SYSTEM OPERATIONAL REQUEST: FWS #1

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FROM: Brian Kelly, State Supervisor, U.S. Fish and Wildlife Service, Idaho Fish and Wildlife Office, on behalf of the Libby BO Policy Group

DATE: May 16, 2011

SUBJECT: **2011 Libby Dam Releases for Sturgeon and Bull Trout Augmentation Flows**

SPECIFICATIONS:

Based on the Fish and Wildlife Service's February 2006 Biological Opinion (2006 BO) on operations of Libby Dam, and the May final April-August volume runoff forecast of 8.165 million acre-feet, we are within a Tier 5 operations year for Kootenai River white sturgeon. The minimum recommended release volume for sturgeon conservation in a Tier 5 year is 1.20 million acre-feet and we recommend the following procedures for discharge of at least this minimum volume from Libby Dam:

- **With Spill (reservoir above elevation 2415')**

  Begin releases of sturgeon volume from Libby Dam once the following conditions are met: Kootenai River temperatures at Bonners Ferry reach 8° C, and Koocanusa Reservoir elevation reaches at least 2,415' MSL; at least one tagged F4 sturgeon is positioned at Ambush Rock; and the forebay of Koocanusa Reservoir warms such that 20-35,000 cubic feet per second (cfs) can be released in unison through the turbines and over the spillway without decreasing Libby Dam release temperatures by more than 2° C.

  Ascending Limb: When these conditions are met, increase discharge from Libby Dam (according to ramping rates in the 2006 BO) to 15,000 cfs for 3 days, followed by discharge of 20,000 cfs for 3 days, discharge of full powerhouse capacity (PHC) for 3 days, and maintain peak discharge of PHC plus spill of up to 10,000 cfs for 7 days.

Alternatively, if discharges from Libby Dam are higher than 15,000 cfs prior to commencement of sturgeon operations, once the conditions described above are met, increase discharge from Libby Dam (according to ramping rates in the 2006 BO) to 20,000 cfs for 4 days, followed by discharge of PHC for 5 days, and maintain peak discharge of PHC plus spill of up to 10,000 cfs for 7 days.

Descending Limb: At approximately 6:00 AM, following peak outflow, reduce discharge from Libby Dam to PHC for 4 days. After four days at PHC, reduce discharge to 20,000 cfs for at least 3 days. This discharge period may be extended if necessary to reduce the rate of reservoir refill.

- If the modeled summer flat flow (targeting reservoir elevation of 2,439' at the end of September) is 15,000 cfs or greater, maintain discharge of 17,000 cfs until the sturgeon volume is exhausted.

- If the modeled summer flat flow is less than 15,000 cfs, then starting at about 6:00 AM, following the period of 17,000 cfs discharge, reduce Libby Dam discharge to 15,000 cfs, then maintain 15,000 cfs discharge until the sturgeon volume is exhausted, or gradually reduce discharge to the summer flat flow. During this gradual discharge reduction, the Corps should avoid a double peak in outflow between sturgeon and summer operations.

Note: The intent of extending flow at this rate is to delay reservoir refill until inflows recede to below turbine discharge capacity, and to make a smooth transition from the spring peak to the lower, stabilized summer flow.

- **Without Spill**

  Given the higher water supply volume in the Kootenai Basin in 2011, it is likely that flood risk reduction operations will supersede sturgeon augmentation operations. In such a scenario, Kootenai River stages may be at or near flood stage prior to sturgeon operations, rendering spill unfeasible or undesirable.

As always, flood risk reduction operations supersede sturgeon flow augmentation, and dam managers will coordinate operations with regional sturgeon managers.

Sturgeon augmentation discharge may be extended for additional days if the Corps elects to provide volume in excess of the minimum volume requirement in the 2006 BO and to control the refill rate of Libby Dam.

Provide stable or gradually declining discharge through the end of September following ramping rates and minimum flow guidelines in the 2006 BO for bull trout and white sturgeon.

Additional recommendations may be provided as water supply forecasts are updated.

JUSTIFICATION:

A continued effort is needed to provide spawning and incubation flows to meet habitat attributes for depth, velocity and temperature in the Kootenai River as defined in the 2008 BO Clarified Reasonable and Prudent Alternative (RPA) for Kootenai River white sturgeon (Table 1). The clarified RPA states that if 2008 and 2009 sturgeon operations at Libby Dam are determined to be "not successful", the action agencies (the Corps and BPA) will operate Libby Dam in 2010 through 2012 to provide additional flows by spilling in excess of powerhouse capacity consistent with a waiver of the Total Dissolved Gas (TDG) water quality standard provided by the State of Montana. The Service issued its determination of "not successful" for 2008 sturgeon operations on April 20, 2009, and issued a "not successful" determination for 2009 operations on December 16, 2009, thus triggering the action agencies to implement provisions to provide flows in excess of powerhouse capacity in operating years 2010 through 2012.

The USGS performed data analysis of the 2006 through 2009 sturgeon augmentation flows in order to assess depth attribute attainment as per the 2006 BO. Kootenay Lake backwater extent varied, but in general a flow of roughly 35,000 cfs at Bonners Ferry provided river depth in the braided reach (RM 152 to RM 157) that met or exceeded the minimum 16.5 ft depth attribute.

Table 1. Kootenai Sturgeon Habitat Attributes from 2008 Libby Dam BO RPA Clarification.

Attribute	**Measure**	**Objective**
Area: RM 141.4 to RM 159.7		
Timing of Augmentation Flows	May into July (triggered by sturgeon spawning condition), in all years except for Tier 1.	Provide conditions for normal migration and spawning behavior.
Duration of Peak Augmentation Flows for Adult Migration and Spawning	Maximize peak augmentation flows with available water for as many days as possible, up to 14 days during the peak of the spawning period with pulses[1], in all years except for Tier 1.	Through in-season management, provide peak augmentation flows that lead to a biological benefit for sturgeon to maximize migration and spawning behavior via a normalized hydrograph.
Duration of Post-Peak Augmentation Flows for Incubation and Rearing	Maximize post-peak augmentation flows with available water for as many days as possible, up	Through in-season management, provide post-peak augmentation flows that lead to a

[1] Kootenai sturgeon spawn on the descending limb of the hydrograph. "Pulses" refer to slight reductions in flow during this two-week period to initiate spawning.

	to 21 days, in all years except for Tier 1.	biological benefit for sturgeon to maximize embryo/free-embryo incubation and rearing via descending limb of a normalized hydrograph.
Minimum Flow Velocity[2]	3.3 ft/s and greater in approximately 60% of the area of rocky substrate in the area of RM 152 to RM 157 during post-peak augmentation flows.	Provide conditions for spawning and embryo/free-embryo incubation and rearing.
Temperature Fluctuation	Optimize temperature releases at Libby Dam to maintain 50° F with no more than a 3.6° F drop.	Provide conditions for normal migration and spawning behavior via a normalized thermograph.
Depth at Spawning Sites	Intermittent depths of 16.5 to 23 ft or greater in 60% of the area of rocky substrate from RM 152 to RM 157 during peak augmentation flows.	Provide conditions for normal migration and spawning behavior.
Substrate Extent/Spawning Structures	Approximately 5 miles of continuous rocky substrate; create conditions/features that improve the likelihood of recruitment success.	Provide habitat for embryo/free-embryo incubation and rearing.
Minimum Frequency of Occurrence	To facilitate meeting the attributes via: <u>powerhouse plus up to 10,000 cfs flow test</u>: a flow test will occur 2010 through 2012 (or until the Kootenai River Restoration Project is implemented) if the Service determines in 2008 and 2009 that the success criteria described in Action 1.3(b) have not been met. <u>Habitat improvement projects and other options</u>: through adaptive	

[2] In order to develop an agreed-upon estimate and measurement of the areal extent of the velocity and depth attributes, the Action Agencies shall, together with the Service and in collaboration with other involved parties as needed, develop appropriate assessment tools (e.g., hydrologic models) of the braided reach.

	management, as noted in RPA Components 2 and 5, implement the Kootenai River Restoration Project by the aspirational date of 2012-2016.	

Operation of Libby Dam for sturgeon flow augmentation and temperature management during 2008 may have influenced the timing, extent, and duration of sturgeon pre-spawning migration. Discharge temperatures during 2008 warmed later than usual and IDFG documented that one tagged sturgeon migrated further upstream than had been previously observed. The 2011 sturgeon pulse and thermograph will be managed to maximize the upstream migration of adults and to optimize conditions during the egg incubation and embryonic stages. Additional flows from spill will coincide with discharges through the powerhouse to ensure release temperatures can be sustained at or above 50° F at Bonners Ferry. The operation will attempt to avoid a sudden decline in temperature during the spawning and incubation phase.

The operating parameters outlined in this SOR are intended to provide some guidance on how to achieve the attributes listed in Table 1 of the 2006 USFWS BO, given the current water supply forecast. Previous years operations have shown that conditions at Libby Dam and in the Kootenai River basin can change rapidly. Recognizing this, the start date and exact shape of the operation will need to be developed and modified in-season as more is known. The in-season coordination will occur in the sturgeon technical team and with a final recommendation coordinated through the action agencies and the Technical Management Team.