BULL TROUT STUDIES IN CENTRAL AND NE OREGON 9405400

SHORT DESCRIPTION:
Determine status, life history, genetic, habitat needs, and limiting factors for bull trout populations in the Deschutes, Hood, Grande Ronde, John Day, Powder, Malheur, Walla Walla and Umatilla basins.

SPONSOR/CONTRACTOR: ODFW
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SUB-CONTRACTORS:
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GOALS

GENERAL:
Supports a healthy Columbia basin, Maintains biological diversity, Maintains genetic integrity, Increases run sizes or populations, Provides needed habitat protection, Adaptive management (research or M&E)

NPPC PROGRAM MEASURE:
10.5A.2

RELATION TO MEASURE:
The U.S. Fish and Wildlife Service has determined that native bull trout in the Columbia Basin are a Category 1 species. This project will provide scientific information that will help develop a protection and recovery plan for bull trout in Oregon's portion of the Columbia Basin.

OTHER PLANNING DOCUMENTS:
Metolius Basin Subplan, 1992 CTWS Integrated Resource Management Plan for the Forested Area, 1997 Oregon Bull Trout Status Report

BACKGROUND

LAND AREA INFORMATION

Subbasin:
Deschutes, Hood, John Day, Grande Ronde, Umatilla, Walla Walla, Powder, Malheur , Pine Creek, Imnaha

Stream miles affected:
Throughout

Land ownership:
Public, private, tribal

Hydro project mitigated:
Mainstem Columbia and Snake Hydroelectric Projects, Powerdale Hydroelectric Project (Pacific Power and Light), Round Butte Hydroelectric Project (Portland General Electric).

Acres affected:
Subbasin wide

Habitat types:
All areas where bull trout are present, from high elevation streams to Snake and Columbia Rivers.

HISTORY:
Project initiated in late 1994. Beginning phases of the project included several cooperative meetings with local basin bull trout working groups comprised of Tribes, Utilities, Landowners, USFS, U.S. fish and Wildlife Service (USFWS), BLM, and ODFW. Matching cost-share funding from permanent positions and capital will be provided by ODFW, CTWS and USFS. A Steering Committee with representatives of BPA, ODFW, Tribes, USFS, USFWS, PGE and Native Fish Society will meet annually to technically review the project.

BIOLOGICAL RESULTS ACHIEVED:

This study has completed, or collected data towards completion, of 13 of the 26 objectives listed in our work plan for the entire 5-year study.

1. During the first field season (1995) 46 bull trout populations were non-lethally sampled for mitochondria and nuclear DNA analysis. These samples have been analyzed and the results will be included in the 1996 annual report.
2. Life history and distribution information from each population sampled in 1995 were collected. This information will help future planned tasks and add to a statewide status report on Oregon's bull trout that will be published in June 1997.
3. Historical and current distributional patterns for bull trout were compiled throughout Oregon's portion of the Columbia River system. Compiled bull trout distribution data for inclusion in ODFW Geographical Information System (GIS) bull trout database.
4. Conducted distribution and habitat use surveys on 15 streams with sympatric populations of brook trout and bull trout (1996). Data summary and analysis will be reported in the 1996 annual report.
5. Conducted studies of competitive interactions and niche overlap between bull trout and brook trout (1996). Data summary and analysis will be reported in the 1996 annual report.
6. Sampled for the incidence of bull trout/brook trout hybrids in streams surveyed (1996). Data summary and analysis will be reported in the 1996 annual report.
7. Collected summertime temperature data from streams with sympatric bull trout and brook trout populations(1996). Data summary and analysis will be reported in the 1996 annual report.
8. Conducted bull trout spawning surveys. This included multiple surveys of 3 selected streams to document variation in spawning behavior and single exploratory surveys to identify previously unknown spawning areas (1996). Data summary and analysis will be reported in the 1996 annual report.
9. Compiled and published Statewide Status Report for Oregon bull trout populations (1997).
10. Compiled and analyzed historical upstream and downstream migrant data for bull trout from the Grande Ronde Basin. Data summary and analysis will be reported in the 1996 annual report.

PROJECT REPORTS AND PAPERS:

Quarterly reports: #1, 1/15/95; #2, 4/15/95; #3, 7/15/95; #4, 10/20/95
1995 Annual Report: 3/96
1996 Annual Report: Drafted
Oregon Statewide Bull Trout Status Report: Drafted

ADAPTIVE MANAGEMENT IMPLICATIONS:

We have used the data gathered in this study to plan, refine and focus our experimental designs. Distribution, life history, and genetic data gathered in this study were considered in selections of specific populations for study. Compilation of historical data allowed us to better plan the timing of upstream and downstream migrant sampling to be conducted in 1997.

In the realm of broader program management, this study will provide scientific data and information that will guide protection and recovery for bull trout in Oregon's portion of the Columbia Basin. The basic data we provide may also be useful to managers in Idaho, Washington, Montana, Alberta and British Columbia. The factors we address in our study, habitat, genetics and interactions with exotic species, have been identified by many authors as key factors in the survival and recovery of bull trout populations. Since little is known about bull trout life history managers cannot fully anticipate the effects of management decisions on bull trout populations. By describing the genetic structure of Oregon bull trout interbreeding stocks of bull trout can be identified for management and conservation of genetic diversity. By evaluating the effects of interactions with exotic species the true magnitude of the threat can be evaluated and corrective measures suggested. By evaluating the habitat preferred by bull trout efforts to conserve and restore bull trout habitat can be guided.

Bull Trout populations are a sensitive species with category federal ESA candidate status (warranted but precluded), and are currently under court ordered review to be listed as an endangered species. Protection and recovery of this sensitive indicator species should help managers improve and identify habitat and other limiting factors for fish and wildlife that historically co-evolved in the same aquatic ecosystem. Examples of benefiting species include salmon, steelhead, redband trout, and tailed frogs. Implementation of recovery plans may also provide additional cultural and recreational fisheries similar to the Metolius River/Lake Billy Chinook population which now provides a major featured species bull trout fishery on tribal and public lands.

PURPOSE AND METHODS

SPECIFIC MEASUREABLE OBJECTIVES:

Objective 1.0 Determine the genetic characteristics of Oregon bull trout populations

1.1 Collect Samples form bull trout groups within the 11 Oregon river basins of the Columbia Basin.
1.2 Conduct mitochondrial and nuclear DNA analysis of those samples.
1.3 Determine spatial relationships between populations, metapopulation structure, and estimates of genetic variation within and among those populations.
2.0 Determine distribution and associated habitats of adult and juvenile bull trout .
2.1 Identify movement patterns and habitat use of radio tagged juvenile bull trout.
2.2 Identify movement patterns and habitat use of radio tagged adult bull trout.
2.3 Map juvenile and adult bull trout distribution using GIS database
Objective 3.0 : Determine relationships between stream temperatures and distribution of bull trout.
3.1 Identify summer temperatures experienced by juveniles in selected streams (ongoing).
3.2 Identify fall through spring temperatures experienced by migrant juvenile bull trout in selected streams of the John Day and Deschutes Basins.
3.3 Identify seasonal temperatures experienced by adult bull trout in the Walla Walla and Wenaha subbasins using thermistor equipped radio tags and infra-red videography
3.4 Relate temperature profiles to observed bull trout distributions using GIS.
Objective 4: Determine selected life history characteristics.
4.1 Trap downstream migrant juvenile bull trout, collect length and scale data and implant with radio and or PIT tags.
4.2 Trap upstream migrant bull trout, collect scale and length data, tag using visual and PIT tags.
4.3 Snorkel areas upstream of trap sites to identify resident (non-tagged) spawners.
Objective 5: Determine the relative risk of interactions with brook trout to bull trout populations.
5.1 Determine the distribution of sympatric bull trout and brook trout (ongoing).
5.2 Estimate the incidence of bull trout /brook trout hybrids (ongoing).
5.3 Record habitat and temperature characteristics associated with distribution of bull trout and brook trout in sympatric populations (ongoing).
5.4 Characterize invertebrate communities in streams with sympatric populations of bull trout and brook trout (ongoing).
5.5 Identify feeding habits and behavior of bull trout and brook trout in sympatric and allopatric populations.
Objective 6.0 Gather data on the variation of bull trout spawning behavior to establish guidelines for the use of spawning surveys in monitoring bull trout abundance.
Objective 6.1 Identify variation in spawning distribution and timing between years (ongoing).
Objective 6.2 Identify how long bull trout redds remain identifiable (ongoing).
Objective 6.3 Identify variations in spawning behavior associated with migrant and resident life histories (ongoing).
Objective 6.4 Estimate variation among spawning surveyors (ongoing).
Objective 6.5 Using data gathered from spawning surveys determine the proper timing and frequency of sampling to accurately estimate the number of spawners in a population.

CRITICAL UNCERTAINTIES:

None apparent. This study employs proven techniques and equipment. The project will not harm threatened or endangered fish and wildlife species.

BIOLOGICAL NEED:

Bull trout are a sensitive native species listed as “sensitive” state status and federal ESA status candidate. The U.S. Fish and Wildlife is currently reviewing the status of bull trout to determine if listing as an endangered species is warranted. It is estimated that bull trout occupy only 36% of their former range south of the Canadian border. Over 72 percent of the bull trout populations in the proposed study subbasins are classified as having a moderate or high risk of extinction. Bull trout number have been severely impacted by harvest pressure, habitat degradation, and interactions with exotic species. Past and current efforts to asses, protect and restore existing bull trout populations have been limited by the lack of basic information about bull trout ecology, life history and genetics. The overall objective of our study is to provide basic information in these areas. This will allow threats to existing bull trout populations to be correctly evaluated and management decisions pertaining to bull trout preservation and restoration to be effectively implemented.
From the data we have gathered and by completing the specific measurable objectives listed above we plan to complete the following objectives:
Objective 1.0 : Determine the genetic characteristics of bull trout within the 11 Oregon river basins of the Columbia Basin and the structure of metapopulations within the Deshutes, Grande Ronde and John Day subbasins. Knowledge of the limits of interbreeding populations is one of the cornerstones of scientific fisheries management. This data is also necessary to asses and maintain genetic diversity in bull trout populations.

Objective 2.0: Determine distribution of juvenile and adult bull trout and habitats associated with that distribution. This will allow assessment and tracking of bull trout populations and guide efforts towards habitat protection, enhancement, and restoration. Such habitat information is necessary for the protection of existing critical habitat and any restoration efforts that my be undertaken. Without this type of information it is impossible to protect and manage fisheries resources.
Objective 3.0: Determine relationships between stream temperature and distribution of bull trout. This will help to identify the role that temperature plays in shaping bull trout distribution. This information also relates to efforts to restore populations by habitat enhancement to lower stream temperatures.
Objective 4.0: Determine selected bull trout life history characteristics. Knowledge of life history characteristics, such as spawning and migration behavior, is the basis of scientific fisheries management.
Objective 5.0: Determine the relative risk to bull trout by non-native brook trout. Brook trout have been identified a significant threat to many bull trout populations. Brook trout may directly compete with bull trout for habitat and food and have also been observed to hybridize with bull trout.
Objective 6.0 Establish guidelines to monitor the abundance and distribution of Oregon bull trout populations. This is one of the main goals of the entire study. All of the research conducted in this project contributes towards this goal. Without effective monitoring of populations it is not possible to protect and restore Oregon bull trout populations.

HYPOTHESIS TO BE TESTED:

1. All bull trout populations found in Oregon's portion of the Columbia Basin are genetically similar (null). This would imply that there is gene flow between all populations of bull trout within the study area. All bull trout populations found in Oregon's portion of the Columbia Basin are not genetically similar (alternate). If this is the case then there are populations of bull trout within the basin that are genetically unique. This would warrant special efforts to protect the genetic identity of these populations.
2. Seasonal distribution of bull trout does not vary between populations or between basins (null). This would imply that all bull trout populations use similar habitat and that all bull trout populations could be managed uniformly. Seasonal distribution of bull trout varies between populations or between basins (alternative). This would indicate that considerations of the habitat use of local populations must be taken into account when managing bull trout.
3. Critical bull trout habitat does not vary with season or life stage(null). That a uniform set of habitat conditions apply to all life stages of bull trout throughout the year. Critical bull trout habitat varies with season or life stage(alternate). Since different types of habitat are important the whole range of habitats used needs to be considered in management decisions.
4. Physical factors such as temperature and elevation do not effect distribution patterns of bull trout (null). This would imply that bull trout distribution is more limited by small-scale habitat considerations. Physical factors such as temperature and elevation effect distribution patterns of bull trout (alternate). Large scale environmental factors play a role in determining bull trout distribution and in some cases may be more important than local habitat in determining bull trout distribution.
5. Temperature regime does not effect interactions of exotic brook trout and native bull trout (null). This would imply that bull trout/brook trout interactions are primarily effected by biotic factors. Temperature regime effects interactions of exotic brook trout and native bull trout (alternate). Temperature plays a role in the dynamics of bull trout/ brook trout interactions. If this is the case low water temperatures may provide refugia for bull trout from competition with brook trout.
6. There is no difference between bull trout diets when only bull trout are present and when brook tout are present (null). This would imply that bull trout and brook trout do not compete for food. There is a difference between bull trout diets when only bull trout are present and when brook tout are present (alternate). This would suggest that bull trout and brook trout compete for the same food resources.
7. There is no significant difference in habitat parameters between stream reaches which contain only bull trout and stream reaches that contain brook trout (null). This would imply interactions between bull trout and brook trout are based only on biological mechanisms such as competition and hybridization. There is a significant difference in habitat parameters between stream reaches which contain only bull trout and stream reaches that contain brook trout (alternate). This would suggest that the encroachment on brook trout on bull trout habitat may be limited by certain environmental parameters.
8. There is no significant difference between years in timing or distribution of bull trout spawning (null). This would suggest that no efforts need to be made to account for year to year variance in designing spawning surveys for bull trout. There is a significant difference between years in timing or distribution of bull trout spawning (alternate). This suggests that efforts to account for year to year variance in spawning behavior must be made when designing spawning surveys.
9. Stream temperature has no effect on the habitat use of juvenile and adult bull trout (null). This would suggest that current water temperature regimes do not influence or limit the distribution of bull trout. Stream temperature have an effect on the habitat use of juvenile and Adult bull trout (alternate). This suggests that water temperature plays an important role in the present distribution of bull trout.

METHODS:

Since this has a number of different objectives a number of different methodologies have been applied. The following is a brief description of methodology by objective.
1. Genetic studies. Genetic studies were collected from 46 bull trout populations in 11 subbasins in Oregon. Sampling sites were chosen to represent the geographic range of bull trout. Sampling design targeted multi year-class populations of juveniles in the upper tributaries of the subabsins sampled. Optimal sample size was established as 30 samples and minimal sample size as 20 samples based on statistical power analysis. Duplicate caudal clips were collected non-lethally from each fish sampled and preserved in 95% ethanol. All genetic samples sent to Fred Allendorf's genetic laboratory at Montana University for analysis of nuclear and mitochondrial DNA sequences.
2. Habitat and Distribution. A candidate list of streams for surveying were selected based on information from the ODFW aquatic habitat database and biologists managing bull trout populations (ODFW, USFS, USFWS, Confederated tribes of the Umatilla, Warm Springs Tribe). After consultation with the ODFW staff biometrician it was decided that a sample of at least 12 streams would be necessary to have a acceptable probability of detecting significant differences between bull trout and brook trout habitat. Streams were chosen from the candidate list with efforts towards representing as many basins as possible. Sampling for fish distribution was done systematically. A 100 m section was sampled using a dc -electroshocker in every 1000m surveyed. Electroshocker settings were determined using injury rate data from 1995 sampling to avoid injury to fish. If any injured fish were observed elecroshocker voltage was immediately reduced. Fish were identified to species , measured, fork length recorded and released into the section they were collected from.
Habitat data was collected using a protocol established by the ODFW aquatic habitat survey. Because of time constraints two modifications were made to this protocol, the detailed riparian surveys were eliminated and the stream was subsampled. Approximately 2000 m were surveyed in 4 evenly spaced 500 m sections in zones of allopatric distribution of bull trout and brook trout within surveyed streams. An additional 500m section was surveyed in the area of bull trout and bull trout overlap within the stream. Data was compiled and analyzed using software developed by the ODFW aquatic habitat survey.
3. Temperature data. Electronic temperature loggers ("hobo-temp", Onset Computer Corp., Pocasset, MA) in waterproof cases were used to record temperatures. These temperature loggers were placed within surveyed streams in areas identified as bull trout zones, brook trout zones and where bull trout and brook trout distribution overlapped. At the end of the sampling season the temperature loggers were recovered and the data they contained downloaded to a PC for summary and analysis.
4. Radio tagging. Adult and juvenile bull trout will be surgically implanted with radio tags to identify migration patterns, temperatures experienced and habitat use. Surgical procedure will follow protocols described by an earlier ODFW study (Thiesfield et. al, 1996). Tracking will be conducted using aircraft, automobiles and small boats. Fish from two subbasins will be tagged, with a target number of 25 juveniles and 25 adults from each subbasin. Juveniles for tagging will be selected from those captured by downstream migrant trapping. Adults will be captured from selected basins by seining or angling. Half of the adult fish will be implanted with tags equipped with temperature sensors. Habitat parameters will be recorded at the sites of tagged fish spottings. Fish locations will be summarized an compiled using GIS software to identify migration routes and patterns of habitat use.
5. Upstream and downstream migrant trapping. Weirs and screw traps will be established in two subbasins. The weir traps will be located in streams identified as juvenile habitat and the screw traps will be located down stream of the weir traps. Traps will be emplaced in March of 1997. The weir traps will include a means of trapping upstream as well as downstream migrants. Bull trout captured will be measured, scales collected, tagged and released. Other species of fish will be identified , measured and released. All bull trout captured will be tagged with PIT tags, selected individuals will be radio tagged or visibly tagged. Fish captured at downstream screw traps will be scanned for the presence of PIT tags, if they are untagged they will be measured, scales collected, and released.
6. Spawning surveys. We are conducting two types of spawning surveys. The first type is the repeat sampling of three streams over four years. These surveys are to identify variation between years in spawning behavior. The second type of survey is exploratory. These are surveys are conducted once to identify and document bull trout spawning in selected areas. In both types of surveys the reach of stream is selected based on previous reports of bull trout presence or spawning. The selected reach is divided into sections based on easily recognized landmarks. The surveyors proceed upstream counting , measuring and flagging each redd identified. Redd numbers and fish observations are summarized for each section and for the stream reach sampled. The three selected streams which are repeat sampled will be sampled 3-4 times over the course of the spawning season each year to identify timing and how long redds remain identifiable to surveyors.

PLANNED ACTIVITIES

SCHEDULE:

PROJECT COMPLETION DATE:

2000

CONSTRAINTS OR FACTORS THAT MAY CAUSE SCHEDULE OR BUDGET CHANGES:
None apparent.

OUTCOMES, MONITORING AND EVALUATION

SUMMARY OF EXPECTED OUTCOMES

Expected performance of target population or quality change in land area affected:
Protection and recovery plans for bull trout and other native Columbia River species are being developed without clear scientific understanding as to population variability of genetic and life history characteristics or potential limiting factors and habitat needs. This study will provide scientific information that will help develop a protection and recovery plan for bull trout in Oregon's portion of the Columbia Basin. This plan will also include the restoration of tribal and recreational fisheries.

Present utilization and convservation potential of target population or area:
Harvest of bull trout in Oregon is presently limited to Lake Billy Chinook. Other populations in Oregon cannot support harvest at this time. Bull trout are presently concentrated in inaccessible areas, by limiting impact on those areas present populations may be maintained. The genetic fitness and long term prospects of present populations are unclear. Bull trout are very sensitive to increased water temperature and sedimentation. since these are two of the primary effects of logging and agricultural development any expansion of these activities into bull trout habitat would be very detrimental.

Assumed historic status of utilization and conservation potential:
Historically many anglers targeted bull trout in waters throughout Oregon. They are a large, aggressive species which are easily taken by hook and line. It is probable they represented a significant portion of sport and subsistence catches anywhere they were present. Bull trout were also a part of the native salmonid ecosystems of the northwest. As a predator they undoubtedly played an important role in the structure of these ecosystems. Historical bull trout range was widespread but bull trout were probably distributed in patches throughout their range. It is thought that because of the discontinuous distribution that migration between patches was important to maintaining the genetic health of populations.

Long term expected utilization and conservation potential for target population or habitat:
With recovery of bull trout populations sport utilization of the species will again be possible. Current high interest in trophy fishing suggests that a large species such as bull trout would prove appealing to many anglers. In addition to its potential as a game fish the bull trout is a part of the native salmonid ecosystems of the pacific northwest. Bull trout could play a significant role in the restoration of these ecosystems. This also meets one of the specific program goals of contributing to rebuilding of weak but recoverable species. If present populations are preserved and stabilized they may form the nucleus of restoration efforts. Bull trout restoration would be most effective and perhaps only effective if it is undertaken as a part of efforts to restore the entire salmonid ecosystems. In addition, as one of the most sensitive members of the northwest salmonid ecosystem the serve an important role as an indicator species for the health of those ecosystems. With restoration of habitat they may be able to expand to their former range, but for populations to recover in numbers their prey base, usually anadromous salmonids, must also recover.

Contribution toward long-term goal:
By identifying and describing genetic structure, habitat needs and limiting factors of bull trout in Oregon we provide information necessary for the preservation and recovery of bull trout populations. In addition our research will contribute to information needed to effectively manage the harvest of bull trout populations.

Indirect biological or environmental changes:
Almost all of the changes resulting from this project will be indirect. As a research project, its aim is to provide data which will allow effective management decisions to be implemented to protect and restore bull trout populations.

Physical products:

We are planning to implant 1000 bull trout with PIT tags and 100 bull trout with radio tags (20 day to 18 month tag life).

Environmental attributes affected by the project:
This project will provide data to guide the management of environmental attributes to protect and restore bull trout populations.

Changes assumed or expected for affected environmental attributes:
Not applicable

Measure of attribute changes:
Not applicable

Assessment of effects on project outcomes of critical uncertainty:
Use scientific information from this study to improve riparian and instream habitat conditions for bull trout.

Information products:
The primary goal of this project is to provide scientific information that will help develop a protection and recovery plan for bull trout in Oregon's portion of the Columbia Basin. The primary information products produced will be six annual reports published in 1995, 1996, 1997, 1998, 1999 and 2000. A statewide bull trout status report for Oregon is presently in press. A GIS database of bull trout distribution and habitat is being compiled. We will also produce publications in refereed journals and make presentations at professional fisheries meetings using the data from this study.

Coordination outcomes:
Because of the large geographic area covered by this study we have contacted and coordinated with many local resource managers who have responsibility for bull trout. This has served to make them aware of others working with bull trout and available information resources regarding bull trout. By making these contacts we have laid the groundwork necessary for coordinating the preservation and restoration of bull trout populations in Oregon.

MONITORING APPROACH
Since this is a research project the primary product will be information. The primary outlet for the information will be the six annual reports produced. Comparison of the objectives listed in the project work plan with results found in the final report will allow tracking of specific objectives. Additional information resources produced from data collected in this project such as the statewide bull trout status report for Oregon should also be taken into account.

Provisions to monitor population status or habitat quality:
The purpose of this project is to provide basic data on bull trout ecology genetics and distribution to allow effective monitoring of bull trout populations. The most directly applicable products of our study are the production of the bull trout status report for Oregon and the compiling of a GIS database of bull trout populations in Oregon.

Data analysis and evaluation:
Descriptive data, fish counts, lengths and scale data, habitat parameters and spawning counts will be compiled and summarized using computer databases (D-Base, Excel, etc.). Spatial data such as distribution limits, and radio tag tracking will be entered into a GIS database. Descriptive data including means, standard deviations and ranges will be calculated for all descriptive data. Testing of specific hypotheses will be conducted using analysis of variance or non-parametric statistical techniques as appropriate for each data set. Multi-variate analysis, such as principal components analysis, will be applied to habitat information to identify critical habitat factors associated with bull trout distribution. The ODFW staff biometrician has been consulted in the planning of this project and will have input in its final analysis. Genetic data will be analyzed by accepted statistical techniques devised specifically for that purpose (conducted by subcontractor). Results will be reviewed and evaluated considering sample size, possible sample bias, possible flaws in formulation of hypothesis and statistical power analysis where applicable.

Information feed back to management decisions:
The data generated by this report is distributed to resource managers in the form of annual reports. The ongoing development of

this project is guided by steering groups composed of resource managers (Warms Springs and Umatilla Tribes, USFWS, USFS, ODFW, BPA, concerned landowners). Maintaining close contact with resource managers is a critical part of this project.

Critical uncertainties affecting project's outcomes:
Since many of the studies conducted by this project are the first systematic attempts at documenting aspects of bull trout life history, ecology and genetics we would expect it to identify a number of new research needs. Probably the most important will be research into the mechanisms behind the patterns identified by this project.

EVALUATION
1. Completion of objectives listed in the project work plan. 2. Publication of annual reports. 3. Production of other information resources such as publications in peer-reviewed journals, the Statewide Status Report for Oregon Bull Trout, compilation of current and historical distribution, and presentations at professional meetings.

Incorporating new information regarding uncertainties:
There are few uncertainties concerning our ability to complete this project. However as new information concerning bull trout life history and genetics become available we will incorporate them in our experimental designs. This will allow us to better focus our efforts to collect biological information.

Increasing public awareness of F&W activities:
By increasing knowledge about bull trout life history, habitat, and genetics we may contribute to the publics awareness of bull trout and the issues concerning their survival. Though annual reports and scientific papers may be somewhat inaccessible to the general public the information we produce will provide background materials to educate the public about bull trout.

RELATIONSHIPS

OPPORTUNITIES FOR COOPERATION:
This project is dependent on close cooperation between the local bull trout working groups for each basin or subbasin and the project coordinators from Oregon Department of Wildlife (ODFW), U.S. Forest Service (USFS), Portland General Electric (PGE), Bonniville Power Administration (BPA), and the Warm Springs and Umatilla tribes.

COSTS AND FTE

1997 Planned: $239,000

FUTURE FUNDING NEEDS:

PAST OBLIGATIONS (incl. 1997 if done):

FY	OBLIGATED
1994	$75,300
1995	$81,802
1996	$244,102
TOTAL:	$401,204

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

OTHER NON-FINANCIAL SUPPORTERS:
Confederated Tribes of the Umatilla, U.S. Forest Service, U.S. Fish and Wildlife Service, Oregon Trout, Native Fish Society

1997 OVERHEAD PERCENT: 20.5%

HOW DOES PERCENTAGE APPLY TO DIRECT COSTS:
This percentage applies to everything except contracts and capital outlay.

CONTRACTOR FTE: 1 Fisheries Biologist, 3.5 Seasonal Experimental Biological Aides

SUBCONTRACTOR FTE: All subcontractors have < 1 FTE from this project