



## Independent Scientific Review Panel

for the Northwest Power & Conservation Council  
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**Memorandum [2017-3]**

**March 7, 2017**

**To:** Tony Grover, Fish and Wildlife Division Director, Northwest Power and Conservation Council

**From:** Steve Schroder, ISRP Chair

**Subject:** Initial impressions on seven responses to the Council's Request for Information about White Sturgeon

### Background

In a March 2, 2017 e-mail message from Lynn Palensky, Council staff asked the ISRP for initial impressions on responses to the Council's [Request for Information about White Sturgeon](#) (RFI). The Council released the RFI on January 13, 2017 and received seven responses from six entities by the RFI's February 28, 2017 deadline. Through the RFI, the Council and Bonneville asked sturgeon managers and researchers to submit information (1 to 3 pages) for one or more of the following activities:

- Conduct white sturgeon population status assessments in the lower Snake or Columbia rivers.
- Assess white sturgeon spawning habitat availability and use in the lower Snake or Columbia rivers.
- Pilot the feasibility of sampling and enumerating white sturgeon larva abundance in the lower Snake or Columbia rivers.
- Assess the magnitude and extent of sturgeon predation below Bonneville Dam.

The seven responses, together, proposed potential studies that would address each of these four activities. These responses are not full proposals, and the Council requested the ISRP's initial impressions in just four working days. Consequently, the full ISRP did not have time to participate in this review and this is not a standard, consensus ISRP proposal review. Instead, three ISRP reviewers evaluated the responses and provided initial impressions on what potential benefits the responses might offer and what information is needed in a full proposal to justify the potential actions. We share our impressions to help inform the Council's deliberations on how to proceed with potential project selection.

These linked documents were available for our review:

- [The seven proposal summaries](#)
- [Sturgeon Request for Information](#) (RFI)
- RFI process document outlining the draft [schedule and review process](#)
- [Sturgeon actions](#) from the Fish and Wildlife Program
- Columbia Basin White Sturgeon [Planning Framework](#)
- [Sturgeon Critical Uncertainties](#)

## Overall Comments

In general, the RFI responses have merit and are innovative, at least in the sense that they propose several cutting-edge technologies to aid in our understanding of sturgeon and potentially to improve their management. The responses are very method-driven, rather than question-driven. They describe how information and analyses will be performed rather than emphasize what we need to know and why that is important for sturgeon management. If implementation of the studies described in these responses is pursued, it is important that these new methods be optimized for their benefit to sturgeon and that full proposals and realistic, testable hypotheses be developed. Without that approach, improvements in sturgeon management under the Fish and Wildlife Program will not necessarily occur.

## Comments on the Seven RFI Responses

The background information (Proponent, RFI activity, etc.) provided under each of the seven response titles came from a table in the Council staff's March 2 e-mail.

### 1. White Sturgeon Population Status Assessments for Isolated at-Risk Populations in the Lower Snake River Impoundments

**Proponent:** WDFW, et.al

**RFI Activity:** 1

**Estimated Budget:** 2018 = \$193k; 2019 = \$157k

**Implementation Timeframe:** Ice Harbor 2018, Lower Monumental 2019

**Existing BPA Project Relationship:** 198605000

**Short Description:** Stock assessment between Ice Harbor and Lower Granite Dams

#### **ISRP Comment:**

Over a decade has passed since rigorous population assessments for white sturgeon have occurred in these reservoirs. Sound data on the status of white sturgeon populations in the three impoundments are needed by managers, especially with the indications of declines in populations over the last few decades and the closure of white sturgeon fisheries in 2015. An important element of this work would be the estimation of individual white sturgeon growth rates in the reservoirs. The White Sturgeon Hatchery Master Plan states that white sturgeon rearing in Snake River reservoirs grow rapidly (page 50) due to low population densities. This implies that white sturgeon in Snake River reservoirs are not limited by food, but are recruit limited and populations will be expected to respond to hatchery supplementation. The proponents also hope to re-capture white sturgeons that were marked with oxytetracycline (OTC). If this can be done, it may be possible to validate aging methods that utilize pectoral fin ray growth patterns. However, it may be difficult to recapture OTC-marked fish and OTC marks can be challenging to detect. The response states that an adaptive management framework will be used (i.e., Implementation Activity, item 5). Critical components of adaptive management would need to be emphasized in a full proposal. These include: quantitative objectives for the white sturgeon populations in the three reservoirs, timelines associated with each objective, metrics to assess population status and trends, and field and laboratory methods to estimate the metrics. Further, and perhaps most importantly, the administrative process for assessment of population monitoring data and making decision regarding white sturgeon management into the future would need to be described. At least one element of the Implementation Activity (e.g. number 4, collect and archive genetic samples...for future analysis) would require explanation of how and when these data would be

incorporated into the adaptive management process in the future. This is a project that ultimately should evolve into a stable monitoring program.

## 2. Discovery and Development of a Genetic Marker for Sex Determination in White Sturgeon

**Proponent:** CRITFC and Yakama Nation

**RFI Activity:** 1

**Estimated Budget:** \$150k

**Implementation Timeframe:** August 2017 - December 2018

**Existing BPA Project Relationship:** 200850400

**Short Description:** Development of a genetic marker for sex determination

### **ISRP Comment:**

The use of a genetic marker to determine sex would be a valuable tool for white sturgeon managers across the basin. As the proponents point out, the method could be used to determine sex ratios by size and age classes including young-of-the-year, determine sex-specific traits (length at age for each sex), examine maternal contributions to populations, and so on. This information would refine demographic profiles of the Basin's white sturgeon populations. For example, differences in growth rates and size of maturation in males and females could influence slot sizes and effort in fisheries as it would reveal how vulnerable each sex might be to harvest. It also provides a way for field crews to easily obtain sex ratio information on sampled and harvested white sturgeon in a non-invasive manner. Questions to be addressed in a full proposal include: (1) Once the marker is identified, will the marker be 100% accurate? (2) How rapidly can the method be applied in a hatchery or field setting? and (3) How costly would analysis be per fish sampled? The proponents discuss the benefits from a conservation aquaculture perspective, but production aquaculture (e.g., sturgeon for caviar) would also gain substantially from being able to identify sex of white sturgeon early in life. They could then cull males and save feed costs associated with producing mature females for caviar. Conservation aquaculture would benefit in a similar way. Past work on sex identification using plasma steroid levels was funded by the U.S. Department of Agriculture by investigators tied to commercial aquaculture interests. It is worth asking if the USDA would be interested in contributing to such research. The proponents point out that a side product of developing such a sex identification marker will be the production of a high quality reference genome. The existence of this genome opens up a number of research opportunities for this species, including trait monitoring which may prove very useful in recovery planning. Details on how they will assemble the reference genome and the approach they plan on using to search out the genetic mechanisms (e.g. the location of the sex determining locus) responsible for determining sex in sturgeon should be included in a full proposal. The proponents anticipate that the technology can be developed within 12-18 months. However, it is unclear if the \$150,000 budget would be sufficient. It is important that the technology would not be proprietary and that it be available to all involved in white sturgeon management and culture.

### 3. White Sturgeon Spawning Habitat and Use in the John Day Reservoir

**Proponent:** ODFW, et.al

**RFI Activity:** 2

**Estimated Budget:** 2018 = \$90k; 2019 = \$76k

**Implementation Timeframe:** 2018-2019

**Existing BPA Project Relationship:** 198605000

**Short Description:** Tagging, tracking, and analysis to assess spawning staging areas, behavior and habitat in John Day reservoir

#### **ISRP Comment:**

The response has several goals: identify sturgeon spawning grounds in the John Day reservoir, examine the thermal preferences of sturgeon, and document the behavioral patterns of spawning sturgeon while residing on spawning grounds. The suggested research could add substantially to understanding of spawning habitat needs, particularly water temperature, of white sturgeon and inform management efforts in the Columbia River. The use of network or graph theory to consolidate and describe behavioral movements on spawning grounds is a promising and innovative approach. Documenting how sturgeon respond to varying temperature regimes is an important addition as it could potentially provide information on how fish behavior or habitat preferences change during periods of rising water temperatures which could affect hydrosystem operations. The identification of spawning areas will make it possible to protect such areas and also identify where hatchery programs may wish to collect larva.

The response states that 30 adult white sturgeon in the John Day Reservoir would be tagged with acoustic transmitters. Ten to twenty of the tags would be equipped with temperature sensors. It is unclear why only a portion of the fish would be tagged with temperature sensors. Tagging all fish with temperature sensors would not add greatly to the budget. In addition, the number of fish to be tagged should be carefully considered; it is not clear 30 is enough for determining spawning locations. There is no mention of determination of the sex of fish at tagging. Would gonadal examination be attempted? This is an example of how development of a genetic marker to determine sex could be useful in research and management. Given the fact that the project proponents would provide both fixed and mobile receivers, a major cost element is provided as in-kind support. The budget for the project appears to be a bargain. It should be noted that transmitters with a 10-year life expectancy would be used; consequently, data extending beyond the 2-year duration of the proposed project could be obtained. There is also a long history worldwide of conducting telemetry studies for identifying sturgeon spawning sites, and these studies would need to be carefully reviewed before proceeding. Many researchers have sought spawning sites but most have not found consistent, focused spawning areas.

#### 4. White Sturgeon Spawning Investigations

**Proponent:** Golder Associates

**RFI Activity:** 2 and 3

**Estimated Budget:** \$87k

**Implementation Timeframe:** May 2017-June 2017

**Existing BPA Project Relationship:** None

**Short Description:** Conduct spawning monitoring (larvae collection) below Ice Harbor Dam

**ISRP Comment:**

The response is to study white sturgeon spawning downstream from Ice Harbor Dam. This was the site of a similar study in the mid-1990s by the USGS. Sampling methods would be similar to those used by the USGS. The techniques (mats, D-rings) have been widely used and have been successful in collecting eggs and larvae. The research does not appear to be novel. It appears to be a repeat of work conducted two decades ago. To aid management, it is critical that the results translate into a meaningful and effective index of annual reproductive success, as well as factors resulting in inter-annual differences. Sampling intensity and metrics to be used to describe densities of eggs and larvae collected with mats or free embryos and larvae with D-ring drift nets are unknown. It is not evident how this study would contribute to either monitoring or management of white sturgeon in a meaningful way. Substantial explanation of how the data would contribute to recovery would be needed in a full proposal. The issue of recruitment needs to be addressed, which is different from egg deposition and larval fish abundance. It is important to indicate specifically what various results might imply in terms of management action.

#### 5. Simulate White Sturgeon Early Life History in Columbia Basin Reservoirs

**Proponent:** Pacific Northwest National Laboratory (PNNL)

**RFI Activity:** 3

**Estimated Budget:** Not given

**Implementation Timeframe:** Jan 2018-Dec 2019

**Existing BPA Project Relationship:** 199502700 (collaboration only)

**Short Description:** 2D model on effect of river flows and transport on juvenile sturgeon above Grand Coulee (to understand recruitment failure)

**ISRP Comment:**

The goal of this response is to develop an agent-based model (ABM) also referred to as an individual based model (IBM) and use it to simulate the effects of river hydrodynamics on the transport and fate of juvenile (3< month-old white sturgeon). It would be built to make estimates for white sturgeon above Grand Coulee Dam. The proponents describe, that once developed, it could be adapted for use in other river reaches if sufficient hydrodynamic data exist. Model outputs would be used to determine potential factors that limit recruitment success. This model might be combined with the multi-layered sturgeon spawning habitat model being proposed by USFWS/USGS. The proponents could see if PNNL researchers would be willing to collaborate with USFWS/USGS personnel to develop a linked model that could be employed by sturgeon managers to evaluate how environmental conditions influence spawning and subsequent larval success. A full proposal would have to address: (1) how the model can contribute to the recovery of white sturgeon within reservoirs, (2) a detailed description of the model and the available data to be used to calibrate the model, and (3) how the model could be adapted to river-reservoir reaches downstream from Grand Coulee Dam. It is questionable that adequate data exist to produce meaningful model outputs.

## 6. Lifecycle Acoustic Transmitters for White Sturgeon

**Proponent:** Pacific Northwest National Laboratory

**RFI Activity:** 2

**Estimated Budget:** Not given

**Implementation Timeframe:** Jan 2018-Dec 2019

**Existing BPA Project Relationship:** None

**Short Description:** Implant long-lived (no battery) acoustic tags for tracking sturgeon, a new technology

### **ISRP Comment:**

Work is being done to develop an energy harvesting transmitter (EHT) acoustic tag that may be able to transmit signals throughout the life of a tagged fish. Consequently, the tag may provide information about the seasonal movements of white sturgeon throughout its range. The tag has the potential to be an exciting and innovative breakthrough in tracking the movements of long-lived fishes. The response seems to address a proof of concept study (i.e., field testing). It seems that the first step in testing EHT tags would be evaluation of performance under controlled conditions in a laboratory or fish hatchery. Field testing would progress following confirming results under controlled conditions. Information is needed on tag size, means of application, minimum fish size for tagging, mortality estimates, effect of tags on growth and behavior, and other factors prior to large-scale field testing. This type of work, if not already done, should be described and carried out prior to releasing EHT-tagged fish into rivers.

## 7. Sturgeon Population Status, Spawning Habitat and Predation

**Proponent:** USFWS & USGS

**RFI Activity:** 1, 2, and 4

**Estimated Budget:** \$230k

**Implementation Timeframe:** May 2017 - 2019

**Existing BPA Project Relationship:** None

**Short Description:** Scope 1: eDNA to assess tributary use in Lower Col; Scope 2: Construct and test spawning habitat models; Scope 3: Assess feasibility of side scan sonar and u/w video to locate carcasses below BON

### **ISRP Comment:**

Three separate projects are suggested.

One response addresses white sturgeon population status, particularly the use of three tributaries in the lower Columbia River by white sturgeon. The proposal is to use eDNA to confirm the use of the tributaries by the population of white sturgeon in the Columbia River. It is not clear how this knowledge would contribute to recovery of the species or if eDNA technology is sufficient to determine presence and/or density of the species in the tributaries under varying flows. If it was determined that eDNA for white sturgeon was present in any or all of the tributaries, it is not evident what it would mean in terms of knowledge or management. Substantial development of hypotheses, methods, and utility of research findings would need to be included in a full research proposal. In a full proposal, could it be indicated if it is possible to estimate abundance as well species presence using eDNA. Work with eulachon in B.C. suggests that eDNA has been successfully used to estimate abundance.

A second response addresses white sturgeon predation by pinnipeds in the lower Columbia River and the need to identify white sturgeon carcasses on the river bottom. Underwater video would be used to verify any targets picked up by sonar scans. This project could contribute to the determination of the extent to which pinniped predation contribute to white sturgeon decreases in abundance.

A third response is to study the spawning habitat needs of white sturgeon in different segments of the Columbia River using habitat models. Existing data would be used in the development of the models. The models would provide predictions of spawning locations and habitat suitability maps at varying flows. The models could address a variety of management scenarios, particularly varying flows. There could be substantial utility to this work. However, it is not possible to assess the modeling effort or if there is sufficient data to calibrate the models without more detail in a full proposal. It appears that such data may only exist in a few locations, e.g., above Bonneville Dam, adjacent to McNary Dam, and on a portion of the Kootenai River. If developed, the model could be used by managers to ascertain the importance of physical parameters on survival and recruitment. It may be possible to combine this habitat model with the IBM model being developed by PNNL personnel.