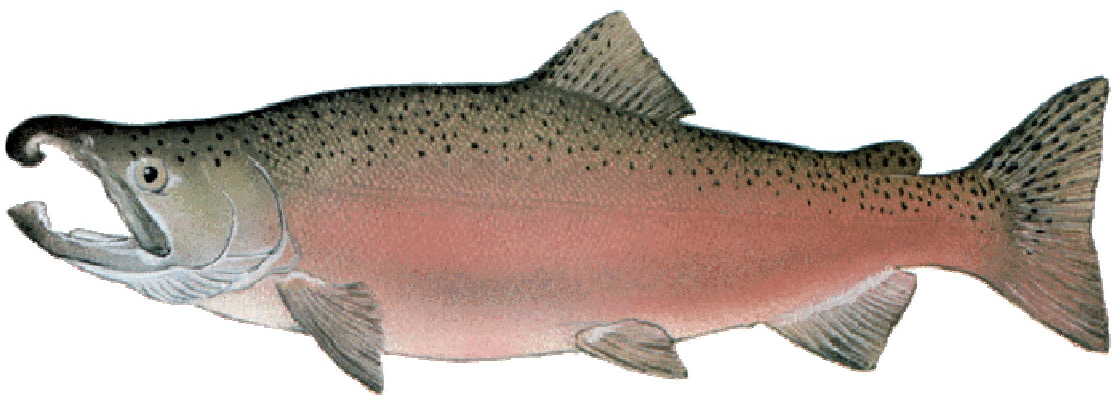
Summary of Habitat and Fish Monitoring Data from East Fork and Upper Mainstem Lobster Creeks: 1988-2005



Prepared by Steve Johnson

Western Oregon Research & Monitoring Program

Oregon Department of Fish and Wildlife

For the Bureau of Land Management

Summary of Habitat and Fish Monitoring Data from East Fork and Upper Mainstem Lobster Creeks: 1988-2005

Since 1988, the Oregon Department of Fish and Wildlife (ODFW) has monitored juvenile salmonid summer abundance, smolt abundance, adult spawner abundance, and stream habitat parameters in East Fork and Upper Mainstem Lobster Creeks of the Alsea watershed (Figure 1). The primary purpose of this monitoring is to study the affects that stream habitat modification has on the freshwater survival and abundance of coho salmon (*Oncorhynchus kisutch*). This work has been partially funded by the Bureau of Land Management's (BLM) Salem District Office since 1996. The purpose of this report is to provide BLM with an update of ODFW's sampling in East Fork Lobster Creek (East Fork) and Upper Mainstem Lobster Creek (Upper Mainstem) during the 2004-05 sampling season and to put these data in context with past data collected by ODFW.

The watershed characteristics of the two study streams are shown in Table 1. In 1991, extensive instream habitat modification was conducted by the BLM in Upper Mainstem as part of a before-after-control-impact (BACI) study to determine the effect of habitat modification on survival rate and smolt abundance of juvenile salmonids. East Fork acted as the control stream during this study, which lasted from 1988 through 1995. A detailed description of this study may be found in Solazzi et al. (2000). During a February 1996 flood, a number of large debris torrents entered Upper Mainstem and significantly impacted the habitat structures resulting in the loss of considerable overwinter habitat for juvenile coho salmon. Similar high streamflows in the winter of 1998-99 caused significant channel changes in East Fork. In the summer of 1999, the BLM used 65 pieces of large wood with a total volume of 265m^3 to create seven in-channel debris jams in East Fork.

Table 1. Watershed characteristics of East Fork and Upper Mainstem Lobster creeks.

Stream	Basin Area (km^2)	Stream Length (km)	Mean summer wetted width (m)	Average gradient (%)
E.F. Lobster Cr.	14.2	3.5	3.5	4.0
U.M. Lobster Cr.	12.4	4.7	3.2	2.6

Habitat Inventory

From 1988 through 2002, we completed physical habitat surveys during the summer (late August – early September) using the methods of Hankin and Reeves (1988) in East Fork (Table 2) and Upper Mainstem (Table 3). No physical habitat surveys were completed in the summers of 2003, 2004, or 2005. Physical habitat surveys were completed in the winter in both streams in the winters of 1990-91, 1991-92, 1995-96, 1996-97, and 2004-05. An additional winter habitat survey was also completed in Upper Mainstem Lobster in the winter of 1993-94 (Table 4). Additional details about sampling methods involved in the physical habitat surveys may be found in Solazzi et al. (2000) and Solazzi and Johnson (2002).

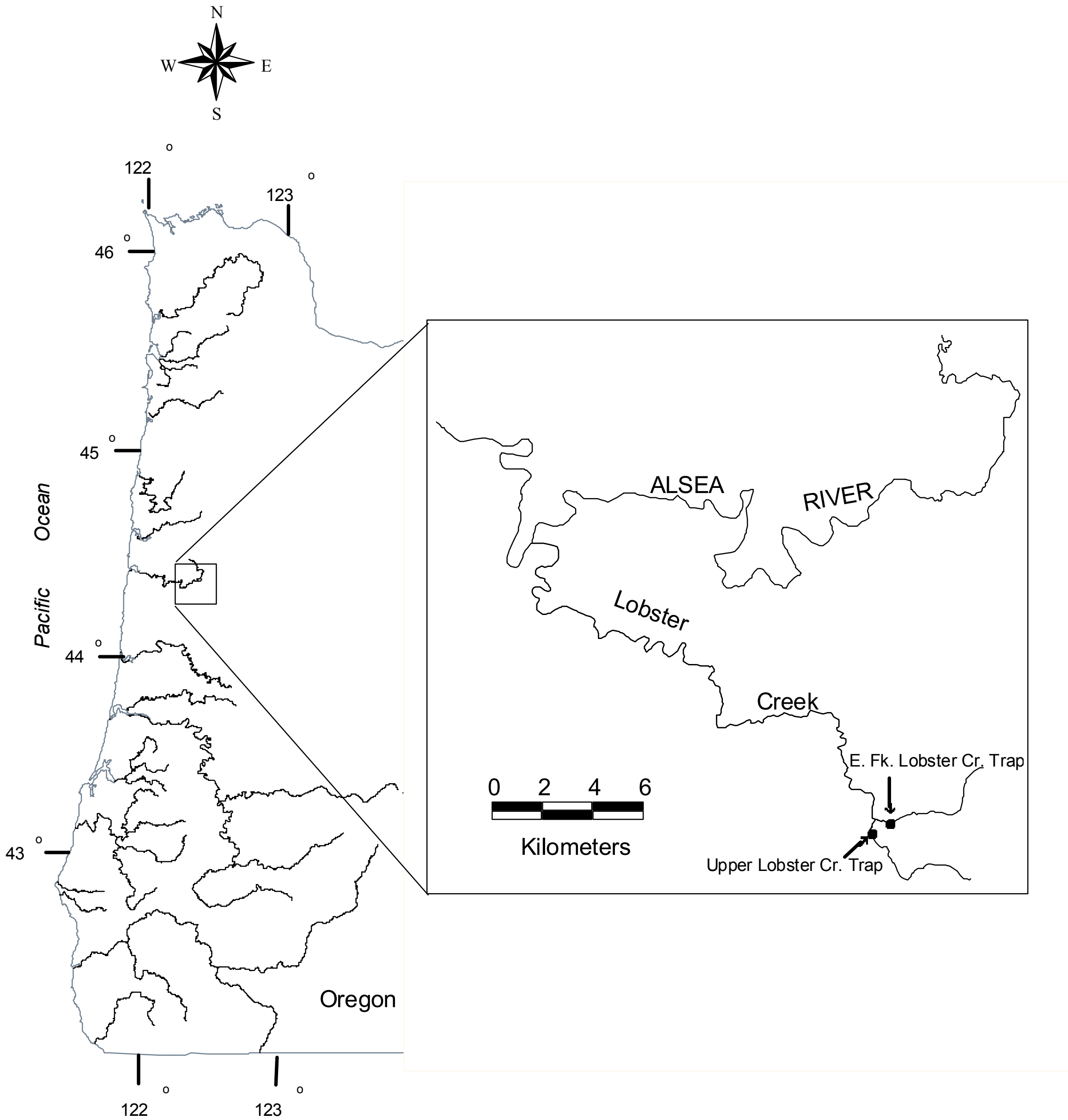


Figure 1. Locations of traps in East Fork and Upper Mainstem Lobster creeks in the Alsea Basin.

Table 2. Habitat survey results for East Fork Lobster Creek, 1988-2002.

Habitat Variable	Year 1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	Average
Glide (m^2)	1,252	2,108	2,737	1,474	912	1,842	1,144	1,635	1,801	1,259	781	735	804	787	834	1,340
Cascade (m^2)	32	0	39	0	0	32	30	0	0	28	0	50	0	30	65	20
Rapid (m^2)	1,965	1,948	4,398	4,723	3,933	6,132	2,678	1,915	1,433	6,187	4,756	5,445	3,350	6,919	4,201	3,999
Riffle (m^2)	3,257	2,428	1,847	1,849	1,662	3,046	3,900	5,479	4,392	2,860	4,532	2,707	6,143	2,562	1,997	3,244
Lateral Scour Pool (m^2)	2,160	2,075	2,710	3,048	2,753	2,613	1,990	1,397	2,440	2,355	2,440	2,361	2,239	2,148	1,782	2,301
Plunge Pool (m^2)	0	344	667	340	238	234	133	214	113	65	52	19	35	15	37	167
Alcove Pool (m^2)	166	12	0	91	281	270	28	11	10	0	0	0	0	0	0	58
Dam Pool (m^2)	1,673	1,273	168	170	145	354	211	0	82	25	0	169	115	0	0	292
Beaver Dam Pool (m^2)	2,885	1,759	687	1,081	1,160	1,622	991	263	273	463	458	369	430	0	72	834
Trench Pool (m^2)	585	716	62	60	60	30	40	0	0	0	47	15	17	16	17	111
Straight Scour Pool (m^2)	1,299	1,575	1,661	2,454	1,893	2,690	2,109	1,810	924	2,370	2,692	1,299	937	2,073	1,534	1,821
Backwater Pool (m^2)	0	22	231	52	105	318	187	147	0	44	70	23	99	58	37	93
Isolated Pool (m^2)	0	0	211	204	244	193	91	108	245	241	195	167	134	92	280	160
% Clay	N/A	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.1	0	0.1	0	0
% Silt	N/A	5.1	4.2	5.8	7.4	7.3	7.0	4.4	1.2	7.3	4.9	2.1	1.3	5.6	1	5
% Sand	N/A	2.2	1.1	0.2	0.9	1.4	3.4	2.0	10.0	2.0	1.5	3.0	2.4	2.6	2	3
% Gravel	N/A	37.5	28.2	25.8	20.1	39.9	33.0	38.0	39.8	23.6	30.3	29.1	22.8	26.7	23	30
% Cobble	N/A	32.6	37.1	43.6	40.7	30.7	36.1	32.5	27.1	36.8	32.7	42.5	35.9	36.4	47	37
% Small Boulder	N/A	15.2	23.8	19.0	25.0	15.1	15.2	16.3	14.7	24.2	20.6	14.6	29.3	21.3	20	20
% Large Boulder	N/A	0.6	0.1	0.3	0.2	0.4	0.3	0.4	0.1	0.1	3.2	0.6	0	0.3	1	1
% Bedrock	N/A	6.8	5.5	5.4	5.7	5.2	4.9	6.3	7.1	6.6	6.8	8.0	8.3	7.1	6	6
No. Large Boulders	N/A	0.8	0.6	0.9	0.7	0.5	0.6	0.2	0.7	0.8	0.4	0.8	0.7	0.6	1	1
Wood Complexity	N/A	1.7	1.9	1.8	2.0	1.7	1.6	1.6	1.6	1.6	1.4	1.7	1.6	1.8	2	2
% Shade	N/A	76.4	76.9	87.9	81.8	80.7	82.0	73.8	80.1	80.0	63.0	82.8	83.8	84.4	84	80
Width (m)	N/A	3.3	3.3	3.5	3.2	3.9	3.0	3.2	3.2	3.4	3.5	3.2	3.7	3.2	3	3

Table 3. Habitat survey results for Upper Mainstem Lobster Creek, 1988-2002.

	Year															
Habitat Variable	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	Average
Glide (m^2)	1,442	2,522	2,320	2,041	1,590	2,592	3,086	3,209	2,334	N/A	2,339	1,182	1,146	1,467	1,070	2,043
Cascade (m^2)	84	65	584	14	71	37	6	0	20	N/A	84	76	0	50	0	78
Rapid (m^2)	1,168	2,072	4,726	1,552	1,552	1,814	1,213	1,232	2,407	N/A	5,929	7,795	6,643	2,722	5,553	3,313
Riffle (m^2)	6,610	4,892	5,134	3,063	3,414	4,498	3,800	5,528	8,574	N/A	4,214	3,744	4,706	7,230	3,627	4,931
Lateral Scour Pool (m^2)	3,424	4,020	3,891	3,639	3,609	2,120	2,312	1,154	4,667	N/A	3,920	5,599	5,212	4,009	3,393	3,641
Plunge Pool (m^2)	811	891	1,243	1,573	1,228	931	832	1,288	1,141	N/A	512	657	343	281	405	867
Alcove Pool (m^2)	175	0	0	1,072	847	1,108	731	834	118	N/A	131	245	222	108	204	414
Dam Pool (m^2)	2,506	384	1,411	6,931	6,784	6,445	5,165	4,410	1,277	N/A	0	0	283	286	274	2,583
Beaver Dam Pool (m^2)	0	4,946	992	1,564	2,548	1,968	1,928	1,792	558	N/A	243	127	412	947	771	1,343
Trench Pool (m^2)	113	245	194	0	0	0	0	0	0	N/A	13	99	19	15	0	50
Straight Scour Pool (m^2)	1,552	1,579	0	1,067	985	4,017	2,553	2,851	3,664	N/A	4,049	2,655	3,950	3,487	4,020	2,602
Backwater Pool (m^2)	0	95	645	90	76	127	125	60	30	N/A	70	116	60	63	49	115
Isolated Pool (m^2)	0	0	72	41	59	58	9	14	22	N/A	112	58	23	38	88	42
% Clay	N/A	0.0	N/A	0.0	0.0	0.0	0.0	0.0	N/A	N/A	0.0	0.1	0.0	0.0	0	0
% Silt	N/A	20.1	N/A	32.9	29.8	33.8	30.0	24.0	N/A	N/A	8.5	15.6	4.1	10.4	8	20
% Sand	N/A	4.7	N/A	2.1	2.5	5.0	17.9	21.9	N/A	N/A	8.3	14.1	9.8	12.3	9	10
% Gravel	N/A	31.1	N/A	30.6	36.7	32.1	33.2	33.4	N/A	N/A	29.7	25.1	30.0	29.7	31	31
% Cobble	N/A	27.0	N/A	21.6	21.2	17.1	12.9	13.5	N/A	N/A	32.1	28.6	33.5	30.2	34	25
% Small Boulder	N/A	13.8	N/A	11.1	8.0	10.1	3.8	5.3	N/A	N/A	16.5	11.5	16.6	12.6	13	11
% Large Boulder	N/A	1.0	N/A	0.3	0.4	0.2	0.3	0.3	N/A	N/A	1.6	2.2	1.9	1.7	2	1
% Bedrock	N/A	2.2	N/A	1.5	1.5	1.7	2.1	2.3	N/A	N/A	3.3	2.8	4.1	3.2	3	3
No. Large Boulders	N/A	2.2	N/A	1.0	1.0	1.1	0.5	0.9	N/A	N/A	1.5	2.0	1.2	1.1	2	1
Wood Complexity	N/A	1.8	N/A	2.6	2.0	2.0	1.8	1.8	N/A	N/A	1.7	1.8	1.8	1.8	2	2
% Shade	N/A	78.0	N/A	75.3	72.2	88.5	82.3	74.8	N/A	N/A	64.5	59.0	65.3	65.9	71	72
Width (m)	N/A	3.0	N/A	3.3	3.1	3.9	3.1	3.4	N/A	N/A	3.3	3.7	3.8	3.5	3	3

Table 4. Winter habitat survey results for East Fork and Upper Mainstem Lobster creeks in select years between 1990-91 and 2004-05.

	East Fork Lobster					Upper Mainstem Lobster					
Habitat Variable	1990-91	1991-92	1995-96	1996-97	2004-05	1990-91	1991-92	1993-94	1995-96	1996-97	2004-05
Glide (m^2)	1,911	3,558	631	274	594	4,538	2,412	2,146	804	752	219
Cascade (m^2)	296	217	159	172	65	403	171	66	48	1,108	88
Rapid (m^2)	10,307	5,857	6,907	10,263	9,333	9,299	4,461	1,535	5,526	8,298	5,784
Riffle (m^2)	6,223	7,392	12,734	10,783	6,882	7,816	7,001	8,733	12,644	14,097	14,847
Lateral Scour Pool (m^2)	3,523	2,586	2,790	3,265	3,287	2,643	2,854	3,383	5,204	3,060	3,748
Plunge Pool (m^2)	1,167	937	666	309	103	1,431	1,384	1,125	2,790	1,097	600
Alcove Pool (m^2)	0	26	251	0	0	0	892	997	1,124	0	73
Dam Pool (m^2)	1,048	841	246	0	484	1,347	8,032	5,943	5,603	850	80
Beaver Dam Pool (m^2)	558	673	357	0	161	24	1,670	1,321	173	0	0
Trench Pool (m^2)	0	103	0	0	61	0	24	0	0	0	0
Straight Scour Pool (m^2)	2,003	2,271	1,837	1,912	1,724	2,975	1,637	1,319	2,727	4,573	6,210
Backwater Pool (m^2)	529	155	290	249	155	417	93	127	362	91	417
Isolated Pool (m^2)	81	91	25	13	0	0	16	16	0	278	37
% Clay	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
% Silt	4.4	3.1	2.4	0.2	2.6	4.2	17.8	24.8	3.5	1.8	0.6
% Sand	2.2	2.7	3.5	2.9	3.5	3.7	7.4	9.4	11.4	10.7	10.3
% Gravel	39.5	34.3	43.2	34.0	26.0	34.6	37.0	38.7	53.6	41.1	10.1
% Cobble	37.1	40.4	31.9	41.0	40.2	33.2	25.2	18.7	19.7	34.1	60.3
% Small Boulder	11.9	13.5	13.7	15.4	24.0	20.1	9.8	4.8	8.1	8.2	14.4
% Large Boulder	0.4	0.6	0.5	0.1	0.3	1.7	1.3	0.3	0.7	1.9	0.1
% Bedrock	4.4	5.2	4.9	6.4	5.4	2.5	1.7	2.6	2.9	1.5	4.0
No. Large Boulders	0.8	1.2	0.7	1.0	2.5	2.0	1.8	0.9	1.2	1.7	3.0
Wood Complexity	2.1	2.0	2.1	2.0	2.1	2.2	2.5	2.3	2.4	2.2	1.7
Width (m)	N/A	5.3	6.1	6.0	6.0	N/A	5.0	5.4	6.6	6.4	5.7

Juvenile Salmonid Summer Population Estimates

The estimated summer rearing populations of juvenile salmonids from 1988 through 2005 are shown in Table 5 for both streams. Each summer from 1988-2002, we estimated the number of young-of-the-year coho salmon, young-of-the-year trout (steelhead and cutthroat combined), age 1+ steelhead, and age 1+ cutthroat trout. To estimate the number of fish rearing in the pools, a diver counted the number of each species and age class in every third pool. These counts were adjusted for each species by a calibration factor derived from electrofishing population estimates in a subset of the snorkeled pools. Finally, the mean of the adjusted values was multiplied by the total number of pools in each stream (Hankin and Reeves 1988). Snorkel estimates were impractical in habitat with shallow depths. Therefore, we estimated the mean density of fish for a subset of glide, riffle, and rapid habitats by electrofishing, employing a removal population estimate with two or more passes (Serber and Lecren 1967). For each habitat type, we then multiplied the mean density by the surface area of the habitat type in the entire stream (Hankin 1984).

In the summer of 2003, 2004, and 2005, as in previous years, we completed dive counts in every third pool; however, we did not use electrofishing equipment to calibrate the diver counts or to estimate population size of juvenile salmonids in fast water habitat. In order to make comparable estimates to the number of juvenile salmonids rearing in each stream from past years, we applied the 2003, 2004, and 2005 uncalibrated diver estimates in pool habitat to the regression of total population estimate for all habitat units (derived from Hankin-Reeves survey methods) on uncalibrated diver counts in pool habitat (Table 6). Data collected from the summer of 1991-2002 on each stream were used to develop the regression equations. The relationship between uncalibrated diver counts in pool habitat and the Hankin-Reeves population estimate (all habitat types) was significant for coho salmon and age 0 trout for both streams. Thus, we used the regression equations in table 6 to obtain the Hankin-Reeves population estimates given in Table 5 for coho salmon and age 0 trout in summers 2003, 2004, and 2005. We found a poor relationship between summer dive counts of steelhead and cutthroat trout (≥90mm) in pool habitat and the total population estimates for all habitat units derived from the Hankin-Reeves method (Table 5). Cutthroat (≥90mm) dive counts in pools were not significant and explained less than 10% of the variation in the Hankin-Reeves population estimates in both streams. The regression was also not significant for steelhead (≥90mm) for East Fork Lobster. While the regression was significant for steelhead (≥90mm) in Upper Mainstem Lobster ($p=0.046$), it explained only about 37% of the variation in the Hankin-Reeves population estimate. Therefore, no estimates of summer population size are provided for steelhead or cutthroat trout (≥90mm) in 2003, 2004, and 2005 (Table 5).

Table 5. Juvenile salmonid population size during summer in East Fork Lobster and Upper Mainstem Lobster creeks, 1988-2005.

	E.F. Lobster Creek				U.M. Lobster Creek			
Sample Year	Coho	Trout <90mm	Steelhead ≥90mm	Cutthroat ≥90mm	Coho	Trout <90mm	Steelhead ≥90mm	Cutthroat ≥90mm
1988	11,462	5,098	530	368	10,667	2,916	437	338
1989	13,694	2,279	792	961	6,406	3,242	248	596
1990	19,278	2,837	474	1,811	18,161	2,288	766	792
1991	9,964	3,490	543	686	7,633	1,776	235	525
1992	7,716	3,096	363	1,255	8819	2951	216	1268
1993	15,842	2,298	672	2,793	23,012	1,327	148	3,337
1994	6,432	2,278	468	998	15,486	2,562	150	729
1995	8,085	2,884	803	583	9,619	3,357	112	1,288
1996	3,767	2,355	412	592	940	2,501	520	893
1997	11,055	4,619	133	444	N/A	N/A	N/A	N/A
1998	4,863	3,516	667	827	6,842	3,153	909	1,018
1999	2,358	5,012	578	917	1,690	10,346	806	2,296
2000	8,001	5,478	800	488	9,385	4,815	1,300	788
2001	10,280	3,288	667	682	17,086	1,772	778	1,165
2002	10,954	4,121	276	1,315	14,247	3,053	127	1,579
2003	10,047	3,437	---	---	21,751	4,580	---	---
2004	10,937	3,686	---	---	14,842	2,431	---	---
2005	8,017	3,400	---	---	10,843	1,879	---	---
Average	9,598	3,510	545	981	11,613	3,232	482	1,187

Table 6. Regression of Hankin-Reeves population estimate (y) on pool dive count (x) of juvenile salmonids in East Fork Lobster and Upper Mainstem Lobster creeks. Data collected from 1991-2002 were used for the regression analysis. Regression equations were used to determine the Hankin-Reeves population estimate for coho salmon and age 0 trout in each stream for the summer of 2003 through 2005.

Stream	Species	Regression Equation	N	R^2	p value
East Fork	Coho	y =1.35356x + 614.296	12	0.736	0.0004
East Fork	0+ trout	y =2.51335x + 1439.24	12	0.424	0.022
East Fork	Steelhead ≥90mm	y =1.33392x + 311.81	12	0.299	0.066
East Fork	Cutthroat ≥90mm	y =2.22139x + 670.77	12	0.076	0.387
Upper Mainstem	Coho	y =1.63557x – 741.6	11	0.942	0.0000007
Upper Mainstem	0+ trout	y =4.09322x – 49.081	11	0.818	0.00013
Upper Mainstem	Steelhead ≥90mm	y =1.91800x + 29.61	11	0.372	0.0462
Upper Mainstem	Cutthroat ≥90mm	y =1.23459x + 1075.26	11	0.015	0.720

Downstream Migrant Juvenile Sampling

In the spring we operated a motor driven floating scoop trap in each study stream to estimate the number of juvenile downstream migrants leaving each stream. A detailed description of the methods used to operate these traps may be found in Solazzi et al. (2000).

The estimated numbers of juvenile salmonids migrating downstream in East Fork in the spring of 2005 are shown in Table 7. Age 1+ coho peaked during the week of March 21-27, and again during the week of April 25 – May 1. The peak in March coincided with a large freshet after an exceptionally dry winter. The number of 1+ coho salmon migrants in East Fork in 2005 (4,580) was the highest we have observed to date, and doubled the 18-year average (Table 8). The size of 1+ coho salmon spring migrants during peak week of migration was similar to other years that had peak migration in March (Table 9). The estimates of coho salmon fry, cutthroat trout (≥90mm) and steelhead (≥90mm) were also higher than the 18-year average (Table 8).

The estimated numbers of juvenile salmonids migrating downstream from Upper Mainstem Lobster Creek in the spring of 2005 are shown in Table 10. The timing of outmigration of age 1+ coho salmon was similar to that observed in East Fork, with peak migration occurring during the week of March 21-27, and a smaller peak observed late April. In 2005, the number of age 1+ coho salmon migrants (4,924) was similar to recent years, and well above the 18 year average (Table 11). The size of 1+ coho salmon migrants was similar to migrants in East Fork, and similar to other years with comparable timing of peak migration (Table 12). Upper Mainstem had the largest number of cutthroat (≥90mm) migrants in 2005 (1,647) that we have observed since we began trapping in 1988, while the number of steelhead migrants (≥90mm) was below the long term average (Table 11).

Overwinter Survival

The overwinter survival of juvenile coho salmon was 41.9% in East Fork and 33.2% in Upper Mainstem, indicating that overwinter survival during the winter of 2004-05 was higher than average in both streams (Table 13). The mild winter of 2004-05, characterized by only a few moderate freshets, is thought to be at least partially responsible for the higher than average overwinter survival. This increased overwinter survival, in turn, resulted in the higher than average abundance of age 1+ coho salmon migrants in both streams.

Table 7. Weekly estimates of the number of juvenile salmonids migrating downstream from East Fork Lobster Creek, spring 2005.

Week	Coho 1+	Coho Fry	Trout Fry	Chinook Fry	Trout 60-89mm	Steelhead >90mm	Cutthroat >90mm
FEB 28-MAR 6	17	3,628	0	0	9	5	2
MAR 7-13	11	568	0	0	0	0	4
MAR 14-20	188	183	0	0	12	59	4
MAR 21-27	856	191	0	0	140	66	25
MAR 28-APR 3	518	16,084	0	0	234	69	41
APR 4 – 10	591	21,586	0	0	86	51	87
APR 11-17	386	14,616	1	0	23	13	22
APR 18-26	504	4,154	1	0	12	23	47
APR 25- MAY 1	850	18,498	24[a]	0	55	66	129
MAY 2 -MAY 8	480	21,900	35[a]	0	28	21	80
MAY 19-15	125	10,988	11[a]	0	28	28	115
MAY 16-22	22	1,496	0	0	11	7	74
MAY 23-29	21	1,032	2[a]	0	6	7	73
MAY 30-JUNE 5	11	782	20[a]	0	0	7	99
Total	4,580	115,706	94[a]	0	644	422	802

[a]Few marked fish recaptured, thus trap efficiency not available. Number shown is total fish captured, not an expanded estimate of total migrants using trap efficiency.

Table 8. The estimated number of juvenile salmonids migrating downstream each spring in East Fork Lobster Creek 1988-2005.

Trap Year	Trap Start Date	Coho 1+	Coho Fry	Trout Fry	Chinook Fry	Trout 60-89mm	Steelhead >90mm	Cutthroat >90mm
1988	9-Mar-88	1,178	19,044	3,204	2,130	14[a]	15[a]	15[a]
1989	1-Mar-89	2,691	48,133	3,594	264,733	43	1[a]	268
1990	5-Feb-90	3,549	22,736	4,381	0	99	32	110
1991	4-Feb-91	2,121	8,422	2,984	0	76	45	296
1992	4-Feb-92	2,627	6,992	1,486	0	123	49	251
1993	3-Feb-93	2,055	46,550	1,875	0	202	117	699
1994	1-Feb-94	3,641	4,266	5,529	0	102	26	738
1995	1-Feb-95	892	8,130	5,549	0	55	21	187
1996	12-Feb-96	985	6,302	33[a]	0	116	3[a]	7[a]
1997	3-Mar-97	1,055	42,715	13,609	0	25	14[a]	5[a]
1998	2-Mar-98	1,286	18,416	14,584	0	464	455	523
1999	1-Mar-99	909	3,251	3,413	228	247	169	839
2000	28-Feb 00	1,189	17,108	8,025	0	737	714	691
2001	28-Feb 01	4,121	44,651	20[a]	0	1,131	1,371	999
2002	26-Feb 02	2,945	30,585	10,370	0	90	147	1,231
2003	28-Feb 03	2,054	329,809	10,523	5,951	426	76	842
2004	1-Mar-04	2,968	278,736	21,958	0	853	762	1,454
2005	27-Feb 05	4,580	115,706	94[a]	0	644	422	802
	Average	2,269	58,429	7,406[b]	16,061	301[b]	306[b]	652[b]

[a]Few marked fish recaptured, thus trap efficiency not available. Number shown is total fish captured, not an expanded estimate of total migrants using trap efficiency.

[b]Average only includes years for which trap efficiency estimates are available.

Table 9. Number of coho salmon smolts (±95% CI), week of peak migration, and mean fork length of smolts during week of peak migration in East Fork Lobster Creek.

Sample year	Smolts ± CI			Peak week	Mean FL (mm) ± CI		
1988	1,178	±	144	3/21-3/27	79.1	±	5.0
1989	2,691	±	280	3/20-3/26	72.4	±	3.5
1990	3,549	±	266	3/23-3/29	76.2	±	4.4
1991	2,121	±	130	5/6-5/12	91.6	±	4.4
1992	2,627	±	166	4/6-4/12	na		
1993	2,055	±	219	4/19-4/25	89.9	±	3.6
1994	3,641	±	226	5/2-5/8	91.5	±	2.8
1995	892	±	153	5/1-5/7	95.0	±	3.0
1996	985	±	220	2/12-2/18	73.3	±	6.4
1997	1,055	±	205	4/21-4/27	84.8	±	4.3
1998	1,286	±	189	4/27-5/3	96.4	±	3.8
1999	909	±	103	3/15-3/21	74.9	±	3.2
2000	1,189	±	172	4/17-4/23	99.4	±	2.9
2001	4,121	±	256	4/23-4/29	93.1	±	4.3
2002	2,945	±	192	4/8-4/14	78.3	±	3.7
2003	2,054	±	221	4/14-4/20	84.7	±	5.1
2004	2,968	±	250	3/22-3/28	78.0	±	5.3
2005	4,580	±	363	3/21-3/27	77.9	±	2.5

Table 10. Weekly estimates of the number of juvenile salmonids migrating downstream from Upper Mainstem Lobster Creek, spring 2005.

Week	Coho 1+	Coho Fry	Trout Fry	Chinook Fry	Trout 60-89mm	Steelhead >90mm	Cutthroat >90mm
FEB 28-MAR 6	9	596	0	0	0	3	8
MAR 7-13	29	62	0	0	0	13	31
MAR 14-20	87	52	0	0	2[a]	19	32
MAR 21-27	395	31	0	0	0	0	63
MAR 28-APR 3	1,103	3006	0	0	2[a]	6	224
APR 4 – 10	680	16301	0	0	0	1	123
APR 11-17	350	11401	0	0	0	0	118
APR 18-26	539	3191	0	0	0	3	168
APR 25- MAY 1	752	2947	254	0	0	1	473
MAY 2 -MAY 8	668	14881	285	0	0	0	237
MAY 19-15	187	11457	28	0	0	0	85
MAY 16-22	80	3104	7	0	0	0	44
MAY 23-29	34	1523	4		0	0	5
MAY 30-JUNE 5	11	651	40	0	0	0	36
Total	4,924	69,203	618	0	4[a]	46	1,647

[a]Few marked fish recaptured, thus trap efficiency not available. Number shown is total fish captured, not an expanded estimate of total migrants using trap efficiency.

Table 11. The estimated number of juvenile salmonids migrating downstream each spring in Upper Mainstem Lobster Creek 1988-2005.

Trap Year	Trap Start Date	Coho 1+	Coho Fry	Trout Fry	Chinook Fry	Trout 60-89mm	Steelhead ≥90mm	Cutthroat ≥90mm
1988	9-Mar-88	1,337	4,311	4,100	1[a]	3[a]	2[a]	21[a]
1989	1-Mar-89	832	1,570	1,370	1[a]	1[a]	0	22
1990	5-Feb-90	974	5,419	1,218	0	5[a]	14	55
1991	4-Feb-91	3,455	6,702	449	0	7[a]	36	319
1992	4-Feb-92	4,171	2,430	9[a]	0	15[a]	284	762
1993	3-Feb-93	2,666	21,077	1,138	0	21[a]	209	382
1994	1-Feb-94	8,909	8,628	21[a]	0	37[a]	101	579
1995	1-Feb-95	5,797	1,759	12[a]	0	0	10[a]	606
1996	12-Feb-96	428	0	0	0	1[a]	2[a]	73
1997	3-Mar-97	214	1,266	6,561	0	0	6[a]	7[a]
1998	2-Mar-98	2,913	3,915	1,406	0	584	484	1,391
1999	1-Mar-99	1,481	353	9,135	0	24[a]	147	398
2000	28-Feb-00	377	5,811	20,006	0	799	494	645
2001	28-Feb 01	4,173	18,238	1,947	0	665	347	1,134
2002	25-Feb-02	4,506	11,486	2,272	0	9[a]	196	761
2003	28-Feb-03	5,059	218,174	15,769	3,439	212	21[a]	1,459
2004	1-Mar-04	4,814	147,083	14,250	0	9[a]	23[a]	1,514
2005	27-Feb 05	4,924	69,203	618	0	4[a]	46	1,647
	Average	3,168	29,301	5,349[b]	215[b]	349[b]	197[b]	734[b]

[a]Few marked fish recaptured, thus trap efficiency not available. Number shown is total fish captured, not an expanded estimate of total migrants using trap efficiency.

[b]Average only includes years for which trap efficiency estimates are available.

Table 12. Number of coho salmon smolts (±95% CI), week of peak migration, and mean fork length of smolts during week of peak migration in Upper Mainstem Lobster Creek.

Sample year	Smolts ± CI			Peak week	Mean FL (mm) ± CI		
1988	1,337	±	210	4/4-4/10	80.3	±	3.4
1989	832	±	240	3/6-3/12	67.8	±	1.6
1990	974	±	103	4/23-4/29	98	±	4.1
1991	3,455	±	153	4/1-4/7	75.4	±	2.7
1992	4,171	±	198	3/30-4/5	na		
1993	2,666	±	175	4/19-4/25	94.8	±	3.6
1994	8,909	±	351	3/29-4/3	74.3	±	3.1
1995	5,797	±	279	4/24-4/30	90.0	±	5.0
1996	428	±	235	4/29-5/5	109.0	±	4.0
1997	214	±	351	4/14-4/20	112.1	±	4.0
1998	2,913	±	333	4/20-4/26	92.4	±	4.5
1999	1,481	±	184	5/3-5/9	92.2	±	3.8
2000	377	±	151	5/8-5/14	98.3	±	2.8
2001	4,173	±	411	3/26-4/1	81.2	±	2.6
2002	4,506	±	316	4/8-4/14	79.6	±	3.7
2003	5,059	±	279	4/7-4/13	83.0	±	3.8
2004	4,814	±	349	4/5-4/11	82.5	±	4.2
2005	4,924	±	404	3/28-4/3	79.6	±	3.3

Table 13. The overwinter survival of juvenile coho salmon in East Fork Lobster and Upper Mainstem Lobster Creek. Survival was calculated by dividing the number of downstream migrating 1+ coho salmon captured in brood year + 2 by the summer population of juvenile coho in brood year +1.

Brood Year	E.F. Lobster Cr.	U.M. Lobster Cr.
1987	23.5%	7.8%
1988	25.9%	15.2%
1989	11.0%	19.0%
1990	26.4%	54.6%
1991	26.6%	30.2%
1992	23.0%	38.7%
1993	13.9%	37.4%
1994	12.2%	4.4%
1995	28.0%	22.8%
1996	11.6%	N/A
1997	18.7%	21.6%
1998	50.4%	22.3%
1999	51.4%	44.5%
2000	28.6%	26.4%
2001	18.8%	35.5%
2002	29.5%	22.1%
2003	41.9%	33.2%
Average	26.0%	27.2%

Spawning Adult Surveys

From October 27, 2004 through February 10, 2005, we conducted periodic surveys to count adult salmon and steelhead in each stream. A single observer walking the entire salmon-bearing length of each study stream counted the number of redds and the number of live and dead salmon and steelhead.
Area-under-the-curve (AUC) extrapolation techniques (Biedler and Nickelson 1980; Neilson and Geen 1981; Solazzi 1984) were used to estimate the total number of spawning coho salmon from the survey data.

Counts of live adult coho spawners during the 2004-05 spawning season are shown in Table 14. Based on AUC adjusted estimates, a total of 167 and 183 adult coho salmon were estimated to have spawned in East Fork and Upper Mainstem Lobster creeks (Table15).

Table 14. Spawning ground counts for live adult coho salmon in East Fork Lobster and Upper Mainstem Lobster creeks during the winter of 2004-05.

Date*	E.F. Lobster Cr.	U.M Lobster Cr.
10/27/04	0	2
11/5/04	11	3
11/12/04	4	0
11/22/04	1	0
11/29/04	0	0
12/6/04	0	0
12/14/04	73	82
12/20/04	44	43
12/27/04	4	10
1/3/05	8	2
1/10/05	6	4
1/20/05	35	42
1/27/05	8	27
2/3/05	3	2
2/10/05	1	0

Table 15. Area-under-the-curve estimates of the number of adult coho salmon spawning in East Fork Lobster and Upper Mainstem Lobster creeks, 1986-2004 brood years.

Brood Year	E.F. Lobster Cr.	U.M. Lobster Cr.
1986	159	31
1987	90	32
1988	302	22
1989	154	40
1990	32	9
1991	21	11
1992	272	284
1993	20	47
1994	30	25
1995	36	34
1996	25	23
1997	47	25
1998	6	1
1999	21	39
2000	105	107
2001	52	52
2002	671	802
2003	753	824
2004	167	183
Average	156	136

References

Beidler, W.M., and T.E. Nickelson. 1980. An evaluation of the Oregon Department of Fish and Wildlife standard spawning fish survey system for coho salmon. Oregon Department of Fish and Wildlife, Information Report Series, Fisheries Number 80-9, Portland.

Hankin, D.G. 1984. Multistage sampling designs in fisheries research: applications in small streams. Canadian Journal of Fisheries and Aquatic Sciences 41:1575-1591.

Hankin, D.G., and G.H. Reeves. 1988. Estimating total fish abundance and total habitat area in small streams based on visual estimation methods. Canadian Journal of Fisheries and Aquatic Sciences 45:834-844.

Neilson, J.D., and G.H. Geen. 1981. Enumeration of spawning salmon from spawner residence time and aerial counts. Transactions of the American Fisheries Society 110:554-556.

Rodgers, J.D., M.F. Solazzi, S.L. Johnson, and M.A. Buckman. 1992. Comparison of three techniques to estimate juvenile coho salmon populations in small streams. North American Journal of Fisheries Management 12:79-86.

Seber, G.A.F., and E.D. Le Cren. 1967. Estimating population parameters from catches large relative to the population. Journal of Animal Ecology 36:631-643.

Solazzi, M.F. 1984. Relationships between visual counts of coho, chinook, and chum salmon from spawning fish surveys and the actual number of fish present. Oregon Department of Fish and Wildlife, Information Report Series, Fisheries Number 84-7, Portland.

Solazzi, M.F., T.E. Nickelson, S.L. Johnson, and J.D. Rodgers. 2000. Effects of increasing winter rearing habitat on abundance of salmonids in two coastal Oregon streams. Canadian Journal of Fisheries and Aquatic Sciences. 57:906-914.

Sollazi, M.F. and S.L. Johnson. 2002. Summary of Habitat and Fish Monitoring Data from East Fork and Upper Mainstem Lobster Creeks: 1988-2002. Report prepared by Oregon Department of Fish and Wildlife, Western Oregon Research and Monitoring Program, for the Bureau of Land Management in fulfillment of contract agreement. Report is available online at the ODFW Research and Monitoring Website: http://oregonstate.edu/Dept/ODFW/life-cycle/reports/2001blm.pdf.