

## Narrative

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**Table 1. Proposal Metadata**

<b>Project Number</b>	200811700
<b>Proposer</b>	Confederated Tribes of the Colville Reservation
<b>Project Title</b>	Rufus Woods Reservoir Redband Broodstock Net Pens
<b>Short Description</b>	Raising of redband rainbow trout in net pens in Rufus Woods Lake
<b>Province(s)</b>	Intermountain
<b>Subbasin(s)</b>	Lake Rufus Woods
<b>Contact Name</b>	Ed Shallenberger
<b>Contact email</b>	Ed.shallenberger@colvilletribes.com

### Information transfer:

#### A. Abstract

The Colville Tribal Hatchery (1985-038-00) was built in 1989 in order to raise fish for planting on the Colville Reservation. Due to its limited holding capacity, this hatchery was designed to rear eggs obtained from other agencies or from wild broodstock, but it was not designed for holding broodstock.

In 2003 the Colville Tribal Hatchery began a program to raise and release the native, inland strain of redband rainbow trout ('redbands') rather than the coastal strain of rainbow trout that the hatchery had been obtaining from the Washington Department of Fish and Wildlife (WDFW). Small redbands obtained from WDFW and also from Reservation streams were held as broodstock in raceways at the hatchery. As this program has developed more raceway space has been devoted to holding these redband broodstock. At present a third of the existing raceways (4 of 12 raceways) are being used for holding broodstock, and space and water requirements will be even greater as these adult fish increase in size.

Rather than invest in expensive water and raceway upgrades in the existing hatchery, we investigated the feasibility of holding broodstock off-site in net pen facilities. Although no reservation lakes meet the necessary requirements for holding broodstock, salmonids have been successfully raised in net pens in Rufus Woods Reservoir since 1991. It was decided that net pens were the best option for holding redband broodstock or redbands being held for special purposes (educational, fishing derbies etc.). Due to the financial instability of the largest of the net pen operators, it was felt that the safest course of action was for the Colville Tribe to install and operate its own net pens. Since the date of the original proposal, the financial problems of the net pen operators have been solved, and the largest facility has agreed to hold, feed and care for the Tribe's redband broodstock on a contractual basis at a significant savings to the Colville Tribe. This project will enable the Colville Tribe to raise sufficient broodstock to meet reservation redband trout planting needs without jeopardizing

the incubation and rearing capacity of the Colville Tribal Hatchery for other species managed under the Resident Fish Program.

**B. Problem statement: technical and/or scientific background**

The Colville Tribal Hatchery was constructed in 1989 in order to raise fish for reservation lakes and streams to mitigate for fish losses due to the construction of Grand Coulee and Chief Joseph Dams. This hatchery was originally designed to utilize eggs obtained from other agencies or from other sources, but not to hold broodstock. Originally 10 raceways were constructed, with two additional raceways were added in 2002 without enlargement of the water supply system. While the existing 12 raceways and water supply system are sufficient for the original tasks of incubating eggs and raising fish for stocking in Reservation lakes and streams, they are insufficient for the additional function of holding broodstock.

In 2003, in accordance with subbasin plan goals 1C1 1C2 and 1C3, the Colville Tribe began a project to stock the native redband rainbow trout (*Oncorhynchus mykiss gairdneri*) rather than non native strains of rainbow trout obtained from the US Fish and Wildlife Service or the Washington Department of Fish and Wildlife. Juvenile redbands were collected from Bridge Creek on the Colville Reservation and from WDFW and held at the Colville Tribal Hatchery. These fish became the Colville Tribe's original broodstock, but additional redbands have been collected annually from Reservation streams and added to the program to infuse current and local genes into the broodstock program.

To date, the program has been highly successful, with increasing numbers of redbands planted each year while phasing out the number of non-native coastal rainbow trout. Starting in 2009 only native redbands will be planted from the Colville Tribal Hatchery

This success has caused serious repercussions at the hatchery. Currently one third (4 out of 12) of the raceways are being devoted to holding redband broodstock. Additionally, two isolation troughs are also used for newly captured redbands. Ideally, at least six raceways and four isolation would be used in order to segregate new fish, year classes and sexes. This would put untenable demands on an already over taxed system. Possible solutions to the current capacity limitations on our successful redband broodstock program fall into three categories and each was reviewed in the decision to utilize net pens for the majority of our redband broodstock.

A. Upgrade the Colville Tribal Hatchery.

Hatchery capacity could be expanded by adding additional raceways, wells and pumps. Meeting present demands would require the construction of at least four additional raceways and increasing available water supply to provide an additional 3000 gallons per minute of water flow. While possible, this solution would be the most expensive, both in capital outlay and ongoing cost. Preliminary cost estimates are approximately \$800,000 for capital and annual operating costs (additional electrical demand and 1 FTE) of at least \$80,000.

B. Restrict Production at the Colville Tribal Hatchery.

In addition to redband trout (February - April spawners) the Colville Tribal Hatchery also raises Lahontan cutthroat trout (*Oncorhynchus clarki henshawi* – May spawners) and eastern brook trout (*Salvelinus fontinalis* – October-November spawners) for Tribal

stocking programs. The limited production and the spacing of spawning and incubation times for these species will facilitate efficient utilization of hatchery capacity. Reduced production of these species would free up few resources for redband production. While elimination of these non-native species from the hatchery stocking program can be seen as a significant step towards a commitment to restore our native fish communities it should be recognized that eastern brook trout are highly desired by Tribal members and only stocked in a limited number of reservation lakes and Lahontan cutthroat trout are only stocked in Omak Lake, a highly alkaline in which redbands will not survive. Alternatively redband production could be cut by approximately 30%. While there is no additional cost to this option, it does not meet hatchery goals.

B. Shift some holding and/or rearing to off-site locations.

1. Find a lake on the Colville Reservation capable of safely holding broodstock. An inventory of Reservation lakes initiated in 2005 has failed to identify any lakes that meet all criteria for safely holding redband broodstock. Critical considerations including the lake's location (restricted public access), physical characteristics (water quality, thermal and dissolved oxygen profiles, depth, history of summer and winter-kill episodes) and resident fish communities. Had a suitable lake been available this would have been the most efficient and cost effective alternative.
2. Purchase species other than redbands from other aquaculture ventures instead of rearing them in the Colville Tribal Hatchery. Now that eggs from redband broodstock constitute the bulk of the hatchery's production, their synchronous collection, incubation and rearing exceed facility capacity due to resources occupied by broodstock. This option will be used to a limited extent in 2009, when 10,000 pounds of sterile rainbow trout will be purchased from a net pen aquaculture facility and planted in reservation lakes. Because of economies of scale and efficiencies of operation, net pen operators can raise large fish at a lower cost than we can raise them in the Colville Tribal Hatchery. While this is a very cost efficient solution it is only useful in eliminating the space required for fish to be used for "put and take" angling. It is the basic philosophy of the Colville Tribal Hatchery is whenever possible, to stock sub-catchable fish which will grow in Reservation waters before entering the fishery. Not only is this practice more economical, but it produces a much better quality of fish.
3. Hold redband broodstock in Tribal owned net pens in the Columbia River. This is a feasible alternative and was a major part of the original plan. Capital costs of a very small net pen operation (approximately \$300,000) are considerably less than the cost of hatchery expansion. Although there is no water pumping costs, efficient operation of a very small net pen operation is impossible (requires 2 FTEs) and therefore total operational costs would be similar to hatchery expansion.
4. Contract rear the holding of redband broodstock by one of the net pen operators in Rufus Woods Reservoir. By their very nature, well run net pen operations can rear fish at a much lower cost than is possible by hatcheries. This is due to economies of scale, no pumping costs and efficient use of personnel. A well run net pen and raise fish of 1kg or larger for about 10% of the cost of most hatcheries. Both net pen operators have expressed a willingness to raise redband broodstock for the Colville Tribes. This alternative is the most cost effective option. Capital costs will be less than \$25,000 and annual operational costs would

be similar to those incurred by expanded hatchery operations and less than those incurred by Tribal owned net pens.

**C. Rationale and significance to regional programs**

Redband rainbow trout are listed in the Upper Columbia, San Poil and Lake Rufus Woods subbasin plans as focal species and a species at risk due to introgression from transplanted coastal rainbow trout. The primary purpose of the project is help the Colville Tribal Hatchery efficiently produce redband trout for distribution in reservation waters. This will help meet Subbasin Plan objectives 1C1 (Protect, enhance, restore and increase distribution of native resident fish populations and their habitats in the IMP with primary emphasis on sensitive, native salmonid stocks), 1C2 (Maintain and enhance self-sustaining, wild populations of native game fish and subsistence species to provide for harvestable surplus) and 1C3 (Minimize negative impacts [e.g. competition, predation and introgression] to native species from non native species and stocks.)

**D. Relationships to other projects**

This project will be closely tied to the Colville Tribal Hatchery project (1985-038-00). Redband broodstock raised in these net pens will be used for producing fish to be raised in the Colville Tribal Hatchery and planted in Reservation lakes and streams.

Table 2. Relationship to existing projects

Funding Source	Project #	Project Title	Relationship (brief)
BPA	1985-038-00	Colville Tribal Hatchery O&M/M&E	The Colville Tribal Hatchery raises redband rainbow trout for stocking in Reservation waters. Holding broodstock in net pens supports the hatchery and allows it to produce to its potential.

**E. Project history (for ongoing projects)**

New project

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

**Objective 1.** The primary objective of this project is to reduce the need for raceway space and water at the Colville Tribal Hatchery by raising redband rainbow trout broodstock off site.

The Colville Tribal Hatchery has very limited water and raceway space. Upper Columbia, San Poil and Lake Rufus Woods subbasin plans all list redband rainbow trout (*Oncorhynchus mykiss gairdneri*) as a focal species that is at risk due to introgression from transplanted coastal rainbow trout. The Colville Tribal Hatchery has developed a population of captive redband broodstock and no longer produces and plants coastal rainbow trout. This program currently utilizes one third of the available raceways and water and seriously jeopardizes the production of fish to be planted.

**Objective 2.** Maintain a population of redband rainbow with a sufficiently large average size to be utilized for educational purposes, fishing derbies and specialized planting needs.

The Colville Tribal Hatchery does not have space or water available for holding fish throughout the year to meet specialized planting needs.

**Work element 1. Manage and administer (119).**

Under this project the Colville Tribes will contract with a local aquaculture facility to raise hatchery redband broodstock of three age classes as well as fish for planting as space is available. The contract will be competitively bid. While price will be a major selection factor, facilities and capability will be considered just as important.

The milestones associated with this work element are:

**Milestone A.** Contract with local aquaculture facility to raise fish.

**Milestone B.** Work with contractor to determine schedule, equipment needs and feed needs.

**Milestone C.** Purchase and install necessary equipment and supplies.

**Milestone D.** Supervise contract.

**Work element 2. Rear fish (63).**

Under this work element existing redband rainbow trout broodstock will be transported to the net pens and raised by a contractor under supervision on the biologist in charge of the program. Eggs and milt will be collected as needed under the Colville Tribal Hatchery Project (1985-038-00).

Milestones under this work element are:

**Milestone A.** Transport fish. Fish will be transported to the net pen site to be reared by the contractor.

**Milestone B.** Supervise the rearing of redband broodstock and any other redbands being raised by the contractor for the Colville Tribal Hatchery. Fish will be reared in two 12-meter square net pens, each subdivided into four quadrants. One thousand two year old fish will be

held in each of two quadrants. Three year old fish will be held in two quadrants (750 male and 750 female). Four year old fish will also be held in two quadrants (500 male and 500 female). The remaining two quadrants will be used for sorting fish or raising additional fish when space is available.

**Work element 3. Produce (annual) progress report (132).**

**Work element 4. Produce Pisces status reports (185).**

### **G. Monitoring and evaluation**

The monitoring and evaluation of results will be objectively measured by the fish growth, fecundity and eyed egg production from fish kept at the net pens. Similarly hatchery production and success can be objectively measured by the number fish and biomass produced and fish mortality.

Fish health will be regularly monitored by hatchery staff or by Dr. Ed Shallenberger, the project lead. Dr. Shallenberger pioneered the fish farming industry in Rufus Woods Reservoir and is fully capable of monitoring all aspects of this projects

### **H. Facilities and equipment**

The facilities used will be those of one of the two aquaculture facilities in Rufus Woods Reservoir. Both are quality operations who are easily capable of raising redband broodstock. Eight new nets will need to be purchased to hold these fish. Selection will be made by competitive bid.

### **I. References**

As describe in the Intermountain Province (IMP) Subbasin Plan (Rufus Woods Subbasin) on page 50-12 the third highest priority 1C is to “Protect, enhance, restore, and increase distribution of native resident fish populations and their habitats in the IMP with primary emphasis on sensitive, native salmonid stocks”. The proposed project will allow the Colville Tribes to raise sufficient redband broodstock to increase the distribution of a native resident fish to their historic habitats.

### **J. Key personnel**

Edward W. Shallenberger, Senior Resident Fisheries Biologist, Colville Confederated Tribes  
Dr. Shallenberger pioneered aquaculture in Rufus Woods Reservoir. He sold Columbia River Fish Farms in 2005 and began work with the Colville Confederated Tribes in 2006. He no longer is employed by or has any ownership in any aquaculture facility.

Sheri L. Sears, Resident Fish Division Manager, Colville Confederated Tribes

## **EDWARD W. SHALLENBERGER**

Senior Resident Fisheries Biologist  
Colville Confederated Tribes

[ed.shallenberger@colvilletribes.com](mailto:ed.shallenberger@colvilletribes.com)  
P.O. Box 150, Nespelem, WA 99155  
(509) 634-2121

### **EDUCATION**

Willamette University, Salem Oregon  
B.A.—Biology, 1964  
Stanford University, Stanford, California  
M.A. – Vertebrate Zoology, 1966  
University of California, Los Angeles, California  
Ph.D. – Animal Behavior, 1970

### **PREVIOUS WORK EXPERIENCE**

May 1994 to  
April 2006

Columbia River Fish Farms, LLC, Omak, Washington 98841

**General Manager:** Responsible for the design, permitting and construction and operation of a 4,000,000 pound/year fish farm. In 1994, with the help of a single partner I purchased Stolt Sea Farm's Columbia River assets and designed, permitted and built Columbia River Fish Farms. Under my guidance the farm grew from its initial 8,000 m<sup>3</sup> of cage space to its present 80,000 m<sup>3</sup>.

In addition to supervising the daily operation of the farm I shared the long term planning responsibilities with my partner. I was in charge of all dealings with Tribal, Federal, State and County agencies as well as all contractors and suppliers.

July 1992 to  
November 1993

Stolt Sea Farms, Port Angeles, Washington 98362.

**Manager, Columbia River Site:** In charge of pilot project fish farm on the Columbia River. In charge of all day to day operations at the Columbia River Site. Tests at this site led to the development of Columbia River Fish Farms.

March 1992 to  
July 1992

Mariculture Inc., Augusta, Maine.

**General Manager:** Hired by Key Bank of Maine to manage Mariculture Inc. which Key Bank was in the process of repossessing.

March 1988 to  
December 1991

Tailfin, Inc., 820 D Ave., Anacortes, Washington 98221

**General Manager:** Responsible for construction, installation and operation of a 32-pen salmon farm.

## **RUFUS WOODS AQUACULTURE**

### **Stolt Sea Farms 1989-1994**

Began small pilot project in 1989.

Increased to semi-commercial scale in 1992.

Ceased operations in 1994 due to increased permit requirements.

### **Columbia River Fish Farms**

Began operations in 1994. Produced up to 4.5 million pounds of rainbow trout annually.

Sold in 2005.

### **Columbia River Fish Farms (2)**

2005-2008. Filed for bankruptcy in 2008. Sold in the fall of 2008.

### **Pacific Aquaculture**

Purchased farm from Columbia River Fish Farms in September, 2008. Is in the process of major refurbishment.

### **Chief Joseph Fish Farm**

1996-present. Produces approximately 1 million pounds of rainbow trout annually.

Sheri L. Sears  
Resident Fish Division Manager  
Colville Confederated Tribes  
Nespelem Fish and Wildlife Office  
1-509-634-2118  
[sheri.sears@colvilletribes.com](mailto:sheri.sears@colvilletribes.com)

***Education:***

Eastern Washington University, 1995, B.S. Environmental Biology  
Kaiser Foundation School of Nursing, 1972 R.N. ICU CCU Certified  
Contra Costa College, California, 1972 A.A.S. Nursing

***Employment History:***

July 2006 – Present ~ Colville Confederated Tribes  
Resident Fish Division Manager Biologist IV

November 2001 – June 2006 ~ Colville Confederated Tribes  
Lake Roosevelt Habitat Improvement Project Manager Biologist II

June 1999 – November 2001 ~ Colville Confederated Tribes  
Habitat Biologist I

March 1999 – June 1999 ~ USGS – Biological Division  
Rufus Woods Total Dissolved Gas Impact Assessment Project Field Biologist

September 1997 – November 1998 ~ Steven County Conservation District  
Field Technician Stream surveys Steven's county watersheds.

1996 –1997 ~ Department of Ecology, ERO  
Environmental Intern - Worked with Washington State Attorney General on development of  
Grass Seed burning ban and developed library of literature to support rule decision.

March 1995 – July 1995 ~ Waste Water Treatment Intern City of Cheney  
Tested effluent and wrote manual on identification of aquatic organisms beneficial to waste  
water treatment.

***Professional Affiliations:***

**2009** - President of the Columbia Basin Fish and Wildlife Authorities (CBFWA) Resident  
Fish Advisory Committee

**2008** – Vice President of the Columbia Basin Fish and Wildlife Authorities (CBFWA)  
Resident Fish Advisory Committee

**2007 – Present** - Columbia Basin Water Management Plan representative and conducted  
assessment for EIS on proposed actions impacts to Lake Roosevelt.

**2006 – Present** - CCT Representative Lake Roosevelt Managers

**2008 - Present** - Member of Army Corp of Engineer's (USACE) Technical Management  
Team (TMT) working with the Bureau of Reclamation (BOR), USACE, various tribes, and  
the states of Washington, Oregon, Idaho, and Montana on Columbia River and Snake River  
dam operations and flow coordination

**2003 – Present** - Wildland Fire Situation Analysis (WFSA) Team Leader

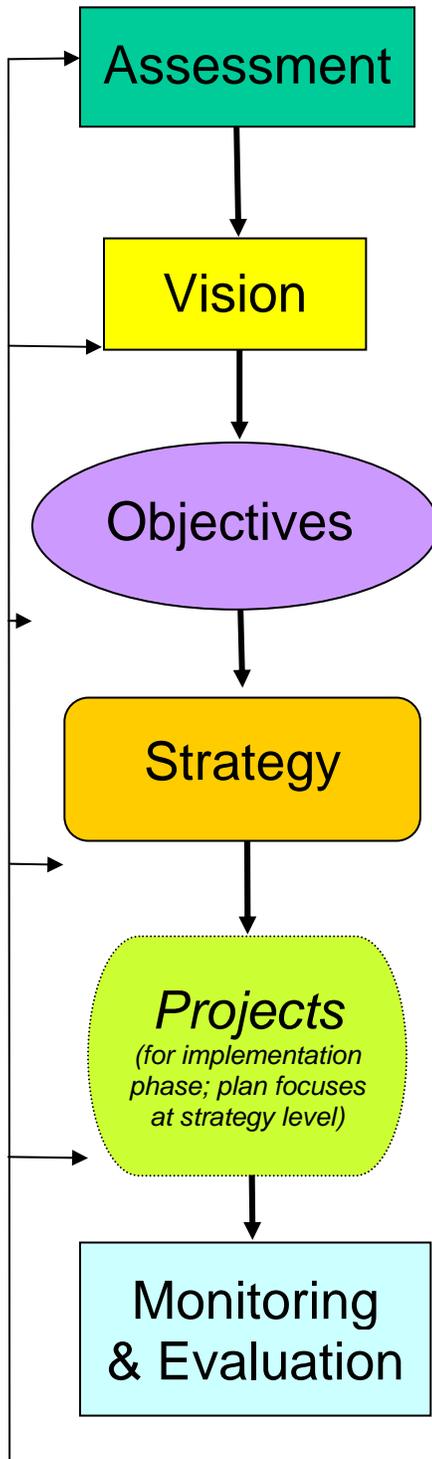
**2001 – Present** - Burned Area Emergency Rehabilitation (BAER) Team – Wildfire impacts  
to fish and wildlife and documentation of Emergency Stabilization and Rehabilitation Plans  
for all fires on the Colville Reservation.

**2001 – Present** Upper Columbia River Remedial Investigation and feasibility study (RI/FS)

***Duties:***

Coordinate with state, tribal, federal and international entities on a variety of aquatic and fish management issues. I have worked with other Tribal departments on the development and revision of Tribes' Hydraulic, Forest Practices Act, and Water Quality codes and the review of land use applications. Reviewed, prepared, and approved all hydraulic permit applications for activities on the Colville Reservation and have completed multiple Environmental Impact Statements (EIS), biological assessments, NEPA compliance documentation, and worked extensively with Global Information System (GIS) mapping and analysis (ArcView, ArcMap, and Terrain Navigator). Assisted in the development and review of the Tribe's Integrated Resource Management Plan and the EIS and Record of Decision (ROD)

Responsibilities include project, personnel, and budget management and daily operations of BPA project. Prepared quarterly and annual reports developed scope of work and conducted field data collection on fish migration, habitat conditions, stream surveys, water quality and statistical analysis of data. Development, management, and implementation of multiple habitat and passage projects and obtained all necessary permits and environmental compliances under BIAM 30 and National Historic Preservation Act. Developed protocols and quality assurance plans,



**Identifies Limiting Factors**

Spawning habitat loss due to development in headwaters, passage problems at culverts, high water temperature in lower reaches, extinct coho run

**Guides and Prioritizes Actions**

Establish protected and rebuilt self-sustaining fish runs; maintain genetic integrity; reconnect habitats

**Type 1, Population:** Return 5,000 spring Chinook & 1,000 coho

**Type 2, Habitat:** Water temperature <70 in lower reaches

**Build from Strength** - protect all actively spawning redds

**Restore Ecosystem** - recover riparian functions in lower reach

**Artificial Production** - restoration of coho run

Habitat Acquisition  
in Headwaters  
1985-045-01

Culvert Replacement  
and Fencing Enclosure  
2001-000-01

Coho Reintroduction (RFP)

**Indicators:** water temperature, sediment load, redd and juvenile counts

**Performance Standards:** lower reach water temperatures not to exceed 70

Note: the numbers given above are hypothetical and, for habitat projects, the ISRP and ISAB have recommended that performance standards may be more usefully articulated by coupling the potential range of parameter conditions (i.e., median, range, and variance) with a predicted rate of change from the current to the desired state. See the ISAB's report: A Review of Strategies to Recover Tributary Habitat (ISAB 2003-2) [www.nwcouncil.org/library/isab/isab2003-2.htm](http://www.nwcouncil.org/library/isab/isab2003-2.htm).

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