SYSTEM OPERATIONAL REQUEST: FWS #1

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FROM: Susan Martin, Supervisor, U.S. Fish and Wildlife Service, Upper Columbia Fish and Wildlife Office, on behalf of the Libby BiOp Policy Group

DATE: May 30, 2008

SUBJECT: **2008 Libby Dam Releases for Sturgeon and Bull Trout Augmentation Flows**

SPECIFICATIONS:

Based on the May final April-August volume runoff forecast of 6.116 million acre-feet, we are within a tier 3 operations year for Kootenai River white sturgeon as defined in the Fish and Wildlife Service's February 2006 Biological Opinion (2006 BO) on operations of Libby Dam. The minimum recommended release volume for sturgeon conservation under these circumstances is 1,041 thousand acre-feet.

The selective withdrawal gate system at Libby Dam became temporarily inoperable on 22 May, 2008. At this time, temperature control is limited to the existing arrangement of gates stacked into place – 10 of 18 rows in slots 1 through 7 (providing water to turbines 1 through 4). There are also gates placed into slots 8 and 9, but no gates in slots 10 through 14 – thus temperature control through unit 5 is non-existent (drafting through unit 5 equates to drafting the coldest water available to the selective withdrawal system).

Given this condition, and the gradually warming forebay and river water temperatures (Figure 1), the technical team recommends the following procedures to begin the sturgeon augmentation operation at Libby Dam for 2008:

1. On Sunday, June 1, increase Libby Dam outflow from 14,800 cfs to full powerhouse following 2006 BiOp ramping rates. This flow will allow necessary sediment sampling by USGS to be completed in the Bonners Ferry reach of the river, and will also allow for observation of the effects of mixing coldwater release through unit 5 (20%) with warmer water through units 1 through 4 (80%), to inform potential selective withdrawal modifications in the future.

2. After 48 hours of full powerhouse flow, decrease flow to ~ 20,000 cfs (4 units at full load) through units 1 through 4.

3. Continue flow of 20,000 cfs until selective withdrawal system functionality at Libby Dam is restored (approximately June 10).

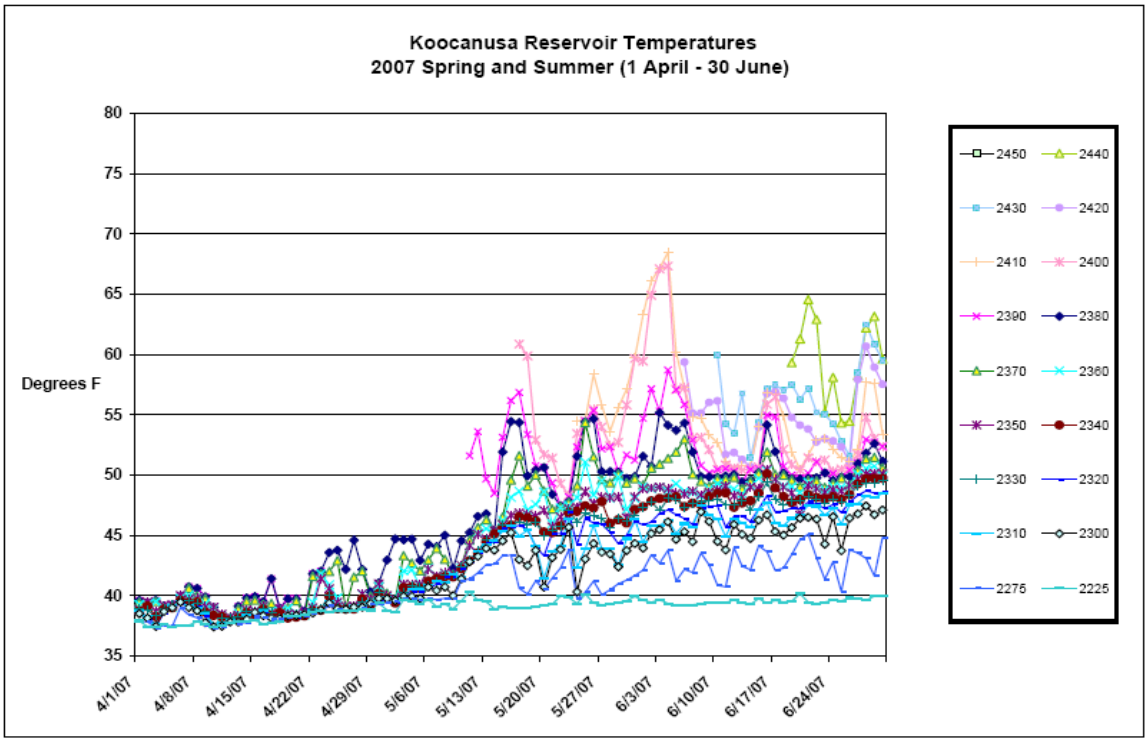
4. Additional recommendations will be provided when the selective withdrawal gate facilities at Libby Dam are fully operational, and when the technical team is able to reassess reservoir, river and sturgeon status – estimated assessment timeline is currently approximately 10 June.

It is recognized that increasing flows by drafting water through unit 5 may result in slight cooling of the Kootenai River downstream of Libby Dam. However, the condition will be temporary, and will occur prior to intentional operations to increase release temperature from Libby Dam, and should not have a substantially negative effect on sturgeon behavior at this time. The opportunity to allow for increasing forebay temperature, and increasing river temperature during the ensuing operation (i.e. 4 units), coupled with the eventual opportunity to continue to increase river temperature through use of the selective withdrawal system, is the basis of this portion of the sturgeon augmentation operation.

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 2006 BO RPA for Kootenai River white sturgeon (Table 1). USGS has performed modeling of the braided reach with the observed 2006 and 2007 flows, and based on these results, the velocity attribute and the minimum depth attribute of 16.5' intermittently in 60% of the braided reach (RM 152-157) is achievable with flows at Bonners Ferry of roughly 35,000 cfs (as per 2006 and 2007 sturgeon flow data; Figure 2); the maximum depth attribute of 23' may not be achievable without exceeding flood stage of 1,764' MSL.

Temperature is known to be very important in sturgeon spawning behavior in conjunction with flows; at the time of preparation of this SOR temperature conditions in the forebay of Koocanusa Reservoir had not developed to the extent that would warrant commencement of a sturgeon flow operation; temperature development towards appropriate conditions is approximately 3 weeks later than at this time in 2007 (Figure 1).



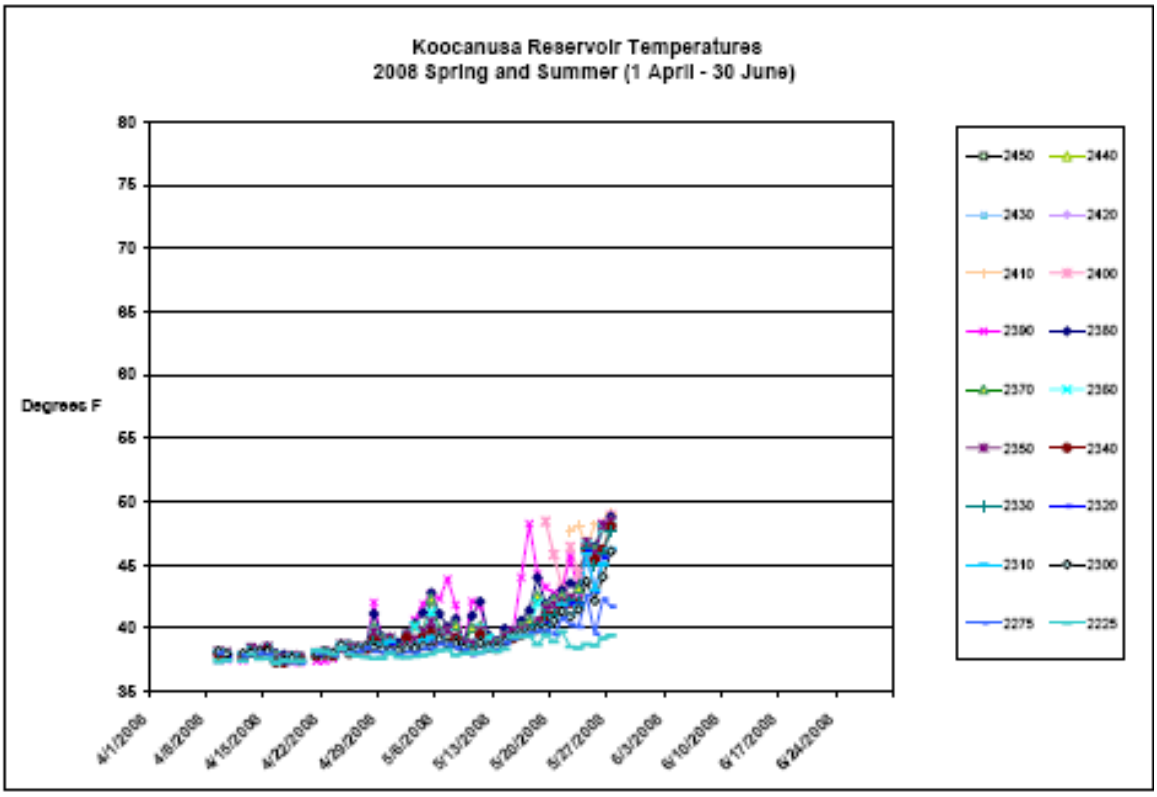


Figure 1. Koocanusa Reservoir forebay temperature in 2007 and 2008. The reservoir remained isothermic until early May in 2008; mid-column temperature reached and maintained 46.4° F(8° C) by mid-May in 2007 and did not attain this temperature in 2008 until late the last week of May.

Table 1. Kootenai Sturgeon Habitat Attributes from 2006 Libby Dam BiOp.

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 to 21 days, in all years except for Tier 1.	Through in-season management, provide post-peak augmentation flows that lead to a 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 degrees F with no more than a 3.6 degree 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	Provide conditions for normal migration and

[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.

[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.

	the area of rocky substrate from RM 152 to RM 157 during peak augmentation flows.	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**: Powerhouse plus 10,000 cfs flow test: the flow test will occur 3 or more times during the next 10 years; 3 times within the next 4 years if conditions allow, and other options are not available to meet this measure. **Habitat improvement projects and other options**: through adaptive management, as noted in RPA Action 6, implement the habitat projects and other available options no later than 2010 and continuing through the term of the proposed action.	Maximize the probability that habitat attributes necessary for successful in-river sturgeon spawning and recruitment will be provided multiple times during the term of the proposed action.

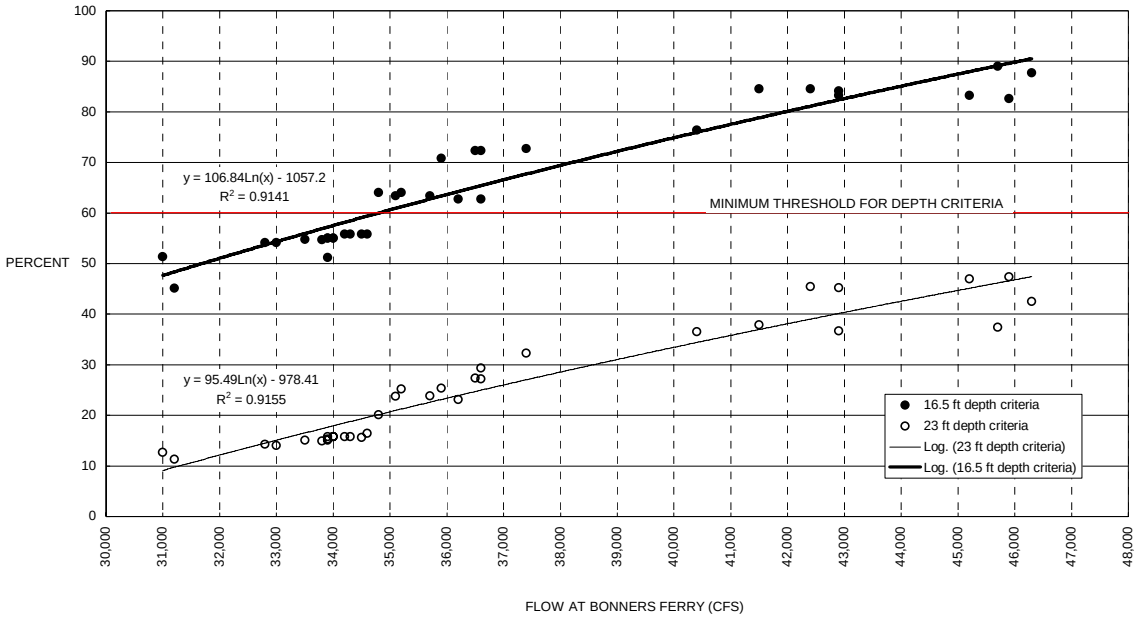


Figure 2. Kootenai River stream flow and percent of longitudinal profile between RM 152 and 157 meeting or exceeding water depths of 16.5 and 23 ft, respectively, during 2006 (May 18 to June 5) and 2007 (May 22 to June 5) white sturgeon spawning flow augmentation (combined data). To ascertain the percentage of depth attribute attained for each flow, choose a flow on the x-axis and follow the vertical gridline to the intersection of the line of fit (either the 16.5 ft or 23 ft).

Given the state of inoperability of the selective withdrawal system, and the anticipated restoration of functionality by mid-June, the operations described in this document are intended to provide the best opportunity to achieve the attributes listed in Table 1, given the water supply conditions predicted in 2008. We recognize that no firm start date is given in this request. This is due to the desire of sturgeon managers and dam operators to allow for in-season management of dam operations in response to evolving conditions. Previous years' operations have shown that conditions at Libby Dam and the Kootenai River can change rapidly. Therefore allowing for flexibility in operations should aid in achieving the sturgeon habitat attributes.