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## PART I - ADMINISTRATIVE

### Section 1. General administrative information

#### Title of project

North Fork Malheur River Bull Trout And Redband Life History Study

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**BPA project number:** 9701901  
**Contract renewal date (mm/yyyy):** 3/2000  **Multiple actions?**

**Business name of agency, institution or organization requesting funding**  
Burns Paiute Tribe - Natural Resources Department

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**Business acronym (if appropriate)** BPT

#### Proposal contact person or principal investigator:

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**NPPC Program Measure Number(s) which this project addresses**  
10.1, 10.1A.2, 10.2A.1, 10.5, 10.6

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**FWS/NMFS Biological Opinion Number(s) which this project addresses**

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#### Other planning document references

1) North Fork Malheur Scenic River Management Plan, USDA (1993). 2) Malheur Wild and Scenic River Management Plan, USDA (1993). 3) Malheur River Basin Fish Management Plan, Oregon Department of Fish and Wildlife (1990).

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#### Short description

Identify the seasonal distribution and life history characteristics of bull trout and redband trout in the Malheur River Basin through the use of radio telemetry, PIT tags, genetic sampling, spawning surveys, and habitat surveys.

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#### Target species

Bull trout and redband trout

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## Section 2. Sorting and evaluation

### Subbasin

North Fork River Malheur

### ***Evaluation Process Sort***

<b>CBFWA caucus</b>	<b>Special evaluation process</b>	<b>ISRP project type</b>
Mark one or more caucus	If your project fits either of these processes, mark one or both	Mark one or more categories
<input type="checkbox"/> Anadromous fish <input checked="" type="checkbox"/> Resident fish <input type="checkbox"/> Wildlife	<input checked="" type="checkbox"/> Multi-year (milestone-based evaluation) <input type="checkbox"/> Watershed project evaluation	<input type="checkbox"/> Watershed councils/model watersheds <input type="checkbox"/> Information dissemination <input type="checkbox"/> Operation & maintenance <input type="checkbox"/> New construction <input checked="" type="checkbox"/> Research & monitoring <input type="checkbox"/> Implementation & management <input type="checkbox"/> Wildlife habitat acquisitions

## Section 3. Relationships to other Bonneville projects

***Umbrella / sub-proposal relationships.*** List umbrella project first.

<b>Project #</b>	<b>Project title/description</b>
9701900	Stinkingwater Project Bull Trout and Redband Trout Life History Study

### ***Other dependent or critically-related projects***

<b>Project #</b>	<b>Project title/description</b>	<b>Nature of relationship</b>
9405400	Bull Trout Genetics, Habitat Needs, L.H. Etc. In Central And N.E. Oregon	Life History
9701900	Stinkingwater Project Bull Trout and Redband Trout Life History Study	Life History
9106	Acquisition of Malheur Wildlife Mitigation Site	Through acquisition ~ 7 miles of the Malheur River will be restored

## Section 4. Objectives, tasks and schedules

### *Past accomplishments*

<b>Year</b>	<b>Accomplishment</b>	<b>Met biological objectives?</b>
98	Identified bull trout entrainment over Beulah Reservoir	Yes
98	Identified a larger distribution range of spawning bull trout throughout the North Fork Malheur River tributaries	Yes (met 1st year objectives)
98	Documented 1 year of bull trout seasonal migration from Beulah Reservoir to the headwater streams	Yes
98	Monitored use of Beulah Reservoir prior to migration	Yes
98	Gathered genetic samples of radio tagged bull trout	Yes
98	Spawning surveys on all North Fork tributaries	Yes
98	Documented entire seasonal migration patterns of all radio tagged bull trout	Yes
98	Gathered infrared thermal imaging data for the North Fork River	Yes, data is being analyzed by Oregon State University

### *Objectives and tasks*

<b>Obj 1,2,3</b>	<b>Objective</b>	<b>Task a,b,c</b>	<b>Task</b>
1	Document the complete migratory patterns of bull trout in the North Fork Malheur River and Beulah Reservoir and determine fluvial, adfluvial and resident forms.	a	Radio tag 20 bull trout and PIT tag ~ 100; track migration patterns using radio telemetry and recapture methods
		b	Hook and line survey for juvenile and subadult bull trout in tributaries; PIT tag up to 20 in each trib and monitor possible movement back to reservoir through the use of a screw trap set below major spawning tributaries
		c	Recapture PIT tagged fish in trap nets and fyke nets in reservoir to verify migration
2	Determine adult population trends	a	Continue monitoring spawning

	and age class structures in bull trout and redband trout		activities in documented areas and any new areas identified through the use of radio telemetry
		b	Gather scale samples from 30 bull trout and redband trout caught in trap nets at reservoir sites; gather 30 scale samples from fish caught in the screw trap located below tributaries; gather 30 samples from tributaries
		c	ODFW will analyze scale samples to identify the age class structure within the North Fork River and Beulah Reservoir
		d	Identify the population trends in adult spawners by summarizing and evaluating past, present and the next two years of data collection
3	Determine water quality parameters in North Fork River Malheur	a	Continue using thermographs to gather data on established sites
		b	Correlate FLIR data with thermograph information
4	Determine the timing of spawning and preferred spawning sites	a	Continue monitoring the locations and timing of bull trout spawning activities via radio telemetry in the North Fork Malheur and its tributaries
		b	Continue spawning surveys on North Fork tributaries (GPS and enter into GIS data base)
5	Determine bull trout use of Beulah Reservoir and fish entrainment through the gates	a	Track all radio tagged bull trout in reservoir until migration occurs
		b	Phase 2 entrainment monitoring will involve the placement of a 8' rotary screw trap ~ 1/4 mile below the reservoir. The trap will be in place for ~ 45 days and checked twice daily
		c	Identify bull trout movement or survivability after entrainment has occurred. Up to 5 fish may be radio tagged below the reservoir to help us identify these characteristics. This

			task is only to identify the possibility of this occurrence(see methods)
6	Evaluate the habitat profile of critical bull trout spawning and rearing tributaries of the North Fork Malheur River	a	Using ODFW's methods for stream survey, approximately 30+ miles of tributaries will be surveyed
7	Determine the genetic variability of redband trout vs hatchery trout within the North Fork Malheur River and Beulah Reservoir	a	Gather 60 samples from North Fork tributaries, 60 from the screw trap located ~30 miles from reservoir and 60 samples from trap nets at reservoir
		b	Compare genetic information to hatchery stocked fish to identify hybridization and the possible distribution of hybridization
8	Determine cool micro-refugia within the North Fork Malheur River	a	Identify areas of cool water and temperature profiles using Forward Looking Infrared (FLIR) videography within the North Fork Malheur River (~40 miles)
		b	Snorkeling will be used to verify any bull trout use of cold water refugia - in relation to FLIR flight data

**Objective schedules and costs**

Obj #	Start date mm/yyyy	End date mm/yyyy	Measureable biological objective(s)	Milestone	FY2000 Cost %
1	4/2000	10/2000	rate and timing of movement throughout migration	X	20.00%
2	4/2000	10/2000	index of adult spawners and age class from scale samples	X	10.00%
3	4/2000	11/2000	water quality throughout subbasin	X	10.00%
4	7/2000	10/2000	timing of spawning activities	X	5.00%
5	4/2000	7/2000	entrainment rates of bull trout through reservoir	X	11.00%
6	6/2000	9/2000	habitat conditions		32.00%
7	4/2000	9/2000	genetic variability	X	4.00%

8	7/2000	7/2000	teperature profiles of North Fork River	X	8.00%
				<b>Total</b>	100.00%

**Schedule constraints**

Weather

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**Completion date**

10/2001

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**Section 5. Budget**

**FY99 project budget (BPA obligated):** \$143,347

***FY2000 budget by line item***

<b>Item</b>	<b>Note</b>	<b>% of total</b>	<b>FY2000</b>
Personnel	1 Program Coordinator @ \$19.23 hr (2080 hrs) and 1 Fisheries Technician @ \$10.00 hr (1080 hrs)	%44	50,800
Fringe benefits	25% Of Salary	%11	12,700
Supplies, materials, non-expendable property	1 Trap Net - \$2000, 1 PIT Tag Reader - \$585, 1 ATS Reciever - \$2530 with Yaggi Antannae \$96	%4	5,211
Operations & maintenance	None		
Capital acquisitions or improvements (e.g. land, buildings, major equip.)	None		
NEPA costs	\$0		
Construction-related support	\$0		
PIT tags	# of tags: 200 - 14mm tags	%0	580
Travel	To and from work sites = 130 miles/day X 4 days/wk X 7 months @ \$.32/mile	%4	4,659
Indirect costs	26%	%16	19,076
Subcontractor	Oregon Department of Fish and Wildlife -- Analyze 40 miles of stream survey data @ \$160/mile	%5	6,400
Subcontractor	University of Washington, genetic analyses of 180 redband samples @ \$65/sample	%10	11,700
Subcontractor	Oregon Department of Fish and	%2	2,700

	Wildlife scale sample analyses 90 @ \$30/sample		
Other			
<b>TOTAL BPA FY2000 BUDGET REQUEST</b>			<b>\$113,826</b>

**Cost sharing**

Organization	Item or service provided	% total project cost (incl. BPA)	Amount (\$)
Oregon Department of Fish and Wildlife	Field equipment, 1 full time seasonal technician and 2 biologist (District and Assistant District biologist) averaging ~ 30hr/wk-	% 14	30,000
Bureau of Reclamation	2 data loggers, field equipment and funding for additional technical support	% 14	30,000
US Forest Service (Prairie City ranger District)	Field equipment, 1 part time seasonal technician and 2 biologists averaging ~20hrs/wk	% 14	30,000
Bureau of Land Management (Vale District)	Funding for Project	% 2	5,000
Trout Unlimited	In-kind services	% 0	1,000
Oregon Trout	In - kind services	% 0	1,000
<b>Total project cost (including BPA portion)</b>			<b>\$210,826</b>

**Outyear costs**

	<b>FY2001</b>	<b>FY02</b>	<b>FY03</b>	<b>FY04</b>
<b>Total budget</b>	\$96,000			

**Section 6. References**

Watershed?	Reference
<input type="checkbox"/>	Bond, C.E. 1992. Notes on the nomenclature and distribution of the bull trout and effects of human activity on the species. Pages 1 - 4 in P.J. Howell and D.V. Buchanan, editors. Proceedings of the Gearhart Mountain bull trout Workshop. Oregon Chapter AFS
<input type="checkbox"/>	Bowers, W.L., P.A. Dupee, M.L. Hanson, and R.R. Perkins. 1993 bull trout population summary Malheur River basin. Oregon Department of Fish and

	Wildlife, Hines, Oregon. Unpublished report.
<input type="checkbox"/>	Buchanan, D. M., M.L. Hanson, R.M. Hooton. 1996. 1996 Status of Oregon's Bull Trout. Draft Report. Portland, OR
<input type="checkbox"/>	Buchanan, D. M., M.L. Hanson, R.M. Hooton. 1997. Status of Oregon's Bull Trout. Oregon Department of Fish and Wildlife. Portland, Oregon.
<input type="checkbox"/>	Buckman, R.C., W. E. Hosford, P.A. Dupee. 1992. Malheur River bull trout investigations. Page 45 - 57 in P.J. Howell and D.V. Buchanan, editors. Proceedings of the Gearhart Mountain bull trout Workshop. Oregon Chapter American Fisheries Society.
<input type="checkbox"/>	Currens, P.K. 1996. Genetic variation of rainbow trout from the Snake River and Harney Basins. Oregon Department of Fish and Wildlife Final Report, Oregon State University. Corvallis, Oregon.
<input type="checkbox"/>	Howell, P.J. and D.V. Buchanan, editors. 1992. Proceeding of the Gerahart Mountain bull trout workshop. Oregon Chapter of the American Fisheries Society, Corvallis.
<input type="checkbox"/>	Kostow, K. 1995. Biennial report on the status of wild ifhs in Oregon. Oregon Department of Fish and Wildlife, Protland, Oregon.
<input type="checkbox"/>	Leary, R.F., F.W. Allendorf, and K.L. Knudsen. 1983. Consistently high meristic counts in natural hybrids between brook trout and bull trout. Systemic Zoology , 32 (4) : 369-376.
<input type="checkbox"/>	Pribyl, S.P., and W.E. Hosford. 1985. Mlaheur Basin wild trout evaluations. Information Report Numbers 85-5. Oregon Department of Fish and Wildlife. Hine, Oregon.
<input type="checkbox"/>	Ratliff, D.E. and P.J. Howell. 1992. The status of bull trout populations in Oregon. Proceeding of the Gerahart Mountain bull trout workshop. Oregon Chapter of the American Fisheries Society, Corvallis.
<input type="checkbox"/>	United States Department of Agriculture. 1993. North Fork Malheur Scenic River Management Plan. United States Forest Service, Pacific Northwest Region. John Day, Oregon.
<input type="checkbox"/>	Spruell, P. and F.W. Allendorf. 1997. Nuclear DNA analysis of Oregon bull trout. Oregon Department of Fish and Wildlife Report 97/5. Protland, Oregon.
<input type="checkbox"/>	Wishard, L.N., J.E. Seeb, F.M. Utter and D. Stefani. 1984. A genetic investigation of suspected redband trout populations. Copeia, 1:120-132.

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## PART II - NARRATIVE

### Section 7. Abstract

Past land use practices and construction of hydroelectric facilities have degraded the North Fork Malheur River to the point where survival of the remaining native salmonids are severely threatened. The goal of this project is to gain an understanding of the life history of bull trout and redband trout in the Malheur River Basin and to apply this knowledge to

better the management and conditions of the ecosystem that these fish depend on. Little information is available concerning their population, seasonal migration and distribution, and movements throughout the basin. What information there is indicates that management and land practice need to be revised in order to preserve the persistence of these species. This project outlines a plan to assess habitat conditions, trends in populations, distributions, genetic compositions and migration characteristics. The project will assist in achieving the goals and objectives defined in the Northwest Power Planning Council's 1994 Columbia River Fish and Wildlife Program. This project also complements the management plans outlined in the Malheur Wild and Scenic River Management Plan, and the Oregon Department of Fish and Wildlife's Malheur River Fish Management Plan. Assessments of these surveys will be the basis of recommendations for enhancement and protection strategies that are in line with council measures. Implementation of these strategies will provide native fishes with suitable habitat and enhance their survivability.

## **Section 8. Project description**

### **a. Technical and/or scientific background**

The following is a summary of existing information on bull trout *Salvalinus confluentus* in the Malheur River Basin provided by the report of Oregon Department of Fish and Wildlife (1997). Other supporting information will consist of data we have gathered from our on-going life history research of bull trout and redband trout *Oncorhynchus mykiss gairdneri* in the North Fork Malheur River.

The Malheur River, situated in southeast Oregon, is a tributary to the Snake River entering about RK 595. It drains an area of approximately 12,950 sq. km and is approximately 306 km in length. It originates at elevations of 1,982 to 2,133 m in the Blue Mountains and flows at elevations of about 611 m at the confluence with the Snake River.

Bull trout are found at elevations above 1,219m in the forested headwaters of the North and Middle Forks of the Malheur River within the Malheur National Forest. The populations in the two forks were isolated from one another by the construction of the Warm Springs Dam in 1919 at RK 198 on the mainstem Malheur River and Agency Dam in 1934 at RK 29 on the North Fork Malheur River. Access to the Malheur River from the Snake River was limited after the construction and operation of the Nevada Diversion Dam about RK 31 on the lower Malheur River. Prior to the construction of the dams, bull trout as well as large runs of chinook salmon *Oncorhynchus tshawytscha* and steelhead trout *Oncorhynchus mykiss* would have had access to the Snake River as well as the Malheur Basin. The lower reaches of the Malheur River are considered too warm in the summer for bull trout rearing and spawning, but they would have provided a migration corridor to the Snake and Columbia rivers, as well as wintering habitat.

In addition to the loss of anadromous fish in this area, resident fish have also suffered significant habitat loss and degradation due to land-use factors such as timber harvest, livestock production and irrigation withdrawals. Bull trout have specific environmental requirements and complex life histories making them especially susceptible to human activities that alter their habitat (Howell and Buchanan, 1992). For some time, it has been known that bull trout populations have been declining throughout their range (Howell and Buchanan, 1992; USDA, 1993; Kostow, 1995). Ratliff and Howell, in 1992, listed habitat degradation as the primary cause for depletion of bull trout in this area.

Following the recent decision in June 1998, bull trout in the Columbia River Basin have been listed as a threatened species under the federal Endangered Species Act. Bull trout are in serious risk of going extinct (ODFW 1996). The Malheur National Forest Plan designates bull trout as an indicator species for non-anadromous fish and riparian habitat in the forest. The assumption is that management activities that affect bull trout will affect a variety of other species in the same or similar habitat. Accordingly, measures to protect the indicator species will protect other species as well (Buckman, *et. al.*, 1992).

Bull trout were held in low regard by anglers and fishery managers due to its supposedly poor fighting qualities and piscivorous habit (Bond 1992). Oregon Department of Fish and Wildlife would stock systems with brook trout *Salvalinus fontinalis*, to supplement the undesirable qualities of bull trout. The Middle Fork Malheur River has been stocked with brook trout and they are highly impacting the survivability and genetic characteristics of bull trout. The North Fork River has not been stock with brook trout. According to ODFW information, brook trout fry were stocked by pack train in the 1930s by sheepherder volunteers in exchange for free hunting and fishing licenses (ODFW unpublished report 1993.). As mentioned, brook trout pose a serious threat to bull trout populations due to habitat competition and their ability to hybridize with bull trout resulting in a loss of genetic integrity (Ratliff and Howell, 1992; Leary, *et. al.* 1983). These brook trout may already be in part responsible for the loss of bull trout in some areas and represent a threat to them throughout most of the remainder of their range in the Middle Fork Malheur drainage. In 1997, tribal fish surveys on a Middle Fork tributary, Summit Creek, indicated that the majority of the brook trout concentrations are in direct conflict with bull trout habitat. BPA is funding ODFW to determine feeding interactions between bull trout and brook trout in the Middle Fork tributaries. Furthermore, the Warm Springs dam on the Middle Fork and Agency dam on the North Fork Malheur prohibits the migration of adfluvial fish causing additional genetic losses (Buckman, *et. al.*, 1992). Genetic data suggests bull trout in both forks are more closely related to each other than to any other inland population of bull trout (Spruel and Allendorf, 1997).

Four distinct life history patterns of bull trout have been identified: (1) the anadromous form in which the adult migrates from marine to stream habitat to spawn, (2) the adfluvial form in which the adult migrates from lakes to streams to spawn, (3) the fluvial form in which the adult migrates from large rivers to small streams to spawn, and (4) the resident form in which the adult remains and spawns in small streams. It is not known if these (Malheur Basin) bull trout are all fluvial or a combination of fluvial and resident life

history patterns (ODFW 1996). In order to develop a restoration plan for the trout, it is crucial to define the life history these trout exhibit.

It is still unknown the current abundance, recruitment and age class structure, growth rates. Redband trout in the Malheur River system are also of high concern as to their population, genetic composition and taxonomic classification. The taxonomy and classification of redband trout has in the past been in a state of controversy. However, Behnke, in 1992, stated that “for fisheries management, the major significance of separate evolutionary lines leading to coastal rainbow and interior redband trout does not concern correct taxonomy. Rather it concerns differences in the adaptive specialization the two forms have acquired over several thousands of years and how these differences can be accommodated in management programs.” In particular, redband trout are adapted to harsh arid environments (Wishard, *et. al.*, 1984). Habitat degradation, as well as possible genetic deterioration, are the primary causes for the depletion of redband trout in the region. Construction of Warm Springs dam, Agency dam on the North Fork Malheur and the Brownlee dam on the Snake, has interrupted natural gene flow within the population (Pribyl and Hosford, 1985) in addition to the stocking of non-native trout in the region. Protein work done by Ken Currens in 1996 demonstrated that there were a number of populations in the Snake River and Harney Basin that have diverged from the typical ranges of the allele frequencies found in inland rainbow trout of the Columbia River. He suggested that this could be one of two things; possible hybridization with non-native trout, or that these native populations may be more diverse than previously assumed.

## **b. Rationale and significance to Regional Programs**

### **Rationale**

The Pacific Northwest Electric Power Planning and Conservation Act of 1980 called for recommendations of to develop a program to protect, mitigate, and enhance fish and wildlife on the Columbia River and its tributaries that were affected by the development of hydroelectric activity. In 1997, the Burns Paiute Tribe (BPT), with funding provided by Bonneville, began developing a Fisheries Natural Resources Department with the intent to assist in the recovery and persistence of native resident fish in the Malheur Basin. This project is a habitat and life history study designed to record the movements and seasonal patterns of bull and redband trout.

The primary native resident fish species that are targeted for active management in this region include bull trout and redband trout. The management intent of these populations by the area fish managers can be expressed by two main goals. The first and primary goal of this subregion is to protect, enhance and restore where needed, these fish in their historical habitat. The second goal is to provide fisheries and harvest opportunities of native fisheries and also of introduced game fish where native fisheries have been irrevocably altered. Both of these goals have been further defined by a specific set of management objectives that describe desired population levels, water quality levels and habitat standards. These objectives are outlined in the Multi-Year Implementation Plan in

a Basin wide description of fish management plans developed by regional fish managers in the Columbia Basin.

To achieve management objectives, fish managers have outlined several broad strategies. From a population perspective, the strategic intent is to protect, maintain and enhance native fish production, identify populations with unique genetic characteristics and maintain this diversity, and reestablish populations, where possible, in areas where native populations have been eliminated. From a management perspective, the strategic intent focuses on learning more about the condition of existing fish populations and the habitat in which they live, protecting and enhancing this habitat, and creating harvest opportunities and managing angling demand consistent with healthy fish populations.

Specific actions can be defined for each of these strategies. Fish production is maintained and enhanced by managing habitat and harvest and in some cases, using artificial production to supplement populations. Genetic diversity and adaptiveness of fish populations is maintained by establishing protection refuges for wild populations in the absence of hatchery fish. Populations are reestablished within historic ranges by connecting habitats, and reestablishing historical habitat conditions. Learning is accomplished by assessing fish population status, fish distribution and habitat conditions, and monitoring responses of each to management actions. Habitat is protected and enhanced by providing necessary stream flows, improving water quality and halting and reversing habitat degradation. Using artificial production and improving natural production creates harvest opportunities. Angling demand is managed by promoting angling opportunities, controlling angler access and managing introduced gamefish such as bass, crappie, catfish and hatchery trout, however these actions are of *lower priority to fish managers than maintaining and enhancing native populations.*

This study complies with the following measures in the Columbia River basin fish and Wildlife Program 1994:

- (1) Resident fish Goal to recover and preserve health of native resident fish injured by hydropower system (measure 10.1),
- (2) Fund the fishery managers' efforts to complete assessments of resident fish losses throughout the Columbia River Basin (measure 10.1A.1),
- (3) Accord high priority to areas of the basin where anadromous fish are not present (measure 10.2A.1),
- (4) bull trout mitigation (measure 10.5),
- (5) study and evaluate bull trout populations (measure 10.5A) and,
- (6) other resident fish populations (measure 10.6).

According to the program, the council believes these studies and evaluation should be undertaken and completed, quickly, and on-the-ground projects identified and implemented as soon as possible to address the needs of these species. In addition, these studies should be coordinated to avoid redundant work to increase the learning potential.

Following the recent decision in June 1998, bull trout in the Columbia River Basin have been listed as a threatened species under the federal Endangered Species Act. The US Fish and Wildlife Service is currently in the process of developing Biological Opinion Document relative to bull trout which should be completed by early 1999.

We are working with the US Fish and Wildlife and state agencies to insure that our research complies with the Endangered Species Act. We have received a Section 10 Permit from the Service authorizing our department biologist to conduct and fulfill our contract obligations.

**c. Relationships to other projects**

We have developed a good working relationship with several projects and agencies during the course of our research. We are currently working on coordinating our projects in eastern Oregon into an umbrella project that would cover all other bull trout life history studies.

The North Fork Malheur River project is directly related to the Stinkingwater project (9701900). The completion of the two studies will further the goals of state, federal and regional agencies who share common interest in developing management strategies to enhance, protect and restore weak stocks of bull trout and redband trout.

These projects are in the process of being combined into one through our contracting officers. The Paiute Tribe originally wrote the Stinkingwater proposal to conduct work on the Middle Fork Malheur. Once the staff had been hired to work on the project, new cost-sharing agreements had been established and the focus of study had changed slightly.

The newly formed working group decided it would be more beneficial to focus on the North Fork Malheur River because there were no brook trout populations in that system, unlike the Middle Fork. Tribal biologist then submitted a new proposal that would fund the Tribe to continue the work on North Fork and continue efforts in the Middle Fork Malheur River. The new project title will be " Evaluate the Life History of Native Salmonids in the Malheur Basin".

Other projects we have related our efforts to is the Bull Trout Genetics, Habitat Needs, Life History, Etc. In Central and N.E. Oregon (Project # 9405400). The Burns Paiute Tribe assisted ODFW in completing objective 5 of the proposal; characterization and interactions between bull trout and introduced brook trout. We will continue to assist in their efforts and work together on data exchanges.

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

***Project History***

This is an on going project that is 1 year under way. The project used funds from the Stinkingwater Project (contract # 97B131260, project # 9701900) to supplement the research. The action to amend our existing contract was approved by the Resident Fish Managers and the Bonneville Power Administration on December 15, 1997.

During the first year of the Stinkingwater Project, the biologist hired to lead the project developed a cost share agreement with eight local agencies to participate and consolidate the efforts in the life history study of bull trout and redband trout. All participating agencies agreed on the need for the study, but suggested that we start our efforts on the North Fork Malheur River.

The reasoning for this was that the North Fork has no brook trout population such as the Middle Fork. Therefore the studies we conducted on North Fork would not be interfered by brook trout. This would give us a better understanding on the actual life history of bull trout with no competition or interference from other char species. Although we have been working on both drainages, most of our efforts have concentrated on the North Fork.

Our first year of research was successful in accomplishing our objectives on schedule. All partners shared equal responsibility and devotion to the project. Although all of our data is currently being analyzed, we can assume that bull trout and redband populations are in fact threatened by current habitat conditions, water quality and land management practices.

Of the 19 bull trout tagged in Beulah Reservoir, 17 survived the implants and successfully migrated to their spawning grounds. On their return in late October, 1 adult was lost to a fisherman who caught and released the fish but later died from a 1 in esophageal tear (Oregon State University analyses, Fish Pathology Labs) and 2 adults were lost to poaching (2 radios found ~ 10 yd. from North Fork River on the bank) and 1 was lost to a post spawning mortality. All others were tracked until they reached the reservoir or their batteries expired.

#### **e. Proposal objectives**

This is a proposal to coordinate current activities, and to implement additional activities leading to a reasonably high degree of knowledge concerning bull trout and redband trout life history patterns in the Malheur River basin. At this time, relatively little is known about these fish. Considering their biological sensitivity and the political sensitivity surrounding the management of bull trout habitat, a clear understanding of their life history patterns is a prerequisite to informed, defensible land management decisions and activities.

In general, this project will coordinate the continuation of work to be completed by six (or more) different agencies and organizations through the fiscal year 2000. The proposal integrates past work by various universities and government agencies and incorporates this

into a comprehensive program of work through the next three years for both the Middle Fork and North Fork Malheur River system.

### **Objectives**

1. Document the complete migratory patterns of bull trout in the North Fork Malheur River and Beulah Reservoir.
2. Continue monitoring population trends (index) and age class structure in bull trout and redband trout
3. Monitor water quality
4. Determine the timing of bull trout spawning
5. Determine the use of Beulah Reservoir and entrainment over the dam
6. Evaluate habitat profile of critical bull trout spawning and rearing tributaries on the North Fork Malheur River
7. Continue quantifying genetic population structure in redband populations.
8. Determine cool micro-refugia within the North Fork Malheur River

### **f. Methods**

This project will use various methods to achieve the project objectives, including; 1) the installation of two screw traps, 2) use of PIT tags and micro-radio transmitters to track fish movements, 3) annual spawning surveys (redd counts), 4) use of Forward Looking infrared (FLIR) videography and thermographs 5) fish capture and tagging in Beulah Reservoir, and 6) the compilation and evaluation of existing water temperature data.

Basic setup and operation of the project will start in early spring, depending on weather. Bull and redband trout will be trapped in Beulah Reservoir. This will be accomplished by deploying 2 trap nets and 4 fyke nets @ 1/2 inch mesh. Personnel will operate a boat and check these traps every other day for a period of 2.5 month or until target numbers have been achieved. Tissue samples, scale samples lengths and weights will be taken on bull trout that are captured. Bull trout larger than 395 grams will have a radio transmitter implanted. Those that do not meet the minimum weight will be PIT tagged. Scale samples lengths and widths will be taken on redband trout captured in the nets. Thirty PIT tags will also be put into redband trout (larger than six inches) trapped at Beulah Reservoir and it is possible that radio tags will be implanted. The nets will be pulled out of the reservoir once a minimum of 20 bull trout are implanted with radios.

Radio tagged fish will be tracked at least once every three days. The location of the fish will be documented with a GPS unit. If radio tagged fish remain in the same location, they will be investigated for possible mortality or radio abortion. If needed, snorkeling will be done to observe the fish or find the radio. If the fish is found alive, the site will be defined as a “preferred site” and habitat notes will be taken using ODFW protocol.

Two screw traps will be placed in strategic sites on the North Fork Malheur River. Screw traps will operate between May/June to September/October. Personnel from the Tribe,

ODFW, or Forest Service will check the trapped daily. Data will be taken on all fish species caught in these traps. Lengths and weights will be recorded on bull and redband. Only redband trout larger than 100mm will be measured and weighed, all other will be documented as a capture. An additional 30 redbands will be PIT tagged at the upper screw trap site (~30 mile from Beulah Reservoir) to help us identify migratory use of redbands in the North Fork.

The complete migratory patterns of bull trout in the North Fork Malheur River (Objective 1) can be determined from the use of radio telemetry and the recapture of PIT tagged fish. The recapture of PIT tagged fish will provide downstream and upstream migration patterns of juvenile and/or subadult bull trout as well as redband trout. Recapturing tagged fish at our different stations will help us identify fluvial, adfluvial or resident forms of redbands. An age class for upstream migration for first time spawners can be determined as well as an age class for downstream migration that enter Beulah Reservoir. Scale samples will be gathered from all PIT tagged fish to determine their age.

Radio telemetry and fish sampling will be used to determine bull trout use of Beulah Reservoir (Objective 5). Radio tagged fish captured in the Fyke and Trap nets will be tracked from the time of radio installation until they leave the reservoir. Fish will be tracked by boat; all locations will be documented with a GPS unit.

Entrainment of fish over the reservoir will be monitored with the use of a screw trap. We will place an 8' screw trap 1/4-mile below the spillway of the dam approximately 3 to 5 days before the release gates are opened. To monitor this action, we will set up temporary quarters for an individual to stay and check the trap twice a day as we expect a large volume of fish to enter the trap for the first month of release from the dam.

All but 2 adult bull trout caught in the trap will be taken back up to the reservoir and released. We will place up to 5 radios in bull trout (2 adult and 3 subadults) caught in the trap to monitor any life history below the reservoir. Their survival and existence below the reservoir has never been documented. In our last field season we had a technician conduct random interviews of anglers below the reservoir. There were several instances where we have documented up to 9 bull trout (5 adults, 2 subadults and 2 juveniles) caught in one day from 1 angler. The tasks associated with this objective will only determine if there is life after entrainment. If the theory is proven, a more intensive study will be conducted.

For the past five years, ODFW has been leading the spawning surveys on the North Fork system (Objective 4, Objective 2). Radio tagged fish will be tracked to the headwaters and monitored for spawning activity. Once activity is noted, personnel from ODFW, Forest Service, the Tribe and volunteers will initiate spawning surveys. The information we gather from these surveys will help us establish an index of adult spawners (Objective 2).

Spawning surveys are conducted 3 times a year on the North Fork tributaries. This is done to capture peak spawning activity. Surveys are conducted in two-week intervals from late August to early October. Representatives from each cooperative agency as well as various volunteers are present at each survey.

Beulah Reservoir will also be sampled for trend populations in the fall. Oregon Department of Fish and Wildlife has been sampling the reservoir prior to the start of the project. We will continue to conduct these samples and analyze current and past data to determine a population trend within the reservoir.

Samples are collected with gill nets at established sites in the reservoir. Nets will be set late in the evening and checked early in the morning to minimize mortality of fish trapped in the nets. Scale samples will be taken from bull trout caught in the nets. These samples as well as all other scale samples will be sent to ODFW for age class analysis.

Onset Hobo stream temperature thermistors and Forward Looking Infrared (FLIR) Videography will be used to determine water quality (Objective 3). The Forest Service, Bureau of Land Management (BLM) and ODFW will monitor most of the stream temperature sites; the Tribe will be responsible to monitor the remaining temperature sites that are not covered.

FLIR flights will help determine areas of micro-refugia (Objective 8). Using infrared photography from the FLIR flights, the project will identify important cool water pockets that are likely used as holding pockets for bull trout through the mid-summer high water temperatures. This information will also be used in indicating where increases in water temperature are occurring and if those increases are associated with management induced conditions. Flights will begin at Beulah Reservoir and end at the headwaters of the North Fork Malheur (~40 miles). Field verification of these cool water sights and any bull trout use will be determined by snorkeling.

Summer crews will collect stream habitat data on tributaries of the North Fork River using ODFW protocol. This will help us determine overall habitat conditions on a reach level (Objective 6). A member from ODFW (Corvallis Research) has been conducting the quality control in the past years and has agreed to continue until our habitat objectives have been completed. Thirty to forty miles are targeted for survey in FY 2000. The use of historical and recent data from the North Fork Malheur Basin will be used to correlate with the habitat data.

A genetic analysis will be conducted on tissue samples gathered throughout the project (Objective 7). The samples will be sent to Washington State University for complete analyses. Genetic samples will be gathered from redband trout. Sixty samples will be taken from fish caught in the upper screw trap (~30 miles upstream from Beulah Reservoir); 60 from the fish caught in the trap nets in Beulah Reservoir and 60 will be taken by angling in various tributaries. These samples will be compared to hatchery stocked rainbow trout that have been annually stocked for the last 3 decades in Beulah

Reservoir. This objective will give managers an idea of the intensity of hybridization within the reservoir. Taking samples through out the entire river will identify the possible distribution hybridized trout.

The Tribe will document the progress and findings of the research in technical, quarterly, and annual reports. All reports and associated data will be compiled for a final report on the life history of bull trout and redband trout in the North Fork Malheur River. Through our cost share agreement partners, the data we produce will be used to define better management strategies to enhance the population and survivability of bull trout within their respective jurisdictions. A complete report will be submitted to the Bonneville Power Administration, US Forest Service, Bureau of Reclamation and the Bureau of Land Management for implementation towards their land management practices. This information will also be used to set management strategies of future Tribal properties. The Burns Paiute Tribe is currently proposing to acquire a significant piece of property that holds two headwater stream of the Middle Fork Malheur River and a lower section of the mainstem Malheur River ~ 19 mile below the North Fork River Confluence.

**g. Facilities and equipment**

The main facilities used in this study are the Natural Resources Department on the Burns Paiute Reservation. Other facilities and equipment available are from the Oregon Department of Fish and Wildlife district office, the US Forest Service and the Bureau of Land Management, all located in Hines, Oregon.

With this contract we will purchase a vehicle that will be dedicated to the study. Other equipment used on this project is shared between participating agencies on a as needed basis.

One piece of equipment we will be using from Nez Perce Tribe is and 8' rotary screw trap. The use will only be for a period of 3 months. The trap will be returned at the end of use. Future use may be required for the Stinkingwater project.

**h. Budget**

***Personnel***

1 Program Coordinator (Journey Level Biologist) GS 11 Wage Scale  
\$19.23 hr X 2080 hrs/yr. = **\$40,000**

1 Seasonal Fisheries Technician GS 5 Wage Scale  
\$10.00 hr X 1080 hrs/yr. = **\$10,800**

***Fringe Benefit***

25 % of Salary

***Supplies and Material***

1 Trap net - **\$2000**

This purchase will supplement the expiration of an old trap that is "falling apart" and no longer functional.

1 PIT Tag Reader - **\$585**

This purchase is needed to record PIT tagged fish we sample

ATS Receiver w/ antennae - **\$2626**

This purchase would satisfy the lack of receiver equipment needed to effectively track the migration of fish throughout the entire basin.

### ***Travel***

This dollar amount was calculated for the average driving distances to and from work sites during the field season. Field crews will not always visit the same every day as our survey sites vary on a monthly basis. Although this is a conservative estimate, we feel we can eliminate any excess travel with proper scheduling.

Average miles travel/day = 130 miles x 4 days/ week X 7 months @ \$.32/ mile = **\$4,659**

### ***Indirect Costs***

Our Tribal Government sets this percentage 26%

### ***Subcontracts***

- 1) Oregon Department of Fish and Wildlife will analyze our stream survey data. The costs are set by the department @ \$160/mile. In the year 2009 we predict on completing ~ 40 miles of habitat survey. Total cost are \$6,400
- 2) University of Washington is currently the agency we will use to evaluate our redband genetic samples. We predict on gathering 180 samples within the North Fork drainage in the year 2000. Total cost for this service are estimated at @ \$65/ sample with report. Cost = **\$11,700**

## **Section 9. Key personnel**

Daniel Gonzalez, Project Leader – Fish and Wildlife Biologist

Education: BS, Fisheries Science. Oregon State University, 1996  
BS, Wildlife Science. Oregon State University, 1995

Lawrence Schwabe, Assistant Project Leader, Fisheries Biologist  
Education: BS, Fisheries Science. Oregon State University, 1995

## **Section 10. Information/technology transfer**

The Tribe will document the findings of the research in technical, quarterly and annual reports. All reports and associated data will be compiled for a final report on the life history of bull trout and redband trout in the North Fork Malheur River. Through our cost share agreement partners, the data we produce will be used to define better management strategies to enhance the population and survivability of bull trout and redband trout in the Malheur Basin. A complete report will be submitted to the Bonneville Power Administration, US Forest Service, Bureau of Reclamation and the Bureau of Land Management for implementation towards their land management practices. This information will also be used to set management strategies of future Tribal properties. The Burns Paiute Tribe is currently proposing to acquire a significant piece of property that holds two headwater streams of the Middle Fork Malheur River and a lower section of the mainstem Malheur River about 19 miles below the North Fork River confluence.

Once this research is complete, we will consult with our participating state and federal agencies on the development of a basin wide management program that we can implement towards restoration activities.

Our information can also be used by other agencies that are currently conducting bull trout life history research. The data transfer can be beneficial in comparing life history characteristics as they exist between basins of the Snake and Columbia River.

**Congratulations!**