West Fork Smith River
Salmonid Life Cycle Monitoring Project

Final Report: 2005-2006

FY 2004 Allocation
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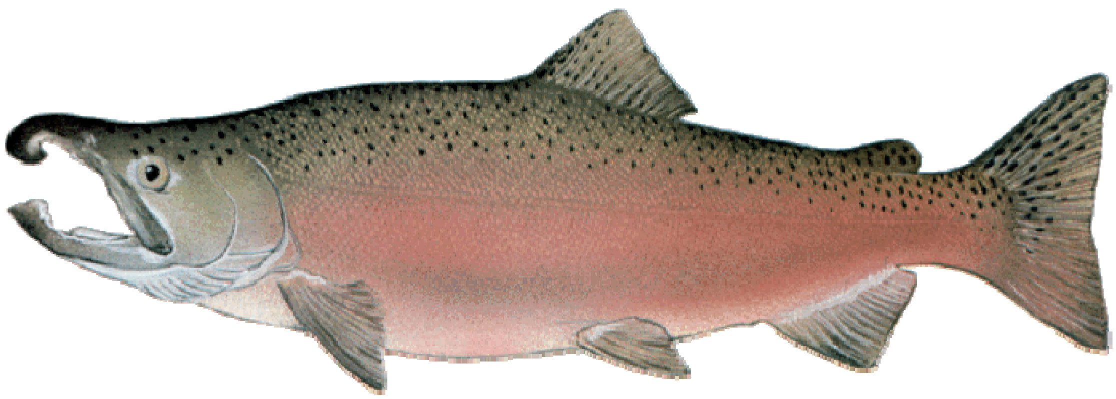

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Introduction

The Salmonid Life Cycle Monitoring Project of the Oregon Department of Fish and Wildlife (ODFW) has guided monitoring of juvenile and adult salmonid fishes (*Oncorhynchus spp.*) in the West Fork Smith River (Umpqua basin) since 1998. These activities are coordinated under the Oregon Plan for Salmon and Watersheds and are part of a broader effort to monitor populations of salmonids in select Oregon coastal streams. Two objectives of this program are to estimate the abundance of returning adult salmonids and downstream-migrating juvenile salmonids, and estimate the marine and freshwater survival rates for coho salmon.

This report summarizes monitoring activities for the 2005-2006 run-year of returning adult fish and year 2006 out-migration of juvenile fish in the West Fork Smith River. A full description of sampling methods is provided in Solazzi et al. (2000) and Jepsen et al. (2006). These and other Life Cycle Monitoring Project reports are available on the ODFW Corvallis Research Lab website, http://nrimp.dfw.state.or.us/crl/

Adult Fish Trap Operation

During summer 2005, repairs were made to the floating weir used as a migration barrier at the adult trap. The weir was installed on September 20, and the first minor freshet and trap catch occurred on November 1. Subsequent periods of high stream flow caused the floating weir to submerge for portions or all of eight days in November, seven days in December, 26 days in January, four days in February and two days in March. During a high-flow event in January, an 18 ft section of the 42 ft long head dam was swept away, probably due to impact from floating debris. The head dam serves to increase flow through the trap box to encourage fish to enter the trap. Temporary repairs were made to the head dam during a period of moderate stream flows in late February.

All wild coho salmon and both wild and hatchery winter steelhead that entered the trap were tagged with two Floy tags and passed above the trap. Fall Chinook salmon were enumerated by sex and origin (wild or hatchery), then passed untagged. The last fish (winter steelhead) entered the trap on April 21, and the trap was decommissioned for the season on May 3.

Spawning Ground Surveys

Spawning ground surveys were conducted in the five principal tributaries and eight reaches of the main stem at approximately seven day intervals from November 1, 2005 to May 9, 2006. Coho salmon spawning activity was widespread throughout all major tributaries and most reaches of the main stem (Table 1). The estimate of coho salmon spawners within survey reaches, based on area-under-curve calculations, represents 69.3% of the estimate for the total basin (summarized below).

Most spawning activity of winter steelhead was observed in the lower to middle reaches of the main stem, between Tributary B (between Coon and Crane creeks) and the bridge above Gold Creek (Table 2). Table 3 also summarizes redd counts of cutthroat trout, and Pacific and brook lamprey.

Fall Chinook spawners were only observed in the main stem, and only during the first increases in stream flow in early to mid-November.

Table 1. Peak live counts and redd counts for coho salmon, and total coho salmon spawners (based on area-under-curve calculations from survey counts) in the West Fork Smith River during the period November 2005 to May 2006.

Survey reach	Length (km)	Peak live	Peak redds	Total AUC
Tributaries				
Coon Cr.	1.11	26	27	59
Crane Cr., lower	1.15	14	27	29
Crane Cr, upper	1.54	28	70	59
Moore Cr, lower	1.33	34	21	44
Moore Cr, upper	1.99	36	28	71
Beaver Cr, lower	2.11	23	32	70
Beaver Cr, upper	1.17	35	55	86
Gold Cr, lower	1.26	10	16	26
Gold Cr, upper	1.86	36	31	83
Main stem				
Trib. B to Crane Cr.	1.71	22	26	33
Moore Cr to Trib. D	2.50	35	18	91
Trib. F to Beaver Cr.	1.56	64	10	105
Beaver to Gold Cr.	0.84	112	10	120
Gold Cr. to left tributary	1.78	61	31	152
Headwaters, Section 3	1.12	40	26	108
Headwaters, Section 4	1.36	25	17	110
Headwaters, Section 5	na	15	19	33
Total				1,279

Estimated Spawner Populations

The estimated spawner populations are based on the number of fish tagged and passed at the adult trap, and number of tagged and untagged fish observed (live fish and spawned-out carcasses) on surveys. Estimates of spawners were made using the adjusted Peterson mark-recapture methodology:

$$N = \frac{(M(1-p^2) + 1)(C+1)}{(R + 1)}$$

where:

N = estimated population above the West Fork Smith River adult trap
M = the number of adult coho salmon marked with two Floy tags
C = the number of adult coho salmon observed for presence of tags on spawning surveys (live fish observations plus carcass recoveries), excluding fish for which presence of tag could not be determined
R = the number of tagged fish observed
p^2 = the probability that a fish lost both tags before being observed

The probability that a fish lost one of the two tags implanted was estimated by the formula:

$$p = n_1 / (2n_2 + n_1)$$

where:

n_1 = the number of observations of fish with one tag
n_2 = the number of observations of fish with two tags

Table 2. Total number of winter steelhead, cutthroat trout, Pacific lamprey and brook lamprey redds counted on survey reaches in the West Fork Smith River for the period December 2005 through April 2006.

		Total redd counts			
Survey reach	Length (km)[a]	Steelhead	Cutthroat	Pac. lamprey	Brook lamprey
Tributaries					
Coon Cr.	1.11	3	0	1	1
Crane Cr., lower	1.15	4	0	2	1
Crane Cr, upper	1.54	2	1	5	9
Moore Cr, lower	1.33	6	1	2	10
Moore Cr, upper	1.99	3	4	6	11
Beaver Cr, lower	2.11	6	3	4	10
Beaver Cr, upper	1.17	6	4	5	3
Gold Cr, lower	2.11	3	2	1	0
Gold Cr, upper	1.86	10	0	1	0
Main stem					
Trib. B to Crane Cr.	1.71	18	0	5	0
Moore Cr to Trib. D	2.50	34	12	7	4
Trib. F to Beaver Cr.	1.56	19	0	0	0
Beaver to Gold Cr.	0.84	18	0	0	1
Gold Cr. to left tributary	1.78	31	0	4	0
Headwaters, Section 3	1.12	8	1	5	8
Headwaters, Section 4	1.36	8	1	6	3
Survey reach totals	24.38	179	29	54	61

[a] Survey reach lengths shown differ from those previously reported; lengths shown are those measured by EPA and are marked at 50m intervals.

Table 3 summarizes annual trap catch and the estimated spawner populations of coho salmon and winter steelhead. The trap catch included five hatchery steelhead, but no hatchery coho salmon, during the 2005-06 run year. There is no hatchery program in the Smith Basin; hatchery steelhead are likely strays from the Siuslaw River. Hatchery coho salmon previously found in the West Fork Smith River were likely strays from the North Umpqua River.

Timing of trap catch for the 2005-06 run year (Figure 1) generally corresponded with timing of high stream flow events. Most fish bypassed the trap during high stream flows when the floating weir was submerged, thus timing of trap catch was only an approximation of run timing.

Confidence intervals (95%) for coho salmon and winter steelhead total spawner estimates are shown in Table 4. Confidence intervals for coho salmon were calculated using a relationship between the F distribution and the binomial distribution. Confidence intervals for winter steelhead were calculated using a bootstrap analysis (Thedinga et al. 1994, 1000 iterations).

Table 3. The number of female (F), male (M) and jack (J) salmonids captured at the West Fork Smith River adult trap and the estimated spawning population above the trap during the return years 1998-99 through 2005-06. For coho salmon, numbers of wild and hatchery female and male spawners were based on percent representation in spawned-out carcasses recovered on surveys and the adult trap weir.

	Trap Catch						Estimated Spawning Population					
Return	Wild			Hatchery			Wild			Hatchery		
Year	F	M	J	F	M	J	F	M	J	F	M	J
Coho												
98-99							72	73	na	0	0	0
99-00	38	58	1	0	0	0	130	163	na	0	0	0
00-01	46	56	23	0	0	0	271	279	na	0	0	0
01-02	49	57	6	8	11	0	707	729	189	15	20	0
02-03	100	173	12	3	0	0	1,520	1,924	114	4	3	0
03-04	56	110	2	0	0	0	1,787	1,940	101	0	0	0
04-05	30	32	0	0	0	0	417	561	na	0	0	0
05-06	17	34	0	0	0	0	734	1,111	na	0	0	0
Fall Chinook												
98-99	0	13	0	0	0	0						
99-00	3	13	0	0	0	0						
00-01	1	32	3	0	0	0						
01-02	5	34	2	0	1	0						
02-03	2	10	0	0	0	0						
03-04	2	20	2	0	0	0						
04-05	8	20	2	6	21	1						
05-06	2	9	4	1	4	0						
Steelhead												
98-99	54	48	4	3	2	0	179	173		10	7	
99-00	244	158	0	1	1	0	275	177		1	1	
00-01	141	118	7	1	2	0	175	155		1	2	
01-02	116	86	2	0	1	0	472	362		2	2	
02-03	45	72	0	0	0	0	145	233		0	0	
03-04	104	92	1	0	1	0	281	252		2	1	
04-05	78	79	2	1	3	0	122	121		2	5	
05-06	56	43	0	4	1	0	229	176		16	4	

Table 4 also shows the percentage of repeat steelhead spawners returning to the West Fork Smith River, based on the number of previously tagged repeat spawners in the trap catch. The percentage of combined male and female repeat spawners has ranged from 0.7% to 12.3%. The highest percentage occurred in 2001, when an estimated 16.5% of females and 10.3% of males were repeat spawners. The estimates of total steelhead spawners in Table 4 have been adjusted to account for repeat spawners. This adjustment was made by assuming repeat spawners were equally represented in trap catch and the population that bypassed the trap. Because the population of spawners observed for presence of tags (C) included tagged repeat spawners, the number of tagged fish observed above the trap (R) was reduced by the percentage of tagged repeat spawners observed in the trap. This adjusted R-value was used in the Peterson algorithm to estimate total spawners, including both new and repeat spawners.

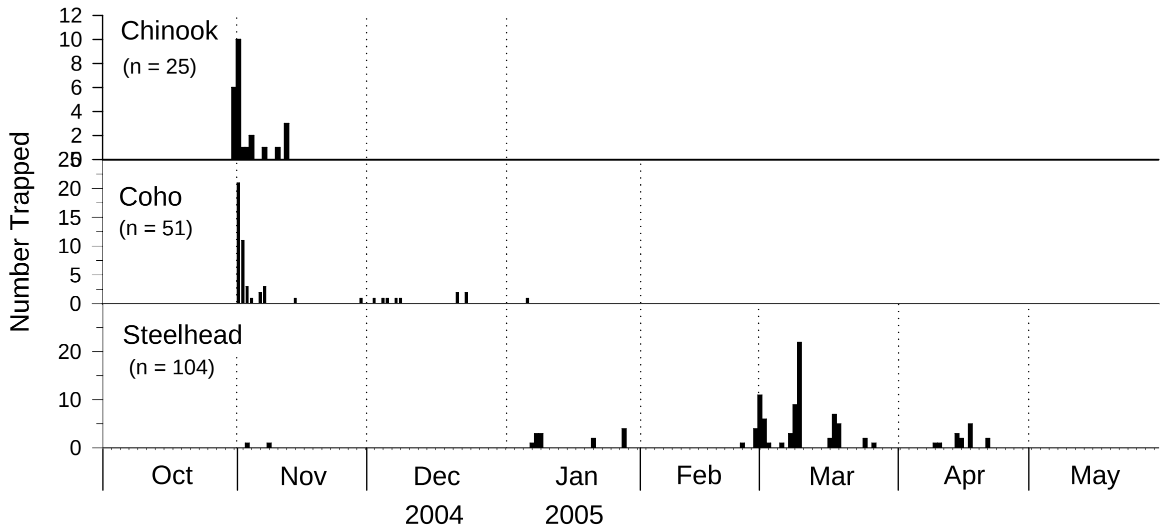

Figure 1. Timing of adult fall Chinook salmon, coho salmon, and winter steelhead trapped in the West Fork Smith River during the 2005-2006 run year.

Table 4 Total estimated spawner populations of coho salmon and winter steelhead in the West Fork Smith River for run years 1998-99 through 2005-06. The adult coho spawner population in 1998-99 was based on area-under-curve estimation from spawner survey data; confidence interval was not calculated. Calculated trap efficiency was based on the percentage of total estimated spawners that were trapped. Repeat steelhead spawners were determined from the percentage of fish that entered the adult trap with tags implanted prior to the current run year.

Return Year	Coho (95% CI)		Trap Effic. (%)	Steelhead (95% CI)		Trap Effic. (%)	Repeat Spawner (%)
98-99	145	na	na	366	(± 128)	na	na
99-00	293	(238-372)	32	453	(± 21)	89.3	na
00-01	550	(465-657)	18.3	334	(± 15)	91.2	0.7
01-02	1,471	(1,216-1,794)	7.5	834	(± 205)	28.2	12.3
02-03	3,451	(3,122-3,927)	7.9	375	(± 108)	33.0	4.8
03-04	3,727	(3,220-4,441)	4.5	536	(± 111)	38.8	2.0
04-05	978	(787-1,233)	6.3	247	(± 12)	66.4	1.8
05-06	1,845	(1,458-2,392)	2.7	425	(± 141)	28.8	5.8

Juvenile Out-Migrant Trap Operation

The juvenile out-migrant trap was installed in the West Fork Smith River on February 7 and removed on June 1. The trap operated continuously until May 18, when it stopped turning due to low stream flows. The trap was motorized for a five-day period using 12-volt batteries and a photo-switch to turn the motor off during day-light hours when smolt downstream movement was thought to be low. Subsequent wet weather allowed the trap to function without a motor through the end of May.

Capture efficiency of traps was normally evaluated daily for each species and age/size class by marking up to 25 fish from each category with a small clip on the caudal fin, then releasing upstream of the trap. Subsequent recaptures of marked fish were recorded and weekly estimates of out-migrants were made by expanding trap catches using the following equations:

$$N_m = c / e_m$$

and

$$e_m = r / m,$$

where:

N_m = weekly estimated out-migrants
c = number of fish captured
e_m = measured weekly trap efficiency
r = number of recaptured marked fish
m = number of marked fish released

Weekly estimates were summed for season totals. When recaptures were infrequent (< five recaptures/week), totals for an equal number of previous and following weeks were pooled to obtain at least five recaptures. Population estimates were generally not calculated if fewer than five marked fish of a particular category were recaptured over the season, in which case number caught is reported.

Beginning in 2005, a weighted value for trap efficiency was used to calculate confidence intervals. Each weekly estimate of trap efficiency was weighted based on the proportion of total estimated migrants that each weekly estimate of migrants represented, using the equation:

$$e_w = e_m * (N_m / N_t),$$

where e_w = weighted weekly trap efficiency, e_m = measured weekly trap efficiency, N_m = weekly estimated migrants, and N_t = season total migrants. The sum of the weighted trap efficiencies was used in the confidence interval calculations.

Estimated numbers of out-migrants for each species and size class are shown in Table 5. Table 5 also shows recoveries of fish that had been implanted with passive integrated transponder (PIT) tags by the U.S. Environmental Protection Agency and U.S. Forest Service (research objectives discussed below).

Table 5. Estimated number of out-migrants in age or size categories, recoveries of PIT-tagged fish, calculated trap efficiencies, and handling mortalities measured at the juvenile migrant trap at river kilometer 1.6 on the West Fork Smith River for the period February 7 – June 1, 2006. Adult cutthroat trout (> 250mm) were not estimated using mark-recapture methodology; for this and other categories with insufficient mark recoveries, number in parentheses denotes actual catch.

Species	Age (salmon) or size (trout, FL, mm) class	Estimated total migrants	PIT-tags N Fish scanned	PIT-tags N tagged[a]	Trap Efficiency	Handling mortalities [b]
Coho	smolts (age 1+)	23,242	8,087	482	0.37	53
	fry (age 0)	36,621			0.14	92
Chinook fry	age-0	102,267			0.20	512
Trout fry	< 60	(295)				1
Steelhead	> 120	3,840	342	2	0.09	2
	90 – 119	582	138	0	0.24	1
	< 60 - 89	96	23	0	0.24	2
Cutthroat	≥ 250	(8)	8	0		3
	160 – 249	2,304	225	7	0.10	0
	120 – 159	1,587	266	5	0.17	1
	90 - 119	(8)	8			
	60 - 89	(1)	1			

[a] recoveries of fish PIT-tagged by US EPA and USFS
[b] handling mortalities only; an additional 83 coho smolts and 47 coho fry were sacrificed for US EPA and Oregon State University for isotope analysis and parasite identification

West Fork Smith River Monitoring Summary: 1998-2006

Current Land Use, Management, and Monitoring Activities

There are currently no active timber harvest activities on private timberlands and no planned timber sales on lands managed by U.S. Bureau of Land Management (USBLM). Current use in the basin is limited to recreation, harvest of special forest products, and rock quarrying. USBLM has completed several in-stream habitat improvement projects, primarily construction of boulder weirs and placement of trees and large woody debris in the main stem. These projects are intended to retain gravel, increase spawning habitat, and improve habitat complexity. The effects of boulder weir placement on aquatic habitat and biota in the West Fork Smith River have been evaluated by Roni et al. (2004).

In addition to fish monitoring activities conducted by ODFW, the U.S Environmental Protection Agency (USEPA) and U.S. Forest Service (USFS) have conducted research (2002 to 2006) on watershed-scale seasonal variation in juvenile salmonid survival and growth. Juvenile coho salmon were implanted with PIT tags during summer by USEPA field crews. Juvenile cutthroat trout and winter steelhead, and small numbers of juvenile coho salmon, were also PIT-tagged by USFS as part of an evaluation of road culverts as potential barriers to juvenile fish movement. These agencies monitored movement and growth of tagged fish upstream of the juvenile trap operated by ODFW, and the juvenile trap provided the last opportunity to sample tagged fish before emigration from the basin. For coho salmon, these combined sampling efforts have provided a comprehensive evaluation of within-basin movement, growth and survival (fry to smolt and summer parr to smolt) for the 2001-04 brood years (see Ebersole et. al., in press, and Wigington et al., in press). In addition to monitoring movement and growth, this sampling also provided an opportunity to evaluate the relationship of summer water temperature and the occurrence of blackspot (Neascus-type trematode) infestation in juvenile coho salmon (Cairns et al. 2005). Additional publications on research conducted within the basin by USEPA and USFS are in preparation.

Coho Salmon

The 1998 brood year was the first brood for which the size of the parent stock and number of eggs deposited was estimated, and thus represents the first brood for which freshwater survival rate could be calculated. Adult coho salmon that returned to the West Fork Smith River in fall 1999 (1996 brood year) represent the first spawners for which the number of smolts that produced these adults was estimated, providing the first opportunity to calculate marine survival rate for this stock. For these and subsequent broods, calculated freshwater and marine survival rates are summarized in Table 6, and trends in these parameters are shown in Figure 2.

Table 6. Estimated number of female spawners, egg deposition, fry and smolt production, number of wild returning adults, and freshwater (FW) and marine survival rates for coho salmon in the West Fork Smith River. Brood year represents the first year that eggs were deposited for a return year (eg. the 1996 brood year was derived from the 1996-1997 return year, and this brood returned as adults in 1999-2000). Percent freshwater survival represents the number of smolts produced from the estimated number of eggs deposited. Percent marine survival was calculated using number of smolts produced minus handling mortalities.

Brood	Female spawners		Egg			Returning adults (wild)		Percent survival	
year	Wild	Hatchery	deposition [a]	Fry	Smolts	female	male	FW	marine
1996					22,412	131	164		1.3
1997				2,527	10,866	273	280		5.1
1998	72	0	205,405	3,014	14,851	707	734	7.2	9.8
1999	130	0	376,545	3,605	20,091	1,521	1,926	5.5	17.3
2000	271	0	721,450	13,550	17,358	1,790	1,940	2.4	21.7
2001	707	15	2,044,536	35,851	15,849	417	561	0.8	6.2
2002	1,520	4	4,853,940	80,876	23,054	734	1,111	0.5	8.0
2003	1,787	0	5,130,275	104,402	39,576			0.8	
2004	417	0	1,169,503	27,598	23,242			2.0	
2005	734	0	1,841,711	36,621					

[a] the number of eggs deposited by each female was estimated using the formula: ∑ 7.96 * (fork length of female in mm) – 2854. This formula is based on the relationship between length of female coho salmon and fecundity developed from hatchery fish returning to Fall Creek hatchery in the Alsea basin (Johnson 1988).

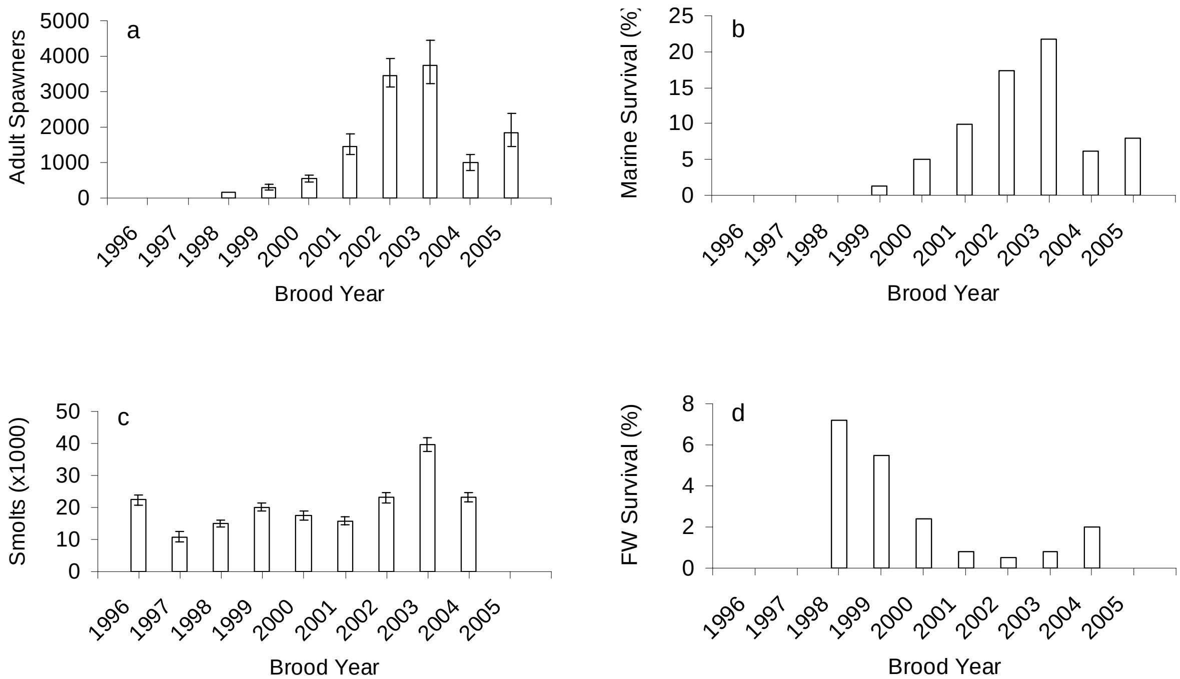

Figure 2. Trends in (a) estimated number of adult spawners, (b) percent marine survival, (c) smolts, and (d) percent freshwater survival for coho salmon in the West Fork Smith River. Error bars show the 95% confidence interval. Marine survival estimates are for the total wild adults returning to spawn from smolts produced from the corresponding brood year. Calendar year of smolt outmigration is brood year +2 years. Calendar year of adult return for marine survival estimate is brood year + 3 years.

Table 7 summarizes data collected on downstream-migrating populations of juvenile coho salmon at the juvenile fish trap. Peak migration generally occurred between mid-April and mid-May, and was likely strongly influenced by patterns of stream flow and water temperature. Trends in coho salmon smolt out-migrants are also shown in Figure 2c.

Figure 3 shows the relationship of number of smolt and fry migrants to size of spawner stock. The relationship of fry migrants to spawners displays a close linear correlation, with increased spawner levels corresponding to proportionate increases in fry migrants. When viewed as number of fry migrants per parent, there is relatively little variation in this parameter over a broad range of spawner levels (Figure 4). This suggests that, within the range of seeding levels observed, a proportion of fry produced from each female tends to move downstream, irrespective of seeding level.

There was no significant linear correlation between female spawners and smolt production (Figure 3). In addition to seeding levels and egg to fry survival rates, smolt production is influenced by variables that determine survival of parr during summer and winter. These variables include summer water temperatures, winter stream flows, density of parr and competition between cohorts and other species, and level of parasite infestation. Survival of a cohort is influenced by each variable to a greater or lesser extent each year, thus a linear relationship would not be expected.

Table 7. Estimated number of coho salmon smolt and fry migrants, week of peak migration for smolts, and mean fork length of smolts during week of peak migration in the West Fork Smith River. Data for smolts represents fish sampled in the second year following egg deposition (eg. fish sampled in 1998 were the 1996 brood year). Data for fry represents fish sampled the first year following egg deposition. Ninety five percent confidence intervals (CI) are shown.

Sample Year	Smolts ± CI	Fry ± CI	Peak week	Mean FL (mm) ± CI
1998	22,412 ± 1,584	2,527 ± 1,224	4/11-5/17	104.6 ± 4.2
1999	10,866 ± 1,465	3,014 ± 658	5/17-5/23	113.0 ± 3.5
2000	14,851 ± 1,088	3,605 ± 752	4/10-4/16	103.0 ± 4.4
2001	20,091 ± 1,337	13,550 ± 3,557	4/23-4/29	112.1 ± 4.3
2002	17,358 ± 1,460	35,851 ± 5,628	5/06-5/12	112.5 ± 2.8
2003	15,849 ± 1,239	80,876 ± 11,360	5/05-5/11	109.2 ± 4.1
2004	23,054 ± 1,523	104,402 ± 7,963	4/12-4/18	105.4 ± 3.8
2005	39,576 ± 2,038	27,598 ± 3,515	5/02-5/08	110.0 ± 5.0
2006	23,242 ± 1,550	36,621 ± 5,551	5/01-5/07	107.0 ± 4.0

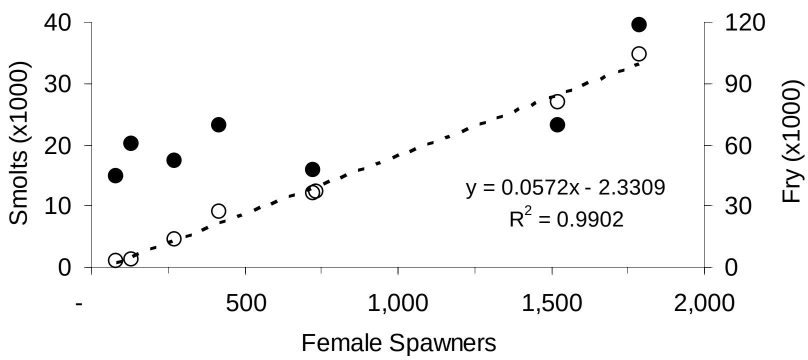

Figure 3. Relationship of total smolt (solid symbol) and fry (clear symbol, dotted trendline) migrants produced, to total female spawners. Data for 1998 through 2004 (smolt) and 2005 (fry) brood years are shown. The regression shown for fry is significant (*P*<0.0001).

Despite a lack of a clear correlation between number of smolts and spawners, smolt production shows relatively little variation over a broad range of spawners (Figure 3). Figure 4 shows that highest production rates, in terms of smolts per female, occur at low spawner densities. This suggests survival of one or more life-history stages may be density dependent, and by inference, habitats essential to specific life-history stages may be limited. The relationships between stream flow, water temperature, parasite load, and fish condition in West Fork Smith River are further discussed in Jepsen et al. (2006)

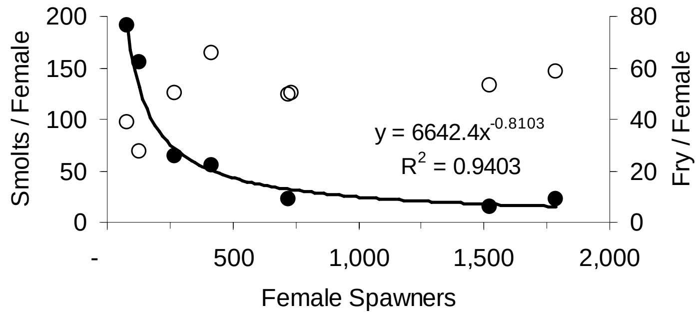

Figure 4 . Relationship of number of smolt (solid symbol and trendline) and fry (clear symbol) migrants produced per female, to total female spawners. Data for 1998 through 2004 (smolt) and 2005 (fry) brood years are shown. The regression shown for smolts per female is significant (*P* =0.0003).

Winter Steelhead

Marine survival estimates are not calculated for winter steelhead because the spawning population is composed of multiple ages, including fish that may be on a second spawning migration. In addition, the steelhead smolt population in any year may be comprised of different brood years.

Estimated numbers of juvenile steelhead migrants are summarized by size class in Table 8. Analysis of scales collected in 1998 and 1999 from steelhead smolts (≥ 120mm fork length) in the West Fork Smith River indicates juveniles may rear for two to three years before emigration as smolts. Juvenile steelhead may also move downstream prior to the smolt stage, and the number of pre-smolt migrants has varied considerably in the West Fork Smith River. Growth rate of juvenile steelhead likely varies between reaches (eg. between tributary and main stem reaches) and between years, thus while fish in the 60-89mm size class may be predominantly age-1, fish in the larger size classes are more likely to be composed of more than one age class. Despite this uncertainty in aging based on size distribution, the 1999 brood year appeared to be a particularly strong year class, represented by 1,675 age-1 migrants in 2000, and some portion of the 3,883 migrants measured in the 90-119mm size class in 2001 (Table 8). It is not known where pre-smolts rear after migrating past the juvenile trap, or whether some portion of these early migrants subsequently return to the West Fork Smith River to rear to the smolt stage.

Cutthroat Trout

Picket spacing in the floating weir and adult trap in the West Fork Smith River is too wide to effectively retain adult cutthroat trout. Live adults and cutthroat trout redds are counted on spawner surveys, but counts are generally too low to make population estimates using area-under-the-curve calculation.

Estimated numbers of juvenile cutthroat trout migrants are summarized by size class in Table 9. The predominant size classes are fish 120-159 mm and 160-249 mm fork length, although there is considerable variation between years in each size class.

Table 8. Estimated number of juvenile steelhead smolts (≥ 120mm fork length), week of peak smolt migration, mean fork length at peak week, and number of pre-smolt migrants in the West Fork Smith River. Number of fish caught is reported in parentheses when trap efficiency could not be determined for a particular category.

Sample Year	Smolts ± CI	Peak week	Mean FL (mm) ± CI	90-119 (mm) ± CI	60-89 (mm) ± CI
1998	6,438 ± 1,286	4/20-4/26	168.9 ± 7.9	761 ± 225	27 ± 26
1999	2,688 ± 846	5/03-5/09	160.9 ± 6.8	66 ± 86	(10)
2000	2,836 ± 593	5/01-5/07	152.6 ± 4.3	193 ± 49	1,675 ± 1,030
2001	2,737 ± 1,338	3/26-4/01	147.5 ± 6.5	3,883 ± 507	620 ± 131
2002	4,681 ± 3,558	4/08-4/14	148.8 ± 7.5	769 ± 513	(10)
2003	2,448 ± 4,306	4/21-4/27	158 ± 10	(75)	159 ± 111
2004	2,916 ± 1,847	4/12-4/18	153.7 ± 8.3	1,138 ± 410	236 ± 158
2005	4,333 ± 1,382	3/21-3/27	145 ± 7.0	752 ± 227	73 ± 68
2006	3,840 ± 1,504	4/10-4/16	160.0 ± 8.0	582 ± 213	96 ± 163

Table 9. Estimated number of cutthroat trout downstream migrants by size class (± 95% CI) in the West Fork Smith River. Number of fish caught is reported in parentheses when trap efficiency could not be determined for a particular category. No estimates were made in 1998 and 1999 when cutthroat trout in the Umpqua basin were listed as a threatened species under federal 4(d) rules.

Sample year	Fork Length: 160-249mm	120-159mm	90-119mm	60-89mm
1998	(192)	(4)	0	0
1999	--	--	--	--
2000	947 ± 581	1,148 ± 439	(11)	(1)
2001	901 ± 251	1,633 ± 377	472 ± 406	(31)
2002	2,417 ± 982	2,748 ± 985	(3)	(1)
2003	1,235 ± 2,177	(70)	(4)	(5)
2004	713 ± 815	135 ± 136	(2)	(7)
2005	898 ± 646	724 ± 454	(2)	0
2006	2,304 ± 1,118	1,587 ± 471	(8)	(1)

Other Species

Total number of select non-salmonid fishes trapped is shown in Table 10. Pacific lamprey captured included both pre- and post-spawned adults. Few western brook lamprey were found in the trap and all were post-spawned adults. Sculpin (*Cottus* spp.) were also caught in very low numbers. Pacific giant salamander larvae (*Dicamptodon tenebrosus*) were frequently captured.

Table 10 . Number of select non-salmonid fishes captured at the West Fork Smith River juvenile fish trap, river kilometer 1.6. Numbers represent actual catch; trap efficiency was not measured for these species. Eyed juvenile lamprey are Pacific lamprey that have completed metamorphosis to the life-history stage that is migrating seaward; eyed juveniles were not distinguished from ammoecoetes in 1998 and 1999. Umpqua dace were not distinguished from speckled dace during 1998 through 2001.

Sample	Pacific lamprey			Speckled	Umpqua	Redside	Largescale	Pike-
year	Adult	Amm.	Eyed juv.	dace	dace	shiner	sucker	minnow
1998	22	585[a]	--	7,637[b]	--	913	100	2
1999	1	327[a]	--	2,975[b]	--	265	97	0
2000	21	648	32	2,440[b]	--	322	85	0
2001	54	144	114	5,194[b]	--	271	167	0
2002	4	300	17	2,298	45	379	50	4
2003	0	216	7	2,830	52	200	10	4
2004	4	309	8	4,292	71	974	35	1
2005	7	749	81	4,879	103	1,117	21	2
2006	4	405	3	5,193	141	1,576	59	0

[a] may include some eyed lamprey juveniles
[b] may include some Umpqua dace

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