Results of the 2014 Survival Compliance Studies at McNary and John Day Dams

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Objectives

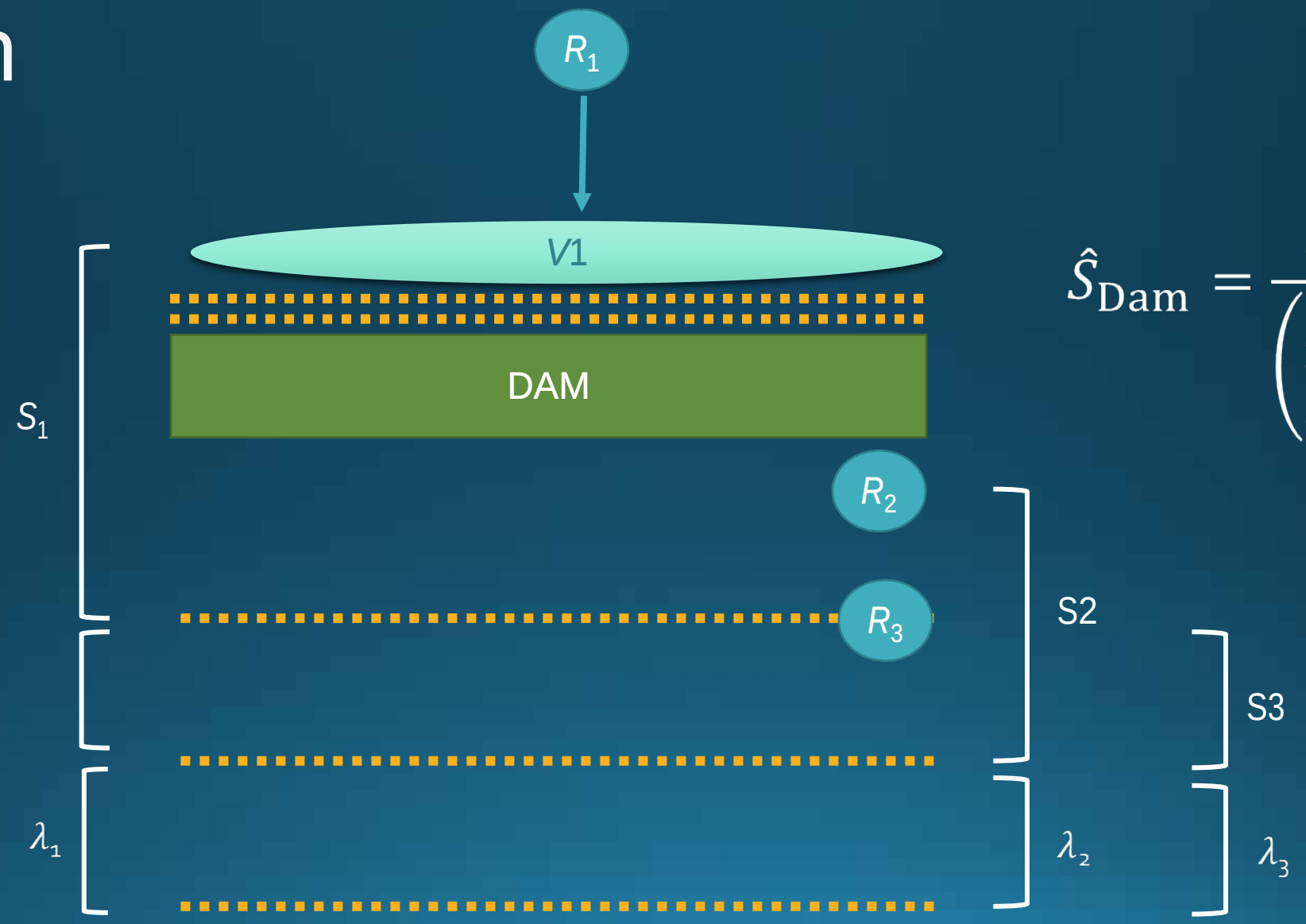
- Perform spring compliance study at:
  - McNary Dam
- Perform summer compliance studies at:
  - McNary Dam
  - John Day Dam
- 2008 BiOp survival standards
  - Spring stocks (i.e., CH1, STH)

$$\hat{S}_{\text{Dam}} \geq 0.96;\ \widehat{\text{SE}} \leq 0.015$$

  - Summer stock (i.e., CH0)

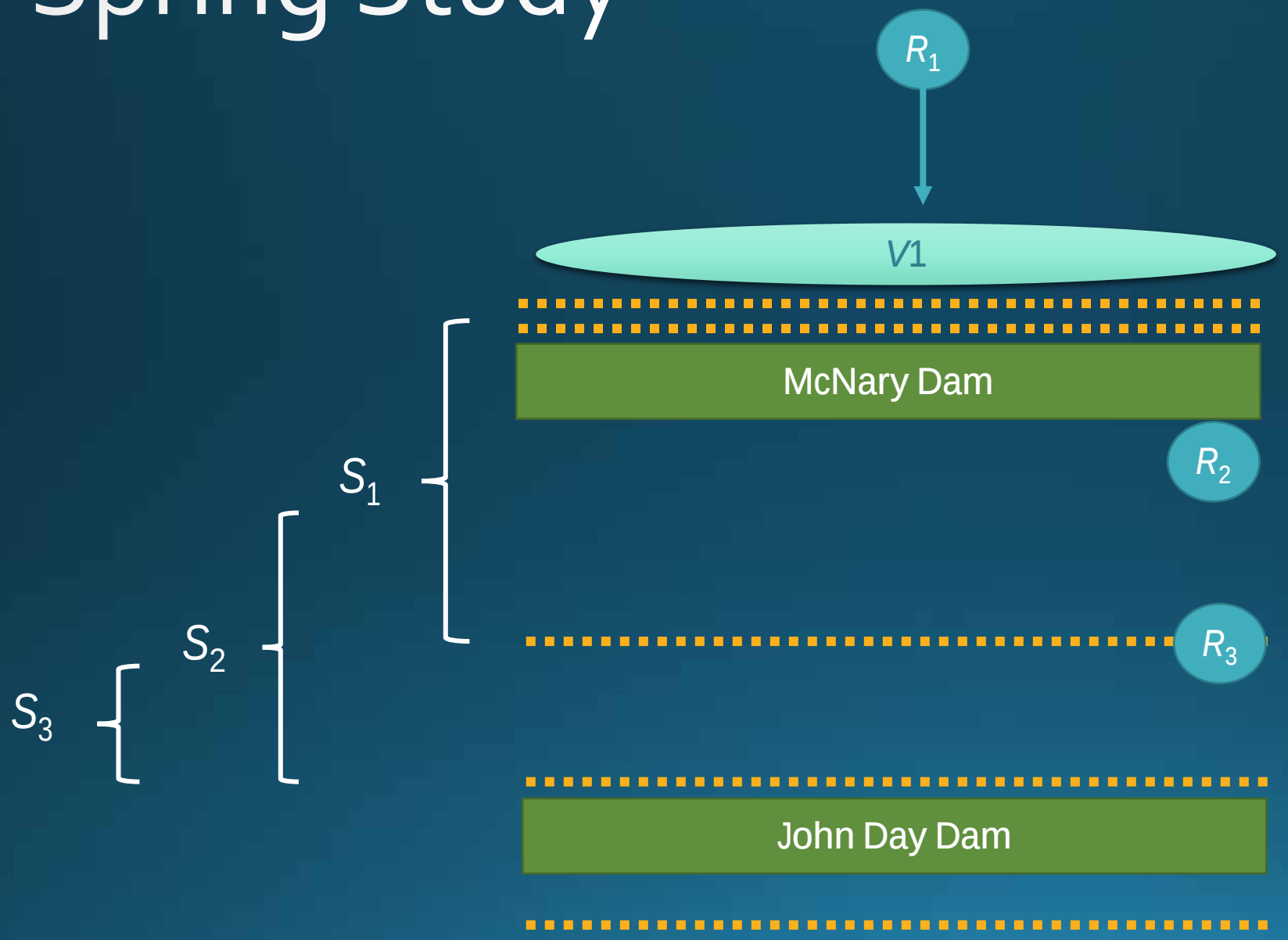
$$\hat{S}_{\text{Dam}} \geq 0.93;\ \widehat{\text{SE}} \leq 0.015$$

Overview of the Virtual/Paired-Release Design



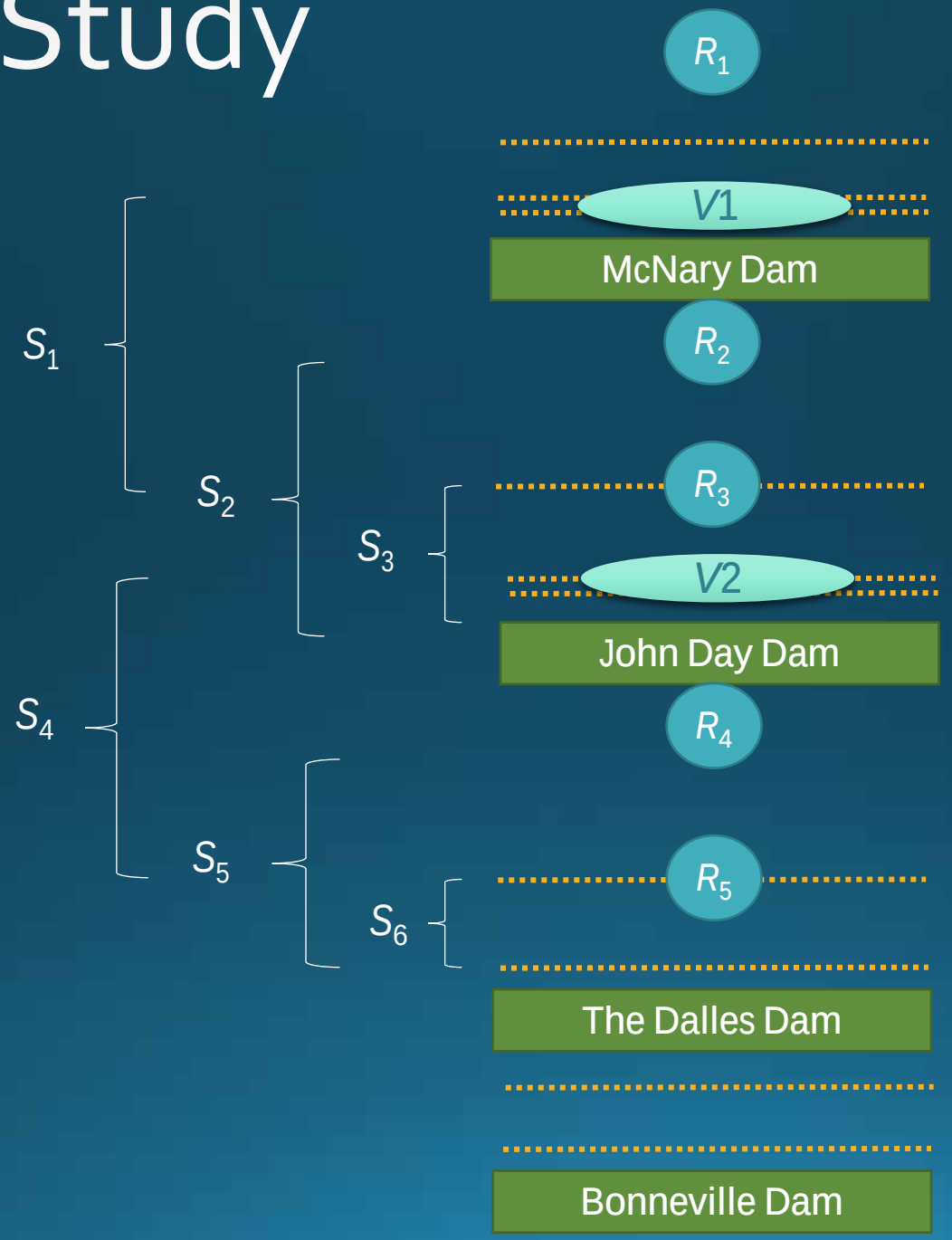
$$\hat{S}_{\mathrm{Dam}} = \frac{\hat{S}_1}{\left(\frac{\hat{S}_2}{\hat{S}_3}\right)}$$

Spring Study



# Tags		
CH1	STH	Rkm
2,497	2,499	503
(2,391)	(2,376)	
		470
2,000	1,999	468
2,002	2,000	449
6,499	6,498	
		349
		325

Summer Study CH0

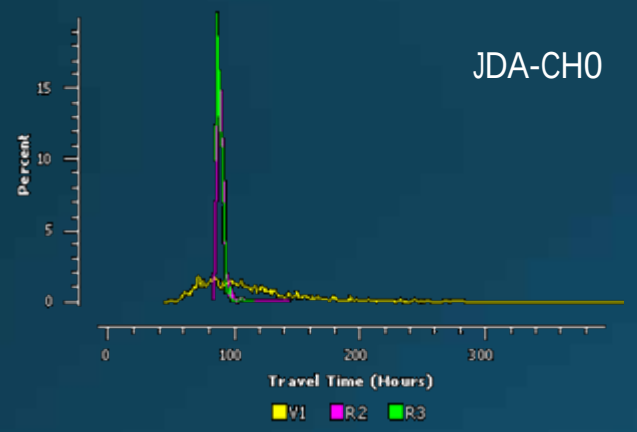


# Tags	Rkm
2,517	503
(2,412)	470
1,995	468
1,997	449
(4,547)	349
981	346
983	325
8,473	311
	275
	236

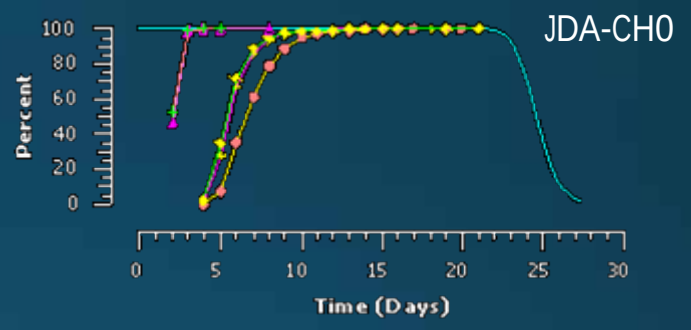
Results

Tests of Assumptions

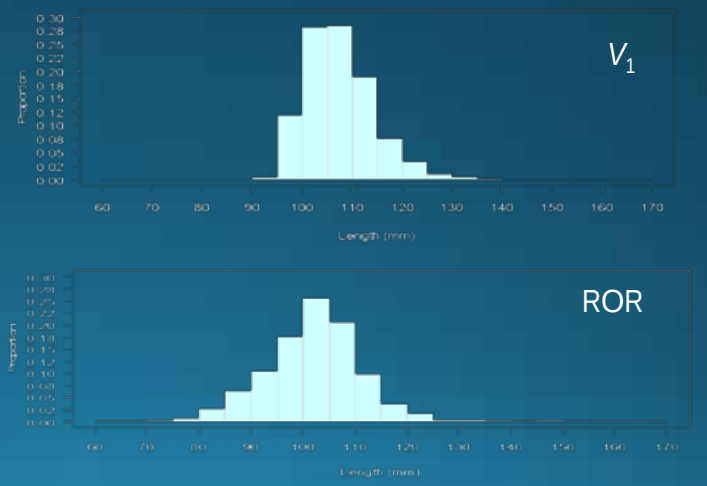
Downstream Mixing of Release Groups



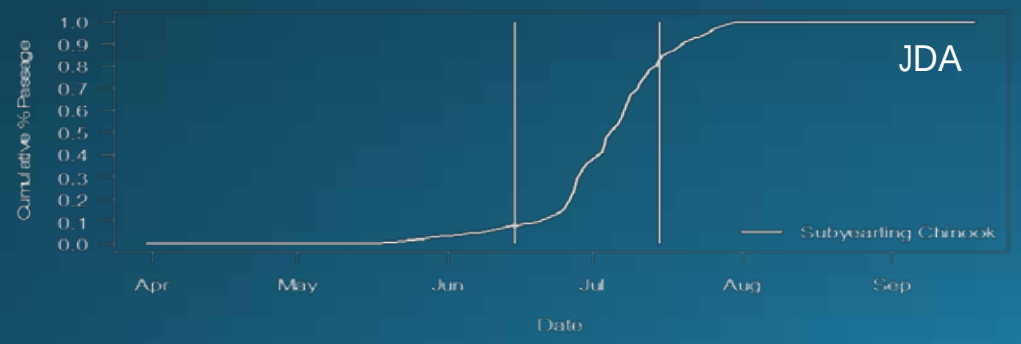
Adequate Tag Life



Size Distributions – JDA CH0



Run Timing



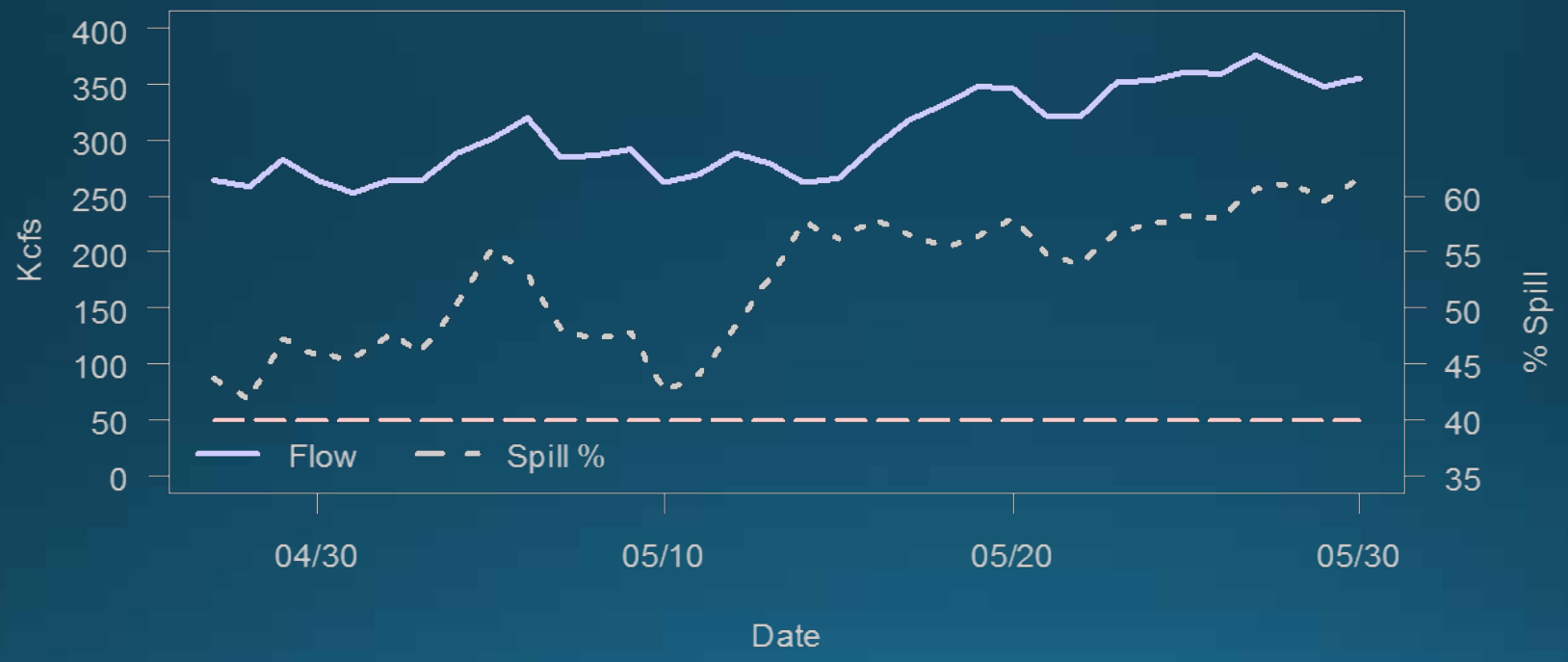
Assumption Evaluations

- Downstream mixing – Yes
- Adequate tag life – Yes
- Dead, tagged fish releases – 2/25 in CH1 study; bias correction applied
- Balanced tagger effort – Yes
- Tagger effects – None found
- Delayed handling/tag effects – None found
- Size of tagged and ROR fish compared
- Study period vs. run timing compared

McNary Dam

McNary Dam

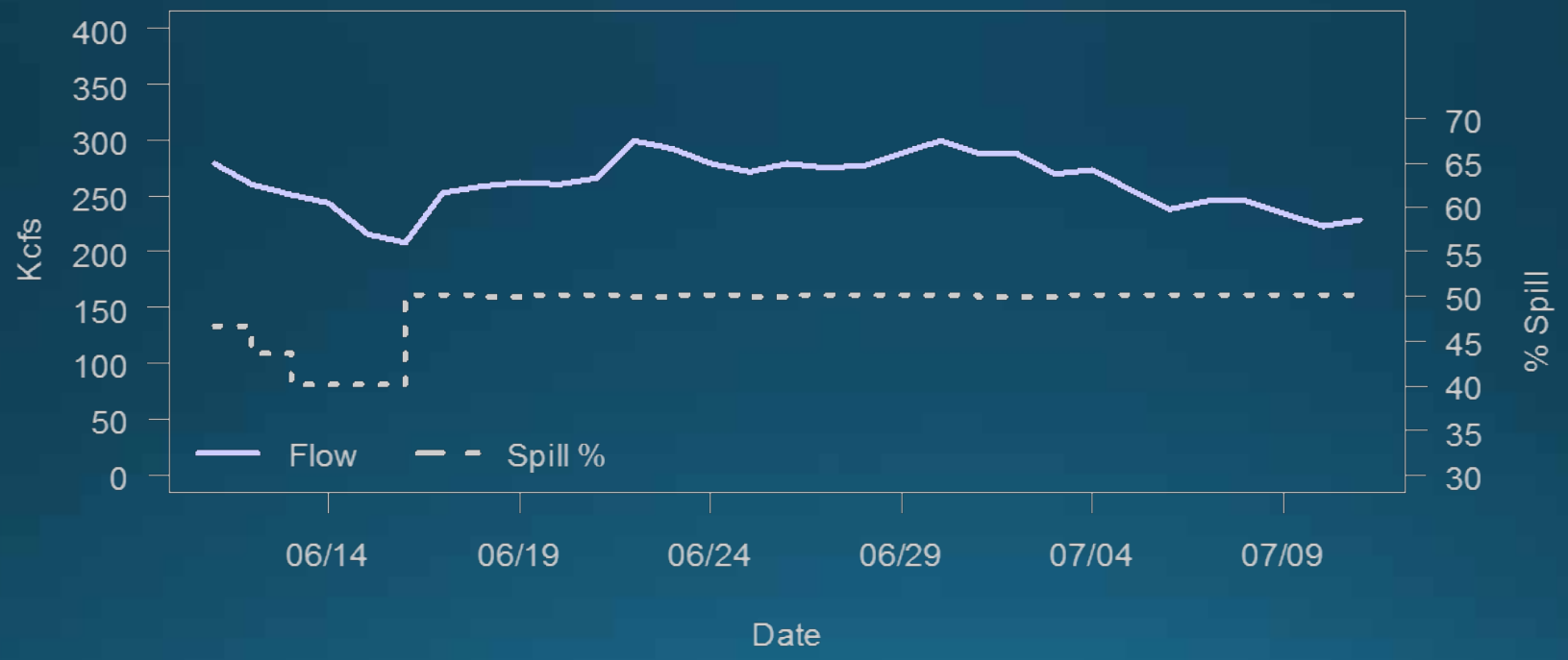
Spring Spill Target: 40%



CONCLUSION: Spill target exceeded

McNary Dam

Summer Spill Target: 50%



CONCLUSION: Spill target largely achieved

2014 Dam Passage Survival – McNary Dam

Fish Stock	$\widehat{S}_{\mathrm{Dam}}$	$\widehat{\mathrm{SE}}$
Yearling Chinook salmon	0.9610	0.0127
Steelhead	0.9698	0.0136
Subyearling Chinook salmon	0.9239	0.0180

Fish Accords – McNary Dam

Performance Measure	Yearling Chinook Salmon	Steelhead	Subyearling Chinook Salmon
BRZ-to-BRZ survival	0.9575 (0.0127)	0.9663 (0.0136)	0.9215 (0.0180)
Forebay residence time*	1.73 h	2.57 h	2.22 h
Tailrace egress time*	0.44 h	0.37 h	0.54 h
SPE	71.4% (0.9)	84.3% (0.8)	53.8% (1.0)
FPE	91.2% (0.6)	97.3% (0.3)	80.9% (0.8)

*Median

Cross-Year Comparison: Dam Passage Survival – McNary Dam

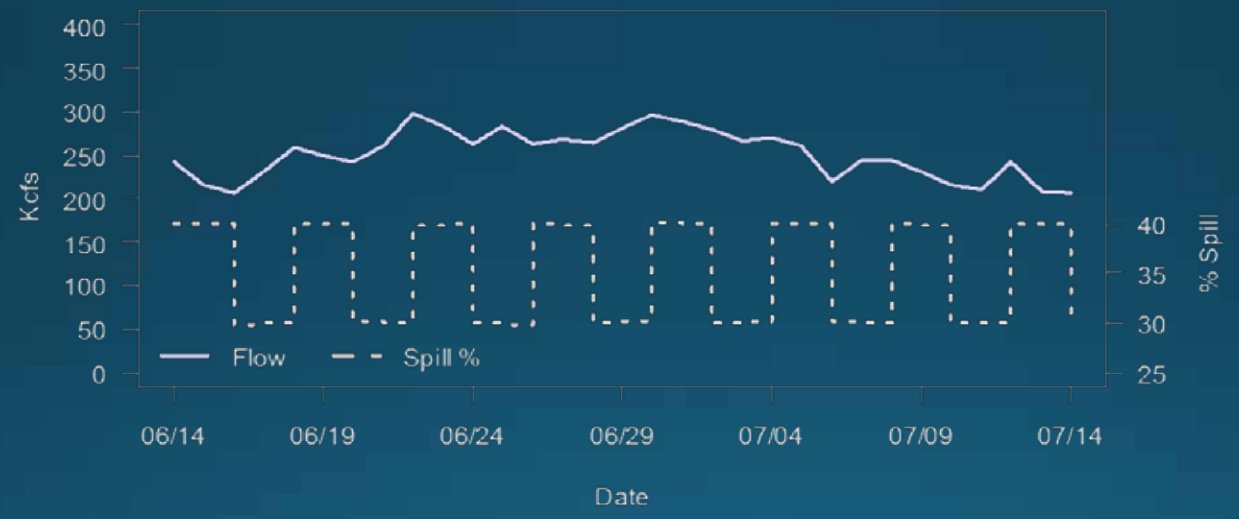
Fish Stock	Year of Study	
	2012*	**2014**
Yearling Chinook salmon	0.9616 (0.0140)	0.9610 (0.0127)
Steelhead	0.9908 (0.0183)	0.9698 (0.0136)
Subyearling Chinook salmon	0.9747 (0.0114)	0.9239 (0.0180)

* Spill targets exceeded $\pm 5\%$

John Day Dam

John Day Dam

Spill Target:
Alternating 2 days of 30% vs. 40% spill



CONCLUSION: Spill treatments well formed

2014 Dam Passage Survival – John Day Dam

Subyearling Chinook Salmon	$\widehat{S}_{\mathrm{Dam}}$	$\widehat{\mathrm{SE}}$
Season-wide	0.9169	0.0061
30% Spill	0.9196	0.0074
40% Spill	0.9131	0.0077

30% vs. 40% spill not significantly different (P = 0.5366)

Fish Accords – John Day Dam

Performance Measures	Season-wide
BRZ-to-BRZ survival	0.9081 (0.0062)
Forebay residence time*	2.12 h
Tailrace egress time*	0.57 h
SPE	63.7% (0.7)
FPE	79.2% (0.6)

*Median

30% vs. 40% Spill Comparison

Performance Measure	**30%** Spill	**40%** Spill
Dam passage survival	0.9196 (0.0074)	0.9131 (0.0077)
BRZ-to-BRZ survival	0.9088 (0.0076)	0.9066 (0.0078)
Forebay residence time (median)	2.28 h	1.91 h
Tailrace egress time (median)	0.58 h	0.56 h
Spill passage efficiency	0.5552 (0.0104)	0.7126 (0.0097)
Fish passage efficiency	0.7576 (0.0090)	0.8231 (0.0082)

Cross-Year Comparison
Dam Passage Survival – John Day

Fish Stock	Year of Study		
	2011	**2012**	**2014**
Y. Chinook salmon	0.9678 (0.0071)	0.9673 (0.0065)	--
Steelhead	0.9867 (0.0061)	0.9744 (0.0028)	--
S. Chinook salmon	--	0.9414 (0.0031)	0.9169 (0.0061)

Conclusions

McNary Dam

- Three survival studies performed in 2014
- Assumptions satisfied
- Spill targets
  - Spring target of 40% exceeded
  - Summer target of 50% largely achieved
- Compliance outcomes
  - Yearling Chinook salmon: $\hat{S} \geq 0.96, \text{SE} \leq 0.015$
  - Steelhead: : $\hat{S} \geq 0.96, \text{SE} \leq 0.015$
  - Subyearling Chinook salmon: : $\hat{S} < 0.93, \text{SE} > 0.015$
- Completion of 2 replicates × 3 stocks
  - Problems meeting spill targets in high flow years

John Day Dam

- One survival study performed in 2014
- Assumptions satisfied
- Spill targets of 30% vs. 40% met; no difference in survival
- Compliance outcome
  - Subyearling Chinook salmon: $\hat{S} \leq 0.93, \text{SE} \leq 0.015$
- Completion of 2 replicates $\times$ 3 stocks
  - 5 of 6 studies met 2008 BiOp standards
  - 2014 subyearling Chinook salmon study: $\hat{S} \leq 0.93$

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