

Narrative

Table 1. Proposal

Project Number	2008-307-00
Proposer	Confederated Tribes of Warm Springs Reservation of Oregon
Short Description	Development of a sockeye salmon population in Deschutes Basin
Province(s)	Columbia Plateau
Subbasin(s)	17070306, 17070302
Contact Name	Brad Houslet
Contact email	bhouslet@wstribes.org

Information transfer:

A. Abstract

Oregon historically had two sockeye salmon (*Oncorhynchus nerka*) populations; the Willowa Lake population in the upper Grand Ronde River Basin in Northeast Oregon and the Suttle Lake population in the Deschutes River Basin in Central Oregon. The anadromous portion of Deschutes population was severely impacted by barriers on Lake Creek in the 1930s and officially extirpated in 1966 with the failure of downstream passage facilities at the newly-constructed Round Butte Dam. Redevelopment of an anadromous sockeye run in the Deschutes Basin is proposed through this project, in coordination with the Oregon Department of Fish and Wildlife (ODFW), the Pelton Round Butte Hydro Project Co-Licensees, Portland General Electric Company (PGE) and the Confederated Tribes of Warm Springs Reservation of Oregon Warm Springs Power and Water Enterprise (CTWSRO - WSPWE). The Licensees are constructing a selective water withdrawal and new downstream fish-passage facilities at Round Butte Dam with the long-term goals of providing safe downstream guidance and passage for steelhead, spring Chinook, and sockeye.

In order to re-establish a sockeye run in the Deschutes Basin from a kokanee population critical population information is necessary. This project in partnership with ODFW and PGE would develop a cost effective and reliable method of sampling reservoir age class population. This project would also develop a life history model that would aid in predicting the age 1+ population. This is an important age class for managers to parse out availability for outmigration as sockeye, and if possible maintain a self sustaining resident kokanee population that can support a recovering bull trout population (Beauchamp and Van Tassell 2001), and provide for the important kokanee fishery (Thiede et al. 2002). Genetic information for the sockeye library would be collected and tracked through the Columbia Basin. The study would also link the use of Suttle Lake production with Lake Billy Chinook (LBC) and if separation is applicable. Spawning escapement and related fry production would be refined for the model inputs. Using the population information collected on kokanee/sockeye production, the model developed will allow basin fish managers to make informed decisions for managing the re-establishment of sockeye in the Deschutes Basin in balance with maintaining the resident kokanee fishery in LBC.

B. Technical and/or scientific background

Historically, the Deschutes River Basin supported one of two sockeye salmon runs in Oregon. Spawning and rearing was mainly in Suttle Lake and Link Creek in the Upper Metolius Watershed (Figure 1 and 2).

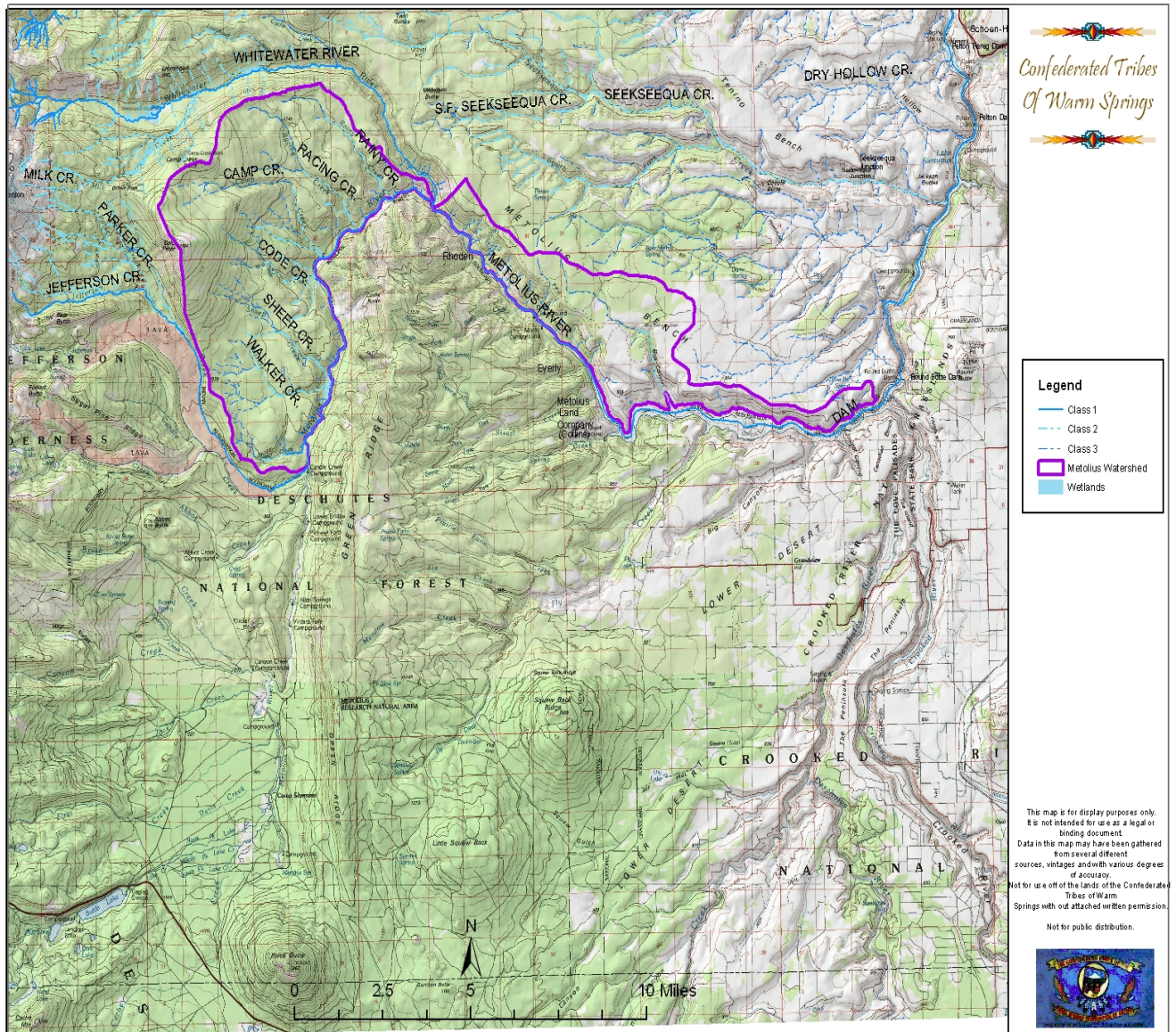


Figure 1. Map of the Metolius watersheds from Roundbutte Dam to the headwaters at Black Butte to the south.

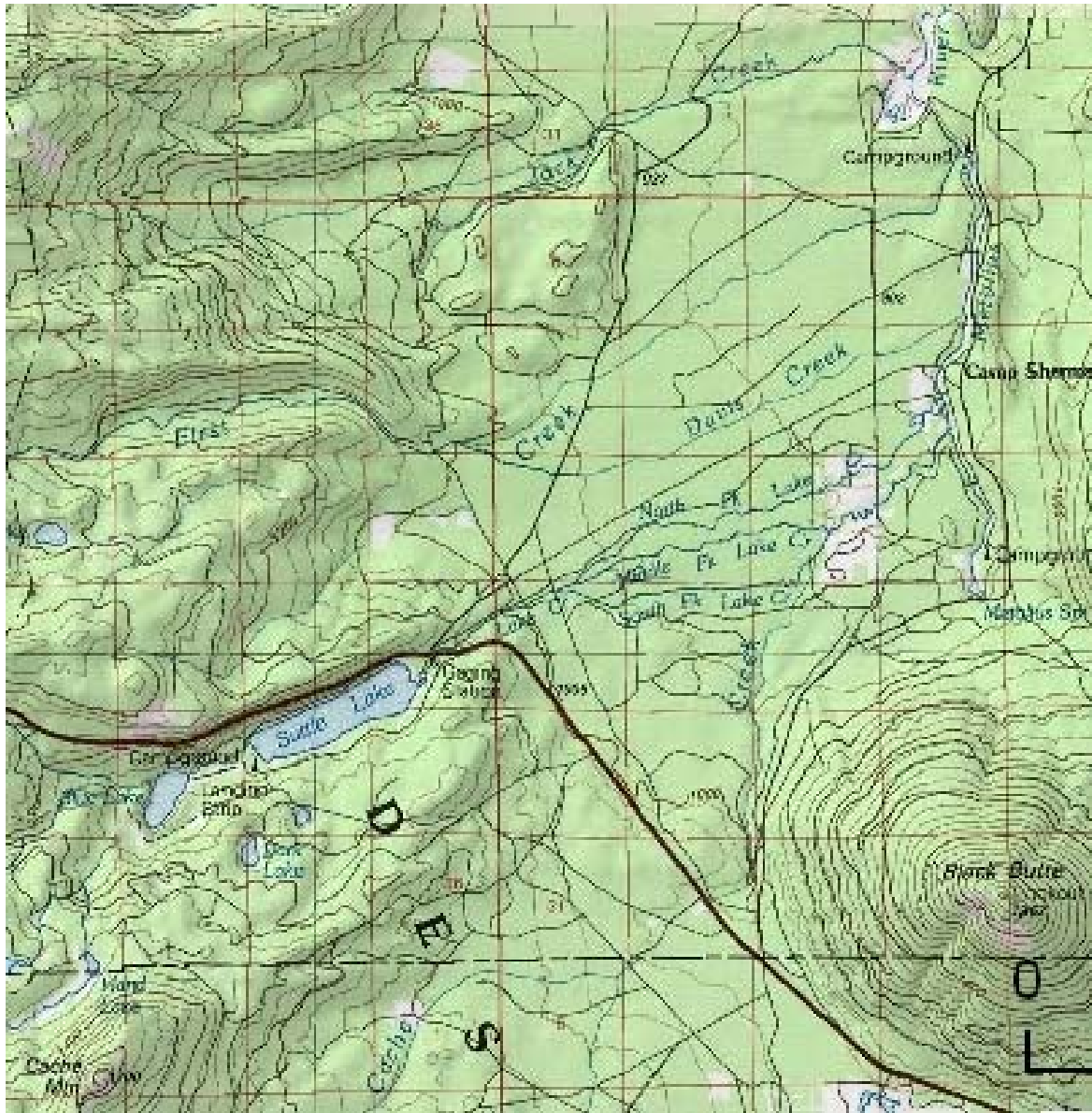


Figure 2. Map of Suttle Lake in relation to the Metolius River

Although the sockeye run was significantly suppressed in the 1930's due to passage issues on Lake Creek below Suttle Lake. The failure of downstream fish passage after the construction of Round Butte Dam in 1964 led to the termination of fish passage in 1966. After this date there were some "sockeye" that returned annually, apparently from outmigration of yearling kokanee, with abundance reaching about 300 fish in 1973 and 1976 (O'Connor et al. 1993 as cited by Gustafson et al. 1997). A self-sustaining kokanee population remains in LBC and Suttle Lake in the Metolius River watershed as a mixture of remnant sockeye and an introduction of hatchery kokanee meant to increase harvest opportunities. Currently, no fish passage occurs at Pelton and Round Butte Dams (PRB). As a condition of the 2005 PRB Federal Energy Regulatory Commission (FERC) licensing sockeye runs to the Deschutes will be reestablished. In the terms of the license, an outmigrant collection facility will be constructed to expedite downstream passage (Figure 3). Adult sockeye returns will be collected at an existing fish facility at the base of the PRB projects and moved upstream.

In 1997, adult sockeye returning to the PRB were collected for otolith microchemistry analysis. Results indicate a portion of those fish were derived from kokanee. As a result of those tests, it was determined kokanee, above PRB, exhibiting life history characteristics to outmigrate would be used for the development of the sockeye in the Deschutes Basin.

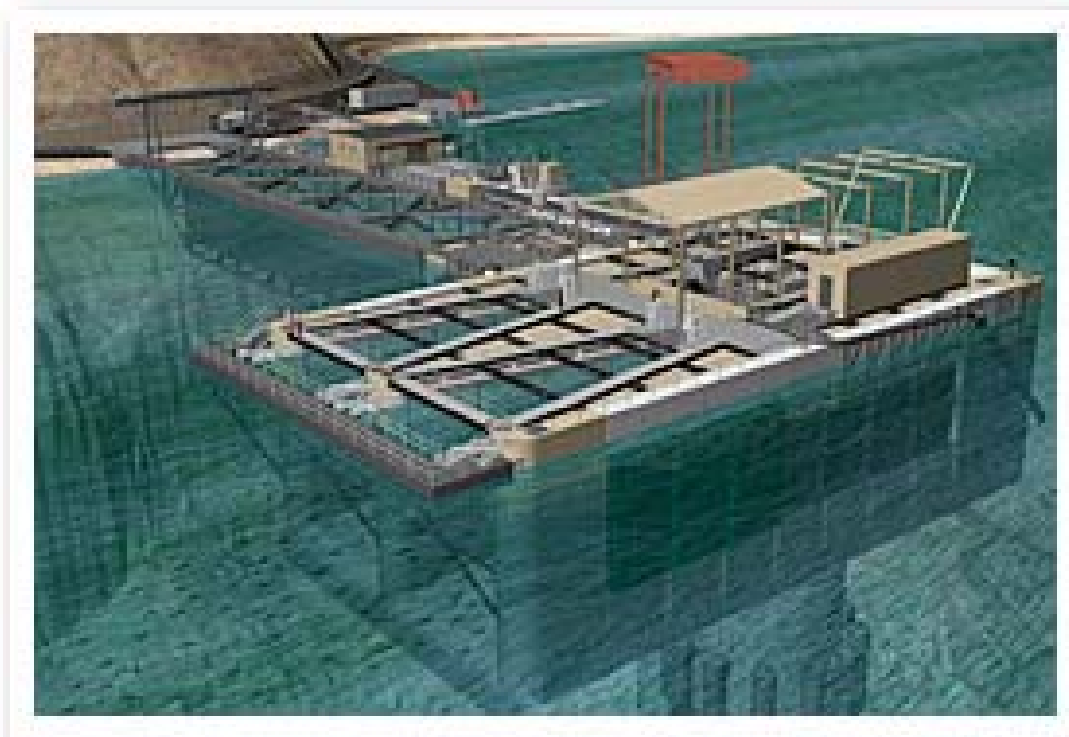


Figure 3. Conceptual drawing of the new PGE/ CTWSRO-WSPWE selective water withdrawal and fish collection facility.

O. nerka in the Deschutes Basin has a unique role in basin management. *O. nerka* is an important consumption fishery on LBC, provides an important forage base for the federally threatened bull trout, and will be relied upon as a source stock for the reestablishment of Deschutes River sockeye. Kokanee management and monitoring above PRB is a multi-agency effort. Information collected includes a harvest creel survey, juvenile outmigrant trap operations in the lower Metolius River, spawning surveys and intermittent hydroacoustic surveys on LBC. A simple life history model has been developed to test the predictability of *O. nerka* populations and age 1+ age class population; unfortunately is not robust enough to meet the challenges of *O. nerka* management.

The proposed objectives of this long term project are to 1). Determine the age distribution of *O. nerka* in LBC; 2). Refine *O. nerka* spawner escapement into the Metolius watersheds; 3). Determine if Suttle Lake *O. nerka* age 1+ production performs differently than LCB outmigrants; 4). Develop a more robust life history model to efficiently predict age 1+ populations to better manage sockeye outmigrant needs.

C. Rationale and significance to regional programs

This is an important project as identified in the Accords through bullet #3 of page 1 stating “To foster a cooperative and partnership like relationship in the implementation of the mutual commitments in this agreement”. Also under A.3. in Research and monitoring and evaluation

“...to robustly track survival improvements and facilitate rebuilding actions accomplished, in part through projects and programs identified in attachment B” and “should be coordinated with implementation partners including other fishery managers”. This project provides all of those elements. As a condition of the 2005 PRB Federal Energy Regulatory Commission (FERC) licensing sockeye runs to the Deschutes will be reestablished. This project would complement the work occurring on the Wallowa Lake population and other Columbia River sockeye populations including Red Fish Lake, Idaho.

The 1990 Deschutes River Subbasin plan (ODFW and CTWSRO 1990) discuss developing and maintaining a self sustaining population of sockeye salmon in the Deschutes basin. The Middle Deschutes Chapter of the current Deschutes Subbasin Plan (NPCC 2004) identify in the key findings that fish a passage facility at the PRB would allow for restoration of anadromous fish in to the Middle Deschutes Subbasin and tributaries including sockeye salmon. By March of 2009 PGE and CTWSRO - WSPWE will complete the construction of a selective water withdrawal and fish collection facility, becoming operational to collect smolts. The 2004 Deschutes Subbasin Plan also lists in the biological objectives that suitable habitat conditions for restored sockeye in the Deschutes Basin (NPCC 2004). Projects funded through PGE, Oregon Watershed Enhancement Board and implemented through many basin stakeholders, spawning and rearing habitat is accessible for sockeye to once again run to Suttle Lake. Additional spawning habitat is found throughout the Metolius River and tributaries with additional lake rearing habitat is also provided by LBC.

D. Relationships to other projects

The current Fish and Wildlife program funds or has funded numerous sockeye projects in the Columbia Basin including work with the Wallowa Lake sockeye population. Current projects funded by BPA include captive brood stock research for Red Fish Lake, Idaho. These studies in coordination with limnological studies are aimed at preventing another population of sockeye from becoming extinct. This study would promote another population of *O. nerka* in the Columbia Basin as others are in peril.

By partnering with PGE/ CTWSRO and ODFW the reintroduction of sockeye into historical habitat will further move sockeye in a positive direction and give the residents of Oregon their 2nd population of sockeye back to the state. PIT tag arrays are currently set up on the Deschutes funded by other non BPA projects for lamprey, fall Chinook and bull trout. Passage operations would be funded by PGE / CTWSRO-WSPWE. Harvest data would be collected and funded by ODFW and PGE / CTWSRO-WSPWE. The Sockeye Chapter of the Upper Deschutes Basin Reintroduction Plan would be funded and led by PGE in cooperation with ODFW and the CTWSRO. Spawning surveys include most basin stake holders including the above plus the US Forest Service, and US Fish and Wildlife Service. PIT tags would be supplied by PGE.

Table 2. Relationship to existing projects

Funding Source	Project #	Project Title	Relationship (brief)
BPA	199107100	Sockeye salmon habitat	Columbia river sockeye are from three populations. This combined with Deschutes ensures increasing sockeye returns to the Columbia basin.

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BPA	199107200	Redfish lake captive broodstock	Columbia river sockeye are from three populations. This combined with Deschutes ensures increasing sockeye returns to the Columbia basin.
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PGE			Construction and operation of the fish collection facility.
PGE			Juvenile <i>O. nerka</i> migrant screw trap collection
PGE			Kokanee harvest creel surveys
PGE/ ODFW/ USFS/CTWSRO			Spawning escapement seining and tagging and escapement counts on the spawning grounds.

F. Proposal biological/physical objectives, work elements, methods, and metrics

The overall goal of the project is to develop a self sustaining sockeye population in the Deschutes Basin using the current kokanee population.

Objective: Determine the age distribution of *O. nerka* in LBC;

WE: Collect/ generate and validate data

- a. Task: Assist in hydroacoustic sampling with ODFW and PGE using a model 241 Portable Split-Beam Echo Sounder, operating at a 200 kHz frequency with a 15-degree vertically aimed transducer, mounted on the side of a boat and connected to a laptop computer on all three branches of LBC. The equipment will be supplied by ODFW. Hydroacoustic sampling will follow transects established by Thiesfeld et al. (1999) and repeated by Burger (2007) and Neilson (2008). Hydroacoustic sampling will occur in November and August. Sampling will typically occur during night time hours and over a 2 - 3 day sampling period during each season. Additional testing and verification of ping strength will be performed to match the LBC environment. Trawls or short term radio telemetry may need to be incorporated to calibrate the echo sounder with the species in the reservoir.
2. WE: Analyze and interpret data
 - a. Task: Contract the analysis of hydroacoustic data with HTI inc. to ensure consistency of analysis from previous sampling years until staff become properly trained and experienced in the hydroacoustic analysis. The report would be due about 2 months after data collection
3. WE: Reporting.
 - a. Task: After receipt of the analysis from HTI the report will then be converted to interpret the age 1+ population of *O. nerka* in the

reservoir. The report will entail the availability of stock to be passed down stream and impacts to the resident population for co-management use. A final report to the co-managers explaining the amount of age 1+ available and recommendations of smolts needed for sockeye development would be made available by March of 2009. This report would be developed each year the first three years post Hydroacoustic analysis and then when the life history model is developed the report would be based from the model outputs.

Objective: Develop a sockeye reintroduction plan

4. WE: Watershed Coordination:
 - a. Task: Coordinate with PGE and ODFW in the management and development of sockeye production in the Deschutes Basin. Ensure communication occurs and staff is coordinated to collect appropriate data.
5. WE: Develop Plan:
 - a. Task: Participate in the development of a sockeye reintroduction plan lead by PGE and in coordination with ODFW for balancing the management of *O. nerka* needs in the basin for harvest of resident kokanee and release for sockeye development. Development of the sockeye chapter of the reintroduction plan begins. Currently, spring Chinook and summer steelhead have been developed (ODFW and CTWSRO 2008).
6. WE: Manage and administer projects:
 - a. Task: Oversee this project and provide coordinated direction for the different forums in a unified effort. Provide the reporting and administration of the contract.

Objective: Refine *O. nerka* spawner escapement into the Metolius watersheds

7. WE: Collect/ generate and validate data
 - a. Task: Further analysis is needed to address concerns of sampling a closed population. Where the marking occurs some of the marked fish may be age 1+ *O. nerka* that may not be intending to enter the spawning population. Past aging of otoliths from the seining and recovered otoliths from spawners have shown a potential to over represent age 1+ in the collection than what is found in the spawned carcasses. Also, if 100% of the spawning habitat is not sampled index locations need to represent random habitats representative of the habitats available. Addressing these concerns will aid in developing an appropriate and reliable spawning population estimate using a mark recapture method and index analysis for assessing management goals for both life history stages of *O. nerka*. Currently, approximately 2,000 fish are Floy tagged and released with 25% of those double Floy tagged using a different color to determine a tag loss estimate correction factor. Floy tagging occurs in three sampling periods starting in the first week of August and ends in the first week of September. The Chapman modification of the Peterson mark – recapture method is currently used to determine the escapement estimate with a 95% confidence interval. Redd counts and spawner

escapement occurs starting in September and is walked through in two week intervals until no new fish are found, typically the last week of October. Currently, nearly 100% of the spawning habitat is sampled.

Objective: Determine if Suttle Lake *O. nerka* age 1+ production performs differently than LBC outmigrants;

8. WE: Collect/ generate and validate data
 - a. Task: Collect outmigrating *O. nerka* from Suttle Lake using a screw trap at the lake outlet entering Lake Creek. Trapping would occur from February to May to determine the age 1+ potential smolt outmigrants. Up to 1,000 age 1+ *O. nerka* from Suttle Lake would be PIT tagged and transported for release in the lower Deschutes River for direct distribution to the anadromous life history form. PIT tagged Suttle Lake 1+ out migrants will be comparison tested with those *O. nerka* released through the fish facility in LBC to test the null hypothesis that there is no difference between LBC released *O. nerka* and those collected in Suttle Lake. PIT tagging would occur from 2009 through 2011. Tagging would be performed during the trapping operations from February to May for each of the next three years.
 - b. Task: Collect genetic samples from LBC and Suttle Lake/ Link Creek population. Fin clips will be taken from *O. nerka* during trapping and seining operations in the spring and fall. Approximately, 100 from each source will be collected, stored in ethanol jars, and transferred to CRITFC for analysis. Sampling would be collected from the trapping occurring from February to May of 2009.

9. WE: Analyze and interpret data
 - a. Task: Genetic samples collected from Suttle Lake *O. nerka* will be sent to Shawn Narum of CRITFC to maintain compatibility with current genetic sampling and library use. Analysis would occur during the summer and fall of 2009.

Objective: Develop life history model for *O. nerka* for estimation of age 1+ population estimates.

10. WE: Analyze and interpret data
 - a. Task: Contract the development of a life history model that will predict age 1+ smolt production for release into the lower river. Data inputs would include annual harvest mortality from ODFW creel surveys, annual natural mortality as estimated by bioenergetics modeling from Beauchamp and Van Tassel (2001) and Beauchamp and Shepard (in draft), age 0+ inputs, from screw trapping data near the mouth of the Metolius River collected by PGE biologists, and calibrated with hydroacoustic estimates. Reliable age 1+ *O. nerka* estimates are vital for determining the availability to pass down stream for Sockeye development, and retaining enough to continue a self-sustaining resident *O. nerka* population in LBC. The model would be started in 2009 with the initial gathering of past population data and further calibrated over the next two years.

C. Facilities and equipment:

- a. The personnel would be stationed out of the Warm Springs Office. Hydroacoustic equipment would be a model 241 Portable Split-Beam Echo Sounder, operating at a 200 kHz frequency with a 15-degree vertically aimed transducer, mounted on the side of a boat and connected to a laptop computer. The analysis of the hydroacoustic data will be contracted to HTI inc. during the first 3 years and then performed by CTWSRO staff after training. HTI inc. performed the analysis in 2007. Consistency in the data analysis is important in the near future while CTWSRO staff becomes familiar and trained in the analyses.
- b. Suttle Lake Trapping would use a 5 foot diameter screw trap placed at the outlet of Suttle Lake. The trap would be supplied by CTWSRO or ODFW.

I. References

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J. Key personnel

Bradley S. Houslet, Project Manager

This project will be implemented by the CTWSRO Branch of Natural Resources personnel. Brad Houslet will administer the BPA contract, coordinate with basin managers, and provide logistical support.

Education

Tennessee Technological University, MS. Aquatic Biology, 1999

University of Wisconsin – Stevens Point, BS Water Resources, 1990

University of Wisconsin – Stevens Point, BS Aquatic Biology, 1990

Work Experience

Confederated Tribes of Warm Springs

Fisheries Department Manager, October 2004 – Present

Manage department projects, budgets and personnel. Serve as the lead technical contact for fisheries related issues in the Columbia Basin for CTWRO.

US Forest Service- Deschutes and Ochoco National Forest

Fisheries Biologist 2003-2004

Lead author for the Upper Deschutes water quality restoration plan. Worked on Deschutes and Ochoco forest interdisciplinary teams for land management projects including timber salvage and watershed restoration projects.

US Forest Service- Deschutes National Forest Crescent Ranger District

District Fisheries Biologist 2003-2003

Lead author for the Crescent Creek water quality restoration plan. Project manager for the Trapper Creek Rehabilitation Project. Was fisheries representative for interdisciplinary teams for land management projects including timber sales and watershed restoration projects. Developed and implemented an investigation on water quality and cyanobacteria issues on Odell Lake, Oregon.

US Forest Service- Deschutes National Forest Sisters Ranger District

Fisheries Biologist 1999-2003

Worked on interdisciplinary teams for land management projects including timber sales and watershed restoration projects. Implemented large wood Recruitment projects, analyzed and reported bull trout density investigation in relation to brook trout and water temperatures in the Metolius watershed. Collected analyzed and reported on fine sediment accumulation rates and habitat impacts to fine sediment levels.

JENS LOVTANG, PRINCIPAL INVESTIGATOR /LEAD BIOLOGIST

Education

Oregon State University, M.S. Fisheries Biology, 2005

Humboldt State University, B.S Natural Resources Planning, 1995

Work Experience

Confederated Tribes of Warm Springs

Fish Production Biologist, November 2005 – Present

Current Duties: Oversee data collection, analysis, and reporting of the CTWSRO Fish Production Program, which includes monitoring of natural production of steelhead and spring Chinook salmon in reservation streams, and kokanee salmon in the Metolius River Basin. Participate in the cooperative management of the Warm Springs National Fish Hatchery.

Oregon Department of Fish and Wildlife, Corvallis, Oregon

Experimental Biology Aide, Gearhart Mountain Bull Trout project, July – August 2005

Experimental Biology Aide, Siletz River Fall Chinook Project, September - October 2005

Oregon State University, Corvallis, Oregon

Graduate Research Assistant (M.S. Candidate), January 2002 – June 2005

Portland General Electric, Madras, Oregon

Fish Technician, Pelton Round Butte Project April – November 1999

Deschutes National Forest, Sisters Ranger District, Sisters, Oregon

Seasonal Fisheries Biologist, 1996 – 1998

Recent Publications

Lovtang, J.C. 2008. Confederated Tribes of Warm Springs, Fish Production Program, 2007 Annual Report. Confederated Tribes of Warm Springs, Warm Springs, OR

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Education

Ph.D., Natural Resources, University of Idaho, 2006
M.S., Marine Science, University of San Diego, 2000
B.S., Fishery Biology, Colorado State University, 1996

Appointment

2002-present Lead Geneticist, Columbia River Inter-Tribal Fish Commission

Selected Publications

Narum, S. R., M. Banks, T.D. Beacham, M.R. Bellinger, M.R. Campbell, J. DeKoning, A. Elz, C.M. Guthrie III, C. Kozfkay, K.M. Miller, P. Moran, R. Phillips, L.W. Seeb, C.T. Smith, K. Warheit, S.F. Young, J.C. Garza. 2008. Differentiating salmon populations at broad and fine geographic scales with microsatellites and SNPs. *Molecular Ecology* 17:3464-3477.

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Campbell, N. R., and S. R. **Narum.** 2008. Identification of novel SNPs in Chinook salmon and variation among life history types. *Transactions of the American Fisheries Society* 137:96-106.

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Seeb, L. W, A. Antonovich, M.A. Banks, T.D. Beacham, M.R. Bellinger, S. M. Blankenship, M. Campbell, N.A. Decovich, J.C. Garza, C.M. Guthrie III, T. A. Lundrigan, P. Moran, S.R. **Narum,** J.J. Stephenson, K.J. Supernault, D.J. Teel, W.D. Templin, J.K. Wenburg, S.F. Young, C.T. Smith. 2007. Development of a Standardized DNA Database for Chinook Salmon. *Fisheries* 30:540-552.

