United States Department of the Interior

FISH AND WILDLIFE SERVICE
Mountain-Prairie Region

IN REPLY REFER TO:
FWS/R6/ES

MAILING ADDRESS:
P.O. BOX 25486, DFC
Denver, Colorado 80225-0486

STREET LOCATION:
134 Union Boulevard
Lakewood, Colorado 80228-1807

MAR 19 2014

David Ponganis
Director, Programs
U.S. Army Corps of Engineers, Northwestern Division
PO Box 2870
Portland, Oregon 97208-2870

Dear Mr. Ponganis:

The U.S. Fish and Wildlife Service (Service), in conjunction with the Lower Yellowstone Intake Project (Intake) Biological Review Team (BRT), has been working closely with the U.S. Army Corps of Engineers (Corps) to define performance objectives and subsequent design criteria for the Intake bypass channel. This letter serves to formally revise portions of the Reasonable and Prudent Alternative (RPA) in the 2003 amended Biological Opinion (BiOp) to the Corps. By this letter I am formally conferring the hydraulic and physical conditions the Service believes will maximize the probability of successful passage of pallid sturgeon at the Intake Dam and Irrigation Headworks Project on the Yellowstone River, Montana. As stated in my letter to you dated February 6, 2013, with the construction and successful performance of the project to these hydraulic and physical conditions, the Corps will achieve its responsibility under the Flow Enhancement below Fort Peck Dam – Intake Montana River Restoration BiOp RPA element.

Bypass Channel Hydraulic and Physical Performance Objectives

The following, unless subsequently modified based on new data, apply to conditions as measured at the United States Geological Survey (USGS) stream gauge at Sidney, Montana, regardless of date, over the discharge ranges specified. In order to maximize the probability of success, two sets of design criteria are recommended below; one set applies to discharges less than 15,000 ft^3/s and one set applies to discharges equal or greater than 15,000 ft^3/s (see also Table 1).

Bypass Channel Flow Split:
The flow split, or proportion of Yellowstone River discharge the Bypass Channel is designed to convey will influence many aspects of the Bypass Channel design and overall scale. Given the variability of the unregulated flows in the Yellowstone River, we recognize that the flow split will vary with river discharge.

As such, the general flow split percentage target for the Bypass Channel design should be 15% with final design attaining at least 12% over the discharge range of 7,000 to 14,999 ft^3/s (198– 424 m^3/s) and 13% to ≥ 15% over the discharge range of 15,000 to 63,000 ft3/s (424– 1784 m3/s).

Bypass Channel Cross-sectional velocities:
Mean bypass channel cross-sectional velocities at all sampled cross-sections must be equal or greater than 2.0 feet per second (ft/s) or 0.61 meters per second (m/s), but less than or equal to 6.0 ft/s (1.8 m/s) over the discharge range of 7,000 to 14,999 ft^3/s (198– 424 m^3/s).

Mean bypass channel cross-sectional velocities (measured as mean column velocities) at all sampled cross-sections must be equal or greater than 2.4 ft/s (0.73 m/s), but less than or equal to 6.0 ft/s (1.8 m/s) over the discharge range of 15,000 to 63,000 ft^3/s (424– 1784 m^3/s). The proportion of the channel exceeding maximum velocities should be minimized to the extent possible. Channel characteristics that maintain variability of flow within or on the margins of the Bypass Channel, without introducing significant turbulence are highly valued.

Bypass Channel Cross-sectional depths:
Minimum cross-sectional depths measured at the lower discharge range of 7,000 to 14,999 ft^3/s (198– 424 m^3/s) at any sampled cross-section must be greater than or equal to 4.0 feet (1.2 m) across 30 contiguous feet of the measured channel cross sectional profile. Minimum cross-sectional depth over the discharge range of 15,000 to 63,000 ft^3/s (424– 1784 m^3/s) at any sampled cross-section must be greater than or equal to 6.0 feet (1.8 m) across 30 contiguous feet of the measured channel cross sectional profile. Adult Pallid Sturgeon typically use depths greater than 1 meter throughout their range. Although adult sturgeon have occasionally been observed shallower, depths greater than 1 meter will reduce the likelihood that significant numbers of adult Pallid Sturgeon may fail to pass through the Bypass Channel.

Bypass Channel Fish Entrance and Exit:
The downstream entrance to the Bypass Channel (i.e., HEC-RAS station 136) is critical to the performance of the structure. Significant efforts remain to adequately characterize suitable conditions at the downstream and upstream openings. To provide sufficient attractant flows, the downstream fish entrance should have a mean cross sectional velocity of greater than or equal to 2.0 ft/s (0.61 m/s) (measured as mean column velocity) through the lower discharge range of 7,000 to 14,999 ft^3/s (198– 424 m^3/s) and mean cross sectional velocity greater than or equal to 2.4 ft/s (0.91 m/s) (measured as mean column velocity) through the range of discharge of 15,000 to 63,000 ft^3/s (424– 1784 m^3/s). Mean cross sectional velocities (measured as mean column velocity) at both the upstream and downstream Channel Bypass openings should be less than or equal to 6.0 ft/s (1.8 m/s) for river discharges ranging from 7,000 – 63,000 ft^3/s (198 – 1784 m^3/s) .

The proportion of the channel exceeding maximum velocities should be minimized to the extent possible.

Characteristics that maintain variability of flow within or on the margins of the Bypass Channel openings, without introducing significant turbulence are highly valued.

Table 1: Tabular Summary of design criteria

Discharge at Sidney, Montana USGS Gauge	7,000 -14,999 ft^3/s	15,000-63,000 ft^3/s
Bypass Channel Flow Split	≥ 12%	13% to ≥ 15%
Bypass Channel cross-sectional velocities (measured as mean column velocity)	2.0 – 6.0 ft/s	2.4 – 6.0 ft/s
Bypass Channel Depth (minimum cross-sectional depth for 30 contiguous feet at measured cross-section)	≥ 4.0 ft	≥ 6.0 ft
Bypass Channel Fish Entrance (measured as mean column velocity at HEC-RAS station 136)	2.0 – 6.0 ft/s	2.4 – 6.0 ft/s
Bypass Channel Fish Exit (measured as mean column velocity)	≤ 6.0 ft/s	≤ 6.0 ft/s

As you are aware, inevitable uncertainties remain that are inherent in both the hydraulic modeling upon which the project design is based and the monitoring and measurement needed to verify that the constructed bypass channel meets the hydraulic and physical conditions stated above. The Service requests that the Corps in coordination with the Service and the U.S. Bureau of Reclamation (BOR) develop the monitoring and measurement plan that will be used to verify that the completed project meets the hydraulic and physical conditions. As you are aware, the conditions on the river have inherent variability that is difficult to predict. This plan should account for this variability and be completed prior to completion of the construction phase of the project.

The Service further requests that the BRT remain involved throughout the remaining project design in order to provide recommendations on how the Corps can best meet the projects objectives and to keep the Corps apprised of the evolving science related to Pallid Sturgeon use of side channels as it relates to potential bypass channel design improvements.

It is my anticipation that the Service will continue to work closely with the Corps during the post-construction warranty period as you verify the bypass channel performance. We think that our continued involvement will be beneficial in helping to achieve pallid sturgeon passage, and would provide valuable lessons learned as we work with the BOR to develop a monitoring and adaptive management plan to ensure the long-term performance of the bypass channel.

As we have discussed previously, this project represents the most biologically superior project in the upper Missouri River Basin for the recovery of the Pallid Sturgeon. I appreciate your commitment to this effort to date and look forward to completing design and construction of the remaining features for a successful fish bypass project.

Sincerely,

Regional Director