Northwest Power and Conservation Council

September 9, 2010

MEMORANDUM

TO: Fish and Wildlife Committee members

FROM: Mark Fritsch, project implementation manager

SUBJECT: Step 1 review of the *Kootenai River White Sturgeon Aquaculture Conservation Facility*, Project #1988-064-00.

PROPOSED ACTION

I. The staff recommends that the Fish and Wildlife Committee approve the Kootenai River Native Fish Conservation Aquaculture Master Plan to proceed to step two level activities.

II. Staff further recommends that the Fish and Wildlife Committee call for additional information to be developed that fully addresses the issues raised by the independent peer review for consideration during the Step 2 review.

SIGNIFICANCE

On November 16, 2009, the Kootenai Tribe of Idaho (KTOI) submitted to the Council as part of the 3 Step Review Process a master plan for the *Kootenai River White Sturgeon Aquaculture Conservation Facility*, Project #1988-064-00.

The master plan proposes to implement critical upgrades to the existing Tribal Sturgeon Hatchery near Bonners Ferry, Idaho for the ongoing Kootenai sturgeon program, and construct a new hatchery (approximately 10 miles upstream) at the confluence of the Moyie and Kootenai rivers to address critical needs associated with the current sturgeon program and to assist in the reestablishment of a native burbot population.

In addition, the master plan addresses the needs as directed in the 2006 USFWS Biological Opinion regarding the effects of Libby Dam operations on the Kootenai River white sturgeon.

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This is an expansion of Kootenai conservation aquaculture efforts to build on demonstrated success over the last 20 years. This program has made substantial contributions to the preservation of genetic diversity of the remnant populations. Hatchery upgrades and expansion have been determined to be essential in forestalling extinction of the listed Kootenai white sturgeon population due to continuing natural recruitment failure and uncertain prospects for restoration of successful natural recruitment in the near future. Development of burbot conservation aquaculture facilities is necessary for reintroduction and restoration of this keystone species concurrent with implementation of an ecosystem-scale habitat improvement program.

BUDGETARY/ECONOMIC IMPACTS

Overview of Step 1 Project Costs

The program costs presented in the Step 1 Master Plan are consistent with Council's Three Step Review Process. It is important to note that these conceptual costs are a planning baseline from which to refine future costs, evaluate alternatives as the proposed project progresses through the preliminary (Step 2) and final (Step 3) design phases, and implementation.

Project costs provided in the Step 1 Master Plan were based on the proposed sturgeon and burbot programs and conceptual designs as presented in the Step 1 Master Plan. The Tribe is proposing to modify facilities at the Tribal Sturgeon Hatchery in Bonner's Ferry and construct a new facility at the Twin Rivers Hatchery site. Cost estimates for facility planning and design, construction, acquisition of capital equipment, environmental compliance, operations and maintenance and research, monitoring, and evaluation are presented for each of the hatchery facilities. A summary of key project expenditures (see Attachment 1) and a summary of future costs projected from Fiscal Year 2010 through FY 2020 (see Attachment 2) is provided at the end of this document.

An important aspect of expected costs for the proposed programs involves shared facilities and functions at the Tribal Sturgeon Hatchery in Bonner's Ferry and the proposed new facility at the Twin Rivers Hatchery site. Some of the proposed facilities, as well as staffing and equipment, will be shared between the Kootenai sturgeon and burbot programs. Planning estimates suggest that the future operational cost of these programs will be at least 30% lower with shared facilities and functions than if two separate, parallel programs were developed and operated. Efficiencies could also be realized in related monitoring and evaluation activities.

Key Expenditures by Program Area

The summary of key expenditures by program area (see Attachment 1) provides a conceptual overview of future costs for the current and future planned programs for both sturgeon and burbot as presented in the Step 1 Master Plan. The estimated onetime costs by program area are as follows:

- Planning & Design Step 1- $490,000 (estimated cost to date for the Step 1 Master Plan as submitted)
- Planning & Design Step 2 - $1,047,000
- Planning & Design Step 3 - $1,017,000

- Construction (Base Components) - $13,997,000
- Construction (Base & Separable Components) $15,251,000
- Capital Equipment $423,790
- Environmental Compliance Step 2 (Permitting, EA, Other) $164,546

The total budget for the conceptual planning associated with the Master Plan is about $490,000. This figure is an estimate that includes conceptual planning, engineering, and development of the Step 1 Master Plan.

The preliminary planning and design stage, intended to meet the Council's Step 2 requirements, is designed to identify any major difficulties or concerns with the program and facility designs. Step 2 design work should provide sufficient detail and specifics to ensure that the intent and scope of Step 1 conceptual design work can be met and to refine the cost estimates further. Step 2 will include refinement of scientific information, environmental compliance and ESA reviews. A placeholder of about $1,000,000 has been identified for Step 2 preliminary planning, environmental compliance, site investigations and design. Initiation of this work is proposed in FY 2010. This budget includes costs for drilling test wells, surveying and other investigative geotechnical work.

A placeholder of about $1,000,000 has been identified for the Step 3 final planning and design stage. It is anticipated that this work will begin in Fiscal Year 2011. Refinement of the Step 3 budget will occur in Step 2 during development of the preliminary design.

The total estimated conceptual construction cost for both the new and modification of existing facilities outlined in the master plan is $15,251,000. This figure includes burbot rearing ponds, sturgeon spawning channels and remote rearing units for sturgeon. The estimated construction cost estimate includes construction, construction management, and inspection. The budget estimate used master planning guidance of +/- 35 to 50 percent and will be refined as part of the next submittals associated with Steps 2 and 3.

The operations and maintenance (O&M) budgets for the project from Fiscal Year 2007 through Fiscal Year 2009 averaged $1,300,000. The monitoring and evaluation (M&E) budgets for the project from Fiscal Year 2007 through Fiscal Year 2009 averaged $400,000. It should be noted that the M&E budget includes critical uncertainties research activities that relate to future program implementation.

Future cost estimates for Operations and Maintenance, for both sturgeon and burbot programs, involving shared facilities and functions at the Tribal Sturgeon Hatchery in Bonner's Ferry and the proposed new facility at the Twin Rivers Hatchery site are estimated to be about $1,970,000 annually. Related M&E expenses are estimated to be $744,000 annually. These estimates are in 2012 dollars assuming construction is near completion (see Attachment 2).

Estimated ten year costs to operate the sturgeon and burbot programs at the Tribal Sturgeon Hatchery and Twin Rivers Hatchery from Fiscal Year 2010 through Fiscal Year 2020 are presented in Attachment 2. The estimated costs are allocated to the fiscal year in which the expense will likely occur. Costs for each program area are escalated to the year in which they

are expected to occur. This estimated cost summary assumes planning and implementation of new facilities for both the burbot and sturgeon programs would occur in 2010 through 2012. As previously noted, consistent with Step 1 of the Council's step process, cost estimates at this stage are conceptual. The Kootenai Tribe will be refining these estimates during the Step 2 and Step 3 planning phases. The ten year estimated cost summary is designed to be a planning tool and will be updated as costs are refined.

BACKGROUND

The Kootenai Subbasin is an international watershed located primarily in the Province of British Columbia, Canada, with smaller portions of the subbasin in the states of Montana and Idaho. The Kootenai River is the second largest Columbia River tributary in terms of runoff volume and the third largest in terms of watershed area (10.4 million acres; approximately 16,180 square miles).

From headwaters in southeastern British Columbia the Kootenai River flows southward into northwestern Montana where Libby Dam, forming Lake Koocanusa, impounds it. Downstream from Libby Dam, the river flows into Idaho, and then turns north, entering British Columbia and Kootenay Lake. The river exits the West Arm of Kootenay Lake at the town of Nelson and flows westward to its confluence with the Columbia River at Castlegar, British Columbia.

During the last century, the Kootenai subbasin has been modified by agriculture, logging, mining, flood control, and other land uses. The agricultural development in the basin has altered the physical habitat conditions in the lower Kootenai River floodplain by conversion of wetland and riparian habitats to farmland. Attempts to dike the lower river began in the late 1800s and by the 1990s over 90% of the historical floodplain habitat was separated from the river by levees.

When Libby Dam became operational in 1972, it reduced annual peak flows by half, thus significantly disrupting the natural hydrograph and thermograph. These modifications resulted in unnatural flow fluctuations in the Kootenai River and its floodplain, which no longer provide suitable habitat to support all life stages of many native aquatic and riparian species. In addition, the lake behind Libby Dam acts as a nutrient and sediment sink for the river downstream.

In developing the Kootenai River Subbasin Plan, the Kootenai Subbasin Technical Team selected bull trout, westslope cutthroat trout, Columbia River redband trout, kokanee, burbot, and Kootenai River white sturgeon as focal fish species in the subbasin because of their population status and ecological and cultural significance.

Kootenai River White Sturgeon

Several white sturgeon populations in western North America are anadromous, but only the Kootenai River supports a naturally landlocked population, isolated since the last glacial age approximately 10,000 years ago. Consequently, this population adapted to specific local conditions in the Kootenai River headwater system. Kootenai sturgeon are active at cooler temperatures, spawn in different habitats, and have lower genetic diversity than other populations in western river systems. The range of this population extends from Kootenay Lake upstream

190 km to Kootenai Falls, MT, but sturgeon are primarily found in the low gradient reach downstream from Bonners Ferry, ID and in Kootenay Lake.

Kootenai River white sturgeon have been declining for at least 50 years. The Kootenai sturgeon population was listed as endangered on September 6, 1994 under the Endangered Species Act (ESA) and a recovery plan was completed in 1999. Only 1,000 adults were estimated to remain in 2007 from a population ten times that size just 20 years ago. Significant recruitment of young sturgeon has not been observed since the early 1970s and consistent annual recruitment has not been seen since the 1950s. The remaining wild population consists of large, old fish that are declining by about 4% per year as fish die naturally and are not replaced. Future prospects of these remaining fish are highly uncertain as they reach very advanced ages. Numbers have already reached critical low levels where genetic and demographic risks are acute. Without intervention, functional extinction would occur well before the last wild fish dies.

Natural recruitment has failed because habitat changes have rendered current conditions unsuitable for successful incubation and early rearing. Natural spawning has been confirmed almost every year based on collection of several thousand eggs and developing embryos under a range of environmental conditions. Viability of fertilized eggs and larvae has been confirmed by successful hatchery production using wild broodstock. However, at least two recruitment bottlenecks occur. Embryo incubation survival is very low due to unstable sand and silt substrate in spawning habitats. Early rearing survival appears to be limited by physical habitats and biological ecosystems that are substantially altered from historical conditions. Wild juveniles are only occasional observed in intensive sampling with gillnets (0 to 11 wild juveniles caught per year).

Habitat changes responsible for recruitment failure appear to include the additive effects of pre- and post-Libby Dam factors. Libby Dam began regulating flows in the Kootenai River in 1972. Subsequent dam operations reversed the natural annual hydrograph by storing the spring freshet for flood control purposes and releasing water during winter months for power production. Downstream habitat changes resulting from flow regulation are complex and include changes in habitat-forming processes, reductions in flood frequency, longitudinal shifts in river transition zones, warmer downstream water temperatures during the winter, and cooler temperatures during the spring and summer months[1]. Dam operations have been significantly modified in an attempt to provide more normative downstream flow and temperature patterns but these changes have not produced conditions adequate for significant natural recruitment.

The Kootenai Tribe and the Kootenai Sturgeon Recovery Team have recognized that prospects for achieving long-term recovery of a naturally self-sustaining population remain uncertain and that the ultimate success of recovery efforts requires restoration of habitats and an ecosystem

[1] Since the early 1990s, Libby Dam operations have been modified to help restore Kootenai sturgeon and burbot migration, spawning, and recruitment. These changes included ceasing spring power peaking operations (load following), creating more normative spring flows and temperatures for Kootenai sturgeon, and more normative winter flows and temperatures for burbot. Daily load-following has largely been eliminated from winter and spring operational strategies since the early 1990s, primarily due to the ESA listing of Kootenai sturgeon and bull trout, and associated ramping rates specified in USFWS Libby Dam Biological Opinion. However, weekly load shaping still occurs during the winter months (i.e., varying flow during the week to generate power during high-demand periods) and follows established ramping rates.

capable of sustaining a natural population. Meanwhile, given the continued failure of measures to restore natural recruitment, the Tribe and Recovery Team have determined that the conservation aquaculture program represents the sole demonstrated effective alternative for forestalling extinction of Kootenai sturgeon.

Burbot

The burbot is the only true freshwater species in the cod family. Burbot inhabit cold rivers and lakes throughout their distribution and exhibit fluvial or adfluvial life histories. They occupy many major rivers and lakes within the Columbia Basin, although in Idaho, burbot are native only to the Kootenai River and its tributaries. They are also native to the Kootenai River and Kootenay Lake in British Columbia. The lower Kootenai River adfluvial burbot population spends a portion of its life in the South Arm of Kootenay Lake then migrates up the Kootenai River during winter to spawn in the mainstem river or tributary streams in British Columbia or Idaho.

The historical abundance of burbot in the Kootenai subbasin was never quantified but this fish was clearly abundant in the lake and lower river. Burbot historically provided a critical winter fishery for the Kootenai Tribe and many non-tribal anglers. Native Americans traditionally targeted burbot during the winter spawning period as a source of fresh meat when other food resources were limited.

Recreational burbot fisheries were historically very popular throughout the subbasin. A significant winter burbot fishery persisted into the 1950s and 1960s in the Idaho portion of the Kootenai River. In addition, a productive burbot fishery also occurred in the West Arm of Kootenay Lake during late spring and early summer in the 1960s and 1970s. Fisheries were curtailed as population declines became apparent over the last 30 years, but these actions were not successful in restoring the populations. No evidence of successful spawning or recruitment of Kootenai burbot in Idaho has been found since the IDFG began intensive monitoring efforts in 1993.

The distribution of burbot in the Kootenai subbasin is limited to Koocanusa Reservoir and Trout Lake. Burbot are functionally extinct in the riverine portion of the Kootenai subbasin in Idaho and extirpated in the West Arm of Kootenay Lake. Extensive recent sampling captured very few adult or juvenile burbot in Kootenay Lake and the Kootenai River. Recent population estimates indicates that only 50 fish remain in the lower Kootenai population (95% CI: 25-100 fish).

As with Kootenai sturgeon, no single factor appears responsible for the collapse of burbot in the subbasin. Rather, a combination of historical overharvest, habitat alteration and loss, and ecosystem degradation, contributing to recruitment failure, appears to be the cause. Related factors include increased winter flow, elevated winter water temperature, environmental degradation, floodplain loss, changes in primary and secondary productivity, Kootenay Lake flood control practices, and the altered composition of the ecological community.
Native burbot in the Kootenai River in Idaho are Red Listed in B.C., and are a designated by the State as a Species of Special Concern in Idaho. In Montana, burbot are listed as a Species of Special Concern. Kootenai burbot were proposed for Federal listing under the ESA in 2000 but

USFWS determined that this population was not eligible for listing because it did not meet the defining criteria of a Distinct Population Segment. However, Kootenai burbot are clearly an important cultural, ecological, and fishery resource in the Kootenai Basin.

I. History and objectives of the Kootenai River Aquaculture Conservation Facility

Kootenai White Sturgeon

In response to the Council's 1987 Columbia River Basin Fish and Wildlife Program, Bonneville funded the construction of the Kootenai Tribe of Idaho Experimental White Sturgeon Facility, which began operations in the spring of 1991. The low-capital facility was originally constructed to determine whether gametes from wild sturgeon in the Kootenai River were viable and artificial propagation was feasible using existing water sources of the Kootenai River. Initial experimental culture efforts between 1991 and 1996 demonstrated gamete viability and aquaculture feasibility by successfully fertilizing, incubating, hatching, and rearing sturgeon embryos and juveniles.

The 1996 USFWS draft Recovery Plan called for the full implementation of a conservation aquaculture program in order to replace failing natural recruitment and prevent near-term extinction. The existing facility and equipment were inadequate to meet conservation needs consistent with the Recovery Plan and a breeding plan to preserve genetic variability of the white sturgeon in the Kootenai River.

A series of upgrades to the existing hatchery were reviewed, approved, and implemented in 1998, 1999 and 2007/2008 to meet project and USFWS recovery plan objectives[2]. Monitoring of initial hatchery releases documented significant survival in the wild but also found that survival was highly correlated to size at release. At the same time, a series of experimental flow measures were implemented at Libby Dam in an attempt to restore natural recruitment. All such attempts to date have failed - current dam operations are not meeting the needs for natural recruitment. It is now apparent that the next generation of sturgeon is entirely dependent on the hatchery program production.

Where the scale of the current aquaculture program was previously designed to provide a short-term bridge to the expected restoration of natural recruitment, continuing recruitment failures have led to a reconsideration and expansion of the program objectives. Revised program objectives for the near-term include: 1) Prevent demographic extinction by replacing failed natural recruitment. 2) Establish an increasing trend and broad distribution of ages and sizes in the wild population in order to ensure future sustainability. 3) Preserve native genetic and life history diversity by capturing and spawning significant numbers of representative broodstock. 4) Provide contingencies for uncertain future availability of wild broodstock and prospects for restoring natural recruitment. 5) Inform recovery strategies by using hatchery fish to identify limiting life stages and habitat capacity. Revised program objectives for the long term include: 6) Avoid annual spawning stock limitation where too few fish might be available to capitalize on

[2] The Recovery Plan adopted by the U. S. Fish and Wildlife Service in 1999 identified a long-term goal of downlisting and delisting Kootenai white sturgeon when the population becomes self-sustaining. Short-term objectives included reestablishing natural recruitment and preventing extinction through conservation aquaculture.

favorable natural spawning conditions in any year (or to continue to provide hatchery broodstock). 7) Minimize, to the extent possible, the time interval between the functional extinction of remaining wild adults and maturation of the first hatchery generation. 8) Maintain an effective population size in the wild adequate to avoid genetic bottlenecks that risk loss of diversity or inbreeding depression in the next generation. 9) Avoid significant detrimental impacts of hatchery fish on natural production due to competition, predation, or disease magnification. 10) Avoid hatchery selection or domestication that might reduce future fitness or viability.

Burbot

Recent research on burbot aquaculture requirements has demonstrated the potential feasibility in burbot conservation and recovery efforts. A collaborative project was initiated in 2003 by the KTOI, British Columbia Ministry of Environment (BC MoE) and the University of Idaho Aquaculture Research Institute (UI-ARI) to evaluate the feasibility and develop effective methods for captive propagation of burbot for a conservation aquaculture program. The first wild broodstock for this project were collected in 2003 from Duncan Reservoir in British Columbia and were provided to the KTOI by the BC MoE. These fish were successfully acclimated and spawned in 2004 at the UI-ARI facility, leading up to the KTOI's first small-scale experimental releases into the wild in Idaho and British Columbia in the fall of 2009.

In recent years, burbot production has been expanded at the UI-ARI. Improvements in culture techniques continue to be made and fish are being produced for ongoing research projects. However, existing facilities at the UI-ARI are not adequate to move to the next phase of the burbot conservation and restoration effort.

The goal for the Tribe's burbot aquaculture program is to reestablish a native burbot population in the lower Kootenai River. The KTOI's proposed aquaculture program would reintroduce burbot into the lower Kootenai River and begin rebuilding the population using genetically similar stock from within the subbasin (from Moyie Lake in British Columbia). It is also possible that native broodstock from the remnant lower Kootenai population could be incorporated into the program.

The KTOI has developed a step-wise experimental program that includes four phases. Success in each phase is required to move the program forward to a subsequent phase. Each phase and the associated production goals are described below.

- Phase 1 (Developmental Aquaculture Feasibility Analysis) was initiated in 2001 and has been completed. Reliable, successful aquaculture apparatus and techniques were developed based on pioneering aquaculture research. This work continues to demonstrate the feasibility of burbot culture at a significant scale and laid the groundwork for the next phase. The second objective is to continue to develop and refine burbot culture methods and systems. Ongoing and future research on propagation methods is expected to pay future dividends in increased effectiveness and reduced cost of burbot aquaculture. This production level and commitment of UI-ARI facilities and staff are the extent available

due to other critical research and developmental functions it provides, which is an important factor driving development of the proposed Tribal facility.

- Phase 2 (Developmental Post-release Pilot Study) involves annual releases of limited numbers of juvenile burbot to evaluate distribution, movements, habitat use, food habitats, and effective sampling methods by life stage. This phase was initiated with the first experimental release of 247 burbot into the Kootenai River October and November of 2009.

- Phase 3 (Adaptive Experimental Evaluation) steps up hatchery production and monitoring efforts to determine how well hatchery-produced burbot survive, grow, and mature in sufficient numbers to reestablish a significant population in the Kootenai system. This phase involves a population-scale monitoring effort to address in-river questions and critical uncertainties. Phase 3 is distinguished from Phase 2 by the scale and intensity of production and monitoring efforts. Phase 2 involves limited research and monitoring of small-scale pilot-level releases to provide qualitative assessments of behavior and biology of hatchery-reared fish. Phase 3 involves larger-scale, extensive quantitative monitoring to provide statistically testable numbers of burbot to evaluate statistically post-release survival, growth, biological condition, and maturation. The Twin Rivers facility is needed in Phase 3 to produce sufficient fish for a statistically robust evaluation[3]. A key objective of Phase 3 is to estimate post-release survival rates of hatchery-reared burbot with enough precision to guide future production efforts and to reach established population and use objectives.

- Phase 4 (Population Rebuilding) would implement a full-scale restoration program designed to meet population and use objectives established in Phase 3.

II. Kootenai River Native Fish Conservation Aquaculture Program Master Plan

Kootenai River White Sturgeon

Upgrades and expansion of the sturgeon aquaculture facilities identified in this proposed Master Plan are needed to address expanded program objectives that accompany the recognition that the next sturgeon generation will be produced primarily by the hatchery. Upgrades proposed at the existing hatchery include a new spawning room that would eliminate the need to relocate large fish from one building to another, provide a safer means to transport large adult sturgeon to and from the river, and other measures to improve fish culture practices and worker safety. Because there is no physical capacity to expand the Tribal Sturgeon Hatchery, the Tribe is requesting approval for construction of the new Twin Rivers Hatchery.

It is important to note that the KTOI hatchery program is explicitly linked to the ecosystem-based habitat restoration activities as being implemented by the Tribe through Project 2002-002-

[3] The new facility at Twin Rivers is not proposed solely as a burbot facility. It is deemed essential by the Tribe for effective continuation and necessary expansion of the sturgeon program. Therefore, the inclusion of the burbot component is a cost-effective approach and the experimental nature of the program results in a lower risk.

00, *Kootenai River Habitat Restoration Project* and is a necessary stop-gap measure while those restoration activities are designed, implemented, and have a chance to take effect.

The existing hatchery has several needs that would be addressed by the proposed improvements and expansion outlined in the aquaculture master plan. In particular, the ability to meet production objectives has been limited by available rearing space operating at full capacity. In attempting to meet objectives with limited facilities, high rearing densities have contributed to unacceptably high mortality, an effect exacerbated by high summer water temperatures. Assessments of population status and release size experiments indicated that the existing hatchery lacks adequate rearing space to meet stocking goals developed to address the current low population size and future target demographic goals. Facility expansion will enable more fish to be reared to Age 1+, thereby optimizing survival rates upon release to the river in temperature and density conditions that optimize in-hatchery survival. Additional rearing space would also improve fish health by reducing density-related pathogen transmission, infection and disease.

The proposed facility modifications and expansions will allow the KTOI to achieve production goals necessary to preserve sufficient demographic diversity and to provide a hedge against an uncertain future, while habitat restoration actions are implemented and take effect. Upgrades to the existing hatchery would include the following:

- adding in-water tanks and mechanical means to transfer broodstock from the dock to holding tanks (large broodstock are currently carried on stretchers up a steep bank to holding tanks several hundred feet away),

- adding a new spawning room (broodstock holding tanks are currently in a separate building from the spawning room, so adult sturgeon must be moved manually between buildings during spawning activities),

- adding a water supply tempering facility to manage heating and chilling requirements for expanded rearing,

- adding weather protection and de-icing systems to the sediment pond to allow year-round operation of the sediment pond and drum filter,

- developing an additional 200 square feet of feed storage and 200 square feet of boat storage, and

- replacing twelve existing 10-foot-diameter rearing tanks with twenty-four new 8-foot tanks to allow greater segregation of fish families and to reduce rearing densities.

Other proposed modifications include: a new 10 -horsepower water pump, water supply intake screen cleaning system, heated drum screen enclosure, fire protection/alarm system, insulation and lighting upgrades, installation of sanitary wall panels in wet rooms, improved ventilation in rearing sheds, a concrete floor in rearing shed No. 2, and construction of isolation walls for the water treatment electric room.

The proposed new facilities at Twin Rivers would include spawning channels, incubation rooms, rearing ponds, water filtration, two employee houses, and administrative/biological support facilities. The Twin Rivers Hatchery site is desirable because it provides high quality pathogen-free groundwater as well as surface water from both the Moyie and Kootenai rivers. The site may also provide conditions for white sturgeon free embryos to imprint to and ultimately home to a reach that appears to provide adequate habitat conditions for recruitment. Because of these and other attributes, the KTOI purchased this property for hatchery and fisheries development.

The expansion of the program to a new facility at Twin Rivers would:

- provide capacity to meet revised program goals and provide flexibility for future adaptive management of the program,

- provide additional space to expand Kootenai sturgeon rearing capacity, while also ensuring low rearing densities, and allowing for greater segregation of fish families,

- encourage fish to imprint and home on waters farther upstream where more suitable spawning and incubation habitat currently exists, and

- provide flexible facilities that can accommodate aquaculture research, allow for some adaptive program modification as needed, and provide efficient fish production under improved conditions to support restoration efforts.

In addition, purchase and deployment of two remote incubation and rearing facilities for sturgeon is proposed as part of the sturgeon program. These facilities would be used experimentally to imprint Kootenai sturgeon at remote locations further upstream than Twin Rivers where more favorable spawning, incubation, and initial rearing habitats also appear to exist.

Production targets identified in the Master Plan are designed to ensure that immediate preservation objectives are met while balancing considerations of longer term risks. Targets for total broodstock, family size, fish size at release, and total releases are derived from a series of quantitative analyses tailored to address specific short- and long-term risks. Issues regarding the balancing of short- and long-term risks in the program were discussed in detail in the Tribe's responses to ISRP comments on the aquaculture master plan.

Burbot

The Tribe is proposing to include burbot aquaculture facilities as part of the new Twin Rivers Hatchery. The burbot holding, spawning and rearing tanks would be located in a separate building from Kootenai sturgeon and rainbow trout (a certified disease-free stock to feed burbot and sturgeon broodstock) to minimize potential pathogen transmission outlined as follows:

- Adult Fish Holding/Spawning. Round tanks with adequate cover are required to hold adult burbot.

- Incubation. Burbot eggs are incubated in one liter Imhoff cones mounted over small circular start tanks.

- Start Tanks. Post-hatch burbot volitionally move up through the water column out of the top of the incubators into the start tanks where they will be fed and closely monitored for disease as they grow to a size acceptable for transfer out of the start tank room. Burbot hatchlings require live feed (rotifers and *Artemia)* that will be raised in an adjacent live feed culture room.

- Rearing Tanks. Four-foot-diameter indoor circular tanks and eight-foot troughs will be used for burbot dry diet transition and grow-out.

- Burbot Ponds. Because early life stages of burbot are highly cannibalistic in high densities associated with intensive culture system, six 10 by 10 meter outdoor earthen ponds are planned for experimental larval and extended burbot rearing. Each pond will have a concrete harvest and water level control structure, supply, drain piping and predator barriers. Larger ponds for long-term holding of captive broodstock are also being considered.

Most of the primary Twin Rivers Hatchery structures (buildings, water supply network and utilities) will support both burbot and Kootenai sturgeon culture. Of the total 23,550 square feet of indoor space proposed at Twin Rivers Hatchery, 5,725 square feet will be dedicated to the burbot program. In addition, six outdoor burbot ponds are proposed that will occupy 20,000 square feet.

III. Major Project Review (The Three-Step Process)

On October 14, 2009 the ISRP provided their preliminary review (ISRP Document 2009-40) to the Council of the Master Plan titled *Kootenai River White Sturgeon Aquaculture Conservation Facility*, Project 1988-064-00. The ISRP requested additional information (i.e., "response request") and requested that the response be presented in a revised master plan.

On June 25, 2010 the Council received the requested revised master plan titled *Kootenai River Native Fish Conservation Aquaculture Master Plan* and on August 9, 2010 the ISRP provided their final review.

The ISRP found that the revised master plan meets requirements for proceeding to Step 2 (Qualified) for the Kootenai white sturgeon component of the master plan and meets requirements for proceeding to Step 2 for the burbot component.

Kootenai River White Sturgeon

The ISRP found that the KTOI have provided adequate responses to the majority of the ISRP's comments in the preliminary review of the Master Plan (ISRP Document 2009-40). The ISRP was appreciative of the extensive detail provided in the response document and the revised

Master Plan. The ISRP recommendation was qualified with a request to include additional information/detail in the Step 2 Master Plan document including:

- establish quantitative benchmarks (i.e. estimated population size, survival rates, adequate number of families, and age structure) and a decision pathway to adjust production goals based on monitoring data of hatchery fish in the wild,

- refine the monitoring program to collect the necessary data to determine if benchmarks are being met or exceeded, and

- provide additional details regarding the rationale and justification as to the need for additional hatchery capacity.

Burbot

The ISRP found that the KTOI responded adequately to ISRP recommendations by providing sufficient information and justification for the burbot component in the Master Plan to proceed to Step 2. The ISRP also thanked the KTOI for providing the detailed burbot Hatchery and Genetic Management Plan (HGMP) and for their phased program design based on the research aspects regarding burbot habitat requirements and limiting factors.

ANALYSIS

The KTOI provided a master plan that adequately defended the need for actions for both Kootenai sturgeon and burbot and demonstrates the urgency to implement effective actions to restore these native populations to their ecologically and culturally important roles in the region. Because of the critical role of habitat in the restoration of both native populations, the KTOI is also committed to implementing concurrently a suite of ecosystem restoration projects as essential companions to the conservation aquaculture program.

Kootenai River white sturgeon were listed as endangered under the ESA in 1994. The USFWS draft Recovery Plan for Kootenai River white sturgeon, published in 1999, calls for implementation of conservation aquaculture to prevent extinction and provide recruitment. The Libby Dam BiOp also specifically acknowledges the need for continued operation of the Tribe's sturgeon aquaculture program in Reasonable and Prudent Action Component 4, and directs the action agencies (BPA and the USACE) to provide funding to expand adult holding and spawning capability at the Tribal Sturgeon Hatchery.

The next 10-20 years will be a critical period for the future of sturgeon in the Kootenai River. There will be a significant bottleneck in spawner numbers as the wild population declines but hatchery fish are not yet mature. The conservation aquaculture program will be essential for bridging the population across this period.

Kootenai River burbot seem to be functionally extinct, and the KTOI has developed a step-wise four-phased experimental program that would reintroduce burbot into the lower Kootenai River and begin rebuilding the population using genetically similar stock from within the subbasin.

The KTOI intends to continue using their existing Tribal Sturgeon Hatchery near Bonners Ferry and to support the small-scale fail-safe program[4]. To address the need for additional rearing capacity and to imprint Kootenai sturgeon on waters further upstream, as described previously, the KTOI is proposing to develop a new aquaculture facility, the Twin River Hatchery, on Tribal-owned property at the confluence of the Moyie and Kootenai rivers, approximately 10 miles east of Bonners Ferry.

The proposed new facilities at Twin Rivers would include spawning channels, incubation rooms, rearing ponds, water filtration, two employee houses and administrative/biological support facilities. The Twin Rivers Hatchery site is desirable because it provides high quality pathogen-free groundwater as well as surface water from both the Moyie and Kootenai rivers. In addition, the site may provide conditions for white sturgeon to imprint to and ultimately home to a reach that appears to provide adequate habitat conditions for recruitment.

In addition, purchase and deployment of two remote incubation and rearing facilities for sturgeon is proposed as part of the sturgeon program. These facilities would be used experimentally to imprint Kootenai sturgeon at remote locations further upstream than Twin Rivers where more favorable spawning, incubation, and initial rearing habitats also appear to exist.

The ISRP supports these actions as outlined and reviewed in the revised master plan and requests that both the sturgeon and the burbot components proceed with Step 2 activities (i.e., preliminary design and environmental review). This recommendation from the ISRP is made with the understanding that the KTOI clarify plans to address questions raised by the ISRP in the Step 2 submittal as part of their master plan document.

Based on the ISRP review the Council staff recommends that the Fish and Wildlife Committee approve the *Kootenai River Native Fish Conservation Aquaculture Master Plan* to proceed with Step 2 activities. This recommendation is subject to the requirement that the KTOI addressing the issues raised by the ISRP as part of the Step 2 submittal.

[4] A fail-safe Kootenai sturgeon facility was developed at the Kootenay Trout Hatchery in Fort Steele, British Columbia to provide a backup site to avoid repeating a year class loss. Family groups were initially split for rearing at the each facility, and to increase the program's production capacity. This fail-safe program has operated successfully since 1999. As part of this Master Plan, the Tribe proposes continued use of the facilities (now operated by the Freshwater Fisheries Society of B.C.) for fail-safe operations because: 1) it is a successfully operating off-site program, 2) physical facilities are proven and functional, 3) no additional capital investments are required for continued operation and 4) international permitting and logistics can be continued efficiently.

Attachment 1. Summary of Key Expenditures by Program Area

Program Area	Estimated Cost	Occurrence	Level of Certainty
Planning & Design Step 1 *	$490,000	One Time	Estimated budget from Project budget 198806400 (Step 1 development)
Planning & Design Step 2 **	$1,046,999	One Time	Estimated budget from Project budget 198806400 (Step 2 development not started)
Planning & Design Step 3 ***	$1,017,114	One Time	Estimated budget from Project budget 198806400 (Step 3 development not started)
Construction (Base Components)	$13,997,000	One Time	Concept (+/- 35% to 50%) (escalated to 2012 dollars)
Construction (Base & Separable Components)	$15,251,000	One Time	Concept (+/- 35% to 50%) (escalated to 2012 dollars)
Capital Equipment	$423,790	One Time	Concept (+/- 35% to 50%) (escalated to 2012 dollars)
Environmental Compliance Step 2 (Permitting, EA, Other)	$164,546	One Time	Concept (+/- 35% to 50%) Completed during Step 2 (2011 dollars)
Land Purchases, Lease & Easements ****	$0	One Time, Annual	Budget to be determined
Annual Operations & Maintenance / Future Tribal Hatchery Program *****	$906,515	Annual	Refined concept (+/- 25%), Estimated cost once new Twin Rivers Program is implemented (2009 dollars)
Annual Operations & Maintenance / New Twin Rivers Program *****	$923,411	Annual	Refined concept (+/- 25%), Estimated cost once new Twin Rivers Program is implemented (2010 dollars)
Monitoring & Evaluation *****	$701,886	Annual	Refined concept (+/- 25%), Estimated cost once new Twin Rivers Program is implemented (2010 dollars)

Notes and Assumptions;

- * Shows estimated expenditure for FY 2007, 2008, 2009 and 2010 (This is an estimated figure from the total project budget for Project No. 198806400)
- ** Shows estimated expenditure from FY 2010 (This is an estimated figure from the total project budget for Project No. 198806400)
- *** Shows estimated expenditure from a projected FY 2011 budget (This is an estimated figure from the total project budget for Project No. 198806400)
- **** Land Purchases, Leases and Easements (estimated budget is not identified at this time)
- ***** Annual Operations and Maintenance and Monitoring and Evaluation costs are based on efficiencies from implementing the new Twin Rivers programs
- Budget figures assume that work would proceed on the timeline shown in Figure 8-1

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Attachment 2. Exhibit B: Ten Year Summary of Future Costs, FY 2010 – FY 2020

PROGRAM AREA	FISCAL YEAR										
	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
A. Planning and Design											
A.1 Step 1: Conceptual Engineering, Planning											
A.2 Step 2: Preliminary Engineering, Planning & Environmental Compliance	$732,899	$314,100									
A.3 Step 3: Final Engineering, Planning		$1,017,114									
B. Construction											
B.1 Existing Tribal Hatchery Estimated Construction Costs			$903,000								
B.2 Twin Rivers Estimated Construction Costs			$13,094,000								
B.3 Twin Rivers Estimated Construction Costs (Separable Components)			$1,254,000								
C. Capital Equipment											
C.1 Capital Equipment			$423,790								
D. Environmental Compliance											
D.1 Environmental Compliance	$65,818	$98,727									
E. Land Purchase and Easements (to be determined)											
E.1 Land Purchases, Leases & Easements	$0										
F. Operations and Maintenance											
F.1 Sturgeon Program (Existing Tribal Hatchery)	$1,338,692	$1,378,853									
F.2 Sturgeon & Burbot Program (Existing Tribal hatchery & Twin Rivers)			$1,970,220	$2,029,327	$2,090,207	$2,152,913	$2,217,500	$2,284,025	$2,352,546	$2,423,123	$2,495,816
G. Monitoring and Evaluation											
G.1 Monitoring & Evaluation Program	$701,886	$722,943	$744,631	$766,970	$789,979	$813,679	$838,089	$863,232	$889,129	$915,802	$943,276
Total Estimated Capital Costs	$798,718	$1,429,941	$15,674,790	$0	$0	$0	$0	$0	$0	$0	$0
Total Estimated O&M Costs	$2,040,578	$2,101,796	$2,714,851	$2,796,297	$2,880,186	$2,966,592	$3,055,589	$3,147,257	$3,241,675	$3,338,925	$3,439,093
Total Estimated Costs	$2,839,296	$3,531,737	$18,389,642	$2,796,297	$2,880,186	$2,966,592	$3,055,589	$3,147,257	$3,241,675	$3,338,925	$3,439,093

Notes and Assumptions;

- A1. Step 1 Planning (based on current expenditures to complete planning)
- A2. Step 2 Planning (based on estimate in FY 2010 budget, assume 70% of expenses in FY 2010 and 30% in FY 2011) escalation was included in FY 2010 budget
- A3. Step 3 Planning (based on estimates put together for the FY 2010 budget, assumes 100% of expenses in FY 2011)
- B.1. Existing Tribal Sturgeon Hatchery Estimated Construction Costs (escalated from 2009 dollars to mid 2012 dollars)
- B.2. Twin Rivers Estimated Construction Costs (escalated from 2009 dollars to mid 2012 dollars)
- B.3 Twin Rivers Estimated Construction Costs, Separable Components (budget shown was escalated from 2009 dollars to mid 2012 dollars)
- C.1 Capital Equipment, estimated lump sum for equipment items not shown in construction estimate (escalated from 2009 to 2012 dollars)
- D.1 Environmental Compliance Costs (assumes 40% of expenses in FY 2010 and 60% of expenses in FY 2011)
- E.1. Land Purchases, Leases and Easements (to be determined)
- F. O&M costs escalated at 3% annually. Increased costs for expanded production is assumed to start in FY 2012
- F.1 Sturgeon and Burbot Program (Existing Tribal Sturgeon Hatchery, operations sharing with new site starts in 2012)
- F.2 Sturgeon and Burbot Program (Existing Tribal Sturgeon Hatchery and Twin Rivers Starts in 2012)
- G.1 Monitoring and evaluation program (costs escalated at 3% annually, increased costs for expanded production is assumed to start in FY 2012)

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