
PART I - ADMINISTRATIVE

Section 1. General administrative information

Title of project

Kootenai River White Sturgeon Studies And Conservation Aquaculture

BPA project number: 8806400

Contract renewal date (mm/yyyy): 10/2000 **Multiple actions?**

Business name of agency, institution or organization requesting funding

Kootenai Tribe of Idaho

Business acronym (if appropriate) KTOI

Proposal contact person or principal investigator:

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NPPC Program Measure Number(s) which this project addresses

10.3B.11, 10.4B.1, 10.4B.2, 10.4B.5, 10.8B, 2.2G

FWS/NMFS Biological Opinion Number(s) which this project addresses

Kootenai River White Sturgeon Biological Opinion (59 FR 45989)

ESA Section 10 Permit No. PRT-798744

Other planning document references

Bonneville Power Administration. 1997. Kootenai River White Sturgeon Conservation Aquaculture Project Environmental Assessment. DOE/EA 1169. Portland, Oregon.

Kincaid, H. 1993. Breeding Plan to Preserve the Genetic Variability of the Kootenai River White Sturgeon. Final Report to the Bonneville Power Administration. Contract Number DE-AI79-93B002886. Portland, Oregon.

Resident Fish Manager's Caucus of the Columbia Basin Fish and Wildlife Authority (RFM-CBFWA). 1997. Multi-Year Implementation Plan for Resident Fish Protection, Enhancement, and Mitigation in the Columbia River Basin. Final Draft, June 3, 1997. Columbia Basin Fish and Wildlife Authority. Portland, Oregon.

Short description

Prevent extinction, preserve existing gene pool, and begin rebuilding healthy age classes of the endangered white sturgeon in the Kootenai River using conservation aquaculture techniques with wild broodstock.

Target species

white sturgeon, kokanee, burbot

Section 2. Sorting and evaluation

Subbasin

Kootenai

Evaluation Process Sort

CBFWA caucus	Special evaluation process	ISRP project type
Mark one or more caucus	If your project fits either of these processes, mark one or both	Mark one or more categories
<input type="checkbox"/> Anadromous fish <input checked="" type="checkbox"/> Resident fish <input type="checkbox"/> Wildlife	<input type="checkbox"/> Multi-year (milestone-based evaluation) <input type="checkbox"/> Watershed project evaluation	<input type="checkbox"/> Watershed councils/model watersheds <input type="checkbox"/> Information dissemination <input checked="" type="checkbox"/> Operation & maintenance <input type="checkbox"/> New construction <input checked="" type="checkbox"/> Research & monitoring <input checked="" type="checkbox"/> Implementation & management <input type="checkbox"/> Wildlife habitat acquisitions

Section 3. Relationships to other Bonneville projects

Umbrella / sub-proposal relationships. List umbrella project first.

Project #	Project title/description

Other dependent or critically-related projects

Project #	Project title/description	Nature of relationship
9404900	Kootenai River Ecosystems Improvements Study	Co-investigator

8806500	Kootenai River Fisheries Investigations	Co-investigator
9084	Assessing Genetic Variation Among Columbia Basin White Sturgeon	Genetics testing for Kootenai River white sturgeon

Section 4. Objectives, tasks and schedules

Past accomplishments

Year	Accomplishment	Met biological objectives?
1991	Monitored wild white sturgeon reproduction and recruitment	No viable year classes have been produced since 1974
1991	Built experimental hatchery	N/A
1991	Produced white sturgeon offspring from wild adults	Yes - proved that gametes from wild white sturgeon were viable by producing offspring in hatchery
1992	Produced white sturgeon offspring from wild adults	Yes
1992	Released offspring from 1991 year class into the Kootenai River	Yes - met required experimental release numbers
1993	Produced white sturgeon offspring from wild adults	Yes
1993	Performed kokanee spawning surveys	N/A
1994	Released offspring from 1992 year class into the Kootenai River	Yes - met required experimental release numbers
1994	Monitored juvenile releases	Yes - survival and growth of cultured juveniles is adequate
1994	Performed kokanee spawning surveys	N/A
1995	Produced white sturgeon offspring from wild adults	Yes
1995	Monitored wild sturgeon reproduction during experimental flow releases	Unknown - spawning occurred but no measured recruitment
1995	Performed kokanee spawning surveys	N/A
1996	Monitored wild sturgeon reproduction during experimental flow releases	Unknown - spawning occurred but no measured recruitment
1996	Spawnd wild adult white sturgeon	No - gametes from wild adults were not viable
1996	Performed kokanee spawning surveys	N/A
1997	Produced white sturgeon offspring from wild adults	No - entire larval year class lost due to equipment failure
1997	Monitored wild sturgeon reproduction during experimental flow releases	Unknown - spawning occurred but no measured recruitment
1997	Developed and implemented disease	Yes

	testing protocol for juvenile releases	
1997	Developed and tested non-lethal sampling method for detection of white sturgeon iridovirus (WSIV)	Yes - non-lethal test was as rigorous in detection of WSIV as lethal method
1997	Released offspring from 1995 year class into the Kootenai River	Yes
1997	Developed methodology for field collection of sperm to reduce number of wild sturgeon transported to hatchery	Yes - viability of sperm collected in field is adequate for use in spawning procedure
1997	Monitored juvenile releases	Yes - survival and growth of cultured juveniles is adequate
1997	Performed kokanee spawning surveys	N/A
1997	Reintroduced kokanee eggs into two tributaries using instream incubation	Yes - hatching success was approximately 85%
1998	Began facility and water supply upgrades	Yes - increased water supply and quality, as well as equipment reliability
1998	Produced white sturgeon offspring from wild adults	Yes
1998	Monitored juvenile releases	Yes - survival and growth of cultured juveniles is adequate
1998	Monitored wild sturgeon reproduction during experimental flow releases	Unknown - spawning occurred but no measured recruitment
1998	Reintroduced kokanee eggs into three tributaries using instream incubation	Unknown - eggs will incubate until spring 1999

Objectives and tasks

Obj 1,2,3	Objective	Task a,b,c	Task
1	Prevent extinction and preserve genetic variability of white sturgeon in the Kootenai River using conservation aquaculture.	a	Collect and spawn wild broodstock following protocol outlined in the breeding plan for white sturgeon in the Kootenai River (Kincaid 1993).
1		b	Rear progeny in at least two separate facilities to prevent fish loss due to unforeseen circumstances.
1		c	Initiate planning process for facility to be constructed for white sturgeon rearing using a reliable water source.
1		d	Retain family identity by keeping individual families separate during egg, larvae, and juvenile stages. Mark juvenile white sturgeon with

			PIT tags and scute removal before release.
1		e	Investigate tagging techniques to allow for release of white sturgeon juveniles at Age 1.
1		f	Release up to 1,000 white sturgeon juveniles per family into the Kootenai River following release protocol outlined in the breeding plan (Kincaid 1993).
1		g	Further refine disease testing protocol for detection of the presence and prevalence of white sturgeon iridovirus (WSIV) and other pathogens affecting white sturgeon.
1		h	Design and implement research to further define the relationship between salmonid diseases (i.e. IPNV) and their potential effect on white sturgeon.
1		i	Investigate techniques for cryopreservation of gametes from white sturgeon.
2	Monitor and evaluate genetic variability, survival, condition, growth, movement, and habitat use of hatchery reared juvenile white sturgeon released into the Kootenai River.	a	Conduct sonic tracking studies to determine movement and habitat use of hatchery reared juvenile white sturgeon.
2		b	Sample juvenile white sturgeon to determine life history characteristics using gillnets, hoopnets, and angling.
2		c	Evaluate habitat characteristics in areas used by juvenile white sturgeon and identify habitat improvement opportunities.
2		d	Evaluate genetic characteristics of hatchery produced juvenile white sturgeon.
3	Provide facilities, assistance, and coordination for additional research and training.	a	Hatch and rear certified disease-free rainbow trout as food for wild white sturgeon brood stock and as part of aquaculture training.

3		b	Provide facilities and assistance for development of research methods for IDFG burbot and rainbow trout project.
3		c	Provide facilities and assistance for cooperative research with USGS National Biological Service to determine timing of embryo development of white sturgeon.
3		d	Provide facilities and assistance for cooperative research with USGS National Biological Service to determine timing of embryo development of white sturgeon.
3		e	Provide technical assistance and training to others involved in white sturgeon conservation in the Columbia Basin.
3		f	Develop techniques for propagation of native burbot using wild broodstock.
4	Investigate kokanee fishery improvement opportunities.	a	Collect baseline abundance, distribution, and reproduction data for native kokanee in lower Kootenai River tributaries.
4		b	Provide recommendations and implementation program for improving salmonid spawning habitat in Kootenai River tributaries.
4		c	Obtain disease-free kokanee eggs from Canada for experimental reintroductions into tributaries in the lower Kootenai River where kokanee have been extirpated.
5	Assist IDFG with the monitoring and evaluation of natural spawning of white sturgeon.	a	Use artificial substrate mats to sample for eggs and larvae in areas above Bonners Ferry when fish move above the bridge.
5		b	Use D-ring plankton nets to sample for eggs and larvae during spawning.
5		c	Sample stomachs of predator fish for eggs and larvae.

6	Provide administrative and technical oversight of Kootenai Tribal Fisheries Program funded by BPA.	a	Participate in the NPPC and CBFWA process.
6		b	Provide monthly and annual progress reports to BPA.

Objective schedules and costs

Obj #	Start date mm/yyyy	End date mm/yyyy	Measureable biological objective(s)	Milestone	FY2000 Cost %
1	1/1991	1/2015	Replacement of one generation (20 year classes) of white sturgeon.	x	88.00%
2	1/1991	1/2022	Survival of one generation (15 out of 20 year classes) of white sturgeon to spawning.	x	5.00%
3	1/1991	1/2015	Ongoing assistance and coordination for research		3.00%
4	1/1993	1/2008	Return of sustainable, harvestable levels of kokanee to tributaries where reintroduction has occurred.	x	2.00%
5	1/1991	1/2008	Ongoing M&E coordinated by IDFG	x	1.00%
6	1/1991	1/2022	Participation required as long as native species are at risk to due construction and operation of hydrosystem.	x	1.00%
				Total	100.00%

Schedule constraints

The conservation aquaculture program should continue until evidence is available to show that natural reproduction is yielding adequate recruits to sustain the genetic variability of the population, as defined in the recovery plan (USFWS 1998).

Completion date

Section 5. Budget

FY99 project budget (BPA obligated): \$1,281,092

FY2000 budget by line item

Item	Note	% of total	FY2000
Personnel	Biologist/Admistrator; Hatchery Manager; 4 Fish Culturists; M&E; Hatchery Maintenance	%9	240,000
Fringe benefits	33% of Personnel Costs	%3	79,200
Supplies, materials, non-expendable property		%1	30,000
Operations & maintenance		%2	60,000
Capital acquisitions or improvements (e.g. land, buildings, major equip.)	Building and major equipment	%51	1,400,000
NEPA costs	FY99	%0	
Construction-related support	Design, construction management, construction contingencies	%22	608,000
PIT tags	# of tags: 6,000	%1	17,400
Travel	includes training	%0	10,000
Indirect costs	54.7% of PERSONNEL COSTS	%6	174,602
Subcontractor	University of Idaho- Biology Department	%1	25,000
Subcontractor	B.C. Ministry of Fisheries- Aquaculture	%2	65,000
Subcontractor	B.C. Ministry of Fisheries - Research	%1	28,000
Subcontractor		%0	
Subcontractor		%0	
Other	Professional Services (IDFG database; disease and genetic testing)	%0	13,000
TOTAL BPA FY2000 BUDGET REQUEST			\$2,750,202

Cost sharing

Organization	Item or service provided	% total project cost (incl. BPA)	Amount (\$)
Upper Columbia	Fish and Wildlife Support	%3	74,500

United Tribes			
US Fish and Wildlife Service	Disease testing - no cost contribution for some analysis		%0
British Columbia Ministry of Fisheries	Fail-safe facility - contributions listed in Section 8d.		%0
			%0
Total project cost (including BPA portion)			\$2,824,702

Outyear costs

	FY2001	FY02	FY03	FY04
Total budget	\$1,942,250	\$1,000,000	\$1,100,000	\$1,200,000

Section 6. References

Watershed?	Reference
<input type="checkbox"/>	Anders, P.J. 1995. Kootenai River White Sturgeon Studies. Report C: Kootenai River Tributary Kokanee Spawning Ground Survey. Annual Report. BPA Project No. 88-64.
<input type="checkbox"/>	Conte, F.S. S.I. Doroshov, P.B. Lutes, and M.E. Strange. 1988. Hatchery Manual for the White Sturgeon (<i>Acipenser transmontanus</i> Richardson) with Application to other North American <i>Acipenseridae</i> . Publications Division, Agriculture and Natural Resources,
<input checked="" type="checkbox"/>	EcoAnalysts, Inc. 1998. Stream Habitat Survey of Long Canyon, Parker, and Trout Creeks: Tributaries to the Kootenai River, Idaho, with Special Consideration of Kokanee Spawning Habitat and Enhancement Potential. Prepared for Kootenai Tribe of Idaho.
<input type="checkbox"/>	Ireland, S.C. 1997. Kootenai River White Sturgeon Studies and Conservation Aquaculture. Annual Report. BPA Project No. 88-64. Portland, Oregon.
<input type="checkbox"/>	J-U-B Engineers. 1997. Preliminary Engineering Report - Hatchery Improvements for the Recovery of White Sturgeon. Prepared for Kootenai Tribe of Idaho. BPA Project No. 88-64.
<input type="checkbox"/>	Kincaid, H. 1993. Breeding Plan to Preserve the Genetic Variability of the Kootenai River White Sturgeon. Final Report to the Bonneville Power Association. Contract Number DE-AI79-93B002886. Portland, Oregon.
<input type="checkbox"/>	LaPatra, S.E., J.M. Groff, G.R. Jones, B. Munn, T. L. Patterson, R.A. Holt, A.K. Hauck, and R.P. Hedrick. 1994. Occurrence of white sturgeon iridovirus infections among cultured white sturgeon in the Pacific Northwest. <i>Aquaculture</i> Vol. 126:201-210.
<input type="checkbox"/>	McCabe, G.T., and L.G. Beckman. 1990. Use of an artificial substrate to collect white sturgeon eggs. <i>California Fish and Game</i> 76 (4) : 248-250.

<input type="checkbox"/>	MFWP, CSKT, and KTOI. 1997. Fisheries mitigation and implementation plan for losses attributable to the construction and operation of Libby Dam.
<input type="checkbox"/>	Northcote, T.C. 1973. Some impacts of man on Kootenay Lake and it's salmonids. Great Lakes Fishery Commission. Technical Report, Number 2.
<input type="checkbox"/>	Northwest Power Planning Council. 1994 as amended in 1995. Fish and Wildlife Program (FWP). Portland, Oregon.
<input type="checkbox"/>	Paragamian, V.L., G. Kruse, and V. Wakkinen. 1995. Kootenai River White Sturgeon Investigations. Annual Progress Report FY 1994. Prepared for U.S. Department of Energy, Bonneville Power Administration. Contract No. DE-AI79-88BP93497; Project No. 88-6
<input type="checkbox"/>	Paragamian, V.L., G. Kruse, and V. Wakkinen. 1996. Kootenai River White Sturgeon Investigations. Annual Progress Report FY 1996. Prepared for U.S. Department of Energy, Bonneville Power Administration. Contract No. DE-AI79-88BP93497; Project No. 88-6
<input type="checkbox"/>	Parsley, M.J., L.G. Beckman, and G.T. McCabe. 1989. Report I in A.A. Nigro, editor. Status and habitat requirements of white sturgeon populations in the Columbia River downstream from McNary Dam. Report to Bonneville Power Administration, Project 86-
<input type="checkbox"/>	Partridge, F. 1983. Kootenai River Fisheries Investigations. Idaho Department of fish and Game. Job Completion Report. Project F-73-R-5, Subproject IV, Study VI, Boise, Idaho.
<input type="checkbox"/>	Resident Fish Manager's Caucus of the Columbia Baisn Fish and Wildlife Authority (RFM-CBFWA). 1997. Multi-Year Implementation Plan for Resident Fish Protection, Enhancement, and Mitigation in the Columbia River Basin. Final Draft, June 3, 1997. Columb
<input type="checkbox"/>	U.S. Department of Interior, Fish and Wildlife Service. 1996. White Sturgeon: Kootenai River Population Draft Recovery Plan. Region 1, USFWS, Portland, Oregon.
<input type="checkbox"/>	U.S. Department of Interior, Fish and Wildlife Service. 1998. White Sturgeon: Kootenai River Population Recovery Plan. Region 1, USFWS, Portland, Oregon.

PART II - NARRATIVE

Section 7. Abstract

The white sturgeon (*Acipenser transmontanus* Richardson) population in the Kootenai River was listed as endangered by the U.S. Fish and Wildlife Service on September 6, 1994, due to a virtual lack of recruitment during the last two decades. The Kootenai River White Sturgeon Study and Conservation Aquaculture Project was initiated to preserve the genetic variability of the population, begin rebuilding natural age class structure, and prevent extinction while measures are implemented to restore natural recruitment. A breeding plan will be implemented to guide management in the systematic collection and spawning of wild adults before they are lost from the breeding

population. The implementation of the breeding plan includes measures to minimize potential detrimental effects of conventional stocking programs. The objectives of the conservation aquaculture program are to produce 4-9 separate families per year and use preservation stocking criteria to produce 4 to 10 adults per family that survive to breeding age. Monitoring and evaluation using genetic sampling, sonic tracking, gill-netting, and angling will assess genetic variability, survival, growth, movement, and habitat use of juveniles released into the Kootenai River. Success of the project will be determined by: 1) an increase in the number of juvenile sturgeon in the Kootenai River drainage; 2) survival of hatchery fish to sexual maturity; 3) retention of wild sturgeon life history characteristics and genetics in the hatchery reared population; and 4) an understanding of the life history characteristics and factors limiting natural recruitment of sturgeon in the Kootenai River. This project also proposes to provide recommendations and an implementation program for improving kokanee spawning habitat in Kootenai River tributaries, as well as reintroduction of native kokanee into streams where they have been extirpated. Reintroduction will be accomplished using a native stock of kokanee from the North Arm of Kootenay Lake. The goal will be to improve habitat conditions in tributaries to provide for natural spawning, thereby increasing prey items for sturgeon, as well as improved fishing opportunities for kokanee.

Section 8. Project description

a. Technical and/or scientific background

The white sturgeon (*Acipenser transmontanus* Richardson) population in the Kootenai River was listed as endangered on September 6, 1994 (59 FR 45989) under the authority of the Endangered Species Act of 1973. The Kootenai River population is one of several land-locked populations of white sturgeon found in the Pacific Northwest. Their distribution extends from Kootenai Falls, Montana, located 50 river kilometers below Libby Dam, downstream through Kootenay Lake to Cora Linn Dam on the lower west arm of Kootenay Lake, B.C. A natural barrier at Bonnington Falls downstream of Kootenay Lake has isolated the white sturgeon in the Kootenai River from other white sturgeon in the Columbia River since the last glacial age approximately 10,000 years ago (Northcote 1973). The population was listed due to the virtual absence of recruitment during the past two decades, declining population size, and post-development habitat loss and degradation. The last substantial year-class was produced naturally in 1974, the year prior to operation of Libby Dam. The dam impounds the Kootenai River near Libby, Montana, forming Lake Koocanusa. Construction and operation of Libby Dam has drastically altered the hydrograph, thermograph, and downstream nutrient loading rates in the Kootenai River. Research since 1991 has confirmed natural spawning in six of the past seven years, however natural recruitment has been virtually absent since 1974. In 1995, estimates put the population of adult white sturgeon in the Kootenai River at 1,469 individuals (Paragamian et al. 1996). Nine years of sampling found only 16 naturally recruited white sturgeon (or about 1% of the population) that were 21 years of age or less (Paragamian et al. 1995). Because white sturgeon do not begin reproducing until approximately age 20, this means that the equivalent of one full generation in the white sturgeon life cycle may be lost.

Recovery of the white sturgeon in the Kootenai River is contingent upon re-establishing natural recruitment, minimizing additional loss of genetic variability to the population, and successfully mitigating biological and physical habitat changes caused by the construction and operation of Libby Dam. The overall recovery strategy for the white sturgeon in the Kootenai River takes a three-pronged approach (USFWS 1998). Each of the following measures are considered Priority 1 actions to be implemented immediately: 1) augment flows of the Kootenai River to enhance natural reproduction; 2) implement a conservation aquaculture program, i.e., artificial propagation and release, to prevent extinction; and 3) re-establish suitable habitat conditions, to increase the chances of white sturgeon survival past the egg/larval stage. This project directly addresses the Priority 1 action in the recovery plan for white sturgeon. The conservation aquaculture program is currently the only known means to conserve genetic variability of the white sturgeon population, begin rebuilding healthy age class structure, and prevent extinction while other measures are taken to re-establish suitable habitat conditions to increase the likelihood of adequate recruitment in the wild white sturgeon population.

The recovery plan for white sturgeon takes an ecosystem approach by including measures to benefit other resident fish species. Native kokanee are considered an important prey item for white sturgeon and also provided an important fishery in the tributaries of the lower Kootenai River. Native kokanee populations have declined dramatically in the past two decades. Kokanee runs into north Idaho tributaries of the Kootenai River numbering thousands of fish as recently as the early 1980's (Partridge 1983) have now become "functionally extinct". Redd counts from 1993-1998 indicate the South Arm stock of kokanee from Kootenay Lake that migrates into the tributaries of north Idaho has been extirpated (Anders 1995; Ireland 1997). This project plans to reintroduce native kokanee from the North Arm of Kootenay Lake using instream incubation techniques with eyed eggs, while project 94-49 (Kootenai River Ecosystem Improvement) concurrently plans to implement habitat protection and restoration measures on degraded streams by identifying areas where streams can be restored and working with private landowners to restore and protect stream habitat for native fish species.

Native burbot in the Idaho and Canadian portion of the Kootenai River drainage are also at risk of becoming extinct (Paragmian 1996). IDFG has been monitoring the movement, habitat use, and spawning behavior of burbot since 1993 and has not found evidence of successful spawning or recruitment. As with the white sturgeon, conservation aquaculture may play a role in the recovery of this species, as efforts to restore habitat conditions necessary for the survival of burbot continue. This project plans to develop and refine culture techniques for native burbot using wild broodstock.

b. Rationale and significance to Regional Programs

This project meets the following goals and objectives outlined in the Council's Fish and Wildlife Program (FWP 1994) and the Resident Fish Section of the Multi-Year Implementation Plan (RFM-MYIP 1997). The overall goal of the FWP and the RFM-

MYIP is to promote the long-term viability of native fish in native habitats where possible. The decline of native fish species in the Kootenai River drainage has been attributed to the construction and operation of Libby Dam (USFWS 1998). The following objectives have been listed in the RFM-MYIP for white sturgeon and other native species in the Kootenai River drainage: 1) Mitigate and compensate for the decline of white sturgeon in the Kootenai River drainage caused by the construction and operation of Libby Dam; 2) Preserve existing gene pool and re-establish natural age class structure of the population; 3) Restore recruitment produced by naturally-spawning adult sturgeon; 4) Restore this stock of sturgeon to a sufficient abundance and age distribution to allow for ceremonial, subsistence, and recreational harvest by tribal members and recreational harvest by sport anglers; 5) Recover to sustainable harvest levels, the migratory kokanee populations that historically spawned in the westside tributaries to the Kootenai River; and 6) Restore viable native fish populations in historic spawning and rearing areas. The conservation aquaculture program directly addresses these goals as a component in the overall framework of the Council's Fish and Wildlife Program and the RFM-MYIP to promote the long term viability of native fish in native habitats where possible.

The Council's Fish and Wildlife Program lists the following measures that this project addresses:

- 10.3B.11: "In consultation with the Confederated Salish and Kootenai Tribes, the Montana Department of Fish, Wildlife, and Parks, the Kootenai Tribe of Idaho and other appropriate entities, fund the design, operation, and maintenance of mitigation projects in the Kootenai River system and Lake Koocanusa to supplement natural propagation of fish..."
- 10.4B.1: "Operate and maintain a low-capital sturgeon hatchery on the Kootenai Indian Reservation. With Bonneville, explore alternate way to make effective use of the hatchery facility year-round."
- 10.4B.2: "Survey the Kootenai River downstream from Bonners Ferry, Idaho, to the Canadian border to: 1) evaluate the effectiveness of the hatchery, and 2) assess the impact of water-level fluctuations caused by Libby Dam on hatchery operations for outplanting of sturgeon in the Idaho portion of the Kootenai River."
- 10.4B.5: "As part of the Kootenai sturgeon recovery strategy the Kootenai Tribe of Idaho is to: 1) operate the Kootenai Tribal sturgeon hatchery and develop propagation methods to ensure healthy sturgeon are outplanted into the Kootenai River, 2) participate on the water budget team, and 3) conduct monitoring and evaluation to assess the effectiveness of these measures..."
- 10.8B: Biological objectives for kokanee salmon in the Kootenai River
- 2.2G.1: "The Council calls for the development, funding, and implementation of agreements between fish and wildlife managers on both sides of the U.S./Canada border that recognize the mutual benefit of protection mitigation and enhancement for transboundary species..."

To date, the program has integrated the measures called for in the FWP and provided promising progress toward the recovery of white sturgeon and kokanee in the Kootenai

River drainage. Also note the relationship of this project to the overall recovery strategy (USFWS 1998) that is outlined in Section 8a of this document.

c. Relationships to other projects

The project is part of the overall recovery plan for the white sturgeon in the Kootenai River (USFWS 1998). Several other related projects in the drainage address other important aspects of recovery. IDFG Project 8806500 assesses the natural spawning of the white sturgeon, MFWP Project 8346500 develops and refines experimental flow releases for sturgeon, and KTOI Project 9404900 identifies opportunities for ecosystem recovery that will benefit all native species, as well as monitoring water quality in the Kootenai River and tributaries. Together the projects further the overall goal of the FWP to protect native fish in their native habitats. A cooperative relationship exists between these projects and resources are frequently shared. The rationale for using conservation aquaculture is clearly outlined in the breeding plan to preserve genetic variability of the endangered white sturgeon in the Kootenai River (Kincaid 1993), as well as the recovery plan (USFWS 1998). Taking no action risks extinction of the species in the Kootenai River.

All recovery work is coordinated through the white sturgeon recovery team that includes members from the U.S. Fish and Wildlife Service (USFWS), Kootenai Tribe of Idaho (KTOI), Idaho Department of Fish and Game (IDFG), Montana Fish, Wildlife, and Parks (MFWP), University of Idaho (U of I), Army Corp of Engineers (ACOE), British Columbia Ministry of Environment, Land, and Parks (BC MELP), and Canada Department of Fisheries and Oceans (CDFO). The white sturgeon in the Kootenai drainage are a transboundary fish, crossing interstate and international boundaries. This project is a component of many different programs working concurrently on the recovery of the white sturgeon and the ecosystem it inhabits. Other relationships are summarized below.

All field data collected on white sturgeon is compiled in a single database coordinated by IDFG. Data is compiled to provide the most accurate and up to date information concerning broodstock collection, capture of wild sturgeon for sonic tracking, and locations of fish fitted with transmitters, etc. MFWP is compiling IFIM information for the lower Kootenai River that will be useful in determined habitat availability for white sturgeon and other native species in the drainage

The genetic analysis of archived samples at University of Idaho requires collaboration with the Institute of Aquaculture and contributes to research proposed for FY99 by Dr. Matt Powell concerning genetic diversity of white sturgeon stocks in the Columbia Basin (New Project #9084). We have also provided genetic samples to the USFWS forensics lab in Ashland, Oregon to assist in stock identification in the illegal trade of caviar and to BC MELP for stock identification in the Columbia Basin in Canada.

Kathy Clemens and John Morrison (USFWS), Scott LaPatra (Clear Springs Research in Buhl, ID), Dr. Joseph Groff (UC Davis), Sally Goldes (BC MELP), and Dorothy Keiser (CDFO) have all been instrumental in designing a disease testing protocol for the release of hatchery reared white sturgeon, as well as designing research to better understand white sturgeon iridovirus (WSIV). Concerns have arisen about the potential for white sturgeon to carry the IPNV pathogen (a salmonid virus) and collaborative research and testing is being conducted to gain more knowledge. Results will be published in a peer reviewed journal article.

In 1997 and 1998, we provided facilities and assistance to the USGS Biological Service for a research project to determine the timing of white sturgeon embryo development. This project required intense sampling during the incubation stage. This research will be repeated in 1999 or 2000 using different water temperatures. The results of this research will be used to stage sturgeon eggs from the Kootenai River more accurately and will be reported for future use by other sturgeon biologists. Also in 1999, we will be providing facilities and support to a graduate student investigating the effects of heavy metals on incubation and hatching. This information will be used to answer long-standing questions about the effects of water quality in the Kootenai River on hatching success.

In 1994, the KTOI went to Canada to teach BC MELP field techniques for sex determination of adult white sturgeon. KTOI also assists with the fall sampling of adult sturgeon in Kootenay Lake. In 1997, BC MELP provided the KTOI with 100,000 kokanee eggs from the North Arm stock of Kootenay Lake that were planted in Long Canyon Creek, a tributary to the Kootenai River in Idaho. In 1998, BC MELP provided the KTOI with 300,000 kokanee eggs and assisted with the instream planting of eggs in three tributaries to the Kootenai River in Idaho. BC MELP will also be providing a back-up facility for juvenile white sturgeon from the Kootenai Tribal Hatchery.

NRCS frequently contacts KTOI concerning the wetlands reserve program, stream rehabilitation, and conservation easements in the Kootenai drainage. We have discussed joint proposals and partnerships for conservation efforts in the Kootenai River drainage.

Upper Columbia United Tribes (UCUT) provides a small portion of funding each year to be used in fisheries research by the KTOI. The UCUT organization also provides technical support for certain aspects of the fisheries program.

All work has been accomplished through the necessary permitting process. A Section 10 Permit has been issued to KTOI for Incidental Take. NEPA requirements have been met for white sturgeon releases. IDFG fish transportation permits have been issued for all fish transport and release. Disease testing protocol has been developed and carried out to the satisfaction of all agencies and entities involved. Because the Kootenai River drainage lies within Montana, Idaho, and British Columbia, any action has the potential to affect the fishery in another area. For that reason, coordination among all agencies is important to the recovery of the Kootenai River ecosystem.

d. Project history (for ongoing projects)

The Kootenai River white sturgeon study and conservation aquaculture program began in 1991 in response to questions concerning water quality, white sturgeon gamete viability and the feasibility of aquaculture as a component to population recovery. In 1991, 1992, 1993, 1995, and 1998, progeny from wild broodstock have been successfully produced and reared in the Kootenai Tribal Hatchery. The white sturgeon was listed as endangered in 1994 and no broodstock capture or spawning occurred. Two experimental releases of a total of 305 fish occurred in 1992 and 1994 (representing 1990, 1991, and 1992 year classes). During 1995, 25 hatchery reared white sturgeon were captured using gill-nets (Paragamian et al. 1995). During 1996, 45 hatchery reared juveniles were captured in the Kootenai River (Paragamian et al. 1996). During 1997, 2,283 hatchery reared juveniles were captured. This information indicates that sturgeon released as age 1+ are surviving in the Kootenai River. In April and October 1997, 2283 white sturgeon juveniles representing 4 family groups from the 1995 year class were released (Ireland 1997). We are in the process of monitoring the releases using sonic tracking and gill-netting. Results will be summarized in the annual progress report. Target release numbers for the preservation stocking program will be adjusted as more information on survival of hatchery reared juveniles becomes available.

The program has accomplished many goals with a low yearly average expenditure (\$361,433/year since 1990 including cost of aquaculture facility). In 1996, due to high spring runoff, cold water temperatures, and take limitations on timing of broodstock collection, no sturgeon from the 1996 year class were produced. Through coordination with USFWS and IDFG, we now have the capability of collecting broodstock at more appropriate times and locations. In 1997, the entire year class was lost as a result of an unfortunate chain of events: 1) In 1996, a proposal was presented to CBFWA to perform some of the necessary upgrades needed at the hatchery. The funding request was not approved; 2) In January 1997, KTOI presented another request for funding in order to upgrade the facility and provide funding for a back-up facility operated by IDFG in Sandpoint. The RFM approved partial funding of the request. The facility in Sandpoint was to be used for back-up but was not available because a broken main waterline had not been repaired. Because the facility was not operational, the KTOI did not have a portion of the 1997 year class in a fail-safe facility; and 3) The use of water from the Northside Water District (de-chlorinated through a charcoal filter) to incubate and rear white sturgeon to 3 weeks of age has been the only successful way to produce sturgeon in the past. Incubating in river water has caused fungus problems and egg suffocation because of silt and bacteria present in the flow-through river water system. During incubation in 1997, the North Side Water District replaced some main lines in the water system and flushed them with chlorine during our most critical stage at the hatchery. The amount of chlorine was more than the filter could handle, resulting in the overnight loss of the entire 1997 year class.

With increased expectations to fully implement the program and the difficulties encountered concerning the loss of the 1996 and 1997 year classes, the conservation aquaculture facility is in the process of being brought up to standard to deal with

problems concerning equipment reliability, and water quality and quantity (J-U-B Engineering Report 1997). Phase I upgrades that have been completed to date (FY98) include: 1) 3-phase power crossing and standby generation system; 2) new river intake piping system; 3) water treatment system with three submersible river intake pumps and two types of filtration followed by ultraviolet disinfection; 4) water temperature control system for incubation; 5) crew quarters and boat storage. Other Phase I upgrades to be completed this winter include repiping and concrete in the main hatchery and installation of a dock to carry wild broodstock from the boat to the hatchery. These upgrades will bring the existing facility up to standard but there will still be a need to provide adequate rearing space for up to 9 families per year as the project becomes fully implemented. Each family group must be reared separate from other family groups to ensure proper identification at outplanting and also must be reared at low densities to prevent disease outbreak (LaPatra et al. 1994). For this reason, we have received funding in FY99 to begin preparing a master plan for another facility within the Kootenai River drainage to provide adequate rearing space and a separate, reliable water source.

The Tribe, as directed by USFWS and in accordance with Council Measure 2.2G.1, has forged a relationship with Canada concerning the recovery of sturgeon. Canada will be providing a “fail-safe” facility for the Kootenai River white sturgeon at the Kootenay Trout Hatchery (KTH) for a relatively low cost beginning in 1999. A portion of each year class of white sturgeon hatched at the Kootenai Tribal Hatchery will be transported to the Kootenay Trout Hatchery in Fort Steele, B.C. to ensure no catastrophic losses of future year classes. Several advantages to using the KTH for a fail-safe as opposed to other locations include: 1) cost effectiveness - the hatchery is already operating and staffed to produce other fish species; 2) located within the Kootenai drainage; 3) fish culture expertise on-site; 4) proven source of high quality groundwater; 5) 24 hour standby system already in place for emergency response; 6) educational opportunity for sturgeon conservation displays in visitor area – 10,000 visitors annually; and 7) close proximity to Bonners Ferry to allow collaboration with KTOI staff.

e. Proposal objectives

1. Prevent extinction and preserve genetic variability of white sturgeon in the Kootenai River using conservation aquaculture.

The captive breeding program will use 3-9 females and an equal number of males captured from the Kootenai River each spring. Fish will be spawned in pairs or in diallel mating designs to produce individual families that will be reared separately to maintain family identity. Fish will be marked to identify family and year class before release. Number of fish released will be equalized at up to 1,000 per family. Assuming annual survival rates of 50% for years 2 and 3, and 85% for years 4-20 of all fish planted, the target numbers would yield approximately 8 progeny per family or about 4 breeding pairs per family at age 20. The goal is to produce 4-10 breeding adults per family. Natural survival in the river environment during the 18+ years from planting to maturity would result in variability in genetic contribution of families to the next broodstock generation.

Number of fish released per family will be adjusted in future years when actual survival rate is known. Implementation of the breeding plan each year for the 20-year generation interval using 5 different mating pairs per year would yield an effective population size of 200. Because this program is designed to produce approximately 8 breeding adults per family and to approximate a “normal expanding” natural population, it should not exaggerate the contribution of a small fraction of the parent population, as occurs in typical supplementation programs.

2. Monitor and evaluate genetic variability, survival, condition, growth, movement, and habitat use of hatchery reared juvenile white sturgeon released into the Kootenai River.

Monitoring and evaluation is an important component of the overall program and results will be used in an adaptive management approach. Specific tasks are outlined in Section 4 of this document.

3. Provide facilities, assistance, and coordination for additional research and training.

Numerous cooperative arrangements have been made to use the aquaculture facility for important research occurring within the Kootenai drainage, as well as throughout the Columbia Basin. The projects are described in Section 4.

4. Investigate kokanee fishery improvement opportunities.

KTOI has been collecting baseline abundance, distribution, and reproduction data for native kokanee in six lower tributaries of the Kootenai River for the past five years using redd counts and visual observation. Habitat data has been collected on three streams to date. KTOI will complete habitat surveys this year on three more streams and evaluate each stream for habitat restoration opportunities (through Project #94049). All lower portions of the tributaries are on private land and KTOI has already built a relationships with the landowners. Some have expressed interest in a partners program to restore riparian areas and degraded stream banks. Reintroduction of kokanee into the west side tributaries will only occur if concurrent habitat work can take place. Disease-free kokanee eggs (eyed) from the North Arm stock of Kootenay Lake in British Columbia will be used for reintroduction using instream incubation techniques. Hatching success of eggs incubated instream will be determined using emergence traps or hatching canisters. Success of reintroductions will be determined by monitoring returns to the stream.

5. Assist IDFG with the monitoring and evaluation of natural spawning of white sturgeon.

The evaluation of natural spawning of white sturgeon is an IDFG objective. KTOI will not duplicate that effort but rather augment sampling by using different gear types, sampling in areas not previously sampled, and sharing information.

f. Methods

Sturgeon culture techniques differ from those used for salmonids because of inherent differences in gonad development, spawning frequency, and sperm and egg structure, physiology, and biochemistry. Given the uniqueness of the species and the new concept of conservation aquaculture for a long-lived species, methodology has been adapted by networking with experts in the field, as well as using and refining techniques described in the Hatchery Manual for White Sturgeon (Conte et al. 1988). Techniques have been refined to suit the purposes of the conservation aquaculture program. For example, surgical removal of eggs was used for 2 years until hand-stripping of eggs proved to be a viable alternative. Hand-stripping of eggs greatly minimizes stress associated with Cesarean surgery and reduces the recovery period of post-spawning adult white sturgeon prior to release back into the wild. Also, we are in the process of refining techniques for field collection and storing of sperm to minimize the number of wild fish brought to the hatchery.

From March through June, wild white sturgeon from the Kootenai River are collected using setlines and angling. Captured fish are placed ventral side up in a hooded stretcher suspended across the gunwales. Sex and reproductive development is determined by visual observation of gonadal tissues through a 2-3 cm midline incision on the ventral surface of the fish. Reproductive development of males and females is categorized according to criteria reported by Conte et al. (1988). All fish are examined for recapture, the removal of a scute, marked with a PIT tag, weighed, and measured. Once sex and reproductive status is determined, fish are either brought to the hatchery for spawning or released back into the river.

A complete description of broodstock evaluation, gamete processing, and incubation of eggs is outlined in Conte et al. (1988). This includes information concerning: 1) assay to determine spawnable females and final oocyte maturation; 2) spawning induction of females including injection schedule for LHRHa, injection procedures, and observation of response; 3) milt and egg extraction overview including checking sperm viability, sperm dilution, egg fertilization, and egg de-adhesion; and 4) incubation of eggs and early life stages.

Sturgeon are reared in the Kootenai Tribal Hatchery for up to 2 years prior to release. One month before release, the fish are disease tested using the protocol developed by USFWS and Clear Springs Research and agreed upon by all agencies. Test results are provided to all agencies and a transportation and release permit is obtained from IDFG at the request of KTOI and USFWS. Release numbers are determined each year by the white sturgeon recovery team. Before release, each fish is weighed, measured, tagged with a PIT tag, and has a scute removed to identify year class in case of tag loss. Sturgeon are transported to the release site in an oxygenated tank truck and released from shore or by boat. Small 45 day sonic transmitters are attached to several juvenile white sturgeon to evaluate movement after release.

Monitoring and evaluation of juvenile white sturgeon is accomplished using sonic tracking, gill-netting, hoopnets, and angling. Habitat use will be characterized by identifying areas where juvenile sturgeon are located by telemetry or captured and measuring physical habitat attributes (depth, temperature, water velocity, pH, conductivity, TDS, etc.) and describing specific habitat type. Genetic characteristics of juvenile white sturgeon will be archived by placing a tissue sample from the pectoral fin in a lysis buffer tube and sending to the lab. At least 5% of each family group will be individually sampled. The goal of the release is to provide 4-10 spawners per family at age 20. Considering the long time to maturation, monitoring and evaluation of the hatchery releases will need to be a long term commitment.

Monitoring and evaluation of natural spawning of white sturgeon will be accomplished using artificial substrate mats (McCabe and Beckman 1990), D-ring plankton nets (Parsley et al. 1989), and stomach sampling of predator fish.

Kokanee spawning ground surveys were conducted in 1993 to 1998 in lower Kootenai River tributaries. Spawning kokanee, redds, and carcasses were counted and stream temperature was recorded. Streams were surveyed twice a week between the end of August and the first week of October. Habitat surveys have been performed on 3 tributaries to quantify type, number, and length of habitat units and available spawning gravel, as well as areas of the stream that could potentially be rehabilitated (EcoAnalysts 1998). Reintroduction will be accomplished using instream incubation techniques. Hatching success of eggs incubated instream will be determined using emergence traps and hatching canisters. Biological objectives for kokanee returns are listed in the FWP (1994).

g. Facilities and equipment

In response to the Council's 1987 Columbia River Basin Fish and Wildlife Program, BPA funded the construction of the KTOI Experimental White Sturgeon Facility, which began operations in the spring of 1991. The low-capital facility was originally constructed to determine whether artificial propagation was feasible based on existing water quality of the Kootenai River and whether gametes from wild sturgeon in the Kootenai River were viable. Initial culture efforts have successfully fertilized, incubated, and hatched eggs in 1991, 1992, 1993, 1995, 1997, and 1998. The facility was considered experimental until 1996, when the draft recovery plan called for the full implementation of the conservation aquaculture program (USFWS 1996). The existing facility and equipment was inadequate to meet the new expectations of the conservation aquaculture program as stated in the recovery plan (USFWS 1998) and the breeding plan to preserve genetic variability of the white sturgeon in the Kootenai River (Kincaid 1993). A 1997 funding request was presented to NPPC and CBFWA for approval to bring the facility up to standard in order to provide adequate reliability (Phase I System Improvements – J-U-B Engineering Report 1997). The funding request was approved in time to make the following improvements to the existing facility in 1998: 1) Upgrade the water supply capacity; 2) Improve the water treatment system to assure acceptable

water quality; 3) Improve reliability through equipment upgrades and redundancy; and 4) Improve facilities for maintenance and protection of equipment. The existing hatchery and rearing operations will still experience significant obstacles related to temperature fluctuations in the river, potential for catastrophic contamination of the river upstream of the hatchery influencing hatchery water quality, and inadequate rearing space. Phase II improvements are included in the FY99, FY2000, and FY2001 funding requests for this project. Phase II will address the ability to moderate river water supply temperatures and/or quality with a local groundwater resource at the existing facility, as well as develop an alternative rearing facility. The alternative facility would mitigate river water quality and temperature concerns by providing a separate location with a more reliable water source for hatching and rearing the fish (J-U-B Engineering 1998). It would also expand rearing capability for the increased family numbers called for in the breeding plan (Kincaid 1993). The existing facility would become the river water spawning and incubation facility for the alternative site. All equipment and facilities will be designed for future conversion to the culture of other native species if conservation measures dictate that culture is necessary for preservation of the species.

Other facilities include an outbuilding with 6 - 20' rearing tanks, an office building, a small storage shed, a boat shed, and crew quarters. Vehicles, boats, and office equipment are adequate for the current program needs. Minor supplies and equipment are included in the project budget.

h. Budget

Personnel - Includes all employees required to carry out the objectives listed in Section 4.

Fringe Benefits – 33% of personnel costs

Supplies, Materials, Non-expendable Property – includes all items necessary for program supplies, monitoring and evaluation, fish food, aquaculture chemicals, spawning hormone, sonic tags, and miscellaneous research and sampling equipment.

Operations and Maintenance – includes utility costs (telephone, electricity, and propane), equipment maintenance and repair (trucks, boats, hatchery equipment), and building and grounds maintenance.

Capital Acquisitions or Improvements – Phase II building and equipment (second facility to provide for adequate rearing with alternate water source) as described in Section 8d and 8g of this document.

NEPA Costs – Master planning and NEPA planned for FY99.

Construction-related Support – Phase II building design, construction management, and construction contingencies as described in Section 8d and 8g of this document.

PIT Tags – 6,000 tags for tagging 1998 year class releases and begin transition tagging (ISO 134.7 kHz) of wild sturgeon.

Travel - Travel for cooperative work with Canadian fisheries, ESA proceedings, regional fisheries and aquaculture meetings, regional interagency meetings, Native American Fish and Wildlife Society, and continuing education. Travel for regional meetings concerning CBFWA and NPPC process reimbursed by CBFWA.

Indirect – 54.7% of Personnel Costs (not total contract). Indirect costs cover all general administration and accounting needs of the project. The Tribe with the Inspector General negotiates this rate.

Subcontract – University of Idaho – Department of Biological Sciences – Dr. Joseph Cloud – research will focus on fertility of frozen sturgeon milt, sperm ATP, cryopreservation of sperm, and cryopreservation of embryos.

Subcontract – B.C. Ministry of Environment: Fisheries Division – Aquaculture – O & M for “fail-safe” facility.

Subcontract - B.C. Ministry of Environment: Fisheries Division – Management – monitoring and evaluation of juvenile white sturgeon in Kootenay Lake, B.C. Large concentrations of adult sturgeon occur in Kootenay Lake at certain times – juveniles may exhibit similar behavior. Burbot donor stock feasibility will also be investigated.

Other – Professional Services – partial support for database coordinated by IDFG; University of Idaho – Aquaculture Research Institute – genetic testing for monitoring of genetic characteristics of hatchery-reared juvenile white sturgeon; any disease testing needs not met by USFWS.

Section 9. Key personnel

Susan C. Ireland Fisheries Biologist/Administrator 1 FTE Kootenai Tribe of Idaho
Hired 9/96

B.S. Biology May 1982. University of Idaho.

M.S. Fish and Wildlife Management November 1993. Montana State University.

Position Description: Serve as the Tribal Fisheries Program Manager responsible for all aspects of the program including research and aquaculture.

Primary Duties: 1) Design, implement, and coordinate all aspects of the Fisheries Program; 2) Conduct, supervise, and participate in all aspects of the fisheries research and aquaculture activities; 3) Generate and submit all monthly and annual reports and budgets; 4) Serve as professional spokesperson for the Kootenai Tribe concerning fisheries issues in state, federal, local, and public arenas; 5) Serve as negotiator and liaison among regional, national, and Canadian fisheries agencies concerning all political and biological interagency agreements; 6) Keep Tribal Council informed on progress and status of all pertinent fisheries issues and program activities; 7) Assure adherence to Tribal procedures and guidelines by all Fisheries Program personnel.

Previous employment includes:

Fisheries Biologist MSU Fisheries Coop Unit Bozeman, MT 3 years

Fisheries Technician University of Idaho and Montana Fish, Wildlife, and Parks 2 years

Graduate Student Montana State University 2 years

Land Management Committee Chairman MT AFS 1.5 years

Experience has included many aspects of fisheries and habitat sampling, data collection and analysis, and interpreting and reporting results. Native species have been my main career focus including work with white sturgeon in the Snake River and the Kootenai

River, pallid sturgeon and shovelnose sturgeon in the upper Missouri River, and westslope cutthroat in tributaries throughout western Montana. I have also participated other aspects of fisheries management including collection and organization of fisheries data for Montana River Information Systems, contacting fisheries biologists throughout the state to contribute to the database, reviewing and commenting on environmental assessments relating to fisheries habitat, and serving in volunteer positions in the Montana Chapter of AFS.

Ireland, S.C. 1998. Kootenai River White Sturgeon Studies and Conservation Aquaculture. Annual Report (in prep). BPA Project No. 88-64. Portland, Oregon

Ireland, S.C. 1997. Kootenai River White Sturgeon Studies and Conservation Aquaculture. Annual Report. BPA Project No. 88-64. Portland, Oregon.

Ireland, S.C. 1993. Habitat use and seasonal movement of westslope cutthroat trout on a basin-wide scale. Masters Thesis. Montana State University. Bozeman, Montana

Lapatra, S.E., S.C. Ireland, J.M. Groff, K. M. Clemens, and J.T. Siple. 1998. Adaptive disease management strategies for the endangered population of Kootenai River white sturgeon *Acipenser transmontanus*. In review. Fisheries.

McMahon, T.E., S.R. Dalbey, S.C. Ireland, J.P. Magee and P.A. Byorth. 1996. Field evaluation of visible implant tag retention by brook trout, cutthroat trout, rainbow trout and arctic grayling. North American Journal of Fisheries Management. 16:921-925.

Shepard, B.B., S.C. Ireland, C.C. Downs, and R.G. White. 1998. Population dynamics and demographics of westslope cutthroat trout *Oncorhynchus clarki lewisi* inhabiting isolated headwater tributaries of Montana. Final Report to USDA, Forest Service, Rocky Mountain Research Station. Contract INT-92682-RJVA. Boise, Idaho.

U.S. Department of Interior, Fish and Wildlife Service. 1998. White Sturgeon: Kootenai River Population Recovery Plan. Region 1, USFWS, Portland, Oregon.

John T. Siple Hatchery Manager 1 FTE Kootenai Tribe of Idaho
University of Idaho 1 year Aquaculture

Position Description: Serve as Tribal Hatchery Manager responsible for all aspects of the aquaculture component of the Fisheries Program.

Position Duties: 1) Supervise, oversee, and provide instructions for all aquaculture operations at the Kootenai Tribal hatchery including: collection of wild broodstock, evaluation of potential spawners and stage of development, assay to determine spawnable females and final oocyte maturation, induction of spawning of females, injection schedule for LHRHa, observation of response, milt and egg extraction, checking sperm viability, sperm dilution, egg fertilization, egg de-adhesion, incubation of eggs, early life stages, feed initiation, disease monitoring, and rearing to release; 2) document all

conditions during various life phases; 3) update hatchery operations manual; 4) Supervise 4 full-time and one temporary fish culture technician; 5) provide and implement recommendations for improving efficiency and success at the hatchery; 6) other duties as assigned by the Tribal Fisheries Biologist.

Experience includes:

11 years field and hatchery work with Kootenai and Snake River white sturgeon. 31 total years of fish culture experience with Idaho Fish and Game and Kootenai Tribe of Idaho including spawning, rearing, and stocking of cutthroat trout, rainbow trout, steelhead, and kokanee.

I have worked for Idaho Fish and Game, mainly in fish culture, in various locations throughout the state for 29 years. I now work for the Kootenai Tribe of Idaho and have been involved in the conservation aquaculture program for the white sturgeon at the Kootenai Tribal Hatchery since it began in 1991. I correspond and collaborate with many other sturgeon culturists and disease specialists around the country to keep up with the latest developments in sturgeon culture.

Fisheries Publications- White Sturgeon

Siple, J.T. and S.C. Ireland. 1996. Kootenai River White Sturgeon Studies. Annual Hatchery Report. BPA Project No. 88-64

Siple, J.T. and P.J. Anders. 1995. Annual Kootenai Hatchery Report. In: Kootenai River White Sturgeon Studies. Annual Report B. BPA Project No. 88-64.

Siple, J.T. and P.J. Anders. 1994. Annual Kootenai Hatchery Report. In: Kootenai River White Sturgeon Studies. Annual Report B. BPA Project No. 88-64.

Siple, J.T. and P.J. Anders. 1993. Annual Kootenai Hatchery Report. In: Kootenai River White Sturgeon Studies. Annual Report B. BPA Project No. 88-64.

Siple, J.T. and G. Aitken. 1992. Annual Kootenai Hatchery Report. In: Kootenai River White Sturgeon Studies. Annual Report. BPA Project No. 88-65.

Siple, J.T. and G. Aitken. 1991. Annual Kootenai Hatchery Report In: Kootenai River White Sturgeon Studies. Annual Report. BPA Project No. 88-65.

Siple, J.T. and T.L. Patterson. 1991. Snake River Sturgeon Report. Information from 1988-1990. Progress Report. Idaho Department of Fish and Game. Boise, Idaho.

LaPatra, S.E., J.M. Groff, T.L. Patterson, W.D. Shewmaker, M. Casten, J. Siple, and A.K. Hauck. 1996. Preliminary Evidence of Sturgeon Density and Other Stressors on Manifestation of White Sturgeon Iridovirus Disease. *Journal of Applied Aquaculture*. Vol. 6, No. 3 pp. 51-58.

Section 10. Information/technology transfer

The conservation aquaculture program is an integral part of the USFWS recovery plan. As new knowledge is gained, the information will be used to guide future efforts of recovery of the white sturgeon and the Kootenai River ecosystem in an adaptive management approach. Information is presented at the annual BPA Review of Projects, regional and national fisheries symposiums, local conservation and sportsmen groups, as well as other appropriate forums as the opportunity arises. Future publications include a collaboration with Clear Springs Research concerning new knowledge about white sturgeon iridovirus, a peer reviewed report about conservation aquaculture of white sturgeon in the Kootenai River, and annual progress reports. IDFG and KTOI have an information booth and display of live juvenile white sturgeon at the county fair. KTOI is preparing an informational pamphlet about conservation aquaculture and sturgeon recovery for the general public. Tours are frequently given at the Kootenai Tribal Hatchery to agency representatives, local school groups, and interested citizens. BC MELP plans to add a white sturgeon display at Kootenay Trout Hatchery in British Columbia. Fisheries biologists interested in white sturgeon conservation have participated in many aspects of our program in order to further their knowledge of the species.

Congratulations!