SPRING CHINOOK SALMON EARLY LIFE HISTORY 9202604

SHORT DESCRIPTION:
Investigate the abundance, migration patterns, survival, and habitat use of spring chinook salmon juveniles in the Grande Ronde River basin to provide information critical for restoration of these local populations while maintaining genetic diversity similar to natural populations.

SPONSOR/CONTRACTOR: ODFW
Oregon Department of Fish and Wildlife
Richard W. Carmichael, Program Leader
211 Inlow Hall - EOSC, La Grande, OR 97850
541/962-3777 odfw2@eosc.osshe.edu

SUB-CONTRACTORS:
Oregon State University, Dr. Bill Liss

GOALS

NPPC PROGRAM MEASURE:
7.1C, 7.1D, 7.4L, 7.7B

RELATION TO MEASURE:
This study will provide such information as directed under three separate measures of the Columbia River Fish and Wildlife Program. Measure 7.7B directs funding for Model Watershed projects in Idaho, Oregon, and Washington. Support for this early life history study and the expansion was recommended by the Grande Ronde Model Watershed technical committee and Board of Directors, as well as by local biologists. This study provides data that will enable identification of limiting factors for salmon production and will help in prioritizing on-the-ground restoration activities. This study also falls under program measure 7.1C in that it provides pertinent baseline information, including life history and population status data, on sustainability of wild and naturally spawning populations in the Grande Ronde basin. In addition, it provides the means fo

BIOLOGICAL OPINION ID:
Information collected during this study relates to and will be useful for two actions described in the NMFS Hydrosystem Operations Biological Opinion. This study will provide data on multiple detections of wild PIT-tagged salmon at mainstem dams. This information can be used in evaluating in-river survivals of wild salmon. In addition, data collected during this s tudy has been and will continue to be incorporated into the PATH life cycle modeling project. This project also directly addresses life history information needs such as rearing distribution and migration patterns critical to selecting rearing and release strategies for the Grande Ronde Basin endemic broodstocks specified in the Hatchery Biological Opinion.

OTHER PLANNING DOCUMENTS:
Precipitous declines in Snake River spring chinook salmon resulted in these stocks , including the Grande Ronde River stocks, being listed as threatened under the Endangered Species Act (October 1992). Proposed recovery efforts for these stocks require knowledge of stock specific life history strategies and critical habitats for spawning, rearing, and downstream migration (Snake River Recovery Team 1993, Northwest Power Planning Council 1992, Oregon Department of Fish and Wildlife 1990).. There is little information available on the early life history and critical rearing habitats in the Grande Ronde River basin. Recent calls for information include: a description of the spatial differences in spawning and rearing habitat (Snake River Recovery Team 1993), development of a profile on genetic , life history, and morphometric characteristics of wild and naturally spawning populations (Snake River Recovery Team 1993; Northwest Power Planning Council 1992, Oregon Department of Fish and Wildlife 1990), and evaluation of critical habitat needs and factors limiting production (Northwest Power Planning Council 1992, Oregon Department of Fish and Wildlife 1990). In addition, this project is providing valuable information needed for the development of endemic broodstocks as identified in the draft recovery plan.

TARGET STOCK	LIFE STAGE	MGMT CODE (see below)
Bear Creek Spring Chinook	Juvenile, smolt	L, W
Catherine Creek Spring Chinook	Juvenile, smolt	S, L, W
Wallowa River Spring Chinook	Juvenile, smolt	S, L, W
Upper Grande Ronde River Spring Chinook	Juvenile, smolt	S, L, W

Lostine River Spring Chinook	Juvenile, smolt	S, L, W

AFFECTED STOCK	BENEFIT OR DETRIMENT
Bull trout	Beneficial
Summer steelhead	Beneficial

BACKGROUND

Stream name:
Catherine Creek, Upper Grande Ronde River, Wallowa River, Lostine River, Bear Creek

Subbasin:
Grande Ronde River Subbasin

Land ownership:
Public and Private

Project is an office site only

HISTORY:
Recovery efforts for endangered stocks of Snake River salmon require life history and critical habitat information. The spring chinook early life history study was initiated in 1993 with NMFS, ESA funds. BPA funding for the project commenced in September of 1994. To date, we have collected data from three migration years on the upper Grande Ronde River and one migration year on Catherine Creek and six months in the Wallowa River basin.

BIOLOGICAL RESULTS ACHIEVED:
Preliminary analysis of the data indicates differences in migration patterns and survival both between populations and between groups exhibiting different life history strategies within a population. Data demonstrated that both the upper Grande Ronde and Catherine Creek populations exhibit a fall movement out of summer rearing areas in addition to the typical spring smolt migration. In Catherine Creek it appears that 50% or more of the juvenile population leave summer rearing areas in the fall, where as only approximately 10% leave the upper Grande Ronde. In addition, we found that the fish migrating out of the upper Grande Ronde in the fall are larger than fish that remain in the rearing areas and that fish continue to move out of rearing areas at extremely low water temperatures. Knowledge of such difference between local populations is essential to ensure protection and enhancement efforts are targeted to benefit all existing populations and preserve maximum genetic diversity. We also have collected habitat utilization data for the Catherine Creek population which indicates that juvenile chinook are most abundant in pool habitats. In the upper Grande Ronde River, the low number of spring chinook juveniles made it very difficult to locate salmon in the habitat and we think our habitat data from 1995 is equivocal. However, we have substantial data that indicates that the Grande Ronde River valley habitat is utilized by a substantial number of overwintering spring chinook salmon from both the Catherine Creek and upper Grande Ronde population. Grande Ronde Valley habitat has been heavily degraded due to agricultural and other anthropogenic impacts. These salmon leave upper rearing areas in the fall, overwinter in the Grande Ronde valley and leave the valley as smolts in the spring. This study has identified critical habitat areas for spring chinook salmon.

PROJECT REPORTS AND PAPERS:
Monthly and quarterly progress reports.Annual Reports: 1994. Investigations into the life history of spring chinook salmon in the Grande Ronde River basin. 1995. Early life history study of Grande Ronde River basin chinook salmon.Presentations of results to Model Watershed Board, Technical Committee, and other Grande Ronde organizations, Oregon Chapter American Fisheries Society.

ADAPTIVE MANAGEMENT IMPLICATIONS:
Results of this study have been used to make recommendations for protection and enhancement of Grande Ronde basin spring chinook populations and their critical rearing habitats. Data from the first two years of this study demonstrated reduced survival among spring chinook salmon that overwinter in the upper Grande Ronde River as compared with those salmon that migrate out of the upper Grande Ronde in the fall. Thus, we recommended to local managers that the upper Grande Ronde habitat be considered critical for overwintering salmon and that immediate habitat restoration efforts should be directed there. Grande Ronde valley habitat also has been shown to be important to overwintering salmon and we have recommended it as a high priority for protection and restoration. In addition, this Early Life History study provides population status information (Fish and Wildlife Program Measure 6.2.A) in the form of estimates of smolt production out of Grande Ronde River tributaries. Data

collected as a part of this project can also be used by the Grade Ronde Model Watershed Program (Fish and Wildlife Program Measure 6.5B) and local managers to monitor changes in juvenile production as restoration and monitoring activities are implemented.

PURPOSE AND METHODS

SPECIFIC MEASUREABLE OBJECTIVES:

Objective 1. Document the annual in basin migration patterns for spring chinook salmon juveniles in the upper Grande Ronde River and Catherine Creek, including the abundance of migrants, migration timing, and duration.
Objective 2. Estimate and compare smolt detection rates at mainstem Columbia and Snake River dams for fall and spring migrating spring chinook salmon from the upper Grande Ronde River and Catherine Creek.
Objective 3. Determine the winter distribution of spring chinook salmon that leave the upper Grande Ronde River in the fall.
Objective 4. Determine seasonal habitat utilization and preference of spring chinook salmon in the upper Grande Ronde River and Catherine Creek.
Objective 5. Determine the importance of cold-water refugia to the life history strategies of juvenile salmonids in the Grande Ronde basin.
Obj. 5a. Map and characterize potential thermal refugia in critical rearing habitats for juvenile salmonids.
Obj. 5b. Characterize associations between thermal refuge characteristics aand channel, riparian and watershed conditions.
Obj. 5c. Determine timing and duration of thermal refuge use by juvenile salmonids and relate to life history strategies.
Objective 6. Document the annual in basin migration patterns for spring chinook salmon juveniles in the Wallowa River basin, including the abundance of migrants, migration timing, and duration.
Objective 7. Estimate and compare smolt detection rates at mainstem Columbia and Snake River dams for fall and spring migrating spring chinook salmon from the Wallowa River basin.
Objective 8. Determine the winter distribution of spring chinook salmon in the Wallowa River basin.
Objective 9. Determine seasonal habitat utilization and preference of spring chinook salmon in the Wallowa River basin.

CRITICAL UNCERTAINTIES:

1. To collect sufficient numbers of outmigrating spring chinook salmon juveniles for tagging and trap efficiencies, a minimum number of successful redds is needed. Although this number is uncertain, we have shown that sufficient data can be obtained from as few as 11 total redds in Catherine Creek.
2. Requires authorization by NMFS via Section 10 permit which has been obtained annually.

BIOLOGICAL NEED:

Proposed recovery efforts for the endangered stocks of Snake River spring chinook salmon require knowledge of stock specific life history strategies and critical habitats for spawning, rearing, and downstream migration. In the past, such information has not been available for spring chinook salmon in the Grande Ronde River basin. It has been uncertain what alternate life history strategies existed in these local populations, how the strategies exhibited might differ between populations, and how these strategies might impact survival of spring chinook salmon in the Grande Ronde basin. Recent calls for information include: a description of the spatial differences in spawning and rearing habitat, development of a profile on genetic, life history, and morphometric characteristics of wild and naturally spawning populations, evaluation of critical habitat needs and factors limiting production in the Grande Ronde basin. This project provides information on life history and habitat use that will be used to set priorities for habitat enhancement and restoration.

HYPOTHESIS TO BE TESTED:

Much of the information obtained in this study is descriptive (outmigration patterns, habitat utilization) and does not conform to hypothesis testing. However, there are specific testable hypothesis that pertain to Objectives 1 and 2.
Ho1: Migration timing to Lower Granite dam is similar among spring chinook salmon tag groups that exhibit different life history strategies.
Ha1: Migration timing to Lower Granite dam is different among spring chinook salmon tag groups that exhibit different life history strategies.
Ho2: Dam detection rates for tag groups that exhibit different life history strategies are similar.
Ha2: Dam detection rates for tag groups that exhibit different life history strategies are different.
Ho2a: Dam detection rates of fall-tagged salmon are similar to dam detection rates of spring-tagged salmon.
Ha2a: Dam detection rates of fall-tagged salmon are different from dam detection rates of spring-tagged salmon.

ALTERNATIVE APPROACHES:
No alternative approaches other than downstream migrant trapping were considered.

JUSTIFICATION FOR PLANNING:
N/A

METHODS:
1. Experimental design
Rotary screw traps will be used to collect juvenile spring chinook salmon as they migrate from rearing areas. Five hundred juveniles each will be PIT tagged during the spring and fall migrations. In addition, after the fall migration is complete we will sample the rearing areas to collect (by seine) and PIT tag an additional 500 overwintering juveniles. Trap efficiencies will be determined for each trap by releasing known numbers of paint marked juveniles above the traps and determining the number of recaptures within a defined period of time. Numbers of fish captured in the screw traps will be expanded for trap efficiencies. These expanded values will be summed separately for the spring and fall migrations for an estimate of abundance of migrants. In addition, the daily expanded catch will be plotted over time for a graphical representation of in basin migration patterns and duration.
Mainstem Columbia and Snake River dam recoveries of PIT tagged fish will be expanded based on collection efficiencies and used to compare smolt detection rates among tag groups. Comparison of survival estimates of fall migrant fish with winter tagged fish will allow us to estimate the relative success of fall versus spring migration as alternate life history strategies. In addition, a comparison of survival estimates for fish tagged as spring migrants versus winter tagged fish allows us to estimate overwintering mortality.
Three fyke net traps will be placed midstream of two rotary screw traps. By leap-frogging these traps downstream as the fish pass we will be able to follow the movement of fall migrants between our screw traps, thereby obtaining a gross estimate of winter distribution. Once the movement past the fyke traps has stopped, we will conduct nighttime snorkeling surveys to refine our assessment of chinook salmon winter distribution and to determine their abundance. We will conduct habitat surveys, measuring such parameters as temperature, flow, maximum river depth, width at three different points, length, substrate composition, instream habitat, cover, and shade for each unit.
We will conduct detailed investigations into the summer habitat utilization of juvenile spring chinook salmon residing in the Wallowa basin. We will select sampling sites based on previous physical habitat surveys (ODFW Aquatic Inventories Project data) and accessibility. Sites will be sampled by snorkel observation with two to four persons making two passes following transect lines. We will record fish species presence and abundance and will measure the same habitat variables as indicated for winter surveys. The surface are of each sampling site will be used to calculate the density of juvenile salmon per unit area of habitat. Given the habitat available to the fish, we will then determine juvenile salmon habitat preference using preference/selectivity indices
Thermal refugia locations will be mapped on 7.5 minute USGS topographic maps. Individual thermal refugia and within-channel settings will also be mapped using measuring tapes, rod and compass in relation to established reference points. This will allow the construction of map overlays of fish locations within the stream channel in relation to thermal and other habitat characteristics, and will provide a baseline map of thermal refuge morphology for monitoring seasonal or annual changes. For each thermal refuge, the following variables will be measured: mean and maximum depth, surface area, substrate composition, available cover, and temperature.
Sampling for thermal refuge occurrence will be conducted across a stratified sample of channel, riparian, and watershed condition categories. Sampling strata will be delineated by classifying study watersheds and stream reaches according to valley geomorphology, geology, land uses, channel form, and existing vegetation. Thermal refuge characteristics (type, size, temperature) will be compared among different geomorphic and land-use settings. Channel and riparian conditions will be described for each site by taking transect measurements of channel, bank, and floodplain form and dimensions, riparian canopy density, channel substrate composition, and occurrence of woody debris. This information will allow for tests of association between channel and riparian characteristics and thermal refuge occurrence.
Utilization of thermal refugia will be assessed by snorkel surveys and seining. Marking of juveniles in conjunction with the habitat mapping described above will allow quantification of fish densities, distances moved, and fish behavior. This data will be analyzed for changes over time and across different locations in the basin.
2. Type and number of fish to be used.
As this project involves trapping, seining and snorkeling in natural systems, the type and number of fish observed and collected is variable depending on abundances of natural populations. In 1995, we collected approximately 6,500 and PIT tagged approximately 1,400 spring chinook salmon. This study is subject to a limit of 25,000 spring chinook salmon that can be

captured and handled and approximately 3,000 spring chinook salmon that can be captured, handled, and PIT tagged. Other common species collected include: summer steelhead, red side shiner, chiselmouth, squawfish, yellow perch, whitefish, large-scale suckers, bridgelip suckers, brown bullhead, carp, bulltrout, crappie, largemouth bass, smallmouth bass.

PLANNED ACTIVITIES

SCHEDULE:

Implementation Phase	**Start**	a. 10/97b. 10/97c. 10/97d. 10/97e. 10/97f. 12/97g. 12/97h. 12/97 i. 2/97j.11/97k. 9/98l. 7/98m.10/97n. 9/98	**End**	a.7/98b.10/97c. 7/98 d. 12/97e. 12/97f. 2/98g. 2/98h. 2/98i. 6/98j.9/98k.9/98 l. 9/98m. 9/98n.11/98	**Subcontractor** Oregon State University

Task a. Continue operating six rotary screw traps in the Grande Ronde River, Catherine Creek, the Lostine River and the Wallowa River.b. Evaluate spawning data on Bear Creek to determine if trap boxes can be used to assess production, survival, and migration pattern in this tributary.c. Conduct trap efficiency tests daily, or at a minimum of three times per week.d. PIT tag 500 fall migrants from each population.e. Operate fyke traps during the fall outmigration on selected streams.f. PIT tag 500 juveniles overwintering above the traps.g. Conduct winter distribution surveys.h. Determine winter habitat use and abundance of juvenile spring chinook salmon.i. PIT tag 500 spring migrants from each population.j. Evaluate use of thermal refugia by juvenile spring chinook salmon.k. Obtain dam detection data from PSMFC.l. Determine summer habitat use and abundance of juvenile spring chinook salmon.m. Analyze data collected.n. Write and submit annual progress report.

PROJECT COMPLETION DATE:
N/A

CONSTRAINTS OR FACTORS THAT MAY CAUSE SCHEDULE OR BUDGET CHANGES:
Spring Chinook salmon in the Grande Ronde basin are listed as threatened under the Endangered Species Act. Therefore, these research activities are regulated by NMFS and are subject to NMFS permitting for scientific take. This project involves the handling of large numbers of naturally-produced spring Chinook salmon. Consequently, there is some risk of mortality associated with our field activities. Over the past three years juvenile Chinook salmon mortality has been low, although it has varied some year to year mortality has remained near or below 1% of all fish captured. We have and continue to take several precautions to reduce or eliminate mortality when collecting salmon. We have replaced fin clipping with a benign paint mark for trap efficiencies, we have installed debris racks in front of our fyke traps to help prevent clogging, and when we anticipate high debris loads at our traps we implement 24 hour trap checking to reduce debris accumulation and minimize the time fish are held in the trap. All field activities on private land are subject to obtaining permission from the landowner for access to the river. Options for resolving these critical constraints are identified under Monitoring Approach.

OUTCOMES, MONITORING AND EVALUATION

SUMMARY OF EXPECTED OUTCOMES

Expected performance of target population or quality change in land area affected:
Results of this Early Life History study will be used to make recommendations for protection and enhancement of Grande Ronde basin spring chinook populations and their critical rearing habitats. Our information will allow the Model Watershed Program and local fish managers to prioritize restoration efforts on sound scientific information. Information from this study will be useful in establishing and monitoring salmon recovery efforts in this basin. Juvenile production data collected can be used to monitor changes in production over time and evaluate success of òon the ground' activities implemented. In addition, information obtained in this study on population specific differences will have implications for management of spring chinook salmon throughout their range.

Present utilization and convservation potential of target population or area:
These stocks are listed as threatened under ESA and have little or no current utilization potential. Given the regional and local efforts underway these stocks have significant potential for recovery and persistence. The escapement estimate to the Grande Ronde Basin for 1996 was approximately 900 chinook salmon.

Assumed historic status of utilization and conservation potential:
Grande Ronde basin populations were abundant and sustainable prior to completion of mainstem dams. These stocks were highly productive and supported tribal, recreational, and commercial fisheries.

Long term expected utilization and conservation potential for target population or habitat:
The desired conservation potential is that these stocks will reach full recovery and sustainability to once again support tribal and recreational fisheries.

Contribution toward long-term goal:
Regional and Grande Ronde basin recovery efforts will utilize information from this study.

Indirect biological or environmental changes:
There are no additional biological nor environmental changes that could result indirectly from this project.

Physical products:
The total number of fish that will be PIT tagged will range from 6,000 to 7,500, depending on whether or not trapping is initiated in Bear Creek in 1997.

Environmental attributes affected by the project:
As mentioned previously, this project will provide information for prioritization of habitat restoration activities. No additional environmental attributes will be affected by this project.

Changes assumed or expected for affected environmental attributes:
N/A

Measure of attribute changes:
N/A

Assessment of effects on project outcomes of critical uncertainty:
This project will not be conducted if a Section 10, ESA permit is not obtained.

Information products:
Information products produced include monthly, quarterly, and annual progress reports, monthly activities reports to our co-managers, articles for ODFW Fish Research newsletter, as well as technical reports and presentations.

Coordination outcomes:
The outcomes of coordinating efforts of this project with others as identified include increased efficiency, transfer of information, and the development of recommendations for management that extend well beyond the scope of this project.

MONITORING APPROACH
The biological outcomes of this project can be measured by evaluating if, when, and how information produced by this project is utilized by regional fish managers in restoring and conserving chinook salmon populations in the Grande Ronde basin.

Provisions to monitor population status or habitat quality:

One objective of this Early Life History study is to determine abundance of juvenile spring chinook salmon leaving tributary systems in the Grande Ronde basin. This information can be used to estimate and monitor juvenile production from these tributaries over time. In addition, this study is exploring differences in life history strategies utilized by tributary populations and is collecting information on migration patterns and size, age, and condition of migrants. Other projects in the basin are also collecting information important for monitoring population status including: redd counts, estimates of adult escapement, hatchery: wild ratios on spawning grounds, age composition on spawning grounds.

Data analysis and evaluation:

Statistical Analysis. Bootstrap estimation will be used with trap efficiency data and the number of migrants collected to determine the abundance of chinook salmon juveniles leaving each system. Parametric T-tests and ANOVA tests will be used to compare dam detection rates among groups. Appropriate nonparametric will be substituted if the data are found not to conform to parametric assumptions. Comparisons among and between thermal refuge types will be made using summary statistics and ANOVA or nonparametric test as appropriate. Multiple regression or similar correlational analyses will be used to test for associations between channel and riparian characteristics and thermal refuge occurrence. ANOVA or similar nonparametric analyses will be used to compare juvenile salmonid densities across different habitats. All analyses are subject to review by an ODFW statistician.

Information feed back to management decisions:

There are both informal and formal channels for communication to local and regional managers. Perhaps the most effective means of communication are through project presentations, such as ODFW biennial Research Reviews, presentations to the Grande Ronde Model Watershed, and Oregon Chapter AFS. In addition all of our project progress reports are copied to local fish managers.

Critical uncertainties affecting project's outcomes:

Each critical uncertainty affecting project outcomes could be resolved in a different fashion. Uncertainties imposed by ESA could be resolved by moving forward toward a Section 6 consultation for the Oregon Department of Fish and Wildlife or some such similar simplification of the annual permitting process. We are attempting to resolve uncertainties associated with access to private land by developing long term landowner agreements that extend for the duration of the project. Sample size uncertainties can be resolved by marking or tagging more fish than necessary to assure adequate sample sizes upon recapture.Corollary research needs include similar life history information for wilderness populations of spring chinook salmon in northeast Oregon as well as for local populations of summer steelhead. In addition, more specific information on survival by specific life stage (especially fry and parr) is needed for these populations of spring chinook salmon. Given the information produced by this study, specific information on summer parr densities would contribute substantially to our understanding of juvenile survival.

EVALUATION

Overall project performance should be evaluated by comparing the objectives and tasks identified in the work statement to the annual progress and final completion reports. In addition, evaluation of how the information produced by this project is used by area fish managers can be used to evaluated overall effectiveness of the project.

Incorporating new information regarding uncertainties:

Any changes to critical uncertainties will be incorporated using an adaptive management process.

Increasing public awareness of F&W activities:

Oregon Department of Fish and Wildlife employees have established public outreach plans. As part of our public outreach in Fish Research, employees meet with school groups, clubs, and organizations as well as initiate articles for the local newspaper to inform the public of our activities. In the past three years project personnel have taken volunteers and school children out to participate in field activities, have given presentations to local groups, and have been interviewed for or sponsored articles for the local newspaper. We plan to continue these activities in the future.

RELATIONSHIPS

RELATED BPA PROJECT	RELATIONSHIP

8810804 STREAMNET - the Northwest Aquatic Information Network	Provide information for use in database.
9600800 PATH - Plan for analyzing and testing hypotheses	Provide data for life cycle mode development
9604400 Grande Ronde Basin Spring Chinook Captive Broodstock Program	Our study summer habitat surveys serve as reconnaissance surveys for locating juvenile chinook salmon for the Captive Brood study. In addition, knowledge of life history information will help guide development of production and release strategies.

RELATED NON-BPA PROJECT	RELATIONSHIP
3. Spring Chinook Salmon Spawning Ground Surveys (funded by Lower Snake River Compensation Plan of USFWS): The project goal is to monitor the escapement of salmon to the Grande Ronde and Imnaha river basins.	Data will be combined from both projects when assessing smolt-to-adult survival and spawner/recruit relationships in the Grande Ronde River basin.

OPPORTUNITIES FOR COOPERATION:

This Early Life History study cooperates with numerous ongoing projects both within the Grande Ronde basin and in the Columbia River region. Information collected by our project has been and continues to be utilized by other projects including but not limited to Grande Ronde Basin Captive Broodstock Program and the PATH project (see above for integration with other projects). This data integration eliminates potential duplication of efforts, increases the efficiency of project operation, and enhances the data base of these other projects. The Early Life History study also provides the opportunity to monitor changes in tributary smolt production and survival of wild smolts to Lower Granite Dam over time, thereby providing information useful for evaluating ôon the ground' restoration and enhancement activities. Lastly the Early Life History study has been approved by and is supported locally as an integral part of the Grande Ronde Model Watershed Program.

COSTS AND FTE

1997 Planned: $494,124

FUTURE FUNDING NEEDS:

FY	$ NEED	% PLAN	% IMPLEMENT	% O AND M
1998	$510,977		100%	
1999	$521,200		100%	
2000	$531,600		100%	
2001	$542,200		100%	
2002	$553,000		100%	

PAST OBLIGATIONS (incl. 1997 if done):

FY	OBLIGATED
1994	$445,309
1995	$108,630
1997	$520,897
TOTAL:	$1,074,836

Note: Data are past obligations, or amounts committed by year, not amounts billed. Does not include data for related projects.

OTHER NON-FINANCIAL SUPPORTERS:

This research project is supported by the Grande Ronde Model Watershed, Union County Commissioners, US Fish and Wildlife Service's Lower Snake River Compensation Program, National Marine Fisheries Service, and Nez Perce Tribe.

LONGER TERM COSTS: $550,000

It is anticipated that managers will request that we continue monitoring smolt survival and life history characteristics to generate a long term database.

1997 OVERHEAD PERCENT: Presently ODFW overhead is 20.5%, however, it varies annually.

HOW DOES PERCENTAGE APPLY TO DIRECT COSTS:

Overhead applies to a portion of the total direct costs excluding capital and contract services.

CONTRACTOR FTE:

SUBCONTRACTOR FTE: 1 FTE