksen said the Corps will ramp Libby outflow down, beginning after 6 p.m. on Sunday, to about 12.5 Kcfs. She proposed that the Corps and Bonneville use Scenario 1 as the base case for any discussions with Canada; it was so agreed. In response to a question from Merotz, Henriksen said the two scenarios modeled most recently by the Corps were run off an assumption of 4.44 MAF at Libby, the most recent forecast volume.

What about the possibility of shifting some of the Libby flood control draft to September? Ron Boyce asked. That's a moving target, Henriksen replied; the Corps does have early forecasting capability for Libby this year, and the variable end-of-December flood control point could be as high as 2423 feet. You're talking about drafting the water that would normally come out later in the fall in September? Scott Bettin asked. Correct, Boyce replied. Bettin said that is not a requirement in the Biological Opinion; it therefore becomes an economic decision on Bonneville's part. Obviously there are a lot of multi-purpose needs that will have to be considered in such a decision, including chum operations, Henriksen added. In the meantime, said Silverberg, flows at Libby will be ramped down to about 12.5 Kcfs beginning Sunday night, and we will discuss this further at a future TMT meeting.

3. Hanford Reach Update.

Chris Carlson reported that the 2004 Hanford Reach fish protection operation started on March 20 and ended on June 12, when 400 temperature units from the end of spawning was achieved. He noted that this year's agreement was the result of seven years of research, and went briefly through the background and structure of this year's agreement. Strict compliance isn't really possible because of the complex nature of the logistics in the Mid-Columbia; it is not an exact science, Carlson said – particularly on Sundays, when flows and load are low, and Monday, when flows increase quickly in response to rising load. Carlson detailed some of the other exceptions to the flow bands. He said flows were controlled for 84 days in 2004; on 75 of those days, we were within the flow band (+5%).

The group discussed who was responsible for maintaining load on the weekends under the 2004 agreement; Wellschlager said it was BPA's understanding that it was the Mid-Columbia operators' responsibility. Carlson agreed, but noted that it was not always possible,

operationally, to do that. That's why Mondays were excluded from compliance, he said.

Carlson said that, on an hourly basis, Grant PUD was within compliance with the flow bands 97% of the time, a much higher percentage than in past years. He then went through the dates on which the flow bands were exceeded by more than 5 Kcfs; the last of those dates was June 10, when the 40 Kcfs flow band was exceeded by 6 Kcfs. On a number of those days, the flow band was exceeded by only 6-7 Kcfs, Carlson noted; it was significantly exceeded on only five days. Will you publish a year-end report? Henriksen asked. Yes, Carlson replied – it is already in draft form, and should be available soon.

4. Mid-Columbia Flow Objectives.

Henriksen said Priest Rapids continues to release between 125 and 135 Kcfs; the next milepost in operations is June 30 refill at Grand Coulee. Tony Norris said Grand Coulee is at about 1285 feet currently; the project is expected to fill significantly over 4th of July weekend, and Grand Coulee should touch 1289.5 Kcfs by Monday, July 5. The STP run shows Mid-Columbia flows between 110 and 110 Kcfs for the Monday-Sunday period preceding June 5, Henriksen said; flows will gradually decline from 125 Kcfs over the next week. In other words, we're on course to refill Grand Coulee by the first week in July, Bettin said.

5. Zone 6 Treaty Fishery.

Kyle Martin said the tribes had submitted SOR 2004 C-5 on June 17, covering the summer treaty fishery. This SOR requests the following specific operations:

- Beginning at 6 a.m. on June 23, and ending at 6 p.m. on June 25:
- Bonneville pool: operate the pool within 1 foot from full pool (msl elevation 76.5-75.5)
- The Dalles (Celilo) pool: operate the pool within 1 foot from full pool (msl elevation 159.5-158.5)
- John Day pool: operate the pool within 1 foot from full pool (msl elevation 264.5-263.5)

Martin noted that, with a forecast summer chinook run of 90,000 adults, this is just the second time in the last 40 years that a summer treaty fishery has been possible. He added that CRITFC will be conducting an aerial survey of where the nets are placed and will contact Henriksen with this information. Bettin noted that, tomorrow morning, there will be a period of no spill at The Dalles; he suggested that the tribal fishers wait until that operation begins to set their nets in order to avoid being impacted.

Any thoughts about why this is such a good run? Litchfield asked. Summer chinook appear to be following the recent trends of record adult returns across all stocks, Cindy LeFleur replied – even this year's spring chinook run was a good run, despite the fact that it was overpredicted. We believe that ocean production is quite high right now, she said. Is it fair to say that the spill summer reduction in 2001 didn't have the negative biological impacts that were predicted at the time? Wellschlager asked. No, they did have an effect, particularly on the five-year-old age class of the 2005 spring chinook run, LeFleur said; it is possible that the summer chinook were less affected. It's too early to say that there was no impact from that operation,

Boyce observed – we’re still analyzing that, and will provide information to TMT once we have more data. It was agreed to discuss the available adult return data in the context of the 2001 summer spill program at an August TMT meeting.

What is the Corps’ planned operation? Martin asked. Henriksen said the Corps has sent out a teletype to Bonneville Dam and BPA to maintain 75-76.5 feet in elevation as a hard constraint and 75.5-76.5 as a soft constraint; we also reminded the project that the goal of this operation is to minimize wear and tear on the nets by minimizing pool fluctuations, Henriksen replied.

6. McNary 1% Test Operation.

Turner said the Corps will not be scheduling any more maximum discharge tests at McNary for the immediate future; FFDRWG will meet in Portland at 9 a.m. July 9 at NOAA Fisheries’ Portland offices to discuss both short-term and longer-term McNary modernization test operations.

7. McNary End of Fish Spill and Start of Transport.

Henriksen said that, at last week’s TMT meeting, the group agreed that, once “springlike” conditions ended – flow less than 220 Kcfs and temperatures above 62 degrees F in the McNary tailrace – voluntary spill for fish passage would end at McNary and transport would begin. Jim Adams said that, as of 5 a.m. today, water temperatures had been above the 62-degree threshold at the fixed monitoring station in the McNary tailwater for two days. Henriksen said flow at McNary has been below 220 Kcfs for the past six days. The Corps is now prepared to stop spill and begin collecting fish, Henriksen said.

There will continue to be some involuntary spill, Bettin said; would the salmon managers like us to shape that spill according to the SOR submitted last week? Yes, Wills replied – no change to the requested operation. In response to a question from Paul Wagner, Turner said the weather forecast for the McNary area is for air temperatures in the 90-100 degree range through Friday; there may be some cooling on Saturday. Bettin said voluntary spill ended at 6 a.m. this morning, and will not resume. Turner added that yesterday’s day-average flow at McNary was 204 Kcfs, down from 211 Kcfs on Monday. And again, said Bettin, involuntary spill will continue during nighttime hours until total river flow recedes to powerhouse capacity at McNary.

If there are no objections, said Turner, we will begin collection for transportation at McNary today. Boyce said that there needs to be some discussion of the most recent transport research data regarding the relative benefits of transport vs. in-river migration during this period; we will bring that to TMT for discussion. I understand, however, that these are the criteria in the BiOp, and Oregon will not object to the planned operation, he said. And we have agreed to have that discussion, once the information is finalized, said Turner. After a few minutes of additional discussion, no TMT objections were raised to the Corps’ proposed operation; fish collection for transport will begin today. It was further agreed that BPA and the Corps will shape the available spill into nighttime hours when the spill volume is less than 20% of the total river flow; there will be less than 40 Kcfs spill today, so spill will be shaped into nighttime hours tonight. Spill

will be continue 24 hours per day when the available spill is greater than 20% of total river flow.

8. Dworshak Summer Operations.

Wills said this topic was briefly discussed at the last TMT meeting; he noted that he had asked the Corps to model three potential operating scenarios for Dworshak summer operations. This topic was also discussed at yesterday's FPAC meeting, at which Kyle Martin agreed to produce some additional model runs. Wills noted that this is the beginning of the 2004 Dworshak discussion; he said he does not expect to make a decision on this operation at today's meeting.

Martin said he and Ben Cope of EPA had modeled three scenarios: the Nez Perce Tribe/Idaho plan, TMT's 2003 Dworshak operation, and the operation described in the 2000 Biological Opinion. He described the model parameters he and Cope used to generate these runs. Under the Nez Perce Tribe/Idaho plan, Dworshak outflow would be ramped up to 7 Kcfs on July 12; it would go to 10 Kcfs on July 19, to 14 Kcfs on July 26, and held at that volume until August 23, at which point it would be ramped down to 12 Kcfs, then to 9 Kcfs by August 30, to 7 Kcfs by September 6, to 4 Kcfs by September 13, and to minimum outflow (1.5 Kcfs) by September 20. Under this scenario, Dworshak would achieve elevation 1520 by September 20.

Under the TMT 2003 scenario, Dworshak outflow would be ramped up to 10 Kcfs by July 5, then to 14 Kcfs by July 12; Dworshak outflow would then be gradually ramped down by 1 Kcfs per week from 13.5 Kcfs on July 19 to 6.5 Kcfs by September 30. That outflow volume would then be held through September 19, at which point Dworshak outflow would be ramped down to minimum and elevation 1520 would be achieved.

Under the Biological Opinion scenario, Dworshak outflow would be ramped up to 14 Kcfs by July 5, and held at that volume through August 22. For the week of August 23-30, Dworshak outflow would be 7 Kcfs; it would then be ramped down to minimum outflow. Elevation 1520 would be achieved by August 31 under this plan.

In terms of the effects of these three scenarios on water temperatures at Lower Granite, temperatures would be highest through August 1 under the Nez Perce Tribe/Idaho plan; they would then decline sharply through the end of September. Under the TMT 2003 scenario, water temperatures would be lower through August 1, but would then rise through the end of August, followed by declining temperatures in September. Under the BiOp scenario, water temperatures would gradually rise from the second week in July through late September, at which point they would gradually decline.

Martin asked whether the TMT would like to see other scenarios modeled. In response to a question, Martin said the assumed operation for Brownlee is that the project would follow load during August and September. Henriksen said the Corps had modeled the same three scenarios in preparation for today's meeting, but did not track the temperature effects of these operations. She noted that the Corps had used an assumed volume of 2.4 MAF at Dworshak, which is slightly above the volume shown in the current water supply forecast. Some of the outflow volumes in the Corps model runs are slightly different from those shown in the CRITFC model runs, because the Corps modeled an operation that would not exceed the state TDG standards. In

response to a request from Bettin, Henriksen said the Corps will model a “no-spill” operation at Dworshak, showing a flat outflow of 10.5 Kcfs from Dworshak until elevation 1520 is achieved.

Dave Statler said that, from the Nez Perce perspective, he would prefer to see cooler water drawn from Dworshak starting on July 1, as natural flows begin to recede. That would provide some cooling effect and a better transition, in terms of temperature, Statler said. Is there any field data on the fork lengths of the Clearwater fish at this point? Martin asked. We have collected some information, but I don’t have it in front of me right now, Statler replied. That would be useful information for the salmon managers to consider, in terms of relative fork lengths in 2004 compared to this date in previous years, Martin observed. We can certainly put that together and bring it to the next FPAC meeting, Statler said. And how often will your crews be sampling? Martin asked. Once a week, Statler replied.

Can we do a “backcast” of forecast vs. observed water temperatures in 2003? Litchfield asked. I can put that together, Martin replied – that would be good information to have. My recollection is that, temperature-wise, the operation worked pretty well last year, Wellschlagler observed. I believe that’s correct, but my question had to do with the accuracy of the model results, not the effects of the operation, said Litchfield.

Boyce said the salmon managers will discuss the biological implications of this data; it was agreed that TMT will meet on June 30 to discuss Dworshak operations. It was further agreed that the TMT will attempt to reach a decision on the Dworshak summer operation at that meeting. Jim Adams added that, in most years, there is a surplus of cold water in Dworshak reservoir at the end of the temperature control season, so if the TMT wants to go to a cooler outflow temperature beginning July 1, there should be adequate cold water available to do so.

It was noted that, according to Dworshak National Fish Hatchery personnel, a Dworshak outflow temperature of 45-48 degrees is compatible with the fish growth needs of the hatchery. However, we need to exercise care in water temperatures for the wild/natural fall chinook rearing in the Lower Clearwater, Russ Kiefer observed. It was agreed to reduce Dworshak outflow temperature from 52 degrees F to 50 degrees F as soon as possible. It was further agreed that the Corps will closely monitor temperatures in the Lower Clearwater to gauge the effects of this lower-temperature release from Dworshak. Henriksen said the Corps will produce an analysis of the current temperature stratification structure in Dworshak reservoir in time for discussion at next week’s TMT meeting. Henriksen said she will work with Dworshak project personnel to reduce Dworshak’s outflow temperature to as close to 50 degrees as possible, erring slightly on the high side.

9. Status of Operation.

Henriksen said Libby is at elevation 2442, 17 feet from full, filling slightly, and releasing 16 Kcfs. We will reduce outflow from that project to about 12.5 Kcfs by next Monday, June 28, she said. Norris said Grand Coulee is at about elevation 1286, currently, and will touch 1289.5 on June 5. Hungry Horse is very close to full at this point; the project personnel are watching inflows closely to avoid fill and spill. Hungry Horse will likely release about 4.5 Kcfs for flow augmentation once it fills. We’re still not sure we will receive flow augmentation water from

above Milner this year, said Norris; however, approximately 300 kaf is expected to be available from the Boise and Payette in 2004, and has already begun to be released – 150 kaf from the Payette, 40 kaf from the Boise, 85 Kcfs from high pumpers and 17.7 kaf from Oregon natural flows. Another 30-60 kaf may be available from the Snake above Milner, Norris said, but we don't know about that for sure at this point.

Dworshak is 1.6 feet from full and filling, said Henriksen; the project will fill by June 30. Flow at Lower Granite has been about 50 Kcfs over the past week; observed flow was 70 Kcfs for the spring period.

Moving on to the current status of the outmigration, Wagner said the main action is in subyearlings, with indices of about 30,000 at Lower Granite and lesser numbers (due to transportation) at the other Lower Snake projects. At McNary, the indices have jumped from 50,000 to more than 600,000 fish per day over the past few days. In terms of timing, the subyearling migration at Lower Granite was significantly earlier in 2004, compared to other recent years; it is lagging somewhat behind the curve at McNary. Steelhead passage at McNary has also lagged behind projections in 2004; at lower Granite, steelhead passage has closely followed the pre-season projections of timing and numbers. Yearling chinook and steelhead passage has also lagged behind projections at Rock Island.

Wellschlager said there are no power system problems to report at this time. Moving on to water quality, Adams said there were a number of TDG exceedences at multiple projects in the system last week, probably due to rising water temperatures; as a result, the spill caps were reduced significantly at a number of projects.

10 The Dalles Spill Outage.

Mike Langslay of the Corps said the Corps conducted a bathymetric survey of the stilling basin at The Dalles last week to check for erosion under the new, concentrated 6-bay spill pattern; significant erosion was found on the spillway apron. Langslay shared various bathymetric data for the spillway apron, comparing data from 1991, 1999, 2003 and 2004. Some of the eroded areas are now three feet deep, Langslay said; much of that damage appears to have occurred in the last eight weeks of spill. We need to put a diver in the water to survey the damage, he said, so that we can evaluate how to operate the project for the rest of the year. He said the plan is to stop spill for four hours tomorrow morning (beginning at 8 a.m.) to give the divers a chance to survey the damage.

We also need to discuss what the spill operation should be from here on out at The Dalles, said Langslay; options range from continuing to spill 40% of total river flow through six bays, reduce spill to 30% of total river flow (or possibly a lower percentage) through the six bays, continue at 40%, but spreading spill over more bays through the old juvenile spill pattern, or stopping spill altogether. One concern is the ongoing biological evaluation at The Dalles, said Langslay; as long as spill continues at some level in the six bays, we should be able to continue to get useful information. If we go to the juvenile spill pattern, however, future data collection will be compromised. The juvenile evaluation is currently scheduled to continue to July 18. Turner observed that, as total river flow falls, under the 40% protocol, spill volumes will also be

reduced. Another Corps representative replied that, as total river flow recedes, so do tailwater elevations at the project, so even at reduced spill volumes, the erosion would likely continue.

No TMT objections were raised to tomorrow's spill stoppage to allow the diver survey of The Dalles spillway apron. And what will be the process for making a decision on future spill at The Dalles? Boyce asked. It will depend on what the divers find, Rock Peters replied; it will depend on whether it's a structural integrity or a cost-to-fix issue. We will make a recommendation based on what the divers find and upcoming flow and spill levels, so that we avoid a multi-million-dollar fix, Peters said. Certainly structural safety should be an issue, said Boyce, but you also need to factor in the biological effects of any curtailment of The Dalles spill. Once the cost-to-fix issue comes under discussion, he said, that's the point at which you'll need to engage the region. Understood, said Peters – we will convene a TMT conference call on Monday to discuss what the divers find and what the Corps intends to do. It was further agreed that, if the divers need more than four hours to complete their survey, they will have the time they need. Henriksen said she will notify the TMT about the time and call-in number for that conference.

11. Lower Columbia River Spill Program.

On June 22, the salmon managers submitted SOR 2004-15. This SOR, supported by USFWS, ODFW, WDFW, the Nez Perce and Shoshone-Bannock Tribes, and CRITFC, requests the following specific operations:

- Continue implementing the BiOp spring spill program through June 30. Beginning on July 1, spill daily at Lower Columbia River projects according to the summer spill provisions contained in the 2000 BiOp.
- Spill 24 hours daily at John Day Dam at 30% of instantaneous flow
- Spill at The Dalles Dam shall occur for 24 hours a day at a level equal to 40% of instantaneous flow.
- Spill to the 120% gas cap at Bonneville Dam during nighttime hours and 75 Kcfs during daytime hours.

Wills went briefly through the justification for this SOR; please refer to the full text of this document (available via hot-link from the TMT homepage) for details. Boyce said the salmon managers understand that the regional discussion of the summer spill program is ongoing; the intent of this SOR is to ensure that there are no lapses in the summer spill program while this issue is being decided. Scott Boyd said he had heard that another spill proposal could be issued as soon as this afternoon.

Henriksen said a letter on this issue is available from the Joint Technical Team. Peters said the Corps received the JTS letter in May; it was focused on a technical response to a proposal to test 50 Kcfs spill vs. BiOp spill at Bonneville. The Corps responded to the technical comments in the letter, which also raised some policy issues. From a larger perspective, the study itself is a valid test; however, when it was designed, we were hoping that we would be able to get a full differential in the BiOp spill – 75 Kcfs day, 140 Kcfs at night. That has the potential to compromise the differences in that test, because we could see spill as low as 80 or 90 Kcfs at

night, Peters said. Wills said the salmon managers would like to sit down with the Corps in another venue – perhaps at FPAC – to discuss the Corps’ response to the JTS letter. It was so agreed.

12. Next TMT Meeting date.

A TMT conference call was scheduled for 10 a.m. Monday to discuss spill operations and erosion at The Dalles. The next TMT meeting was set for June 30. Meeting summary prepared by Jeff Kuechle. (Meeting lasted 3.5 hours)

TMT PARTICIPANT LIST

June 23, 2004

Name	Affiliation
Kyle Martin	CRITFC
Mike O’Bryant	CBB
Cindy Henriksen	COE
Steve Haeseker	USFWS
Russ George	WMCI
Tom Haymaker	PNGC
David Benner	FPC
Lee Corum	PNUCC
Ron Boyce	ODFW
Jim Litchfield	Montana
David Wills	USFWS
Cindy LeFleur	WDFW
Rudd Turner	COE
Donna Silverberg	Facilitation Team
Scott Boyd	COE
Tina Lundell	COE
Tony Norris	USBR
Laura Hamilton	COE
John Wellschlager	BPA
Nic Lane	BPA

Paul Wagner	NOAAF
Jim Adams	COE
Brian Merotz	Montana
Vicky McGraw	BPA
Dan Bedbury	EWEB
Kevin Nordt	PGE
Amy Reece	COE
Chris Carlson	GCPUD
Margaret Filardo	FPC
Greg Hoffman	COE
Bruce MacKay	Consultant
John Marshall	COE
Scott Bettin	BPA
Cathy Hlebechuk	COE
Dave Statler	NPT
Russ Kiefer	IDFG
Martin Hatscher	SCL
Julie Ammann	COE

TECHNICAL MANAGEMENT TEAM

BOR: Tony Norris / John Roache

BPA: Scott Bettin / John Wellschlager

NMFS: Paul Wagner / Chris Ross

USFWS: David Wills / Steve Haeseker

OR: Ron Boyce

WA: Cindy LeFleur

ID: Russ Kiefer

MT: Jim Litchfield

COE: Cindy Henriksen / Rudd Turner / Cathy Hlebechuk

TMT MEETING

Wednesday June 30, 2004 0900 - 1200 hours

**Custom House Room 118
Portland, Oregon
Conference call line: 503-808-5190**

*All members are encouraged to call Donna Silverberg with any issues or concerns they would like to see addressed.
Please e-mail her at dsilverberg@cnmm.net or call her at (503) 248-4703.*

AGENDA

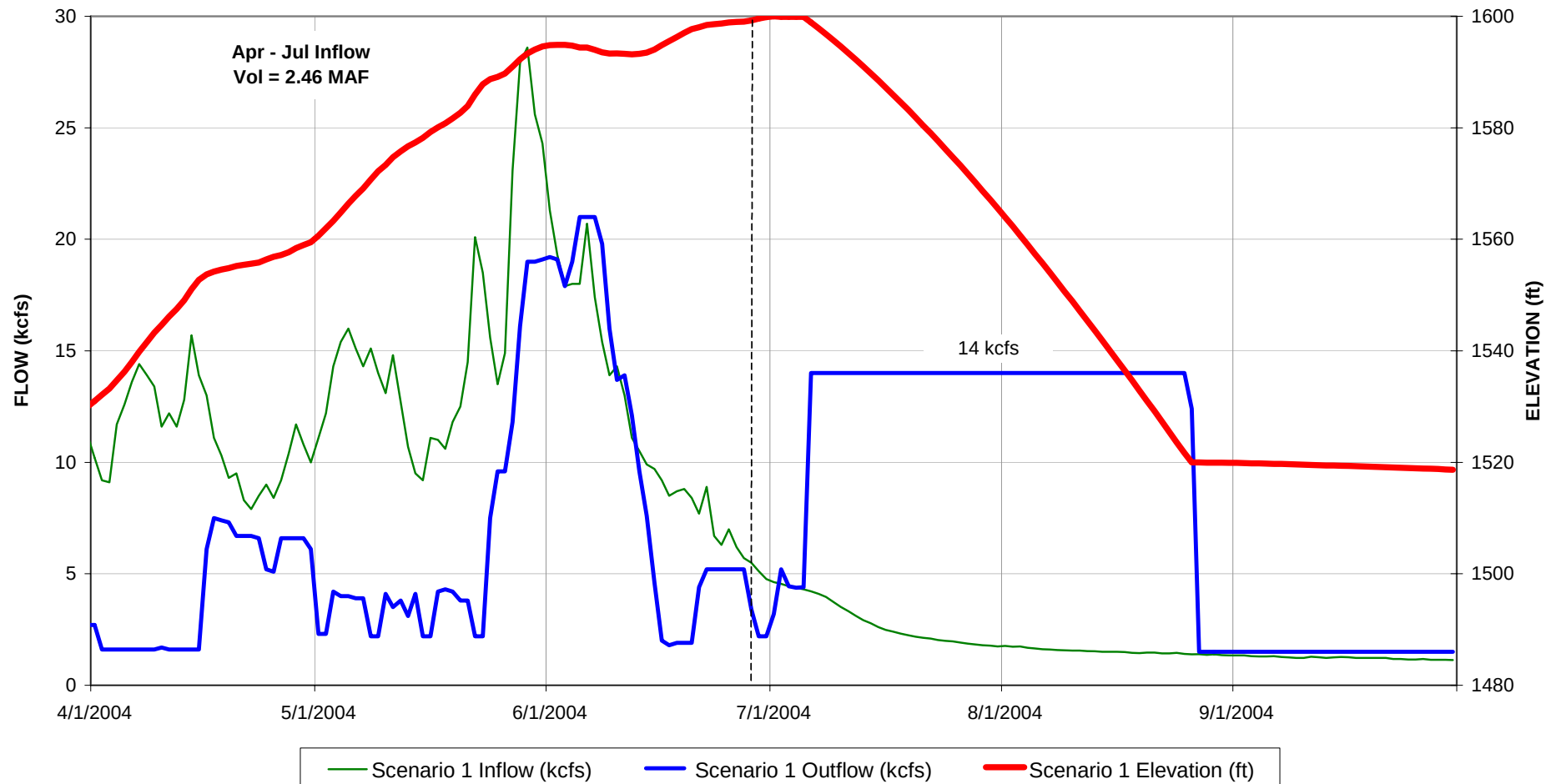
1. Welcome and introductions.
2. Libby operations. (USFWS, MT, COE)
3. Dworshak summer operations.
 - i. [\[Temperature and Flow Modeling \]](#) 
 - ii. [\[Lower Granite Dam \(RM107\) and Ice Harbor Dam \(RM10\) Temperatures \] - Kyle Martin](#) 
 - iii. [\[Dworshak Pool Information \] - Kyle Martin](#) 
 - iv. [\[Clearwater River at Peck \(1979, 1991, 1994 weather\) - Lower Granite Dam \(1979, 1991, 1994 weather\) \] - Kyle Martin](#) 
 - v. [\[Dworshak Outflows and Lower Granite Tailwater Temperatures in June-July \]](#) 
 - vi. [\[Dworshak Tailwater Temperatures in June \]](#) 
 - vii. [\[Changes In Water Temperature Over Time Dworshak Reservoir \]](#) 
 - viii. [\[SOR #2004-16 \]](#) 
4. Zone 6 Treaty fishery - [\[SOR 2004-C6 \]](#)  (CRITFC).
5. Update of The Dalles Spill Outage (COE)
6. Status of Operation
 - a. Reservoirs
 - b. Fish
 - c. Power System
 - d. Water Quality
 - a. Spill Information
 - i. [\[Average Daily Spill \]](#) 
 - ii. [\[Exceedance Type \]](#) 
 - b. Average percent TDG for 12 highest hours - [\[June 2004 \]](#)
7. Other
 - a. Set agenda for next meeting

Questions about the meeting may be referred to Cindy Henriksen at (503) 808-3945, or Rudd Turner at (503) 808-3935, or Cathy Hlebechuk at (503) 808-3942

Temperature Modeling

- Water temperatures in DWR reservoir peak the first week of September – see the DWR temperature profile.
- DWR reservoir cools down in the mid to late September, so the available water temperature drops, making it more difficult to control water release temperatures.
- From July through September, there is a surplus of cool water but a shortage of the right distribution of warm water needed to maintain a set release temperature.
- The “warm” water thermo clines used to control DWR water temperatures are between 1474 and 1564 ft elevation (July 2) and between 1457 and 1499 ft by September 5.
- The flows determine how many different thermal clines can be used at the same time. Low flows (7 kcfs and less) allow only one or two units to operate while high flows allow all three units to operate with the ROs and spillway.

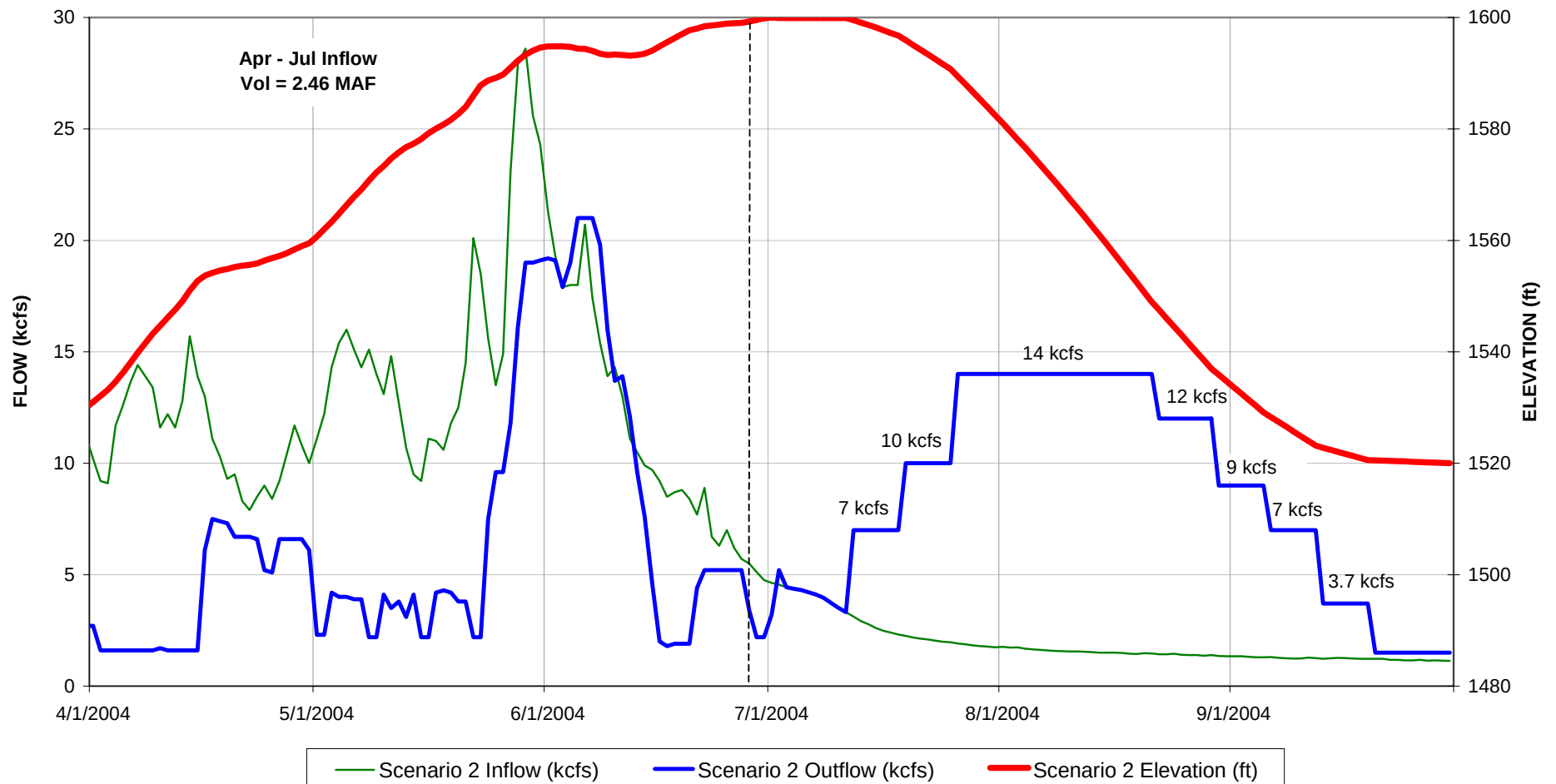
DWORSHAK OPERATION (Scenario 1: BiOp Operation)



BiOp Flow Modeling

- Water temperature of 48°F can be maintained from July 5 until 1520 ft elevation is reached in late August.
- After the reservoir reaches 1520 ft, the needed thermal cline zones are not available. DWR water release temperatures either go above 50 °F or below 42 °F.

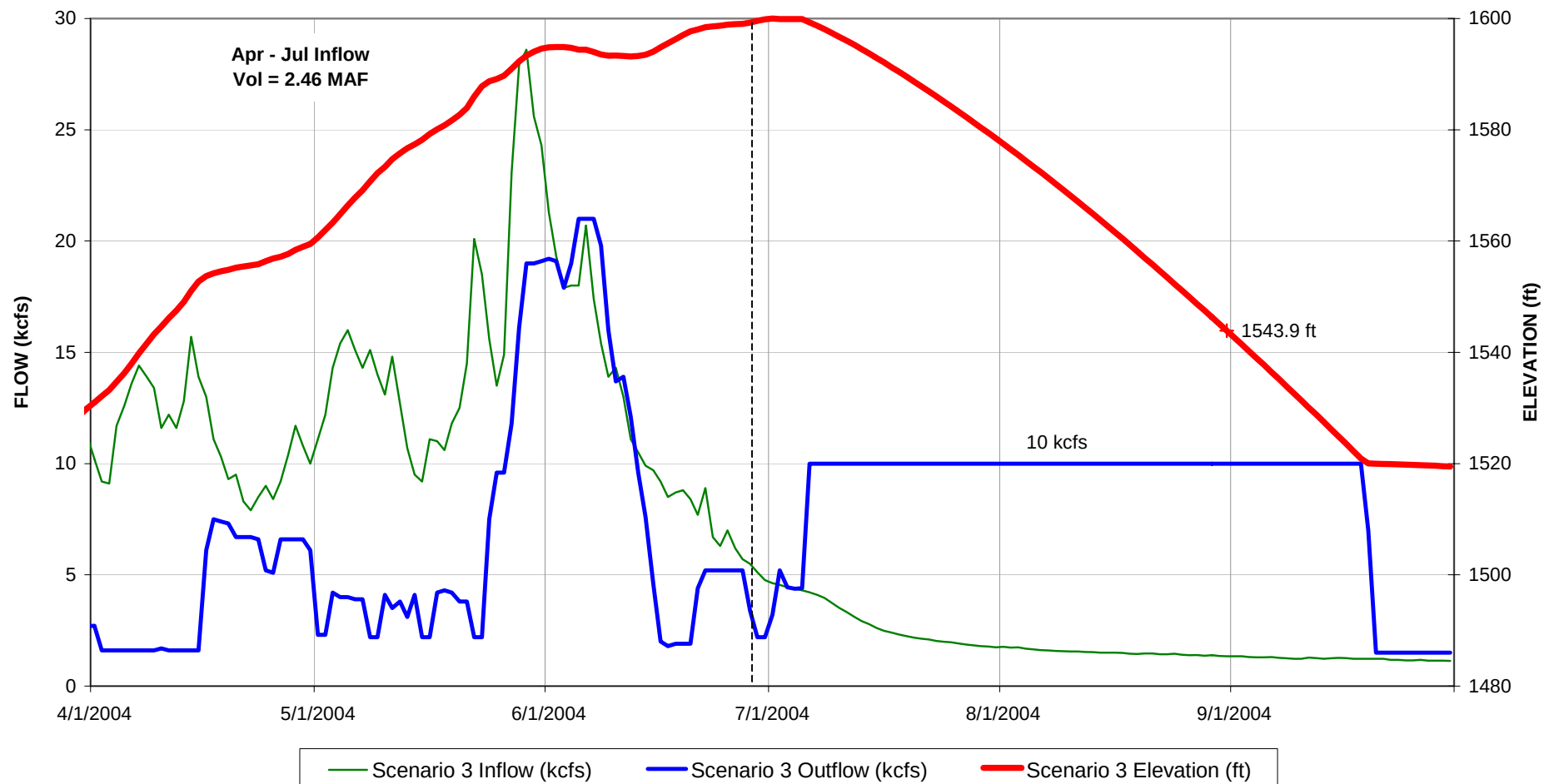
DWORSHAK OPERATION (Scenario 2: Nez Perce Tribe - Idaho Recommendation)



NPT-ID Flow Modeling

- Reserving more water to be released in late August and early September gives the “warm” water in the reservoir more time to get even warmer, providing more “warm” water in the specific thermo clines needed to control DWR release water temperatures.
- Water temperature of 48°F can be maintained until Aug 31.
- At the end of August, the needed thermal cline zones are available to maintain 46 °F for two more weeks into September before the water release temperatures either go above 50 °F or below 42 °F.

DWORSHAK OPERATION
(Scenario 3: Draft to elev 1520 ft using full powerhouse capacity - no spill)



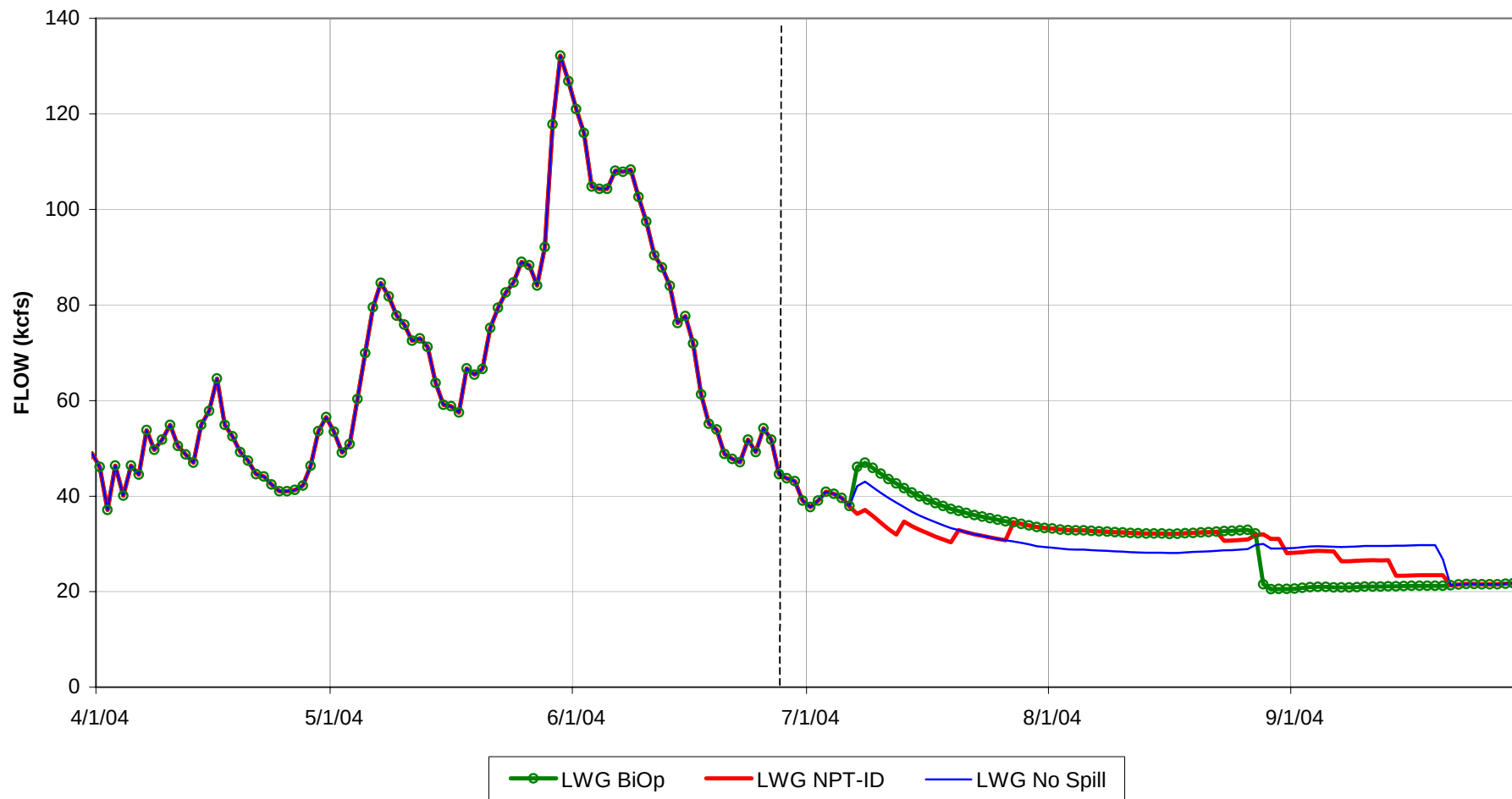
BPA Flow Modeling

- Being able to use the ROs and spillway give more flexibility to control water temperatures for a longer period of time. (5 different water temperature levels vs. three).
- This flow regime was not modeled, but the same comments on the Nez Perce flow modeling applies here: Reserving more water to be released in late August early September gives the “warm” water in the reservoir more time to get even hotter, making more “warm” water available for controlling release water temperatures.

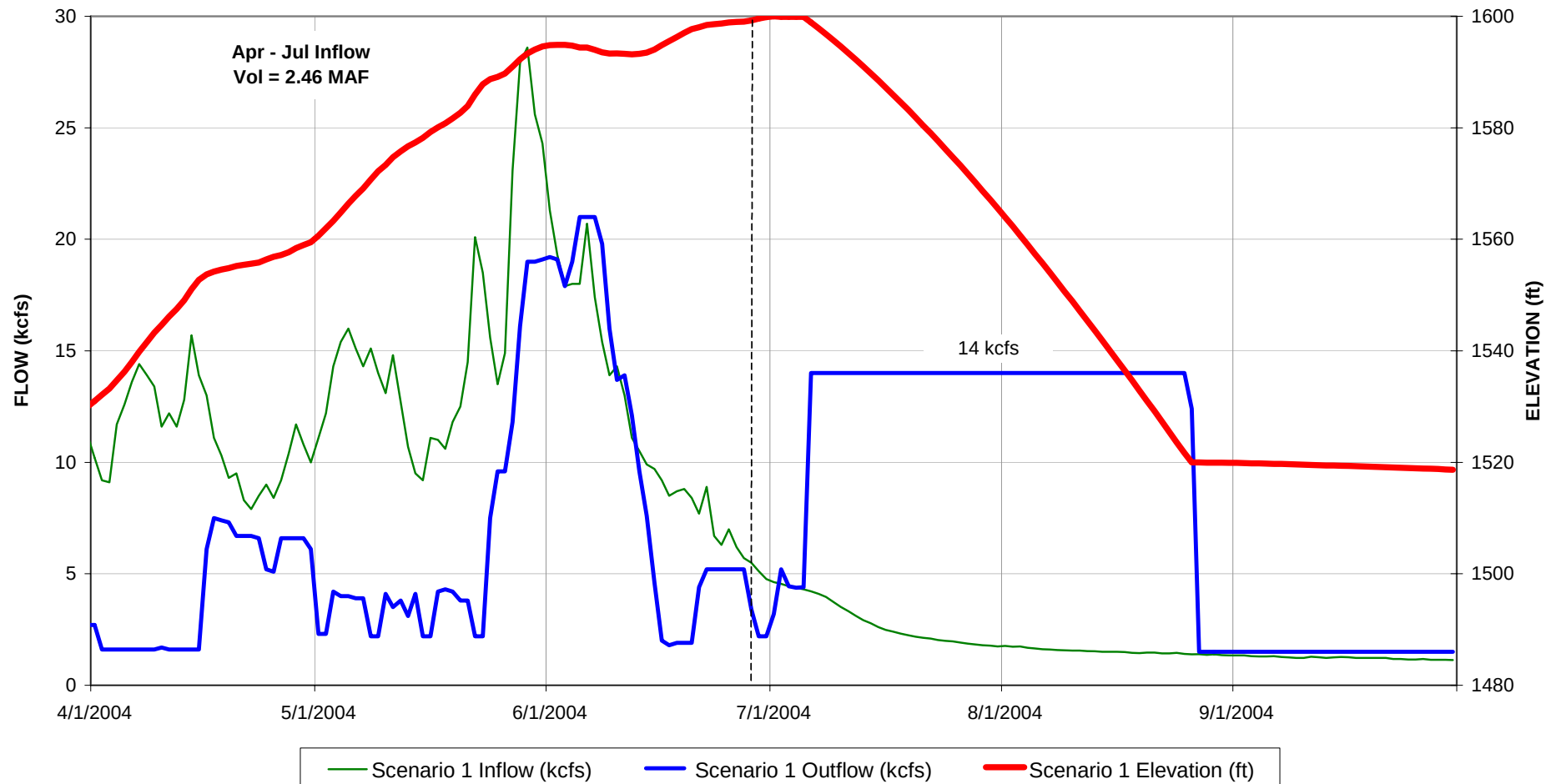
Temperature Modeling

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- The flows determine how many different thermal clines can be used at the same time. Low flows (7 kcfs and less) allow only one or two units to operate while high flows allow all three units to operate with the ROs and spillway.

RESULTANT LOWER GRANITE FLOWS (Based on Dworshak Modeling)



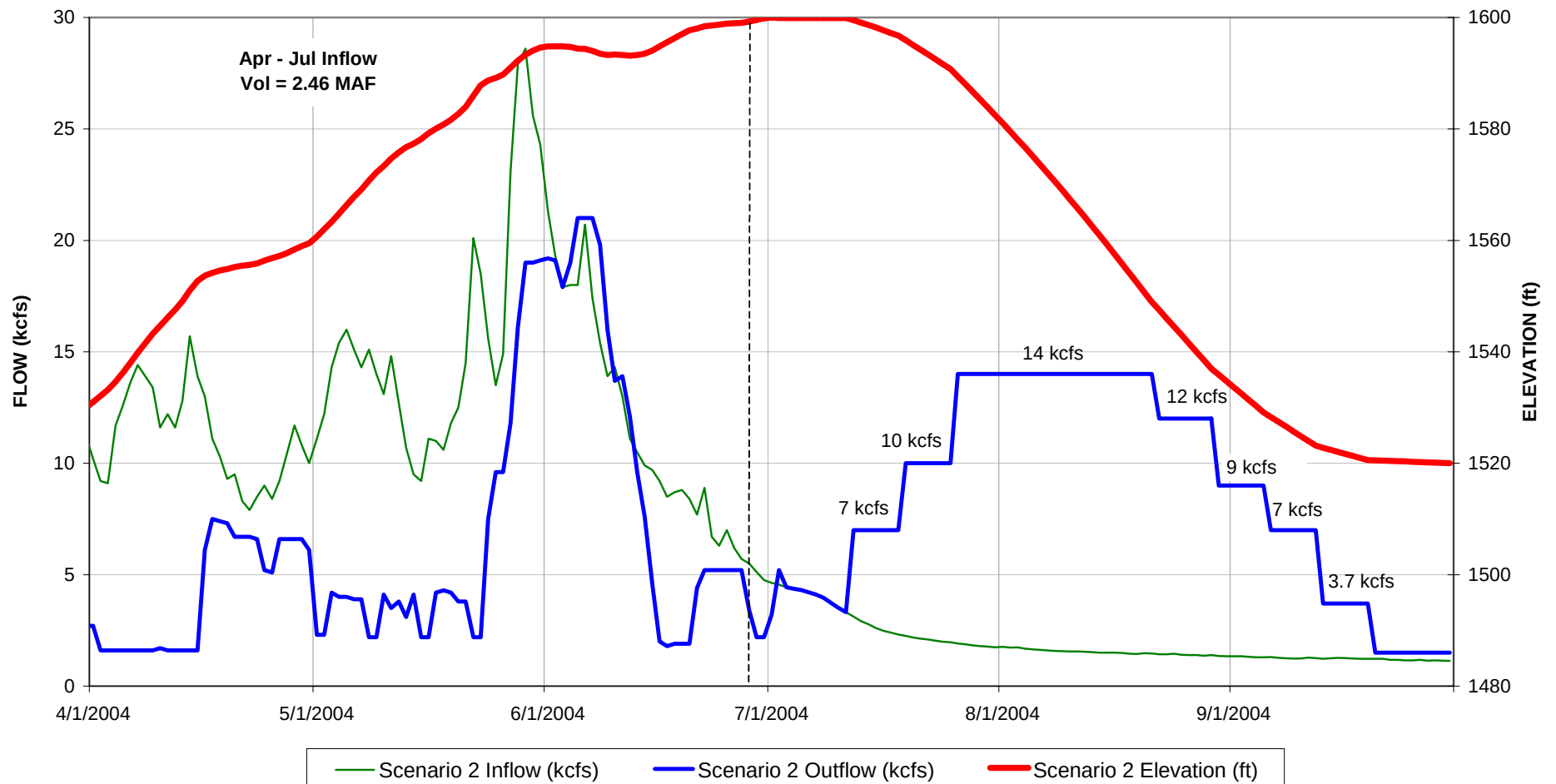
DWORSHAK OPERATION (Scenario 1: BiOp Operation)



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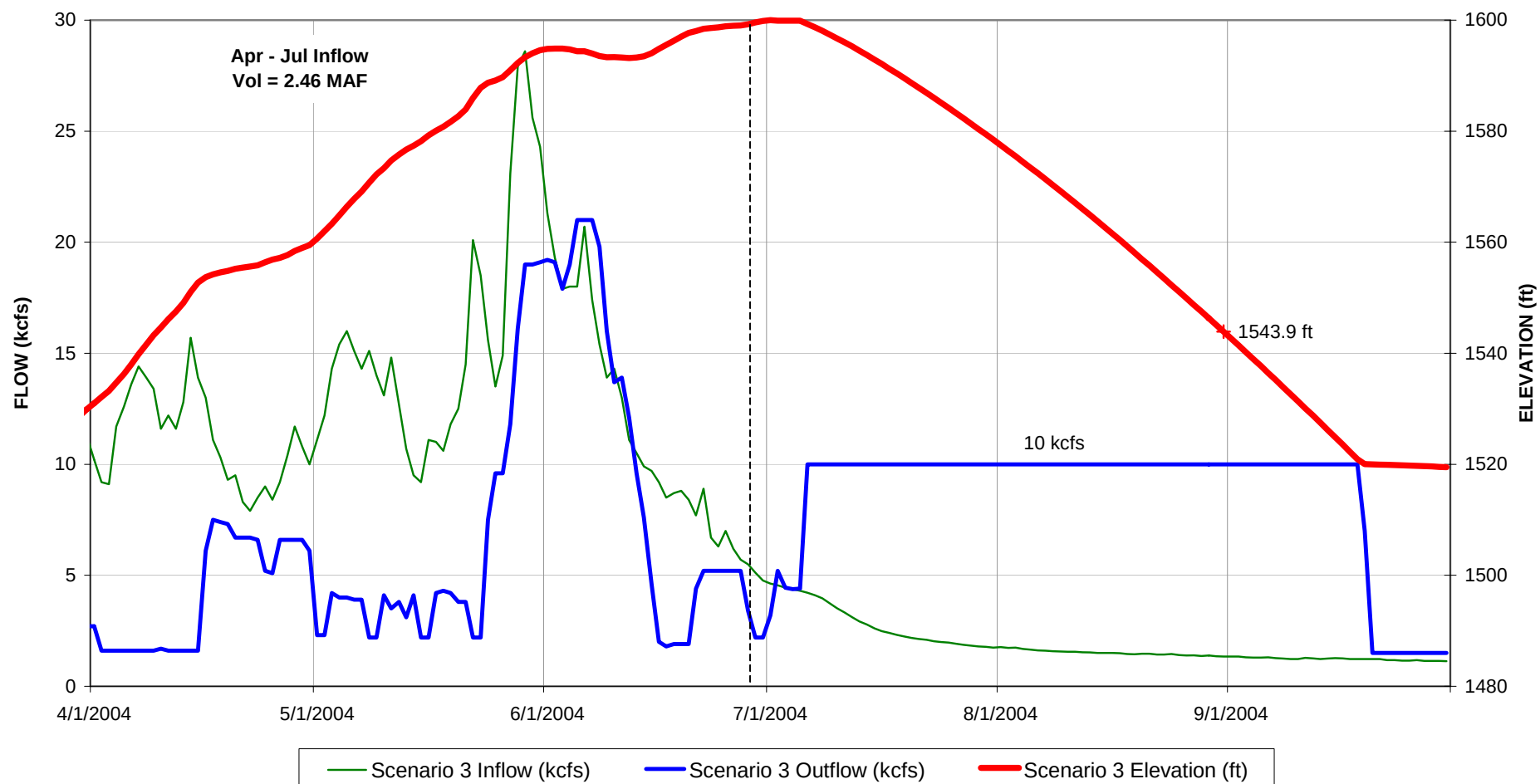
DWORSHAK OPERATION (Scenario 2: Nez Perce Tribe - Idaho Recommendation)



NPT-ID Flow Modeling

- Reserving more water to be released in late August and early September gives the “warm” water in the reservoir more time to get even warmer, providing more “warm” water in the specific thermo clines needed to control DWR release water temperatures.
- Water temperature of 48°F can be maintained until Aug 31.
- At the end of August, the needed thermal cline zones are available to maintain 46 °F for two more weeks into September before the water release temperatures either go above 50 °F or below 42 °F.

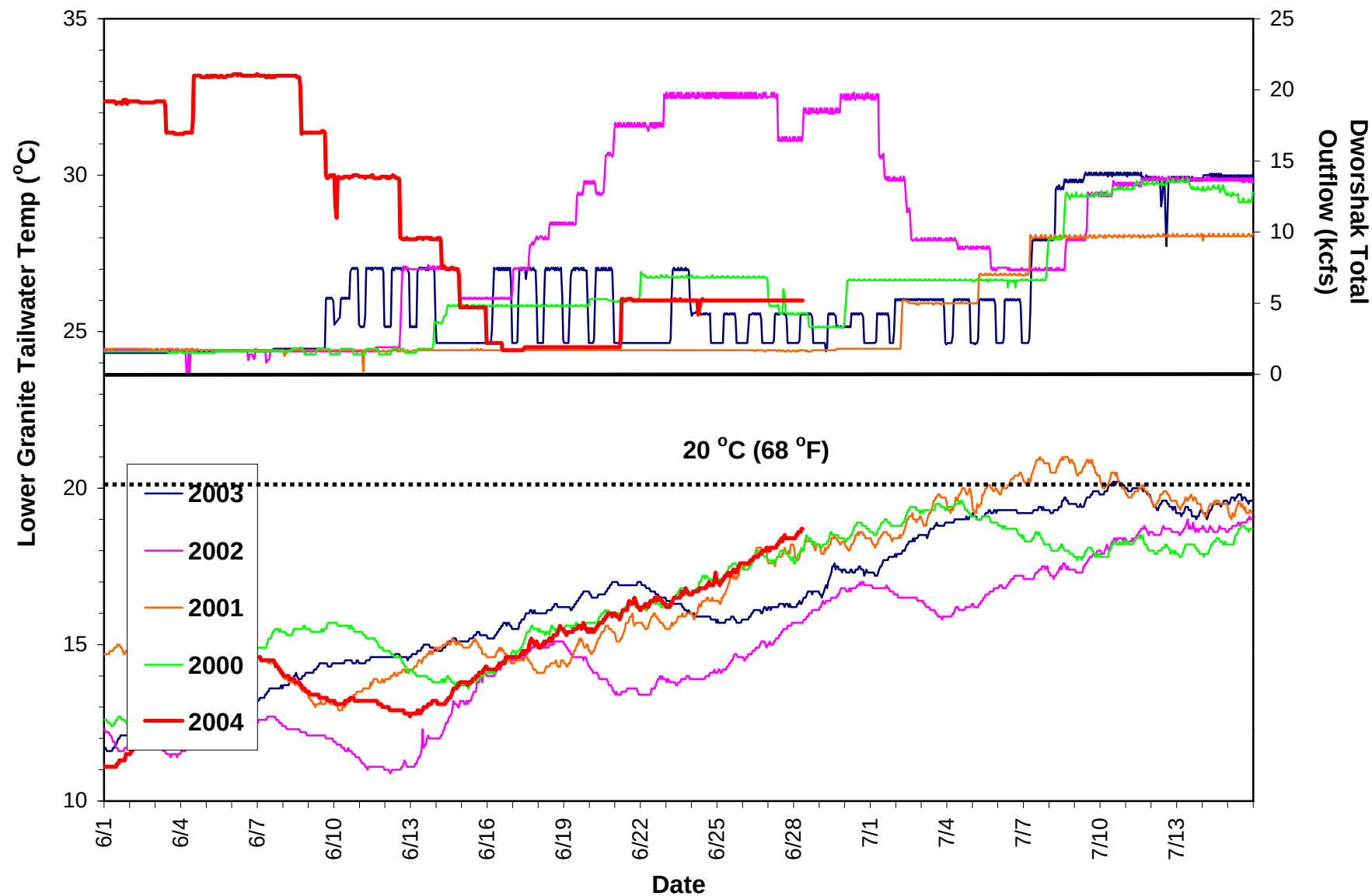
DWORSHAK OPERATION
(Scenario 3: Draft to elev 1520 ft using full powerhouse capacity - no spill)



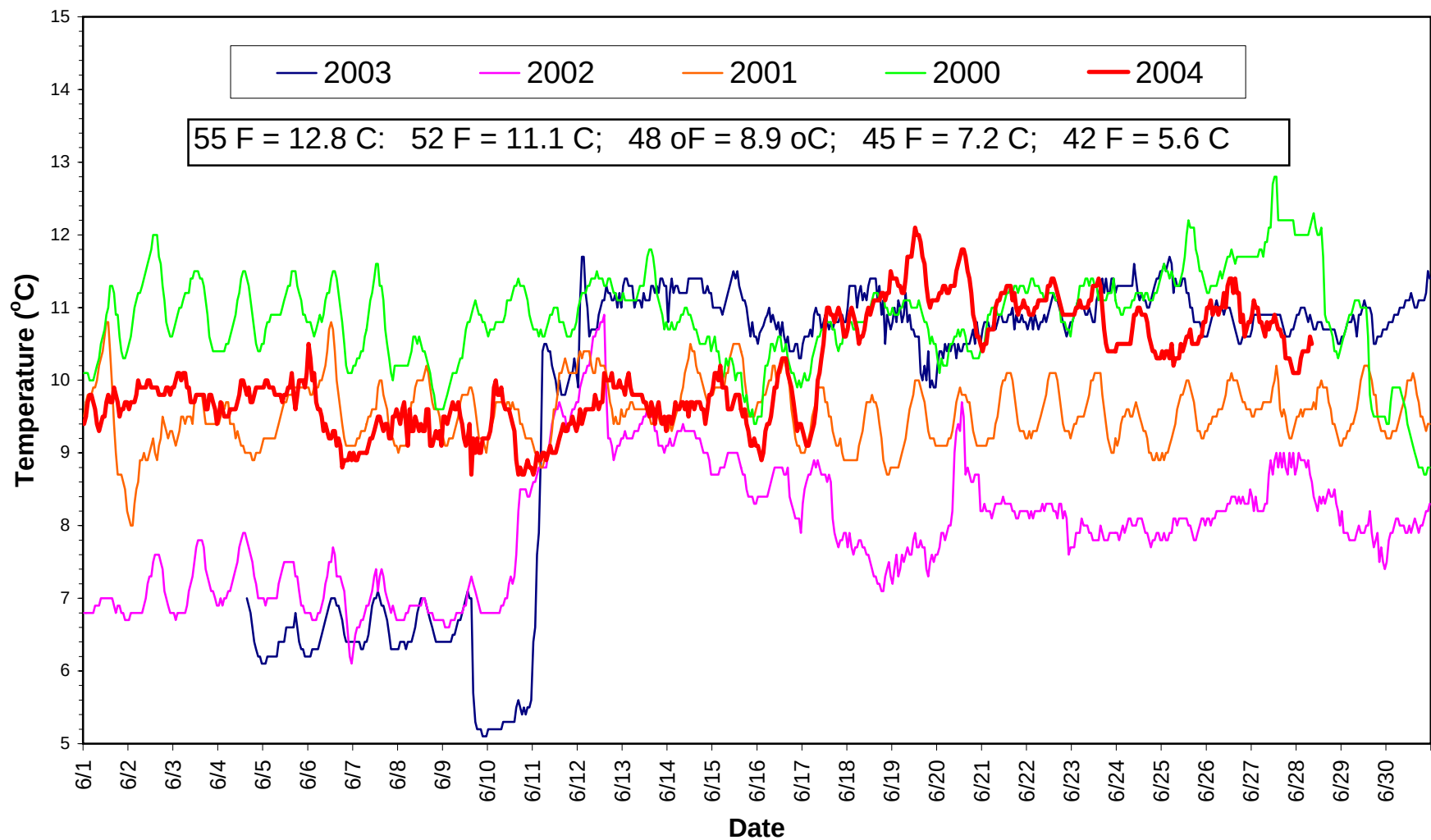
No Spill Modeling

- Being able to use the ROs and spillway give more flexibility to control water temperatures for a longer period of time. (5 different water temperature levels vs. three).
- This flow regime was not modeled, but the same comments on the Nez Perce flow modeling applies here: Reserving more water to be released in late August early September gives the “warm” water in the reservoir more time to get even hotter, making more “warm” water available for controlling release water temperatures.

Dworshak Outflows and Lower Granite Tailwater Temperatures in June-July



Dworshak Tailwater Temperatures in June



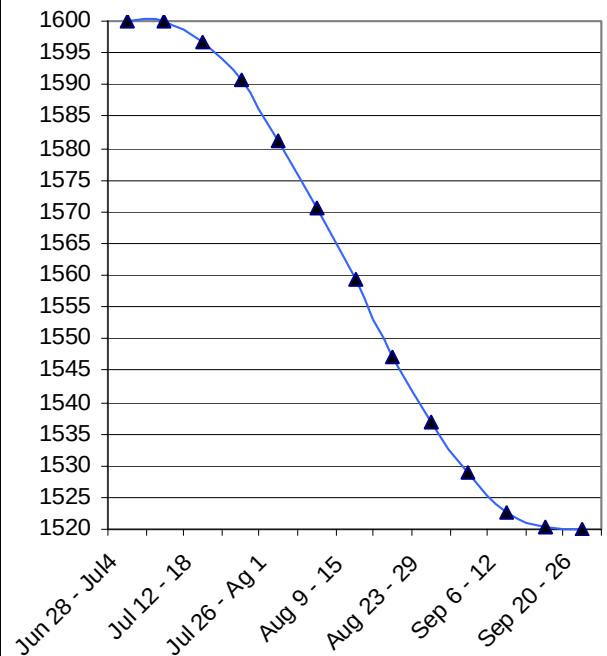
N.F. Clearwater at Dworshak (DWR)

23-Jun-04	Outflow	STP Inflow (6-23-04)	DWR Pool
WY 2004	(NPT-ID)	(NWRFC)	Storage
SUMMER	(kcfs)	(kcfs)	(KaF)
			Elevation
			end-of
			week:
Jun 27th		Forecast:	1600.0
Jun 28 - Jul4	4.8	4.8	2015 1599.9
Jul 5 - 11	3.9	3.9	2014 1599.9
Jul 12 - 18	7.0	2.7	1954 1596.7
Jul 19 - 25	10.0	2.1	1844 1590.7
Jul 26 - Ag 1	14.0	1.8	1675 1581.0
Aug 2 - 8	14.0	1.7	1504 1570.6
Aug 9 - 15	14.0	1.5	1331 1559.2
Aug 16 - 22	14.0	1.5	1157 1547.2
Aug 23 - 29	12.0	1.4	1010 1536.7
Ag30-Sep 5	9.0	1.3	903 1528.8
Sep 6 - 12	7.0	1.3	823 1522.8
Sep 13 - 19	3.7	1.2	789 1520.3
Sep 20 - 26	1.4	1.2	786 1520.0
Total (KaF):	1,594	365	

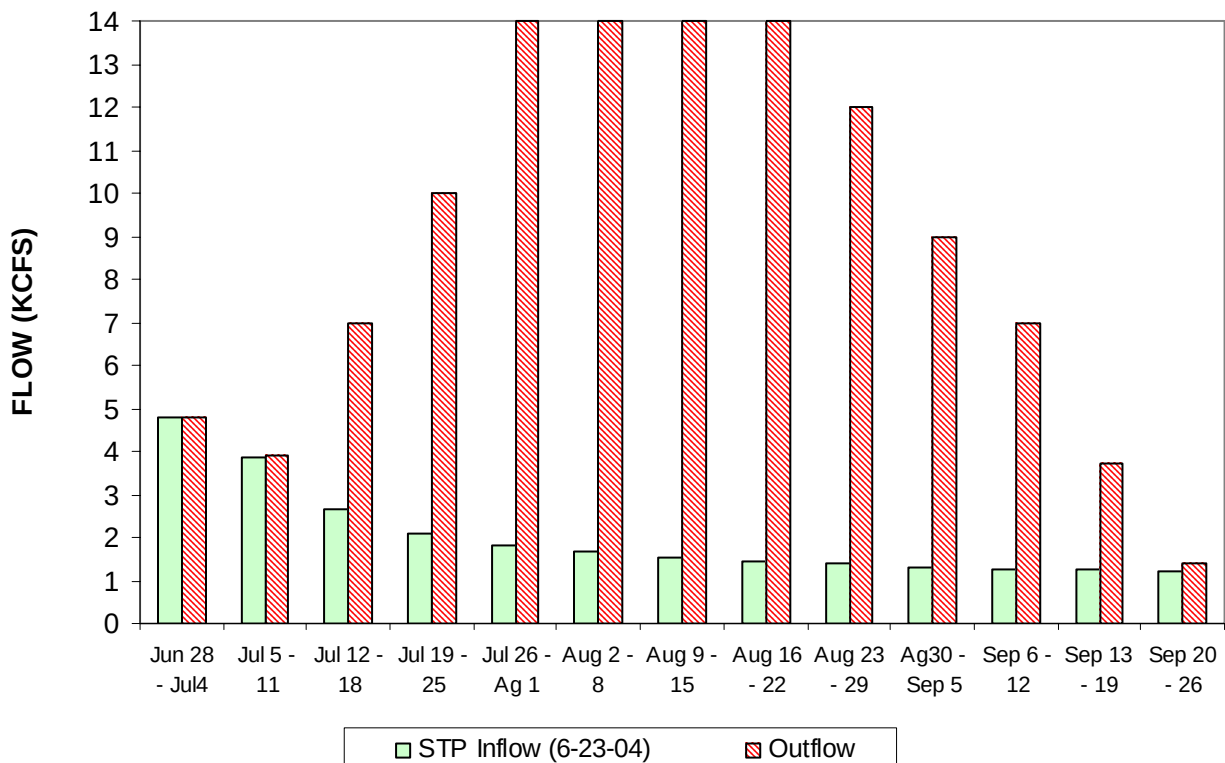
CRITFC Hydro Program

NPT-ID Plan

DWORSHAK POOL ELEVATIONS



DWORSHAK SEASONAL FLOWS: NEZ PERCE TRIBE-ID PLAN



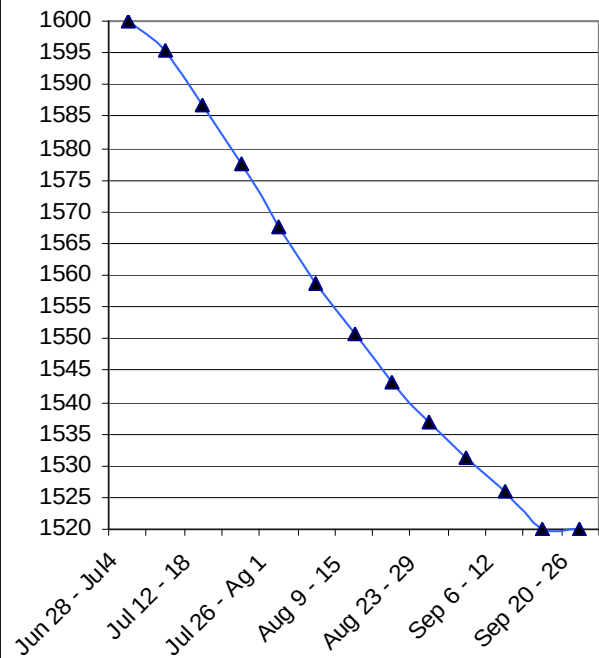
N.F. Clearwater at Dworshak (DWR)

23-Jun-04	Outflow	STP Inflow (6-23-04)	DWR Pool
WY 2004	TMT-2003	(NWRFC)	Storage
SUMMER	(kcfs)	(kcfs)	(KaF)
			Elevation
			(feet)
			end-of
			week:
Jun 27th		Forecast:	1600.0
Jun 28 - Jul4	4.8	4.8	2015 1599.9
Jul 5 - 11	10.0	3.9	1930 1595.3
Jul 12 - 18	13.9	2.7	1774 1586.7
Jul 19 - 25	13.5	2.1	1615 1577.4
Jul 26 - Ag 1	13.0	1.8	1460 1567.7
Aug 2 - 8	11.5	1.7	1323 1558.7
Aug 9 - 15	10.0	1.5	1206 1550.6
Aug 16 - 22	9.0	1.5	1101 1543.2
Aug 23 - 29	8.0	1.4	1010 1536.7
Ag30-Sep 5	6.6	1.3	936 1531.3
Sep 6 - 12	6.6	1.3	862 1525.8
Sep 13 - 19	6.6	1.2	788 1520.1
Sep 20 - 26	1.3	1.2	786 1520.0
Total (KaF):	1,594	365	

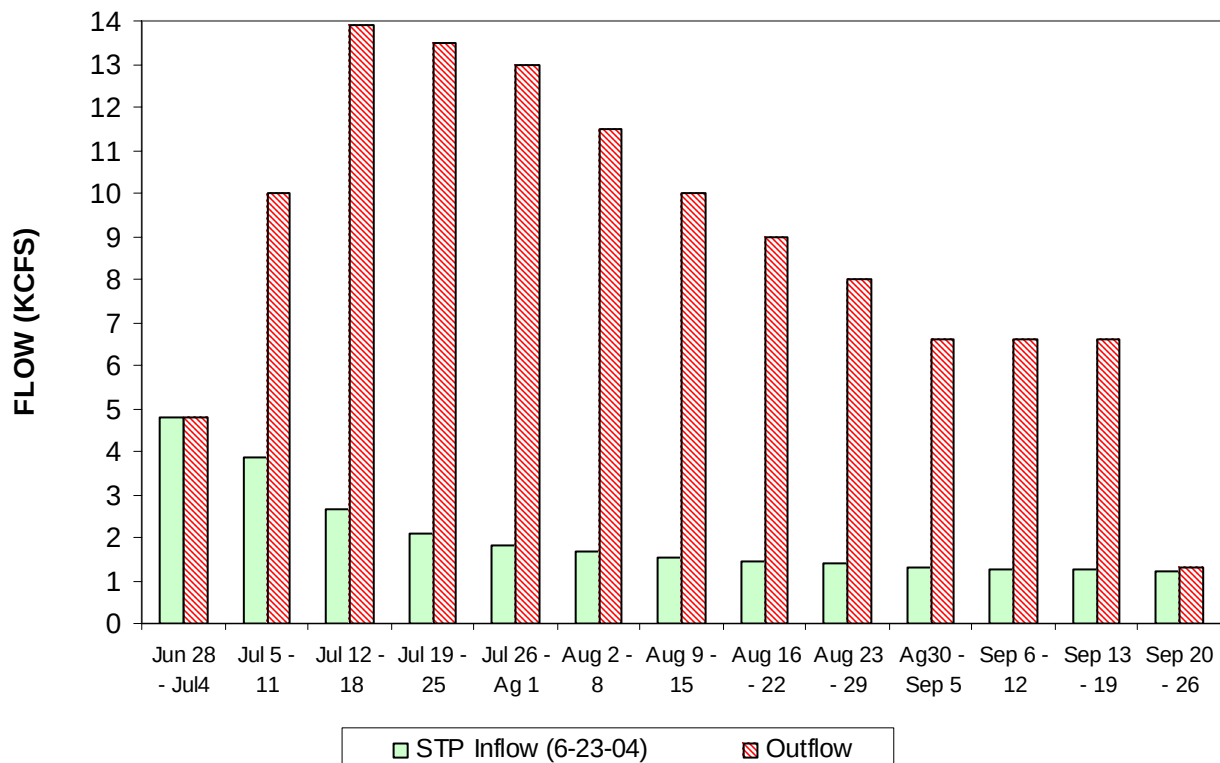
CRITFC Hydro Program

TMT-2003 Plan

DWORSHAK POOL ELEVATIONS



DWORSHAK SEASONAL FLOWS: TMT-2003 PLAN



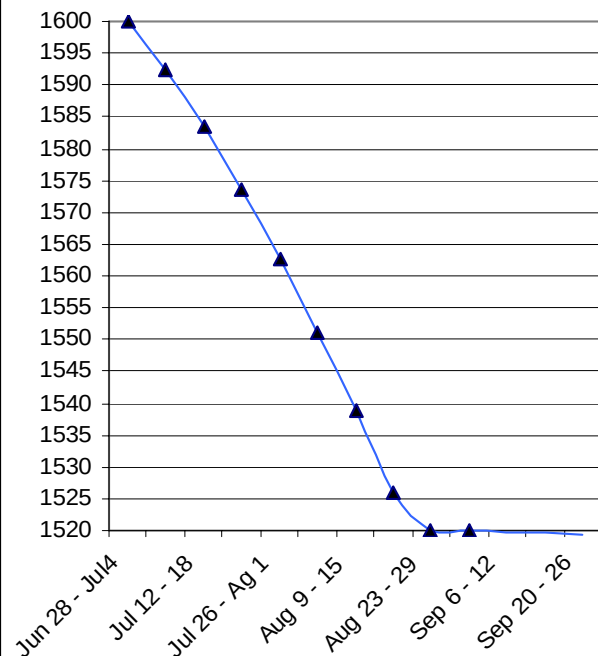
N.F. Clearwater at Dworshak (DWR)

23-Jun-04	Outflow	STP Inflow (6-23-04)	DWR Pool
WY 2004	(NMFS)	(NWRFC)	Storage
SUMMER	(kcfs)	(kcfs)	(KaF)
			Elevation
			(feet)
			end-of
			week:
Jun 27th		Forecast:	1600.0
Jun 28 - Jul4	4.8	4.8	2015
Jul 5 - 11	14.0	3.9	1874
Jul 12 - 18	14.0	2.7	1717
Jul 19 - 25	14.0	2.1	1551
Jul 26 - Ag 1	14.0	1.8	1382
Aug 2 - 8	14.0	1.7	1211
Aug 9 - 15	14.0	1.5	1038
Aug 16 - 22	14.0	1.5	864
Aug 23 - 29	7.0	1.4	786
Ag30 - Sep 5	1.4	1.3	785
Sep 6 - 12	1.4	1.3	783
Sep 13 - 19	1.4	1.2	781
Sep 20 - 26	1.4	1.2	778
Total (KaF):	1,602	365	

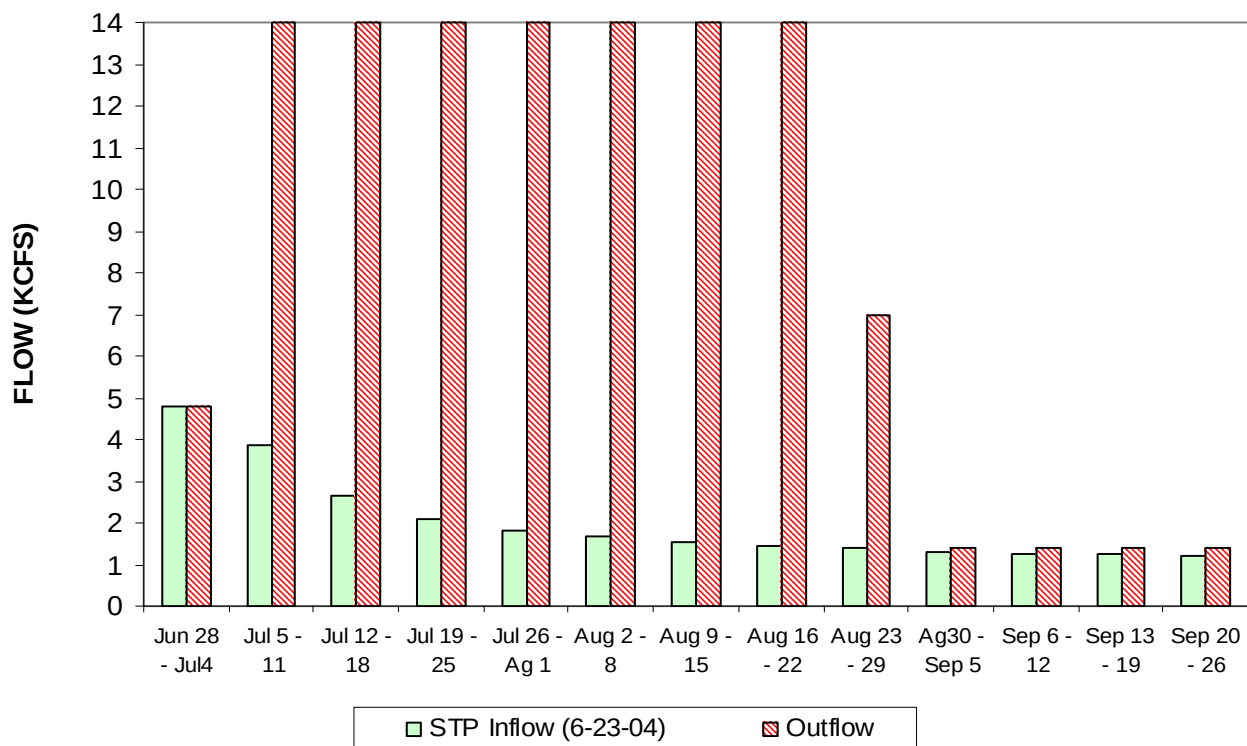
CRITFC Hydro Program

Biological Opinion

DWORSHAK POOL ELEVATIONS



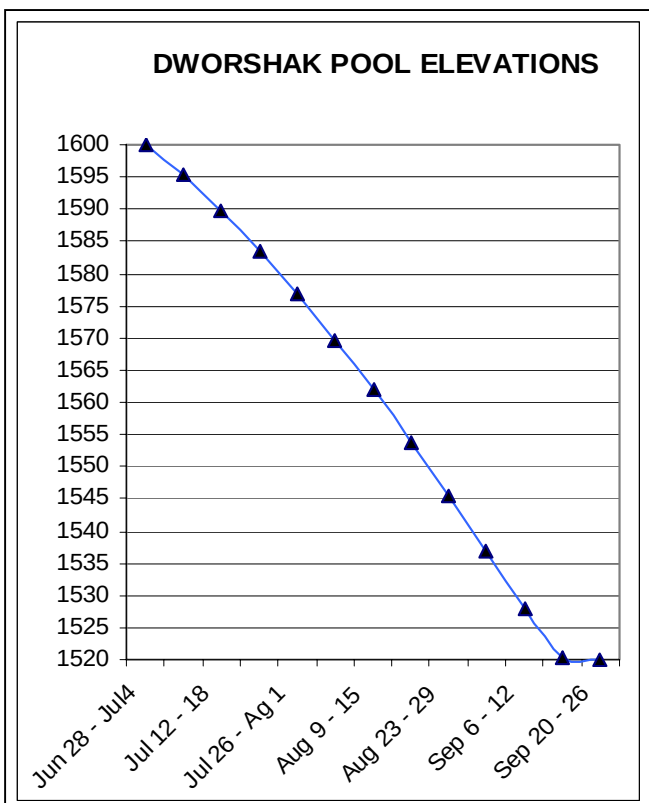
DWORSHAK SEASONAL FLOWS: 2000 BIOLOGICAL OPINION



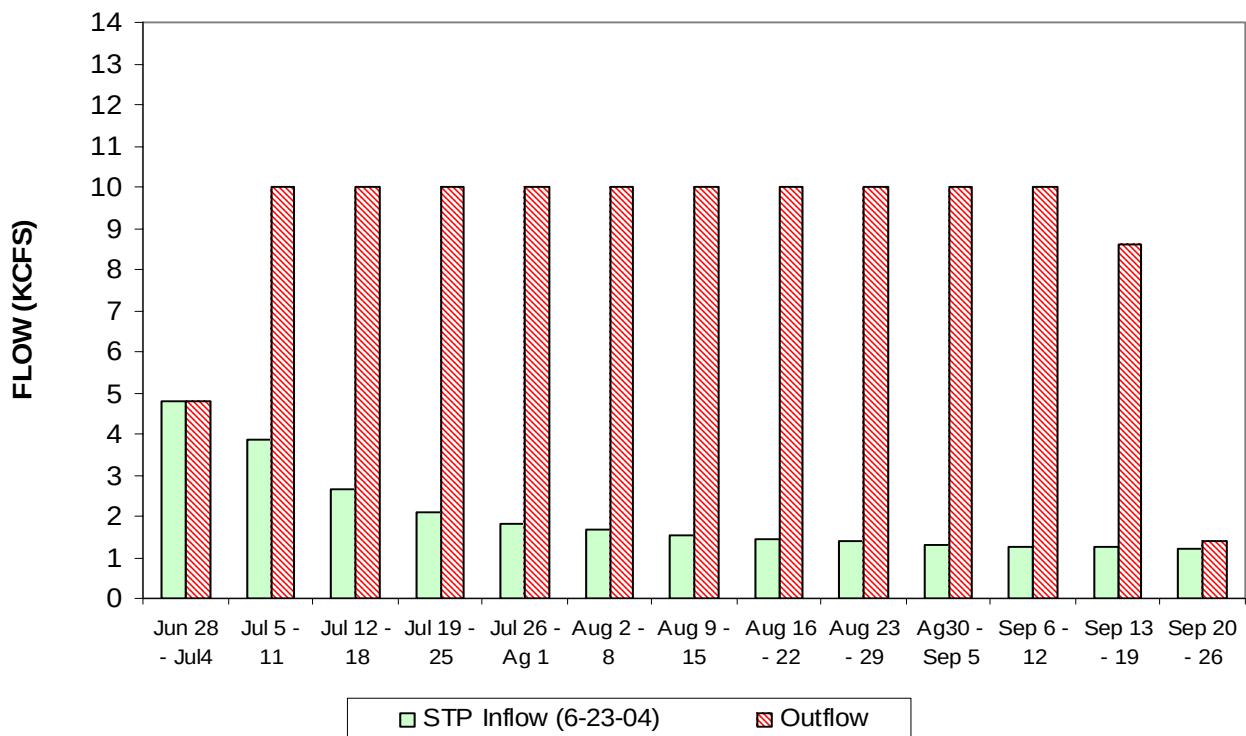
23-Jun-04 WY 2004 SUMMER	Outflow BPA (kcfs)	STP Inflow (6-23-04) (NWRFC) (kcfs)	DWR Pool Storage (KaF)	Elevation (feet) end-of- week:
Jun 27th		Forecast:		1600.0
Jun 28 - Jul4	4.8	4.8	2015	1599.9
Jul 5 - 11	10.0	3.9	1930	1595.3
Jul 12 - 18	10.0	2.7	1828	1589.8
Jul 19 - 25	10.0	2.1	1718	1583.5
Jul 26 - Ag 1	10.0	1.8	1604	1576.7
Aug 2 - 8	10.0	1.7	1489	1569.6
Aug 9 - 15	10.0	1.5	1371	1561.9
Aug 16 - 22	10.0	1.5	1253	1553.8
Aug 23 - 29	10.0	1.4	1133	1545.5
Ag30-Sep 5	10.0	1.3	1013	1536.9
Sep 6 - 12	10.0	1.3	891	1528.0
Sep 13 - 19	8.6	1.2	789	1520.3
Sep 20 - 26	1.4	1.2	786	1520.0
Total (KaF):	1,594	365		

CRITFC Hydro Program

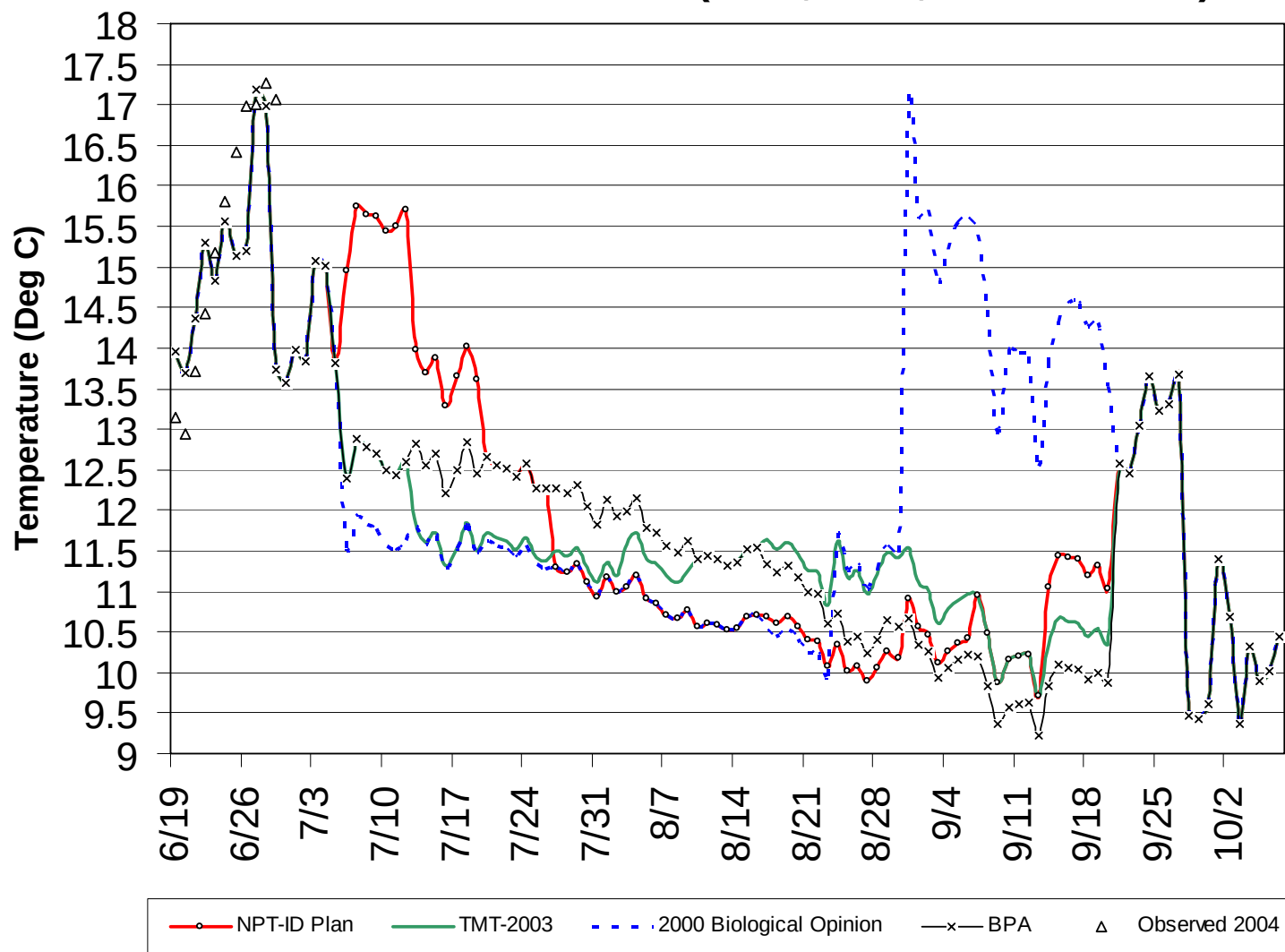
BPA Plan



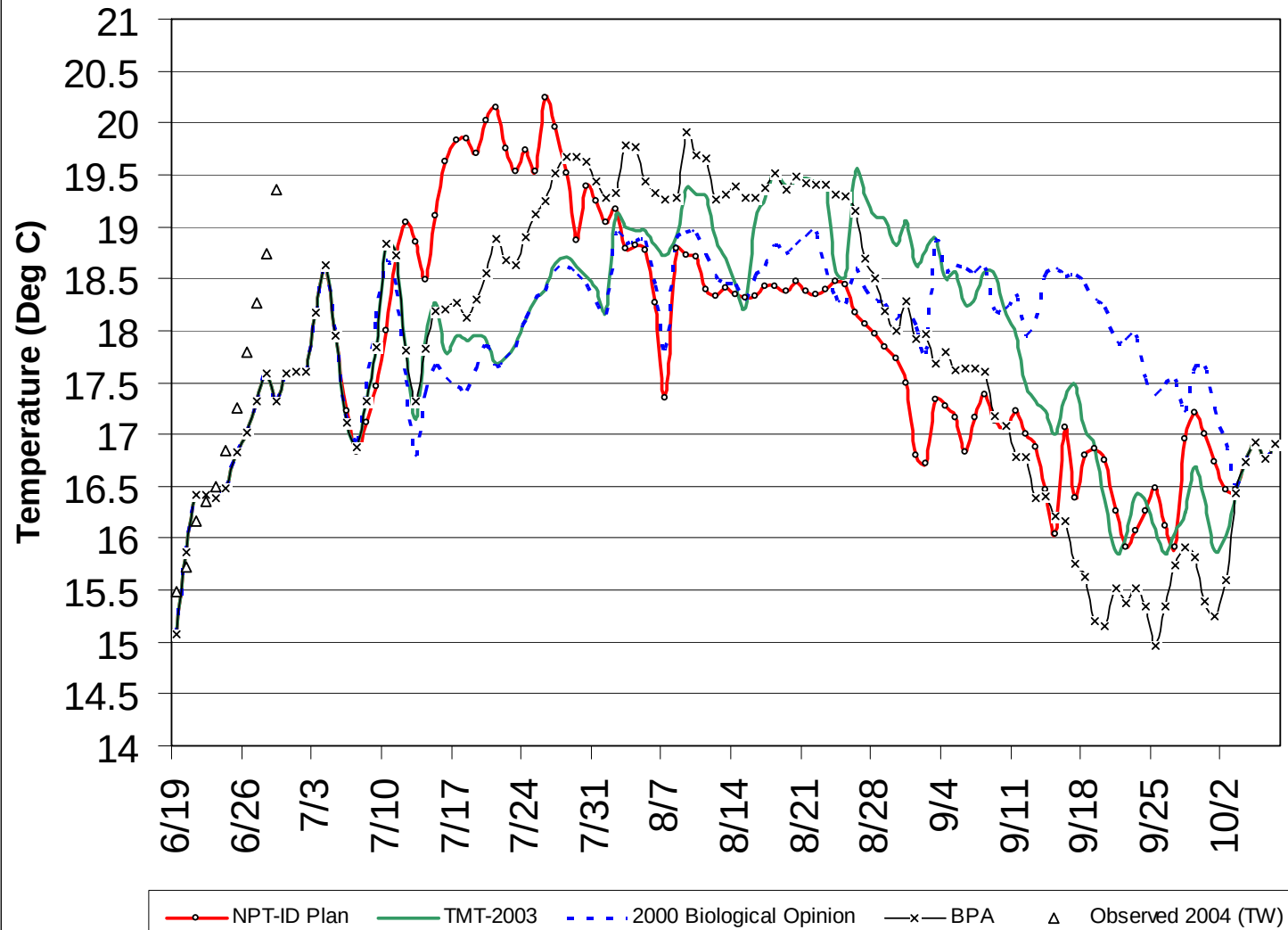
DWORSHAK SEASONAL FLOWS: BPA PLAN



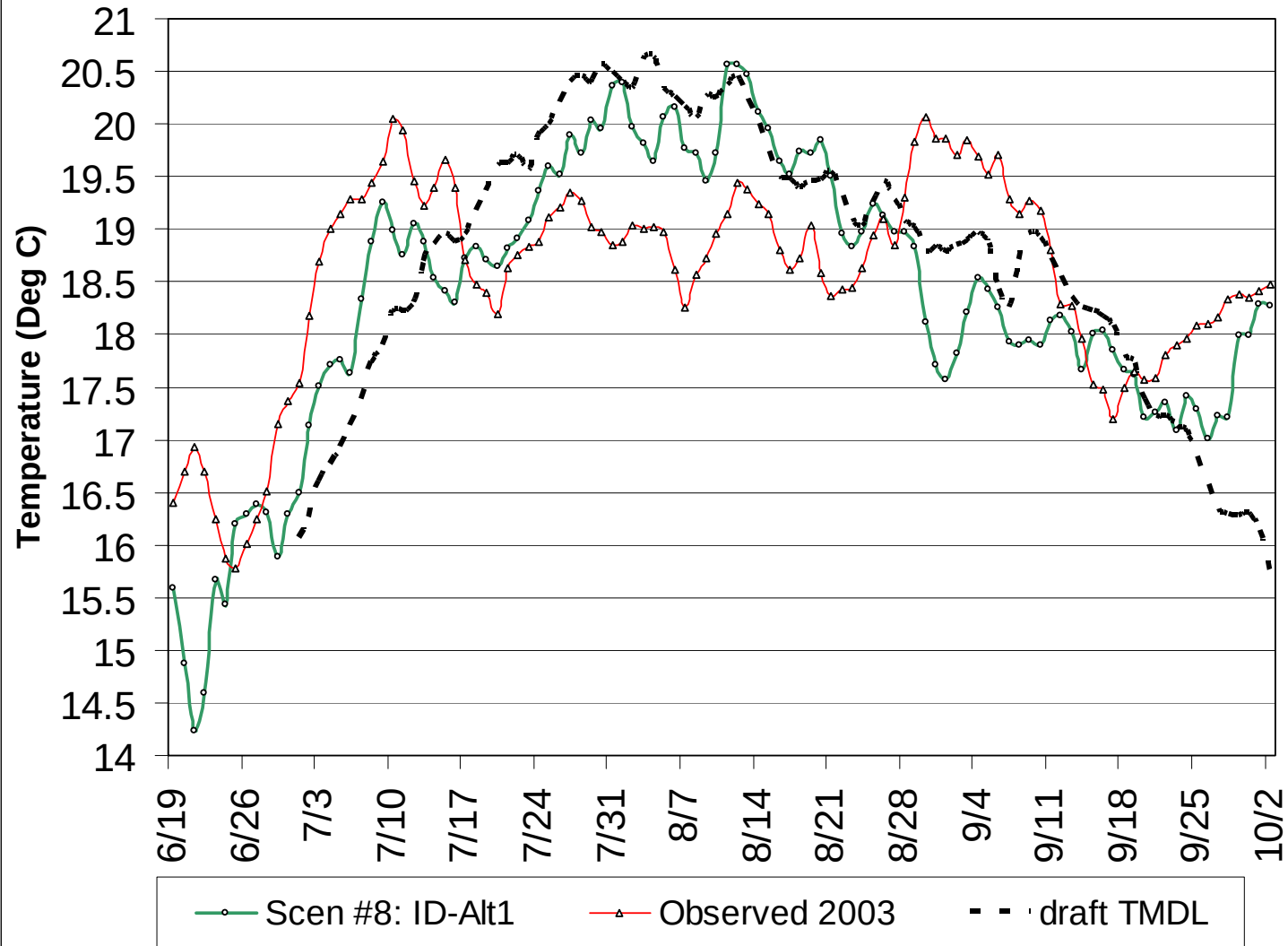
Clearwater River at Peck (1979, 1991, 1994 weather)



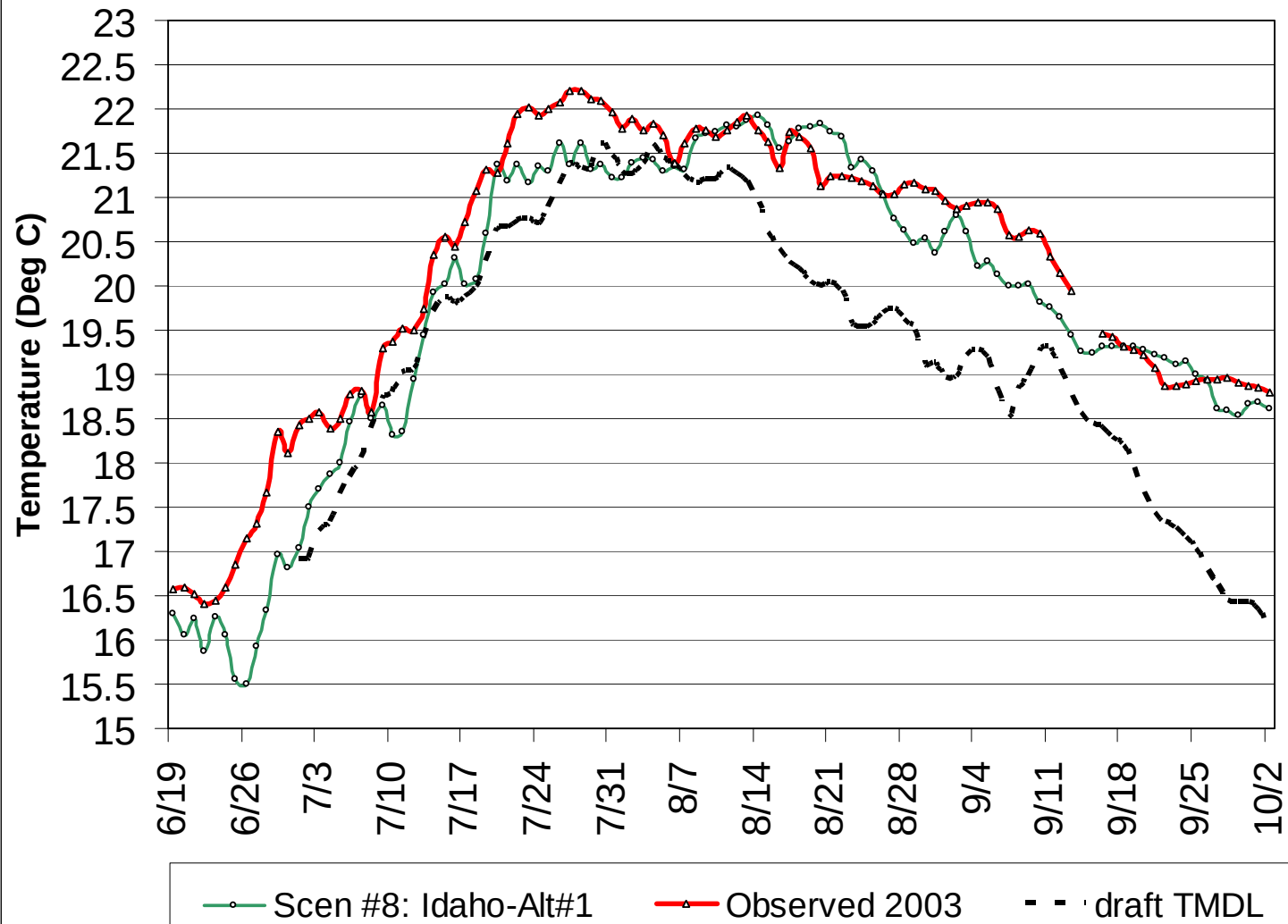
Lower Granite Dam (1979, 1991, 1994 weather)



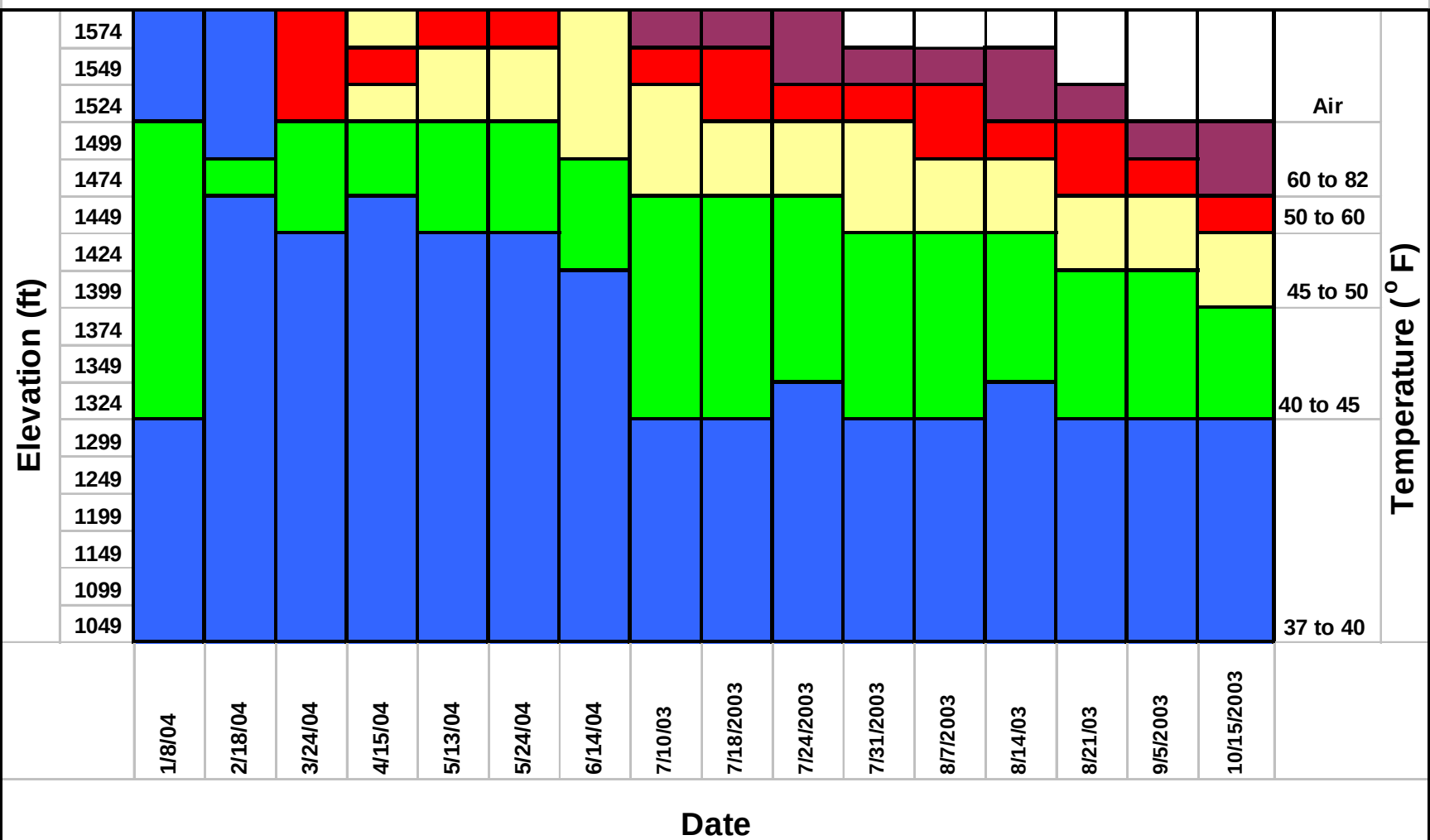
Lower Granite Dam (RM107)



Ice Harbor Dam (RM10)



CHANGES IN WATER TEMPERATURE OVER TIME	
DWORSHAK RESERVOIR	



**TECHNICAL MANAGEMENT TEAM
MEETING NOTES
June 30, 2004
CORPS OF ENGINEERS NORTHWESTERN DIVISION OFFICES – CUSTOM
HOUSE
PORTLAND, OREGON**

FACILITATOR’S SUMMARY NOTES ON FUTURE ACTIONS

Facilitator: Robin Harkless

The following notes are a summary of issues that are intended to point out future actions or issues that may need further discussion at upcoming meetings. These notes are not intended to be the “record” of the meeting, only a reminder for TMT members.

Libby Operations:

Cindy Henriksen, COE, reported that outflows at Libby decreased from 16 kcfs to 12.5 kcfs, per discussions at last week’s TMT meeting. Libby is now above elevation 2445’.

Dworshak:

In response to discussions last week, the COE provided a graph of the quantity of cold water available through the summer from Dworshak. The graph suggests that there should be a sufficient amount of cold water this year. TMT members looked at other graphs provided by the COE and CRITFC – all can be found as attachments to today’s agenda. The COE noted that using more generating units provides more flexibility and control of temperatures because water can be drawn from different strata. CRITFC provided a graph of observed 2003 average temperatures and effects on modeling, per a request from Montana. Current temperatures at Lower Granite are higher than previously expected, roughly 19° C.

SOR 2004-16:

The salmon managers put together SOR 2004-16 based on data from CRITFC, Dworshak elevations, temperatures, forecasts, operations from previous years, etc. The salmon managers requested the following operation: ramp Dworshak up from 6.8 to 7.2 kcfs this afternoon (6/30) and hold through 7/5. Then, ramp the project up to 10 kcfs through 7/7 and discuss operations at the next TMT meeting. The request put forth was intended to strike a balance between the needs of everyone in the region.

Dave Statler, Nez Perce, reported that fall chinook are currently rearing: 766 wild and 86 yearlings have been observed in the lower Clearwater. Paul Wagner, NOAA, clarified that the use of “BiOp” operations in the graphs and discussions is intended as a ‘bookend’.

The COE acknowledged that many agencies signed on to the SOR, and agreed to do their best to get to 45°. In the future, the COE would prefer more notice to plan and coordinate the operation. BPA also agreed to the request, and also prefers more notice from the salmon managers.

ACTION: The salmon managers are hoping to craft a longer term request for Dworshak operations next week, and will try to give more heads up if expecting a change on July 7th. In the meantime, the COE will plan to hold the project at full powerhouse (~10 kcfs – it was clarified that full powerhouse is slightly less than 10 kcfs, as written in the SOR), and will hold this operation through Friday, 7/9 (instead of 7/7). The salmon managers present at today's meeting agreed to this.

SOR 2004 – C6:

CRITFC requested the following operations to accommodate a treaty fishery from June 30th at 6am through July 2nd at 6pm: Hold the pools at Bonneville, The Dalles and John Day within one foot of full. 103,000 adult Chinook and 115,000 sockeye total numbers are estimated, so there are good harvest opportunities for the tribes at this time. The net locations are as follows: 34% at Bonneville; 23% at The Dalles; and 43% at John Day.

ACTION:

The COE issued a teletype to BPA to operate a 1.5' range at Bonneville as a hard constraint. The Dalles will operate to meet power needs but generally does not fluctuate. John Day will operate at a 1.5' range, from 262.5-264.

The Dalles Spill:

Divers, during a four-hour outage at The Dalles, found some erosion but not enough to raise concerns for the integrity of the spill apron. So, the conference call scheduled to follow-up on this issue on Monday, 6/28, was cancelled. The COE will continue with current operations at The Dalles.

System Status:

Reservoirs: Libby inflows are just above 23 kcfs and dropping; Hungry Horse is at elevation 3559.75', at full elevation. 5.7 kcfs will be released through the weekend, and then outflows will lower to 5.3 kcfs. Grand Coulee is at elevation 1286.7' and releasing 14.6 kcfs. Milner will release 1500 cfs on July 9th for flow augmentation. Total volumes for August will be known on July 1st. A Brownlee agreement has been reached between Idaho Power and BPA. 100 total kaf will be provided in July as mitigation for curtailed spill.

Fish status: Subyearlings are passing Lower Granite at a steady rate of over 20,000. Numbers are higher at Lower Granite than previous years. A very large number of Hanford Reach production subyearlings are passing McNary, about 500,000/day. 59,000 adult chinook have been observed since June 1st, which is similar to previous years.

Water quality: Laura Hamilton, COE, reported that exceedances at McNary have been temperature-related. Additional water quality information can be found on the TMT web page as attachments to the agenda(s).

Next Meeting, July 7, 9:00 am:

Agenda Items:

- Dworshak operations
- Zone Six Treaty Fishery

1. Greeting and Introductions

The June 30 Technical Management Team meeting was chaired by Cindy Henriksen of the Corps and facilitated by Robin Harkless. The following is a distillation, not a verbatim transcript, of items discussed at the meeting and actions taken. Anyone with questions or comments about these minutes should call Henriksen at 503/808-3945.

2. Libby Operations.

Henriksen said Libby outflow was reduced from 16 Kcfs to 12.5 Kcfs on Sunday night, June 26. The reservoir is at about elevation 2445 feet, currently, and filling very slowly.

3. Dworshak Summer Operations.

Henriksen reviewed the most recent Corps analysis of the volume of cold water available from Dworshak this summer; this information is available via hotlink from today's agenda on the TMT homepage. She said the Corps had modeled three scenarios; under the first, Dworshak would reach elevation 1520 by August 31; under the second, Dworshak would not reach elevation 1520 until September 15; under the third, Dworshak would release a flat 10 Kcfs from the first week in July through the end of September (no spill operation) and reach elevation 1520 by the third week in September. Under the first (BiOp) scenario, Dworshak would release 14 Kcfs from July 5 through August 31; under the second (NPT/Idaho Plan), Dworshak would gradually ramp up to 14 Kcfs through the last week in July, hold that flow volume through the third week in August, then gradually ramp down to 3.7 Kcfs by the second week in September.

Under both scenarios, the Corps anticipates that an outflow water temperature of 46-48 degrees can be maintained for the duration of the operation. Henriksen noted that, the more generating units that are being operated at Dworshak, the greater the ability to control outflow temperature at the project. The group devoted a few minutes of discussion to the logistics of controlling outflow temperature from Dworshak.

The discussion then moved on to the modeled water temperature impacts of the three Dworshak operational scenarios. Kyle Martin said that, according to his analysis, the Nez Perce/Idaho plan would result in somewhat higher water temperatures early in the season and lower water temperatures through August and early September. The BPA plan would result in lower water temperatures in July, slightly higher temperatures in August, and lower temperatures in September.

Henriksen said water temperatures are currently about 19.3 degrees C in the Lower Granite tailwater. It was noted that air temperatures in the Lower Granite area are currently moderating, and will continue to cool for the next few days. Dworshak is currently releasing 2.2 Kcfs; the project is at 1599.5, almost full, with inflows of 5.7 Kcfs.

On June 29, the action agencies received SOR 2004-16. This SOR, supported by USFWS, IDFG, ODFW, WDFW, NOAA Fisheries, The Nez Perce and Shoshone-

Bannock Tribes and CRITFC, requests the following specific operations: On Wednesday afternoon, June 30, ramp Dworshak outflows up to between 6.8 and 7.2 Kcfs, maintain through July 5. On July 6, further increase outflows to 10 Kcfs through July 7. Target 45 degree outflow water temperature through July 7.

Wills provided an overview of the SOR, the full text of which is available via hotlink from today's agenda on the TMT homepage. Why the ramp-up -- why don't the salmon managers want to immediately go to 10 Kcfs? Jim Litchfield asked. Because we were trying to consider the Nez Perce/Idaho position, and wanted to avoid releasing too much cold water too soon for the wild/natural fall chinook rearing in the Clearwater downstream of Dworshak, Wills replied. The average fork length of those fish is 63 mm, Dave Statler added; we need to ensure that they get adequate thermal units to continue to grow toward smoltification.

Henriksen said the Corps appreciates the fact that all of the salmon managers have endorsed this SOR. She said the Corps will go to a two-unit operation beginning today and will begin to ramp temperatures down to 45 degrees. She added, however, that it may be logistically difficult to implement the SOR by this afternoon, given the late timing of its submission. We understand, said Wills; he asked that the Corps implement the SOR as soon as feasible. It should be possible to achieve the requested outflow by this afternoon, said Henriksen, and we will do our best to meet the temperature provisions. Henriksen and John Wellschlager asked that, in the future, the salmon managers attempt to submit SORs meant for immediate implementation somewhat earlier, if possible.

In response to a question from Harkless, Wills said the salmon managers are working on a longer-term Dworshak SOR, which will be submitted next Wednesday. In response to a question from Scott Bettin, Russ Kiefer said the Dworshak operation after July 7 will depend on the water temperature situation at Lower Granite – if it remains cooler, the request will likely be to maintain Dworshak outflow at 10 Kcfs; if water temperatures continue to increase, it is likely that the request will be to increase Dworshak outflow to 14 Kcfs. In response to another question, Wills said the intent of the 10 Kcfs request is to operate Dworshak at full powerhouse capacity. When asked about the temperature of the water being released from Dworshak, Statler said he would like to see cool water released, but not so cool as to negatively impact the growth of fish in the Clearwater River. Statler said he preferred the Dworshak outflow temperature be no lower than 45 degrees. After a few minutes of additional discussion, it was agreed that the action agencies should plan to hold 10 Kcfs Dworshak outflow through next Friday, July 9, at temperatures as low as 45 degrees, unless water temperatures in the Lower Granite tailrace rise significantly in the interim.

4. Zone 6 Treaty Fishery.

On June 28, CRITFC submitted SOR 2004 C-6. This SOR, in support of the second summer 2004 treaty fishery, requests the following specific operations:

- Beginning June 30 at 6 a.m. and ending at 6 p.m. on July 2:
- Bonneville pool: operate the pool within 1 foot from full pool (msl elevation 76.5-75.5)

- The Dalles (Celilo) pool: operate the pool within 1 foot from full pool (msl elevation 159.5-158.5)
- John Day pool: operate the pool within 1 foot from full pool (msl elevation 264.5-263.5)

Martin went briefly through the contents of this SOR, the full text of which is available via hotlink from the TMT homepage. Martin said CRITFC's aerial net survey revealed that, during last week's treaty fishery, 69, 48 and 88 nets were placed in Bonneville, The Dalles and John Day pools, respectively. He added that, if tribal fishers catch the expected number of fish, this will be the last summer treaty fishery of 2004.

Henriksen said the Corps has issued its usual teletype to Bonneville, imposing a hard pool elevation constraint of 75-76.5 feet at that project; John Day is operating from 262.5-264; The Dalles pool typically fluctuates very little at this point in the season. Again, she said, we specify in the teletype that the goal of this operation is to minimize wear and tear on the nets.

5. Update on The Dalles Spill Outage.

Henriksen said the diver survey took place as scheduled at The Dalles on Monday; the divers found some erosion on the spillway apron, but not enough to raise structural concerns about the dam. The Corps saw no need to change spill operations this summer; spill at The Dalles continues through six bays, she said. The bottom line is that the erosion problem doesn't seem to be an issue this year, she said.

6. Status of Operation.

Libby is 13 feet from full, with inflows at 23.6 Kcfs and falling, said Henriksen. Mary Mellema said Hungry Horse is at elevation 3559.5, essentially full. The project has been releasing 5.7 Kcfs and will continue to do so through this weekend, at which point outflow will be reduced to 5.3 Kcfs. Grand Coulee is at 1287 feet; Upper Snake flow augmentation will begin on July 9, with 1.5 Kcfs being released above Milner. A total Upper Snake volume of 40-60 kaf is expected to be available in 2004. We should know the total volume by the end of this week, she said.

Day-average flow at Lower Granite was 38 Kcfs yesterday, said Henriksen; it may increase to 40 Kcfs over the weekend, but flows are generally receding in the Snake. Wellschlagler said Brownlee will be releasing 100 kaf during the month of July as part of the summer spill package; he said he does not know what the release temperature of that water will be. He added that an official announcement has not yet been made on the action agencies' summer spill proposal; the proposal is currently under review by NOAA Fisheries, and a decision is expected next week. The water from Brownlee will be released regardless; the current water temperature at Oxbow dam, one project upstream of the Hells Canyon complex, is currently 63 degrees.

With respect to the status of the outmigration, Wagner said the main action is still in subyearlings. The subyearling index has been in the 20,000-30,000 range over the past week. At McNary, the numbers are an order of magnitude larger, because of the Hanford

Reach fall chinook; yesterday's index was more than 427,000 fish. Historic passage at Lower Granite is tracking well ahead of pre-season projections; it is near the lower end of the predicted passage curve at McNary. Bettin noted that 60 million fall chinook smolts are predicted from the Hanford Reach this year, double the 2003 count. With respect to adult passage, 59,920 summer chinook have passed Bonneville to date, in the middle range of the counts for the last four years.

Wellschlagger said there are no power system problems to report at this time. Laura Hamilton said there have been a number of water temperature-related TDG exceedences at McNary over the past week; the Corps has documented water temperature swings of up to 9 degrees in a single day.

7. Next TMT Meeting Date.

The next meeting of the Technical Management Team was set for Wednesday, July 7. Meeting summary prepared by Jeff Kuechle.

TMT Participant List

June 30, 2004

Name	Affiliation
Robin Harkless	Facilitation Team
Cindy Henriksen	COE
Russ George	WMCI
John Wellschlagger	BPA
Scott Bettin	BPA
Mike O'Bryant	CBB
Kyle Martin	CRITFC
Scott Boyd	COE
Tina Lundell	COE
David Benner	FPC
Laura Hamilton	COE
Ken Corum	PNUCC
Kevin Nordt	PGE
Tom Haymaker	PNGC
Jim Litchfield	Montana
Paul Wagner	NOAAF

Rudd Turner	COE
Mary Mellema	USBR
Greg Haller	Montana
Dave Statler	NPT
Mike Buchko	Powerex
Dan Bedbury	EWEB
Martin Hatscher	SCL
Lance Elias	PPM
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