SUMMARY

Objectives for 2002

Project objectives were to: (1) transport migratory salmonids around Elk Creek Dam, (2) determine the proportion of wild adult anadromous salmonids that return to Elk Creek, and (3) determine if transported coho salmon spawn in widely distributed areas upstream of Elk Creek Dam.

Accomplishments in 2002

All objectives were completed, except the proportion of adult fish that returned to Elk Creek could not be determined for the 2001-02 return year.

Findings in 2002

Trap catches of mature salmonids in the 2001-2002 return year totaled 1,446 unmarked and 102 marked coho salmon (*Oncorhynchus kisutch*), 744 wild and 30 hatchery steelhead (*O. mykiss*), one marked and nine unmarked chinook salmon (*O. tshawytscha*), and 139 wild cutthroat trout (*O. clarki*).

A minimum of two adult steelhead, 25 juvenile trout, and 10 juvenile coho salmon died as a result of trap and transport. At least one female coho salmon did not completely spawn after being transported. A minimum of eleven adult steelhead died, possibly because the weir prevented downstream passage. Some of these fish may have otherwise survived to make another spawning run.

Coho salmon fry were distributed somewhat farther upstream as compared to other years. Sensitivity analyses indicated that continued sampling would result in a minimal increase in the precision of the mean estimate of adult spawning distribution.

Recommendations

Sampling to determine coho salmon spawning distribution should be terminated until there is a substantial change in methods for passing adult salmonids around Elk Creek Dam.

INTRODUCTION

Elk Creek enters the Rogue River at River Kilometer (RK) 244. Elk Creek Dam is located 2.6 km upstream from the creek mouth. The basin covers about 351 sq km, of which 343 sq km are upstream of Elk Creek Dam. Mean monthly flow is less than 10 cubic feet per second (cfs) in late summer and is 400-600 cfs in winter. Mean monthly flow in winter peaks between 1,000 and 1,800 cfs.

Coho salmon, steelhead, chinook salmon, and cutthroat trout spawn in the Elk Creek Basin. Coho salmon in southern Oregon and northern California have been listed as threatened by the National Marine Fisheries Service (NMFS) under the Endangered Species Act. Small numbers of spring chinook salmon and fall chinook salmon spawn in Elk Creek when flow increases enough in autumn to permit upstream migration. Adult cutthroat trout also migrate into Elk Creek, although these fish do not appear to be anadromous.

Elk Creek Dam is one of three dams authorized by the United States Congress and constructed by the United States Army Corps of Engineers (USACE) in the Rogue River Basin of southwestern Oregon. The other dams, Lost Creek and Applegate, are fully operational. A court order halted construction of Elk Creek Dam in 1987 after dam height reached 83 feet.

Blockage of spawning areas used by anadromous fish in the Elk Creek Basin was to be mitigated by the production of coho salmon and steelhead at Cole M. Rivers Hatchery. Mitigation was to begin when the dam was fully constructed. A diversion tunnel through the dam was altered after construction in an attempt to provide upstream passage for adult salmonids.

Spawning surveys and trap catches of juveniles suggested that few adult coho salmon or steelhead passed the dam during the 1991-92 run year even though Oregon Department of Fish and Wildlife (ODFW) staff observed hundreds of adult salmonids immediately downstream of the dam. These observations increased concern that adult salmonids were unable to pass Elk Creek Dam.

In response to that concern, a trap-and-haul operation began at Elk Creek Dam in autumn of 1992. Adult salmonids were trapped below the dam and were trucked and released upstream of the dam during the 1992-93 and 1993-94 run years. Trap catches totaled 38 coho salmon and 119 steelhead in 1992-93, and 86 coho salmon and 120 steelhead in 1993-94. Returns in both run years were very low compared with ODFW estimates of historic returns that averaged 1,560 coho salmon, 1,000 summer steelhead, and 2,000 winter steelhead (USACE 1980).

The USACE funded the Elk Creek Dam Fisheries Evaluation Project in the spring of 1995. The project goal was to develop strategies to restore the natural production of self-sustaining migratory salmonids to a level appropriate for the habitat available in the Elk Creek Basin. Findings from the first seven years of work were reported by Satterthwaite et al. (1996a), Satterthwaite et al. (1996b), Satterthwaite and Leffler (1997), Satterthwaite (1998), Satterthwaite (1999), Satterthwaite (2000), and Satterthwaite (2001).

In autumn of 1995, the USACE announced plans to remove a portion of, or all of, the spillway of Elk Creek Dam to provide unobstructed passage for juvenile and adult salmonids. As a consequence of this decision, ODFW reduced the scope of the Elk Creek Dam Fisheries Evaluation Project. Revised project objectives since 1997 are to: (1) transport migratory salmonids around Elk Creek Dam, (2) determine the proportion of wild adult anadromous salmonids that return to Elk Creek, and (3) determine if transported coho salmon spawn in widely distributed areas upstream of Elk Creek Dam.

METHODS

Collection and Transport of Salmonids

The fish collection facility operated continuously from 15 October 2001 through 15 May 2002 and was checked a minimum of once daily. Samplers recorded the species, fin marks or tags, and classified the fish based on visual estimates of fork length. Samplers classified chinook salmon less than 60 cm as jacks, coho salmon less than 50 cm as jacks, and steelhead less than 41 cm as half-pounders. Project staff transported and released all fish,

except coho salmon of hatchery origin, in Elk Creek about one km upstream from the dam. Coho salmon of hatchery origin were killed in accordance with the National Marine Fisheries Service handling permit issued to ODFW. Coho salmon were classified as hatchery fish if a fin clip, or a maxillary clip, was evident.

Spawning Distribution of Coho Salmon

Upstream limits of coho salmon spawning were estimated from the distribution of subyearling coho salmon. During September, I snorkeled the larger streams where fry were found in 1996-2001. Surveys began at the upstream limits where coho salmon fry were observed in previous years. Samplers attempted to determine the upstream limits of fry to the nearest 0.1 km and sampled at least 0.2 km upstream of sites that appeared to be the upstream limit of fry distribution.

RESULTS AND DISCUSSION

Collection and Transport of Salmonids

Trap catches of adult salmonids at the collection facility in the 2001-2002 return year totaled 1,446 unmarked and 102 marked coho salmon, 714 wild and 17 hatchery steelhead, one unmarked and nine marked chinook salmon, and 139 wild cutthroat trout. Weekly trap catches are presented in Table 1 and in Table 2.

Project staff observed that a minimum of two adult salmonids died for unknown reasons as a result of trap and transport. Two steelhead were found dead in the trap on 2 May. Project staff also found 25 juvenile trout and 10 juvenile coho salmon dead in the trap. The juvenile fish were torn in half, and likely died as a result of problems with the screened intake that fed water into the trap.

In addition, there was an indication that trap and transport may have caused delayed mortality among adult salmonids. Samplers found four female adult salmonids on the upstream side of the weir and judged that two died before they had completely spawned. Samplers also found 11 dead adult steelhead on the upstream side of the weir. These fish may have died because they were unable to migrate downstream through or over the weir. Had the weir not been present, some of these fish may have survived to make another spawning migration during the succeeding year.

Proportion of Fish that Returned to Elk Creek

The return rates of wild coho salmon and steelhead to Elk Creek are estimated as the number of wild fish trapped in Elk Creek as compared to the number of cohorts that pass the fish counting station at Gold Ray Dam. Estimates of fish counts at Gold Ray Dam have yet to be completed by ODFW for the 2001-2002 return year. These data will be presented in the next annual report.

Table 1. Number of mature coho salmon, steelhead, and cutthroat trout trapped at the fish collection facility on Elk Creek, 2000-2001 return year. Coho salmon jacks were less than 50 cm long and half-pounders were less than 41 cm long. All cutthroat trout were longer than 30 cm and none exhibited hatchery marks. Data may include fish transported multiple times. All fish were released upstream of Elk Creek Dam except that coho salmon known to be of hatchery origin were killed rather than released.

	Coho salmon				Steelhead				
	Jacks		Adults		Half-pounders		Adults		
Week of capture	Unmarked	Marked	Unmarked	Marked	Wild	Hatchery	Wild	Hatchery	Cutthroat trout
11/05-11/11	0	0	0	0	0	0	0	0	0
11/12-11/18	2	1	11	2	0	0	0	0	0
11/19-11/25	37	9	211	17	0	0	21	0	48
11/26-12/02	16	7	495	26	2	0	77	1	15
12/03-12/09	6	2	381	15	4	0	47	1	7
12/10-12/16	5	1	146	7	2	0	77	2	22
12/17-12/23	2	1	77	4	3	0	50	0	8
12/24-12/31	0	0	22	1	0	0	27	0	14
01/01-01/07	0	0	11	2	4	0	23	1	3
01/08-01/14	0	0	21	3	3	0	19	0	4
01/15-01/21	0	0	2	3	0	0	0	0	0
01/22-01/28	0	0	0	1	0	0	5	0	0
01/29-02/04	0	0	0	0	0	0	1	0	0
02/05-02/11	0	0	1	0	1	0	17	0	1
02/12-02/18	0	0	0	0	0	0	5	0	0
02/19-02/25	0	0	0	0	4	0	72	0	2
02/26-03/04	0	0	0	0	0	0	5	1	0
03/05-03/11	0	0	0	0	0	0	6	0	1
03/12-03/18	0	0	0	0	0	0	16	0	3
03/19-03/25	0	0	0	0	3	0	93	6	6
03/26-04/01	0	0	0	0	2	0	51	1	0
04/02-04/08	0	0	0	0	1	0	58	2	4
04/09-04/15	0	0	0	0	1	0	22	0	1
04/16-04/22	0	0	0	0	0	0	17	1	0
04/23-04/29	0	0	0	0	0	0	5	0	0
04/30-05/06	0	0	0	0	0	0	0	0	0
05/07-05/13	0	0	0	0	0	0	0	1	0
Annual total	68	21	1,378	81	30	0	714	17	139

Table 2. Number of mature chinook salmon trapped at the fish collection facility on Elk Creek, 2000-2001 return year. Jacks were less than 60 cm long. Data may include fish transported multiple times.

Week of capture	Jacks		Adults	
	Marked	Unmarked	Marked	Unmarked
10/22-10/28	0	0	0	2
10/29-11/04	0	0	0	4
11/05-11/11	0	0	0	0
11/12-11/18	0	0	1	0
11/19-11/25	0	0	0	3
Annual total	0	0	1	9

Spawning Distribution of Coho Salmon

Coho salmon spawned in widely distributed areas of the Elk Creek basin during 2001. In comparison to other years, coho salmon fry tended to be distributed farther upstream in 2002. I found fry in West Branch, and in Bitterlick Creek, farther upstream than previously documented (Table 3). Once again, the waterfalls located at RK 20.9 on Elk Creek appeared to be barriers to spawning adults.

Data from 1996-2002 suggested that fry surveys would be an effective method to determine whether adult coho salmon continue to spawn in widely distributed areas of the Elk Creek Basin. With seven years of data, the 95% confidence intervals associated with the means of spawning limits ranged between 0.4 and 1.1 km (Table 3). Assuming no changes in the standard deviations associated with the means, I estimate that the 95% confidence intervals should range between 0.4 and 1.0 km with eight years of sampling.

Future changes to methods of fish transportation, or construction to modify or remove a portion of Elk Creek Dam, may result in some type of fisheries evaluation. Baseline data on the spawning distribution of coho salmon in the Elk Creek Basin is a low-cost method of evaluating the effects changed conditions for fish passage. As there appears to be minimal benefit associated with gathering more years of data, I recommend termination of this sampling until there is a substantial change in methods for passing adult salmonids around Elk Creek Dam.

ACKNOWLEDGMENTS

Ronald Leffler, Roy Moore, and Eric Pfaff assisted with sampling, data entry, and data summary.

Table 3. Upstream limits (RK) of coho salmon fry in five creeks within the Elk Creek Basin, 1996-2002.

Year	West Branch	Flat	Sugarpine	Bitterlick	Elk
1996	3.5	3.2	8.9	4.0	23.0
1997	3.8	4.1	6.6	2.0	20.9
1998	4.1	5.5	9.2	3.1	20.9
1999	4.4	3.2	7.2	4.0	20.9
2000	4.6	3.2	6.6	3.8	20.9
2001	3.8	3.2	6.9	1.4	20.9
2002	4.7	4.7	7.4	4.8	20.9
Mean	4.1	3.9	7.5	3.3	21.2
±95% CI	0.4	0.9	1.0	1.1	0.7

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