

**Bonneville Power Administration  
Fish and Wildlife Program FY99 Proposal**

**Section 1. General administrative information**

**Bull Trout Assessment - Willamette/Mckenzie**

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**Bonneville project number, if an ongoing project**    9405300

**Business name of agency, institution or organization requesting funding**  
Oregon Department of Fish and Wildlife

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**Business acronym (if appropriate)**    ODFW

**Proposal contact person or principal investigator:**

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**Subcontractors.**

<b>Organization</b>	<b>Mailing Address</b>	<b>City, ST Zip</b>	<b>Contact Name</b>

**NPPC Program Measure Number(s) which this project addresses.**

10.5A.1

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

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**Other planning document references.**

McKenzie Subbasin Fish Management Plan, Resident Trout Section. Adopted by the Oregon Fish and Wildlife Commission, April 1997 (ODFW 1997a)  
McKenzie Watershed Council Water Quality and Fish and Wildlife Action Plan, Adopted by consensus by the McKenzie Watershed Council, Jan. 11, 1996

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**Subbasin.**

Upper Willamette (McKenzie River, Middle Fork Willamette River)

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**Short description.**

Monitor distribution, population trends, and habitat use of bull trout populations in the Upper Willamette Basin. Implement rehabilitation of the bull trout population in Middle Fork Willamette.

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**Section 2. Key words**

Mark	Programmatic Categories	Mark	Activities	Mark	Project Types
+	Anadromous fish		Construction	+	Watershed
X	Resident fish		O & M	+	Biodiversity/genetics
	Wildlife		Production	+	Population dynamics
	Oceans/estuaries	+	Research	X	Ecosystems
	Climate	X	Monitoring/eval.		Flow/survival
	Other		Resource mgmt		Fish disease
			Planning/admin.		Supplementation
			Enforcement		Wildlife habitat en-
			Acquisitions		hancement/restoration

**Other keywords.**

Life history, population rehabilitation

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**Section 3. Relationships to other Bonneville projects**

Project #	Project title/description	Nature of relationship
9206800	Willamette Basin Aquisition	Targets acquisition of critical fish habitat in the Upper Willamette Basin.
9405400	Bull Trout Genetics, Habitat needs, L. H. etc. in Central and N.E, Oregon	Both are Columbia River Basin bull trout studies. This project targets Willamette Subbasin populations whereas 9405400 targets subbasins in Eastern Oregon.
8810808	STREAMNET	We provide information and maps for website and database.

## Section 4. Objectives, tasks and schedules

### *Objectives and tasks*

<b>Obj 1,2,3</b>	<b>Objective</b>	<b>Task a,b,c</b>	<b>Task</b>
1	Objective 1. Determine distribution of bull trout in the Middle Fork Willamette and McKenzie river basins.	a	Task 1.1. Locate bull trout by snorkeling, electrofishing and spawning surveys in areas identified as suitable and by angler reports.
		b	Task 1.2. Locate rearing and spawning areas of bull trout in the mainstem and South Fork McKenzie rivers.
2	Objective 2. Determine population size of bull trout in the McKenzie and Middle Fork Willamette basins.	a	Task 2.1. Estimate the number of bull trout in the Middle Fork subbasin using snorkel observations and spawning surveys. Snorkeling will be conducted at night to enhance the effectiveness of the survey.
		b	Task 2.2. Estimate the number of juvenile bull trout migrating from Anderson Creek.
		c	Task 2.3. Estimate the number of bull trout residing in Anderson Creek by calibrated night snorkel counts.
		d	Task 2.4. Conduct Anderson Creek, Olallie Creek and mainstem McKenzie spawning ground counts.
		e	Task 2.5 Refine bull trout abundance index using snorkeling gear to count adult bull trout in pools of the mainstem McKenzie and South Fork McKenzie rivers.
		f	Task 2.6 Utilize estimates of the number of spawning bull trout collected in Objective 3 to obtain trend information on bull trout populations.
3	Objective 3. Determine the location of spawning areas for	a	Task 3.1. Conduct extensive spawning surveys in the mainstem

	bull trout in the McKenzie and Middle Fork Willamette basins.		Middle Fork and tributaries.
		b	Task 3.2. Conduct extensive spawning surveys in the McKenzie River and tributaries above Trail Bridge Dam; tributaries of the mainstem below Trail Bridge Dam.
		c	Task 3.3 Utilize information gained in Objective 1 to obtain undiscovered spawning locations.
4	Objective 4. Determine life history characteristics of bull trout in the Middle Fork and McKenzie river basins.	a	Task 4.1. Summarize information collected in Objectives 1,2 and 3 to identify habitat characteristics of adult and juvenile rearing areas and spawning locations.
		b	Task 4.2. Identify available habitat in the McKenzie and Middle Fork Willamette sub-basins.
5	Objective 5. Implement the 1997 rehabilitation Plan for the bull trout population in the Middle Fork Willamette River.	a	Task 5.1. Transfer young of the year bull trout from Anderson Creek to the Middle Fork Willamette River during February, March and April 1998 through 2002.
		b	Task 5.2. Conduct snorkel surveys to monitor survival, distribution and growth.
6		c	Task 5.3 Identify habitat characteristics of juvenile rearing areas.
6	Objective 6. Determine the effectiveness of restrictive angling regulations for maintaining bull trout populations in the Willamette Basin.	a	Task 6.1. Estimate catch of bull trout by anglers in Cougar and Trail Bridge reservoirs and determine potential mortality.
7	Objective 7. Provide information acquired about bull trout to landowners and land management agencies within the McKenzie and Middle Fork Willamette basins and to other regional entities.	a	Task 7.1. Compile and analyze data collected in this study and relate to habitat surveys completed by WNF and ODFW.
		b	Task 7.2. Complete and distribute

			a report of findings. Additional informational and technical presentations will be conducted as requested.
		c	Task 7.3. Coordinate and participate in bi-annual meetings of the Upper Willamette Bull Trout Working Group to coordinate field activities and exchange information.

**Objective schedules and costs**

Objective #	Start Date mm/yyyy	End Date mm/yyyy	Cost %
1	04/1996	06/2000	5.00%
2	06/1996	11/2002	15.00%
3	02/1994	08/2002	10.00%
4	03/1998	11/2002	30.00%
5	06/1994	11/2002	15.00%
6	06/1994	08/2002	5.00%
7	08/1994	10/2002	10.00%
8	10/1994	11/2002	10.00%
			TOTAL 100.00%

**Schedule constraints.**

No constraints are foreseen.

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**Completion date.**

2002

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**Section 5. Budget**

***FY99 budget by line item***

Item	Note	FY99
Personnel	Experimental Biology Aide 1, 15 FTE months	\$32,940
Fringe benefits		
Supplies, materials, non-expendable property	Gloves, wading boots, waders, flashlights and batteries, dry suit repair and office supplies	\$1,130
Operations & maintenance		
Capital acquisitions or		

improvements (e.g. land, buildings, major equip.)		
PIT tags	# of tags:	
Travel	Mileage, vehicle rental and per diem	\$3,365
Indirect costs	Overhead	\$8,573
Subcontracts		
Other		
<b>TOTAL</b>		\$46,008

***Outyear costs***

<b>Outyear costs</b>	<b>FY2000</b>	<b>FY01</b>	<b>FY02</b>	<b>FY03</b>
Total budget	\$47,390	\$48,810	\$50,275	\$0
O&M as % of total	0.00%	0.00%	0.00%	0.00%

**Section 6. Abstract**

**Abstract**

The goal of this project is to attain population health and long term sustainability of bull trout and their habitat in the Upper Willamette Basin by the acquisition of quantifiable population information and the rehabilitation of depressed bull trout stocks. This project is being conducted under Section 9.3G (1) of the Northwest Power Planning Council's Resident Fish and Wildlife amendments. The project will describe the range of bull trout in the Upper Willamette Drainage Basin system by snorkeling or electrofishing surveys on tributaries. We will monitor the population size using downstream migrant traps and snorkel counts, conduct spawning surveys and estimate the number of spawning bull trout, monitor the movements of radio-tagged bull trout to determine habitat use and locate spawning areas, and evaluate the effectiveness of habitat improvement projects for bull trout within the basin. A small percentage of bull trout captured in the downstream migrant trap will be transferred to unoccupied habitat in the Middle Fork Willamette River and monitored for survival and growth. This project will provide timely information about bull trout populations to resource managers in the McKenzie and Middle Fork Willamette watersheds. Information concerning distribution, population trends, and habitat use of bull trout populations will aid in rebuilding depressed populations and in mitigation of hydroelectric/flood control projects. This project proposes to continue through FY 2002, and, with associated habitat improvement projects and management decisions, bull trout populations are expected to slowly increase over the project period. The results of this project are monitored and evaluated annually by the Upper Willamette Bull Trout Working Group; whose members include all agencies with management responsibility for bull trout in the Willamette Basin.

## **Section 7. Project description**

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

#### **Background**

Bull trout (*Salvelinus confluentus*) are large char weighing up to 18 kg and growing to over one meter in length (Goetz 1989). Bull trout are now thought of as valuable indicators of ecosystem status and health because they require cold, spring-fed water, relatively undisturbed habitat (usually associated with old growth forests), and unrestricted interbasin migrations (Rieman and McIntyre 1993, Ratliff and Howell 1992). This project is being conducted under Section 9.3G (1) of the Northwest Power Planning Council's Resident Fish and Wildlife amendments which states the need to "fund bull trout population and habitat surveys in the Middle Fork Willamette and McKenzie River systems and habitat improvements identified in the surveys to benefit bull trout." This project is consistent with the ODFW McKenzie Subbasin Fish Management Plan (ODFW 1997c), ODFW Wild Fish Management Policy (Kostow 1995) and the McKenzie Watershed Council Water Quality and Fish and Wildlife Action Plan, adopted by consensus by the McKenzie Watershed Council, January 11, 1996.

#### **Status**

On June 11, 1997, U.S. Fish and Wildlife Service (USFWS) proposed to list the Columbia River bull trout population segment (including the McKenzie populations) as Threatened. A public comment period ended August 12, 1997, and currently USFWS is determining how to proceed. It is possible that the Upper Willamette populations will be listed as Threatened in 1998. Information collected in this study regarding the status of McKenzie and Middle Fork Willamette basin bull trout was supplied to USFWS by ODFW (Buchanan et al. 1997).

#### **History of project area and bull trout populations**

In Oregon, bull trout were once found in the Clackamas, Santiam, McKenzie, and Middle Fork Willamette subbasins (Goetz 1989). However, bull trout have declined throughout their range because of overharvest, past land management practices, and removal of fish by chemical application in some areas. Because of their piscivorous nature, bull trout were blamed for declines in populations of more "desirable" species such as Pacific salmon (*Oncorhynchus* spp.), rainbow trout (*O. mykiss*), and cutthroat trout (*O. clarki*). Bull trout have now been extirpated from all areas west of the Cascades except the McKenzie subbasin and possibly the Middle Fork Willamette subbasin. The McKenzie subbasin contains the only verifiable populations of bull trout in Western Oregon (ODFW 1997c).

McKenzie Subbasin Project Area: Historically, bull trout in the McKenzie River subbasin may have been a contiguous population from the Willamette River to Tamolitch Falls or two populations with some overlapping distributions (Leary et al. 1993). If two populations did exist, one spawned in the upper reaches of the South Fork McKenzie and one in the upper reaches of the mainstem McKenzie. Construction of Cougar Dam cut off the South Fork population from the mainstem in 1963, and at nearly the same time, Trail Bridge Dam divided the mainstem McKenzie population. The McKenzie and Willamette populations likely existed as parts of a metapopulation, in which the two populations mixed, at least occasionally, in the Willamette River.

The current McKenzie populations are as follows: 1) the mainstem McKenzie and tributaries up to Trail Bridge Dam, including the South Fork McKenzie below Cougar Dam, 2) the South Fork McKenzie and tributaries from Cougar Dam upstream, and 3) the upper McKenzie River and tributaries from Trail Bridge Dam to Tamolitch Falls, including Sweetwater Creek.

The McKenzie River subbasin portion of the project area includes all the tributaries and channels of the McKenzie River up to Tamolitch Falls, including the South Fork McKenzie River and tributaries.

Middle Fork Willamette Subbasin Project Area: Historically, bull trout were reported in the Middle Fork Willamette subbasin, including the Middle Fork and North Fork of the Middle Fork Willamette rivers as well as Salt, Swift, and Staley creeks (Goetz 1989). Fish from the McKenzie population may have ranged occasionally into the mainstem Willamette and spawned with bull trout from the Middle Fork Willamette River (MFW). However, relatively warm water temperatures in the mainstem Willamette and the bull trout's strong homing instinct may have precluded common genetic exchange between the populations (Buchanan and Gregory 1997, Houslet and Riehle 1997).

In addition to overharvest in the MFW, several specific factors can be identified in the decline of bull trout. Extensive timber management and road building practices damaged bull trout spawning and rearing habitat and precluded access to suitable habitat. Construction of Dexter, Lookout Point, and Hills Creek dams modified stream temperatures and restricted migrations to and from spawning grounds. Loss of salmon above the dams eliminated one of the bull trout's largest food sources. Rotenone poisoning to remove undesirable fish above Hills Creek Dam in 1960 killed bull trout in MFW tributaries. Table 1 shows the last reliable observations of bull trout in the MFW subbasin.

Table 1. Bull trout observations in the Middle Fork Willamette subbasin.

WATERBODY	LAST YEAR OBSERVED
MFW below Hills Creek Reservoir	1953
MFW above Hills Creek Reservoir	1990
North Fork of MFW	1962

Potential bull trout habitat remains in spring-fed portions of the MFW and tributaries above Hills Creek Reservoir (Rigdon Ranger District 1996). However, despite occasional angler reports, repeated electrofishing and snorkel surveys of the MFW and tributaries have not detected bull trout presence. Therefore, the Upper Willamette Bull Trout Working Group believes that Middle Fork Willamette bull trout will not continue to persist in the subbasin without rehabilitation efforts.

This project was initiated in 1994 and four field seasons of collecting data have been completed. Previous work in the upper Willamette Subbasin has been reported in annual reports by ODFW (1994, 1995, 1996, 1997a, 1997b). See Section 7d, Project history, for details of findings.

This project has generated major commitments of time and funding from the U.S. Forest Service, Eugene Water and Electric Board, ODFW, local and national angling groups, and others. Monitoring information is being used by the McKenzie Watershed Council, U.S. Forest Service, ODFW and the USFWS in land management and regulatory decisions.

Knowledge gained from this project will aid ODFW and land management agencies in mitigating the impacts of hydroelectric development and land management practices on bull trout in the Upper Willamette Basin. This knowledge will be useful for planning and lessening the impacts of major projects including the U.S. Army Corps of Engineers proposal to retrofit a temperature control tower to the penstock at Cougar Reservoir.

**b. Proposal objectives.**

**Project objectives**

**Goal: Attain population health and long term sustainability of bull trout and their habitat in the Upper Willamette Basin by the acquisition of quantifiable population information and the rehabilitation of depressed bull trout stocks.**

**Objective 1. Determine distribution of bull trout in the Middle Fork Willamette and McKenzie river basins.**

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 may be undertaken. Bull trout distribution within a basin may vary widely depending on life history, life stage and season. The overall null hypothesis to be tested is “ $H_0$ : There is no significant difference between observed bull trout distribution and a random distribution”.

Distribution maps from this objective have been made available to management biologists and posted on the Streamnet world wide web site (Buchanan et al., 1997).

**Objective 2. Determine population size of bull trout in the McKenzie and Middle Fork Willamette basins.**

The number of bull trout in the McKenzie and Middle Fork Willamette basins is not known. Information collected in this study should allow us to enumerate populations, determine trends and relate population size to genetic significance. Hypotheses to be tested are:

“H<sub>0</sub>: There is no significant difference between years in observed bull trout populations of the McKenzie Basin”.

“H<sub>0</sub>: Bull trout are no longer present in the Middle Fork Willamette River”.

**Objective 3. Determine the location of spawning areas for bull trout in the McKenzie and Middle Fork Willamette basins.**

Little information is available on bull trout abundance and population trends (Rieman and McIntye, 1993). Bull trout are a rare and cryptic species so enumerating them is very difficult. Spawning surveys have been used with a number of salmonid species to monitor populations. This objective examines variability associated with using spawning surveys, provides baseline data for designing surveys and evaluates their effectiveness as a monitoring tool. Without effective monitoring of populations it is not possible to protect and restore Oregon bull trout populations. Hypothesis to be tested include:

“H<sub>0</sub>: There is no significant difference between years in the distribution of redds within a stream”.

“H<sub>0</sub>: There is no significant differences between redd counts by different surveyors”.

“H<sub>0</sub>: There is no significant difference between years in spawning timing”.

“H<sub>0</sub>: There is no significant difference in the variation of distribution of redds within a stream”.

**Objective 4. Determine life history characteristics of bull trout in the Middle Fork and McKenzie river basins.**

This objective involves the gathering of basic life history data to allow tracking and management of migratory bull trout populations. One of the major components of this goal examines the role of non-migrant fish in otherwise migrant bull trout populations. Knowledge of life history characteristics, such as spawning and migration behavior, is the basis of scientific fisheries management. The null hypothesis associated with this objective is: “H<sub>0</sub>: Bull trout populations are limited by habitat quantity and quality in the Upper Willamette Basin”.

**Objective 5. Implement the 1997 rehabilitation Plan for the bull trout population in the Middle Fork Willamette River.**

This study has provided the framework for the rehabilitation of the bull trout population on the Middle Fork Willamette River. This is a very important advance in bull trout management in the Willamette Basin because random re-establishment of natural populations has been eliminated by hydroelectric and flood control projects. With review from the Upper Willamette Bull Trout Working Group, we have completed a risk assessment, rehabilitation plan and monitoring program. Implementation of the this

effort will require the funding included in this proposal. The results of the rehabilitation program will have region-wide implications. The null hypothesis associated with this objective is: “H<sub>0</sub>: A population of bull trout can not be re-established by transfers of young of the year fish”.

**Objective 6. Determine the effectiveness of restrictive angling regulations for maintaining bull trout populations in the Willamette Basin.**

Recent restrictive angling regulations prohibit harvest of bull trout in all of Oregon except for limited populations in the Deschutes Basin (Buchanan et al, 1997). In the McKenzie and Middle Fork Willamette basins, angling regulations require the release of non-finchipped fish in most bull trout waters. The null hypothesis associated with this objective is: “H<sub>0</sub>: Bull trout populations are not protected from mortality by angling regulations”.

**Objective 7. Provide information acquired about bull trout to landowners and land management agencies within the McKenzie and Middle Fork Willamette basins and to other regional entities.**

This project will provide timely information about bull trout populations to resource managers in the McKenzie and Middle Fork Willamette watersheds. Information concerning distribution, population trends, and habitat use of bull trout populations will aid in rebuilding depressed populations and in mitigation of hydroelectric/flood control projects. Quarterly and annual reports have been and will be written and distributed to members of the Upper Willamette Bull Trout Working Group and other interested parties.

**c. Rationale and significance to Regional Programs.**

This study will further the goals of FWP by providing scientific information that will help protect and restore weak stocks of native bull trout. These stocks have been threatened or changed by migration barriers which limit spawning and rearing habitats and which may limit the prey base along with other important limiting factors such as genetic and random risks, over harvest, non-native species introductions and habitat loss. Like salmon and steelhead, bull trout have been impacted by hydroelectric development in the Willamette Subbasin Hydroelectric dams have isolated small bull trout populations and prevented genetic exchange. Work conducted in this project in cooperation with *Bull trout life history, genetics, habitat needs, and limiting factors in central and northeast Oregon* (Bellerud et al. 1997) has increased the potential for bull trout recovery in Oregon. The work of Spruell and Allendorf (1997) suggest that maintaining the genetic diversity of bull trout requires the continued existence of many populations throughout the Columbia Basin. Recent restrictive angling regulations prohibit harvest of bull trout in all of Oregon except for limited populations in the Deschutes Basin (Buchanan et al, 1997). Fishery managers need this increased understanding of movement patterns, habitat needs, genetic characteristics, and the effects of exotic fish to protect and restore Oregon's bull trout.

The information collected in this study is key to the implementation of the McKenzie Subbasin Fish Management Plan, Resident Trout Section, (ODFW 1997c), the McKenzie Watershed Council Water Quality and Fish and Wildlife Action Plan (McKenzie Watershed Council 1996) and the Wild Fish Management Policy of ODFW (Kostow, K. 1995). The McKenzie Watershed Council (MWC) is submitting project proposals for funding watershed habitat assessment, prioritization and acquisition. Bull trout information collected in this project will aid MWC in acquisition decisions. In addition, this study has interacted with a large number of habitat improvement projects in the upper Willamette Basin in cooperation with the USFS, Oregon Department of Transportation (ODOT), Eugene Water and Electric Board (EWEB), BLM, Weyerhaeuser Co., Guistina Land and Timber, Oregon Council Federation of Fly Fishers and Trout Unlimited (See Section 8). These projects would likely have been less successful without the information provided by this study.

This study has also provided the framework for the rehabilitation of the bull trout population on the Middle Fork Willamette River. BPA, ODFW, USFS and others in the Upper Willamette Bull Trout Working Group, have invested a major commitment of time and money to collect information needed to implement this rehabilitation program. This project will guide implementation through the year 2002, when the success of the project will be ascertained and applicability to other systems can be evaluated. This is a very important advance in bull trout management in the Willamette Basin because random re-establishment of natural populations has been eliminated by hydroelectric and flood control projects. With review from the Upper Willamette Bull Trout Working Group, we have completed a risk assessment, rehabilitation plan and monitoring program. Implementation of this effort will require the funding included in this proposal. The results of the rehabilitation program will have region-wide implications.

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#### **d. Project history**

##### **Project History for Bull Trout Assessment – Willamette/McKenzie Project #9405300**

This project initiated in 1994 and we have completed four field seasons of data collection and analysis. Project costs have been: FY97 \$41,611, FY96 \$58,151, FY95 \$58,949, FY94 \$37,579. Our FY98 Budget is \$61,964. Reporting documents submitted include quarterly reports and annual reports for FY94, FY95, FY96, and FY 97 (ODFW 1994, 1995, 1996, 1997a and 1997b).

Major findings reported to date include:

- Bull trout have not been located in the Middle Fork Willamette River basin.
- Over 100 miles of stream have been surveyed for presence of bull trout. Young of the year bull trout have only been found in known spawning tributaries. Juvenile bull trout, ages 3+ and older have been found in tributaries without known spawning locations. It appears these sub-adults may be nomadic foragers.

- Redd surveys conducted on Anderson and Olallie creeks and the mainstem McKenzie show an increasing trend in adult bull trout abundance.
- Redd surveys conducted on Roaring River, and South Fork McKenzie indicate few bull trout are surviving to spawn.
- Pools surveyed in the index area of McKenzie River show peak counts in late July and August. We have not observed a positive correlation between index pool counts of bull trout and spawning ground counts
- Pools surveyed in the index area of South Fork McKenzie River show peak counts in June decreasing through the summer. Evidence of illegal angler harvest has been found.
- With a downstream migrant trap, we monitored of timing and numbers of juveniles moving downstream in Anderson Creek. Data indicates good spawning success; however, habitat for young of the year bull trout may be limited. The 1996 flood appears to have had a negative effect on emergent bull trout.
- Monitoring of radio transmitters implanted in bull trout has allowed us to describe seasonal movements and habitat use in mainstem McKenzie, South Fork McKenzie, and Cougar Reservoir. We have found the range of bull trout on the McKenzie River extends at least 15 miles further downstream than previously known.
- Information collected on this project has allowed ODFW to complete a risk assessment, rehabilitation plan and monitoring program for bull trout in the Middle Fork Willamette River. The implementation phase of the rehabilitation program is included in this proposal. This effort would not have been accomplished without Columbia River Basin Fish and Wildlife Program.
- The project has generated major commitments of time and funding from the U.S. Forest Service, Eugene Water and Electric Board, local and national angling organizations, and others.
- Monitoring information is being used by the USFWS, McKenzie Watershed Council, U.S. Forest Service, and Oregon Department of Fish and Wildlife in land management and regulatory decisions.

**e. Methods.**

### **Methods**

The methods used in the following tasks are detailed in annual project reports (ODFW 1994, 1995, 1996, 1997a, 1997b).

#### **Objective 1**

Task 1.1. Locate bull trout by snorkeling, electrofishing and spawning surveys in areas identified as suitable and by angler reports.

Activity 1.1.1. Determine suitable habitat from habitat surveys conducted by USFS and ODFW during 1990 to 1997.

Activity 1.1.2. Maintain informational posters about bull trout in the Middle Fork Willamette and McKenzie basins. These posters provide anglers with key

bull trout identification characteristics and places to report sitings of bull trout.

Activity 1.1.3. Conduct snorkel and electrofishing surveys during July through September. Surveyors will record data on stream morphology, key habitat components, species composition and location (location will be determined by topographic maps and GPS).

Activity 1.1.4. Conduct spawning area surveys during September and October.  
Known

Activity 1.1.5. Enter data into GIS compatible database.

Task 1.2. Locate rearing and spawning areas of bull trout in the mainstem and South Fork McKenzie rivers.

Activity 1.2.1. Surgically implant radios in up to 10 bull trout.

Activity 1.2.2. Identify spawning and rearing areas by tracking radio tagged fish.

Activity 1.2.3. Identify habitat characteristics of spawning and rearing areas.

## **Objective 2**

Task 2.1. Estimate the number of bull trout in the Middle Fork subbasin using snorkel observations and spawning surveys. Snorkeling will be conducted at night to enhance the effectiveness of the survey.

Task 2.2. Estimate the number of juvenile bull trout migrating from Anderson Creek.

Activity 2.2.1: Operate a rotary screw fish trap in Anderson Creek.

Activity 2.2.2: Determine timing of migration of juvenile bull trout from Anderson Creek.

Activity 2.2.3: Determine the sampling efficiency of the downstream migrant trap.

Activity 2.2.4: Expand daily catches to account for days not fished and trapping efficiency.

Task 2.3. Estimate the number of bull trout residing in Anderson Creek by calibrated night snorkel counts.

Task 2.4. Conduct Anderson Creek, Olallie Creek and mainstem McKenzie spawning ground counts.

Task 2.5. Refine bull trout abundance index using snorkeling gear to count adult bull trout in pools of the mainstem McKenzie and South Fork McKenzie rivers.

Task 2.6. Utilize estimates of the number of spawning bull trout collected in Task 2.3 to obtain trend information on bull trout populations.

## **Objective 3**

Task 3.1. Conduct extensive spawning surveys in the mainstem Middle Fork and tributaries including but not limited to Baboon, Bear, Beaver, Chako, Chuckle Springs, Coulee, Echo, Found, Hyak, Indigo, Menehaha, Noisy, Simpson, Staley, Swift, and Tumblebug creeks.

Task 3.2. Conduct extensive exploratory spawning surveys in the McKenzie River and tributaries above Trail Bridge Dam; tributaries of the mainstem below Trail Bridge Dam including but not limited to Horse, Separation, Deer, Anderson, and Lost creek basins; and in the South Fork McKenzie River and tributaries.

Tributaries above Trail Bridge Dam include the mainstem, Smith River , Kink and Sweetwater creeks.

Task 3.3. Utilize information gained in Objective 1 to obtain undiscovered spawning locations.

#### **Objective 4**

Task 4.1. Summarize information collected in Objectives 1,2 and 3 to identify habitat characteristics of adult and juvenile rearing areas and spawning locations.

Task 4.2. Identify available habitat in the McKenzie and Middle Fork Willamette subbasins.

#### **Objective 5**

Task 5.1. Transfer young of the year bull trout from Anderson Creek to the Middle Fork Willamette River during February, March and April 1998 through 2002.

Task 5.2. Conduct spring, summer and fall snorkel surveys to monitor survival, distribution and growth.

Task 5.3 Identify habitat characteristics of juvenile rearing areas.

#### **Objective 6**

Task 6.1. Estimate catch of bull trout by anglers in Cougar and Trail Bridge reservoirs and determine potential mortality.

Activity 6.1.1. Conduct angler interviews and pressure counts.

Activity 6.1.2. Estimate the number of fish caught.

Activity 6.1.3. Estimate potential for angler-induced mortality using mortality information in the literature.

#### **Objective 7**

Task 7.1. Compile and analyze data collected in this study and relate to habitat surveys completed by USFS and ODFW.

Task 7.2. Complete and distribute a report of findings. Additional informational and technical presentations will be conducted as requested.

Task 7.3. Coordinate and participate in bi-annual meetings of the Upper Willamette Bull Trout Working Group to coordinate field activities and exchange information.

#### **f. Facilities and equipment.**

##### **Facilities and equipment**

Personnel will be based at the Springfield District Office of the Oregon Department of Fish and Wildlife. They will have access to state owned radio tracking equipment, boats, dry suits, protective clothing, and desk space with computers. In addition, the USFS has purchased a rotary screw downstream migrant trap for this project and FY98 funds from BPA were used to purchase a transportation tank and trailer for juvenile bull trout. Additional equipment needed will include vehicle rental and assorted minor supplies

(gloves, wading boots, waders, flashlights and batteries, dry suit repair and office supplies).

**g. References.**

**References**

Bellerud, B.L., S. Gunkel, A.R. Hemmingsen, D.V. Buchanan and P.J. Howell. 1997. Bull trout life history, genetics, habitat needs, and limiting factors in central and northeast Oregon. U.S. Department of Energy, Bonneville Power Administration, Portland, Oregon.

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Buchanan, D.V., M.L. Hanson and R.M. Hooton. 1997. Status of Oregon's bull trout. Oregon Department of Fish and Wildlife. Portland, Oregon.

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## Section 8. Relationships to other projects

### Relationships to other projects

The information collected in this study is key to the implementation of the McKenzie Subbasin Fish Management Plan, Resident Trout Section, (ODFW 1997c), the McKenzie Watershed Council Water Quality and Fish and Wildlife Action Plan (McKenzie Watershed Council 1996) and the Wild Fish Management Policy of ODFW (Kostow, K. 1995). In addition, this study has interacted with a large number of other projects in the upper Willamette Basin:

Project title/funding entity	Relationships
Sweetwater Creek culvert replacement/USFS, Oregon Department of Transportation (ODOT), Eugene Water and Electric Board (EWEB)	Cooperators
Olallie Creek culvert replacement/USFS, ODOT, EWEB, Oregon Council Federation of Fly Fishers	Cooperators
Sweetwater Creek bull trout transplant/USFS, EWEB	Cooperators
Deer Creek large woody debris placement/USFS, EWEB	Cooperators
Leaburg Lake large woody debris placement/EWEB	Cooperator
Horse Creek instream projects/USFS	Cooperator
Anderson Creek study reach/USFS	Cooperator
Buck Side Channel enhancement projects/USFS	Cooperator
Paradise Side Channel hazard tree replacement/USFS	Cooperator
South Fork McKenzie wood replacement project/USFS	Cooperator
Upper South Fork McKenzie aquatic restoration/USFS	Cooperator
Middle Fork Willamette aquatic restoration/USFS	Cooperator

Bring Back the Natives cooperative research and habitat program/Trout Unlimited, USFS, EWEB, BLM, Weyerhaeuser Co., Guistina Land and Timber

Cooperator

These projects would likely have been less successful without the information provided by this study.

This project has been a collaborative effort between ODFW and USFS Blue River, McKenzie and Rigdon ranger districts. We have all have provided major investments of time and resources. In addition, this study has had the cooperation and resources of the Oregon Department of Transportation (ODOT), Eugene Water and Electric Board (EWEB), BLM, Weyerhaeuser Co., Guistina Land and Timber, Oregon Council Federation of Fly Fishers and Trout Unlimited.

## **Section 9. Key personnel**

### **Key Personnel**

**Jeffrey S. Ziller**, Principle Investigator, 0.17 FTE, no charge to BPA.

Duties will include hiring, training and supervision of seasonal employees, supervision of and participation in field activities. Will also be responsible for the writing and timely distribution of reports as well as presentations to intra-agency and inter-agency meetings.

**Mark G. Wade**, Project Manager, 0.25 FTE, no charge to BPA

Duties will include training and supervision of seasonal employees, supervision of and participation in field activities. Will also participate in the writing and timely distribution of reports as well as presentations to intra-agency and inter-agency meetings.

### **Jeffrey S. Ziller**

#### Education:

B.S. Fisheries Science, 1976, Oregon State University.

Current employer: ODFW, Upper Willamette Fish District, Northwest Region, 1990-present.

Current responsibilities: District Fish Biologist responsible for state authorized fish management in the Upper Willamette Basin including the entire watersheds of the McKenzie, Middle Fork Willamette and Coast Fork Willamette rivers.

Previous employment:

Dates	Employer	Responsibilities
1983-1990	ODFW	Assistant District Biologist, Klamath Fish District, Central Region. Responsibilities included management of bull trout populations and Lost River and shortnose suckers in the Klamath River Basin.
1980-1983	ODFW	Assistant Project Leader, Deschutes River Life History Studies and Round Butte Hatchery Evaluation, ODFW Research Section
1978-1980	ODFW	Project Assistant, Deschutes River Life History Studies and Round Butte Hatchery Evaluation, ODFW Research Section
1976-1978	ODFW	Project Assistant, Willamette Summer Steelhead Project, Alsea River Winter Steelhead Project, Catchable Trout Evaluation, ODFW Research Section

Expertise: I have been responsible for bull trout population monitoring and/or management in the Deschutes, Klamath and Upper Willamette Basins for the past 20 years. I have extensive knowledge of bull trout life history characteristics in each of these basins. I also have extensive knowledge of sampling techniques for bull trout and have managed the current bull trout assessment project in the McKenzie and Middle Fork Willamette basins since it's inception in 1994.

Publications and job completions:

Ziller, J.S. 1992. Distribution and relative abundance of bull trout in the Sprague River Subbasin, Oregon. Pages 18-29 in P.J. Howell and D.V. Buchanan, editors. Proceedings of the Gearhart Mountain bull trout workshop. Oregon Chapter of the American Fisheries Society. Corvallis, Oregon.

Ziller J.S. 1991. Factors that limit survival and production of largemouth bass in Upper Klamath and Agency lakes, Oregon. Oregon Department of Fish and Wildlife, Information Report 91-6. Portland, Oregon.

Lindsay, R.B, J.S. Ziller and R.K. Schroeder. 1982. An ecological and fish cultural study of Deschutes River salmonids, Annual Progress Report F-88-R-13. Oregon Department of Fish and Wildlife. Portland, Oregon.

Wade, M.G. and J.S. Ziller. 1996. Stock Status Review, Upper Willamette Fish District. Oregon Department of Fish and Wildlife. Springfield, Oregon.

Wade, M.G. and J.S. Ziller. 1997. Stock Status Review, Upper Willamette Fish District. Oregon Department of Fish and Wildlife. Springfield, Oregon.

## Mark G. Wade

### Education:

B.S. Fisheries Science, 1977, Oregon State University

M.S. Fisheries, 1987, Oregon State University

Thesis - The relative effects of *Ceratomyxa shasta* on crosses of resistant and susceptible stocks of summer steelhead.

Current employer: ODFW, Upper Willamette District, Northwest Region, 1988-present.

Current responsibilities: Assistant District Fish Biologist responsible for state authorized fish management in the Upper Willamette Basin including the entire watersheds of the McKenzie, Middle Fork Willamette and Coast Fork Willamette rivers.

### Previous employment:

Dates	Employer	Responsibilities
1979-88	ODFW	Foster Steelhead Restoration Project, ODFW Research Section
1977-79	ODFW	Willamette Summer Steelhead Project, ODFW Research Section

Expertise: I have monitored bull trout populations in the Upper Willamette Basin for the past 10 years. I have extensive knowledge of bull trout life history characteristics in each of these basins. I also have extensive knowledge of sampling techniques for bull trout and have assisted in managing the current bull trout assessment project in the McKenzie and Middle Fork Willamette basins since it's inception in 1994.

### Publications and job completions:

Buchanan, D.V., M.G. Wade and D.L. Higley. 1993. Restoration of the native winter steelhead run on the South Santiam River above Foster Dam, Completion Report, Oregon Department of Fish and Wildlife, Portland, Oregon.

Wade, M.G. and J.S. Ziller. 1994. Stock Status Review, Upper Willamette Fish District. Oregon Department of Fish and Wildlife. Springfield, Oregon.

Wade, M.G. and J.S. Ziller. 1995. Stock Status Review, Upper Willamette Fish District. Oregon Department of Fish and Wildlife. Springfield, Oregon.

Wade, M.G. and J.S. Ziller. 1996. Stock Status Review, Upper Willamette Fish District. Oregon Department of Fish and Wildlife. Springfield, Oregon.

Wade, M.G. and J.S. Ziller. 1997. Stock Status Review, Upper Willamette Fish District. Oregon Department of Fish and Wildlife. Springfield, Oregon.

## Section 10. Information/technology transfer

### Information/technology transfer

Information acquired about bull trout will be compiled and analyzed including relationships to habitat surveys completed by USFS and ODFW. We will complete and distribute a report of findings to landowners and land management agencies within the McKenzie and Middle Fork Willamette basins and to other regional entities. Additional informational and technical presentations will be conducted as requested. In addition, we will coordinate and participate in bi-annual meetings of the Upper Willamette Bull Trout Working Group to coordinate field activities and exchange information. We maintain a poster of project accomplishments for presentation to gatherings of interested individuals.