ANNUAL PROGRESS REPORT

PROJECT TITLE: Native Trout Studies

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Native Trout Studies

I. **Summary**: During 1999, we operated traps to capture upstream and downstream migrant westslope cutthroat trout in the upper mainstem John Day River and three of its tributaries. We also operated a rotary screw trap in the John Day River downstream of all tributary traps. These traps were operated from May throughout the contract period. A total of 94 westslope cutthroat trout were captured in all traps, ranging in size from 7 to 39 cm. The screw trap also captured 4,014 fish of six other species. We continued to track cutthroat trout with radio tags implanted in 1998 throughout the life of the tags. These fish displayed a variety of movements, including fluvial migrations from Roberts Creek into the mainstem John Day River, localized movements, and a suggestion of extensive movement. We prepared a draft report of that summarizes information about westslope cutthroat trout in the John Day Basin. We helped determine the distribution and abundance of bull trout and sympatric rainbow trout in four streams of the Middle Fork John Day River.

II. **Background**: Native Trout Studies is an ongoing project within the Oregon Department of Fish and Wildlife (ODFW) intended to further the understanding of the biology of Oregon's native trout. In recent years its focus has been on the identification of life history and genetic characteristics of native trout within the Upper Klamath, John Day, Metolius, Malheur, and Grande Ronde basins. Project personnel also provide technical assistance to ODFW staff and managers as needed. This report describes continued studies of westslope cutthroat trout *Oncorhynchus clarki lewisi* and new study of bull trout *Salvelinus confluentus* and rainbow trout *O. mykiss* in the John Day Basin. It also describes information about westslope cutthroat trout in Oregon supplied to the US Fish and Wildlife Service for its recent review of the species' status.

III. **Objectives**:

A. Determine the timing and relative abundance of westslope cutthroat trout moving to and from tributaries of the upper mainstem John Day River.

B. Continue radio telemetry of tagged fish until tags expire.

C. Prepare a draft summary report on the status of westslope cutthroat trout in Oregon.

D. Determine the distribution, density, and population size of bull trout in streams of the Middle Fork John Day River subbasin.

IV. **Procedures**: We continued to operate traps in the upper mainstem John Day River subbasin to capture migrant fish. Weir traps were placed in Call Creek at river kilometer (RKm) 0.7, Roberts Creek at RKm 1.3, and the upper mainstem John Day River at RKm 449.2. These locations were the same as in 1998 (Hemmingsen 2000). A 1.5-m diameter screw trap (E.G. Solutions, Inc) was again placed in the mainstem John Day River to recapture fish sampled at weir traps and to capture fish whose movements originated downstream of any weir. In 1999 this screw trap was located at RKm 434.2,

downstream of the confluence with Reynolds Creek. During the previous two years, the screw trap was located at Rkm 436.8 downstream of the confluence with Deardorff Creek. The relocation in 1999 was caused by denial of access to the site at Rkm 436.8 by the private landowner. Consequently, weir traps previously placed in Deardorff Creek (Hemmingsen 2000) were relocated in 1999 to RKm 7.9 of Reynolds Creek. While the screw trap was accessed through private land, all weir traps were located within U.S. Forest Service boundaries (Fig 1). All traps were usually sampled daily. Fish were measured to fork length and scale samples were collected. Cutthroat trout that were 150 mm or longer were identified with 14-mm tags with a passive integrated transponder (PIT) at 125 KHz (Avid) implanted in the in the fish's abdominal cavity.

We continued to track movements of cutthroat trout that received radio tags in 1998. Procedures for tracking of radio-tagged fish were the same as previously reported (Hemmingsen 2000). Radio-tagged fish were usually tracked weekly, from the ground when possible and from the air when needed. Aerial tracking from October 1998 through March 1999 was conducted from a plane operated by the Oregon State Police. Aerial tracking during April through September 1999 was conducted from a plane operated by Baker Aircraft Inc with funds provided by this contract. These funds consequently permitted simultaneous tracking of bull trout, tagged with funds provided by the Bonneville Power Administration, at times when the Oregon State Police were unavailable for flights in the John Day Basin.

We assisted with determination of population characteristics of bull trout in four streams in the Middle Fork John Day River subbasin during July. Objectives were to determine distribution, abundance, size and age of bull trout. Sampling of streams was coordinated by ODFW biologists at the John Day district office and conducted by them, Native Trout Project personnel, biologists from the US Forest Service, US Fish and Wildlife Service, Oregon Department of Transportation, members of the Youth Conservation Corps, and interested volunteers from the public.

The preliminary distribution of bull trout within all streams to be sampled was estimated from existing survey data. Thirty-two sample units 50 m in length were determined, based on an assumed coefficient of variation in bull trout densities, acceptable confidence intervals of the derived estimates, and the available labor force. Sample units were located systematically, once every 800 m, throughout the preliminary distribution of bull trout. At the start of each 800-m reach, a 50-m sample unit was identified and constrained by blocking nets. The width of the stream at each net was measured so that the surface area of each sample reach could be calculated. We captured bull trout by electrofishing two passes between blocking nets. A pass was defined as the extent of the sample unit from the downstream end to the upstream end, then back downstream to the unit origin. A reduction in the catch of bull trout between passes by at least 50% was required; when that requirement was not met, two additional passes were conducted. All captured bull trout and rainbow trout were anesthetized and measured. Scales were collected from most bull trout to determine their age. Bull trout 150 mm or longer were injected with PIT tags so that they can be identified if recaptured in subsequent years. In addition to assistance with sampling, project personnel were responsible for design of the sampling plan, layout of sample units, analysis of data, estimation of ages from analysis of scales, and production of a final report.

V. **Findings**: Low mountain snow levels, high stream flows, and difficulty in locating new trap sites prevented placement of any traps until May. The screw trap was set 06 May and operated throughout the contract period until mid-October 1999. In this time it captured 53 cutthroat trout that ranged in length from seven to 39 cm. Although these fish were captured throughout the sampling period, 16 were captured in May. The total of 53 is considerably greater than totals captured in 1998 (8) or 1997 (6). In addition, the screw trap captured *S. confluentus* (68), *O. mykiss* (280), *O. tshawytscha* (3,520 juveniles and 6 post-spawning adults), *Cottus spp* (79), *Catostomus spp* (55), and *Prosopium williamsoni* (6).

Weir traps were placed in Reynolds Creek on 11 May but high stream flow impeded efficient operation initially. Then on 21 May, one stream bank collapsed and three trees fell onto the weir. Traps were placed in Call and Roberts creeks on 12 May, about one month later than in 1998. High stream flows minimized effective operation of these traps through June, and prevented placement of weirs in the upper mainstem John Day River until 10 July. As with the screw trap, all weir traps operated until mid-October.

The downstream migrant trap in Call Creek captured 11 cutthroat trout that ranged in length from eight to 39 cm. Seven of these were captured in June, three in July, and one in August. These results are very similar to those of Call Creek in 1998. Ten cutthroat trout that ranged in length from seven to 15 cm were captured the downstream migrant trap in Roberts Creek. The first of these occurred the third week of July and four were captured in October. This total (10) is considerably lower than the total (52) captured in Roberts Creek in 1998, but similar to the total (12) captured in 1997. The downstream migrant trap in Reynolds Creek captured seven cutthroat trout that ranged in length from seven to 20 cm. The first was captured soon after trap emplacement and it is likely that others passed earlier. None was captured after the first week of September. Only four cutthroat trout that ranged in length from seven to 39 cm were captured in the downstream migrant trap in the upper mainstem John Day River. Two of these fish were captured in July, one in August, and one in October. This low total is probably due to the delayed trap emplacement. Thirteen and 17 cutthroat trout were captured at this site in 1998 and 1997, respectively. Of these, 26 were captured prior to the second week of July either year.

A total of nine cutthroat trout were captured among all upstream migrant traps, including four each in Call Creek and the upper mainstem John Day River and one in Reynolds Creek. Eight of these fish ranged in length from 17 to 29 cm while the ninth was 8 cm long. Again, it is likely that other cutthroat trout moved upstream earlier in the year before traps were in place. No upstream migrant cutthroat trout was captured in Roberts Creek, unlike 1998 when eight were captured prior to July.

These data and those reported for 1997 and 1998 (Hemmingsen 2000) only begin to describe the timing and relative abundance of westslope cutthroat trout moving to and from tributaries of the upper mainstem John Day River. It is important to remember that all traps were intended to capture bull trout for different objectives, and that all westslope cutthroat trout captured were incidental to efforts focused on bull trout. If future efforts to define the movements of cutthroat trout in the John Day Basin employ traps, their design must enable more effective sampling at high flows with high debris loads and unstable stream substrates so that the time of sampling can be extended.

As previously reported (Hemmingsen 2000), two of three westslope cutthroat trout captured and tagged in Roberts Creek (150.832 and 151.102) were last found in the mainstem John Day River (Table 1). These data suggest that some westslope cutthroat trout in the upper John Day subbasin have fluvial life histories. No fluvial movement was shown by any of four fish tagged in Call or Deardorff creeks, although 151.763 (Call Cr) and 151.062 (Deardorff Cr) displayed some localized movements within each stream. Both tagged fish from Call Creek received tags of short duration (40 and 70 days), so more extensive movements may not have been detected. Of the three tagged cutthroat captured in the screw trap, 150.783 could be located only two weeks after tagging, 150.843 displayed localized potamodromy through a range of 8.3 km, and 150.922 surprisingly traveled 67.5 km between 29 September and 17 December 1998. The extensive, unique movement of the latter tag coupled with its stationary location from December 1998 until expiration in October 1999 causes doubt about the status of the cutthroat trout tagged. Attempts to visually confirm its status were unsuccessful.

All radio tags shown in Table 1 have expired. Their implantation and subsequent tracking was an exploratory project intended to detect possible movements of westslope cutthroat trout in the upper mainstem John Day subbasin. We were able to use existing resources for bull trout research to gain some insight about the possible variety of movements shown by cutthroat trout, and identify areas for future investigations of this species.

We electrofished 32 sample units in Big Creek, its tributary Deadwood Creek, Clear Creek, and Granite Boulder Creek in the Middle Fork John Day River subbasin. Preliminary results from two streams are presented. We began sampling Big Creek at an elevation of 4280 ft and captured only two bull trout in four survey units extending to 5,000 ft elevation (Table 2). Bull trout were consistently more abundant in units five through eight, appearing at densities from 0.01 to 0.03 fish per m^2. From reaches nine through 11 (6,020 ft), bull trout were at densities between 0.10 and 0.20 fish per m^2. Near the headwaters at 6,200 ft, bull trout were at density of 0.31 fish per m^2, a relatively large value thought to be rather uncommon. Bull trout in Big Creek during July were distributed throughout 8,800 m of stream, but most occurred in the upper 5,600 m. The overall population size of bull trout age 1 (>50 mm) or older in Big Creek was estimated to be 1,950 individuals, with a 95% confidence interval of $\pm$ 1,068. Although bull trout can be mature at age 3, most reproductive individuals are thought to be age 4 and older. In Big Creek, the transition from age 3 to age 4 was about 150-160 mm. There were numerous individuals estimated to be age 5-7. The 440-mm fish in reach six was estimated to be eight years old. Because of its size, it probably was not a year-round resident of Big Creek. This fish suggests that a fluvial life history form may presently exist in bull trout of the Middle Fork John Day River subbasin.

We began sampling Clear Creek at 4,580 ft elevation and captured only two bull trout from there through unit four at 4,760 ft (Table 3). We found bull trout at density of 0.05 fish per m^2 in unit five, which increased to 0.14 fish per m^2 in unit seven at 4,960 ft elevation. Thereafter, the abundance of bull trout dropped dramatically. Beyond unit nine at about 5200 ft, Clear Creek dries up during summer. Bull trout in Clear Creek during July were distributed throughout 7,200 m of stream, but most were found within about 2,400 m. The overall population size of bull trout age 1 or older in Clear Creek was estimated to be 640 individuals, with a 95% confidence interval of $\pm$ 518. In Clear Creek, the transition from age 3 to age 4 was also about 150-160 mm. However, of all bull trout age 1 or older, analysis suggests that about 10% were age 4 and the rest were

age 1, 2, or 3. Results on bull trout in Deadwood and Granite Boulder creeks as well as similar information on rainbow trout in sympatry with bull trout in all four streams will be presented in a subsequent report.

We completed a draft report on westslope cutthroat trout in Oregon (Appendix A). This report summarizes most information available through 1998. A future version will include size and age data collected by this project and new information presented in this annual report.

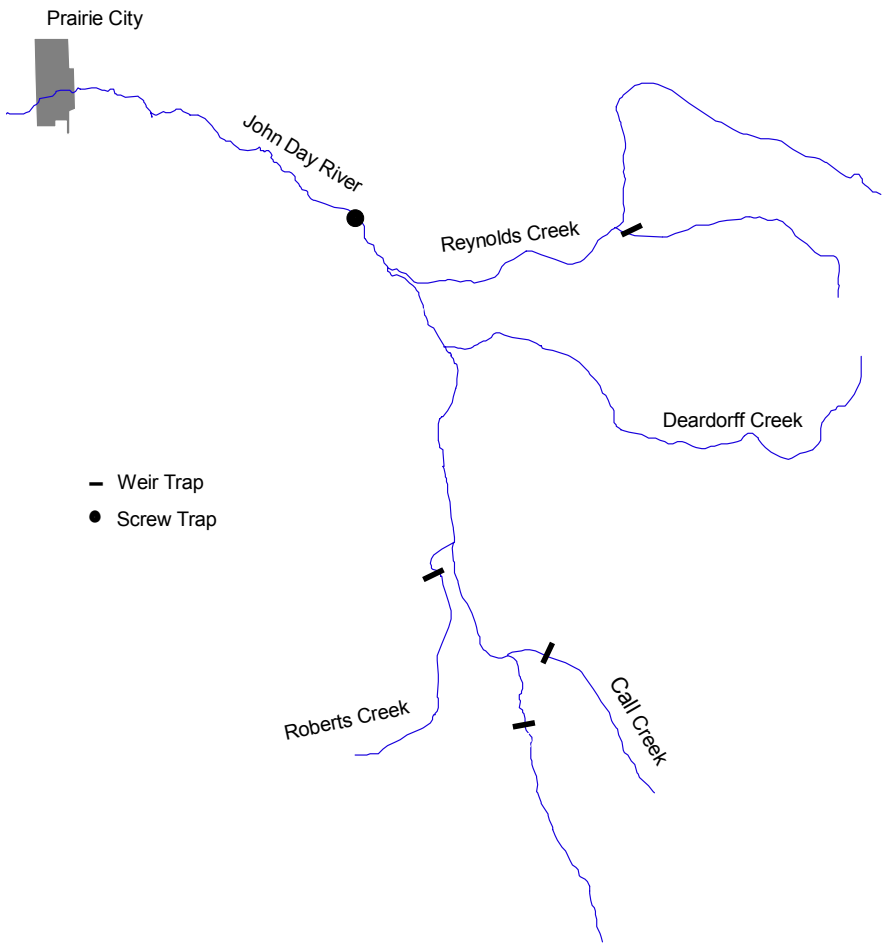

Figure 1. Locations of traps in the upper mainstem John Day River subbasin in 1999.

Table 1. Movements of radio-tagged cutthroat trout in the upper mainstem John Day River subbasin through September 1999.

Location, Date tagged (1998)	(MHz)	Date last detected	Location
		Weirs:	
John Day R:			
18 Jun	151.102	12 Jun '99	John Day River, km 422.7 [a]
Call Cr:			
04 Jun	151.752	18 Jun '98	Call Cr, km 0.5 [b]
14 Jun	151.763	30 Sep '98	Call Cr, km 1.2 [c]
Roberts Cr:			
22 Apr	150.802	21 Jul '98	Roberts Cr, km 0.9 [d]
24 May	150.832	17 Dec '98	John Day River, km 419.1 [e]
26 Jun	151.102	08 Apr '99	John Day River, km 441.4 [f]
Deardorff Cr:			
10 Apr	150.821	17 Dec '98	Deardorff Cr, km 5.3 [g]
14 Jun	151.062	08 Apr, '99	Deardorff Cr, km 3.7 [h]
		Screw trap:	
John Day R:			
30 Apr	150.783	08 Apr, '99	John Day River, km 434 [i]
21 May	150.843	04 Aug '99	John Day River, km 428.5 [j]
29 Sep	150.922	18 Oct '99	John Day River, km 369.3 [k]

a) 151.102, captured in the upper John Day River weir (km 449.2) on 18 June, may be confused with another tagged in Roberts Creek, but likely had remained at this location since 30 September '98.
b) 151.752 was located 100 m downstream of the weirs on 08 and 18 June. Tracking on 09 and 21 July failed to locate it.
c) 151.763 remained at this location since 09 July.
d) 150.802 stayed within 20 m downstream of the weirs.
e) 150.832 was located in Roberts Creek about 50 m from the mainstem John Day River on 26 May. It was not located again until 09 October when it was at km 426 in the John Day River, downstream of Reynolds Creek.
f) 151.102, captured in Roberts Creek on 26 June, may be confused with another tagged in the upper main stem John Day River, but likely had remained at this location since 28 September '98.
g) 150.821 stayed within 50 m of the weir through 12 May. It moved upstream to km 8.9 of Deardorff Creek by 10 June, and to km 9.4 by 09 July. It remained at km 9.4 until 03 September and had returned to km 5.3 by 28 September where it remained until last detected.
h) 151.062 remained within km 2.9 – 3.7 since 09 July '98.
i) 150.783 was never located after 12 May (13 days after tagging).
j) 150.843 reached km 432 by 04 June, km 431 by 12 June, and back upstream to km 433 where it remained until last detected.
k) 150.922 moved to the last detected location by 17 Dec '98 where it remained until the tag expired.

Table 2. Lengths and densities of all bull trout sampled in Big Creek during July 1999.

Unit [a]	Elevation (ft)	Number of bull trout	Fork length (mm) minimum	Fork length (mm) maximum	Fork length (mm) average	Density [b]
1	4280	0				
2	4420	2	180	240	210	0.01
3	4600	0				
4	4760	0				
5	5000	3	131	190	154	0.01
6	5180	5	39	440	153	0.02
7	5360	6	82	290	148	0.02
8	5680	6	139	167	152	0.03
9	5850	23	99	169	137	0.18
10	6020	20	67	181	146	0.16
11	6080	17	102	200	158	0.13
12	6200	36	109	179	140	0.31
Overall		118	39	440	146	
6-13		116	39	440	144	0.08

[a] Units were 50 m long.
[b] Number of bull trout per square meter of stream surface.

Table 3. Lengths and densities of all bull trout sampled in Clear Creek during July 1999.

Unit [a]	Elevation (ft)	Number of bull trout	Fork length (mm) minimum	Fork length (mm) maximum	Fork length (mm) average	Density [b]
1	4580	1			172	< 0.01
2	4650	0				
3	4690	2	90	183	137	0.01
4	4760	2	75	96	86	0.01
5	4820	8	36	101	72	0.05
6	4900	17	92	206	134	0.10
7	4960	25	35	230	85	0.14
8	5070	1			193	0.01
9	5170	0				
Overall		56	35	230	103	0.03

[a] Units were 50 m in length.
[b] Number of bull trout per square meter of stream surface.

VI. **References**:

Hemmingsen, A.R. 2000. Native trout studies. Oregon Department of Fish and Wildlife, Fish Research Project F-136-R-11, Annual Progress Report, Portland.

VII. **Plans for 1999-00**:

A. Prepare a draft report on the distribution, density, and population size of bull trout in streams of the Middle Fork John Day River subbasin.
B. Finalize a proposal to determine the movements of westslope cutthroat trout in the mainstem John Day River subbasin and associated seasonal habitat characteristics.
C. Initiate a telemetry study to define those movements.

VIII. A total of $108,146 was spent on "Native Trout Studies" during FY99

IX. **Acknowledgements**:

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