SYSTEM OPERATIONAL REQUEST: FWS #1

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FROM: Rich Torquemada, Assistant Field Supervisor, U.S. Fish and Wildlife Service, Northern Idaho Field Office, on behalf of the Libby BiOp Policy Group

DATE: May 15, 2009

SUBJECT: **2009 Libby Dam Releases for Sturgeon and Bull Trout Augmentation Flows**

SPECIFICATIONS:

Based on the May final April-August volume runoff forecast of 5.209 million acre-feet, we are within a Tier 2 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 0.80 million acre-feet, and we recommend the following procedures for discharge of at least this minimum volume from Libby Dam:

> Ascending Limb/Peak: Once Kootenai River temperatures at Bonners Ferry reach 8° C, ***and*** Koocanusa Reservoir warms such that 20-25,000 cubic feet per second (cfs) can be released through the turbines without decreasing Kootenai River temperatures by more than 1.5° C, increase flow at Libby Dam to full powerhouse capacity (according to ramping rates in the 2006 BO); the ramp up should begin at 6:00 AM on the initial day.
>
> Peak: Maintain full powerhouse flow at Libby Dam for one hundred sixty eight hours (7 days). No load following should occur during this period of peak flows. Discharge at this volume may be extended if necessary to reduce the rate of reservoir fill.

Descending Limb: At about 6:00 AM following 7 days of peak outflow, discharge from Libby Dam can be reduced (following prescribed ramping rates) to 20,000 cfs. This discharge period may be extended if necessary to reduce the rate of reservoir refill. Note: The intent is to delay reservoir refill until inflows decline below turbine capacity.

At about 6:00 AM after five days at 20,000 cfs, ramp Libby Dam discharge downward to 17,000 cfs.

At about 6:00 AM after five days at 17,000 cfs, ramp Libby Dam discharge downward to 15,000 cfs. After 5 days at 15,000 cfs, Libby Dam discharge can be shaped to June VARQ flows. During this gradual ramp down the Corps should consider alternatives that will avoid a double peak in outflow between sturgeon and summer operations.

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.

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 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 (per 2006 and 2007 sturgeon flow data; Figure 1); the maximum depth attribute of 23' may not be achievable without exceeding flood stage of 1,764' MSL.

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 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° 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%	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.

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

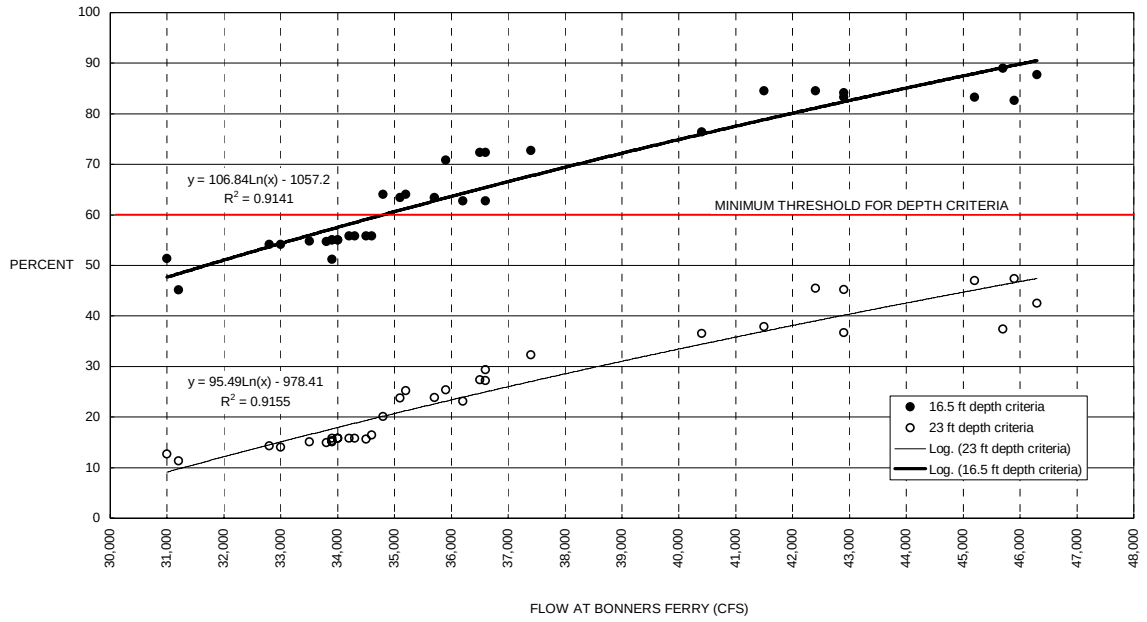

Figure 1. Kootenai River stream flow and percent of longitudinal profile between RM 152 and 157 meeting or exceeding water depths of 16.5 and 23 ft, respectively, during 2006 (May 18 to June 5) and 2007 (May 22 to June 5) white sturgeon spawning flow augmentation (combined data). To ascertain the percentage 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).

Operation of Libby Dam for sturgeon flow augmentation and temperature management during 2008 produced river conditions that may have influenced sturgeon migration timing, extent, and duration. Temperature releases from the dam were substantially cooler than in recent years due to cooler forebay temperature (Figure 2). Idaho Department of Fish and Game documented that one tagged sturgeon had migrated further upstream during spring 2008 than any other tagged sturgeon had previously been observed. This movement may have been a response to sturgeon augmentation operation that differed from previous years in terms of temperature and timing. Thus, the intent of the 2009 sturgeon operation will be to attempt to create similar conditions in the river via timely selective withdrawal gate placement and flow management.

Specifically, Libby Dam will pass water temperatures available at elevation ~ 2,325' until the commencement of the post-peak flow period, at which time the selective withdrawal gates above that elevation will be stacked in a fashion that creates an increasing thermograph (target of 50 degrees F or greater at Bonners Ferry) on the receding limb of the hydrograph at Libby Dam. The gates will be managed as to not create a decrease of 3.6 degrees F or greater in release temperature at Libby Dam during the post-peak operation.

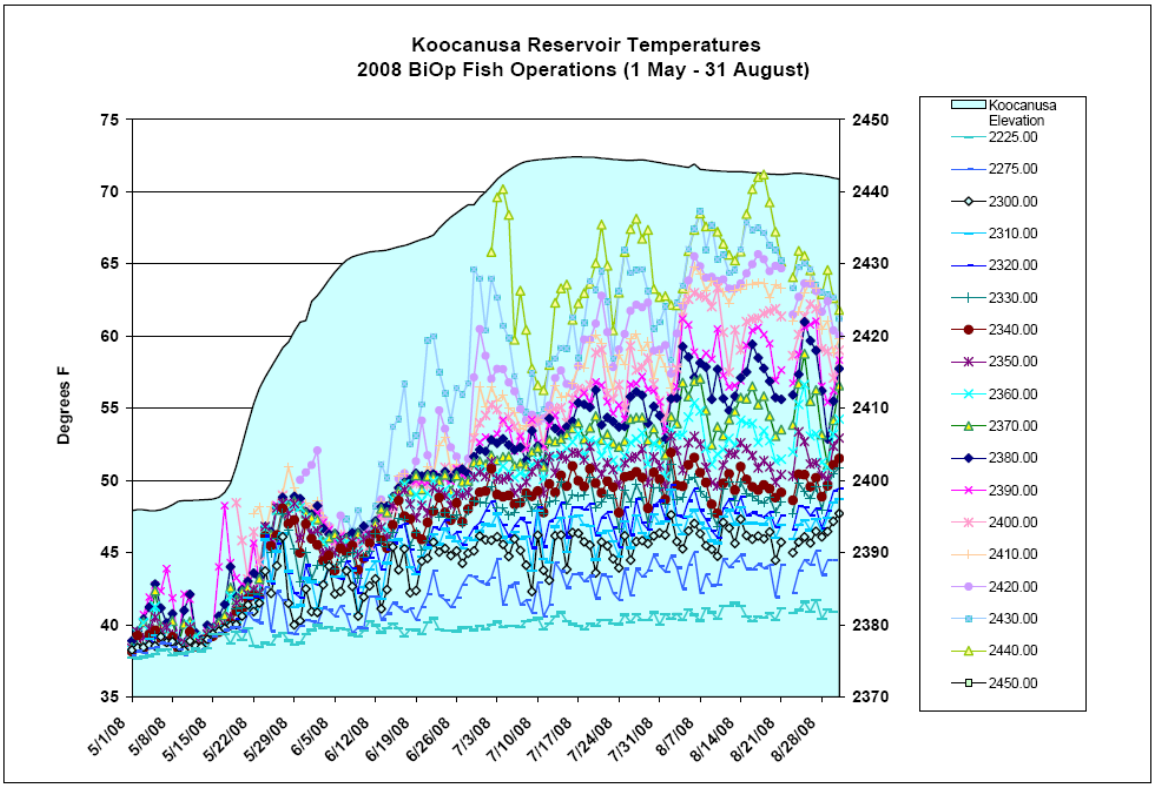

Figure 2. Koocanusa Reservoir forebay temperature profile and elevation during May through August, 2008. Forebay temperatures during early to mid-June were substantially cooler than the same period in recent years.

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 2009. 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.