PROGRESS REPORTS

2007

FISH DIVISION

Oregon Department of Fish and Wildlife

Hood River Bull Trout Abundance, Life History, and Habitat Connectivity, 2007.

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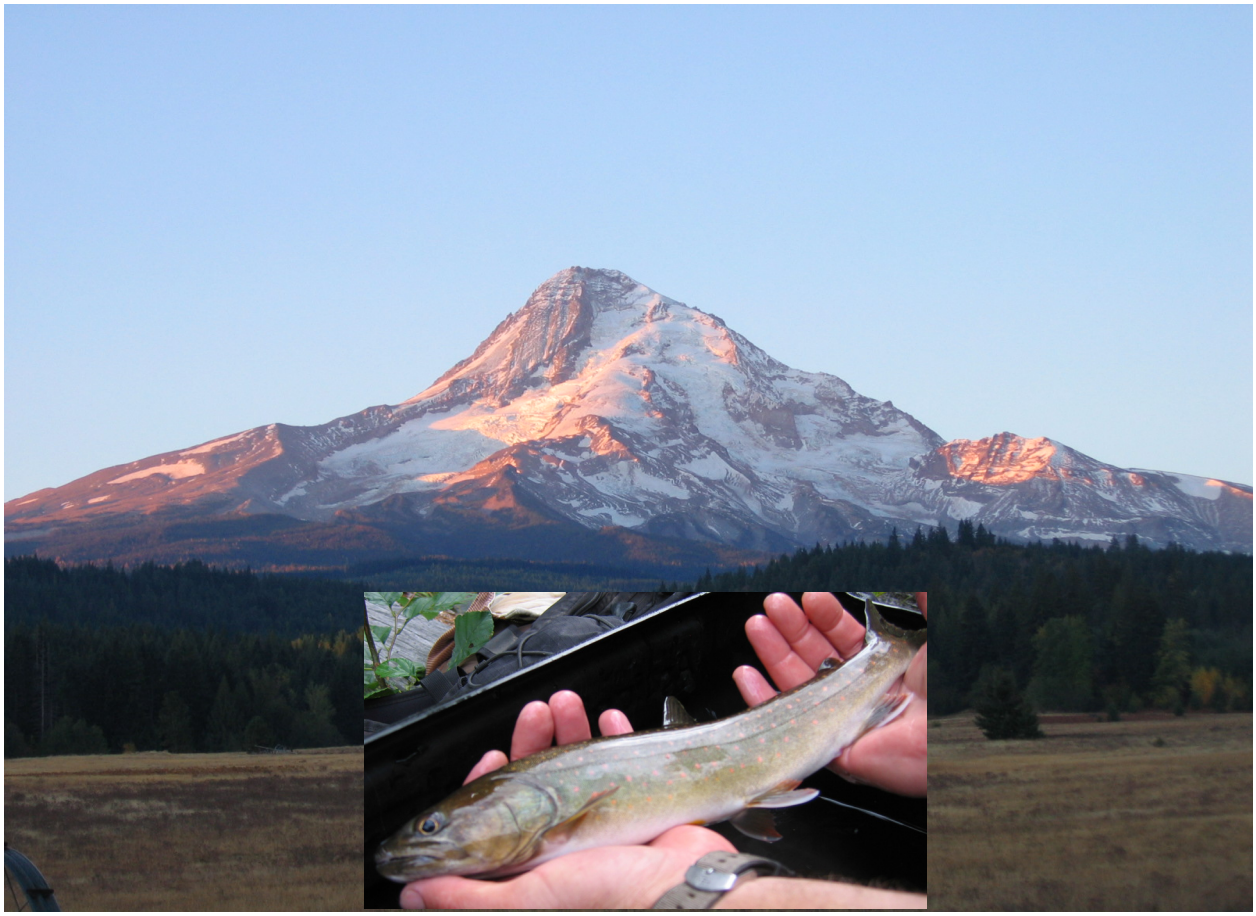

Steven J. Starcevich and Steven E. Jacobs
Native Fish Investigations Project
Oregon Department of Fish and Wildlife
Corvallis Research Lab, Corvallis, Oregon

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CONTENTS

INTRODUCTION

Hood River bull trout are thought to exist as two independent reproductive units (USFWS 2004), known as local populations (Rieman and McIntyre 1995). The Clear Branch local population is isolated above Clear Branch Dam, which provides limited downstream fish passage during infrequent and sporadic periods of spill and no upstream passage. Bull trout in this population inhabit Laurance Lake Reservoir and tributaries upstream of Clear Branch Dam. The Hood River local population occurs in the mainstem Hood River and Middle Fork Hood River downstream of the Clear Branch Dam and a small number of adult bull trout migrate each year into the Hood River from the Columbia River (Figure 1). The status of both populations is extremely precarious. The Clear Branch population is at risk of a random extinction event due to low numbers, negative interactions with non-native smallmouth bass, isolation and limited spawning habitat (USFWS, 1998). The Hood River population also appears to be small and is threatened by passage barriers, unscreened irrigation systems, impaired water quality and periodic siltation of spawning substrate by glacial outbursts.

Clear Branch bull trout spawn in Clear Branch and Pinnacle Creek. After rearing in these two natal streams for an unknown time period, most are believed to migrate downstream to Laurance Lake Reservoir. Clear Branch bull trout have been documented passing over the dam spillway during high water events (Pribyl et al. 1996) and may provide a recruitment source for the Hood River local population. Adult bull trout tagged at Powerdale Dam have been observed at Coe Branch irrigation diversion and in a trap at the base of Clear Branch dam. These fish may have been attempting to reach spawning areas located upstream of the dam. However, the success of bull trout migrating downstream via the spillway or the possibility of successfully navigating through the diversion network has never been determined. Depending on the water year, the Middle Fork Irrigation District (MFID) may not spill at all, or the timing of the spill may not coincide with the timing of downstream migration, which is currently unknown (East Fork Hood River and Middle Fork Hood River Watershed analysis).

Smallmouth bass were discovered in Lake Laurance Reservoir in the 1990s. Creel surveys have shown that large adult bass are caught occasionally in the reservoir and schools of bass fry have been seen by district fish biologist (Rod French, ODFW, personal communication), suggesting that they are spawning successfully. This illegal introduction poses a potential threat to the Clear Branch bull trout population, but its magnitude is unknown because the bass population size and the degree of interaction between the two species are unknown. Bull trout and smallmouth bass have significantly different temperature preferences and tolerances, with bull trout being one of the most sensitive coldwater species and bass being a warmwater species. Lake Laurance, a relatively high-altitude reservoir at 890 m (2,920 feet), does not provide ideal bass habitat so these two species may have largely non-overlapping distributions or differing activity periods (Terry Shrader, ODFW warmwater fish biologist, personal communication). However, based on past reservoir temperature data (Berger et al. 2005), there are periods in the reservoir when there is potential for bull trout and bass interaction: periods when bull trout are susceptible to bass predation and when juvenile fish might compete for resources.

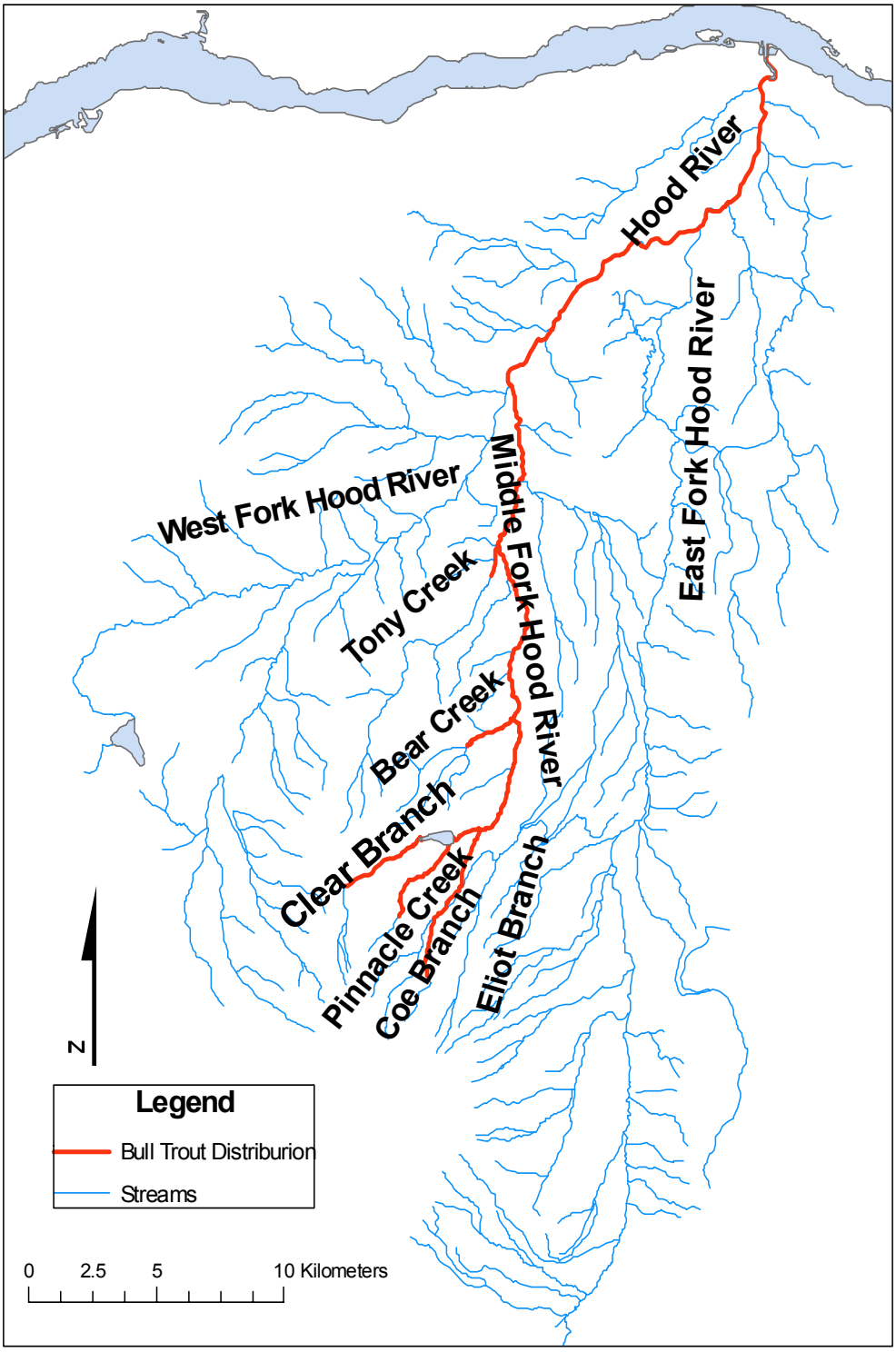

Figure 1. Map of the Hood River Basin showing the suspected distribution of bull trout.

Spawning activity of the Hood River local population has been observed in a few locations within the Middle Fork of Hood River (Figure 1). Although consistent and extensive spawning areas for this population are not known, some of the locations where juvenile rearing or potential bull trout redds have been observed include the Middle Fork Hood River and some of its tributaries: Bear Creek, Compass Creek and Coe Branch (USFWS 2004). However, Coe Branch, Compass Creek, and the Middle Fork are glacial streams with a high volume of sand and silt which may compromise spawning success. No bull trout spawning or rearing has been observed on the East and West Forks of Hood River. The Middle Fork and mainstem Hood River provide foraging, migration and overwintering habitat.

Hood River bull trout are also known to migrate into the Columbia River. Two bull trout tagged at Powerdale Dam (RK 7.2 of mainstem Hood River) were recovered near Drano Lake in Washington State; and one was captured 11 kilometers downstream of the confluence of the Hood and Columbia Rivers (USFWS 2004). Every year (usually between May and July), adult bull trout, presumably migrating upstream from the Columbia River, are captured and anchor-tagged at Powerdale Dam. Although some of these tagged fish have been observed upstream (one in Coe Branch and three below Clear Branch dam), the spawning destination of fluvial adults within the Hood River basin is largely unknown.

Dispersing juvenile bull trout and migrating adults in this local population are threatened by flow diversions with inadequate screening and passage facilities. Several structures are suspected to impede upstream migration or entrain juvenile and adult bull trout into irrigation works (Pribyl et al. 1996, HRWG 1999). These structures include: the diversion at Clear Branch Dam (passage and screening), Coe Branch (passage and screening), and the Farmers Irrigation District diversion (screening) on the mainstem Hood River (HRWG 1999). However, little research has been conducted to assess the impacts of these structures on migrating bull trout.

Beyond a general knowledge of the distribution of Hood River bull trout and the nature of anthropogenic factors that potentially restrict their life history and habitat connectivity, little is known about this recovery unit. Baseline information about adult abundance is lacking for both local populations, the potential of a source (Clear Branch) and sink (Hood River) relationship between the two local populations has not been explored, and the migratory life history of adult fish caught at Powerdale Dam is unknown. The degree to which irrigation and hydropower diversions hamper connectivity within the Hood River basin is also poorly understood. Migratory life histories have been viewed as key to populatioin persistence (Rieman and McIntyre 1995; Dunham and Rieman 1999), and understanding movement patterns and associated habitat requirements are critical to maintaining those migratory forms (Muhlfeld and Morotz 2005; Hostettler 2005). This information is also critical to evaluating bull trout recovery in the Hood River Subbasin (Coccoli 2004).

The Oregon Department of Fish and Wildlife (ODFW) initiated a study in 2006 to improve our understanding of the abundance, life history, and potential limiting factors of the bull trout in this recovery unit. This report describes findings for the first two years of the study (2006-2007). Specific study objectives for the first two years were:

1. Determine the migratory life history of Hood River bull trout and assess the potential impacts of flow diversions and two new falls on the Middle Fork Hood River (scoured by the November 2006 glacial outburst) on bull trout migrations.

2. Determine current distribution of bull trout reproduction and early rearing in historical and potential bull trout streams in the Hood River Subbasin.

3. Determine the juvenile and adult life history of the Clear Branch local population and develop a statistically reliable and cost-effective protocol for monitoring the abundance of adult Clear Branch bull trout.

4. Assess the potential impact of smallmouth bass on bull trout in Laurance Lake Reservoir.

METHODS

Hood River Local Population Life History

Movement patterns of adult bull trout captured at Powerdale Dam were tracked with Passive Integrated Transponder (PIT) tag technology in 2006 and both PIT-tags and radio telemetry in 2007. In both years, upstream migrating fish were captured at Powerdale Dam (RK 7.2), anesthetized, measured, weighed, and given PIT-tags (Texas Instruments, Inc., 23mm, half-duplex) by making a small (<1 cm) incision at the base of, and perpendicular to, the dorsal fin and inserting the tag into the dorsal sinus. In 2007, radio transmitters (Lotek, Inc., coded nanotags, 200-day battery life) were surgically implanted into the interperitoneal cavity.

Half-duplex PIT-tag reader (Oregon RFID) and antenna arrays were set up to detect movement of PIT-tagged fish. Arrays were installed in two locations in 2006: 1) Middle Fork Hood River near the town of Dee (RK 26), and 2) Coe Branch–Clear Branch confluence (RK 39), which is about 1 km downstream of Clear Branch Dam. Also, in 2006, because of repeated malfunctions with the Coe Branch-Clear Branch confluence PIT-tag reader, an upstream-migrant weir trap was installed 200 m downstream of Clear Branch Dam to monitor adult homing toward upper Clear Branch. In 2007, in order to monitor movement over the two new falls on the middle fork (Figure 3), the Dee PIT-tag array was installed about 200 m downstream of the first new 3-meter falls and last year's site, and a third array was added on the middle fork upstream of the Tony Creek confluence (RK 28), which is about halfway between the two falls. All the arrays were installed and running by the end of May. They were tested weekly and downloaded every two weeks.

Radio-tagged bull trout were tracked by vehicle or by foot at weekly intervals. GPS coordinates and a description of the habitat were recorded when a tag was located. These coordinates were converted to river kilometers.

Current Known Bull Trout Distribution

Electrofishing distribution surveys were conducted in April and May on Eliot Branch, Coe Branch and its unnamed tributaries, and Compass Creek to assess the current distribution of bull trout and determine where future monitoring should be focused. Electrofishing surveys consisted of a single-pass directed upstream throughout all habitat units and subunits (pockets) likely to provide rearing habitat. Exploratory redd surveys also were done in several potential bull trout streams in the Hood River subbasin. These surveys were scheduled to coincide with peak spawning in Clear Branch.

Clear Branch Local Population Life History and Abundance

Weir traps spanning the active channel of Clear Branch were used to monitor movements between the creek and reservoir and to mark adults for population estimates. The weirs consisted of fixed screened panels arranged in a "V-shape" across the stream channel with a fyke trap located in the center. The upstream-migrant weir trap was located in a pool tailout about 500 m upstream of the reservoir. At the head of the same pool, about 20 m upstream, we installed a downstream-migrant weir trap to capture fish moving from the creek to the reservoir. All bull trout captured were measured for fork length and scanned for PIT tags. Untagged bull trout over 100 mm fork length were given a PIT-tag (interperitoneal cavity). In order to calculate trap efficiency, bull trout PIT-tagged in the downstream-migrant weir trap were released in a pool 100 m upstream of the traps and their recapture noted on the data sheet. At the Clear Branch upstream-migrant trap, all adult bull trout captured were given interperitoneal (fish between 180 and 300 mm fork length) or dorsal sinus (>300 mm) PIT-tags to gain a better understanding of Clear Branch adult life history (e.g., repeat spawning, migration timing).

To estimate the abundance of adult bull trout (>180 mm in fork length) in Clear Branch we used a two-fold approach. First, we counted the number of lacustrine-adfluvial adult bull trout by maintaining the upstream-migrant weir trap from June or July to the end of spawning (November). Second, a population estimate was conducted in Clear Branch upstream of the weir traps to estimate the abundance of stream-resident adult bull trout or early adults migrants that had moved from the reservoir and upstream of the traps before they were installed.

In 2006, a single-pass electrofishing mark-recapture protocol was used to estimate bull trout abundance in Clear Branch. The assumptions of the Lincoln-Peterson mark-recapture model are 1) a closed population, 2) random distribution of marked and unmarked fish, and 3) the same capture probability between marked and unmarked fish (White et al. 1982). To ensure a closed population, the downstream-migrant weir trap, which blocked the entire stream, was checked each morning for marked and unmarked bull trout, and the pool between this trap and the upstream-migrant trap was electrofished before and after the sampling to determine if bull trout were passing the weir trap. To meet the random distribution assumption, the marking phase consisted of a single pass by two electrofishing teams throughout the entire bull trout distribution upstream of the trapping site. Finally, to reduce the chance that marked and unmarked fish will have differing capture probabilities, marked bull trout were given at least 48 hours to recover before the recapture phase began. During the marking phase, fish were given upper caudal clips, measured for fork length, and then released near the capture location. The recapture phase goal was to count all marked and unmarked bull trout, measure fork lengths, and estimate juvenile and adult abundance.

In 2007, to avoid handling of juvenile and early adult migrant bull trout and cutthroat trout and focus the population estimate solely on adult bull trout, we used a mark-resight snorkeling protocol. At the upstream-migrant trap, all adults were given an upper caudal fin hole-punch and released in a large pool about 100 m upstream of the traps. Day and night snorkel surveys were conducted to determine the most effective time for mark-resight population estimates on Clear Branch. All bull trout observed were counted, with adults and juveniles (<180 mm fork length) tallied separately. For each adult fish, body length was estimated (and when possible measured with a graduated staff) and presence or absence of a caudal hole-punch was recorded. Paired day and night surveys were done 48 hours apart so that disturbed fish would have time to resume normal behavior and each paired survey had a similar number of marked fish in the study area. All pool channel units and subunits large enough for an observer were

snorkeled. Equal effort was expended on each survey. To increase replication and remove interobserver variation as a source of error, all snorkel surveys were done by the same person.

Smallmouth Bass in Lake Laurance Reservoir

Two sampling methods were used to learn more about smallmouth bass diet and their population age structure and relative abundance in Lake Laurance Reservoir. In an attempt to capture bass during a time when there was the highest likelihood of habitat overlap with reservoir-dwelling bull trout, hook and line sampling was conducted on 12 and 20 June by a group of experienced bass anglers. Secondly, we sampled the reservoir on 20 August at night using an electrofishing boat and the expertise of ODFW warm water fish biologist Terry Shrader.

RESULTS AND DISCUSSION

Hood River Local Population

Powerdale Dam Fish Ladder Trap

In 2006, four bull trout were captured moving from the Columbia River into the Powerdale Dam fish ladder trap on the Hood River**.** These fish were PIT-tagged by ODFW district crewmembers between 22 May and 16 June and ranged from 380 to 580 mm fork length.

In 2007**,** six adult bull trout were captured Powerdale Dam fish ladder. Bull trout were caught between 13 May and 1 July and ranged in fork length from 390 to 530 mm. All were PIT-tagged in the dorsal sinus and two of these also were given interperitoneal coded radio transmitters. One bull trout lost its PIT-tag in the recovery pen before the fish was released. The PIT-tag was found after the release of the fish.

PIT Tag Detections

In 2006, three (of the four) bull trout PIT-tagged at the Powerdale Dam trap (RK 7) were recorded 19 river km upstream at the Middle Fork Hood River PIT-tag reader near Dee (RK 26) between 29 June and 29 July. Travel time for these fish was 27, 38, and 44 days. One of these PIT-tagged fish was captured about 13 km upstream 44 days later at the upstream-migrant trap (RK 39) near the base of Clear Branch Dam.

In 2007, the Dee array detected three (of the five) bull trout PIT-tagged at Powerdale Dam. The first fish (which was also radio-tagged, C33 in Figure 2) took 3 weeks to swim the 19 km to this array, was detected first on 4 July, and was logged regularly until 16 August. The second fish (also radio-tagged, C13 in Figure 2) made the journey in 44 days, reached the Dee array on 10 July, and was last detected on 22 July. The last fish also took 3 weeks to go from the dam to the Dee array, arriving on 12 July, and was detected almost daily until 16 August. The Middle Fork array at Tony Creek did not detect any bull trout, suggesting no PIT-tagged bull trout passed above the first new falls despite spending several days to weeks near the base of this falls (Figure 3).

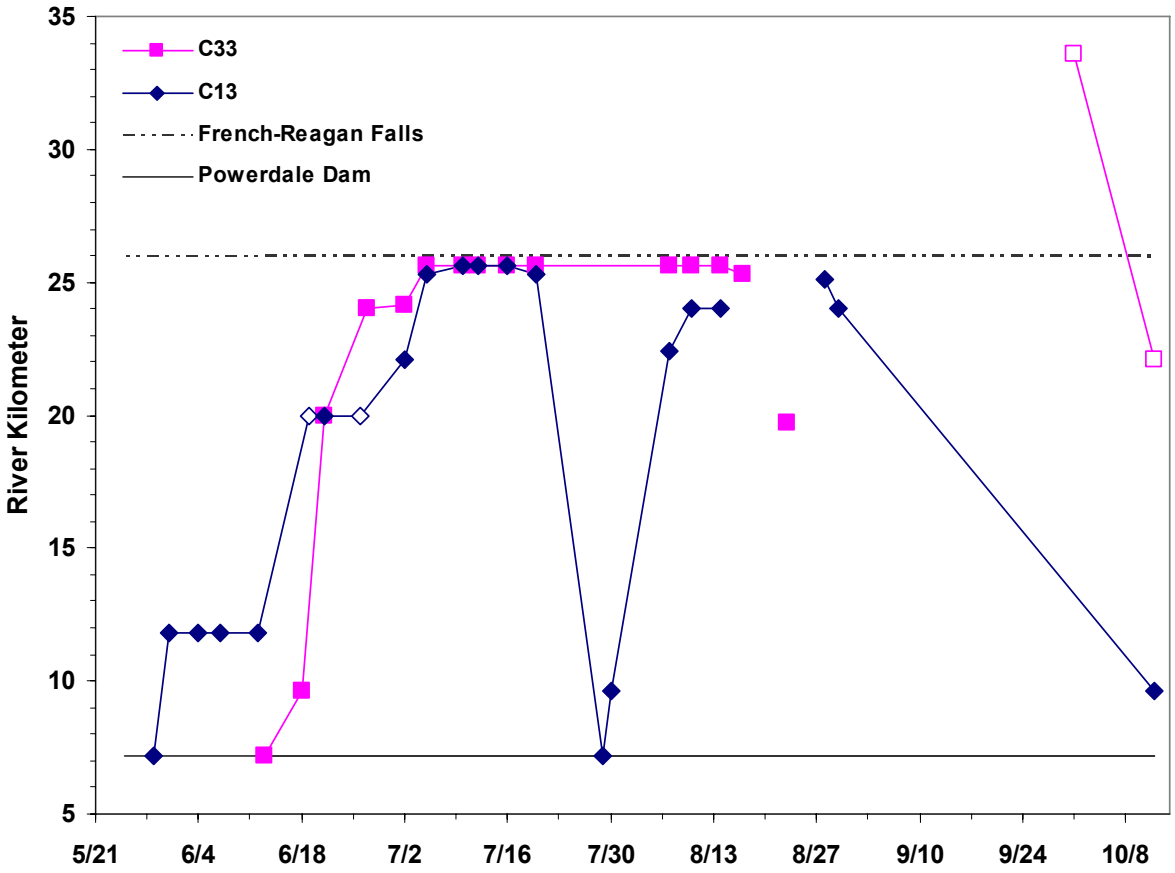

Figure 2. Tracking histories of two bull trout radio tagged at Powerdale Dam fish ladder trap in 2007. Open symbols represent observations in the West Fork Hood River. All other observations were in the mainstem and middle fork. Middle fork joins the mainstem at RK 23.

Figure 3. Two new falls carved out of the Middle Fork Hood River during the flood and debris torrent in November 2006. French-Reagan Falls (left), with 3 m aluminum pole on the right bank for reference, is 26 km upstream of the mouth of Hood River. The second falls (right) is about the same height and 2 km farther upstream.

Also in 2007, the Coe Branch-Clear Branch array (RK 39) detected a single PIT-tag on 26 September. The tag came from an adult fish that was caught in the upstream-migrant trap in upper Clear Branch and tagged 28 July 2006 (294 mm FL). This fish had been recaptured 4 September 2007 (350 mm FL) in the same trap on upper Clear Branch and released upstream. It is very unlikely that this bull trout could get past the traps, move through the reservoir, and pass downstream over Clear Branch Dam, which does not have a fish ladder and did not spill. The most plausible hypothesis is that this fish was preyed upon by a river otter, which carried the PIT-tag in its gut over the Coe Branch-Clear Branch array.

Radio Tracking

In 2007, two adult bull trout radio tagged at Powerdale Dam were tracked at least weekly via streamside and vehicle tracking. Both fish appeared to be delayed at the base of the new falls (French-Reagan Falls in Figures 2 and 3), but never passed upstream, suggesting it may be a barrier to bull trout. Both fish appeared to home to the Middle Fork Hood River and both also used the West Fork Hood River. Fish "C13" (470 mm FL) entered the west fork and spent about two weeks holding in the pool below Punchbowl Falls before spending at least 12 days near the base of the first falls. This fish also fell back downstream, was recaptured ascending the Powerdale Dam fish ladder on 29 July, and moved into the middle fork a second time. "C33" moved quickly to the base of French-Reagan Falls, remained there at least 43 days, and then was lost by the tracker. A tracking flight was scheduled and "C33" was relocated on the west fork, near the Lake Branch confluence.

Current Bull Trout Distribution

Electrofishing surveys were done in April and May in 2006. Two bull trout were captured and PIT-tagged on Coe Branch between the mouth and the Coe hydroelectric/irrigation diversion and two were PIT-tagged in the first 500 meter upstream of the diversion. Otherwise, bull trout were not observed elsewhere on the distribution surveys. Exploratory redds surveys were done on the middle fork tributaries of Tony Creek, Bear Creek, Squeegee Creek, Compass Creek, Coe Branch and one of its unnamed tributaries, Green Point Creek, and Boomer Creek; west fork tributaries McGee Creek and Elk Creek; and the east fork tributary Cold Springs Creek. No bull trout redds were observed during exploratory surveys.

Clear Branch Local Population

Downstream-migrant Weir Trap

In 2006, the Clear Branch downstream-migrant trap was installed about 400 m upstream of Lake Laurance Reservoir. It began fishing 50% of the stream on 24 May. Weir panels were added as the spring flows subsided and the trap fished 100% of the stream by 7 July. The trap was removed on 17 October. In total, 164 bull trout (including recaptures) were caught moving downstream into this trap; 136 juvenile bull trout were caught, averaging 129 mm fork length (range, 88-176 mm); and 124 bull trout (>100 mm) were PIT-tagged (Figure 4). Six postspawning adults were captured in the first half of October. Trap efficiency was not estimated in 2006.

In 2007, the Clear Branch downstream-migrant trap was installed in the same location as in 2006. It began fishing 80% of the stream width on 24 April, a month earlier than last year, and was fishing the entire stream by 29 May (Figure 5). During this time, 42 juvenile bull trout

were captured and used to calculate trap efficiency, which was about 52% (22 were recaptured). A postspawning adult was captured on 28 September. The weir was damaged by a high water event and debris build-up on 2 October. Postspawning adults were able to pass this trap until the weir panels were repaired on 7 October. By 21 October, flow and debris load were too high to continue running this trap. In total, 126 juvenile bull trout were caught moving downstream into this trap. They averaged 123 mm fork length (range, 92-171 mm) and 78 bull trout (>100 mm) were PIT-tagged.

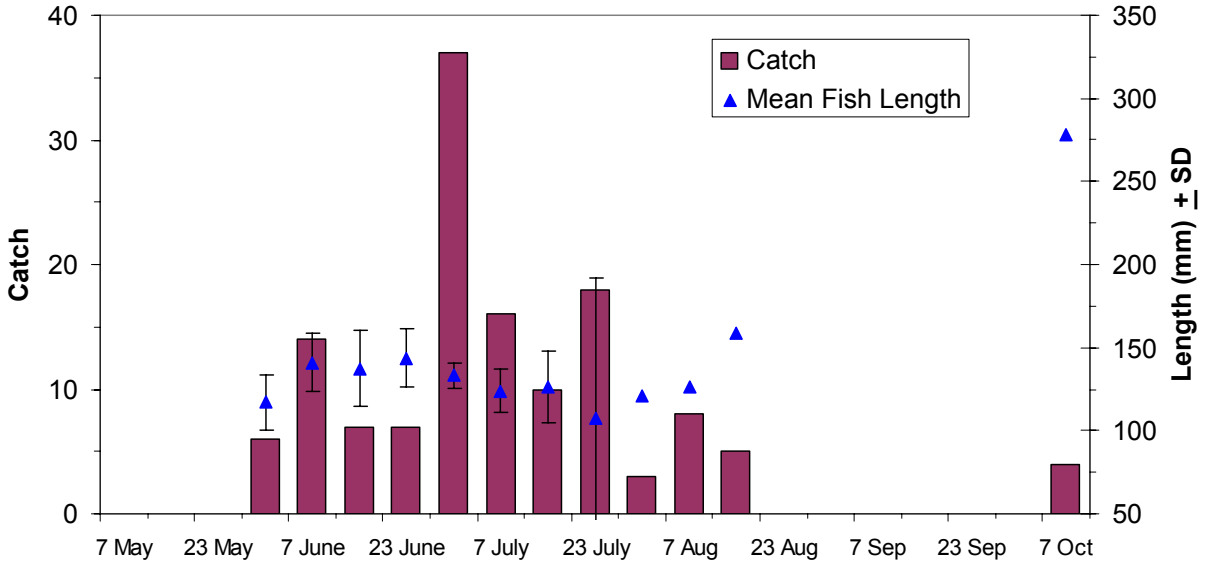

Figure 4. Bull trout captured in Clear Branch downstream-migrant weir trap in 2006. Catches and lengths are grouped by weekly intervals. The trap was installed on 25 May and first intersected the entire channel width on 7 July.

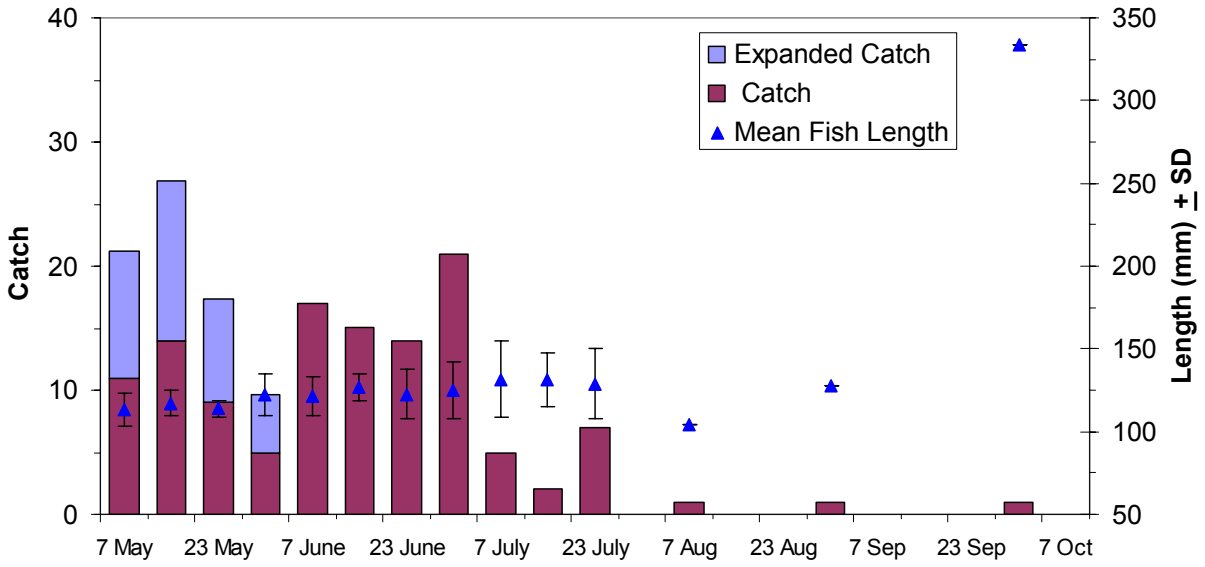

Figure 5. Bull trout captured in Clear Branch downstream-migrant weir trap in 2007. Catches and lengths are grouped by weekly intervals. The trap was installed on 24 April and first blocked the entire channel width on 29 May. Trap capture efficiency was estimated during this period.

Upstream-migrant Weir Trap

In 2006, upper Clear Branch upstream-migrant trap was installed on 7 July and fished the entire stream until it was removed on 20 October. This trap caught 27 adult bull (fork length >180 mm) trout migrating upstream to spawn (Figure 6). The mean fork length was 293 mm (range, 202-545 mm). In 2007, the upstream-migrant trap on Clear Branch was installed on 29 May, more than five weeks earlier than in the previous year (Figure 5). The trap operated continuously until high water events damaged it repeatedly in early October. Adults may have been able to pass this trap without capture between 2 and 7 October and after 16 October; however, the trap continued to catch fish until it was removed completely on 23 October. In total, 90 adult bull trout were captured in this trap, averaging about 284 mm in fork length (range, 192-530 mm).

Eight bull trout were recaptured from last year in the upstream-migrant trap. Three of these bull trout (194-232 in fork length in 2007) were caught outmigrating as juveniles (140-150 mm) in 2006 and likely returned to spawn for the first time in 2007 (Table 1). The other five recaptures, caught moving upstream before spawning or downstream after spawning in 2006, appeared to be repeat spawners in 2007 (Table 1). All recaptured fish grew between the two capture events. On average, length between the first and second capture increased by 27% (range = 3%-61%).

Table 1. PIT-tagged bull trout caught moving upstream (US) or downstream (DS) in 2006 and recaptured in the upstream-migrant trap in 2007.

Initial capture in 2006			Recaptured in 2007		
Date	Migrant trap	FL (mm)	Date	Migrant trap	FL (mm)
6/26/06	DS	150	9/27/07	US	232
6/26/06	DS	143	10/2/07	US	230
7/28/06	US	294	9/4/07	US	350
8/17/06	DS	140	7/20/07	US	194
9/20/06	US	234	8/30/07	US	280
10/3/06	DS	274	8/20/07	US	305
10/3/06	US	380	8/24/07	US	458
10/5/06	DS	277	7/20/07	US	286
7/28/06	US	294	9/4/07	US	350

Spawning Surveys

In 2006, redd surveys on Clear Branch were conducted once a week from 9 August until 26 September, when the first redd was observed. It was surveyed twice a week until we stopped observing new redds, which was 9 October. In total, 16 redds were observed in upper Clear Branch, 4 of which were counted downstream of the traps. Median length and width of the pocket and mound was 74 cm and 35 cm. Pinnacle Creek redd surveys were done on the same schedule but were started on 28 July. Four redds were observed on Pinnacle Creek, two of which were downstream of the traps. The first redd was seen on 25 September and the last on 9 October. Bull trout in Pinnacle Creek and Clear Branch each constructed redds in stream

area exposed by lowered reservoir levels. Both of these redds were inundated under at least one meter of standing water as the reservoir filled up in November.

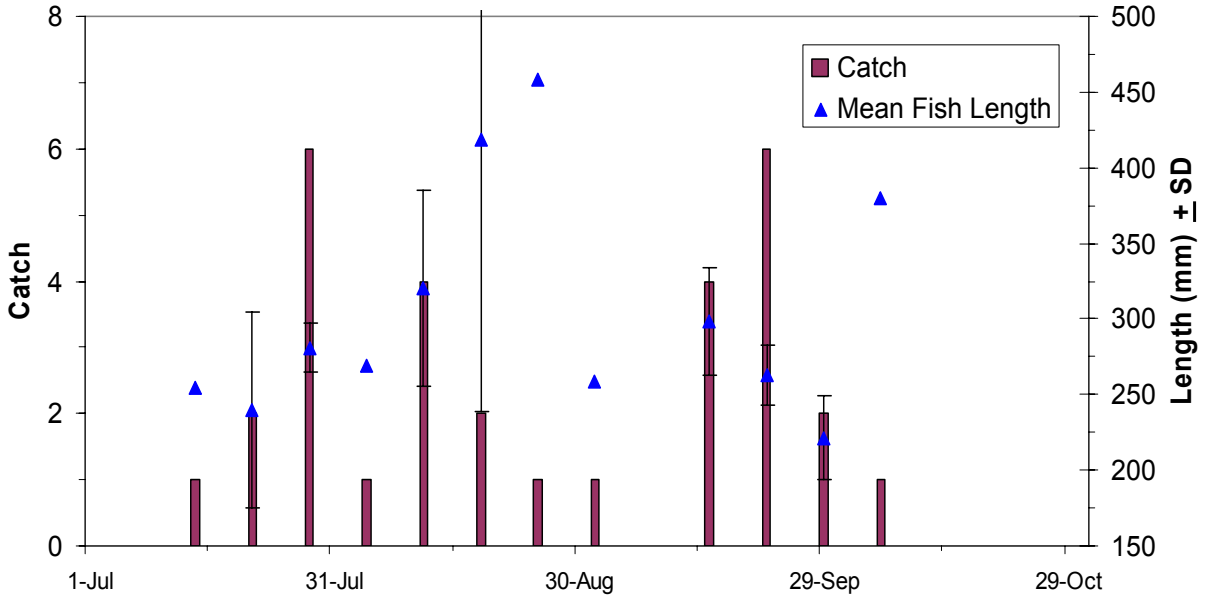

Figure 6. Bull trout captured in the upstream-migrant trap in 2006.

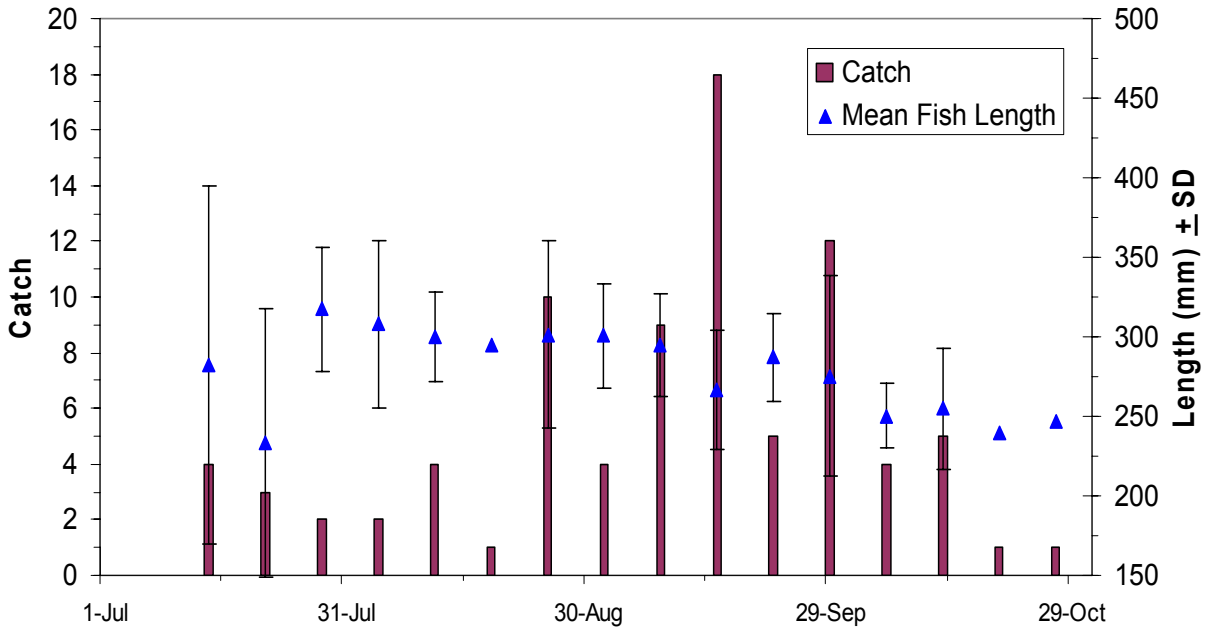

Figure 7. Bull trout captured in the upstream-migrant trap in 2007,

In 2007, bull trout spawning surveys were done every week on Clear Branch and every two weeks on Pinnacle Creek. The first survey occurred on 21 August and no redds were seen. The first redds were seen on 24 September and the last redd was counted on 30 October. In total, 25 redds were counted. One was counted downstream of the traps. Seven redds were counted upstream of the abandoned USDA Forest Service bridge, including two on the

unnamed south fork and four on the unnamed north fork. On the north fork, test digging was observed within 50 m of the falls at the end of the bull trout distribution. Only one small redd was counted on Pinnacle Creek. Median length and width of the pocket and mound was 76 cm by 35 cm.

Population Estimate

In 2006, an electrofishing mark-recapture population estimate was conducted from 17-21 July with the help of the ODFW screen shop and district office and Parkdale Ranger District. It resulted in a Lincoln-Petersen population estimate of 513 bull trout ±61%. Of the 128 bull trout captured during the estimate, only 9 were larger than 180 mm. There were no adult recaptures so the estimate could not be broken into separate juvenile and adult abundances. The best estimate for adults comes from summing these 9 fish, with 27 caught at the upstream-migrant weir trap and the 6 postspawning adults caught in the downstream-migrant trap in October, which adds up to 42 adult bull trout.

In 2007, day and night snorkel surveys were done over two three-day periods: 28-30 August and 10-12 September. Night surveys appear to be substantially more effective for adult and juvenile bull trout snorkel counts (Figure 6). During the day, only two adults and no juveniles were seen. At night, at least 10 adult and 50 juvenile bull trout were observed. Fish observed at night were calm and sedentary enough that the snorkeler was able to take several length measurements for each fish. During the day, adults were skittish and length was visually estimated.

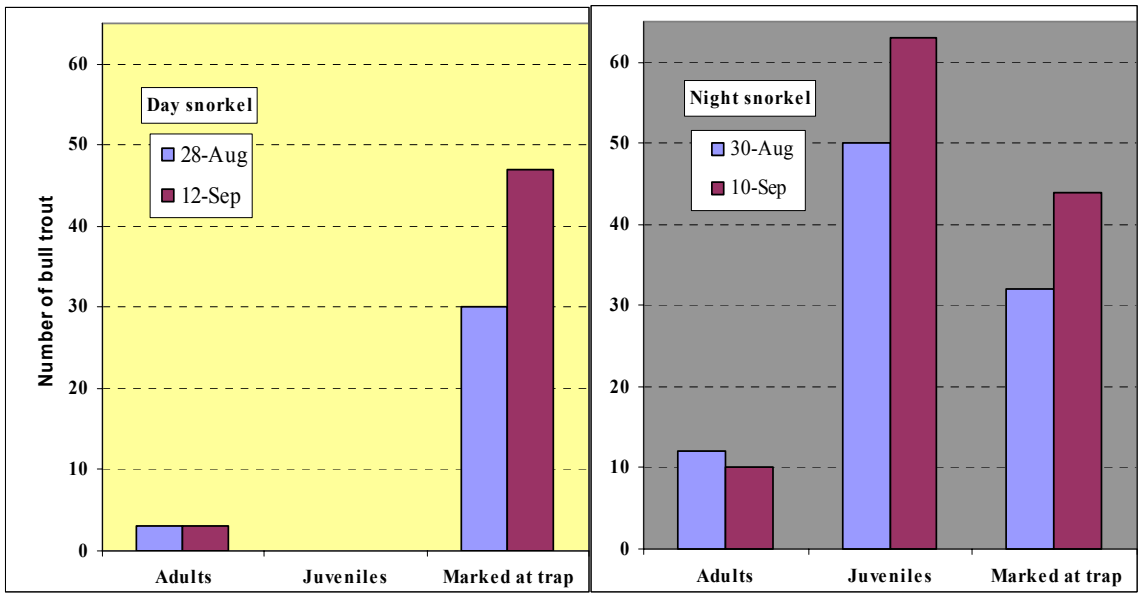

Figure 8. Juvenile (<180 mm FL) and adult bull trout snorkel counts at day and night and the number of marked adult bull trout upstream of the Clear Branch traps.

The following Lincoln-Peterson mark-resight equation was used to calculate adult abundance (N_B): $N_B = (M+1)(R+1)/(C+1)$; where,

C = snorkel sample,
M = fish initially marked and released,
R = marked fish resighted

During the 30 August 2007 night snorkel, 34 adult bull trout had been trapped, marked, and released upstream. During the survey, 12 adults were counted and 11 possessed caudal hole-punches. This resulted in an estimate of 37 adult bull trout (SE=2.8). This estimate added to the number of adults moving upstream past the trap after the snorkel survey resulted in a total adult abundance of 93±5 (95% Confidence Interval). The snorkel counts obtained during the four surveys resulted in abundance estimates ranging from 90 to 95 adult bull trout. This suggests that the upstream-migrant trap was installed early enough that almost all of the adults in the study area were caught at the trap and there is no significant resident population in Clear Branch.

Smallmouth Bass in Lake Laurance Reservoir

Two different methods were used to sample smallmouth bass in Lake Laurance Reservoir. First, hook and line sampling was conducted on 12 and 20 June 2007, totaling 42 angler hours, by a group of experienced bass anglers. Water temperature throughout the water column was 15.5° C. The group fished in all habitat and caught many hatchery stocked rainbow trout, two cutthroat trout, and five bull trout (250-325 mm FL). No bass were caught so stomach sampling could not be done.

Second, a mark-recapture population estimate of smallmouth bass in Lake Laurance reservoir was attempted. We sampled at night using an electrofishing boat and the expertise of warmwater fish biologist Terry Shrader. The marking phase began on 20 August at 7:45 PM, shortly after dusk, and ended at 10:00 PM and reservoir surface temperature was 17° C. Coldwater refuges, mainly near the mouths of Clear Branch and Pinnacle Creek, were avoided to minimize the risk to bull trout and maximize the bass catch. We captured 2 juvenile smallmouth bass, 6 bull trout (mean fork length 212 mm, range 179-263 mm), and 89 other trout (mean fork length 201 mm, range 70-345 mm). Crawfish appeared to be plentiful. The bass measured 90 and 110 mm total length and later were determined through scale analysis to be age-2. According to Terry Shrader, this represents unusually slow growth for bass relative to growth in other Oregon reservoirs. Age-2 bass in Prineville reservoir average about 171mm, and in Lake Billy Chinook and Brownlee reservoirs the mean is about 150 mm. Because of the low number of bass caught, we did not conduct the recapture phase of the population estimate.

These preliminary findings – the small number of bass caught during extensive hook and line angling and boat electrofishing, their low abundance relative to other species, and their apparent slow growth – suggest that the reservoir provides poor habitat for the illegally introduced bass, which, at this time, likely have minimal impact on the bull trout population.

CONCLUSIONS

We gained important information on the first three study objectives regarding 1) Hood River bull trout life movement patterns and habitat connectivity, 2) current bull trout distribution, and 3) developing a reliable monitoring protocol for Clear Branch adult abundance. We will continue to work toward completion of these three objectives in 2008, the final year of this study. We completed our fourth objective regarding the potential impacts of smallmouth bass on bull trout in Lake Laurance Reservoir.

First, PIT-tagged and radio-tagged bull trout homed to the Middle Fork Hood River, spent substantial amount of time at or near the base of French-Reagan Falls, but were not able to pass over. Winter steelhead trout passed over this falls, but were not able to ascend a second falls carved into the channel, about two km upstream, during the same November 2006 flood and debris torrent. These new falls appear to block bull trout from homing to their natal spawning grounds in the upper middle fork and precluded us from evaluating passage issues in the upper subbasin and understanding where these fish spawn.

Second, the results from our electrofishing distribution surveys and exploratory redd surveys, while they do not prove an absence of bull trout elsewhere in the subbasin, they do strongly suggest that bull trout are at least very rare in the subbasin apart from upper Clear Branch. After extensive surveys, Clear Branch remains the sole known area of bull trout reproduction in the Hood River subbasin.

Third, our Clear Branch trap results show that the reservoir is important habitat for both juvenile and adult bull trout. Trap catches during the descending limb of the hydrograph showed an annual juvenile outmigration (in progress when the trap was installed), likely after rearing for a year or two in the creek, probably coinciding with the spring freshet and virtually ending when the stream returned to base flows. Trap and snorkel survey results suggest that most, if not all, adult bull trout return to the reservoir after spawning and at least some adults are repeat spawners. Based on the results of the mark-resight population estimate, the traps were installed early enough in Clear Branch in 2007 to capture almost all of the adults moving upstream from the reservoir to spawn in the creek. For both juvenile and adult bull trout, night was clearly the best time to conduct snorkel surveys for the resighting phase of the estimate. These results suggest that snorkel surveys during the day would not be reliable for mark-resight estimates. Using the redd count as an index of the number of spawning bull trout in Clear Branch upstream of the traps, there were at least 3.5 adult bull trout (N=42) per redd (N=12) counted in 2006 and about 3.9 adults (N=93) per redd (N=24) counted in 2007.

Finally, our sampling in Laurance Lake Reservoir this year strongly suggests that the potential impact of smallmouth bass on bull trout in the reservoir appears at this time to be minimal and the reservoir appears to be poor habitat for smallmouth bass. However, this research represents a snapshot during a single year and it would be wise to periodically repeat this sampling effort to ensure that the bass population is consistently small and growth continues to be unusually slow.

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