FY 2008-2009 F&W Program Accords (MOA) Proposal Review

Narrative

Table 1. Proposal Metadata

Project Number	2008-306-00
Proposer	The Confederated Tribes of the Warm Springs Reservation of Oregon
Short Description	Deschutes River fall Chinook are an important stock, locally and internationally, for subsistence, recreation and economy. We propose to develop methods to improve escapement estimates, validate existing methods, and collect unknowns such as smolt-to-adult ratios to reduce the potential impacts of over harvest and evaluate other forms of direct mortality.
Province(s)	Columbia Plateau
Subbasin(s)	Deschutes River
Contact Name	Jennifer Graham
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Information transfer:

A. Abstract

Since time immemorial, aboriginal people of the Confederated Tribes of the Warm Springs Reservation of Oregon (CTWSRO) have harvested fall Chinook salmon (*Oncorhynchus tshawytscha*) for subsistence, ceremonial, and medicinal purposes. Not only is this species culturally significant, but it also has a high economic and recreational value to non-Indians. Since fall Chinook do not recognize state, international or tribal boundaries, the need for accurate escapement estimation tools are needed. The CTWSRO has actively worked to protect this resource within the Deschutes River Subbasin, Columbia River Basin and in International waters. Escapement data is used by a variety of entities including CTWSRO, Technical Advisory Committee of the Columbia River Fish Management Plan and the United States Chinook Technical Committee to the Pacific Salmon Commission. However, genetic composition of fish entering the Deschutes is unknown. Recent telemetry and genetic analysis leads us to believe there is a fair amount of straying and/or dip-ins. Weather and turbidity have decreased our ability to continuously, accurately estimate escapement. In order to estimate escapement, we will continue to validate the current Oregon Department of Fish and Wildlife estimate based on a combination of aerial redd counts and a mark-recapture abundance estimate. We will also determine the feasibility of establishing a PIT tag reader at the mouth of the Deschutes. Currently we have multiple coded wire tagged brood years anticipated to return to the Deschutes for the next five years. In order to recover these tags, we will conduct carcass surveys in the lower Deschutes River. This information will be used to determine if Lyons Ferry Hatchery fish can be used as a surrogate for ocean exploitation distribution when Deschutes River information is not available. Carcass surveys will also be used to recover Passive Integrated Transponder's implanted at Bonneville Dam.

B. Technical and/or scientific background

The Deschutes stock of upriver bright fall Chinook salmon is of wild origin. Juveniles rear in the mainstem Deschutes River for three to six months before emigrating to the Columbia River estuary. They enter the ocean at age one (Jonasson and Lindsay 1988). Adults return to spawn as three - five year olds. It is believed fall Chinook salmon spawn entirely within the mainstem Deschutes River from the mouth to Rkm 161. Adults enter the river from mid-July through October. Peak adult migration occurs late-September through mid-October. Spawning occurs from late-October through early January with the peak in November.

Deschutes River fall Chinook are one of three naturally spawning runs within the Columbia River upriver bright fall Chinook (URB) stock used in an abundance based coast-wide management approach (USCTC 1997). Upriver bright fall Chinook are a major contributor to Southeast Alaska and Canadian fisheries. As a result they are of primary concern for the Pacific Salmon Commission. Deschutes River fall Chinook salmon have been identified as an indicator stock for URB by the United States Chinook Technical Committee (USCTC). A continued data base on these fish is needed to monitor potential effects of the abundance-based management approach of the Pacific Salmon Treaty on this stock.

Recognizing the importance of the Sherars Falls fishery (rkm 70) and biological diversity these fish represent, the CTWSRO and the Oregon Department of Fish and Wildlife (ODFW) have established escapement goals for both the above and below Sherars Falls run components. The spawning escapement goal to river is 4,000 adults with 2,000 below Sherars Falls and 2,000 above the falls (ODFW 1996).

C. Rationale and significance to regional programs

This project is consistent with the Columbia River Basin Accords (Accord) by meeting subbasin planning goals. The project is also included in Attachment B, Category 3 of the Accord, which benefits fish species identified in the Northwest Power Act. This project will also meet the provisions as laid out in the Accord for all projects.

Fall Chinook were identified within the Deschutes River Subbasin plan as a focal species. Fish from the Deschutes have been and are important contributors to Columbia River runs. The main objective for the fall Chinook portion of the subbasin plan was to maintain genetic diversity, adaptiveness, and abundance of wild indigenous fall Chinook salmon. It is unknown what percentage of the run is made up from stray and/or dip-in fish; therefore, we do not know what impact it has on the population structure. The fall Chinook population is highly variable but is believed to have historically ranged from 16,000 – 19,000 fish. The majority of limiting factors for fall Chinook are habitat related. With moderate habitat improvements, the EDT model predicts an increase of 1,700 fish over a 25 year period. Previous habitat work appears to have had positive impacts.

D. Relationships to other projects

Escapement data collected in the Deschutes is used by CTWSRO, the Technical Advisory Committee (TAC) of the Columbia River Fish Management Plan and the United States Chinook Technical Committee to the Pacific Salmon Commission (USCTC). The CTWSRO uses this information to predict runs to ensure an escapement of 2,000 fish upstream of Sherars Falls (rkm 70.4). Estimates are used by TAC to complete preseason predictions. Deschutes River fall Chinook are a Pacific Salmon Treaty (PST) escapement indicator stock and used in an abundance-based coastwide model. The model generates yearly pre- and post- season cohort

abundance estimates. These estimates are used to set ocean harvest and assess the health of Chinook stocks. The accuracy of return data is important because it will help to prevent over-harvest and ensure spawner escapement for wild Chinook.

Deschutes River fall Chinook research and monitoring is a collaborative, cost shared effort between multiple agencies and funding sources. We will work with other agencies on projects funded through BPA. These projects include a Deschutes River habitat restoration project which can benefit the overall production of fall Chinook. We will work closely with this project to ensure information is exchanged on locations where habitat restoration would be a benefit. We will also coordinate sampling efforts with a genetic assessment project at Bonneville Dam which will implant Passive Integrated Transponder (PIT) tags in adult Chinook salmon. Assuming it is feasible to design a PIT tag interrogation site to span the river, these fish tagged at Bonneville Dam can be used to estimate escapement in the Deschutes River. As the project matures, we anticipate the need to develop methods for PIT tagging juvenile fish. We will work closely with a project in Hanford Reach, Columbia River, to train personnel and share pertinent information. We will also work closely with the Production Advisory Committee (PAC) of *U.S. v. Oregon* for project development assistance and information exchange. Finally, with funds available through the Pacific Salmon Commission and Pacific Coastal Salmon Recovery Fund we will cost share the PIT tag interrogation site feasibility study, aerial redd counts, and carcass surveys. We will also work closely with the TAC and the USCTC so information is exchanged to meet basinwide and international needs.

Information gathered by ODFW will be used in some of our objectives. We will closely coordinate field sampling and information exchange with ODFW.

Table 2. Relationship to existing projects

Funding Source	**Project #**	**Project Title**	**Relationship (brief)**
BPA	2008-301-00	Deschutes Basin Restoration Program	Will collaborate on habitat projects which will benefit fall Chinook production.
BPA	2008-511-00	Genetic assessment of Columbia River Stocks	Will PIT tag adult fall Chinook to estimate escapement.
Alaska Sustainable Salmon Fund	45785	Hanford Reach Chinook Migration and Survival	Information exchange and assistance with developing methods for tagging.
Pacific Salmon Comission, USCTC		Improvement in estimates of Columbia River fall Chinook salmon (*Oncorhynchus tshawytscha*) escapements	Cost share for feasibility of a PIT tag interrogation site.
Pacific Coastal Salmon Recovery Fund		Deschutes River Fall Chinook salmon Coded Wire Tagging Project	Cost share for carcass surveys
Pacific Salmon Commission		Deschutes River Fall Chinook Monitoring Program	Cost share for aerial flights

E. Project history (for ongoing projects)
New Project

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

Study Area

The lower Deschutes River Subbasin (hydrologic unit code 1707306) is located in north-central Oregon, flowing northerly from Pelton-Round Butte Hydroelectric Project at Rkm 161 to its confluence with the Columbia River (Figure 1). The lower Deschutes River drains approximately 6,993 km^2, with 1,223 km of perennial streams and 2,317 km of intermittent streams. Most of headwaters within the basin are located on the eastern slope of the Cascade Mountain Range.

Majority of westside tributaries to the lower Deschutes are spring-fed with stable base flows except during snowmelt. However, White River enters the Deschutes River at Rkm 74.9 and is glacially fed. During periods of inclement weather, large amounts of glacial flour can be expelled from White River and decrease visibility for periods ranging from an afternoon to several days. Eastside tributaries drain the Ochoco Mountains, with flow dominated by precipitation runoff. Winter high flows are a result of rain-on-snow events and low levels of precipitation during summer months result in intermittent flows (O' Connor et al. 2003)

A series of hydroelectric dams begin at Rkm 161. Currently no fish passage is available at these facilities; therefore, fall Chinook distribution is prematurely terminated.

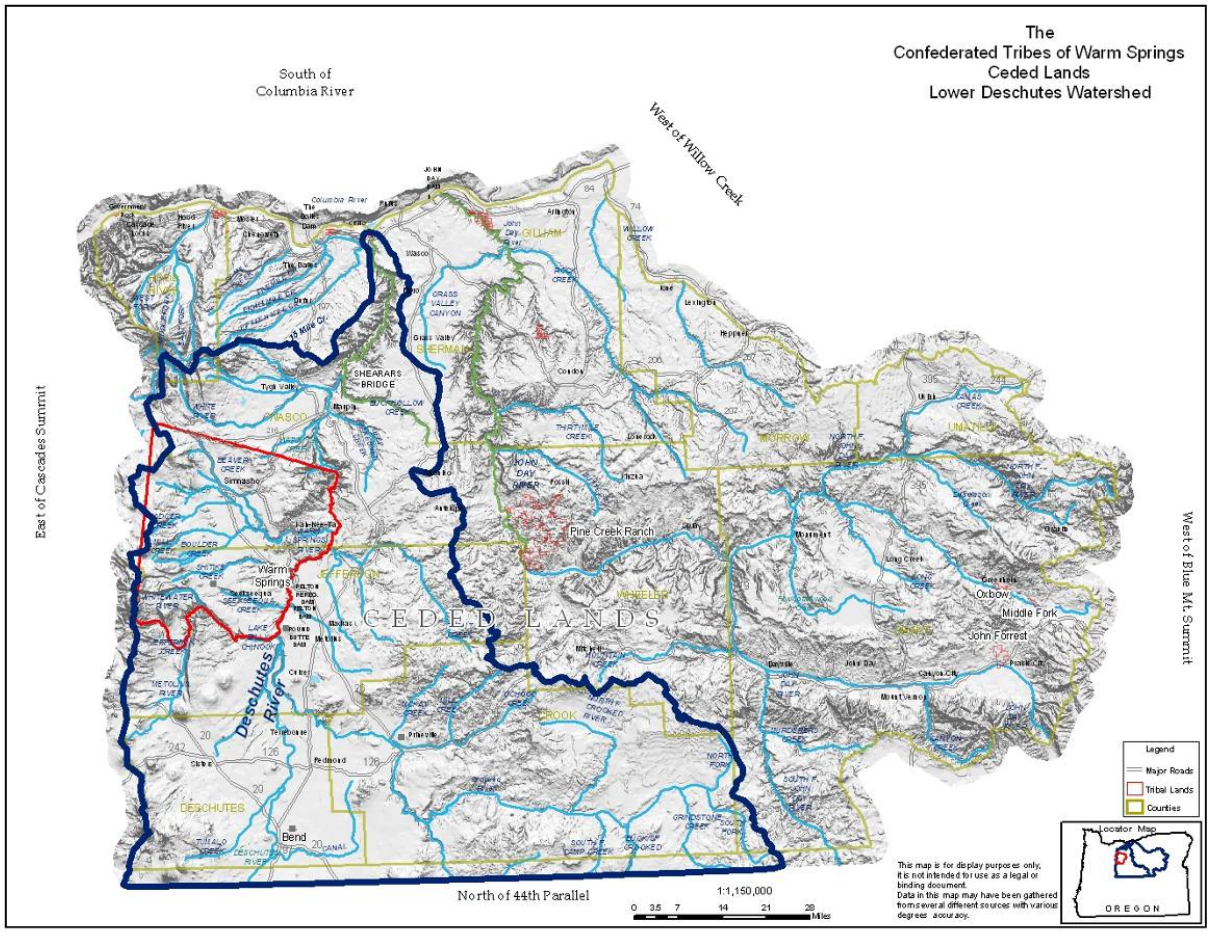

Figure 1. Map of the lower Deschutes River Subbasin, Oregon

Objective 1: Determine the genetic composition of the lower Deschutes River

Work element 157 – Collect/Generate/Validate Field and Lab Data
Work element 162 – Analyze/Interpret Data

The Deschutes River fall Chinook stock is of wild origin. It has been suggested there is a fair amount of mingling between wild and hatchery fall Chinook in the lower Deschutes. Recent radio tagging and genetics studies suggest a high dip-in and/or stray rate. A radio tag study conducted from 2005 – 2007 in cooperation with the University of Idaho found 24% of the 131 fish tagged at rkm 32 left the Deschutes River (Naughton et al., *in prep.*). Also, genetic analysis was completed by Columbia River Inter-Tribal Fish Commission which suggests a high proportion of fish handled at rkm 32 were strays or dip-ins (Graham and Narum, *in prep.*). We will determine the genetic composition for the lower Deschutes River population by taking genetic samples from successfully spawned carcasses throughout the lower Deschutes River.

Task 1.1: Genetic tissue collection

Tissues will be taken from adult fall Chinook salmon carcasses in good condition captured through carcass surveys in winter 2008 and 2009. Our goal is to collect 200 samples upstream of Sherars Falls (rkm 70.4) and 200 below each sampling year. DNA will be extracted from tissue samples, and the polymerase chain reaction (PCR) utilized to amplify genetic markers (microsatellites and SNPs; Narum et al. 2008). Fluorescently labeled PCR products will be scored by electrophoresis or laser detection methods. Raw genotype data will be converted to standardized alleles.

Task 1.2: Genetic Analysis

The genetic baseline for this analysis consists of 10 populations representing 5 reporting groups: lower Columbia River Tule (Spring Creek Hatchery Tules), mid/upper Columbia River fall run (Hanford Reach, Priest Rapids Hatchery, Wells Hatchery, Methow River summer run), Snake River fall run (Lyons Ferry Hatchery, Clearwater River fall run, Nez Perce Tribal Hatchery), Deschutes River summer/fall run (upper Deschutes River summer/fall run), and Deschutes River spring run (Shitike Creek spring run) stocks. Mixture simulations with 100% composition of known stock origins from the genetic baseline will be examined with the program ONCOR (Anderson, 2008) to evaluate the power of the baseline to analyze mixture samples. Simulations will be repeated independently with 100% composition of each of the 10 baseline populations. In each simulation, 200 multilocus genotypes will be drawn from the baseline (sampling with replacement assuming random mating and independent assortment of loci) and stock composition of the mixture estimated from the average of 100 replicates, given 100% as the parametric value. Stock composition estimates for unknown samples will also be estimated using ONCOR.

Objective 2: Determine the feasibility of installing a full duplex PIT tag reader in the Deschutes River

Work Element 156 – Develop RM&E Methods and Designs

Task 2.1: Investigate the feasibility of a PIT tag array

Installation of a PIT tag interrogation site in the lower Deschutes River would provide CTWSRO with an opportunity to collect information which is currently lacking or difficult to collect. This includes calculation of smolt-to-adult ratios, immigration and emigration timing, straying and escapement. The logistics of finding a location with low flow and shallow water may be

difficult. Recreational activities on the river will also limit the type of PIT tag array (PTA) we could use. While multiple locations are available, a location near the river mouth is preferred.

Biomark has PIT tag detection systems in the South Fork Salmon River and John Day River. Although neither system is as large as what would be needed in the Deschutes, the same design will likely meet our needs. Such a system could be expanded to cover the full 400 foot width of the river with a series of panels. These flat panel weir antennas permanently secured to the bottom of the river. This system's main drawback is the expense of building and installing the antenna panels as well as a detection range of less than two feet.

Task 2.2: PIT tag emigrant fall Chinook to develop smolt-to-adult ratios.
If installation of a PTA is feasible, we will work with researchers in the CRB and PAC to develop a study plan for PIT tagging juvenile emigrant fall Chinook. The information gathered from this study would develop a currently unknown smolt-to-adult ratio. This database would also be available to be compared with Snake River fall Chinook survival through Columbia River dams.

Objective 3: Develop a method for continuous, accurate escapement estimates
Work element 156 – Develop RM&E Methods and Designs

The ability of CTWSRO and ODFW to accurately estimate fall Chinook varies with weather conditions, fish catchability, and water quality. These factors have greatly decreased our ability to estimate escapement. Ultimately an escapement estimation method would be developed which is not reliant on visual observation of fish or redds. If not possible, a method will be developed which minimizes assumption violations. This objective would be closely linked with the installation of a PTA in the mainstem Deschutes.

Since 1977, fall Chinook escapement has been monitored through aerial redd counts. In 2001, a gill net mark-recapture project was implemented to validate the escapement estimate derived through aerial redd counts. Currently there is no measure of precision for aerial redd counting in the lower Deschutes River; however, based on field observations it appears there is great potential for error due to a gamut of factors (i.e., inter- and intra- personnel error, redd age, water visibility, light conditions during surveys, weather conditions, redd depth). In the recent past, multiple flights or flights during peak spawning have not been possible due to poor weather conditions (e.g., fog, rain, snow).

Since 2003, declining trends have been observed in URB passing Bonneville Dam in the lower Columbia River. A similar decline has been observed in Deschutes River fall Chinook captured through gillnetting and the Sherars Falls adult fish trap. While this decline has not affected the ODFW mark-recapture estimate above Sherars Falls, it has greatly affected CTWSRO's ability to estimate escapement for the whole river.

Deteriorated river conditions are a concern from White River (rkm 75) to the mouth. Changes in weather patterns or prolonged periods of moisture cause large amounts of glacial flour from White River to be discharged into the Deschutes River. The duration of these occurrences can be an afternoon or many days.

Objective 4: Validation aerial redd counts

Work element 157 – Collect/Generate/Validate Field and Lab Data
Work element 162 – Analyze/Interpret Data

Until a method can be developed and implemented which generates a more accurate escapement estimate, aerial redd surveys will need to continue. In winter 2007, we conducted a pilot study to develop a method for verifying aerial counts by determining the true numbers of redds within a study reach. Preliminary results suggest aerial redd counts in the Deschutes severely undercount the actual number of redds (McGrath et al. *in prep*.). The purpose for validating the current method is to determine if a correction factor can be developed for the Oregon Department of Fish and Wildlife's 31 year database

Current Escapement Estimate Methods

Adult and jack fall Chinook salmon escapement above Sherars Falls is estimated by ODFW using Chapman's modification of the Petersen mark-recapture estimator coupled with aerial redd counts. Adults and jacks are captured and initially marked at Sherars Falls Adult Salmon and Steelhead Trap, located at the head of the Sherars Falls fish ladder. The trap is operated five days a week during evening hours, from late June through the end of October. Fish are measured to the nearest 0.5 cm fork length, examined for fin marks, scale sampled, and Floy tagged. Two Floy tags are attached to each fish. After sampling, fish are released into a recovery pool for volitional release.

Second event sampling occurs in November and December. Fish are examined at Pelton Trap (rkm 161) and through inspecting post spawn carcasses. Since 1989, Pelton Trap and carcass surveys have been combined to determine the number of marked and inspected fish. Fish are inspected at Pelton Trap for first event marks. When present, Sherars Falls tags are removed and replaced with a uniquely colored Floy tag. This allows fish to be recognized as previously captured and counted; therefore, not being double counted when calculating escapement. Post inspection and retagging, fish are returned to the river.

Carcass surveys are conducted from November through early-January. Three days per week, a crew surveys from rkm 141 to 161. Recovered carcasses will be examined for coded wire tags (CWT) as well as presence of first event marks and Pelton tags. Biological data collected will include fork length, sex, and spawning success. Estimated recovery location will also be noted, including reach and commonly used geographical names. After processing, carcasses will be severed in two to prevent re-counting during subsequent surveys and returned to the river.

Aerial redd counts are conducted twice from mid-October through December. The Deschutes River is divided into 14 reaches consisting of the entire lower 161 kilometers. During each redd counting pass, redds are counted independently by two observers and recorded by a third person who also identified reach breaks. The higher of the two counts is used to represent each reach.

Spawner escapement below Sherars Falls is estimated by expanding the redd count below Sherars Falls by the fish per redd ratio above Sherars Falls. The fish per redd ratio above Sherars Falls is based on the number of fish estimated in the mark-recapture and the number of redds counted. Assuming redd counting by surveyors is consistent throughout the 161 rkms, the following formula is used to estimate escapement of fall Chinook below Sherars Falls:

$$N_{\text{Below Sherars}} = N_{\text{Above Sherars}} \left(\frac{\text{Redds Below Sherars}}{\text{Redds Above Sherars}} \right)$$

The spawner escapement above Sherars Falls and the spawner escapement below Sherars Falls, are added together to estimate total Deschutes River escapement. Estimated harvest from creel census is added to the spawner escapement estimate to get a total run estimate of fall Chinook to the Deschutes River.

Task 4.1: Aerial redd counts
Fall Chinook redd counts are conducted at least twice from mid October through December. Counts are conducted using a McDonnell/Douglass 500 helicopter. The pilot will maintain airspeed of 10 – 20 knots. Flight altitude will range from 30 – 75 m.

Redds were counted in the lower 161 km of the Deschutes River. The helicopter proceeded downstream from Pelton Re-regulating dam (rkm 160) to the mouth. Counts are conducted in 14 reaches (Table 3). Two observers, wearing polarized sunglasses, independently count each reach. At the end of the reach, observers discreetly report the total number of redds.

Task 4.2: Select study reaches.
Due to the rigor needed to conduct census counts, we will randomly select 2 to 5 study reaches (Table 3) to survey each year. Randomly picking sites over multiple years should give us a representative sample of varying spawner densities and habitat conditions.

Task 4.3: Census redd counts
Counts will occur from the onset of spawning through the duration (mid-October through January). A two person crew will survey from a jet boat fitted with an elevated counting tower. In some areas it may be necessary for foot surveys to be conducted such as in shallow water conditions. In order to ensure accuracy of counts and recording, one individual will be responsible for collecting all data.

Census counts will occur with great rigor. Ideally counts would be conducted every three to five days. Efforts will be made to survey all wetted channel areas with minimal fish disturbance. Completed salmon redds will be enumerated and recorded on a map. Maps will be developed from aerial photos. Notes regarding redd condition (e.g., previous years redd, new since last survey, superimposition) will be kept. As the number of redds within the study reach increases, there is potential for redd clustering. When clustering occurs, diagrams of the clusters will be made and then referenced on the maps.

Task 4.4: Assist with adult trap operations at Sherars Falls
Sherars Falls trap is operated 8 hours per day, five days per week, from mid-June through the end of October. Prior to inspection, fall Chinook are anesthetized with CO2. Biological data including age, sex and fork length are recorded. Each fish receives two spaghetti tags. Both tags

Table 3. Aerial redd counting reaches in the lower Deschutes River.

Reach	Start Rkm	Stop Rkm	Survey Length	Description
1	160	156	4	Re-Reg Dam to Shitike Creek
2	156	140	16	Shitike Creek to Trout Creek
3	140	134.4	5.6	Trout Creek to Warm Springs River
4	134.4	110.4	5.6	Warm Springs River to Two Springs Creek
5	110.4	92.8	17.6	Two Springs Creek to Nena Creek
6	92.8	83.2	9.6	Nena Creek to Maupin Bridge
7	83.2	70.4	12.8	Maupin Bridge to Sherar's Falls
8	70.4	54.4	16	Sherar's Falls to Jones Canyon
9	54.4	49.6	4.8	Jones Canyon to Cedar Island
10	49.6	38.4	11.2	Cedar Island to Macks Canyon Boat Ramp
11	38.4	35.2	3.2	Mack's Canyon Boat Ramp to Lower Dike
12	35.2	32	3.2	Lower Dike to Nookie Rock
13	32	16.8	15.2	Nookie Rock to Fall Canyon
14	16.8	0	16.8	Fall Canyon to Mouth

are applied beneath the anterior dorsal fin rays on the right side. After inspection and tagging fish recover in a pool and volitionally release to the Deschutes River.

Task 4.5: Data Analysis

We will assess differences in accuracy between aerial and census pass redd counts. The census surveys provide a valuable dataset of the cumulative distribution of redd construction over time. We will assume that the census of redds is the true number within a reach and will be compared to the number, and can be used in a variety of ways to validate redd count methods.

Objective 5: Conduct Carcass Surveys

Work element 157 – Collect/Generate/Validate Field and Lab Data
Work element 159 – Transfer/Consolidate Regionally Standardized Data
Work element 162 – Analyze/Interpret Data

From brood year 2001 – 2006, 193,994 juvenile summer/fall Chinook have been coded wire tagged with an adjusted release of 186,773. Our long-term goal is to provide ocean distribution and Columbia River exploitation rates for Deschutes River summer/fall Chinook. We will also use this information to verify if CWTed summer/fall Chinook from Lions Ferry Hatchery (LFY) can be used as surrogates to represent Deschutes River fish when ocean distribution and exploitation tag data is unavailable.

Columbia River Inter-Tribal Fish Commission and UI will be PIT tagging adult fall chinook at Bonneville Dam. They will be targeting 'upriver bright' and Deschutes River fish, two U.S. Chinook Technical Committee indicator stocks. The use of PIT tags will allow identification of tagged fish collected in carcass surveys. The objective of the project is to improve the current methods of estimating Columbia River fall Chinook salmon escapements.

Task 5.1: Inspect fall Chinook carcasses for CWT and PIT tags

Fall Chinook carcass surveys will be conducted 4–5 days per week in the lower Deschutes River from late-October 2008 through mid-January 2009. The river will be divided into three survey reaches: Rkm 0 - 38, Rkm 38 - 70, and Rkm 70 - 161.

Two jet boats, each manned with a two-person crew, as well as a crew of three riverbank walkers will be employed to recover carcasses. Long- and short-handled gaffs will be used to remove carcasses.

Recovered carcasses will be examined for CWT and PIT tags as well as presence of various secondary marks. Biological data collected will include fork and mideye-to-hypural plate lengths, sex, and spawning success. Estimated recovery location will also be noted, including reach and commonly used geographical names. After processing, carcasses will be severed in two at the dorsal fin to prevent re-counting during subsequent surveys and returned to the river.

All carcasses will be scanned for CWTs using a handheld CWT detector wand. Snouts will be removed from fish testing positive for a CWT and/or adipose clipped fish. Removed snouts will be placed in a plastic bag to be returned to the office and frozen until they can be dissected for tag retrieval. Each snout bag will include an identification card with biological data for individual fish and approximate recovery location.

To identify the presence of a PIT tag, all fish will be scanned with a handheld detector. Tag numbers will be recorded on the datasheet and saved in the handheld detector to be downloaded at a later date.

Task 5.2: Identify the origin of coded wire tag recoveries using RMIS

Snouts will be removed from the freezer and dissected for CWT retrieval. Once tags are retrieved, they will be examined under a microscope for decoding and two trained personnel will read them for accuracy. If discrepancies are found, tags will be read again by both parties. If agreement can not be reached, a third independent party will read the tag. Decoded tag information will be entered into a computerized spreadsheet for code verification. Decoded tags

will then be adhered to an index card with tag recovery information and the fish's biological data for further reference.

To determine the validity of reconciled tag codes, personnel will enter tag codes into the RMIS database to determine origin. If the tag code is not present in the database, the tag will be decoded again, and re-entered into RMIS.

Task 5.3: Report CWT recoveries
Decoded and blank CWTs will be reported to CRITFC for entry into the RMIS database.

Task 5.4: Report PIT tags recoveries
Recovered PIT tags will be reported to PTAGIS.

Task 5.5: CWT Analysis
A Wilcoxin non-parametric test will be used to test for differences between the Deschutes River and Lyons Ferry Hatchery groups. The other alternative could be developing a log linear model with recovery probability by age and strata as the dependant variable and testing for stock, and stock-year interaction effects.

Task 5.6: Data Analysis
Further analysis will describe size and age distribution; sex composition; spawning success; spatial and temporal distribution of recovered carcasses; and stock composition of CWTs recovered in the Deschutes.

H. Facilities and equipment
Facilities and associated utilities will be provided by the Confederated Tribes of Warm Springs. Major equipment purchases include a new jet boat, two outboard motors, and PIT tag readers. Activities to be cost shared with other projects include the installation of a mainstem PIT tag interrogation site including antenna and receiver and helicopter services to conduct aerial redd counts. We may also need to purchase PIT tags.

I. References
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J. Key personnel

JENNIFER GRAHAM, PRINCIPLE INVESTIGATOR/PROJECT MANAGER
THE CONFEDERATED TRIBES OF THE WARM SPRINGS RESERVATION OF OREGON

This project will be implemented by the CTWSRO Department of Natural Resources personnel. Jennifer Graham will administer the BPA contract, coordinate with basin managers, provide logistical support, assist with data analysis and take the lead for project reporting.

Education

South Dakota State University
B.S. Biological Sciences – Wildlife and Fisheries Sciences
2000

Professional Experience

Research and Monitoring Program Manager
Confederated Tribes of Warm Springs, 2006-present
Provide professional, scientific, technical and administrative guidance and oversight for the professional and technical staff of the research and monitoring program. Plan, organize, and direct the work of subordinates. Develop goals and objectives of the fisheries research and monitoring program for anadromous and resident fish, and lamprey. Continue to develop fisheries research and monitoring programs both on and off the Reservation. Pursue and develop new funding sources, projects and staff development opportunities. Provide administrative oversight including contracting, contract compliance, preparation and review of technical reports and the overall coordination of each of the individual elements within the program. Provide tribal policy representatives with information and recommendations for policy decisions regarding all aspects of fish management on the Reservation, Ceded, Usual and Accustomed fishing areas, and aboriginal lands. Prepare annual operating program budgets.

Fisheries Biologist
Confederated Tribes of Warm Springs, 2002-2006
Responsibilities include research project design, direction, and implementation for lamprey; supervise technical and field staff; planning and managing multiple budgets, technical report writing, data analysis and interpretation; conducted field sampling; represent the Confederated

Tribes of Warm Springs Reservation of Oregon as a technical liaison for hydro-relicensing and superfund lamprey concerns, as well as the Columbia Basin Lamprey Technical Workgroup; identification of lamprey research needs and potential funding sources; assisting with project funding solicitation; work collaboratively with inter- and multi-agency efforts to address lamprey concerns; and effectively communicate with Tribal constituents.

Selected Publications

Graham, J. 2008. A Mark-Recapture Experiment to Improve the Escapement Estimate of Fall Chinook Salmon in the Deschutes River, Oregon. Progress report issued to the Columbia River Intertribal Fish Commission.

Graham, J. 2008. Deschutes River Fall Chinook Salmon Coded Wire Tagging Project II. Progress Report issued to the Columbia River Intertribal Fish Commission.

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LYMAN JIM, IMPLEMENTATION COORDINATOR
THE CONFEDERATED TRIBES OF THE WARM SPRINGS RESERVATION OF OREGON

Lyman has worked for the CTWSRO Department of Natural Resources since 1995. Mr. Jim's experience with fall Chinook includes acting as crew leader for coded-wire tagging, escapement and carcass survey projects since 1997. His leadership, field sampling knowledge, trouble shooting skills, and river navigational skills make him invaluable to the success of these projects.

Education

Graduated from Madras High School
Madras, Oregon
1985

Military Service

U.S. Army, 1985 to 1989

Professional Experience

Implementation Lead
Confederated Tribes of Warm Springs, 1997 - present
Coordinate and implement tribal fisheries research projects including operation and maintenance of field gear (e.g., jet boats, seining, migrant traps); maintain equipment; lead daily field crew activities; effectively communicate, orally and written; enter, verify, and assist with summarizing of field data; assist in report preparation; and coordinate field sampling activities with a variety of entities.

Selected Publications

Jim, L., J. C. Graham, and J. Seals. 2008. Deschutes River fall Chinook salmon monitoring program, 2007. Annual report to the Pacific Salmon Commission.

SHAWN R. NARUM, SUBCONTRACTOR FOR GENETIC ANALYSIS
COLUMBIA RIVER INTER-TRIBAL FISH COMMISSION
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3059-F National Fish Hatchery Rd.
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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.

Narum S. R., D. Hatch, A. J. Talbot, P. Moran, and M. S. Powell. 2008. Conservation of iteroparous salmonids in complex mating systems. Journal of Fish Biology 72:45-60.

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.

Narum, S. R., M. R. Campbell, and J. J. Stephenson. 2007. Genetic variation and structure of Chinook salmon life history types in the Snake River. Transactions of the American Fisheries Society 136:1252-1262.

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.