

Upper Willamette Basin Bull Trout Action Plan 2010

Upper Willamette Bull Trout Working Group

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April 2010

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INTRODUCTION

Populations of bull trout *Salvelinus confluentus* have declined markedly over the last century as a consequence of habitat alteration, introduction of nonnative species, overharvest, and eradication efforts. Accordingly, the U. S. Fish and Wildlife Service listed bull trout as threatened in the coterminous United States under the Endangered Species Act in 1999 (63 FR 31647). In the Willamette River basin, bull trout were extirpated from the Clackamas, Santiam, and Middle Fork Willamette drainages by the late 1900s, while extant populations in the McKenzie drainage were assessed “Of Special Concern” to “High Risk” in the 1990s (Buchanan et al. 1997). To address this situation, resource management agencies have conducted research and monitoring of bull trout populations in the upper Willamette basin and have attempted to improve the status of the species through habitat modifications (e.g., large wood and gravel augmentation, modified dam operations), reintroduction of bull trout to formerly occupied sites, and reduction of incidental angling mortality and poaching.

The Upper Willamette Bull Trout Working Group (Working Group) formed in 1989 to coordinate efforts to improve the status of bull trout populations in the upper Willamette River basin (McKenzie River and Middle Fork Willamette drainages). Working Group participants include Eugene Water and Electric Board (EWEB), Oregon Department of Fish and Wildlife (ODFW), U.S. Army Corps of Engineers (USACE), U.S. Fish and Wildlife Service (USFWS), and the U.S. Forest Service (USFS). Numerous additional groups and individuals have also contributed to Working Group efforts in the past. The Working Group meets at least annually to assess progress and plan future activities, and the group produces an annual Action Plan that constitutes a guide to future research and management actions. This Action Plan includes activities conducted in the McKenzie River and Middle Fork Willamette drainages under various projects, plans, and agency directives, including the USFWS Draft Recovery Plan (USFWS 2005), USFWS Willamette Project Biological Opinion (USFWS 2008), USACE Cougar Dam Water Temperature Control and Trap and Haul projects (USFWS 2006), and Willamette National Forest Land and Resource Management Plan, as amended (USFS 1990). Additionally, some activities in the upper McKenzie River basin are associated with a proposed project (funding pending) to trap, mark, and monitor bull trout in anticipation of construction activities at Trail Bridge Reservoir planned to begin in 2012.

RELATIONSHIP OF THE ACTION PLAN TO THE BULL TROUT DRAFT RECOVERY PLAN

The USFWS Draft Recovery Plan provides fundamental guidance for research, monitoring, and management activities pertaining to bull trout. The portion of the 2002 Draft Recovery Plan for the Willamette Basin (Chapter 5) was revised in 2005 with input from the Working Group, and the Action Plan includes activities directed at achieving the goals, objectives, and needed actions specified in the Draft Recovery Plan. The goal of the Draft Recovery Plan (USFWS 2005) is to ensure the long-term persistence of self-sustaining, complex, interacting groups of bull trout distributed throughout the species’ native range so that the species can be delisted. To achieve this goal, the Draft Recovery Plan identifies the following objectives for the Willamette Recovery Unit:

- Maintain current distribution of bull trout and restore, where habitat is deemed sufficient, distribution to previously occupied areas within the Willamette River Recovery Unit.
- Maintain stable or increasing trends in abundance of bull trout.
- Restore and maintain suitable habitat conditions for all bull trout life history stages.
- Conserve genetic diversity and provide opportunity for genetic exchange.

Criteria identified in the Draft Recovery Plan for attaining these objectives include:

1. Distribution criteria will be met in the Upper Willamette River core area when bull trout are distributed among three or more local populations in the recovery unit: two in the Upper Willamette River core area and one in the Clackamas River core habitat. In a recovered condition, the Upper Willamette River core area would include local populations in the McKenzie and Middle Fork Willamette rivers. Meeting connectivity criteria (below) would lead to a reduction in the number of existing local populations in the McKenzie River from three to one because isolation due to impassable dams is the single reason these three groups of bull trout currently qualify as discrete local populations. Core habitat in the Clackamas River subbasin would also contain one or more local populations in a location that has yet to be identified. Feasibility analyses are needed to assess the potential for reintroducing bull trout to historic habitat in the Middle Fork Willamette River subbasin (Salt Creek, Salmon Creek, and the North Fork Middle Fork Willamette River) and into the Clackamas River core habitat. If a feasibility study in the Clackamas River subbasin concludes a bull trout reintroduction is not likely feasible, than distribution criteria for the establishment of a local population in the Clackamas River subbasin will be removed. The North and South Santiam rivers have been designated research need areas to assess their future ability to support reintroductions of bull trout.
2. Abundance criteria will be met when estimated abundance of adult bull trout is from 900 to 1,500 or more individuals in the Willamette River Recovery Unit. The recovered abundance range was derived from the professional judgment of the Willamette River Recovery Unit Team in estimating the productive capacity of identified local populations and potential habitat. These abundance goals may be refined as more information becomes available through monitoring and research.
3. Trend criteria will be met when adult bull trout exhibit stable or increasing trends in abundance in the recovery unit, based on a minimum of 15 years of monitoring data.
4. Connectivity criteria will be met when intact migratory corridors among all local and potential local populations provide opportunity for genetic exchange and diversity. In the Upper Willamette core area, meeting connectivity criteria will require the establishment of upstream and downstream fish passage facilities at Cougar, Trail Bridge, Dexter, Lookout Point, and Hills Creek dams. Depending on future analyses of habitat quality and quantity in the North and South Santiam subbasins, establishment of fish passage at impassable dams in these subbasins may be necessary.

The Draft Recovery Plan identifies numerous *Actions Needed* to make progress toward achieving these criteria. The Working Group strives to make activities listed in this Action Plan consistent with actions identified in the Draft Recovery Plan.

RELATIONSHIP OF THE ACTION PLAN TO THE USFWS BIOLOGICAL OPINION ON THE CONTINUED OPERATION AND MAINTENANCE OF THE WILLAMETTE PROJECT

In 2008, the National Marine Fisheries Service and USFWS issued final biological opinions on operation of USACE Willamette Project dams. The 7/11/08 USFWS BO directs the USACE to follow Reasonable and Prudent Measures necessary and appropriate to minimize impacts of incidental take of bull trout, including (referenced according to BO numbering):

- 1) Minimize incidental take of bull trout as a result of isolating bull trout populations and fragmenting bull trout habitat with Willamette Project dams.
- 2) Minimize incidental take of bull trout resulting from the lack of upstream and downstream fish passage at Willamette Project dams.
- 3) Minimize incidental take of bull trout resulting from implementation of the USACE's Resident Fish Mitigation Agreement with ODFW.
- 7) Minimize incidental take of bull trout and Oregon chub from construction projects implemented under the proposed action.

To be exempt from the prohibitions of Section 9 of the Endangered Species Act, the USACE must comply with the following non-discretionary Terms and Conditions which implement Reasonable and Prudent Measures pertaining to bull trout. To implement Reasonable and Prudent Measures 1, 2, 3, and 7, the USACE must:

- 1.a) Develop a genetics management plan by June 1, 2009. The genetics management plan shall be developed and implemented in cooperation with ODFW, USFS and the USFWS.
- 1.b) Develop, and implement annually, a comprehensive Research, Monitoring, & Evaluation plan for bull trout above and below USACE dams in the McKenzie and Middle Fork Willamette rivers.
- 1.c) Fund habitat suitability assessments (similar in scope to the habitat assessment portion of the 2007 *Clackamas River Bull Trout Reintroduction Feasibility Assessment*) in tributaries of the Middle Fork Willamette River below Hills Creek Dam.
- 2) Incorporate and fully consider bull trout in assessments and structural or operational modifications at Project reservoirs and dams. This includes non-discretionary fish passage related actions identified in the National Marine Fisheries Service RPA (see USFWS 2008).
- 3) Work cooperatively with ODFW and the USFWS to modify the Resident Fish Mitigation Agreement to reduce potential adverse affects from the stocking of hatchery rainbow trout in areas inhabited by bull trout; also investigate reallocating a portion of the USACE's Resident Fish Mitigation Program funds provided to raise non-native hatchery rainbow trout at Leaburg Hatchery in favor of bull trout conservation activities.

Many of the activities in the Action Plan are funded by USACE and specifically directed at satisfying these Terms and Conditions. The USFWS Willamette Project BO strongly influences the content of the Action Plan and is expected to do so for the 15-year duration of the BO.

RELATIONSHIP OF THE ACTION PLAN TO USACE ACTIVITIES AT COUGAR DAM

Modifications to Cougar Dam beginning in 2000 have included considerable effort to monitor distribution, abundance, and movements of bull trout in the South Fork McKenzie River. A water temperature control facility was completed in 2005, new turbine runners were installed in 2007 to lessen the rate of injury to fish, and operation of a new trap and haul facility will begin in 2010. Biological monitoring is necessary to assess the effects of the restored water temperature regime and survival of bull trout passing downstream through the dam, and evaluation of the combined effects of these three features on fish passage and population dynamics is required after the trap and haul system is operational (USACE 2006; USFWS 2006). The goal and objectives of monitoring and evaluation pertaining to bull trout are (USACE 2006):

Evaluate the effects of operating Cougar Dam and the water temperature control facility on sub-adult and adult bull trout in Cougar Reservoir. Bull trout above Cougar Dam are one very small breeding group in the overall McKenzie population. This goal will determine how best to protect the bull trout population segment located above Cougar Dam by reducing the passage rate of fish to below the dam (if excessive) or through continual replacement of most of these fish to the population segment located above the dam. The three objectives associated with this goal are to 1) determine the proportion of sub-adult and adult bull trout in Cougar Reservoir that annually pass downstream, to 2) safely return to the reservoir most of the bull trout that pass to below Cougar Dam, and to 3) determine the survival rate of the bull trout that pass from the reservoir to below the dam.

PROPOSED ACTIONS

The Working Group proposes to:

- 1) Increase productivity of bull trout in the Upper Willamette Basin;
- 2) Reestablish a naturally reproducing bull trout population in the Swift and Bear creeks system;
- 3) Monitor distribution, abundance, and movements of bull trout in the Middle Fork Willamette Basin.
- 4) Monitor distribution, abundance, and movements of bull trout in the upper McKenzie River Basin.
- 5) Maintain spawning populations of bull trout in Sweetwater Creek and McKenzie River upstream of Trail Bridge Dam.
- 6) Monitor distribution, abundance, and movements of bull trout in the South Fork McKenzie Basin.
- 7) Assess potential to determine age and growth using anatomical structures (scales, fin rays, otoliths).
- 8) Develop a genetic management plan for bull trout in the Upper Willamette River core area.
- 9) Assess the feasibility of reestablishing bull trout in the Salt Creek/Salmon Creek/North Fork Middle Fork Willamette River complex.
- 10) Investigate feasibility of modifying the Resident Fish Mitigation Agreement to reduce potential adverse effects from the stocking of hatchery rainbow trout in areas inhabited by bull trout

- 11) Implement the Upper Willamette Bull Trout Action Plan working cooperatively with all the resource management agencies in the Working Group.

Lead agency, funding agency, and new or continuing status noted within parentheses for each activity below; corresponding Draft Recovery Plan measure noted for each task.

Objective 1. Increase productivity of bull trout in the Upper Willamette Basin by improving habitat conditions, improving access to suitable habitat, and decreasing losses caused by incidental angling mortality and poaching.

Task 1.1. Provide for fish passage where manmade barriers impede access by bull trout to suitable habitat. (Draft Recovery Plan - 1.2.5 and 1.4.1)

Activity 1.1.1. Monitor and seek to improve fish passage in Olallie Creek at the Highway 126 culvert. (USFS; continuing)

Activity 1.1.2. Seek to negotiate FERC approval of volitional upstream fish ladder below Trail Bridge Dam and downstream bypass system. (EWEB; continuing)

Activity 1.1.3. Begin operation of upstream fish passage facilities (trap and haul) in the South Fork McKenzie River below Cougar Dam. (USACE and ODFW; **USACE funded**; new)

Activity 1.1.4. Replace impassable FR 21 culverts at Found and Noisy creeks in the Middle Fk. Willamette drainage. (USFS; new)

Task 1.2. Until upstream fish passage facilities are constructed, salvage bull trout holding below Cougar, Hills Creek, and Trail Bridge dams. (Draft Recovery Plan - 1.2.3)

Activity 1.2.1. Angle for bull trout below dams when water conditions are favorable for angling during April through August. Conduct angling efforts at least once per week. At Trail Bridge Dam, conduct controlled spill to draw bull trout into spillway scoop pool and capture with nets. Scan bull trout captured below dams for PIT tags, implant PIT tag in untagged fish, collect tissue samples for genetic analysis, transfer and release fish above barrier. (USFS lead Hills Creek Dams, ODFW at Cougar and at Trail Bridge dams) (**USACE funded**; continuing)

Activity 1.2.2. Experiment with other methods (e.g., trap nets) to capture, detect, or document the presence of bull trout below dams. Scan bull trout captured below dams for PIT tags, implant PIT tag in untagged fish, collect tissue samples for genetic analysis, transfer and release fish above barrier. (ODFW; **USACE funded**; continuing)

Activity 1.2.3. Operate a weir at the lower end of the Carmen–Smith Spawning Channel to capture adult bull trout during July and August. Transfer adult bull trout upstream of dam. (ODFW; ****USFWS funding pending****; continuing)

Task 1.3. Restore historic prey base by reestablishing spring Chinook salmon into habitats occupied by bull trout. (Draft Recovery Plan - 3.1.4)

Activity 1.3.1. Continue to release adult salmon, distribute carcasses, or outplant viable eggs (depending on site considerations and management objectives) above

constructed barriers in the Upper Willamette Basin until we provide volitional fish passage for spring Chinook salmon in areas occupied by bull trout in the upper basin (Trail Bridge, Cougar, Dexter, Lookout Point and Hills Creek dams). (ODFW; continuing)

Task 1.4. Protect bull trout from illegal harvest. (Draft Recovery Plan - 3.2.1 and 3.2.2)

Activity 1.4.1. Continue to enforce angling regulations through the Coordinated Enforcement Plan for Bull Trout.(Oregon State Police; continuing)

Activity 1.4.2. Continue public education and awareness through road signs, posters, pamphlets, presentations, and information available on the internet. (ODFW and USFS; continuing)

Activity 1.4.3. Conduct a creel survey on the upper McKenzie River (focused on Leaburg Lake to Trail Bridge Dam) from April through October, 2009 and 2010. (ODFW; continuing)

Task 1.5. Protect, restore, and enhance bull trout habitat. (Draft Recovery Plan - 1.3)

Activity 1.5.1. Continue to enhance in-stream structure and complexity in the upper Middle Fork Willamette River (MFWR) by adding >300 pieces of LWD in 4.5 miles of the main stem. (USFS; continuing)

Activity 1.5.2. Design projects and write grants to obtain funding for habitat improvement projects in Swift Creek, Coal Creek, Windfall Creek, various class 3 and 4 headwaters streams, and the lower Middle Fork floodplain. (USFS; new)

Activity 1.5.3. Begin implementation of the Upper McKenzie River Side Channel Enhancement Project by adding 30 pieces of woody material to a side channel. This project (wood and gravel placement, and reconnection of off channel habitats) will take place over the next three years (2009-2011) depending on available funding. (USFS; new)

Activity 1.5.4. Update the 1994 South Fork McKenzie Watershed Analysis and develop a 5-year watershed action plan (WAP) for restoration and enhancement. (USFS; new)

Activity 1.5.5. Develop projects for the S. Fk. McKenzie River below Cougar Dam (e.g., large wood placement, gravel augmentation, off-channel habitat connectivity). (USFS; new)

Activity 1.5.6. Replace bridge at Cougar Creek and remove a barrier culvert. (USFS; new)

Activity 1.5.7. Complete NEPA planning for the Middle McKenzie River Side Channel Enhancement Project (implement 2010-2011, depending on available funding)

Activity 1.5.8. Olallie Creek gravel augmentation (implement 2010, depending on available funding). (USFS; new)

Activity 1.5.9. Monitor the large wood enhancement project completed in the McKenzie River upstream of Trail Bridge Dam. (Oregon State University; **USFWS funded**; continuing)

Objective 2. Reestablish a naturally reproducing bull trout population in the Swift/Bear creek system in the Middle Fork Willamette basin.

Task 2.1. Collect and transfer to Leaburg Hatchery up to 25% of the bull trout fry that would be caught in the Anderson Creek screw trap if operated 7 days/week. (Draft Recovery Plan – 3.1.1)

Activity 2.1.1. Operate the Anderson Creek screw trap only 2 days per week to minimize impacts associated with fishing the trap; hold fry catch from first day overnight in the trap (USFS; continuing).

Activity 2.1.2. Transfer up to 87.5% of the 2-day trap catch per week to Leaburg Hatchery for captive rearing. Start transferring fry when the 2-day trap catch is reaches 25 to 50 fry and attempt to capture fry over a 10 to 12 week period to maximize genetic variability in sample collected. For 2010, transfer a total of about 900 fry to Leaburg. (ODFW; **USACE funded**; continuing)

Task 2.2. Transfer captive reared fry to Swift and Bear creeks. (Draft Recovery Plan – 3.1.1)

Activity 2.2.1. For 2010 cohort fry, plan to release the majority (up to 750) in summer or early fall and retain about 150 until following spring. Reintroduction sites provide greater food availability at these times than during late autumn. Mark fish based on the following guidelines: (1) if 12-mm half-duplex PIT tag available, tested, and approved, then strive to PIT-tag fish > 70mm and release in July–August; (2) if only 23-mm tag available, then consider combination of mid-late summer release with alternative mark (e.g., fin clip, VIE), autumn release with PIT tags; (3) implant 23-mm PIT tag into all spring-release fish. Mark all fish with VIE tag to allow estimation of tag loss and later identification of smaller fish by release year. Hold fish for at least one week after marking to check for tag loss and mortality before transfer and release. (ODFW; **USACE funded**; continuing)

Activity 2.2.2. Out-plant about 30 captive reared bull trout in upper Indigo Creek during autumn of 2010. Out-plant all other bull trout in Swift and Bear creeks at a density of 1-3 fish per pocket habitat, as informed by results of field surveys scheduled for 2010. (ODFW and USFS; **USACE funded**; continuing)

Objective 3. Monitor distribution, abundance, and movements of bull trout in the Middle Fork Willamette (MFW) Basin.

Task 3.1. Determine the distribution, abundance, and timing of bull trout spawning in the Middle Fork Willamette (MFW) Basin above Hills Creek Reservoir. (Draft Recovery Plan – 3.1.1, 5.1.1, and 5.5.2)

Activity 3.1.1. To provide an index of spawner abundance, conduct redd surveys as follows:

- 1) Iko, Indigo, and Chuckle springs: weekly (September to mid-October);
- 2) Swift and Bear creeks: once in late September or early October;
- 3) MFWR main stem from Swift Creek to Tumblebug Creek (gorge): weekly;
- 4) MFWR main stem from Staley Creek to Swift Creek: once in early October.

For consistency, an initial survey at each site will be conducted before spawning, and final surveys will be completed jointly by both USFS and ODFW personnel. (ODFW and USFS; USACE funded; continuing)

Activity 3.1.2. Operate a downstream adult fish trap and PIT tag detector in the MFWR near the Echo Creek Bridge, FR 2143, to estimate the number of adult bull trout moving downstream from spawning sites during the spawning period (mid-August to mid-October). PIT-tag and collect tissue samples for genetic analysis from any untagged bull trout. (ODFW and USFS; USACE funded; continuing)

Activity 3.1.3. Operate a network of half-duplex PIT tag interrogation systems to detect bull trout movements in the MFWR basin. Priority locations for antennas:

- 1) MFWR main stem near the Echo Creek Bridge (FR 2143);
- 2) Spring-fed tributaries, including the lower Swift Creek main channel and Iko, Indigo, and Chuckle springs, just above their confluences with the main stem;
- 3) MFWR main stem near the confluences of Iko, Indigo, and Chuckle springs;
- 4) MFWR main stem about 0.5 km upstream of Hills Creek Reservoir;
- 4) MFWR main stem below Hills Creek Dam;
- 5) If adult bull trout are detected moving past the lower Swift Creek antenna, install a second PIT tag interrogation system in Swift Creek below the confluence of Bear Creek.

Maintain functionality and test detection efficiency of each station at least weekly. (ODFW and USFS; USACE funded; continuing)

Task 3.2. Document bull trout natural reproduction in spring-fed tributaries (Iko, Indigo, and Chuckle springs) and areas adjacent to the springs in the MFW main stem. (Draft Recovery Plan – 3.1.1, 5.1.1, and 5.5.2)

Activity 3.2.1. Conduct surface observation or snorkel surveys in Iko, Indigo, and Chuckle springs and adjacent areas of the MFW main stem to determine if identified redds produced young-of-the-year bull trout. (ODFW and USFS; USACE funded; continuing)

Task 3.3. Estimate the number of naturally produced age-1 and older juvenile bull trout rearing in spring-fed tributaries (Iko, Indigo, and Chuckle springs) and directly adjacent areas in the MFW. (Draft Recovery Plan – 3.1.1, 5.1.1, and 5.5.2)

Activity 3.3.1. Conduct minnow trapping surveys during April through September in Iko, Indigo, and Chuckle springs and adjacent areas of the main stem MFW. PIT-tag untagged juvenile bull trout ≥ 120 mm FL, and fin-clip smaller juveniles. Completion of this activity will also allow compilation of individual fish detection histories, estimation of juvenile-to-adult survival rate, and calculation of individual growth rate. (ODFW and USFS; USACE funded; continuing)

Task 3.4. Monitor the survival and life history characteristics of captively reared bull trout released into the Swift/Bear creek system and other release locations. (Draft Recovery Plan – 3.1.1, 5.1.1, and 5.5.2)

Activity 3.4.1. Assess survival, growth, and distribution of bull trout in Swift and Bear creeks by conducting a systematic survey using a combination of minnow trapping,

snorkeling, and potentially electrofishing (in upstream reaches where bull trout have not been detected in past surveys). (ODFW and USFS; **USACE funded**; new)

Activity 3.4.2. Operate a PIT tag interrogation system in lower Swift Creek (Activity 3.1.3) to detect out-migration of captively reared bull trout. (ODFW and USFS; **USACE funded**; continuing)

Activity 3.4.3. Conduct minnow-trapping or snorkeling surveys in Echo Creek, Found Creek, and the MFWR side channel near Swift Creek to assess abundance of out-planted bull trout. (ODFW and USFS; **USACE funded**; new)

Task 3.5. Monitor movements of juvenile and subadult bull trout in the MFW basin. (Draft Recovery Plan – 3.1.1, 5.1.1, and 5.5.2)

Activity 3.5.1. Mark juvenile bull trout with PIT tags (Activities 2.2.1 and 3.1.2) and monitor movements using PIT tag interrogation systems (Activity 3.1.3). (ODFW and USFS; **USACE funded**; continuing)

Activity 3.5.2. Use mobile PIT tag detection systems in spring-fed tributaries to identify locations of tagged bull trout and collect PIT tags no longer implanted in living fish as a result of mortality or tag loss. (ODFW; **USACE funded**; new)

Task 3.6. Evaluate entrainment of bull trout through Hills Creek Dam. (Draft Recovery Plan – 3.1.1, 5.1.1, and 5.5.2)

Activity 3.6.1. Operate PIT tag interrogation system below Hills Creek Dam to assess entrainment of tagged bull trout through the dam (Activity 3.1.3). Evaluate PIT tag detection efficiency at dams using tagged test fish. (ODFW; **USACE funded**; continuing)

Activity 3.6.2. Conduct surveys by angling or using other gears to capture bull trout downstream from Hills Creek Dam (Activities 1.2.1 and 1.2.2). (ODFW; **USACE funded**; continuing)

Objective 4. Monitor distribution, abundance, and movements of bull trout in the upper McKenzie River Basin.

Task 4.1. Determine the distribution, abundance, and timing of bull trout spawning in the upper McKenzie River Basin. (Draft Recovery Plan – 5.1.1, 5.5.2, and 5.6.1)

Activity 4.1.1. To provide an index of status of the donor and potential donor populations for fry translocations, conduct redd surveys as follows during late August through first week of November:

- 1) Anderson Creek: every other week;
- 2) Olallie Creek: downstream of Hwy. 126 every week and in designated upstream areas every other week;
- 3) Sweetwater Creek: at least three times;
- 4) McKenzie River upstream from Trail Bridge Reservoir: at least three times.
- 5) Carmen–Smith Spawning Channel and McKenzie River from velocity barrier to Trail Bridge Dam: at least three times.

For consistency, an initial survey at each site will be conducted before spawning, and final surveys will be completed jointly by both USFS and ODFW personnel. (ODFW and USFS; **USACE funded**; continuing)

Activity 4.1.2. Operate stream-width weir, downstream adult fish trap, upstream passive video counter (FishTick software), and directional PIT tag station in the McKenzie River upstream from Trail Bridge Reservoir to enumerate adult bull trout moving upstream from Trail Bridge Reservoir during August through mid-October; capture (post-spawn) bull trout moving downstream in trap and mark with PIT tag and collect tissue samples for genetic analysis. (ODFW and USFS; ****USFWS and EWEB funding pending****; continuing)

Activity 4.1.3. Operate half-duplex PIT tag interrogation systems in the Carmen–Smith Spawning Channel, Sweetwater Creek, and the McKenzie River above Trail Bridge Reservoir to monitor movements of bull trout during the spawning period. (ODFW and USFS; ****USFWS and EWEB funding pending****; continuing)

Task 4.2. Monitor abundance of out-migrating juveniles in Anderson Creek. (Draft Recovery Plan – 5.1.1 and 5.5.2)

Activity 4.2.1. Operate screw trap in Anderson Creek two days per week during February through July to monitor abundance of out-migrating juvenile (fry and age ≥ 1) bull trout and to collect fry for captive rearing and translocation to Swift and Bear creeks (Activity 2.1.1). Mark bull trout >120 mm FL with PIT tag. (USFS; continuing)

Task 4.3. Monitor movements of juvenile and subadult bull trout in the McKenzie River basin. (Draft Recovery Plan – 5.1.1 and 5.5.2)

Activity 4.3.1. Capture and PIT-tag adult and juvenile bull trout at the Leaburg Canal bypass and other identified sites of bull trout congregation to facilitate assessment of connectivity among populations. This will facilitate detection of increased interchange among populations anticipated to occur with development of fish passage facilities at dams. (ODFW; **USACE funded**; continuing)

Activity 4.3.2. Mark juvenile bull trout with PIT tags (Activities 4.1.2, 4.2.1, 4.3.1) and monitor movements using PIT tag interrogation systems in the Carmen–Smith Spawning Channel, Sweetwater Creek, and the McKenzie River above Trail Bridge Reservoir (Activity 4.1.3), as well as in the Leaburg Canal bypass and Leaburg Dam fish ladders. (ODFW and USFS; continuing)

Objective 5. Maintain spawning populations of bull trout in Sweetwater Creek and McKenzie River upstream of Trail Bridge Dam. Bull trout entrained through the dam are presently unable to return upstream to natal spawning streams. Drawdown of Trail Bridge Reservoir during construction of fish passage facilities anticipated to begin in 2012 will likely result in increased downstream passage of bull trout through the penstock while preventing upstream migration from the reservoir into Sweetwater Creek and potentially into the McKenzie River upstream from the reservoir.

Task 5.1. Mark bull trout with PIT tags to enable later identification of individuals from populations upstream of Trail Bridge Dam. (Draft Recovery Plan – 5.1.1 and 5.5.2)

Activity 5.1.1. Use trap nets in Trail Bridge Reservoir to capture bull trout during July through October. Mark bull trout with uniquely coded PIT tags to enable later identification. (ODFW and USFS; **** USFWS and EWEB funding pending****; continuing)

Activity 5.1.2. Conduct surveys using minnow traps and by snorkeling with hand nets in Sweetwater Creek, McKenzie River upstream from Trail Bridge Reservoir, Anderson Creek, and Olallie Creek. Mark bull trout with uniquely coded PIT tags. (ODFW and USFS; **** USFWS and EWEB funding pending****; continuing)

Task 5.2. Capture adult bull trout below Trail Bridge Dam and transport upstream of dam. (Draft Recovery Plan - 1.2.3)

Activity 5.2.1. Angle for bull trout and net bull trout from the spillway scoop pool below Trail Bridge Dam (Activity 1.2.1) during August through October and operate a weir at the lower end of the Carmen–Smith Spawning Channel in July and August to capture adult bull trout. Transfer adult bull trout upstream of dam. (ODFW and USFS; ****USFWS funding pending****; continuing)

Objective 6. Monitor distribution, abundance, and movements of bull trout in the South Fork McKenzie Basin.

Task 6.1. Determine the distribution, abundance, and timing of bull trout spawning in the South Fork McKenzie River Basin. (Draft Recovery Plan – 5.1.1 and 5.5.2)

Activity 6.1.1. Conduct redd surveys in Roaring River every other week during late August through first week of November. (ODFW and USFS; **USACE funded**; continuing)

Activity 6.1.2. Operate a downstream adult fish trap in Roaring River (the only known spawning location) and PIT tag interrogation systems in Roaring River and the South Fork McKenzie River just upstream of Cougar Reservoir. Mark bull trout with PIT tags. (ODFW; **USACE funded**; continuing)

Task 6.2. Monitor movements of juvenile and subadult bull trout in the South Fork McKenzie basin. (Draft Recovery Plan – 5.1.1 and 5.5.2)

Activity 6.2.1. Operate five-foot screw traps in lower Roaring River (August through October) and in the South Fork McKenzie River just above Cougar Reservoir (March through November). (ODFW; **USACE funded**; continuing)

Activity 6.2.2. Operate PIT tag interrogation systems in Roaring River and the South Fork McKenzie River just upstream of Cougar Reservoir to detect movements of bull trout. (ODFW; **USACE funded**; continuing)

Task 6.3. Evaluate entrainment of bull trout through Cougar Dam. (Draft Recovery Plan – 1.2.3 and 1.2.6)

Activity 6.3.1. Operate PIT tag interrogation systems in the tailrace and regulating outlet channels below Cougar Dam to assess entrainment of tagged bull trout through the dam. Evaluate PIT tag detection efficiency at dams using tagged test fish. (ODFW; **USACE funded**; continuing)

Activity 6.3.2. Operate the new fish ladder and trap below Cougar Dam. Evaluate attraction efficiency, ladder ascension time, and turbine blade strike injuries. (ODFW and USACE; **USACE funded**; new)

Objective 7. Assess potential to determine age and growth using anatomical structures (scales, fin rays, otoliths).

Task 7.1. Develop a catalog of scales and other structures for potential use in determining age and growth. (Draft Recovery Plan –5.5)

Activity 7.1.1. Collect scales from all bull trout > 60 mm FL handled during fisheries surveys. Collect scales, complete pelvic fins, and otoliths from any incidental mortalities to allow comparisons of ageing precision among structures. Scales collected from recaptured bull trout over the next 2 to 3 years may be used for validation assessments to gauge accuracy of scale ageing. This activity will provide the basis for potential future age and growth assessments. (ODFW and USFS; **USACE funded**; continuing)

Objective 8. Develop a genetic management plan for bull trout in the Upper Willamette River core area.

Task 8.1. Develop a genetic management plan that specifies the rate and directions of artificial gene flow necessary to minimize the risk of inbreeding depression and genetic drift while maintaining the historic population structure. (Draft Recovery Plan - 4.3.1)

Activity 8.1.1. Finalize the draft genetic management plan. (USFWS; **USACE funded**; continuing)

Task 8.2. Monitor genetic composition of captively reared bull trout at Leaburg Hatchery used for reintroduction efforts. (Draft Recovery Plan - 4.3.1)

Activity 8.2.1. Collect 50 fin-clips from live and all dead captively reared bull trout for genetic analysis. (ODFW; **USACE funded**; continuing)

Task 8.3. Implement the genetic management plan until intact migratory corridors among all local populations in the Willamette Recovery Unit provide natural gene flow. (Draft Recovery Plan - 4.3.1)

Activity 8.3.1. Implement the genetic management plan until intact migratory corridors among all local populations in the Willamette Recovery Unit provide natural gene flow. (All agencies; **USACE funded**; continuing)

Objective 9. Assess the feasibility of reestablishing bull trout in the Salt Creek/Salmon Creek/North Fork Middle Fork Willamette River complex.

Task 9.1. Conduct fish and habitat surveys to gather new data where needed to assess feasibility of reestablishment. (Draft Recovery Plan - 5.2.1)

Activity 9.1.1. Conduct fish and habitat surveys and deploy automated temperature monitors where needed to gather new data to assess extent of suitable spawning and early juvenile rearing habitat and document migratory barriers. (ODFW; **USACE funded**; new)

Objective 10. Modify, if appropriate, the Resident Fish Mitigation Agreement to reduce potential adverse effects from the stocking of hatchery rainbow trout in areas inhabited by bull trout; also investigate reallocating a portion of the USACE Resident Fish Mitigation Program funds provided to raise non-native hatchery rainbow trout at Leaburg Hatchery in favor of bull trout and other native fish conservation activities (native rainbow (redband) trout, Pacific lamprey, brook lamprey). Determine potential adverse affects from the stocking of hatchery rainbow trout in areas inhabited by bull trout

Task 10.1. Investigate the possibility of reallocating a portion of the USACE Resident Fish Mitigation Program funds provided to raise non-native hatchery rainbow trout at Leaburg Hatchery in favor of bull trout conservation activities. Investigate how the program would handle reduced production of hatchery rainbow trout. (Draft Recovery Plan – 2.1 and 3.3)

Activity 10.1.1. Provide ODFW research perspective in efforts to investigate potential to reallocate a portion of the USACE Resident Fish Mitigation Program funds provided to raise non-native hatchery rainbow trout at Leaburg Hatchery in favor of bull trout conservation activities. (ODFW; **USACE funded**; new)

Task 10.2. Develop a study plan to assess potential adverse affects from the stocking of hatchery rainbow trout in areas inhabited by bull trout. (Draft Recovery Plan – 2.1 and 3.3)

Activity 10.2.1. Further develop study plans to assess potential adverse affects from the stocking of hatchery rainbow trout in areas inhabited by bull trout. (ODFW; **USACE funded**; new)

Objective 11. Implement the Upper Willamette Bull Trout Action Plan working cooperatively with all the resource management agencies in the Working Group.

Task 11.1. Fully fund and continue to implement the Upper Willamette Basin Action Plan. (Draft Recovery Plan – 6.1.1 and 6.2.2)

Activity 11.1.1. Disseminate information to resource management agencies in the Working Group. (ODFW and USFS; **USACE funded**; continuing)

Activity 11.1.2. Distribute periodic progress reports and an annual report of findings to U.S. Army Corps of Engineers and other interested parties. (ODFW; **USACE funded**; continuing)

Activity 11.1.3. Organize the annual meeting of the Upper Willamette Bull Trout Working Group to coordinate field activities between agencies and exchange information (mid-December). (ODFW; **USACE funded**; continuing)

Activity 11.1.4. Provide informational and technical presentations as requested. (All agencies; **USACE funded**; continuing)

Activity 11.1.5. Construct and maintain a Willamette Basin Bull Trout information clearinghouse web site (USFWS; continuing).

REFERENCES

- Buchanan, D.V., M.L. Hanson, and R.M. Hooton. 1997. Status of Oregon's bull trout, distribution, life history, limiting factors, management considerations, and status. Report to Bonneville Power Administration. Contract No. 1994BI34342, Project No. 199505400 (BPA Report DOE/BP-34342-5). Oregon Department of Fish and Wildlife, Portland.
- USACE (U.S. Army Corps of Engineers). 2006. Cougar Reservoir Water Temperature Control Project Supplemental Biological Assessment. Trap and Haul Facility and Post Construction Monitoring and Evaluation. Portland District.
- USFS (U.S. Forest Service). 1990. Willamette National Forest Land and Resource Management Plan, as amended. Willamette National Forest, Eugene, Oregon.
- USFWS (U.S. Fish and Wildlife Service). 2005. Chapter 5, Willamette River Recovery Unit, Oregon. 147 p. *In*: U.S. Fish and Wildlife Service. Bull Trout (*Salvelinus confluentus*) Draft Recovery Plan. Portland, Oregon.
- USFWS (U.S. Fish and Wildlife Service). 2006. Biological opinion on the construction and initial operation of a trap and haul facility and post-construction monitoring and evaluation program associated with the Cougar Reservoir Water Temperature Control Project. Oregon Fish and Wildlife Office.
- USFWS (U.S. Fish and Wildlife Service). 2008. Biological opinion on the continued operation and maintenance of the Willamette River Basin Project and effects to Oregon chub, bull trout, and bull trout critical habitat Designated under the Endangered Species Act. Oregon Fish and Wildlife Office.

APPENDIX 1: PAST ACTIONS

Beginning in 2009, completed or discontinued actions will be noted in this table.

Final year	Action	Reason discontinued
2009	Capture bull trout approximately 175—400 mm TL during the autumn spawning period by night snorkeling with hand nets to assess presence and relative abundance of a resident life history component at targeted locations. This action will be conducted at a limited number of locations (e.g., Iko, Indigo, and Chuckle springs) in 2009 if prior fish surveys or redd count surveys suggest the presence of bull trout of appropriate size.	Summertime surveys indicated minimal #s of bull trout 175–400 mm.
2009	At the beginning of construction of the trap below Cougar Dam in April 2009, capture and relocate adult and juvenile fishes stranded behind the cofferdam according to the USACE fish salvage plan.	Completed
2009	Implement "Phase 4" of the South Fork McKenzie River Aquatic Restoration and Enhancement Project. This is the final phase of log jam development in the South Fork McKenzie River and Roaring River.	Completed
2009	Replace the impassable Rd. 21 culvert in Indigo Springs and enhance spawning and rearing habitat (USFS)	Completed
2009	Determine the feasibility and cost of using balloon tags to determine mortality of bull trout surrogates (rainbow trout) passing through the turbines and through the regulating outlet. Adult bull trout should not be able to pass through the penstock trash rack but can exit the reservoir via the regulating outlet. Juvenile bull trout may be able to pass through the penstock trash rack. ODFW will coordinate with USACE contractor.	Study conducted by USACE contractor
2008	Operate a PIT tag detector with one antenna at the base of the Sweetwater Creek culvert under the Highway 126 and another antenna in Sweetwater Creek above the culvert and compare fish passage times to Trail Bridge Reservoir elevation.	Critical pool elevation identified (although monitoring of tagged bull trout continuing)
2008	Measure redds to nearest square foot and assign species probability rating (bull trout or Chinook).	Completed
2008	Fry Release Strategy II: Uniquely mark fish that reach a fork length \geq 55-65 mm with a 12 mm long PIT tag to monitor survival.	Need fish \geq 100 mm FL for 23-mm half-duplex PIT tag
2008	Set fry traps in the MFW below suspected bull trout redds to determine if they produce young-of-the-year bull trout or Chinook (late February).	Completed
2008	Set baited minnow traps to collect fin-clips for genetic analysis in Olallie Creek above and below the Highway 126 culvert and in Sweetwater Creek.	Completed
2008	Characterize the genetic population structure in the Upper Willamette Basin including variability within and among local spawning aggregations	Analyses completed
2008	Compare the within population genetic variability found in Anderson Creek to the reestablished population in Middle Fork Willamette.	Analyses completed
2008	Submit grant proposal to USFWS to fund phase II and III of Indigo Springs culvert replacement and habitat enhancement.	Funding acquired
2008	Submit grant proposal to USFWS to fund ODFW/NRS1 to care for captively reared bull trout, PIT tags, and lease for an extra vehicle.	Funding acquired

Translocation of bull trout fry

Experiments with restoring the distribution of bull trout in formerly occupied habitat within the Upper Willamette River core area began as early as 1993 with fry being relocated from Anderson Creek to Sweetwater and Olallie creeks after upstream passage through culverts under Highway 126 was restored in 1993 and 1995, respectively. Positive results from these experiments led to a risk analysis and monitoring plan for rehabilitating the bull trout population in the Middle Fork Willamette above Hills Creek Reservoir (ODFW and USFS 1998). At that time, the Middle Fork Willamette River population was the most at-risk population in the Upper Willamette River core area and the Working Group believed that it was no longer viable without intervention. Loss of this population would have considerably decreased distribution of bull trout and may have resulted in a loss of genetic diversity in the Upper Willamette River core area. Relocation of bull trout fry to the Middle Fork Willamette Basin began in 1997. At the request of the USFWS, ODFW and the Working Group reevaluated rehabilitation strategies in 2006 (Upper Willamette Bull Trout Working Group 2007). This action plan includes information from this reevaluation and describes strategies the Working Group proposes to use for reestablishing bull trout in the Middle Fork Willamette Basin above Hills Creek Dam.

We believe fry transfers from Anderson Creek, beginning in 1993, are primarily responsible for the reestablished bull trout in Sweetwater Creek. We will continue to use Anderson Creek as the donor population unless information becomes available to suggest alternative sources. We anticipate relocation of bull trout may continue for seven years (one bull trout generation) at each relocation site, contingent on funding, success of relocations and a genetic analysis of the reestablished population in the Middle Fork Willamette. The Working Group will decide each year where to collect fry and will obtain necessary permits from the USFWS.

References:

- ODFW and USFS. 1998. Rehabilitation of the Middle Fork Willamette Bull Trout Population: Risk Analysis and Monitoring Plan. ODFW, Springfield, Oregon.
- Upper Willamette Bull Trout Working Group. 2007. Status of Bull Trout (*Salvelinus confluentus*) in the Middle Fork Willamette Basin Ten Years after Implementation of a Rehabilitation Plan. ODFW, Springfield, Oregon.

APPENDIX 2: POPULATION STATUS (REDD COUNTS)

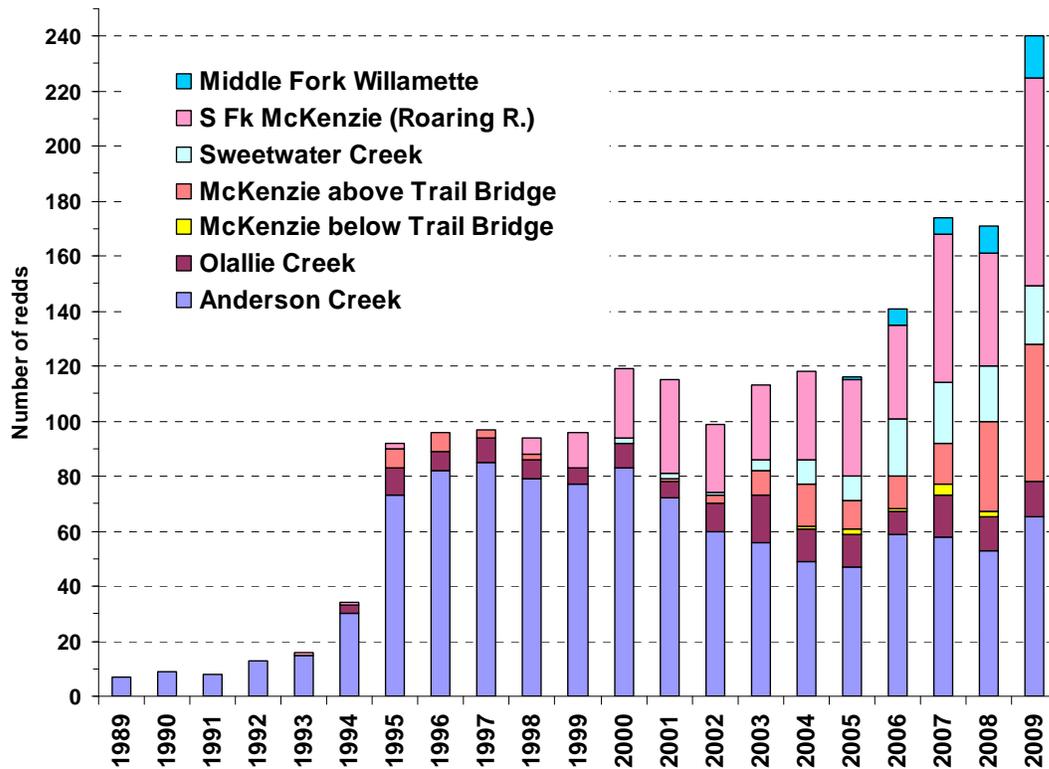


Figure 1. Total number of bull trout redds counted annually in the Upper Willamette River core area since counts began in 1989. Data for redd counts prior to 1999 should be interpreted with caution, as some surveys only included a portion of the known spawning distribution (as discovered in subsequent surveys) and were not repeated intra-annually with the increased frequency of later surveys.