Columbia River Project Water Use Plan

Physical Works Terms of Reference

COLUMBIA RIVER WHITE STURGEON MANAGEMENT PLAN

- CLBWORKS-26 Mid Columbia River White Sturgeon Upgrade Hatchery

April 4, 2008
TERMS OF REFERENCE FOR THE COLUMBIA RIVER
PROJECT WATER USE PLAN

COLUMBIA RIVER WHITE STURGEON
MANAGEMENT PLAN

1.0 OVERVIEW

This document presents Terms of Reference for the mid and lower Columbia River white sturgeon culture program being delivered under the Columbia River White Sturgeon Management Plan. This program will

This document provides detailed Terms of Reference for the following programs:

1) CLBWORKS-24 Mid Columbia River White Sturgeon Experimental Aquaculture: An experimental aquaculture program is required in the short term to provide juveniles for assessing impacts of flow treatment on sturgeon survival, and impacts of Arrow operations on juvenile habitat availability and suitability and juvenile survival.

2) CLBWORKS-25 Mid Columbia River White Sturgeon Conservation Aquaculture: In the longer term, a conservation aquaculture program is required to support the Arrow sturgeon population until such a time that stock abundance/age structure and habitat conditions can support a self-sustaining population and address residual impacts from providing lower than optimal spawning, incubation and rearing flows. If flow and stage conditions required to support a self-sustaining (or hatchery-supplemented) population are not economically feasible, a decision may be made to direct all or part of the conservation aquaculture effort to Kinbasket Reservoir.

3) CLBWORKS-26 Mid Columbia River White Sturgeon Upgrade Hatchery: Upgrades of the culture facilities at the Kootenay Hatchery in Wardner are required to support the experimental and conservation aquaculture program in the mid Columbia River.

4) CLBWORKS-34 Lower Columbia River White Sturgeon Conservation Aquaculture: Annual funding is required to support the ongoing sturgeon conservation culture program in the lower Columbia River, which is designed to provide fish for research purposes and provide artificial recruitment to the population.

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1.0 STUDY RATIONALE

This Terms of Reference (ToR) outlines the terms by which the Columbia Basin Water Use Plan (WUP) will provide capital funding for culture facility modifications to provide larval and juvenile production for release into the middle Columbia River downstream of the Revelstoke Dam (REV). This ToR is submitted in response to the Order under the Water Act (File No. 76975-35/Columbia) issued by the Comptroller of Water Rights (CWR) on 26 January 2007.

Schedule F of the order includes the provision in lieu of operational constraints of the following:

“3c) upgrade existing facilities at the Kootenay Hatchery to support 3a and 3b”

where 3a) refers to an “experimental aquaculture program to provide juveniles for assessing flow treatments on larval and juvenile sturgeon survival and impacts of Arrow operations on juvenile habitat availability, suitability and survival” and 3b) refers to “conservation aquaculture to support the sturgeon population until such a time as stock abundance/age structure and habitat conditions can support a self-sustaining population”.

The Upper Columbia White Sturgeon recovery Initiative (UCWSRI), Technical Working Group (TWG) (Spence 2004) recommended the program “develop aquaculture facilities for juvenile production (estimated cost: one time expenditure of $500,000 to upgrade facilities at the Kootenay Sturgeon Conservation Hatchery)”.

Using this recommendation, the Consultative Committee report (BC Hydro 2005) required conservation culture to support stocks until conditions and demography can support a self-sustaining population, and to address the residual impacts of less than optimal spawning, incubation and rearing flows and habitat conditions.

1.1 Background

Canadian Columbia River populations of white sturgeon were listed as endangered under the Species at Risk Act (SARA) in 2006. Habitat for white sturgeon in the Canadian Columbia River has been hydrographically altered and fragmented by the construction of dams and reservoirs. The population residing in Arrow Lakes Reservoir is currently estimated at approximately 50 individuals (Golder Associates Ltd. 2006), all older than the 1968 year-class. Hypotheses explaining this recruitment failure are varied but one of them is that juvenile rearing habitat for sturgeon spawned in the Revelstoke area is critically limited as a function of the construction and operations of the Hugh L. Keenleyside (HLK) and Revelstoke (REV) dams, and the resulting hydraulic conditions and habitat changes in the mid Columbia. Studies are proposed to examine this hypothesis as well as the suggestion that improved minimum and spawning and incubation flow treatments may provide for habitat.
improvements (i.e. CLBMON #21). Larval and juvenile sturgeon releases are proposed as a means of evaluating habitat use, movements and survival.

Recruitment failure was recognized as a problem for the Columbia River stock as early in 1994, and resulted in the establishment in 2001 of the Upper Columbia White Sturgeon Recovery Initiative (UCWSRI). The initiative published a recovery plan in 2002 which provided direction for recruitment failure research, stock monitoring, and public awareness (UCWSRI 2002a). An integral part of the plan was the initiation of a conservation culture program designed to provide fish for research purposes and to begin to provide some recruitment to the population. The program operates under the guidelines of a breeding plan (UCWSRI 2002b), and is delivered by the Freshwater Fisheries Society of British Columbia (FFSBC) out of the Kootenay Sturgeon Conservation Hatchery (KSCH) provided through their facilities in Wardner, B.C.

As part of the experimental flow treatment and aquaculture plan developed for the mid Columbia sturgeon population, the Water Use Plan Consultative Committee (CC) recommended a 10 year work plan aimed at better understanding juvenile white sturgeon capabilities in the mid Columbia River. The UCWSRI Technical Working Group (TWG) was involved in the Water Use Plan process and contributed to the resulting mid Columbia sturgeon management plan. Following a review of the plan related to the environmental assessment of the Revelstoke Unit 5 (REV5) project, the TWG submitted a modified plan and schedule for the mid Columbia (McAdam 2006). Included in the new plan were expansions to the existing aquaculture facility to provide for larval and juvenile release requirements for the duration of the experimental program and potentially for the conservation program (potentially 2008-2017).

Since the culture program started in the lower Columbia, it has relied on various forms of support. Initially funded by BC Hydro and the province’s Habitat Conservation Trust fund, it is now funded by a combination of resources including major contributions from BC Hydro and the Fish and Wildlife Compensation Program – Columbia Basin (FWCP), and a number of other supporters including FFSBC, grant foundations and other industrial sources. Reliability of full funding has not been assured. In order to provide for dependable financial resources for the maintenance of the culture program, the CC decided to include several levels of conservation culture program support in the Columbia River WUP sturgeon management program. These included maintenance of the existing program, additional juvenile production for release to the mid (Revelstoke) and possibly the upper Columbia (Kinbasket) reaches, an experimental program designed to produce large numbers of larvae and juveniles for experimental purposes and provisions of necessary improvements to the culture facilities to meet expanded production requirements.

This ToR provides for those capital improvements to the available culture facilities necessary to provide for the expanded production required to meet mid Columbia program needs. Improvements may include upgrades to existing facilities or construction and location of new remote facilities. The provision of funds should be used in coordination with CLBWORKS#24 Mid Columbia River White Sturgeon Experimental Aquaculture. The CC recommended total support for this project of $500,000 in 2004 dollars with the resulting improvements in place by 2012.
1.2 Management Questions

The Mid Columbia River White Sturgeon Upgrade Hatchery project does not answer any WUP management questions. Rather, it provides the facilities necessary to produce juvenile sturgeon for release into the mid Columbia River that are then monitored to answer questions regarding juvenile movements, habitat use, prey preferences, and annual survival.

1.3 Key Water Use Decision Affected

The key water use decision of this project is the provision of the necessary facilities for the continued and unaffected provision of juvenile sturgeon for stocking purposes to evaluate juvenile habitat preferences, survival rates and conditions, and movements, and to assist with rebuilding of the mid Columbia stock.

2.0 WHITE STURGEON UPGRADE HATCHERY PROPOSAL

2.1 Objectives

The objectives of the White Sturgeon Upgrade hatchery project are based on requirements described in the Columbia River Water Use Plan documents (BC Hydro 2005) and in the TWG letters of support (Spence 2004, McAdam 2006), and from discussions with the FFSBC. Objectives include;

1. The construction and full service provision of a portable incubation facility capable of handling the production of 500,000 post-hatch larvae to be initially located at the KSCH and completed in time for use during the 2008 brood year.

2. Relocation and full service provision of the portable incubation facility to remote facilities (e.g. Revelstoke), and construction and full service provision of portable rearing facilities capable of producing 100,000 fed larvae at the same remote location and completion in time for use during the 2010 brood year.

2.2 Approach

The Mid Columbia River White Sturgeon Upgrade Hatchery project will be provided by the FFSBC which has the necessary expertise to provide government-sanctioned sturgeon culture facilities capable of the requirements of the breeding plan (UCWSRI 2002b) and the mid Columbia sturgeon management plan (BC Hydro 2005).

The project will include capital improvements to facilities required to provide for mid Columbia sturgeon larvae and sub-yearlings production in support of research into the habitat and flow conditions required to rebuild or establish a second sturgeon population in the Canadian Columbia basin, whether it is artificially supported (failsafe) or self-sustaining.
2.3 Methods

2.3.1 Task 1: Project Coordination

Project coordination involves the general administration and technical oversight of the program. This will include but not be limited to: 1) budget management, 2) staff selection, 3) logistics coordination, 4) technical oversight in field and analysis components, and 5) liaison with regulatory and other interested parties. This task will continue throughout the assessment.

A safety plan must be developed and submitted to the BC Hydro contact, for all aspects of the study in accordance with BC Hydro procedures and guidelines. Specific safety training may be required.

2.3.2 Task 2: Construction of a Portable Incubation Facility

The FFSBC has decided there is no remaining space in the existing hatchery to provide for incubation of sufficient eggs to supply 500,000 post-hatch larvae sturgeon. As an alternative, a portable facility will be constructed in a steel container (40 ft by 8 ft by 9.5 ft) provided with door and window modifications. This approach is based on a similar facility constructed for the Nechako River sturgeon recovery program by the FFSBC. The container will be placed on a concrete pad, and serviced with electrical, water and effluent drainage. Incubation will be provided using 32 Modified McDonald Jars (“upwellers”), and post-hatch larvae will be collected in 8 aluminum troughs.

Eight separate water supply lines will service the container, and each collection trough will drain through separate lines to the effluent settling pond. For water service security, a main supply pump will be supported by a separate backup pump. Emergency alarms are in place for the heated and pumped water systems at the existing Wardner facility. However, separate intruder alarms will be added to the portable container. The facility will be completed in the winter of 2007-2008 in time for production for the 2008 brood year. Operating costs for servicing the portable hatchery are included in CLBWORKS#24 and 25. Extra equipment costs for the portable facility and for transporting the larvae to the mid Columbia will be included in the construction budget.

2.3.3 Task 3: Relocation of the Portable Incubation Facility

Prior to the 2010 brood year, the portable incubation facility will be moved from the Kootenay Sturgeon Conservation Hatchery to a remote location at the Revelstoke Dam. This is to allow for the addition of a short term feeding facility close to incubation, and close to the release sites for fed larvae. The primary reason for this relocation is the belief among members of the TWG that site imprinting may help to reflect more natural habitat interactions among released fed larvae.

The facility will be loaded by crane onto a flat bed and transported to a prepared gravel and concrete pad near the dam. A gravel pad, access road and parking area, and electric, water and effluent drainage services will already be in place prior to the relocation.
2.3.4 Task 4: Construction of a Portable Rearing Facility

The remote facility will consist of the relocated incubation portable and a second container outfitted for short term rearing to produce a final release number of 100,000 larvae. Both containers will be placed on separate concrete pads measuring 50 ft by 12 ft. The site will be provided with 400 liters of water per minute and a 600 Volt 300 Amp electrical service. The rearing container will contain 16 – 3 foot diameter circular fiberglass ponds with a 4 inch centre drain, and outlet standpipe with skirts and side discharge pipes. Water will pass through a roof mounted aeration column and will be heated via stand alone heating units capable of increasing the water temperature by approximately 5-6ºC. The larval collection troughs and the rearing ponds will drain to an effluent settling pond. Since the site will likely be somewhat remote from the dam, it should be provided with a crew trailer and portable toilet.

The site will be provided with emergency alarms for the heated and pumped water systems and intruder alarms. The facility will be completed in the winter of 2009-2010 in time for production for the 2010 brood year. Operating costs for servicing the portable hatchery are included in CLBWORKS#24 and 25. Extra equipment costs for the portable facility will be included in the construction budget.

2.4 Reporting

The FFSBC will provide a construction report for each of the incubation facility at the Kootenay Sturgeon Conservation Hatchery, and relocated incubation facility and rearing facility located at the Revelstoke Dam. The reports should include a description of the facilities final design and of the construction record supported by a breakdown of actual costs, construction drawings, and photographs of the installation process.

Reports will follow the standard format that is being developed for WUP monitoring programs. All reports will be provided in hard-copy and as Microsoft Word and Adobe Acrobat (*.pdf) format, and all maps and figures will be provided either as embedded objects in the Word file or as separate files.

2.5 Schedule

The newly constructed facilities must be completed in time for broodstock acquisition during the years post-hatch larvae (2008) and fed larvae (2010) are first scheduled to be released in the mid Columbia. This means that the facilities must be constructed and operationally tested well before the late spring (May). Construction will occur during the winter from November to February with completion assured by March. The first fertilized eggs could be ready for incubation as early as late June. Construction reports should be submitted by May of the brood year in which the facilities become operational.

2.6 Budget

The estimated budget to provide White Sturgeon Hatchery Upgrade provisions at the Kootenay Sturgeon Conservation Hatchery or at a remote facility in the Revelstoke
area is capped at $500,000 (in 2004 dollars), and scheduled to be expended during 2008-2010.

During the two construction years of the program, the budget for mid Columbia upgrade hatchery support is estimated as follows, (assuming a 2% inflation rate applied from 2004 and a 5% contingency):

- 2008: estimated expenditure of $155,000 (for construction of a portable incubation facility at KSH)
- 2010: estimated expenditure of $456,291 (for completion of the remote portable hatchery/rearing facilities)

The funds will be provided to the FFSBC through a contribution agreement that ensures the conditions and schedules described in the ToR are met.

3.0 REFERENCES

Order under the Water Act (File No. 76975-35/Columbia) under the Water Act, received by BC Hydro on 31 January 2007


McAdam, S. 2006. Revelstoke Unit 5 Operation and the Water Use Plan Mid Columbia White Sturgeon 10 year Monitoring Plan. Letter from Mr. S. McAdam, Co-Chair, Technical Working Group, Upper Columbia White Sturgeon Recovery Initiative to Mr. Dan Ohlsen, Revelstoke Unit 5 Core Committee, and Ms. Pat Vonk, BC Hydro Water License Requirements. October 26, 2006. 3 p. + 1 table

