ANNUAL PROGRESS REPORT

FISH RESEARCH PROJECT

OREGON

PROJECT TITLE: **Clackamas River Bull Trout Reintroduction**

PROJECT NUMBERS: Contracts 13420-AJ030 (USFWS) and 11-CS-11060600-003 (USFS)

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## Executive summary

We transferred 58 subadult/adult and 58 juvenile bull trout from the Metolius River to the Big Bottom reach of the Clackamas River and Pinhead Creek, in June/July, 2011 respectively. Approximately three months after the first transfer of fish, bull trout spawning was observed in Pinhead Creek. We directly observed construction of one bull trout redd and observed four additional redds (during a redd survey) that were likely constructed by bull trout. Subadult and adult bull trout dispersed throughout the Clackamas River between the headwaters and the North Fork Reservoir. The highest density of bull trout occupancy occurred in Big Bottom with individuals dispersing both upstream and downstream of this core area. Of the 58 juveniles that were introduced, 10 emigrated from Pinhead Creek (detected via PIT interrogation array at the mouth of Pinhead Creek) in the first two weeks following release. No other juveniles were detected leaving Pinhead Creek.

We used radio telemetry and PIT tags to monitor the post-release behavior of transplanted fish. We setup seven automated telemetry sites and two PIT tag monitoring arrays throughout the study reach. In addition, staff collected point data for fish twice weekly during the period of July 25 - October 21, 2011. In total, we collected >500,000 point locations for bull trout in the first six months of monitoring. Aerial telemetry proved to be an effective tool to locate individuals not easily located by ground crews and will continue to be utilized when necessary in future monitoring efforts.

Occupancy of North Fork Reservoir was minimal and no individual bull trout occupied any designated anadromous salmonid “High Vulnerability Zone” for longer than two hours. Two bull trout passed through the Portland General Electric Hydroelectric Project in the downstream direction through the juvenile bypass pipeline, one adult and one subadult. Neither fish occupied the area near the upstream end or downstream end of anadromous juvenile surface collectors for longer than 2 h. For reference, it takes approximately 2 h for a PIT tagged smolt to drift the entire length of PGE’s juvenile migrant pipeline.

Bull trout do not appear to be having s significant effect on ESA-listed salmonids in the upper Clackamas River Subbasin. Bull trout occupancy of the designated “High Vulnerability Zones” was close to zero, suggesting that bull trout are not taking advantage of the hydroelectric project to target anadromous salmonids during the peak outmigration period (October 15 – December 15, 2011).

# Introduction

Bull trout (*Salvelinus confluentus*) are native to the Pacific Northwest, and currently occupy habitat in Oregon, Washington, Idaho, Montana, and Nevada. Bull trout prefer cold, clean water in complex stream habitats, and populations have been negatively affected by several factors including habitat degradation (e.g., Fraley and Shepard 1989), barriers to migration (e.g., Rieman and McIntyre 1995), and the introduction of non-native trout species (e.g., Leary et al. 1993). As a result, the abundance of bull trout has declined in many populations across their native range (Rieman et al. 1997) leading to their listing under the Endangered Species Act in 1999 (64 FR 58910).

The restoration of bull trout to historic habitat is one of the primary recovery goals in the U.S. Fish and Wildlife Service's Draft Recovery Plan (USFWS 2002a), and is particularly relevant to habitats in the western portion of the species' range due to the extensive loss of distribution and the documented extirpation of multiple bull trout populations. The Willamette River, a tributary of the lower Columbia River, has experienced extirpations of bull trout from four major subbasins, including the Clackamas River (Figure 1). Although the overall recovery strategy is to reduce and minimize threats affecting bull trout and their habitat in the Willamette River Basin, the establishment of self-sustaining populations will likely require reintroduction into some areas given the size of the basin and low probability of natural recolonization following widespread extirpations, Reintroduction of bull trout in the Clackamas River will help to achieve distribution in the Clackamas River core habitat (defined as habitat that contains, or if restored would contain, all of the essential physical elements to provide for the security of and allow for the full expression of life history forms of one or more local populations of bull trout) (recovery criterion 1 and recovery objective 1) and will increase abundance of adult bull trout in the Willamette River Recovery Unit (recovery criterion 2 and recovery objective 2; USFWS 2002b).

Produced in partnership with U.S. Fish and Wildlife Service (USFWS), this report provides an annual summary of the actions performed by the Oregon Department of Fish and Wildlife (ODFW), the U.S. Forest Service (USFS), and other collaborators (e.g., the Confederated Tribes of Warm Springs Reservation (CTWSR), the National Marine Fisheries Service (NMFS), Portland General Electric (PGE), and the U.S. Geological Survey (USGS)) on the reintroduction of bull trout to the Clackamas River, hereafter referred to as the Project. The report format will be structured, where appropriate, to answer the questions proposed in sections 3.2 and 3.3 of the Implementation, Monitoring, and Evaluation Plan developed by the USFWS Oregon Fish and Wildlife Office and Columbia River Fisheries Program Office. Additional project background on the reintroduction and project management strategy can be found in that plan (http://www.fws.gov/oregonfwo/Species/Data/BullTrout/Documents/ClackamasBT_IME_Plan.pdf).

This project is a joint effort between the State of Oregon and the USFWS to reintroduce bull trout into the Clackamas River. As part of this proposal, on June 21, 2011, the USFWS published a final rule establishing a nonessential experimental population of bull trout in the

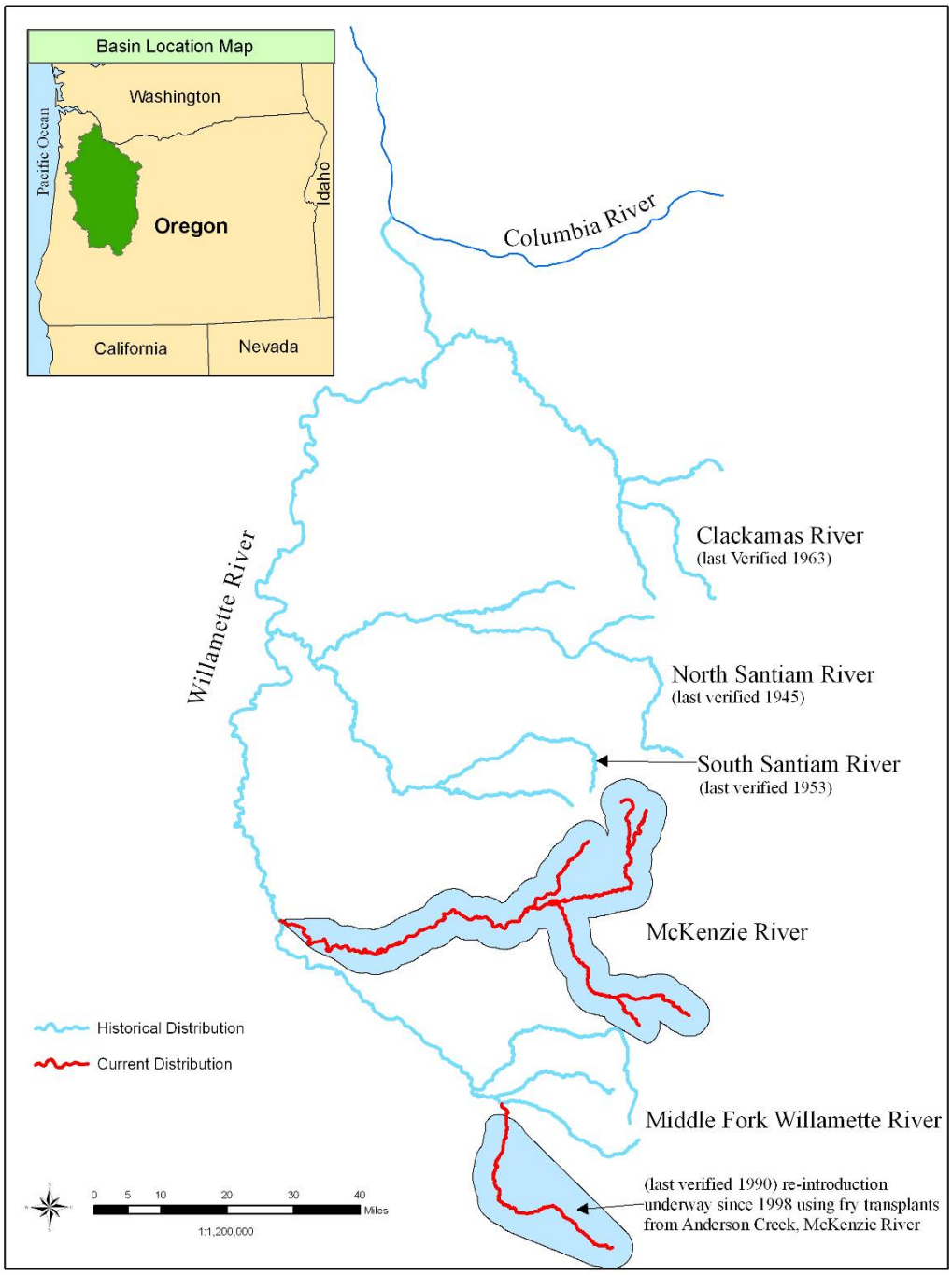


**Figure 1.** Historical and Current Bull Trout Distribution in the Willamette Basin.

Clackamas River under section 10(j) of the ESA (76 FR 35979). As the primary landowner in the upper Clackamas River where the reintroduction will occur, the USFS Mt. Hood National Forest is our primary cooperating agency, along with PGE, NMFS, and the CTWSR, co-manager of bull trout in the Metolius River Subbasin, the source of the donor stock for the reintroduction.

The goal of the project is to re-establish a self-sustaining bull trout population of 300-500 spawning adults in the Clackamas River by 2030. If successful, this project will contribute to the conservation and recovery of bull trout in the Willamette Basin and to the overall recovery criteria outlined in the Draft Bull Trout Recovery Plan (USFWS 2002b). We define a self-sustaining population as one that maintains a minimum adult annual spawning abundance of 100 individuals, contains a high level of genetic diversity representative of the donor stock, and requires little or no additional transfers. The numerical goal of 300-500 spawning adults is consistent with draft recovery planning targets for abundance. Although the amount of suitable habitat in the Clackamas River suggests there is sufficient capacity to support a population of this size, bull trout distribution across the species' range, even within areas of suitable habitat, is patchy; thus, the true capacity of the Clackamas Subbasin for bull trout is unknown.

The IM &E plan outlines three objectives relative to project implementation and monitoring:

(1) Ensure that the proposed action does not threaten the donor stock population;

(2) Monitor and evaluate the effectiveness of the bull trout reintroduction strategy for re-establishing a self-sustaining bull trout metapopulation in the Clackamas River; and

(3) Evaluate the effects of bull trout reintroduction on ESA-listed salmonids that currently occupy the Upper Clackamas River Subbasin.

The actions described in the remainder of this report are intended to address these three objectives.

# Methods

## Implementation

We collected juvenile, subadult, and adult bull trout from the Metolius River basin in Central Oregon. These fish were derived from three major genetic bull trout groupings: (1) Whitewater River, (2) Jefferson and Candle Creeks and, (3) Canyon, Heising, and Jack Creeks. Due to limited knowledge regarding the status of bull trout in the Whitewater River, and per a request from CTWSR, we proposed to limit potential donor impacts by not targeting individuals specifically in the Whitewater River. However, collections of bull trout from the mainstem Metolius River and Lake Billy Chinook may have included some individuals from the

Whitewater River due to the fact they would be physically indistinguishable from bull trout from the other two genetic groupings.

Based on guidelines in the Implementation and Monitoring Plan, our objective was to collect 1000 juveniles (90-250 mm TL), 30 subadults (250-450 mm), and 30 adults (450-650 mm). The numbers of fish actually collected are described below.

**Donor population monitoring**

ODFW conducts an annual redd count survey in October on the Metolius River and its tributaries (Jack Creek, Heising Springs, Canyon Creek/Roaring Creek, Candle Creek, Jefferson Creek, and the Metolius River see Harrington and Wise 2011). The threshold for determining whether the donor population is sufficiently healthy to allow transfers to the Clackamas (as determined through redd counts) is currently 800 spawning individuals (USFWS 2002c, USFWS 2011b).

**Pathogen screening**

Sixty ripe bull trout adults were tested for infectious hematopoietic necrosis virus (IHNV) and bacterial kidney disease (BKD) by collecting (non-lethal) and testing ovarian fluid and sperm in 2010. Fish were captured at temporary weirs in two spawning tributaries (Candle and Canyon creeks) during daily checks between July 6 and October 22, 2010. In addition, each year of transfer also requires the testing (lethal) of 150 fry for IHN virus, which began in the spring of 2011. Similar to the adult samples, it was preferable to have the samples come from more than one spawning tributary. Fry were captured between February 24 and May 19, 2011 at a rotary trap operated by PGE at Monty Campground, (N= 118 fry), and by electrofishing in Jack Creek by ODFW (N= 33 fry).

**Subadult and adult collection and holding**

Subadult and adult bull trout were captured using a variety of methods to maximize the likelihood of capturing both sufficient individuals and putative different life history forms. Fish were collected via angling by the CTWSR from the Eyerly property where the Metolius meets Lake Billy Chinook, in Onieda trap nets set in the Metolius arm of Lake Billy Chinook (downstream of the Eyerly property), and at the PGE Selective Water Withdrawal fish trap at Round Butte Dam. Following capture, all bull trout were transported to Round Butte Fish Isolation Facility where they were held in circular tanks (2500 L) supplied with flow through water from Lake Billy Chinook (9 – 10 $^{o}$C). These fish were checked for injury before being placed in the tanks and apparently healthy fish of the appropriate size (250 - 650 mm) were held for a minimum 48 h depuration period as a precaution against transfer of New Zealand mud snails that have been recently documented in Lake Billy Chinook.

Collections of subadult and adult bull trout began on June 21, 2011 (Table 1). A total of 68 bull trout (250 – 650 mm) were captured for the purposes of radio tagging, but eight were not deemed good candidates for surgery for various reasons (e.g., scars from apparent raptor interaction, hook injury, missing fins, blind in one or more eyes, opercle deformity, scale loss, etc.). Also, two individuals died less than 48 h post-surgery. One died prior to transport, and one died shortly after release. In both cases, the fish had been captured and PIT tagged by other agency projects, and mortalities were not suspected to have been caused by the surgery, but rather a cumulative effect of prior trauma (i.e., prior handling stress from another project, prior tagging stress, recreational angling capture stress, etc.). These mortalities account for the final transport of 58 rather than 60 subadult and adult bull trout to the Clackamas River.

**Table 1**. Origin of collection from the Metolius River system for subadult and adult fish transported to the Clackamas River. Fish were either collected from the Portland General Electric operated surface water collector (SWC) at Round Butte Dam, by angling for fish (The Confederated Tribes of Warm Springs) in the lower Metolius River, or from Onieda trap nets set in the upper Metolius arm of Lake Billy Chinook.

| Capture dates (2011) | SWC | Angling | Trap Nets |
|---|---|---|---|
| June 21 – 29 | 6 | 21 | 9 |
| July 4 – 7 | 0 | 0 | 11 |
| July 11 – 14 | 0 | 0 | 11 |

**Juvenile collection**

Collection of juvenile bull trout began on June 27, 2011. We used a variety of methods, including Oneida trap nets, backpack electrofishing, and baited minnow traps to capture juveniles. Trap net sets were placed primarily for adult bull trout capture, and juvenile capture was merely incidental. Crews of two of more biologists collected fish via electrofishing in Jack, Roaring, Canyon, and Candle creeks, and in a side channel of the Metolius River. Baited minnow traps were set in the Metolius River mainstem, Metolius side channels, and the Metolius arm of Lake Billy Chinook.

**Fish tagging**

Subadult/Adult fish were tagged with one of three sizes of radio tags (4.5, 11, and 16 g: Models NTC-6-2, MCFT2-3FM, MCFT2-3A, Lotek Wireless). Appropriately sized tags were inserted in the body cavity through a small incision just large enough to accommodate the tag, and sutured shut with dissolvable sutures (4-0 Ethilon nylon suture- black monofilament) sufficient to close the incision (3 - 4 stitches). Fish were anesthetized via electronarcosis or MS222 during insertion of all radio tags and/or half duplex (HDX) PIT tags. Bull trout >300 mm received a dorsal sinus implant of a 23 mm HDX PIT tag, bull trout 151 – 299 mm received

abdominally implanted 23 mm HDX PIT tags, and bull trout 70 – 150 mm received abdominally injected 12 mm HDX PIT tags. All tags were sterilized in ethanol and then betadine prior to insertion. The fish were also administered a prophylaxis of erythromycin via intramuscular injection. Implanted fish were allowed to recover for 18 – 48 h before being transported to the Clackamas River.

**Fish transport**

Following recovery, we transferred the fish to release sites in the upper Clackamas River using a 700-1100 L water tank injected with oxygen. Subadults and adults were released throughout the reach known as Big Bottom whereas juveniles were released into Pinhead Creek (Figure 2). Juveniles were transported concurrently with subadults and adults but held in 15 L buckets with small holes drilled in the sides and top to allow water to pass through the buckets. The buckets were suspended in the transport tanks to prevent injury to any fish. The fish were netted from their holding tanks in the morning and transported for approximately 2 h by highway to the release sites. Water temperature was checked hourly with an Oakton Temp 5 thermistor thermometer. Frozen blocks of Lake Billy Chinook water were added to transport tanks to ensure that the temperature did not increase during transport and to ensure that the fish were slowly acclimated to the temperature at the release location. Fortunately the Clackamas was always within 1.5$^{o}$C of holding temperatures at the Round Butte Fish Isolation Facility.

## Monitoring

We used a combination of fixed monitoring sites and manual tracking to document the survival and behavior of adult, subadult, and juvenile fish to address the following questions (IM &E Plan, USFWS 2011a):

1) Do translocated adult and subadult bull trout remain in the upper Clackamas Basin (above Rivermill Dam)?

    1a) If yes, what is their seasonal distribution?

    1b) If yes, is there evidence of spawning activity? If no, does changing the release timing/location provide a different result?

2) Do juveniles remain in the habitat patches they are outplanted to in the short-term or do they move relatively quickly out or into other habitat patches?

    2a) If they stay, how are juveniles distributed within tributaries?

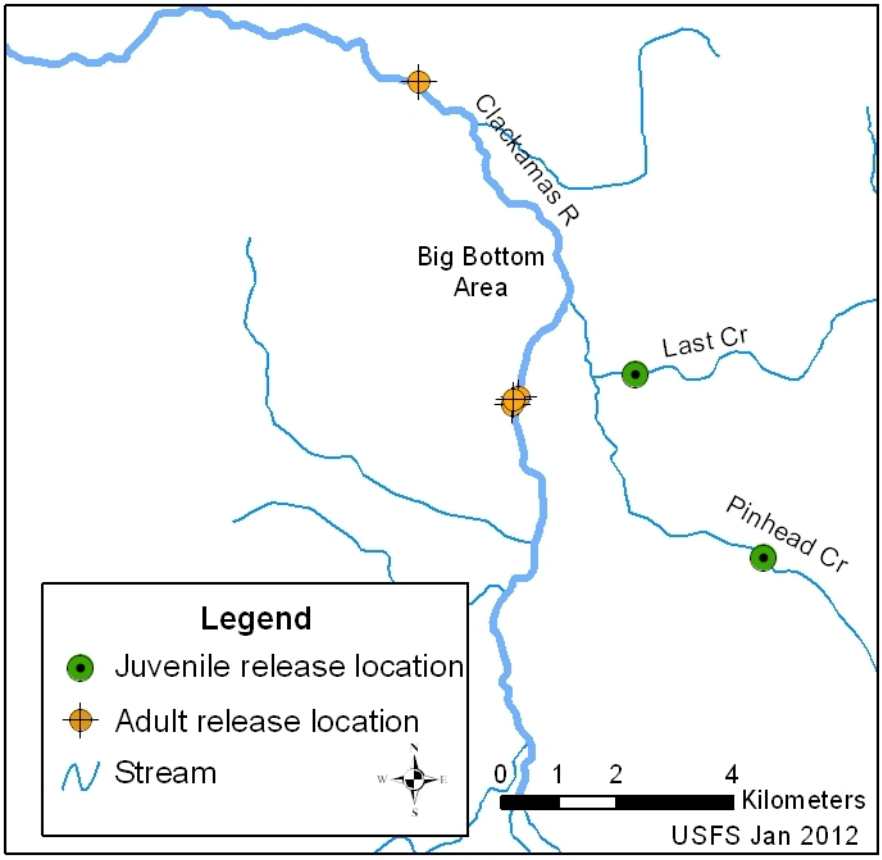


**Figure 2.** Release locations of juvenile, subadult, and adult bull trout in the upper Clackamas River.

**Automated telemetry/PIT tag monitoring sites**

Automated telemetry and PIT tag monitoring sites were distributed throughout the Clackamas River from the downstream most site, Rivermill Dam, upriver to the Cub/Berry Creek confluence (Figure 3). Sites were chosen to adequately cover the expected distribution of subadult and adult bull trout in the Clackamas River (Table 2), and to determine whether anadromous salmonids were being opportunistically predated by radio-tagged bull trout.

Each automated monitoring site was powered by AC power, or DC power when AC power was unavailable. All sites were housed in waterproof environmental enclosures and logged data continuously. The DC powered sites consisted of two 12-V 104 Amp hour (Ah) batteries that had enough stored power to run for approximately 21 days in the absence of power generation. Battery banks were charged via hydroelectric generators and/or photo voltaic charging systems. Each site was visually checked at least once per week to prevent data loss or monitoring interruption. Each battery charge was also checked at that time using a hand

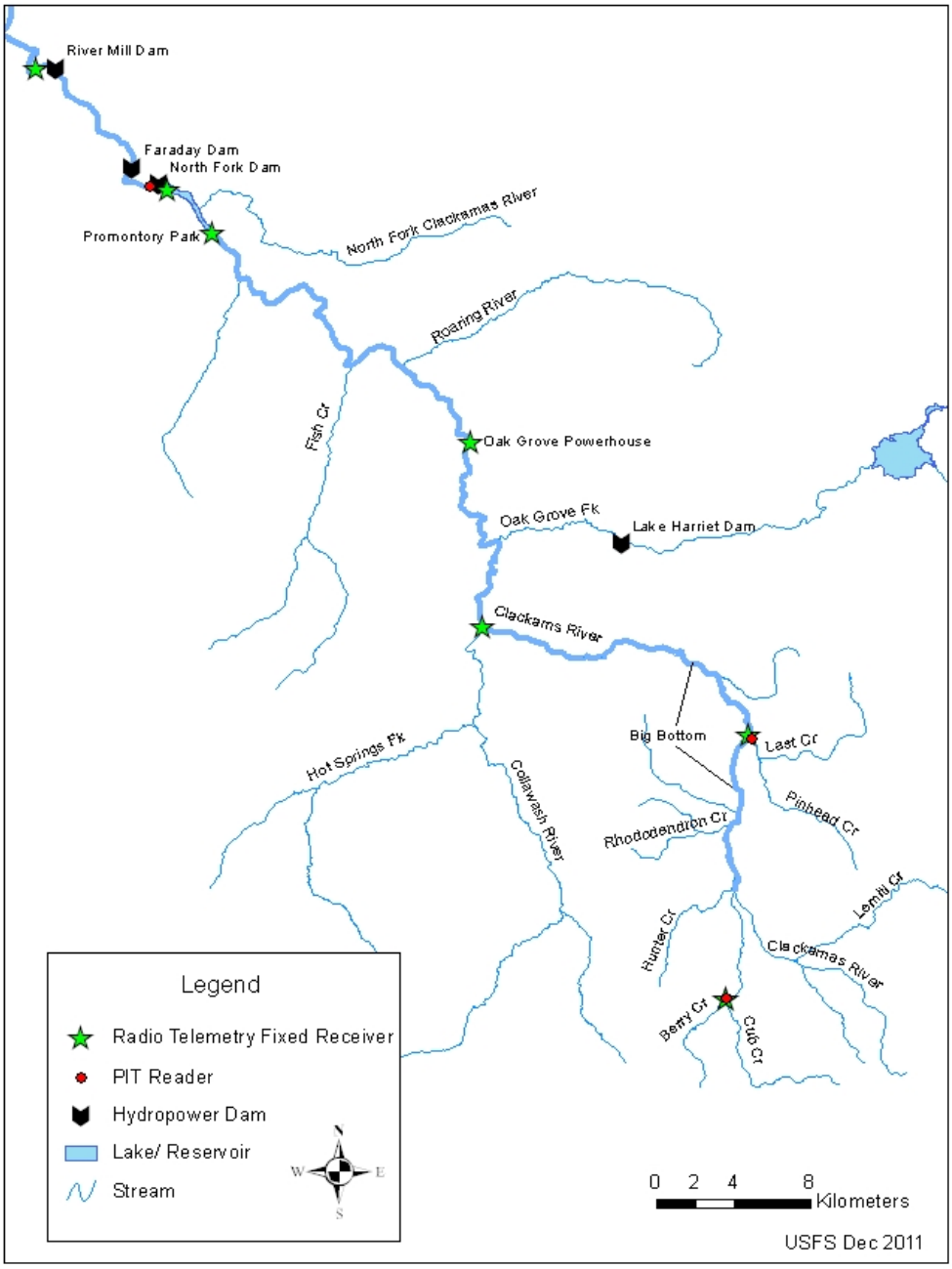


**Figure 3.** Location of automated radio telemetry and PIT tag monitoring sites within the study reach of the Clackamas River.

**Table 2**. This table includes site names, brief rational of site inclusion, operational dates, and distribution of automated telemetry sites in the Clackamas River watershed.

| Site Name | Site Purpose | Operational Dates | River Kilometer |
|---|---|---|---|
| Rivermill Dam | River emigration/anadromous predation prevention | June 30, 2011 – Present | 37 |
| North Fork Dam | Anadromous predation prevention | June 30, 2011 – Present | 48 |
| Promontory Park | Reservoir occupancy | June 30, 2011 – Present | 51 |
| Oak Grove Powerhouse | Downstream/upstream occupancy | June 30, 2011 – Present | 77 |
| Collawash/Clackamas river confluence | Downstream/upstream occupancy | June 30, 2011 – Present | 92 |
| Pinhead Creek | Downstream/upstream occupancy, spawning indication | June 30, 2011 – Present | 109 |
| Cub/Berry creek confluence | Downstream/upstream occupancy, spawning indication | August 25, 2011-October 19, 2011 | 127[1] |

[1]This is an estimated linear measurement for descriptive purposes because it is a tributary to the Clackamas River and runs somewhat parallel to the mainstem of the river (see Figure 3).

held voltmeter to ensure there was an adequate charge to run until the next weekly service check. During the expected peak outmigrations of anadromous salmonids (e.g., October 15 – December 15, and April 15 – June 15) fixed telemetry sites in the High Vulnerability Zones (HVZs), as determined by the Stepwise Impact Reduction Plan (SIRP, NMFS 2011; USFWS 2011a), were checked and downloaded twice weekly to determine whether bull trout were overlapping in space with smolts outmigrating from the upper Clackamas River.

**Mobile telemetry**

We monitored the behavior of tagged fish by manually tracking from a truck, plane, and on foot. A location census of radio-tagged individuals was conducted twice weekly during the suspected spawning season (late August-early October). This census was typically made by driving from the downstream most point in the study area (North Fork Reservoir), to the upstream most point in the study area (upper Cub Creek) in an attempt to locate each radio-tagged adult. These censuses were conducted three to four days apart. When individuals were not located during this survey, the remainder of the week's effort was focused on locating each

missing fish. Each tributary believed capable of accommodating bull trout at any life stage (70 – 650 mm bull trout) was searched because if an area was not searched, we could not confirm fish presence or absence for that region. A record was maintained of the time spent searching each region. These tributaries include but were not limited to: Oak Grove Fork of the Clackamas River, Collawash River, Cabin, Pinhead, Lemiti, Olallie, Squirrel, Cub, Hunter, Fawn, Rhododendron, Lowe, and Kansas creeks. Due to concerns of anadromous predation and scientific interest in reintroduction success (Monitoring Objectives 2 & 3; USFWS 2011a), missing fish were located as soon as possible, especially during anadromous smolt congregation/emigration and suspected bull trout spawning migration i.e., April 15 – June 15 and October 15 – December 15.

Given limitations in the total effort available for radio tracking activities, tracking was prioritized based on the projects goals. The highest priority was to detect fish in the HVZ. The next priority was to obtain relatively precise (accurate enough to observe paired bull trout) locations of fish in tributaries during the spawning season. Throughout the suspected spawning season (late August - early October), priority was given to precisely locating individuals that were utilizing tributaries and Clackamas headwater reaches. These individual locations were given a higher priority than precisely locating individuals in downstream reaches, or individuals that were suspected mortalities downstream of Big Bottom. Other criteria that designated individuals higher priority than others included (based on observations obtained during biweekly location censuses); directional movement toward or occupancy of HVZs, long upstream migrations, close proximity to suspected spawning tributaries, and suspected staging behavior (occupancy of the same location for several censuses).

After individuals in tributaries were accurately located, snorkeling crews consisting of one or two researchers attempted to make visual observations of fish behavior. Snorkeling crews were specifically looking for evidence of tag loss, pre- or post-spawning mortality, overall appearance of health, interactions with other bull trout in the immediate area, interactions with other species of fish, redd construction, habitat use, and fish reaction to surveyor presence. All bull trout snorkeling observations were recorded in narrative format, and included a description of habitat, time spent hiking from the road, time spent in the water, time of day, date, and water temperature.

Aerial telemetry was the most effective method of quickly locating missing individuals or individuals that had left the primary search region (i.e., anything downriver from Rivermill Dam and upriver from the Clackamas River FS4670 road bridge). Aerial detection efficiency was evaluated by placing eight “beacon” tags throughout the Clackamas River and tributaries (in North Fork Reservoir in deep water under power lines, in a small tributary under a large rock, near a tributary in a hollow cavity at the base of a tree, under a bridge on the Collawash River, in a riffle near Austin hot springs under dense forest canopy, in four inches of water next to a metal bridge footing on the upper Clackamas River, hanging from an alder branch out of water in the

headwaters of the Clackamas. Flight path and search region were recorded to ensure adequate geographic coverage.

### Survival

Mortality was determined by visual confirmation or by repeated observation of an individual in the same area for more than a week. Specific cause of mortality was not determined. Often only the bare tag was found in shallow water or just above the water line.

### Spawning

We monitored for spawning activity using a range of methods, including automated PIT tag monitoring sites installed at the mouth of Pinhead and Cub/Berry creeks, manually tracking radio tagged fish into the spawning tributaries, direct observation of spawning fish, and single pass redd counts.

# Results

## Implementation

### Donor population monitoring

The fall redd surveys conducted on the donor stock in the Metolius detected 532 redds in the fall of 2011. Based on this redd count the estimated number of spawning adults is 1,224 which is above the minimum threshold of 800.

### Pathogen screening

In the fall of 2010, 59 adult bull trout were collected for pathogen screening and all tested negative for IHNV and BKD. Additionally 151 bull trout fry were screened for pathogens from February through June 2011 (which were collected from a screw trap at the confluence of the Metolius with Lake Billy Chinook in a rotary trap, and from Jack Creek via electrofishing). All fry tested negative for IHNV.

## Monitoring

There were three releases of subadult and adult bull trout, on June 30 (N= 36), July 8 (N= 11), and July 15 (N= 11) (Figure 3). Bull trout dispersal was minimal in the first two weeks following release and many fish remained near their original release locations. After this acclimation period, fish began to disperse throughout Big Bottom (Figure 4). Bull trout movement overall increased throughout August and September including dispersal into potential spawning tributaries from August through November (Figure 5).

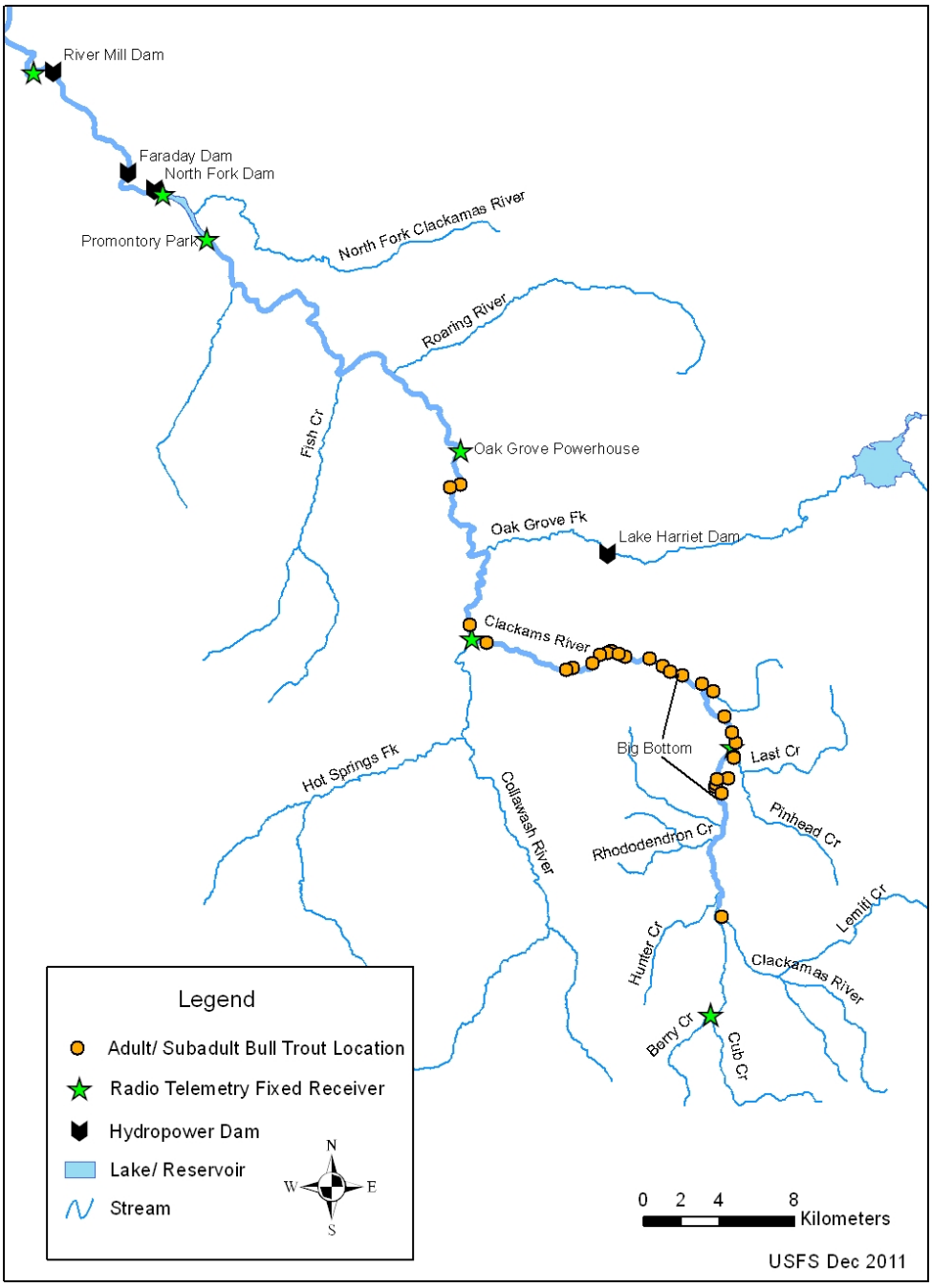


**Figure 4.** August 15, 2011 distribution of bull trout. Each yellow dot represents a unique bull trout.

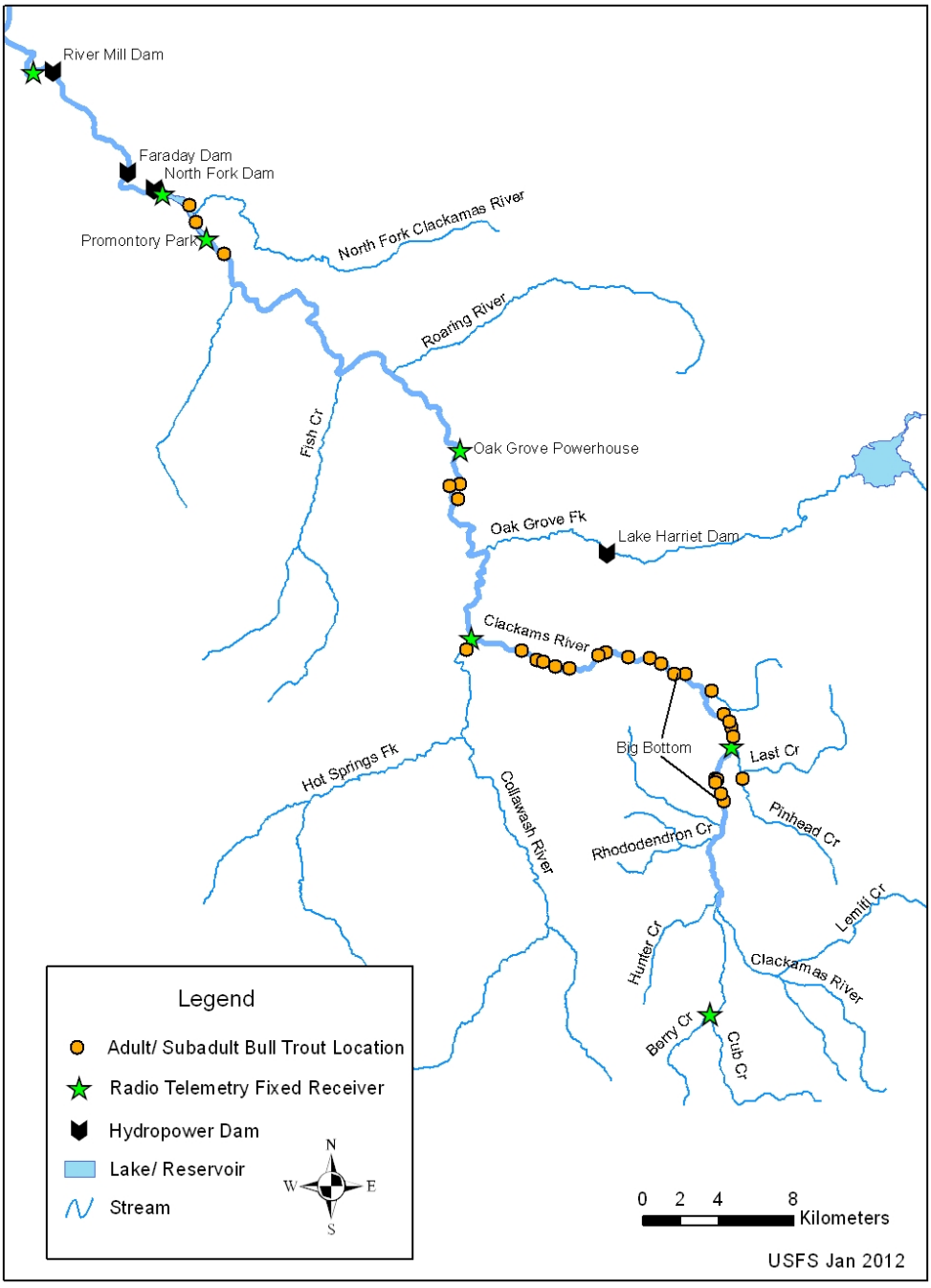


**Figure 5.** October 15, 2011 distribution of bull trout. Each yellow dot represents a unique bull trout.

**Survival**

We documented 20 mortalities of adult or subadult fish between project initiation through December 15, 2011. The median size of all subadults and adults was 470 mm TL (N= 58) versus 465 mm TL (N= 20) for the mortalities (lengths measured at release). Many of these (15) died in the first month post release, suggesting that they died from handling stress, surgical complications, or susceptibility to predation shortly after they were released in the river. In addition, we suspect that some bull trout were captured by anglers based on the location at which tags were recovered.

**Spawning**

Bull trout were congregated in the Big Bottom reach of the Clackamas River and in Pinhead Creek during the putative spawning period. There were a number of problems in determining if bull trout spawning occurred in Big Bottom: 1) because this was the release location, there was no spawning migration, 2) there were numerous anadromous salmonids spawning, so redds could not be differentiated, and 3) the many channels and deep water made surveying the reach for redds impractical. Between early September and late November, 21 of the 58 (36%) subadult/adult bull trout migrated into Pinhead Creek (Figure 6). Pinhead was the only tributary, based on radio tracking, that drew more than an occasional visit from adults during the suspected spawning period.

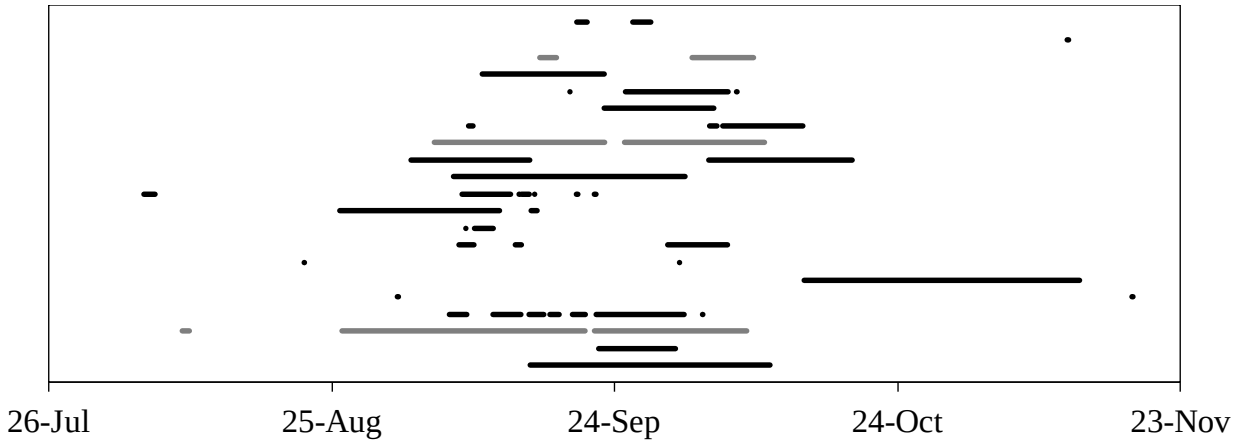


**Figure 6.** Bull trout occupancy of Pinhead Creek (N=21 individuals) in 2011. Each line depicts the length of time an individual fish was known to be in Pinhead Creek based on PIT detections at the mouth of the stream and mobile tracking records in Pinhead and the Clackamas River. Grey lines depict fish observed engaged in spawning activity.

Migration into Pinhead Creek did not seem to be dependent on release location, but a higher proportion of adults (16 of 32, 50%) than subadults (5 of 26, 19%) migrated into Pinhead.

Bull trout in Pinhead Creek came from each of the four release locations. Of the 21 bull trout that migrated into Pinhead Creek, 13 were released at the FS4670 road side channel, 6 were released in proximity to the FS4670 road bridge, and 2 were released in a back channel in lower Big Bottom (Figure 2).

Spawning was observed in Pinhead Creek on two occasions by the telemetry ground crew. Spawning was first observed on October 4th. Two bull trout, 515 mm TL and 470 mm TL, were observed paired and engaged in spawning behavior and a third bull trout, 440 mm TL, was in the vicinity. On October 6th, the same two fish had moved approximately 50 m downstream and were observed actively constructing a redd. Afterwards, we concluded that the first attempt had resulted in a test redd, but the second attempt had resulted in a completed redd.

A single-pass spawning survey was conducted on Pinhead, Last, and Fall Creeks on October 14th. A three-person crew surveyed Pinhead from the mouth to the Pinhead/Last confluence, a two-person crew surveyed Pinhead Creek 1 km upstream of Last Creek and 0.3 km of Fall Creek, and a single person surveyed 2 km of Last Creek. In total, five redds were observed, including the one observed by the telemetry ground crew (Figure 7). The remaining four redds are suspected to have been created by bull trout, but because fish were not observed on the redds, it is possible that they were built by coho or Chinook salmon, which, while not observed during our survey, are also present in the upper Clackamas River during this time (Todd Alsbury, ODFW District Fish Biologist personal communication).

**Juvenile outmigration**

Of the 58 juveniles released in the Pinhead Creek complex, 10 were detected outmigrating at the PIT tag interrogation site at the mouth of Pinhead Creek from June 30 to July 30, 2011. No other juvenile fish were detected after this period.

**High Vulnerability Zone (HVZ) occupancy**

We recorded the presence of seven individuals on the North Fork Dam automated telemetry array, indicating that these fish entered a designated HVZ. However, the cumulative time bull trout spent in any HVZ was low (5 h 28 min and 37 s of occupancy) from June 30, 2011 to December 15, 2011. At no time was more than one bull trout present in the HVZ. The maximum occupancy of any individual was 1 h 59 min and 8 s.

Two individual bull trout swam downstream through the Clackamas River Hydro Project (October 13th and 30th). Each fish entered the juvenile pipeline and traveled the entire distance in less than two hours, which is consistent with PGE evaluations of the travel time through the pipeline with PIT tagged hatchery rainbow trout and wild Chinook smolts (Nick Ackerman PGE Fisheries Biologist, personal communication). Based on fixed-telemetry data, neither fish occupied either the entrance, North Fork Dam forebay, or the exit, Rivermill Dam tailrace, for longer than an hour. Smolt outmigration densities during those days were less than three

juveniles on October 13 and zero juveniles on October 30 (Nick Ackerman PGE Fisheries Biologist, personal communication).

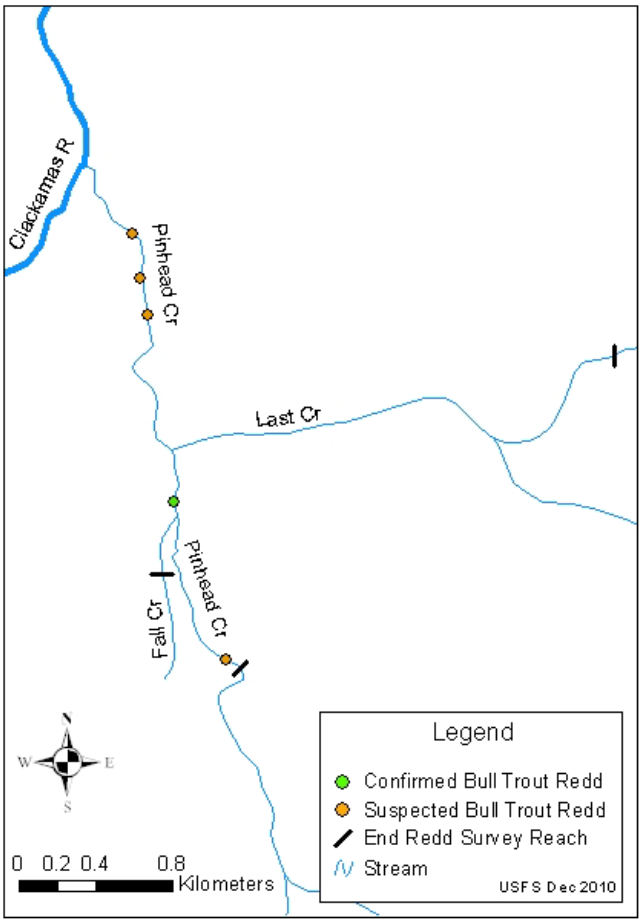


**Figure 7.** Location of suspected and confirmed bull trout redds (based on a redd survey and direct observations).

## Aerial Detection efficiency

Only one aerial flight occurred during the fall monitoring season on September 28, 2011. Seven of the eight beacon tags were detected by the aerial crew. The tag not detected was submerged in the water under a large fallen log in Last Creek.

The aerial crew was specifically looking for fish that had evaded detection by mobile ground crews. At the time of the flight, there were three missing individuals. One of which was located during the flight in the upper Clackamas near river kilometer 120. This fish was last detected at the fixed telemetry site at Pinhead Creek on September 27. Another individual was last detected by the mobile crew in a popular fishing pool in the mainstem Clackamas (upstream

of Austin Hot Springs) adjacent to Route 211 on August 1, and the other was detected passing through the juvenile migrant pipeline migrating downstream past Rivermill Dam on October 13, 2011.

# Summary

## Implementation

In general the collection and transfer of adult and subadult fish was successful. We were within 10% of the numerical targets for transfer of these life-stages. The relatively high mortality post release is of some concern, and we propose to attempt to further minimize handling/stress in 2012. In addition, fish will be treated with azithromycin and oxytetracycline to further reduce the likelihood of disease. In contrast, the collection of juvenile fish was less successful. We transferred substantially fewer juvenile bull trout (58) than proposed (1000). There were a number of difficulties encountered during this initial year in collecting the target number of juveniles including: low density of juveniles in tributaries due to early emigration, low conductivity and high water velocity resulting in low electrofishing efficiency, and conflicts with other fisheries efforts. We expect to address this in 2012 by installation of screw traps in spawning tributaries and beginning collection efforts prior to the time of emigration. With respect to the size of individuals transferred, the proposed size criteria were generally adhered to for juveniles (70 – 250 mm) with the exception of one tagging event where five individual bull trout exceeded the juvenile size criteria. These lengths were 270, 276, 289, 292, and 305 mm which technically classify these fish as subadults. However, only 53 other juveniles were released of the proposed 1000 and 26 other subadults of the proposed 30 were released in 2011, so we feel this is not a substantial deviation from the proposed plan. This will be more closely monitored in the future as collection and transfer protocols are refined. As our proposed transfer quotas of 30 subadults and 30 adults neared completion, we attempted to obtain a more accurate estimate of length upon capture, prior to transporting fish to Round Butte, to ensure we were not hauling fish unnecessarily. It proved difficult to obtain accurate lengths without anesthesia, and we may consider mild anesthesia with MS222 in the future. There were 32 bull trout (251-310 mm) that were captured in the Onieda trap nets that exceeded the size criteria for juveniles that were ultimately returned to Lake Billy Chinook.

The implementation of the first year of the Clackamas bull trout reintroduction followed a multi-year, multi-agency planning effort and represents a significant first step in the reestablishment of bull trout into the native fish community of the Clackamas River.

## Monitoring

Our monitoring program provided a great deal of information on movement and suggests the majority bull trout survived the initial months following the translocation and that the majority of subadults and adults remained in the upper Clackamas Basin upstream of PGE’s

hydroelectric project. We observed minimal reservoir occupancy and almost no HVZ occupancy. The fall dispersal of adults into potential spawning tributaries, particularly Pinhead Creek, and the documentation of spawning by one pair and observations of other potential redds greatly exceeded our expectations for this first year and provided strong initial evidence that translocated bull trout will adapt and reproduce in the Clackamas River. While the intensity of monitoring has been reduced during the winter 2012, it is occurring and information collected will be summarized in the Project's year-two progress report. Consistent with the adaptive management proposal for the Project, we will apply knowledge gained in year-one to various aspects of year-two, including timing and methods of donor collection, tagging, transport and release, and the monitoring of translocated bull trout in the Clackamas River. That said, the primary components of the Project, including the implementation strategy (e.g., donor stock, life stages, and quotas) and the monitoring and evaluation program, remain as described in the Implementation, Monitoring and Evaluation Plan (USFWS 2011a)

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