BONNEVILLE POWER ADMINISTRATION

White Sturgeon Mitigation and Restoration in the Columbia and Snake Rivers Upstream from Bonneville Dam

March 28, 2003

Preliminary Environmental Assessment

DOE/EA-1367

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1. PURPOSE AND NEED FOR ACTION

1.1 INTRODUCTION

Development of the hydropower system in the Columbia River Basin has had far-reaching effects on many species of fish and wildlife. The Bonneville Power Administration (BPA) is responsible for protecting, mitigating, and enhancing fish and wildlife affected by the development, operation, and management of Federal hydroelectric facilities on the Columbia River and its tributaries. (See **Pacific Northwest Electric Power Planning and Conservation Act**[1] (Northwest Power Act), 16 U.S.C. 839 et seq., Section 4.(h)(10)(A).). BPA meets this responsibility, in part, by funding projects identified through a regional process led by the Northwest Power Planning Council (Council).

One of the measures recommended to help mitigate for fish loss and reduced habitat is the **White Sturgeon Mitigation and Restoration in the Columbia and Snake Rivers Upstream from Bonneville Dam Project.** The project is jointly proposed by the Oregon Department of Fish and Wildlife (ODFW), the Washington Department of Fish and Wildlife (WDFW), U.S. Fish and Wildlife Service (USFWS), Columbia River Fisheries Program Office, U.S. Geologic Survey (USGS) Biological Resources Division, and the Columbia River Inter-Tribal Fish Commission (CRITFC).

The project proposes to continue to carry out research, artificial propagation, and transport of white sturgeon to less densely populated areas of the river(s) and hatchery rearing. Additionally, release of hatchery-reared juveniles is proposed. Actions will take place in the following Columbia River mainstem reaches: Bonneville, The Dalles, John Day, and McNary Reservoirs; Hanford Reach, as well as the Wanapum and Rock Island Reservoirs; and the following Snake River mainstem reaches: Ice Harbor, Lower Monumental and Little Goose Reservoirs. The USFWS Fish Technical Center (Abernathy Fish Technology Center, AFTC) near Longview, Washington is being used for this project. The project, its alternatives, and its potential impacts are analyzed in this Environmental Assessment (EA).[2] The successes of the proposed activities and the resulting information acquired would help the project proponents determine how to move ahead with future projects aimed at protecting and mitigating white sturgeon populations in the Columbia and Snake Rivers.

[1]Words in **boldface** in the text are defined in the Glossary.

[2] For more information on analysis requirements under the National Environmental Policy Act, please see Section 4.

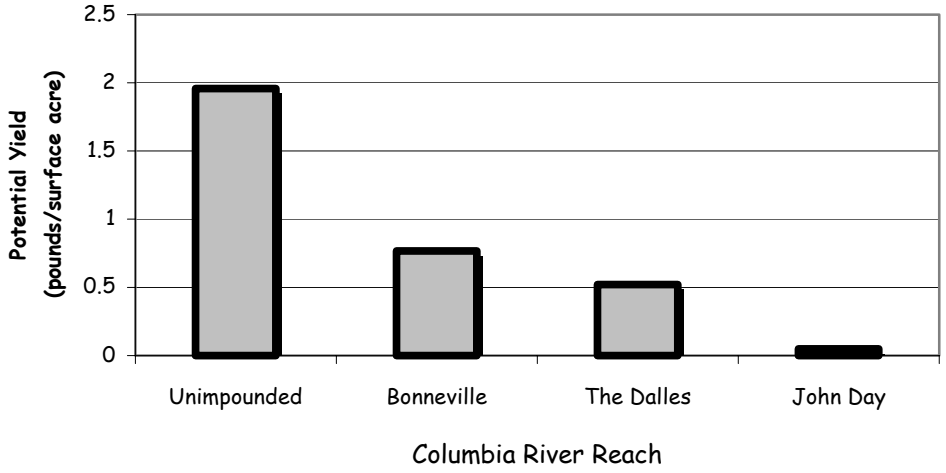
1.2 NEED FOR ACTION

There are no historic estimates of white sturgeon abundance before the non-Native Americans began to settle in the Pacific Northwest and the Columbia River Hydrosystem was developed. Historically, white sturgeon ranged freely up and down the Columbia and Snake Rivers (Bajkov 1951) and undertook extensive seasonal migrations among riverine habitats to take advantage of scattered and seasonally favorable resources.

Construction of dams on the Columbia and Snake Rivers from 1931 to 1968 segregated groups of white sturgeon into a series of functionally discrete populations (North et al. 1993). Development of the Columbia River Basin hydrosystem created impoundments (reservoirs) throughout the basin, restricting movements of white sturgeon and two of their principal food sources (eulachon and lamprey). Development has also degraded or destroyed white sturgeon spawning and rearing habitat. As a result, many impounded white sturgeon populations are not as productive as they were before non-Native American settlement of the region and development of the hydrosystem. In some upper Columbia River Basin reaches, isolated populations may face **extirpation** or extinction (Beamesderfer et al. 1995, North et al. 1993, Parsley and Beckman 1994, Parsley et al. 1993).

The consequences of hydrosystem development on white sturgeon populations are best illustrated in the graph below (Figure 1). The free-flowing reach below Bonneville Dam serves as a reasonable surrogate for the historic potential production; the comparison with other reaches shows distinct differences in production potential. The most important factors influencing those differences were (1) reduced growth rates in Bonneville Reservoir and (2) reduced **recruitment** (successful spawning, hatching, and survival of young fish) in The Dalles and John Day Reservoirs.

Figure 1: Potential sustainable harvest for white sturgeon in the Columbia River downstream from Bonneville Dam (unimpounded) and in the three reservoirs immediately upstream. Potential yield is estimated from area-specific annual recruitment, growth rates, and natural mortality.[3]



1.3 PURPOSES

BPA has identified the following purposes for participating in this project. BPA will base its choice among alternatives on these purposes:

- Follows Council's recommendations on sturgeon.
- Administrative efficiency and cost-effectiveness.
- Avoidance or minimization of adverse environmental impacts.
- Potential to restore and mitigate for documented lost white sturgeon productivity caused by development and operation of the hydropower system.
- Complement activities of fish and wildlife agencies and appropriate tribes.
- Consistency with the legal rights and cultural traditions of the appropriate tribes in the region.
- Potential to coordinate sturgeon studies in the region to avoid duplication of effort.

1.4 RELATED DOCUMENTS

The research portion of this project has been underway for several years. **Categorical Exclusions** (CX) were completed to meet the National Environmental Policy Act (NEPA)

[3] To facilitate comparisons among river reaches, estimates of population productivity (potential yield as sustainable harvest presented here as pounds per reservoir surface acre) have been used to estimate losses attributed to the hydrosystem. Potential yields were estimated from specific reproductive, mortality, growth, and recruitment characteristics of each population (Beamesderfer et al. 1995).

requirements for research activities. The future activity being planned for this project is the release of hatchery-raised white sturgeon. This EA is being completed to meet the NEPA requirements for this activity.

Additionally, Endangered Species Act (ESA) consultations have been completed for this project. A brief history of these consultations follows:

- Biological Assessment, 1997
- National Oceanic and Atmospheric Administration, National Marine Fisheries Service (NOAA-Fisheries) concludes informal consultation and concludes that activities proposed are not likely to adversely affect listed salmonids, November 1997.
- Application for incidental take, July 13, 1998.
- NOAA-Fisheries issues Biological Opinion and completes consultation stating that the proposed activity is not likely to jeopardize the continued existence of listed salmonids species, October 13, 1998.
- BPA letter to USFWS concluding that sampling work planned for this project would have no effect on bull trout, September 1998.
- Re-initiation of consultation with NOAA-Fisheries, including field activities relating to **broodstock** collections, March 1999.
- Re-initiation of consultation with NOAA-Fisheries, including newly listed stocks of salmonids, April 1999.
- NOAA-Fisheries completes formal consultation and determines that additional activities associated with this project will not increase take of listed salmonids and affirmed the terms and conditions in the 1998 Biological Opinion, November 1999.
- Report to NOAA-Fisheries that sampling conducted in fall 2001 resulted in over-take of listed juvenile salmonids, April 2002.
- NOAA-Fisheries acknowledges that BPA notified them that the allowed incidental take of listed juvenile salmonids was exceeded in April 2002.

CXs completed:

- Young of Year, BPA**,** November 7, 1997.
- Population Assessment and Indexing, BPA, June 12, 1998.
- Trawl and Haul, BPA, October 16, 1998.
- **Broodstock** Collection, BPA, March 26, 1999.
- Young of Year, BPA, December 2, 1999.

1.5 DECISIONS TO BE MADE

BPA must decide whether to fund the **White Sturgeon Mitigation and Restoration in the Columbia and Snake Rivers Upstream from Bonneville Dam Project**. Under the Northwest Power Act, BPA receives recommendations from the Council to fund projects that mitigate for hydrosystem impacts on Northwest fish and wildlife habitat. Prior to making its decision, BPA

is required under NEPA to examine the environmental effects of the project and determine whether they are significant. If they are found not to be significant, a Finding of No Significant Impact (FONSI) is issued and work may proceed. If they are found to be significant, BPA cannot implement the proposed action without analyzing it in an Environmental Impact Statement (EIS).

2. ALTERNATIVES

To meet the need for mitigating lost sturgeon habitat and restoring white sturgeon in the Columbia and Snake Rivers in a manner consistent with the objectives of the Council's Program, BPA is considering a proposal to fund the White Sturgeon Mitigation and Restoration in the Columbia and Snake Rivers Upstream from Bonneville Dam Project. The project described within this document qualifies as a resident fish and research project as defined by the Council.

2.1 BACKGROUND

White sturgeon (*Acipenser transmontanus)* are the largest North American sturgeon. They live in rivers from central California to southern Alaska and migrate among them via the Pacific Ocean. In the Columbia River they historically ranged from the ocean up into Idaho, Montana, and Canada. White sturgeon can live for over 100 years, can be 20 feet long, and can weigh over 1500 pounds. Their skeleton is largely cartilage and they have thick skin and bony plates, called scutes, instead of scales. Sturgeon appeared in the fossil record 200 million years ago and have survived to the present relatively unchanged. Female sturgeon spawn at 20-25 years of age (males are about 12 years old), and can produce 300,000-4,000,000 eggs. Of these, less than 0.1% will survive the first year. (Wydoski 1979).

White sturgeon are not usually a ceremonial fish for tribes in the region, but are used for subsistence or commercial purposes. They were over-fished in the late 1800s and populations diminished enough to warrant restoration actions. By the mid 1900s populations recovered enough to support commercial and recreational fisheries. Construction of Columbia River Basin dams have severely restricted movements of white sturgeon and two of their principal food sources eulachon, (*Thaleichthys pacificus)* and Pacific lamprey, (L*ampetra tridentata)* and degraded or destroyed spawning and rearing habitat.

As a result, many impounded white sturgeon populations are not as productive as they were before development of the hydropower system. In some upper Columbia River Basin reaches, isolated populations may face extirpation.

Actions to protect and restore populations and mitigate for effects of the hydropower system on productivity of white sturgeon have been called for in the "Columbia River Fish Management Plan" (US v. Oregon), in "Wy-Kan-Ush-Mi Wa-Kish-Wit" (the anadromous fish restoration plan of the Nez Perce, Umatilla, Warm Springs, and Yakama tribes), and in the "Multi-Year Implementation Plan" (Columbia Basin Fish and Wildlife Authority 1997 Draft). Recommended actions from earlier work are described in "A Review of Alternatives for the Restoration and

Management of White Sturgeon Populations and Fisheries in the Columbia River between Bonneville and McNary Dams (Zone 6)" (DeVore et al. 1995). These recommendations are being implemented and assessed under this project as specific measures that can protect and mitigate populations and productivity of white sturgeon in the three-pool area between Bonneville and McNary Dams.

Since 1986 ODFW, WDFW, USGS, USFWS and CRITFC have been gathering data and studying habitats, movements, population dynamics, feeding, and distribution of white sturgeon in the Columbia River system. See Appendix B for a list of previous accomplishments. Much of this field work has been completed on the Columbia River reach between Bonneville and Priest Rapids Dams, and on the Snake River between the mouth and Lower Granite Dam. Ongoing Federal Energy Regulatory Commission (FERC) re-licensing studies continue to confirm the existence of small populations (less than 1,000 individuals) with few juveniles or sub-adult fish present.

The study goals of the proposed project correspond to those of the "White Sturgeon Research Program Implementation Plan" (Plan) developed by BPA in cooperation with State and Federal fishery agencies, tribes, universities, and the private sector, and approved by the Council in 1985. The earlier phases of the study focused on gathering high-priority information in high-priority areas, as designated in this plan. The study also addresses research priorities described in the White Sturgeon Management Framework completed by the Pacific States Marine Fisheries Commission in 1992.

2.2 PROPOSED ACTION – WHITE STURGEON MITIGATION AND RESTORATION IN THE COLUMBIA AND SNAKE RIVERS UPSTREAM FROM BONNEVILLE DAM

With the decline in anadromous salmonid runs there has been an increase in the importance of the white sturgeon fisheries. Since 1986, ODFW has been working to determine the cause of white sturgeon declines in the reservoirs and to take actions that will restore abundance and productive fisheries. Over time, project goals have changed as new information clarified potential restoration actions.

The focus for this phase of the project is to continue with activities that involve testing to determine the most successful ways of spawning and rearing white sturgeon as well as moving fish from parts of the river where their recruitment rates are higher to parts of the river where recruitment rates are low. Additionally, this phase of the project proposes the release and monitoring of hatchery-raised white sturgeon.

With the continued analysis of research information being collected, the project proponents anticipate that recommendations for actions involving changes to hydropower system operation and configuration to optimize physical habitat conditions for white sturgeon will eventually be made. However, such recommendations are not being made at this time and will not be analyzed as part of this document.

2.2.1 Transplanting of Juveniles

Historically, white sturgeon moved seasonally up and down the Columbia and Snake Rivers. However, construction and operation of the dams and the associated impacts on the natural hydrograph have restricted these movements and isolated the white sturgeon populations. The channel characteristics downstream from McNary and John Day Dams are substantially different than those from The Dalles and Bonneville Dams. In low-water years, the flows in the McNary and John Day Dams do not provide adequate water velocities to provide for good spawning conditions and recruitment of young sturgeon. Conversely, the channel characteristics in tailraces of The Dalles and Bonneville Dams provide adequate velocities even in most low-flow years. Thus, recruitment of white sturgeon in the free-flowing section of the Columbia River and Bonneville Reservoir is generally not a problem. However, sturgeon populations in The Dalles and John Day Reservoirs are sensitive to low-flow years and commonly experience periods of poor recruitment.

Each fall, up to 10,000 juveniles are transplanted from below Bonneville Dam to The Dalles and John Day Reservoirs. A commercial trawler collects the fish, and ODFW hauls them in a fish-liberation truck and releases them at designated locations. The fish are marked prior to release so they can be tracked.

Transplanting juvenile white sturgeon from apparently fullyseeded habitat downstream from Bonneville Dam to under-seeded habitat in The Dalles and John Day Reservoirs may have three beneficial effects: 1) increased yield in the three impoundments downstream from McNary Dam, 2) increased recruitment of broodstock, and 3) restoration of some population mixing that occurred prior to impoundment. Genetics studies done by the University of Idaho indicate that the fish transplanted from below The Dalles Dam to locations above the dam are considered to be genetically the same or similar as the fish already located above the dam (Anders and Powell 2001). However, there is concern that the isolation of the populations caused by the construction of the dams coupled with low recruitment in the upper reservoir could have impacts on genetic diversity.

2.2.2 Broodstock Collection, Spawning and Rearing and Releasing

This project also proposes to determine if native white sturgeon can be successfully collected, spawned, and the progeny reared in a hatchery and released as another step towards mitigating for white sturgeon losses on the Columbia and Snake Rivers.

A Hatchery and Genetic Management Plan (HGMP) for this project has been developed by CRITFC. It states, “The purpose of the propagation component of the program is to develop techniques and protocols in preparation for supplementing white sturgeon populations in areas of the Columbia and Snake rivers where recruitment has been lost due to development and operation of the hydropower system. The performance standards corresponding to this purpose as defined in NPPC (1999) are to:

1. Conduct research to improve the performance and cost effectiveness of artificial propagation efforts and to minimize risks.
2. Avoid mortality risks to wild broodstock at capture and spawning.
3. Avoid disease introduction or increase in disease incidence in the wild population." (CRITFC 2002).

Benefits of the sturgeon hatchery program include: 1) the determination of the best methods to propagate juvenile white sturgeon using wild white sturgeon as broodstock, and 2) the evaluation to determine the best release strategies with the potential benefit of developing a mitigation plan for the upper Columbia River reservoirs via hatchery-released white sturgeon. The release of three consecutive age classes will allow evaluation of release strategies and cost-benefit analysis of future supplementation efforts. A method to determine performance standards for the releases has been designed. (CRITFC 2002).

A comprehensive monitoring and evaluation of hatchery fish in the wild following release will address these performance standards. Numbers and mortality of juveniles are tracked throughout the rearing process. Two years of field sampling will be implemented to recapture and evaluate hatchery-reared fish and any wild-produced fish. Data on numbers, lengths, weights, and marks will be used to estimate survival and growth rates. Comparison of wild numbers, if any, with known hatchery-release numbers will also provide empirical estimates of natural recruitment rate. Growth and condition factors will also provide an index of density dependent effects that could affect productivity of the wild population. Excess eggs and hatchery-reared fish also provide a source of experimental fish for contaminant assessments, animal health research, *in situ* hatching experiments, and other research that might provide insight into factors limiting the wild population. (CRITFC 2002).

2.2.2.1 Options for Sources of Breeding Stock

Two options for obtaining broodstock for the program have been proposed:

1. Using native fish caught in the river.
2. Purchasing white sturgeon **fry** from a licensed aquaculturist.

The researchers' preference is to collect and spawn wild adult white sturgeon broodstock. Artificial propagation techniques are being developed and refined to produce juvenile sturgeon for use in limited research releases. Wild broodstock collection and spawning activities began in Fiscal Year (FY) 1999 and will continue through FY 2003. Limited releases of hatchery-reared fish are proposed from FY 2003 through FY 2006. Evaluation of the effectiveness of various release strategies (age of fish at release) will occur from FY 2007 through FY 2009. (Note: A female was successfully spawned in 2001, but due to substantial losses of juveniles in the winter of 2001-2002, there were no juveniles available for release in 2002.)

To date, most broodstock have been wild fish captured from McNary Reservoir during setlining by CRITFC and WDFW, although a female collected below Bonneville Dam in 2002 was spawned as part of this project. Males and females are captured from March through May in

areas containing pre-spawning aggregations. The locations of these aggregations have been confirmed by the previous three years of broodstock sampling. Annual collection of late **vitellogenic** females and reproductively mature males from these areas, and subsequent spawning of these fish in the hatchery, suggested that fish spawn throughout the entire spawning season and congregate simultaneously in these same areas prior to spawning. Therefore, the broodstock-sampling regime incorporates spawning fish from the duration of the spawning run.

Fish are held for spawning at McNary Dam. This facility uses only Columbia River water. Two independent water sources ensure a redundant system flow for all holding tanks with one source from the river and the other from the juvenile fish facility. One female was successfully spawned in 2001, and another female was also spawned in 2002. Fish are returned to the wild to spawn again.

In the event that spawning of wild broodstock collected from the Columbia River is not successful, newly hatched sturgeon fry may be purchased from a certified aquaculturist in the region that is licensed to raise and sell Columbia River white sturgeon. Due to the presence of only one female in the hatchery in 2002, 50,000 newly hatched fry were purchased to ensure there would be juveniles in the event the spawning was not successful. In fact, the female was successfully spawned; thus there are currently juveniles available from both groups.

Table 1: Broodstock Sample Size

Forty three males and eight females have been collected for broodstock since 1999.

Year	Males	Females	Females Spawned
1999	6	2	1
2000	14	2	0
2001	23	4	1
2002	23	2	1

Broodstock collection may also occur in 2004 if the 2003 spawning season is unsuccessful.

The actual sample size each year is dictated by fishing success. The target number for collection each year is approximately 24 males and 6 females. This number allows for several potential crosses and the likely possibility that some females will not be sexually mature enough to spawn or will undergo re-absorption of the eggs or **atresia,** if water temperatures increase to 19 degrees C.

When spawning was attempted at AFTC, the females would mature in August, but the males were no longer ripe. Putting the fish at the McNary facility where the hatchery is supplied with natural river water solved this problem. The result was that the males and females would mature at the same time, also called sychronous timing. The juvenile rearing room at AFTC also limits the number of potential male and female spawning combinations.

This is a research project and as such the goal is to learn as much as possible about holding, maturing, and spawning white sturgeon, while producing sufficient numbers of juvenile sturgeon for the research design.

2.2.2.2 Options for Raising Progeny

White sturgeon progeny are being raised in a hatchery setting as part of the research portion of this project. Successful hatchery rearing of progeny would provide useful information for the hatchery rearing of white sturgeon on a larger scale. One of the goals of the project is to develop recommendations for densities and lighting conditions in rearing facilities necessary to optimize growth, feed utilization, health, and survival of juvenile white sturgeon. Designs for effective water recycling and reclamation systems for use in white sturgeon rearing facilities may also be developed through this project. Sturgeon spawned for this project would be reared at AFTC. The adults will be spawned at McNary Dam and the newly fertilized eggs will be transferred to AFTC for incubation, hatching, and rearing.

2.2.2.3 Releasing Hatchery-Raised Juveniles

Hatchery-reared white sturgeon would be released into impoundments where recruitment has been lost or severely reduced to test hypotheses regarding strategies to restore and enhance recruitment-limited populations of white sturgeon in the Columbia River. Anticipated survival benefits given different release numbers and age at release would be documented. All releases are planned for Rock Island Reservoir, Columbia River, Washington. This reservoir has little or no natural spawning and unused rearing capacity. It is small enough to assure some success in assessing survival through a mark-recapture experiment.

Juvenile releases will occur at three age classes: age 0+, age 1+, and age 2+. Evaluation of juvenile releases will have two distinct components: (1) monitoring downstream entrainment rates and dam-passage mortality of released fish within the first 6 months of initial release using radio-telemetry and/or sonic tags, and (2) comparing survival and growth among release strategies (ages at release) 1-2 years after the final release.

A release of 12,000 hatchery-reared fish is planned for spring of 2003. Two additional releases of juvenile sturgeon will occur in 2004 and 2005 for the 2002 brood year. (See Table 2). Juvenile releases will occur at three specific age classes: age-0+, age-1+, and age 2+. Evaluation will occur in two phases: (1) monitoring downstream entrainment rates and dam-passage mortality of released fish within 6 months of initial releases using radio-telemetry and/or sonic tags, and (2) comparing survival and growth among release strategies (ages at release) 1-2 years after the final release.

All releases of hatchery-reared white sturgeon are experimental, to assess survival of specific-aged fish. Fish will be PIT-tagged and marked to identify year class and age at release. The original strategy was to rear and release a total of nine groups from 3 separate brood years:

3 groups of age 0+, 3 groups of age 1+, and 3 groups of age 2+. Originally scheduled to begin in 2002, releases will now begin in 2003 and extend through 2006, as the loss of the 2001 brood will limit the releases to a potential total of 6 age-specific groups from two spawning years.

Table 2: Schedule of planned releases of hatchery sturgeon into Rock Island Reservoir.

All releases will occur in Rock Island Reservoir within 1 kilometer (km) of Rocky Reach Dam. Size at release will vary, but most age 0+ fish will be 20-30 centimeters (cm) fork length (FL), age 1+ fish will be 30-40 cm FL, and age 2+ fish will be 40-50 cm FL. Releases will likely be scheduled in May, before peak springtime flows (to minimize entrainment into Wanapum Reservoir). A boldfaced "**X**" indicates a planned release of fish.

Age/ Release Number	Release Year 2003	Release Year 2004	Release Year 2005	Release Year 2006
Age 0+/ ~12,000	**X**	**X**		
Age 1+/ ~6,000		**X**	**X**	
Age 2+/ ~ 4,500			**X**	**X**

Release protocols will depend upon the size of the fish and water conditions. Emphasis will be on maintaining a minimal level of stress and handling during the release. Shore-based releases are planned from the transport tank and/or fish-liberation trucks for age 1+ fish, due to their relatively small size and higher numbers. As fish increase in size, water-based releases using boats, oxygenated totes, and live wells will likely be employed.

Fish will not be acclimated in a pen or other holding facility. Water temperatures will be similar (+/- 3 degrees C) between the hatchery water temperature and the river water temperature.

The numbers of fish released for each age group were chosen to address several issues. The primary reason for specific release numbers by age class is statistical validity during the monitoring and evaluation of this project. (See Table 2). To estimate mortality and entrainment, it is desirable to have sufficient numbers of juvenile sturgeon available for mark/recapture efforts to estimate the remaining numbers of fish by age class.

Thousands of sturgeon present at ages 0+ through 2+ will only number in the dozens to at the most a few hundred by the time they reach sexual maturity at age 20-25 years of age. If this research had been conducted in any of the larger reservoirs immediately upstream or downstream of Rock Island Reservoir the numbers of juvenile sturgeon necessary for a statistically valid study would have numbered in the high tens of thousands per age class per year. A minimum number needed to address factors such as survival and condition was chosen for each year based on supplementation trawl and haul recovery data in John Day and The Dalles Reservoirs, and known survival rates for juvenile sturgeon.

2.2.4 Stock Status Updates

To assess population status and progress toward recovery, white sturgeon abundance will be estimated through mark-recapture evaluations once every three years in each of three reservoirs with important sport and tribal commercial fisheries. Bonneville, John Day, and The Dalles Reservoirs are scheduled for assessments in 2003, 2004, and 2005, respectively.

2.2.5 Describe the Maturation Cycle for White Sturgeon

To determine sex, maturational status, and reproductive potential of white sturgeon in impounded and unimpounded reaches, methods will be developed to determine sex and sexual maturation level of adult white sturgeon by measuring plasma, steroid, and calcium levels. Oregon State University would collect or be supplied with tissues collected from fish harvested in commercial and sport fisheries for this research. No fish would be sacrificed specifically for tissue collection.

2.2.6 Describe the Genetic Stock Structure of White Sturgeon

Tissue samples have been collected for genetic analysis of white sturgeon in the Columbia River Basin. No fish are sacrificed for tissue collection. A small (1 cm^2) piece of pelvic fin tissue is collected incidental to other activities (stock assessment and fisheries monitoring). The tissues are then sent to University of Idaho for use in their separately funded project to describe white sturgeon genetic structure in the Columbia Basin (Assessing Genetic Variation Among Columbia Basin White Sturgeon Populations, BPA project number 199902200).

2.2.7 Annual Young-of-Year Indexing

This activity is designed to describe annual variation in white sturgeon recruitment in reservoirs. Fish are captured with trawl nets and gill nets. All white sturgeon are measured prior to release. Some fish are tagged and sampled for an age structure depending on length, reservoir, and annual sampling design. Data collected is used as an index of annual recruitment that would be correlated with observed physical habitat conditions such as total discharge, water temperature, and estimated available spawning habitat during the months of May, June, and July at selected Columbia and Snake River dam tailraces. Young-of-year sampling is planned or has been conducted at Bonneville, The Dalles, John Day, and McNary Reservoirs in the Columbia River, and Ice Harbor and Little Goose Reservoirs in the Snake River.

2.2.8 Other Activities Associated with the Project

The overall goals of this project are to (1) implement and evaluate selected measures to protect and enhance white sturgeon populations and to mitigate for effects of the hydropower system on production of white sturgeon in Columbia River impoundments downstream from McNary Dam, and (2) determine the need and identify potential measures for protecting and enhancing white sturgeon populations and mitigating for the effects of the hydropower system on production of

white sturgeon in the Columbia and Snake Rivers upstream from McNary Dam. The activities discussed above that involve fish handling will contribute substantially to project goals. Additional documents will be created using existing data that will also contribute to project goals. Current tasks to accomplish these goals include the following:

- Annual fisheries management planning and monitoring of harvest in Bonneville, The Dalles, and John Day Reservoirs.
- Complete reports on timing and development of white sturgeon embryos in relation to incubation temperature.
- Complete reports on habitat use and movements of white sturgeon.
- Complete laboratory work and reports on effects of turbidity and size on vulnerability of age-0 white sturgeon to predation.

The items listed in 2.2.8 above will utilize existing information and not require fish handling with the exception of the final bulleted task. This task would be accomplished by purchasing juvenile white sturgeon from commercial aquaculturists and using them to evaluate predation at USGS laboratory facilities in Cook, Washington. Predators (small mouth bass, channel catfish) would be collected from Columbia River reservoirs. Alternative prey (juvenile salmonids) would come from hatchery facilities.

2.3 NO-ACTION ALTERNATIVE

Under the No-Action Alternative, the White Sturgeon Mitigation and Restoration in the Columbia and Snake Rivers Upstream from Bonneville Dam Project would not be funded by BPA, and most likely would not be implemented. Under this alternative significant tribal and sport fisheries would not realize historic potential production. This alternative would not allow the completion of a comprehensive plan for addressing the research to continue regarding the causes of the low production levels of white sturgeon in the Columbia and Snake Rivers. If white sturgeon are not transported to less densely populated areas of the rivers(s), some isolated populations in the upper Columbia River Basin reaches may face extirpation or extinction. Additionally, activities to help mitigate for white sturgeon losses would not be implemented.

Table 3: Predicted Performance Summary

Decision Factor	Proposed Action	No Action
Potential to restore and mitigate for documented lost white sturgeon productivity caused by development and operation of the hydropower system.	Greater potential, as data and experience gained from this project will help shape the future of white sturgeon restoration in the Columbia and Snake Rivers.	Lower potential, as successful methods of spawning, hatchery rearing, and releasing fish would not be developed.
Potential to coordinate sturgeon studies in the region to avoid duplication of effort.	High potential to avoid redundant work and save costs, as so many agencies are involved.	May result in higher overall costs without coordination of agencies in the region.
Follows Northwest Power Planning Council's recommendations on sturgeon.	Yes	No
Administrative efficiency and cost-effectiveness.	Higher cost than No Action, but costs and administrative efficiencies are maximized through the use of existing facilities and personnel.	No cost to BPA, but efficiencies and effectiveness would not be achieved.
Avoidance or minimization of adverse environmental impacts.	Not likely to jeopardize the continued existence of listed steelhead or salmon populations (NOAA-Fisheries 1998 & 1999).	Potential impact on white sturgeon in upriver reservoirs from extirpation.
Degree to which an alternative complements the activities of fish and wildlife agencies and appropriate tribes.	Complements ODFW, WDFW, USFWS, USGS, and CRITFC positions on sturgeon restoration.	Would not complement agencies' position.
Consistency with the legal rights of the appropriate tribes in the region.	If population can be increased, would contribute to tribal fishery.	If population continues to decline, tribal fisheries would erode.

3. AFFECTED ENVIRONMENT AND ENVIRONMENTAL IMPACTS OF THE ALTERNATIVES, AND PROPOSED MITIGATION

3.1 PROPOSED ACTION – WHITE STURGEON MITIGATION AND RESTORATION PROJECT IN THE COLUMBIA AND SNAKE RIVERS

3.1.1 Water Quality and Quantity

The AFTC facility maintains the necessary National Pollution Discharge Elimination Systems (NPDES) permits from the Environmental Protection Agency (EPA). Water rights permits from the State of Washington are in place for well water, ground water, and creek water. This project is expected to function within the parameters defined by these permits. No changes to the permits are required (Holms 2002).

The McNary Dam facility uses only Columbia River water. The adult sturgeon being held for spawning at this facility are on a reuse system; thus the water is circulated through the hatchery and returned to the river. During their stay at McNary, the fish are not fed, thus diminishing the possibility of creating a water-quality problem. Therefore, neither water quality nor water rights permits are needed for the white sturgeon program at this facility (Parker 2001).

3.1.2 Floodplains and Wetlands

Floodplains and wetlands would not be affected by this project, as there would be no new construction of facilities or other actions affecting floodplains or wetlands.

3.1.3 Threatened and Endangered Species

3.1.3.1 Affected Environment

The USFWS and NOAA-Fisheries list the following threatened and endangered species that occur within the activity areas of this project

Table 4: Salmonid Evolutionarily Significant Units (ESU) of the Columbia River Basin, Listed Under the Endangered Species Act That Could Occur in the Project Area.

ESU	Taxonomic Name	Federal Status
Lower Columbia River Steelhead	*Oncorhynchus mykiss*	**Threatened**
Middle Columbia River Steelhead	*Oncorhynchus mykiss*	**Threatened**
Snake River Basin Steelhead	*Oncorhynchus mykiss*	**Threatened**
Upper Columbia River Steelhead	*Oncorhynchus mykiss*	**Endangered**
Columbia River Chum	*Oncorhynchus keta*	**Threatened**
Lower Columbia River Chinook	*Oncorhynchus tshawytscha*	**Threatened**
Upper Columbia River Spring-run Chinook	*Oncorhynchus tshawytscha*	**Endangered**
Snake River Fall-run Chinook	*Oncorhynchus tshawytscha*	**Threatened**
Snake River Spring/Summer-run Chinook	*Oncorhynchus tshawytscha*	**Threatened**
Snake River Sockeye	*Oncorhynchus nerka*	**Endangered**

Table 5: Other Species Listed Under the Endangered Species Act That May Occur in The Project Area.

• Fish	• Taxonomic Name	• Federal Status
Bull trout	*Salvelinus confluentus*	**Threatened**

3.1.3.2 Environmental Consequences

Listed Species

Bull Trout. BPA consulted with USFWS in September 1998 for a "no effect determination" for bull trout. Field sampling in the past has not resulted in any bull trout interceptions (Rien 2003). In the unlikely event of any interceptions of bull trout, field activities would cease and BPA would immediately commence consultation with USFWS.

Activities planned for the winter of 2006-2007 at Rock Island and Wanapum Reservoirs could result in the capture of bull trout. Consultation with USFWS would be completed before these activities take place.

Salmonids. White sturgeon broodstock collection is conducted in accordance with formal NOAA-Fisheries consultations. Opinions issued 10/13/1998 and 11/26/1999 found that proposed activities were not likely to jeopardize the continued existence of listed salmonids in the Columbia and Snake Rivers. The seasonal timing of field activities in conjunction with the use of specific gear types make encounters with adult or juvenile salmonids extremely unlikely. In the unlikely event of any interceptions of listed fish, field activities would cease and BPA would immediately commence consultation with NOAA-Fisheries.

3.1.4 Land Use and Visual Impacts

There would be no changes to land use or visual resources, as only existing facilities would be used.

3.1.5 Social and Economic Impacts

There would be no adverse social or economic impacts, as existing state agency staff would be used.

3.1.6 Cultural Resources

White sturgeon are not usually a ceremonial fish for tribes in the region, but are used for subsistence or commercial purposes. An increase in the white sturgeon population could contribute to the increased opportunities for tribal fishing rights. Columbia Basin treaty tribes have secured rights to this resource. There would be no adverse impacts to cultural cesources as only existing facilities would be used.

3.1.7 Fisheries Impacts

3.1.7.1 Broodstock Collection

The number of broodstock used in the program represents a very small percentage of the estimated number of adult sturgeon that may spawn in any given year. The "borrowing" of adult sturgeon for the research efforts will have no long-term detrimental effect on the McNary Reservoir white sturgeon population and will likely benefit numerous other populations of sturgeon upstream of McNary Reservoir.

3.1.7.2 Collection and Transplanting of Juveniles

No genetic impacts are expected from moving fish from below Bonneville Dam to locations above the dam. White sturgeon in different parts of the Columbia and Snake Rivers are considered to be the same genetically. They have a long life span and the dams have not been in place long enough for genetic differentiation to take place.

3.1.7.3 Genetic Impacts

No genetic impacts are anticipated from crossing hatchery fish with natural stocks as they are genetically identical; however, the broodstock in any single year represent a subset of the available population. Adverse genetic or ecological impacts from the use of wild broodstock are minimized by the use of a small fraction of the population and the live release of all fish after spawning. Fish-capture methods by angling or setlining also minimize any size selectivity associated with other capture gears such as gillnets. The fish captured thus represent a random sample from the adult population of potential spawners.

3.1.7.4 Rearing and Releasing

The greatest potential for hatchery program impacts is between hatchery and wild sturgeon. Disease transfer, genetic effects, or competition effects of a poorly conceived program might negatively impact wild sturgeon. Wild sturgeon positively impact the program by contributing source broodstock. Wild sturgeon will benefit positively from the program addition of fish to the population to prevent extirpation until successful habitat-recovery measures are implemented.

Disease risks in capture and handling are eliminated by use of sterile techniques in field biopsies and the isolation of broodstock at the holding facility. Standard hatchery equipment and facility sanitation, and fish health maintenance guidelines and procedures are followed.

3.2 IMPACTS OF NO ACTION

Under the No-Action Alternative, the White Sturgeon Mitigation and Restoration in the Columbia and Snake Rivers Upstream from Bonneville Dam Project would not be funded by BPA and most likely not implemented. Thus, previously implemented research and management actions to help mitigate for the impacts of the hydropower system on white sturgeon would not be evaluated and refined. Thus, the potential to protect this fish might be delayed or become more difficult.

Table 6. Summary of Affected Environment and Environmental Consequences

Environmental Resource	Existing Conditions	Proposed Action	No Action
Water Quality	AFTC maintains necessary NPDES permits. Water quality permits are not needed for this project at the McNary facility	AFTC and McNary JFF will be operating within the limits of existing permits even with the addition of this project.	No change
Water Quantity	AFTC has permits for water quantity from the State of Washington. Water rights permits are not needed for this project at the McNary facility.	AFTC and McNary JFF will be operating within the limits of existing permits even with the addition of this project.	No change
Floodplain and Wetlands	None currently affected.	Would not be affected, as there would be no new facilities constructed.	No change.
Threatened and Endangered Species	Several listed anadromous fish **ESU**'s and bull trout are present in the project area.	Potential minor adverse impacts; ESA consultation concludes project will not increase take of listed salmonids..	
Land Use/Visual	Facilities already existing.	No new impacts.	No changes.
Socioeconomic	None currently affected.	No new impacts.	No change
Cultural Resources	None currently affected.	May contribute to improved tribal fishing.	No change
Fisheries	Possible extirpation of white sturgeon in the Columbia and Snake Rivers.	Possible benefits to white sturgeon	Possible extirpation of white sturgeon in the Columbia and Snake Rivers.

4. PERMITS REQUIRED

4.1 APPLICABLE REQUIREMENTS

National Environmental Policy Act

This EA is being prepared pursuant to NEPA (42 U.S.C. 4321 et. seq.) and the Council of Environmental Quality (CEQ) Implementing Regulations, which require Federal agencies to assess the impacts that their proposed actions might have on the environment. Based on information in the EA, BPA will determine whether the proposal would significantly affect the quality of the human environment. If it does, preparation of an EIS is required. If it is determined that the proposal would not have significant impacts, a FONSI will be prepared.

State Environmental Policy Act (SEPA), State of Washington

This project is exempt from SEPA. WAC 197-11-835 (6) and WAC 197-11-840 (8) both allow a Categorical Exemption for the activities proposed by this project.

Threatened and Endangered Species and Critical Habitat

The Endangered Species Act of 1973, as amended, requires that Federal agencies ensure that their actions do not jeopardize Threatened or Endangered species and their critical habitats. See Chapter 3.

White sturgeon broodstock collection is conducted in accordance with formal NOAA-Fisheries consultations. Opinions issued 10/13/1998 and 11/26/1999 found that proposed activities were unlikely to jeopardize the continued existence of listed salmonids in the Columbia and Snake Rivers. In the unlikely event of any interceptions of bull trout or salmonids, field activities would cease and BPA would immediately commence consultation with USFWS or NOAA-Fisheries as appropriate.

Fish and Wildlife Conservation

Provisions of the Northwest Power Act (16 U.S.C. et seq.) are intended to address system-wide fish and wildlife losses. This project is proposed to fulfill these obligations, as part of the Columbia River Basin Fish and Wildlife Program.

Permits for Discharges into Waters of the United States

The AFTC facility currently maintains necessary NPDES permits. No permit is needed for holding adult fish for spawning at the McNary Juvenile Fish Facility (JFF).

State of Oregon or State of Washington

The States of Oregon and Washington require permits to transport eggs, juveniles, or adult white sturgeon within and across State boundaries. These are issued annually. The AFTC facility maintains a permit from the State of Washington for water quantity.

Wetlands and Floodplains Protection

This project would not adversely affect wetlands or floodplains. However, the proposed action would enhance the living values of floodplains and wetlands associated with the Columbia and Snake Rivers above Bonneville Dam.

4.2 REQUIREMENTS NOT APPLICABLE

Safe Drinking Water Act

The proposed action would not affect a sole-source aquifer. No new injection wells would be required, and no pollutants are expected to reach drinking water supplies.

Resource Conservation and Recovery Act

No hazardous materials would be used, discarded, or produced by this project. Solid wastes would be disposed of at a landfill approved by the State of Washington.

Farmland Protection Policy Act

The project would not affect any prime, unique, or other important farmland as defined in the Farmland Protection Policy Act (U.S.C. 4201 et seq.).

Recreation Resources

The proposed project would not affect Wild and Scenic Rivers, National Trails, Wilderness Areas, National Parks, or other specially designated recreational areas.

Heritage Conservation

Federal historic and cultural preservation acts including the National Historic Preservation Act (16 USC 470-470w-6), the Archeological Resources Protection Act (16 YSC 470aa-470ll), the Archeological and Historic Preservation Act (16 USE 469-469c), the American Antiquities Act (16 USC 431-433), and the American Indian Religious Freedom Act (42 USC 1996) are not affected by this project.

Executive Order on Environmental Justice

The project would not adversely affect minority or disadvantaged groups. No adverse effects on any human groups or individuals are expected. This project might have a positive impact for minority/disadvantaged tribal populations by potentially contributing to the restoration of tribal fishing rights.

Noise Control Act

The proposed project would not create noise problems.

5. CONSULTING AGENCIES

Oregon Department of Fish and Wildlife
Washington Department of Fish and Wildlife
Columbia River Inter-Tribal Fish Commission
U.S. Fish and Wildlife Service
National Oceanic and Atmospheric Administration, National Marine Fisheries Service

6. GLOSSARY

atresia: The process of re-absorption of the eggs after spawning or if spawning did not occur. Atretic eggs may exhibit marbling or discoloration as they are re-absorbed in the body cavity.

broodstock: Adult fish used to propagate the subsequent generation of hatchery fish.

Categorical Exclusion (CX): A category of actions, as defined at 40 CFR 1508.4 of regulations implementing the National Environmental Policy Act and listed in appendix A or B to subpart D of 10 CFR Part 1021, for which neither an Environmental Assessment nor an Environmental Impact Statement is normally required.

Evolutionarily Significant Unit (ESU): A distinctive group of Pacific salmon, steelhead, or sea-run cutthroat trout.

extirpation: Reduce to non-existence in a specific area (an extinction in a specific area, but not of all individuals over the entire range).

fry: A larval (juvenile) stage of a fish, generally actively swimming and feeding.

outplant: The release of hatchery-reared fish into streams for rearing and maturing away from the hatchery sites.

recruitment: Addition of new fish (through successful spawning, hatching, growth, and survival) to a particular stage of their life history. Typically the recruitment life stage is defined by fish size, vulnerability to a fishing gear, or based on the specific interests of a study or an evaluation.

Pacific Northwest Power Planning and Conservation Act (Northwest Power Act): The Northwest Power Act of 1980 (16 U.S.C. 839 et. seq.), which authorized the creation of the Northwest Power Planning Council and directed it to protect, mitigate, and enhance fish and wildlife, including related spawning grounds and habitat on the Columbia River and its tributaries.

vitellogenic: The process characterized by an increase in growth (size) of developing eggs, often characterized by "pre", "mid", and late or mature phases.

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APPENDIX A
WHITE STURGEON MITIGATION AND RESTORATION PROJECT MITIGATION ACTION PLAN

	POTENTIAL IMPACT	MONITORING & MITIGATION	PERMIT	RESPONSIBLE PARTY
Water Quality	The hatchery would continue to function within the limits of existing permits.	WDFW, Abernathy facility	NPDES permit.	WDFW
Water Quantity	Water usage is not expected to exceed quantities allowed by existing permits.	WDFW, Abernathy Facility	State of Washington Water quantity permit	WDFW
ESA Listed Species				
Bull Trout	Field sampling in the past has not resulted in any bull trout interceptions.	In the unlikely event of any interceptions of bull trout all field activities would cease and BPA would immediately commence consultation with USFWS.	BPA has completed verbal consults with USFWS.	ODFW must notify BPA.
Salmon & Steelhead Listed Species	Capture of adult salmonids in gill nets used to collect broodstock white sturgeon.	All captured salmonids are identified to species. All catches and dispositions (alive or dead) are reported to NOAA-Fisheries annually. If catch numbers are exceeded, NOAA-Fisheries is notified immediately.	Opinions issued 10/13/1998 and 11/26/1999	ODFW must notify BPA.

APPENDIX B
PAST ACCOMPLISHMENTS

These past accomplishments are listed in the ODFW in the FY 2003 Mainstem/System Wide Province Proposal

1988	Developed methodologies for habitat mapping and modeling, capture gears for various life stages, and marking and aging techniques.
1992	Determined that dams limit movements of white sturgeon and have functionally isolated populations in mainstem Columbia River reservoirs.
1992	Described population dynamics and found them to be unique in each reservoir.
1992	Found population productivity to be 10-100 times higher downstream from Bonneville Dam than in Bonneville, The Dalles, or John Day Reservoirs.
1992	Identified reduced flows and subsequent poor recruitment as a potential factor limiting white sturgeon productivity in impoundments
1992	Determined reservoirs provide large areas of suitable habitat for juvenile and adult white sturgeon, but compensatory population responses may reduce productivity if carrying capacity is exceeded
1992	Determined over-fishing had occurred in Bonneville, The Dalles, and John Day Reservoirs, and described appropriate exploitation rates under the reduced productivity resulting from the development and operation of the hydrosystem.
1997	Implemented an annual sampling program to index relative abundance for age-0 white sturgeon.
1998	Completed index sampling to develop initial descriptions of white sturgeon populations in Rock Island Reservoir, Lake Rufus Woods, and Lake Roosevelt.
1998	Included annual transplants of white sturgeon from below Bonneville Dam to The Dalles and John Day Reservoirs as an ongoing component of the project.
1998	Demonstrated increased abundance of white sturgeon in The Dalles and John Day Reservoirs, which was attributable to intensive harvest management and reduced exploitation.
1998	Developed two indices of relative abundance for age-0 white sturgeon.
1998	Determined that white sturgeon larvae are susceptible to gas bubble trauma in laboratory experiments.
1998	Determined that hydropeaking at The Dalles Dam displaces white sturgeon eggs and larvae from incubation areas.
1998	Provided a broad recommendation for flows to provide spawning habitat.
1998	Found that white sturgeon transplanted to The Dalles Reservoir demonstrated excellent survival and growth one and two years later.
1998	Developed habitat maps and flow-habitat models for the Columbia River up to Priest Rapids Dam.
1998	Completed initial population estimates for white sturgeon in McNary, Ice Harbor, Little

	Goose, and Lower Monumental Reservoirs, and the Hanford Reach.
1999	Initiated work to evaluate the feasibility of using hatchery-reared white sturgeon to supplement depressed populations.
2002	Maintained increases in abundance of white sturgeon in The Dalles and John Day Reservoirs, which again was attributable to intensive harvest management and reduced exploitation.
2002	Developed a discriminate function analysis model to predict white sturgeon sex and stage of maturity using blood plasma indicators, sex steroids and calcium, and fork length.