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## Juvenile Salmonid Monitoring On The Mainstem Trinity River At Willow Creek, California, 2001 - 2005

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California, 2001 - 2005**

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*Abstract* Juvenile salmonid emigration from the mainstem Trinity River has been monitored by the Arcata Fish and Wildlife Office since 1988 with rotary screw traps used as the primary gear type since 1989. This report describes monitoring conducted from 2001 through 2005. Catch data were used to calculate abundance indices for juvenile Chinook salmon (*Oncorhynchus tshawytscha*), coho salmon (*O. kisutch*), and steelhead (*O. mykiss*) which were used to identify the duration and peak of outmigration. In addition population estimates of juvenile Chinook salmon were derived via an intensive mark-recapture procedure from 2002 through 2005. Age of outmigrants, length frequency distributions, migration rates, and hatchery contributions were also estimated. Catch data of other species are presented for sculpin (*Cottus spp.*), speckled dace (*Rhinichthys osculus*), Klamath smallscale sucker (*Catostomus rimiculus*), Pacific lamprey (*Entosphenus tridentatus*), American shad (*Alosa sapidissima*), green sturgeon (*Acipenser medirostris*), and threespine stickleback (*Gasterosteus aculeatus*), as well as for less common species captured.

## **Introduction**

The Klamath and Trinity rivers once supported large runs of Chinook salmon (*Oncorhynchus tshawytscha*), coho salmon (*O. kisutch*), and steelhead (*O. mykiss*) that contributed to economically and culturally important tribal, ocean troll, and recreational fisheries. Declines in the Klamath Basin anadromous fish populations due to floods, water and land management, and fish harvest management (Klamath River Basin Fisheries Task Force 1991), led Congress to enact the Trinity River Basin Fish and Wildlife Restoration Act (PL 98-541) in 1984 and the Klamath River Basin Conservation

Area Fishery Restoration Program (PL 99-552) in 1986. These acts directed the Secretary of the Interior to take actions necessary to restore the fishery resources of the Klamath Basin, primarily by addressing restoration of freshwater habitat.

Past fishery investigations in the Basin have focused primarily on adult returns, due to harvest allocation and escapement objectives. Data on adult returns, however, are not adequate for monitoring restoration efforts in the Basin because adult return data are affected by ocean mortality (both juveniles entering the ocean, and adult mortality), harvest at sea, and a number of other factors. Monitoring emigrating juvenile salmonid populations in conjunction with habitat availability data and suitability studies may permit for the evaluation of restoration efforts because these studies focus on the freshwater phase, which is directly affected by instream conditions.

Intermittent juvenile salmonid investigations have been conducted in the Klamath River Basin by the U.S. Fish and Wildlife Service, Arcata Fish and Wildlife Office since 1981 (USFWS 1982). In 1988, a substantial monitoring effort was undertaken in both the mainstem Klamath and Trinity Rivers utilizing frame nets (USFWS 1989) and rotary screw traps in 1989 (USFWS 1991). The purpose of this project was to monitor the abundance, timing, hatchery contribution, and biological parameters of emigrating anadromous salmonids in the mainstem Klamath and Trinity Rivers. The effort on the Trinity River has continued since initiated in 1989 (USFWS 1991, 1992, 1994, 1998, 1999, 2001).

Information obtained from the salmonid outmigrant monitoring effort was critical in the development of salmonid outmigrant temperature components of the hydrographs recommended in the Trinity River Flow Evaluation (USFWS and Hoopa Valley Tribe 1999). One component of the restoration strategy employed by the Trinity River Restoration Program is to provide suitable water temperatures for emigrating salmonid smolts. This goal is linked to the water temperature objectives for the lower Trinity River (USFWS and Hoopa Valley Tribe 1999, Table 5.11) and the timing of smolt emigration (USFWS and Hoopa Valley Tribe 1999, Figure 5.46). Water-year specific hydrographs were developed to achieve optimum smolt emigration temperatures in normal and wetter years and marginal temperatures in dry and critically dry water years for the majority of the smolt emigration period (USFWS and Hoopa Valley Tribe 1999, Appendix K). To evaluate the influence of the modified spring hydrographs on the salmonid smolt production, including timing, hatchery/natural contribution, and the "health" of the smolts, a smolt monitoring program was implemented in the lower Trinity River. Additionally, increases in spawning and rearing habitat should result in increased production of healthier salmonids, which can be assessed through the information collected by the smolt monitoring program.

It is intended that this information will provide basic biological information that can be used by managers to evaluate the effectiveness of habitat restoration efforts, especially the new flow regimes recommended in the Record of Decision, in restoring the fishery resources of the Trinity River.

## Study Area

The Klamath River is the second largest river system in California, draining about 26,000 square kilometers (km<sup>2</sup>) in California, and 14,400 km<sup>2</sup> in Oregon. The Trinity River is the largest tributary to the Klamath River, draining approximately 7,690 km<sup>2</sup> in California. Two dams, Iron Gate Dam on the Klamath River and Lewiston Dam on the Trinity River, are the upper limits of anadromous fish migration in the Basin. Two fish hatcheries, Iron Gate Hatchery (IGH) on the Klamath River and Trinity River Hatchery (TRH), were constructed to mitigate for losses of anadromous fish habitat upstream of Iron Gate and Lewiston dams.

Trinity River juvenile salmonid outmigrant trapping was conducted at the Riverdale Campground (rkm 34) near Willow Creek, California (Figure 1). This location has been used since 1991 because the channel configuration is fairly consistent from year to year, and it has private access.

## Methods

### *Trap Design and Operation*

Outmigrant sampling was conducted by deploying one to three 2.44 m diameter rotary screw traps at the trapping site. River conditions ultimately dictated when traps were deployed. Depending on river conditions, an effort was made to place rotary traps in the river as early in the spring as possible so that portions of the coho salmon and steelhead smolt outmigration could be sampled, and prior to the emigration of age-0 Chinook salmon so that emigration patterns and the relative abundance of natural and hatchery Chinook salmon could be evaluated.

Traps were anchored with 0.64 cm diameter aircraft cable to large trees or a series of steel fence stakes. One or two 0.1 x 0.15 x 6.0 m (4"x6"x10') beams were used to push the trap out from the bank. Cone revolutions were used to determine where and when the trap could be operated without inducing unnecessary risk to the trap. Traps were fished on the edge of the thalweg during high river discharge, and incrementally moved back into the thalweg as river discharge decreased. When deployed, the bottom of the cone was generally <1 m from the stream bottom. A sample day was defined as the time period between the setting of the trap one day and removal of captured fish approximately 24 hours later. This period encompassed all night hours, when the majority of juvenile salmonids emigrate. Trap checks usually occurred during late morning or early afternoon. During peak emigration periods, fish were removed from traps several times during the sampling period with the frequency dictated by water temperatures, fish numbers, and mortality rates.

Daily trap catch data were summarized by Julian week (JW), with the first day of JW 1 commencing on the first day of the year (Table 1). All JWs are seven days in length except the last JW of the year and the 9th JW during leap years, which are both eight days in length.

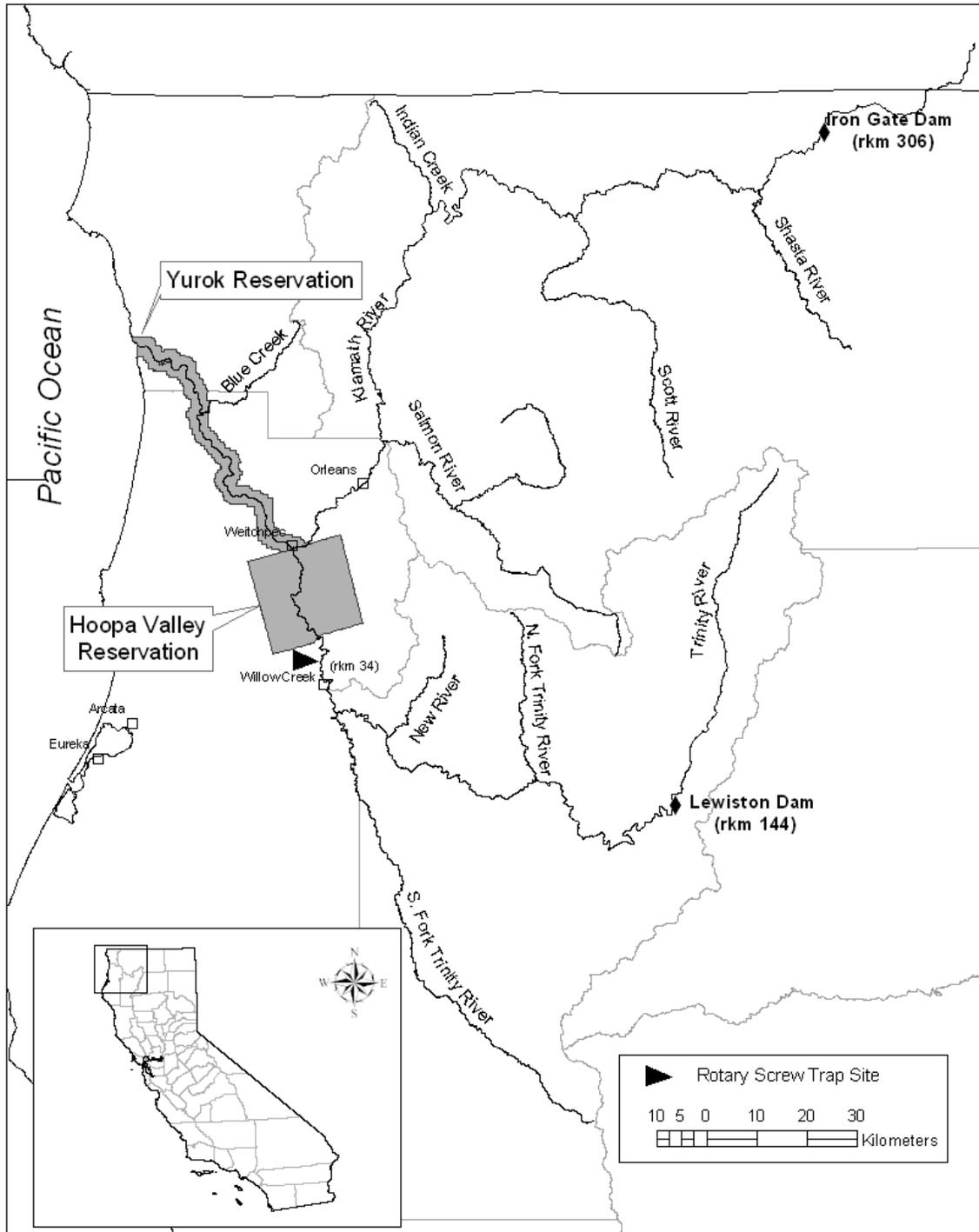


Figure 1. Location of the Trinity River rotary screw trap site near Willow Creek (river kilometer 34), California, operated by the United States Fish and Wildlife Service, Arcata Fish and Wildlife Office and the Yurok Tribal Fisheries Program.

Table 1. Julian week and corresponding first calendar date.

Week		Week		Week	
Julian Week	beginning	Julian Week	beginning	Julian Week	Week beginning
1	1/1	18	4/30	35	8/27
2	1/8	19	5/7	36	9/3
3	1/15	20	5/14	37	9/10
4	1/22	21	5/21	38	9/17
5	1/29	22	5/28	39	9/24
6	2/5	23	6/4	40	10/1
7	2/12	24	6/11	41	10/8
8	2/19	25	6/18	42	10/15
9	2/26	26	6/25	43	10/22
10	3/5	27	7/2	44	10/29
11	3/12	28	7/9	45	11/5
12	3/19	29	7/16	46	11/12
13	3/26	30	7/23	47	11/19
14	4/2	31	7/30	48	11/26
15	4/9	32	8/6	49	12/3
16	4/16	33	8/13	50	12/10
17	4/23	34	8/20	51	12/17
				52	12/24

#### *Water Flow and Temperature Measurements*

Normal cone operating depth was 1.07 m. Daily velocity measurements were taken directly in front of the cone as follows: the submerged portion of the cone was divided into three cells (right, center, left); within each cell, velocity was measured at 0.2 and 0.8 of the cone operating depth for 60 seconds using a General Oceanics® digital flowmeter (Model 2030) (General Oceanics, Inc. 1983). Mean water velocity (ft/s) was calculated for each cell. Each cell area (ft<sup>2</sup>) was calculated, then multiplied by its corresponding mean water velocity (ft/s). The values for each cell were summed, yielding an estimate of volume of river discharge sampled (Qs) in cubic feet per second (ft<sup>3</sup>/s). Discharge data from U.S. Geological Survey Water Resource gauge station at Hoopa (#11-530000 at rkm 19.9) on the Trinity River was used as a surrogate measure of mean daily river discharge (Q) at the trap site. It was assumed that there was no significant difference between river discharge at this gauging station and the trap location.

Water temperature data were collected using an Onset Stow Away Tidbit® temperature logger attached to the outside bottom edge of each traps live box. Temperature was recorded once per hour for the entire sampling season. Mean daily river temperatures were calculated by averaging over 24-hour periods.

### *Biological Sampling Procedures*

All juvenile fish captured were anesthetized with tricaine methanesulfonate (MS-222) prior to processing. Up to 30 individuals of each species and age class (based on size) were randomly subsampled (biosampled) from the daily catch. Biosampled salmonids were measured to the nearest mm fork length (FL), weighed by volumetric displacement (fish over 100 mm) in 2001, weighed by digital scale in 2002-2005, and examined for external marks (stains, fin clips, tattoos), and physical irregularities. All captured salmonids that were not biosampled were tallied by species, age and examined for external marks.

All anesthetized fish not retained were allowed to resuscitate in buckets of ambient river water before being released downstream of the trap. NovAqua® water conditioner was added to recovery buckets to help protect fish during handling, minimize infection, reduce stress and aid in recovery. Adult salmonids were not anesthetized. Fork lengths of adult salmonids were either measured or approximated before release. Any salmonid mortality in the live box was checked for a fin clip and, if included in the subsample, measured. If a salmonid escaped during netting or handling before it could be identified to species or checked for a hatchery mark (i.e. fin or maxillary clip), it was counted in the sample tally as an "unknown". Based on the probability of occurrence, unknown fish were redistributed into the most likely marked or unmarked species categories.

When present, daily subsamples of marked hatchery Chinook salmon were collected. A missing adipose fin (ad-clip) was the external marker depicting Chinook salmon with a coded wire tag (CWT) embedded in the snout. A maximum of five ad-clipped Chinook salmon from each trap were collected daily and sacrificed for subsequent CWT retrieval. Collected fish were stored in a freezer until time of dissection. Occasionally, ad-clipped fish were also collected for disease sampling, after which the CWT's were removed.

Juvenile Chinook salmon were classified as age-0 (young-of-year) or age-1, based on size and date of capture. Coho salmon were classified as either age-0 or age-1; the latter of which were much larger in size, silvery, and lacked distinct parr marks. Steelhead were classified by age based on length-to-age analysis of scales collected from a subsample of steelhead captured. Analysis of scale samples collected from unmarked steelhead over the sampling season provided length-to-age relationships. Un-aged steelhead were assigned an age based on the length-to-age relationship derived from aged samples.

Fish other than Chinook salmon, coho salmon, or steelhead were considered non-target species. Non-target fishes captured were identified to species (or genus in some cases), enumerated, and up to 30 specimens of each species were measured to FL. Total length (TL) was measured on species without a forked caudal fin.

### *Hatchery and Natural Stocks Estimate*

Captured Chinook salmon, coho salmon, and steelhead were categorized as being either of hatchery or natural origin based on external marks, coded wire tag data, and hatchery release data provided by TRH. Hatchery release strategies for Chinook salmon consist of fingerling (age-0) releases in the spring and yearling (age-1) releases in the fall. These

two distinct release periods prompted the division of the trapping season into spring and fall monitoring periods. The spring monitoring period was designated as JW 1 through 39 and the fall period JW 40 through 52. Hatchery reared steelhead and coho salmon are typically volitionally released as smolts or yearling-plus (age-1) in early spring.

*Chinook Salmon*

All collected ad-clipped Chinook salmon were passed through a magnetic field detector manufactured by Northwest Marine Technology® to determine the presence or absence of a CWT. The snout of each fish that registered positive for a tag was dissected until the CWT was recovered. If the tag was not recovered, the fish was considered an ad-clipped fish that had shed its tag. Recovered tags were decoded using a dissection microscope. Coded Wire Tag recoveries were summed by specific CWT code for each JW.

The number of CWT fish captured for each code was estimated by multiplying the number of CWT's recovered by an expansion factor (E) which accounts for all subsampling, CWT's that were lost during dissection, and unreadable tags. The expansion factor (E) was calculated using the formula:

$$E = (C/MS)(AD/H)(T/TR)$$

- Where: C = Total # of Chinook salmon captured,
- MS = Number of Chinook salmon examined for ad-clips,
- AD = Number of ad-clipped Chinook salmon observed,
- H = Number of ad-clipped Chinook salmon collected,
- T = Number of collected ad-clipped Chinook salmon with a CWT,
- TR = Total number of CWT's recovered and decoded after processing.

To account for unmarked hatchery fish in the catch over a JW, the expanded estimates for each CWT code were multiplied by a production multiplier (PM) specific to each CWT code. Each PM was calculated from hatchery release data (Pacific States Marine Fisheries Commission 2006), using the following formula:

$$PM = \frac{\# \text{ Tagged} + \# \text{ Poor Tagged} + \# \text{ Unmarked}}{\# \text{ Tagged}}$$

- Where: # Tagged = The actual number of ad-clipped Chinook salmon released with a CWT,
- # Poor Tagged = The number of ad-clipped Chinook salmon that were tagged and shed the tag (No-Tags),
- # Unmarked = The number of unmarked Chinook salmon in a release group.

The estimated contribution of hatchery Chinook salmon attributable to a specific CWT code for a given JW, was calculated by the following formula:

$$\# \text{ Hatcherycode}_i = (\# \text{ recoveredcode}_i) * (E_{\text{JW}}) * (\text{PMcode}_i)$$

The total weekly estimated hatchery contribution to the catch was the sum of all estimated hatchery Chinook salmon attributable to CWT codes. The weekly contribution of naturally produced Chinook salmon to the catch was estimated by subtracting the estimated hatchery contribution from the total weekly catch. Occasionally, the daily estimated hatchery contribution exceeded the total daily catch. In these instances, the estimated hatchery contribution was limited to the actual daily catch.

Towards the end of each emigration period, when catch rates were low, it is possible that juveniles of hatchery origin were captured but not represented by ad-clipped fish. If no hatchery fish captured within a given time period were marked, the hatchery contribution for that period could not be differentiated from the natural component. Thus, all fish captured during that period were considered of natural origin. The hatchery and natural stock estimates assume no differential mortality between tagged and untagged fish of the same release group, equal vulnerability to capture, and accurate estimates of the numbers of marked, unmarked, and poor tagged fish released from the hatchery. The estimate does not account for ad-clipped or non-ad-clipped hatchery fish removed from the river upstream during other juvenile monitoring operations.

#### *Coho Salmon*

All hatchery coho salmon released from TRH were marked with a right-maxillary clip (max-clip). The weekly contribution of naturally produced coho salmon to the catch was estimated by subtracting the catch of marked hatchery fish from the total catch.

#### *Steelhead*

All hatchery steelhead released from TRH were marked with an ad-clip and right-maxillary clip. The weekly contribution of naturally produced steelhead to the catch was estimated by subtracting the catch of marked hatchery fish from the total catch.

#### *Abundance Index*

A weekly abundance index for each age class of Chinook salmon, coho salmon, and steelhead was estimated for each JW based on catch-effort data. Daily abundance indices ( $\text{Index}_{\text{DC}}$ ) for each species and development stage were calculated by the following equation:

$$\text{Index}_{\text{DC}} = \text{Catch}_{\text{DC}} / (Q_{\text{C}}/Q)$$

Where:  $\text{Catch}_{\text{DC}}$  = Sum of daily catch of a species from all traps  
 $Q_{\text{C}}$  = Sum of discharge sampled ( $\text{ft}^3/\text{s}$ ) by all traps  
 $Q$  = Mean daily river discharge ( $\text{ft}^3/\text{s}$ )

Weekly abundance indices ( $\text{Index}_{\text{CJW}_i}$ ) were calculated for each JW using the following equation:

$$\text{Index}_{\text{CJW}_i} = \sum \text{Index}_{\text{DC}} ((n_{t_i} * (\# \text{ days in JW}_i)) / (\sum \text{TD}_i))$$

Where:  $n_{t_i}$  = Number of traps in operation at site by week  
 $\text{TD}_i$  = Sum of the days sampled by all traps during a given JW

The estimated proportion of hatchery produced fish, based on catches of marked fish and marking rates, were used to apportion the abundance indices into production attributable to hatchery or natural production. The usefulness of this index as an estimator of abundance is contingent upon the assumptions that catch rates are directly proportional to the percentage of river flow sampled and that individuals from a given species are equally susceptible to capture. The abundance index is not intended to represent a population estimate, but is used to compare relative abundance between weeks during the trapping season, and between years.

#### *Migration Rate*

Initial migration rates for hatchery produced salmonids were estimated by dividing the distance (rkm) traveled by the number of days elapsed between the initial hatchery release date and initial capture date for specific CWT codes or marked fish. Due to potential delays in outmigration during volitional releases, mean migration rates were not calculated for volitional release groups.

#### *Population Estimation*

When capture numbers were adequate at the Willow Creek trap site (generally after TRH releases), an intensive mark-recapture sampling technique was employed to generate population estimates for combined natural and hatchery age-0 Chinook salmon. Population estimates were generated using the modified 1-site version of the Rawson model as described by Carlson et al. (1998), stratified by Julian Week. Catch from non-mark-recapture periods were not included in population totals; therefore, the estimates will be underestimates of true population size sampled during the entire trapping period.

Population estimates were not calculated for coho salmon and steelhead because too few steelhead and coho salmon were captured to generate reasonable population estimates.

#### *Mark-Recapture Technique*

A mark unique to each sampling week was applied to anesthetized individuals utilizing a BMX 1000 POW'R-Ject marking unit with photonic marking formula manufactured by NewWest Technologies®. The mark was made by subcutaneously injecting the photonic solution at the base of various fins specific to the color and fin mark designated for that week. After marking, the fish were allowed to recover in containers filled with river water that was aerated and iced to remain within 3°F of ambient river temperatures.

Upon recovery, marked fish were immediately transported upstream 0.4 km by boat and

released into a large, still pool to mix with the population that had yet to pass the sampling site. Recaptures were identified and recorded during normal trapping operations, but were excluded from the catch for that day.

## Results

### *Sampling Season Overview*

Trapping duration at the Willow Creek trap site was determined both by river conditions and funding levels. In years when the project was fully funded, trapping was generally conducted from early spring to late fall (Table 2). In 2005 the project was funded only to operate during the spring emigration period.

Table 2. Period and duration of spring and fall monitoring from 2001 through 2005 and trapping rate at the Trinity River rotary screw traps near Willow Creek (rkm 34), California, operated by the United States Fish and Wildlife Service, Arcata Fish and Wildlife Office and the Yurok Tribal Fisheries Program.

Year	Start-End Dates	Spring Fall	Number Of Traps	Days Trapped	Total Days Possible	Trapping Rate (%)
2001	Apr 10-Sep 30	Spring	1	134	174	77
	Oct 1-Nov 6	Fall	1	13	37	35
2002	Mar 15-Sep 30	Spring	2	200	200	100
	Oct 1-Nov 21	Fall	2	47	52	90
2003	Mar 05-Sep 30	Spring	2	186	210	89
	Oct 1-Nov 21	Fall	2	52	52	100
2004	Mar 19-Sep 30	Spring	3	196	196	100
	Oct 1-Oct 19	Fall	3	17	19	90
2005	Mar 6 – Sep 3	Spring	3	168	182	92
	N/A	Fall	N/A	--	--	--

### *2001*

Juvenile salmonid monitoring on the Trinity River at Willow Creek began April 10th and spanned 134 days during spring of 2001, and 13 days during fall of 2001. The Willow Creek Traps effectively fished for 147 days (69.7% of the 211 possible trap days) in the 2001 monitoring period (Table 2). Consistent daily data collection was disrupted (flawed set) intermittently by large woody debris and mechanical difficulties, but sampling occurred during each of the Julian Weeks during the sampling period.

Maximum daily discharge during the 2001 sampling period, as recorded at Hoopa, California US Geological Survey Water Resource gauge station #11-530000 was 5,090 ft<sup>3</sup>/s and minimum daily discharge was 509 ft<sup>3</sup>/s (Figure 2).

### 2002

Beginning in 2002, the AFWO and YTFP began a cooperative trapping effort at the Willow Creek trap site. This involved the installation of a second trap at the site to increase catches needed to generate mark-recapture population estimates.

Juvenile salmonid monitoring on the Trinity River at Willow Creek began March 15 and spanned 200 days during spring of 2002, and 47 days during fall of 2002. The Willow Creek Traps effectively fished for 247 days (98.0% of the 252 possible trap days) in the 2002 monitoring period (Table 2). Consistent daily data collection was disrupted (flawed set) intermittently by large woody debris and mechanical difficulties, but sampling occurred during each of the Julian Weeks during the sampling period.

Maximum daily discharge during the 2002 sampling period, as recorded at Hoopa, California US Geological Survey Water Resource gauge station #11-530000 was 7,710 ft<sup>3</sup>/s and minimum daily discharge was 499 ft<sup>3</sup>/s (Figure 2).

### 2003

In 2003, the AFWO and YTFP continued a cooperative trapping effort at the Willow Creek trap site. This involved the installation of two traps at the site to increase catches to facilitate mark-recapture population estimates.

Juvenile salmonid monitoring on the Trinity River at Willow Creek began March 5 and spanned 186 days during spring of 2003, and 52 days during fall of 2003. The Willow Creek Trap effectively fished for 238 days (90.8% of the 262 possible trap days) in the 2003 monitoring period (Table 2). Consistent daily data collection was disrupted (flawed set) intermittently by large woody debris and mechanical difficulties; sampling did not occur during Julian Week 18 due to high flows, but sampling occurred in all other Julian Weeks during the sampling period.

Maximum daily discharge during the 2003 sampling period, as recorded at Hoopa, California US Geological Survey Water Resource gauge station #11-530000 was 19,900 ft<sup>3</sup>/s and minimum daily discharge was 564 ft<sup>3</sup>/s (Figure 2).

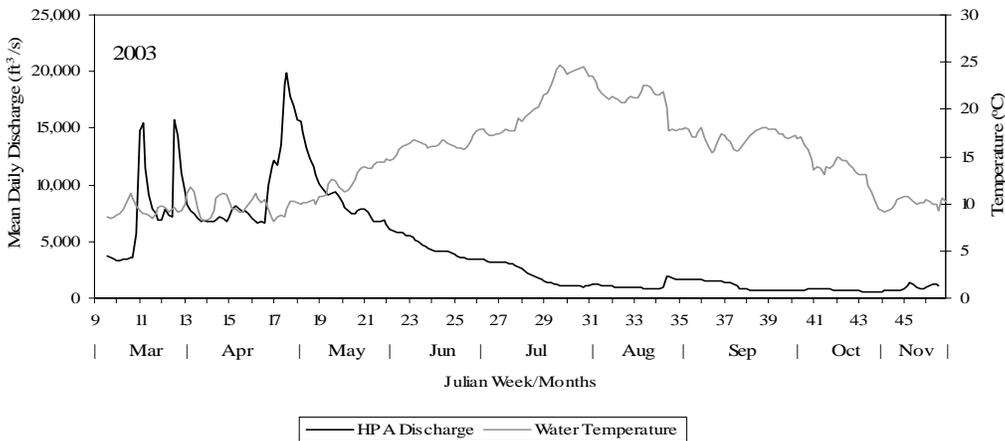
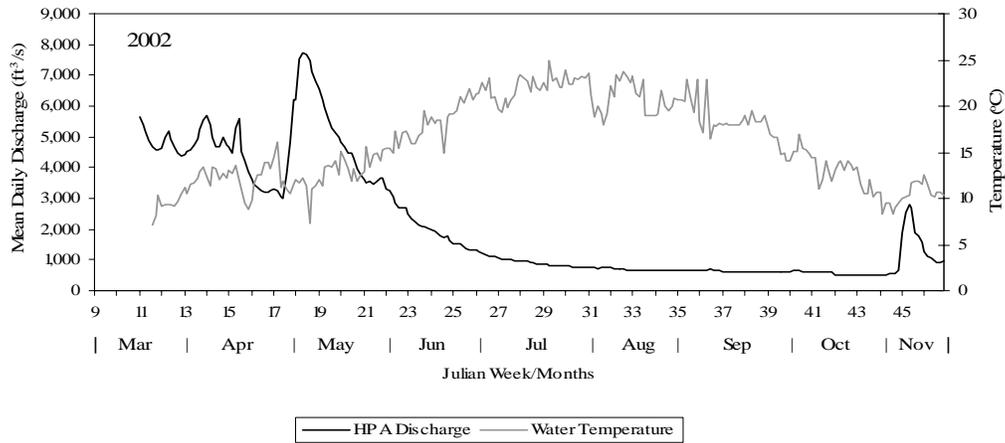
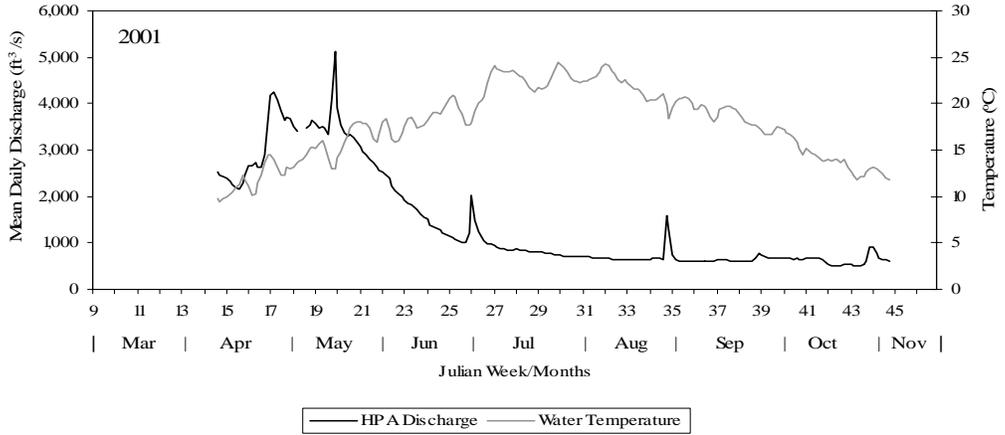


Figure 2. Mean daily discharge (ft<sup>3</sup>/s) as recorded at Hoopa, California (US Geological Survey Water Resource gauge station #11-530000) and mean daily river temperature at the Trinity River rotary screw traps near Willow Creek (rkm 34), California, 2001-2005.

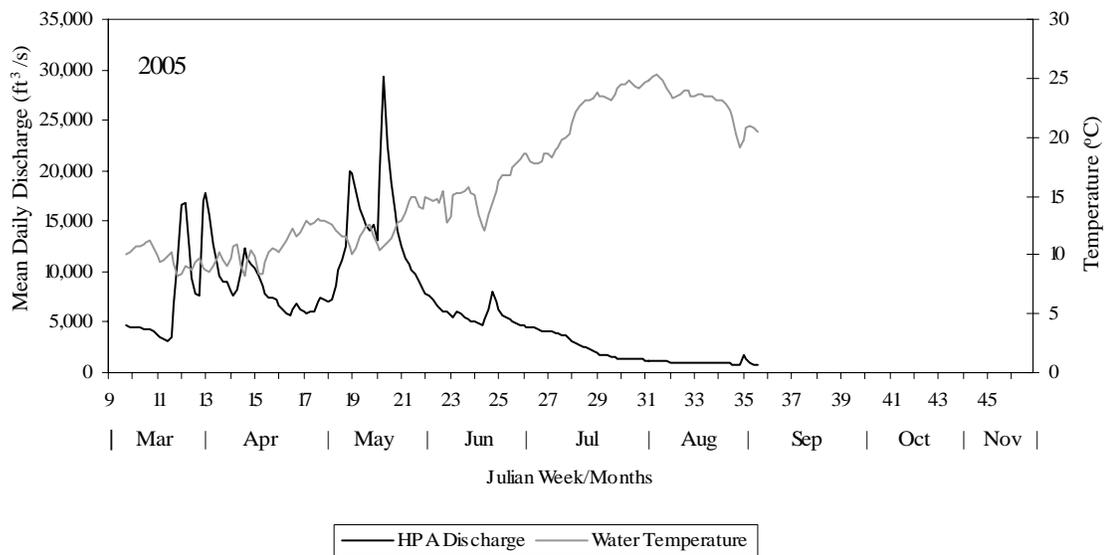
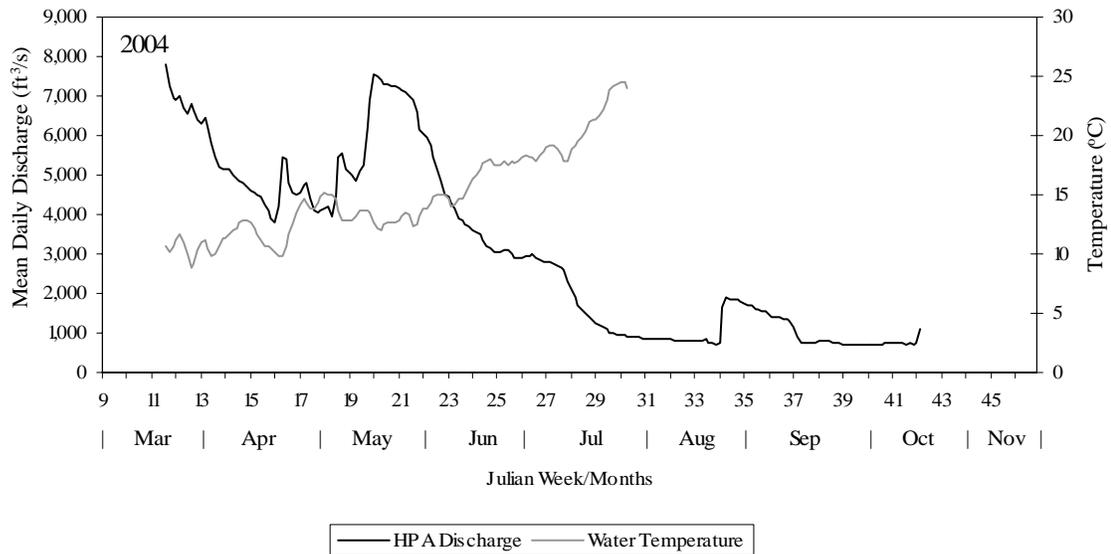


Figure 2 (continued). Mean daily discharge (ft<sup>3</sup>/s) as recorded at Hoopa, California (US Geological Survey Water Resource gauge station #11-530000) and mean daily river temperature at the Trinity River rotary screw traps near Willow Creek (rkm 34), California, 2001-2005.

### 2004

In 2004, the AFWO and YTFP continued a cooperative trapping effort at the Willow Creek trap site. This involved the installation of a third trap at the site to increase catches to facilitate mark-recapture population estimates.

Juvenile salmonid monitoring on the Trinity River at Willow Creek began March 19 and spanned 196 days during spring of 2004, and 17 days during fall of 2004. The Willow

Creek Traps effectively fished for 213 days (99.1% of the 215 possible trap days) in the 2004 monitoring period (Table 2). Consistent daily data collection was disrupted (flawed set) intermittently by large woody debris and mechanical difficulties, but sampling occurred during each of the Julian Weeks during the sampling period.

Maximum daily discharge during the 2004 sampling period, as recorded at Hoopa, California US Geological Survey Water Resource gauge station #11-530000 was 7,790 ft<sup>3</sup>/s and minimum daily discharge was 700 ft<sup>3</sup>/s (Figure 2).

## 2005

In 2005, the AFWO and YTFP continued a cooperative trapping effort at the Willow Creek trap site. This involved the installation of three traps at the site to increase catches to facilitate mark-recapture population estimates.

Juvenile salmonid monitoring on the Trinity River at Willow Creek began March 6 and spanned 168 days during spring of 2005, and 0 days during fall of 2005. The Willow Creek Traps effectively fished for 168 days (92.3% of the 182 possible trap days) in the 2005 monitoring period (Table 2). Consistent daily data collection was disrupted (flawed set) intermittently by large woody debris and mechanical difficulties; sampling did not occur during Julian Week 13 due to high flows, but sampling occurred in all other Julian Weeks during the sampling period.

Maximum daily discharge during the 2005 sampling period, as recorded at Hoopa, California US Geological Survey Water Resource gauge station #11-530000 was 29,300 ft<sup>3</sup>/s and minimum daily discharge was 843 ft<sup>3</sup>/s (Figure 2).

## *Catch Totals*

### *Chinook salmon*

Variations in yearly catch totals (Table 3) are affected not just by year-class strength in a given year, but also trapping duration/efficiency, and variations in timing of the Chinook salmon emigration period. In addition, TRH releases two large groups of Chinook salmon, one in May/June and one in October; in some years, limited or no sampling occurred during October so catch numbers would be affected due to the shorter sampling period.

Trinity River Hatchery released between 3.1 and 3.3 million age-0 Chinook salmon in the spring of 2001 through 2005 (Table 4). Spring releases included ad-clipped Coded Wire Tagged groups, representing 23.7 to 24.8% of released Chinook salmon. The TRH released between 1.3 and 1.4 million age-1 Chinook salmon in the fall of 2001 through 2005 (Table 4). Fall releases included ad-clipped Coded Wire Tagged groups, representing 23.4 to 24.9% of released Chinook salmon.

Table 3. Age-0 Chinook salmon catch totals for 2001 through 2005 at the Trinity River rotary screw traps near Willow Creek (rkm 34), California, operated by the United States Fish and Wildlife Service, Arcata Fish and Wildlife Office and the Yurok Tribal Fisheries Program. Hatchery and Natural catches are estimated from coded wire tag expansions.

Year	Spring Fall	Days trapped	Age-0 Chinook salmon			
			Hatchery	Natural	Total	% Hatchery
2001	Spring	134	8,335	27,962	36,297	23.0
	Fall	13	140	11	151	92.7
2002	Spring	200	19,814	35,332	55,154	35.9
	Fall	47	11,172	380	11,552	96.7
2003	Spring	186	5,523	4,760	10,283	53.7
	Fall	52	5,616	214	5,830	96.3
2004	Spring	196	2,488	7,728	10,216	24.4
	Fall	17	6,749	1,475	8,224	82.1
2005	Spring	168	12,179	37,289	49,468	24.6
	Fall	N/A	N/A	N/A	N/A	N/A

Table 4. California Department of Fish and Game, Trinity River Hatchery Chinook salmon releases 2001-2005. Releases include both spring and fall run Chinook salmon.

Year	Release Season	Number Released	Percentage	
			AD-clipped	Release Dates
2001	Spring	3,261,876	24.2	6/6-6/13
2001	Fall	1,274,407	24.8	10/1-10/10
2002	Spring	3,092,287	24.2	6/3-6/10
2002	Fall	1,349,518	24.9	10/10-10/16
2003	Spring	3,072,825	24.3	6/3-6/7
2003	Fall	1,379,127	24.8	10/1-10/5
2004	Spring	3,224,972	24.8	6/4-6/10
2004	Fall	1,351,415	24.3	10/1-10/20
2005	Spring	3,165,519	23.7	6/1-6/8
2005	Fall	1,391,122	23.4	10/3-10/11

### 2001

Spring monitoring was conducted 134 days during 2001 (Table 3). Catches of Chinook salmon were predominately natural fish with a catch of 27,962 comprising 77.0% of the total spring catch (Appendix 1). A total of 8,335 hatchery fish were captured during the spring monitoring period, comprising 23.0% of the total spring catch. While extended rearing of Chinook salmon over the winter is uncommon, occasional Chinook salmon that overwintered in the river are captured the following spring. One yearling Chinook salmon (not included in the totals presented above) that overwintered was captured during spring monitoring.

Fall monitoring was conducted 13 days during 2001 (Table 3). During the fall season the number of natural Chinook salmon captured totaled 11, representing 7.3% of the total fall Chinook salmon catch. Fall catches included 140 hatchery Chinook salmon, representing 92.7% of the total fall catch.

#### *2002*

Spring monitoring was conducted 200 days during 2002 (Table 3). Catches of Chinook salmon were predominately natural fish with a catch of 35,332 comprising 64.1% of the total spring catch (Appendix 2). A total of 19,814 hatchery fish were captured during the spring monitoring period, comprising 35.9% of the total spring catch. Eight yearling Chinook salmon (not included in the totals presented above) that overwintered were captured during spring monitoring.

Fall monitoring was conducted 47 days during 2002 (Table 3). During the fall season the number of natural Chinook salmon captured totaled 380, representing 3.3% of the total fall Chinook salmon catch. Fall catches included 11,172 hatchery Chinook salmon, representing 96.7% of the total fall catch.

#### *2003*

Spring monitoring was conducted 186 days during 2003 (Table 3). Catches of Chinook salmon were predominately hatchery fish while natural fish, with a catch of 4,760, comprised 46.3% of the total spring catch (Appendix 3). A total of 5,523 hatchery fish were captured during the spring monitoring period, comprising 53.7% of the total spring catch. Sixteen yearling Chinook salmon (not included in the totals presented above) that overwintered were captured during spring monitoring.

Fall monitoring was conducted 52 days during 2002 (Table 3). During the fall season the number of natural Chinook salmon captured totaled 214, representing 3.7% of the total fall Chinook salmon catch. Fall catches included 5,616 hatchery Chinook salmon, representing 96.3% of the total fall catch.

#### *2004*

Spring monitoring was conducted 196 days during 2002 (Table 3). Catches of Chinook salmon were predominately natural age-0 fish with a catch of 7,728, comprising 75.6% of the total spring catch (Appendix 4). A total of 2,488 hatchery fish were captured during the spring monitoring period, comprising 24.4% of the total spring catch. Twenty yearling Chinook salmon (not included in the totals presented above) that overwintered were captured during spring monitoring.

Fall monitoring was conducted 17 days during 2004 (Table 3). During the fall season the number of natural age-0 Chinook salmon captured totaled 1,475, representing 17.9% of the total fall Chinook salmon catch. Fall catches included 6,749 hatchery Chinook salmon, representing 82.1% of the total fall catch.

2005

Spring monitoring was conducted 168 days during 2005 (Table 3). Catches of Chinook salmon were predominately age-0 natural fish with a catch of 37,289, comprising 75.4% of the total spring catch (Appendix 5). A total of 12,179 hatchery fish were captured during the spring monitoring period, comprising 24.6% of the total spring catch. Three yearling Chinook salmon (not included in the totals presented above) that overwintered were captured during spring monitoring.

Fall monitoring was not conducted during 2005.

*Coho Salmon*

Coho salmon smolts and young-of-year were primarily captured early in the trapping season, between early March (JW 10) and late June (JW 26). Natural fish were comprised of age-0 and age-1 fish, while hatchery coho were all age-1 (Table 5). Trinity River Hatchery released yearling coho salmon during March of each of the years sampled (Table 6). All hatchery coho salmon were marked with a maxillary-clip.

Table 5. Spring and fall monitoring natural (N) age-1, hatchery (H) age-1 and natural age-0 coho salmon catch totals and percentages, captured at the Trinity River rotary screw traps near Willow Creek (rkm 34), California, 2001-2005.

Year	Days Trapped	Coho Salmon				% of Total		
		N 1	H 1	N 0	Total	% N 1	% H 1	% N 0
2001	147	53	314	150	517	10.3	60.7	29.0
2002	247	575	858	1,385	2,818	20.4	30.5	49.1
2003	238	117	141	661	919	12.7	15.3	72.0
2004	213	67	506	141	714	9.4	70.9	19.7
2005	168	51	317	1,760	2,128	2.4	14.9	82.7

Table 6. California Department of Fish and Game, Trinity River Hatchery coho salmon releases, 2001-2005.

Year	Release Dates	Number Released
2001	3/15/01-3/22/01	513,334
2002	3/15/02-3/22/02	530,285
2003	3/17/03-3/19/03	415,954
2004	3/15/04-3/17/04	517,335
2005	3/15/05-3/17/05	520,888

2001

Catches of coho salmon during spring of 2001 were predominately hatchery age-1 fish with a catch of 314, comprising 60.7% of the total spring catch (Table 5). A total of 53 natural age-1 and 150 natural age-0 coho salmon were captured during the spring

monitoring period, comprising 10.3% and 29.0%, respectively, of the total spring catch. No coho salmon were captured during the fall season of 2001.

#### *2002*

Catches of coho salmon during spring of 2002 were predominately natural age-0 fish with a catch of 1,382, comprising 46.2% of the total spring catch (Table 5). A total of 573 natural age-1 and 858 hatchery age-1 coho salmon were captured during the spring monitoring period, comprising 25.2% and 28.7%, respectively, of the total spring catch.

Five coho salmon were captured during the fall season of 2002, 3 natural age-0 and 2 natural age-1 coho salmon.

#### *2003*

Catches of coho salmon during spring of 2003 were predominately natural age-0 fish with a catch of 660, comprising 71.9% of the total spring catch (Table 5). A total of 117 natural age-1 and 141 hatchery age-1 coho salmon were captured during the spring monitoring period, comprising 12.7% and 15.4%, respectively, of the total spring catch.

One natural age-0 coho salmon was captured during the fall season of 2003.

#### *2004*

Catches of coho salmon during spring of 2004 were predominately hatchery age-1 fish with a catch of 506, comprising 70.9% of the total spring catch (Table 5). A total of 67 natural age-1 and 141 natural age-0 coho salmon were captured during the spring monitoring period, comprising 9.4% and 19.7%, respectively, of the total spring catch.

No coho salmon were captured during the fall season of 2004.

#### *2005*

Catches of coho salmon during spring of 2005 were predominately natural age-0 fish with a catch of 1,760, comprising 82.7% of the total spring catch (Table 5). A total of 51 natural age-1 and 317 hatchery age-1 coho salmon were captured during the spring monitoring period, comprising 2.4% and 14.9%, respectively, of the total spring catch.

Fall monitoring was not conducted during 2005.

#### *Steelhead*

Steelhead were comprised of natural age-0, age-1 and age-2+ (age-2 and age-3) fish, while hatchery steelhead were all age-1 (Table 7). Trinity River Hatchery released yearling steelhead during March of each of the years sampled (Table 8). All hatchery steelhead were marked with an adipose-clip.

Table 7. Steelhead catch numbers and percentages, captured at the Trinity River rotary screw traps, near Willow Creek (rkm 34), California, 2001-2005.

Year	Season	Steelhead				Total	% of Total			
		Age0	Age1	Age2+	Hat		Age0	Age1	Age2+	Hat
2001	Spring	203	393	372	400	1,368	14.8	28.7	27.2	29.2
2001	Fall	4	1	3	0	8	50.0	12.5	37.5	0.0
2002	Spring	2,491	577	128	772	3,968	62.8	14.5	3.2	19.5
2002	Fall	92	12	0	0	104	88.5	11.5	0	0
2003	Spring	2,122	252	43	158	2,575	82.4	9.9	1.7	6.1
2003	Fall	45	18	1	1	65	69.2	27.7	1.5	1.5
2004	Spring	371	828	434	318	1,951	19.0	42.4	22.2	16.3
2004	Fall	3	1	0	0	4	75.0	25.0	0	0
2005	Spring	840	460	69	134	1,503	55.9	30.6	4.6	8.9

Table 8. California Department of Fish and Game, Trinity River Hatchery steelhead releases, 2001-2005.

Year	Release Dates	Number Released
2001	3/15/01-3/22/01	816,172
2002	3/15/02-3/22/02	624,631
2003	3/17/03-3/19/03	867,618
2004	3/15/04-3/25/04	794,227
2005	3/15/05-3/15/05	792,861

### 2001

Catches of steelhead during spring of 2001 were predominately hatchery age-1 fish with a catch of 400, comprising 29.2% of the total spring catch (Table 7). A total of 393 natural age-1, 372 natural age-2+, and 203 natural age-0 steelhead were captured during the spring monitoring period, comprising 28.7%, 27.2% and 14.8%, respectively, of the total spring catch.

Eight natural steelhead were captured during the fall season of 2001 fish (Table 7).

### 2002

Catches of steelhead during spring of 2002 were predominately natural age-0 fish with a catch of 2,491, comprising 62.8% of the total spring catch (Table 7). A total of 577 natural age-1, 128 natural age-2+, and 772 hatchery steelhead were captured during the spring monitoring period, comprising 14.5%, 3.2% and 19.5%, respectively, of the total spring catch.

One-hundred and four natural steelhead were captured during the fall season of 2002 (Table 7).

### 2003

Catches of steelhead during spring of 2003 were predominately natural age-0 fish with a catch of 2,122, comprising 82.4% of the total spring catch (Table 7). A total of 252 natural age-1, 43 natural age-2+, and 158 hatchery steelhead were captured during the spring monitoring period, comprising 9.9%, 1.7% and 6.1%, respectively, of the total spring catch.

Sixty-five steelhead were captured during the fall season of 2003, all but one were natural fish (Table 7).

### 2004

Catches of steelhead during spring of 2004 were predominately natural age-1 fish with a catch of 828, comprising 42.4% of the total spring catch (Table 7). A total of 371 natural age-0, 434 natural age-2+, and 318 hatchery steelhead were captured during the spring monitoring period, comprising 19.0%, 22.2% and 16.3%, respectively, of the total spring catch.

Four natural steelhead were captured during the fall season of 2004 (Table 7).

### 2005

Catches of steelhead during spring of 2005 were predominately natural age-0 fish with a catch of 840, comprising 55.9% of the total spring catch (Table 7). A total of 460 natural age-1, 69 natural age-2+, and 134 hatchery steelhead were captured during the spring monitoring period, comprising 30.6%, 4.6% and 8.9%, respectively, of the total spring catch.

Fall monitoring was not conducted during 2005.

### *Non-Target Species*

Non-salmonid fish species captured at the Willow Creek trap site were enumerated and measured during both spring and fall monitoring periods.

### 2001

A total of 867 non-target fishes were captured during 2001 (Table 9). Klamath smallscale sucker (*Catostomus rimiculus*) was the most numerous non-target species. Other abundant species included threespine stickleback (*Gasterosteus aculeatus*), speckled dace (*Rhinichthys osculus*), and Pacific lamprey (*Entosphenus tridentatus*) (Table 9).

Table 9. Catch totals of non-target fish species captured at the Trinity River rotary screw trap, near Willow Creek (rkm 34), California, 2001.

Common Name	Scientific Name	Catch (n)
Klamath smallscale sucker	<i>Catostomus rimiculus</i>	251
Threespine stickleback	<i>Gasterosteus aculeatus</i>	229
Speckled dace	<i>Rhinichthys osculus</i>	222
Pacific lamprey	<i>Entosphenus tridentatus</i>	87
Sculpin species	<i>Cottus spp.</i>	55
American shad	<i>Alosa sapidissima</i>	13
Sockeye salmon	<i>Oncorhynchus nerka</i>	5
Brown trout	<i>Salmo trutta</i>	3
Golden shiner	<i>Notemigonus crysoleucas</i>	2
Season Total		867

### 2002

A total of 10,758 non-target fishes were captured during 2002 (Table 10). Klamath smallscale sucker were the most numerous non-target species, followed by American shad (*Alosa sapidissima*), Pacific lamprey, and speckled dace.

Table 10. Catch totals of non-target fish species captured at the Trinity River rotary screw traps, near Willow Creek (rkm 34), California, 2002.

Common Name	Scientific Name	Catch (n)
Klamath smallscale sucker	<i>Catostomus rimiculus</i>	8,388
American shad	<i>Alosa sapidissima</i>	1,368
Pacific lamprey	<i>Entosphenus tridentatus</i>	413
Speckled dace	<i>Rhinichthys osculus</i>	386
Sculpin species	<i>Cottus spp.</i>	101
Threespine stickleback	<i>Gasterosteus aculeatus</i>	70
Green sturgeon	<i>Acipenser medirostris</i>	22
Brown trout	<i>Salmo trutta</i>	4
Golden shiner	<i>Notemigonus crysoleucas</i>	3
Green sunfish	<i>Lepomis cyanellus</i>	3
Season Total		10,758

### 2003

A total of 8,877 non-target fishes were captured during 2003 (Table 11). Klamath smallscale sucker was the most numerous non-target species followed by Pacific lamprey, American shad, and green sturgeon (*Acipenser medirostris*).

Table 11. Catch totals of non-target fish species captured at the Trinity River rotary screw traps, near Willow Creek (rkm 34), California, 2003.

Common Name	Scientific Name	Catch (n)
Klamath smallscale sucker	<i>Catostomus rimiculus</i>	6,628
Pacific lamprey	<i>Entosphenus tridentatus</i>	1,218
American shad	<i>Alosa sapidissima</i>	412
Green sturgeon	<i>Acipenser medirostris</i>	318
Speckled dace	<i>Rhinichthys osculus</i>	187
Sculpin species	<i>Cottus spp.</i>	62
Threespine stickleback	<i>Gasterosteus aculeatus</i>	26
Sockeye salmon	<i>Oncorhynchus nerka</i>	9
Brown trout	<i>Salmo trutta</i>	7
Golden shiner	<i>Notemigonus crysoleucas</i>	5
Green sunfish	<i>Lepomis cyanellus</i>	3
Bullhead specie	<i>Ameirus sp.</i>	2
Season Total		8,877

#### 2004

A total of 5,134 non-target fishes were captured in 2004, predominately Klamath smallscale suckers (Table 12). Other abundant species included American shad, Pacific lamprey, and speckled dace.

Table 12. Catch totals of non-target fish species captured at the Trinity River rotary screw traps, near Willow Creek (rkm 34), California, 2004.

Common Name	Scientific Name	Catch (n)
Klamath smallscale sucker	<i>Catostomus rimiculus</i>	2,935
American shad	<i>Alosa sapidissima</i>	778
Pacific lamprey	<i>Entosphenus tridentatus</i>	771
Speckled dace	<i>Rhinichthys osculus</i>	432
Sculpin species	<i>Cottus spp.</i>	132
Green sturgeon	<i>Acipenser medirostris</i>	38
Brown trout	<i>Salmo trutta</i>	21
Threespine stickleback	<i>Gasterosteus aculeatus</i>	19
Sockeye salmon	<i>Oncorhynchus nerka</i>	6
Bullhead specie	<i>Ameirus sp.</i>	2
Season Total		5,134

2005

A total of 12,561 non-target fishes were captured in 2005 (Table 13). Klamath smallscale sucker was the most numerous non-target species (Table 13). Other abundant species included Pacific lamprey, speckled dace, and green sturgeon.

Table 13. Catch totals of non-target fish species captured at the Trinity River rotary screw traps, near Willow Creek (rkm 34), California, 2005.

Common Name	Scientific Name	Catch (n)
Klamath smallscale sucker	<i>Catostomus rimiculus</i>	9,089
Pacific lamprey	<i>Entosphenus tridentatus</i>	2,575
Speckled dace	<i>Rhinichthys osculus</i>	491
Green sturgeon	<i>Acipenser medirostris</i>	253
Sculpin species	<i>Cottus spp.</i>	43
Threespine stickleback	<i>Gasterosteus aculeatus</i>	30
Green sunfish	<i>Lepomis cyanellus</i>	24
Golden shiner	<i>Notemigonus crysoleucas</i>	21
American shad	<i>Alosa sapidissima</i>	17
Brown trout	<i>Salmo trutta</i>	16
Sockeye salmon	<i>Oncorhynchus nerka</i>	1
Bullhead specie	<i>Ameirus sp.</i>	1
Season Total		12,561

### *Migration Rates*

Due to the volitional release of hatchery reared salmonids (Chinook salmon, coho salmon, and steelhead), mean migration rates could not be calculated. However, maximum migration rates are presented based on the first capture of hatchery released salmon at the Willow Creek trap site.

### *Chinook salmon*

Migration rates calculated from the initial release date and first ad-clip Chinook salmon captured ranged from 12 rkm/d in 2003 to 36 rkm/d in 2001 (Table 14).

### *Coho salmon*

Migration rates calculated from the initial release date and first max-clip coho salmon captured ranged from 4 rkm/d in 2001 to 36 rkm/d in 2002 and 2004 (Table 15), although these values may not be valid due to the traps being installed after the hatchery release.

Table 14. Chinook salmon migration rates, as recorded at the Trinity River rotary screw traps near Willow Creek (rkm 34), California, 2001-2005.

Year	Season	Date First Released	Date First Captured	# of Days	Migration Rate (rkm/d)
2001	Spring	6/6/2001	6/10/2001	4	36
	Fall	10/1/2001	10/5/2001	4	36
2002	Spring	6/3/2002	6/8/2002	5	29
	Fall	10/10/2002	10/18/2002	8	18
2003	Spring	6/3/2003	6/15/2003	12	12
	Fall	10/1/2003	10/6/2003	5	29
2004	Spring	6/4/2004	6/14/2004	10	14
	Fall	10/1/2004	10/6/2004	5	29
2005	Spring	6/1/2005	6/10/2005	9	16

Table 15. Coho salmon migration rates, as recorded at the Trinity River rotary screw traps near Willow Creek (rkm 34), California, 2001-2005.

Year	Season	Date First Released	Date First Captured	# of Days	Migration Rate (rkm/d)
2001	Spring	3/15/2001	4/20/2001*	36	4 *
2002	Spring	3/15/2002	3/19/2002	4	36
2003	Spring	3/17/2003	4/3/2003	17	9
2004	Spring	3/15/2004	3/19/2004*	4	36 *
2005	Spring	3/15/2005	3/20/2005	5	29

\*Values should be interpreted with caution because the hatchery release occurred prior to trap installation.

### *Steelhead*

Migration rates calculated from the initial release date and first ad-clip steelhead captured ranged from 6 rkm/d in 2001 to 29 rkm/d in 2002 (Table 16), although these values may not be valid due to the traps being installed after the hatchery release in 2001.

Table 16. Steelhead migration rates, as recorded at the Trinity River rotary screw traps near Willow Creek (rkm 34), California, 2001-2005.

Year	Season	Date First Released	Date First Captured	# of Days	Migration Rate (rkm/d)
2001	Spring	3/15/2001	4/10/2001*	26	6 *
2002	Spring	3/15/2002	3/20/2002	5	29
2003	Spring	3/17/2003	4/2/2003	16	9
2004	Spring	3/15/2004	3/24/2004*	9	16 *
2005	Spring	3/15/2005	4/3/2005	19	8

\*Values should be interpreted with caution because the hatchery release occurred prior to trap installation.

### *Abundance Indices*

Abundance indices are greatly influenced by river discharge and one must use caution in comparing indices within or between years for absolute numbers of fish passing a site. However, abundance indices are generally thought to be adequate indicators of emigration timing and duration if sampling occurred in all weeks of the sampling period.

### *Chinook salmon*

Total yearly Chinook salmon abundance indices ranged from 283,604 in 2004 to 1,801,346 in 2005 (Table 17; Appendices 1-5).

Table 17. Yearly Chinook salmon Abundance Indices, Willow Creek Trap Site, 2001-2005.

Year	Natural Age-0	Natural Age-1	Hatchery Age-0	Total
2001	714,126	38	173,828	887,992
2002	539,815	322	213,260	753,397
2003	276,799	1,281	86,288	364,367
2004	196,625	881	86,098	283,604
2005	1,489,124	645	311,577	1,801,346

### *2001*

Spring monitoring in 2001 began in April (JW 15), with few natural age-0 Chinook salmon captured before mid-May (JW 20; Figure 3). Abundance indices increased weekly through June, the peak weekly Chinook salmon natural age-0 abundance index occurred JW 24 (Appendix 1). The peak weekly abundance index for hatchery age-0 Chinook salmon occurred during JW 25. The peak weekly hatchery age-0 Chinook salmon abundance index during fall monitoring occurred JW 41. Based on the abundance indices, the hatchery component of Chinook salmon outmigration was 19.1% for the spring sampling period and 85.1% for the fall sampling period.

### *2002*

Spring monitoring in 2002 began in March (JW 11), with few natural age-0 Chinook salmon captured before mid-April (JW 16; Figure 3). Abundance indices increased weekly through May, an initial peak weekly Chinook salmon natural age-0 abundance index occurred JW 20 (Appendix 2) with a second peak JW 24. The peak weekly abundance index for hatchery age-0 Chinook salmon was during JW 25. During fall monitoring, the peak weekly hatchery age-0 Chinook salmon abundance index occurred JW 42. Based on the abundance indices, the hatchery component of Chinook salmon outmigration was 23.5% for the spring sampling period and 77.0% for the fall sampling period.

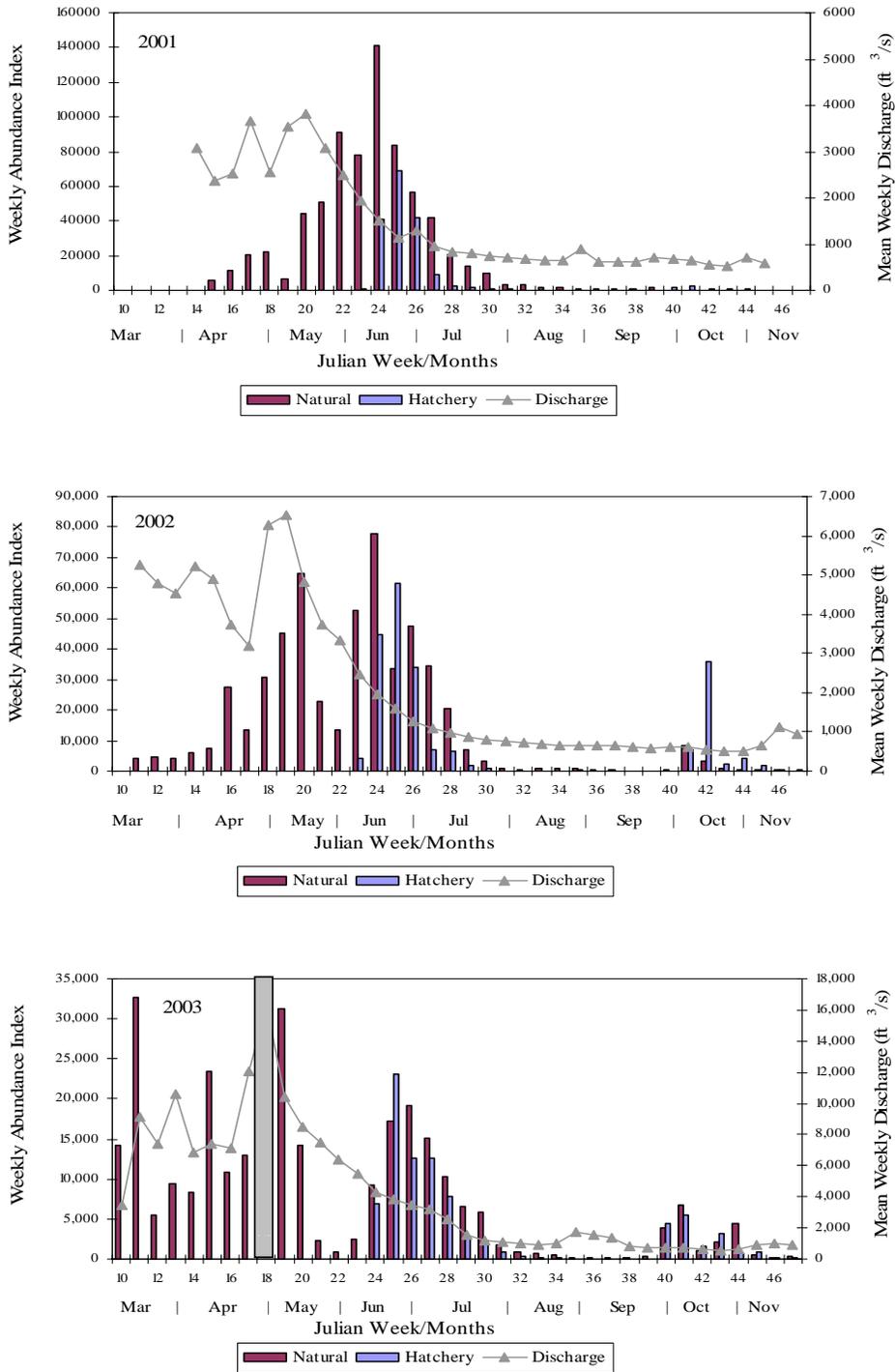


Figure 3. Weekly abundance indices for natural age-0 and hatchery age-0 Chinook salmon captured at the Trinity River rotary screw traps near Willow Creek (rkm 34), California, and mean daily discharge (ft<sup>3</sup>/s) as recorded at Hoopa, California (US Geological Survey Water Resource gauge station #11-530000), 2001-2005. Shaded blocks represent Julian Weeks when traps were not in operation.

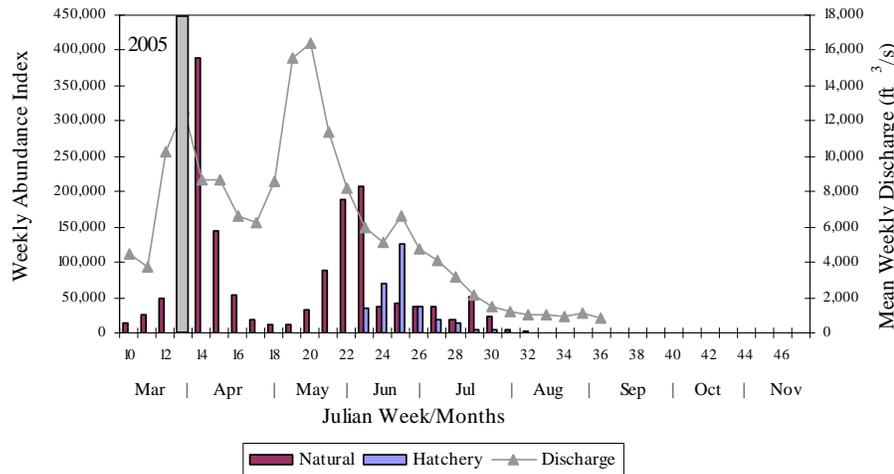
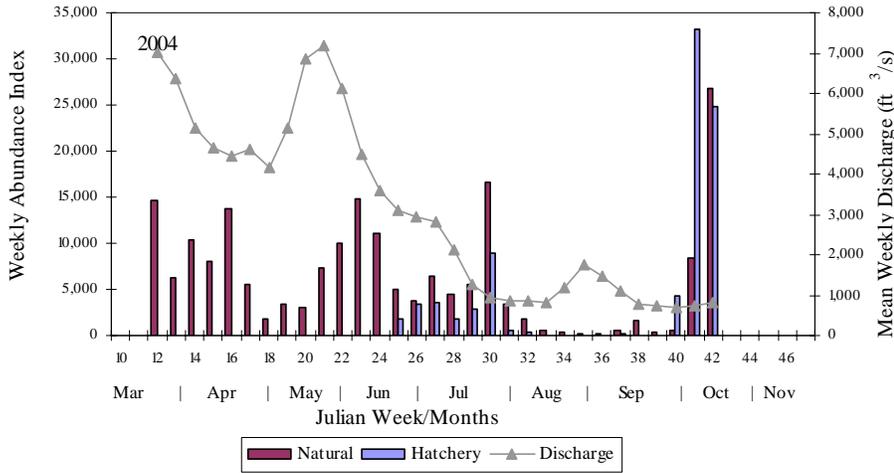


Figure 3 (continued). Weekly abundance indices for natural age-0 and hatchery age-0 Chinook salmon captured at the Trinity River rotary screw traps near Willow Creek (rkm 34), California, and mean daily discharge ( $\text{ft}^3/\text{s}$ ) as recorded at Hoopa, California (US Geological Survey Water Resource gauge station #11-530000), 2001-2005. Shaded blocks represent Julian Weeks when traps were not in operation.

### 2003

Spring monitoring in 2003 began in March (JW 10), with many natural age-0 Chinook salmon captured through May (JW 20; Figure 3). An initial peak weekly Chinook salmon natural age-0 abundance index occurred JW 11 (Appendix 3), with a second peak JW 19, and a third peak JW 26. Sampling did not occur JW 18 so it is uncertain whether the peak in JW 19 is the actual peak in the early sampling period. The peak weekly abundance index for hatchery age-0 Chinook salmon during spring monitoring occurred during JW 25. During fall monitoring, the peak weekly Chinook salmon hatchery age-0 abundance index occurred JW 41. Based on the abundance indices, the hatchery

component of Chinook salmon outmigration was 21.3% for the spring sampling period and 46.0% for the fall sampling period.

*2004*

Spring monitoring in 2004 began in March (JW 12), with many natural age-0 Chinook salmon captured through April (JW 17; Figure 3). Although no clear dominant peak in the Chinook salmon natural age-0 abundance index occurred, peaks did occur on JW 12, JW 16, JW 23 and JW 30 (Appendix 4). The peak weekly abundance index for hatchery age-0 Chinook salmon during spring monitoring occurred during JW 30. During fall monitoring, the peak weekly Chinook salmon hatchery age-0 abundance index occurred JW 41. Based on the abundance indices, the hatchery component of Chinook salmon outmigration was 12.8% for the spring sampling period and 63.6% for the fall sampling period.

*2005*

Spring monitoring in 2005 began in March (JW 10), with many natural age-0 Chinook salmon captured through April (JW 17; Figure 3). Sampling did not occur JW 13 so it is uncertain whether the peak in JW 14 is the actual peak in the early sampling period. A second peak in the Chinook salmon natural age-0 abundance index occurred JW 23 (Appendix 5). The peak weekly abundance index for hatchery age-0 Chinook salmon during spring monitoring occurred during JW 25. Based on the abundance indices, the hatchery component of Chinook salmon outmigration was 17.3% for the spring sampling period. No fall monitoring occurred in 2005.

*Coho salmon*

Total yearly coho salmon abundance indices ranged from 32,815 in 2004 to 194,846 in 2005 (Table 18; Appendices 6-10).

Table 18. Yearly coho salmon Abundance Indices, Willow Creek Trap Site, 2001-2005.

Year	Natural Age-0	Natural Age-1	Hatchery Age-1	Total
2001	6,043	3,542	23,562	33,147
2002	34,600	19,192	27,238	81,030
2003	65,782	8,949	14,967	89,698
2004	5,692	3,102	24,021	32,815
2005	154,618	4,394	35,834	194,846

## *2001*

Spring monitoring in 2001 began in April (JW 15), with few coho salmon captured before mid-May (JW 19; Figure 4). The peak weekly coho salmon natural and hatchery age-1 abundance indices occurred JW 20 (Appendix 6). The peak weekly coho salmon natural age-0 abundance index occurred JW 22. Based on the abundance indices, hatchery produced fish made up 86.9% of the spring period age-1 coho salmon outmigration. No coho salmon were captured during the fall monitoring period.

## *2002*

Spring monitoring in 2002 began in March (JW 11), with many natural age-0 coho salmon captured before April (JW 14; Figure 4). The peak weekly coho salmon natural and hatchery age-1 abundance indices occurred JW 18 (Appendix 7). The peak weekly coho salmon natural age-0 abundance index occurred JW 18. Based on the abundance indices, hatchery produced fish made up 58.7% of the spring period age-1 coho salmon outmigration. Coho salmon abundance indices during the fall monitoring period were very small compared to the spring monitoring period.

## *2003*

Spring monitoring in 2003 began in March (JW 10), with many natural age-0 coho salmon captured before May (JW 18; Figure 4). The peak weekly coho salmon natural and hatchery age-1 abundance indices occurred JW 19 (Appendix 8). Sampling did not occur JW 18 so it is uncertain whether the peak in JW 19 is the actual peak in the early sampling period. The peak weekly coho salmon natural age-0 abundance index occurred JW 13. Based on the abundance indices, hatchery produced fish made up 62.6% of the spring period age-1 coho salmon outmigration. No coho salmon were captured during the fall monitoring period.

## *2004*

Spring monitoring in 2004 began in March (JW 12), with many coho salmon captured before May (JW 18; Figure 4). The peak weekly coho salmon natural and hatchery age-1 abundance indices occurred JW 12, the first week of sampling (Appendix 9). The peak weekly natural age-0 coho salmon abundance index also occurred JW 12. Based on the abundance indices, hatchery produced fish made up 88.6% of the spring period age-1 coho salmon outmigration. No coho salmon were captured during the fall monitoring period.

## *2005*

Spring monitoring in 2005 began in March (JW 10), with many coho salmon captured before May (JW 18; Figure 4). The peak weekly coho salmon natural and hatchery age-1 abundance indices occurred JW 19 (Appendix 10). The peak weekly coho salmon natural age-0 abundance index occurred JW 14, although because sampling did not occur JW 13, it is impossible to tell if a peak occurred in JW 13. Based on the abundance indices, hatchery produced fish made up 89.1% of the spring period age-1 coho salmon outmigration. No fall monitoring occurred in 2005.

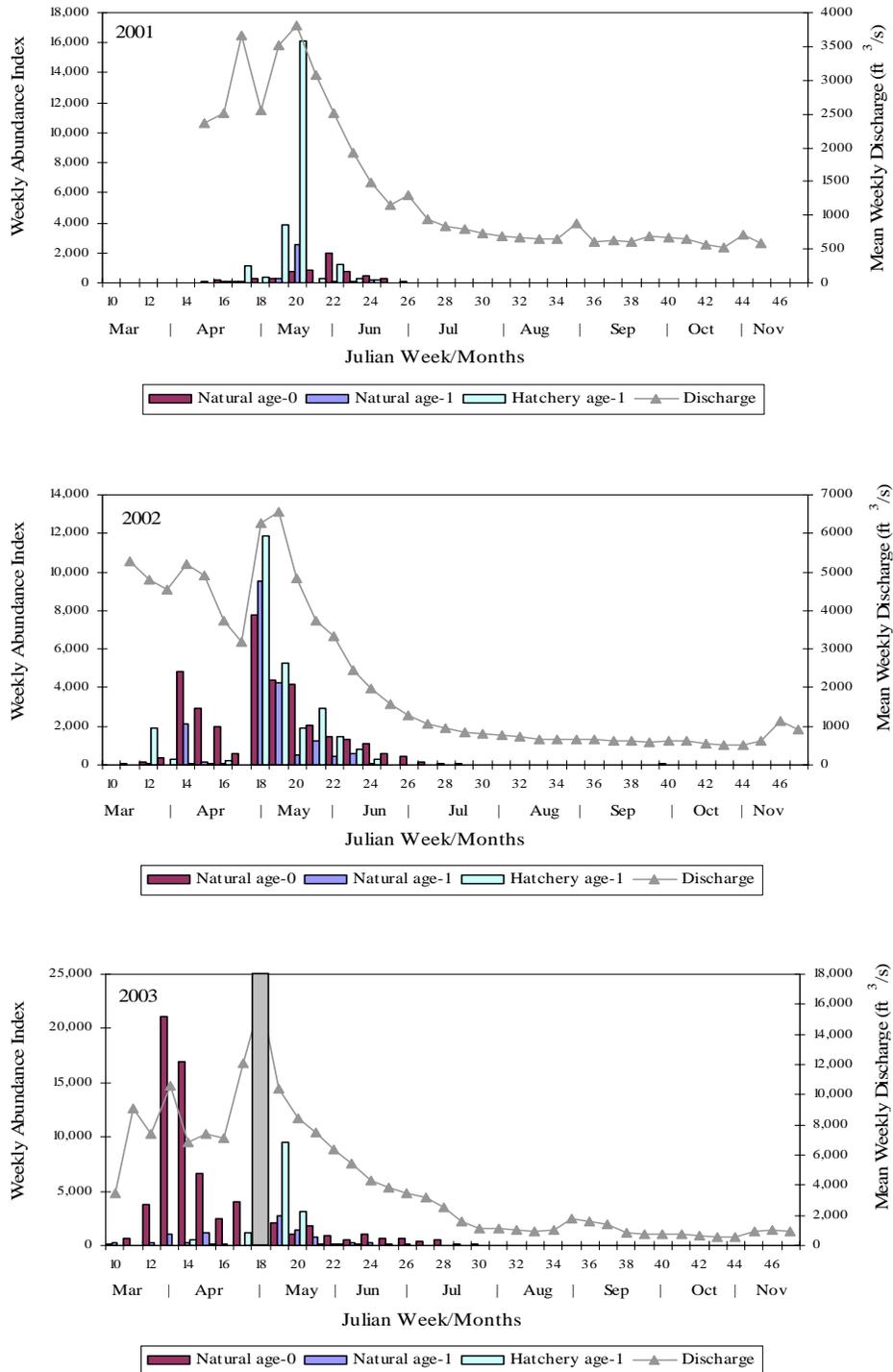


Figure 4. Weekly abundance indices for natural age-0, natural age-1, and hatchery age-1 coho salmon captured at the Trinity River rotary screw traps near Willow Creek (rkm 34), California, and mean daily discharge (ft<sup>3</sup>/s) as recorded at Hoopa, California (US Geological Survey Water Resource gauge station #11-530000), 2001-2005. Shaded blocks represent Julian Weeks when traps were not in operation.

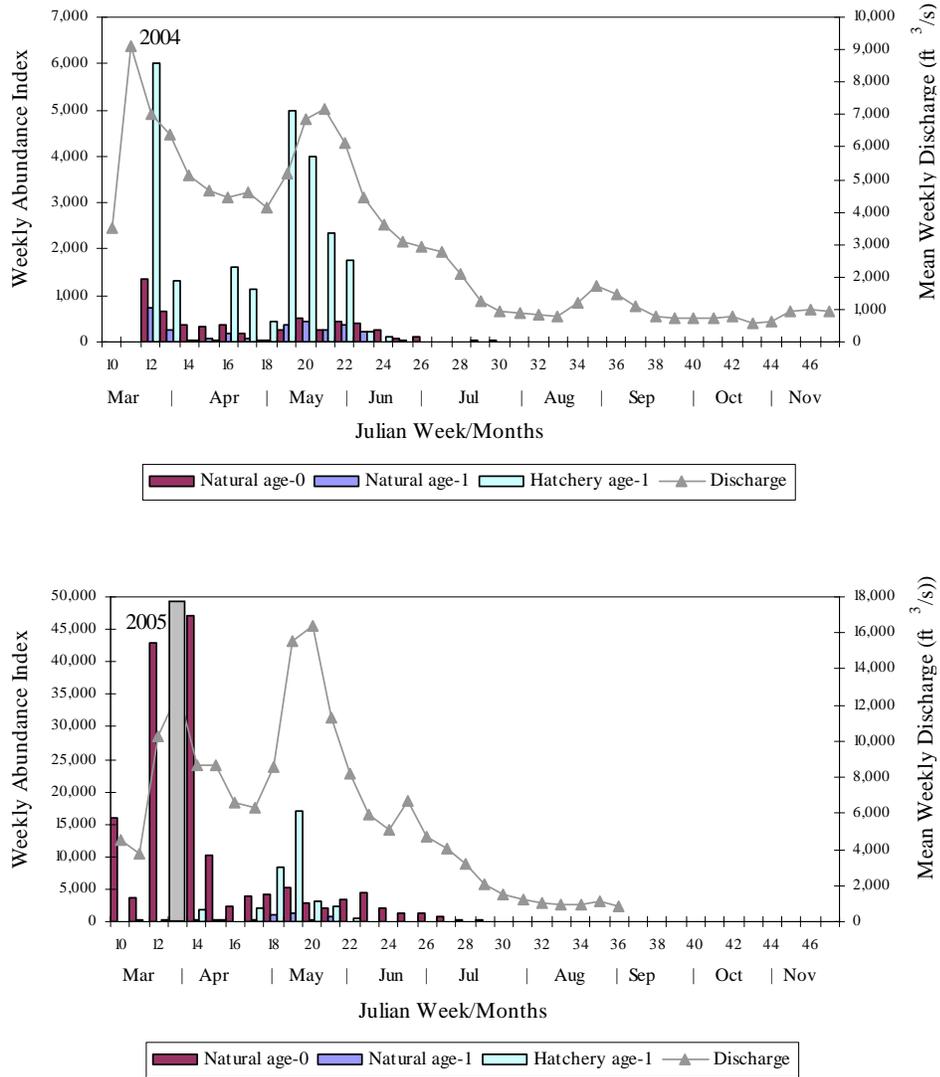


Figure 4 (continued). Weekly abundance indices for natural age-0, natural age-1, and hatchery age-1 coho salmon captured at the Trinity River rotary screw traps near Willow Creek (rkm 34), California, and mean daily discharge (ft<sup>3</sup>/s) as recorded at Hoopa, California (US Geological Survey Water Resource gauge station #11-530000), 2001-2005. Shaded blocks represent Julian Weeks when traps were not in operation.

### *Steelhead*

Total yearly steelhead abundance indices ranged from 60,803 in 2004 to 82,945 in 2003 (Table 19; Appendices 11-15).

Table 19. Yearly steelhead Abundance Indices, Willow Creek Trap Site, 2001-2005.

Year	Natural Age-0	Natural Age-1	Natural Age-2	Hatchery Age-1	Total
2001	4,391	21,823	23,500	25,656	75,370
2002	28,658	12,102	3,563	18,565	62,888
2003	40,146	17,064	3,624	22,111	82,945
2004	6,707	28,693	14,366	11,037	60,803
2005	26,799	29,960	5,480	11,684	73,923

*2001*

Spring monitoring in 2001 began in April (JW 15), with most steelhead captured before July (JW 27; Figure 5). The peak weekly steelhead natural and hatchery age-1 abundance indices occurred JW 16 (Appendix 11). Due to the large catch of hatchery steelhead during the first week of sampling, the peak of emigration may have already occurred when trapping was initiated. The peak weekly steelhead natural age-0 abundance index occurred JW 25. Based on the abundance indices, hatchery produced fish made up 36.3% of the spring period age-1 and older steelhead outmigration. Natural steelhead abundance indices during the fall monitoring period were low compared to those for the spring monitoring period and no hatchery produced steelhead were captured during this period.

*2002*

Spring monitoring in 2002 began in March (JW 11), with most steelhead captured before July (JW 27; Figure 5). The peak weekly steelhead natural age-1 index occurred JW 19 and peak weekly hatchery age-1 abundance index occurred JW 18 (Appendix 12). The peak weekly steelhead natural age-0 abundance index occurred JW 24. Based on the abundance indices, hatchery produced fish made up 54.5% of the spring period age-1 and older steelhead emigration. Natural steelhead abundance indices during the fall monitoring period were low compared to those for the spring monitoring period and no hatchery produced steelhead were captured during this period.

*2003*

Spring monitoring in 2003 began in March (JW 10), with most steelhead captured before August (JW 32; Figure 5). The peak weekly steelhead natural age-1 index occurred JW 20 and peak weekly hatchery age-1 abundance index occurred JW 17 (Appendix 13). Sampling did not occur JW 18 so it is uncertain whether the hatchery and natural age-1 steelhead peaks during JW 17 and JW 20, respectively, are the actual peaks of the emigration. The peak weekly steelhead natural age-0 abundance index occurred JW 28. Based on the abundance indices, hatchery produced fish made up 51.8% of the spring period age-1 and older steelhead outmigration. Steelhead abundance indices during the fall monitoring period were low compared to those for the spring monitoring period.

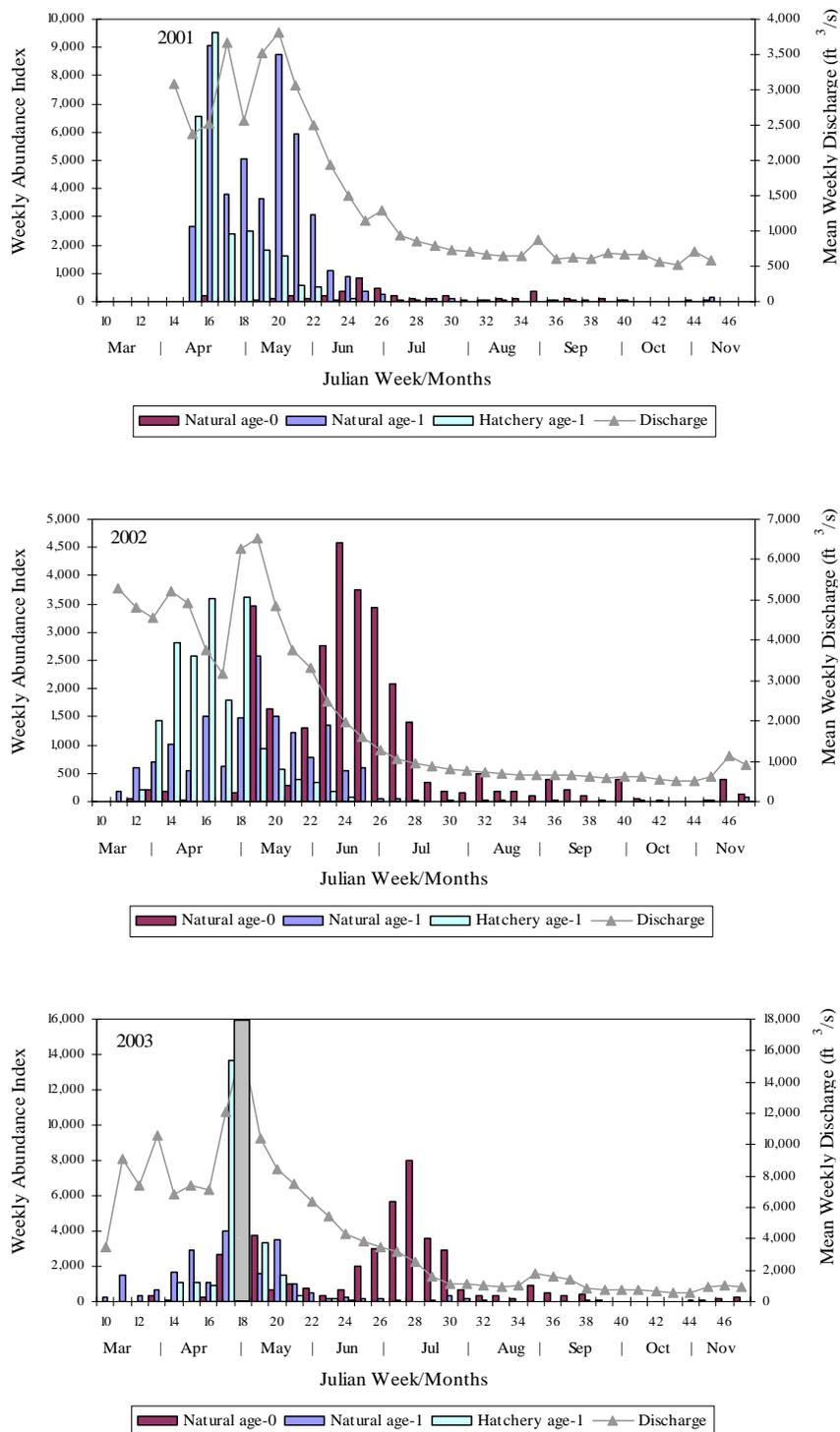


Figure 5. Weekly abundance indices for natural age-0, natural age-1, and hatchery age-1 steelhead captured at the Trinity River rotary screw traps near Willow Creek (rkm 34), California, and mean daily discharge (ft<sup>3</sup>/s) as recorded at Hoopa, California (US Geological Survey Water Resource gauge station #11-530000), 2001-2005. Shaded blocks represent Julian Weeks when traps were not in operation.

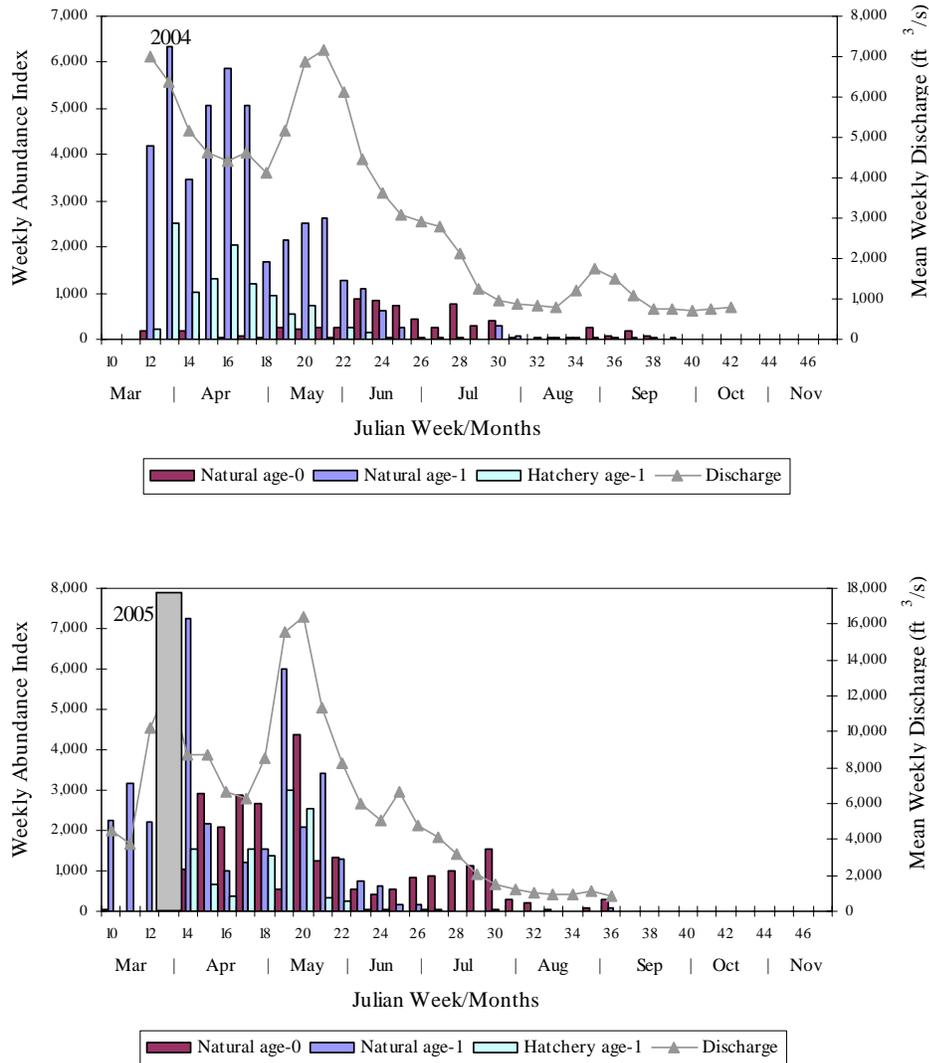


Figure 5 (continued). Weekly abundance indices for natural age-0 natural age-1 and hatchery age-1 steelhead captured at the Trinity River rotary screw traps near Willow Creek (rkm 34), California, and mean daily discharge (ft<sup>3</sup>/s) as recorded at Hoopa, California (US Geological Survey Water Resource gauge station #11-530000), 2001-2005. Shaded blocks represent Julian Weeks when traps were not in operation.

### 2004

Spring monitoring in 2004 began in March (JW 12), with most steelhead captured before July (JW 27; Figure 5). The peak weekly steelhead natural and hatchery age-1 abundance indices occurred JW 13 (Appendix 14). The peak weekly steelhead natural age-0 abundance index occurred JW 23. Based on the abundance indices, hatchery produced fish made up 20.4% of the spring period age-1 and older steelhead emigration. Natural steelhead abundance indices during the fall monitoring period were very low

compared to those for the spring monitoring period and no hatchery produced steelhead were captured during this period.

2005

Spring monitoring in 2005 began in March (JW 10), with most steelhead captured before August (JW 32; Figure 5). The peak weekly steelhead natural age-1 index occurred JW 14 and peak weekly hatchery age-1 abundance index occurred JW 19 (Appendix 15). Sampling did not occur JW 13 so it is uncertain whether the natural age-1 steelhead peak was the actual peaks of the emigration. The peak weekly steelhead natural age-0 abundance index occurred JW 20. Based on the abundance indices, hatchery produced fish made up 24.8% of the spring period age-1 and older steelhead emigration. No fall monitoring occurred in 2005.

*Emigration Timing*

*Chinook salmon*

The emigration period of natural Chinook salmon from the Trinity River appears to have two relatively distinct emigration periods, a late-winter peak and a spring peak. In some years the late-winter peak may have occurred prior to trap installation, and other years the peak occurred during the early trapping period (Figure 3, Appendices 1-5). In all years Chinook salmon were caught the first day trapping occurred, suggesting that juvenile Chinook salmon were present before traps were installed. By late August, the abundance indices for all years was very low. The Chinook emigration during the fall monitoring period generally occurred over a five week period shortly after the fall hatchery release.

Peaks in emigration generally occurred earlier for natural age-0 Chinook salmon (Table 20) compared to hatchery age-0 Chinook salmon, while emigration duration, the period when fish are captured, was longer for natural compared to hatchery Chinook salmon.

Table 20. Spring season Chinook salmon emigration timing and duration, Willow Creek Trap Site, 2001-2005. Values represent Julian Weeks.

Year	Emigration Duration		Emigration Peak	
	Age-0	Hatchery	Age-0	Hatchery
2001	15-39	23-36	24	25
2002	11-39	23-39	24	25
2003	10-39	23-39	N/A*	25
2004	12-39	24-39	12,23,30**	30
2005	10-36	23-36	N/A*	25

\*Due to missing sampling weeks, these values could not be determined.

\*\*Multiple peaks in sampling season

*Coho salmon*

The emigration period of natural age-0 coho salmon from the Trinity River was protracted over the period from March through July. (Figure 4, Appendices 6-10). In most years age-0 coho salmon were caught the first day trapping occurred, suggesting that age-0 coho salmon were present before traps were installed. Peaks in emigration generally occurred between Julian Weeks 12 and 22 for natural age-0 coho salmon (Table 21).

Table 21. Spring season coho salmon age-0 emigration timing and duration, Willow Creek Trap Site, 2001-2005. Values represent Julian Weeks.

Year	Emigration Duration	Emigration Peak
	Age-0	Age-0
2001	16-26	22
2002	11-35	18
2003	10-37	N/A*
2004	12-37	12
2005	10-30	N/A*

\*Due to missing sampling weeks, these values could not be determined.

The emigration period of natural age-1 coho salmon from the Trinity River appears to have one distinct emigration period which typically ends in early to mid-June (Figure 4, Appendices 6-10). In most years age-1 coho salmon were caught the first week trapping occurred, suggesting that age-1 coho salmon were present before traps were installed. Peaks in emigration were generally similar for natural age-1 coho salmon and hatchery age-1 coho salmon (Table 22). Emigration duration was longer for natural compared to hatchery age-1 coho salmon.

Table 22. Spring season natural and hatchery coho salmon age-1 emigration timing and duration, Willow Creek Trap Site, 2001-2005. Values represent Julian Weeks.

Year	Emigration Duration		Emigration Peak	
	Natural	Hatchery	Natural	Hatchery
2001	15-29	16-24	20	20
2002	12-29	12-24	18	18
2003	10-36	14-28	N/A*	N/A*
2004	12-25	12-24	12	12,19**
2005	10-27	12-24	N/A*	N/A*

\*Due to missing sampling weeks, these values could not be determined.

\*\*Multiple peaks in sampling season

*Steelhead*

The emigration period of natural age-0 steelhead from the Trinity River typically begins in April and occurs throughout the monitoring season with most movement occurring from April through July (Figure 5, Appendices 11-15). In most years, age-0 steelhead were not caught until well into the sampling period, suggesting that the majority of the age-0 steelhead emigration was captured during the sampling periods. Peaks in emigration generally occurred between Julian Weeks 23 and 25 for natural age-0 steelhead (Table 23).

Table 23. Spring season steelhead age-0 emigration timing and duration, Willow Creek Trap Site, 2001-2005. Values represent Julian Weeks.

Year	Emigration Duration	Emigration Peak
	Age-0	Age-0
2001	16-39	25
2002	12-39	24
2003	13-39	N/A*
2004	12-38	23
2005	10-36	N/A*

\*Due to missing sampling weeks, these values could not be determined.

The majority of the natural age-1+ (includes ages 1, 2, and 3) steelhead emigration from the Trinity River extends at least from March though June, (Figure 5, Appendices 11-15). In most years age-1+ steelhead were caught the first week trapping occurred, suggesting that age-1+ steelhead were present before traps were installed. The emigration for age-1 hatchery steelhead is similar except that it typically tapers off by the end of May. Peaks in emigration were generally similar for natural age-1+ steelhead and hatchery age-1 steelhead (Table 24).

Table 24. Spring season natural (includes ages 1, 2, and 3) and hatchery steelhead emigration timing and duration, Willow Creek Trap Site, 2001-2005. Values represent Julian Weeks.

Year	Emigration Duration		Emigration Peak	
	Natural	Hatchery	Natural	Hatchery
2001	15-39	15-25	16	16
2002	11-37	12-24	16	18
2003	10-39	14-25	N/A*	N/A*
2004	12-39	12-30	13	13
2005	10-36	14-31	N/A*	N/A*

\*Due to missing sampling weeks, these values could not be determined.

*Population Estimates*

Beginning in 2002, an intensive mark recapture program was conducted at the Willow Creek trap site. Only age-0 Chinook salmon were captured in quantities sufficient for conducting mark-recapture. Population estimates include both natural and hatchery age-0 Chinook salmon because hatchery Chinook salmon were not 100% marked. Season wide marking rate ranged from 11.5% in 2002 to 62.5% in 2005 (Table 25). For the periods that mark-recapture based population estimates were conducted, the 95% confidence interval ranged from +/-8.9% of the population estimate in 2005 to +/-54.9% of the population estimate in 2003 (Table 26). At this time, estimators for population estimates and associated variances for periods when mark-recapture estimates were not conducted have not been developed for the Willow Creek trap site data. It is anticipated that this will be one of the issues/tasks reviewed during an outmigration monitoring review. Annual age-0 Chinook salmon mark-recapture population estimates and abundance indices for the same time periods were significantly correlated ( $r=0.982$ ,  $n=4$ ,  $p<0.005$ ) suggesting that the abundance indices may be a valid measure of relative population size (Figure 6). Direct comparisons of population estimates between years (Table 26, Appendices 16-19, Figure 6) should not be done with these data because the marking period varied from year-to-year (Table 25). Fall sampling did not occur in each year, and mark recapture estimates were not calculated for fall sampling periods.

Table 25. Age-0 Chinook salmon mark-recapture period, marking rate, and recapture rate, Willow Creek Trap Site, 2001-2005.

Year	Marking Period	Catch	# Marked	Marking Rate	# Recaps	Recapture Rate
2002	JW 17-27	55,146	6,362	11.5%	212	3.3%
2003	JW 24-30	10,283	2,208	21.4%	30	1.4%
2004	JW 13-19, JW 21-30	10,216	3,032	29.7%	31	1.0%
2005	JW 14-19, JW 21-27	49,468	30,897	62.5%	636	2.1%

Table 26. Natural and hatchery age-0 Chinook salmon stratified population estimates for periods mark-recapture population estimates were conducted, Willow Creek Trap Site, 2002-2005.

Year	Estimate	Stratified Population Estimates	
		Lower 95% Confidence Level	Upper 95% Confidence Level
2002	1,330,070	1,076,791	1,583,349
2003	671,993	303,132	1,040,854
2004	430,687	302,839	558,536
2005	2,292,137	2,087,850	2,496,424

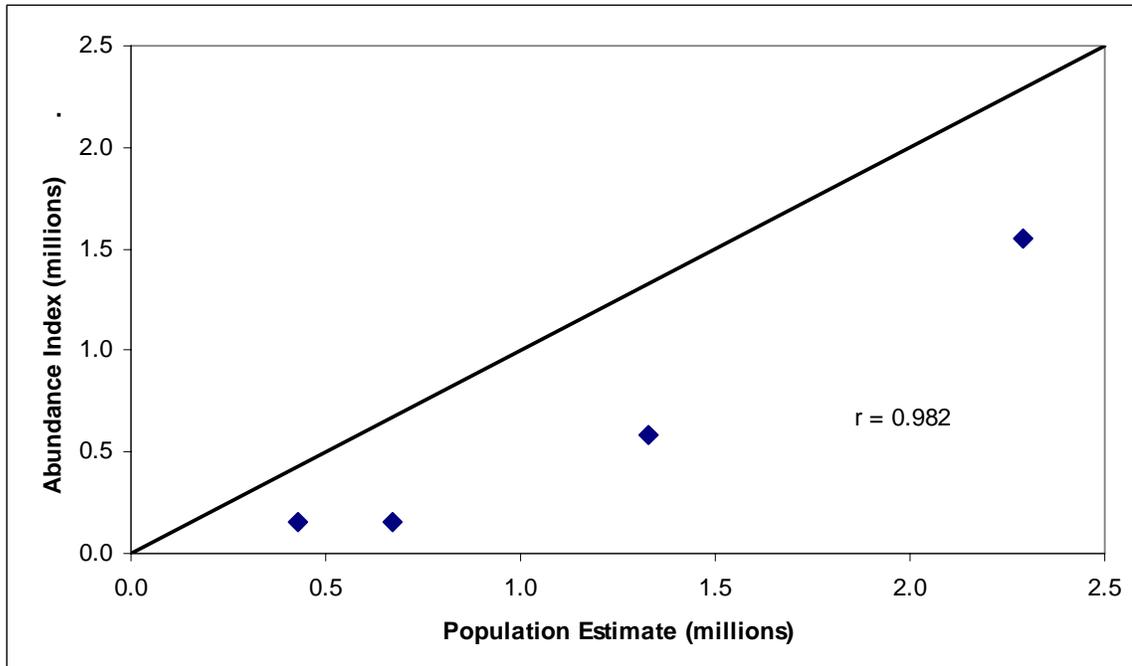


Figure 6. Relationship between mark-recapture population estimates and abundance indices for natural and hatchery age-0 Chinook salmon for periods mark-recapture population estimates were conducted at the Trinity River rotary screw traps near Willow Creek (rkm 34), California, 2002-2005. Solid line represents a one-to-one relationship.

### *Fork Lengths*

#### *Chinook salmon*

##### *2001*

Mean FL of age-0 Chinook salmon generally increased over the 2001 sampling season (Figure 7; Appendix 20). Mean FL increased noticeably in Julian Week 40 with the arrival of fall released hatchery fish.

##### *2002*

Mean FL of age-0 Chinook salmon generally increased over the 2002 sampling season (Figure 7; Appendix 21).

##### *2003*

Mean FL of age-0 Chinook salmon generally increased over the 2003 sampling season (Figure 7; Appendix 22).

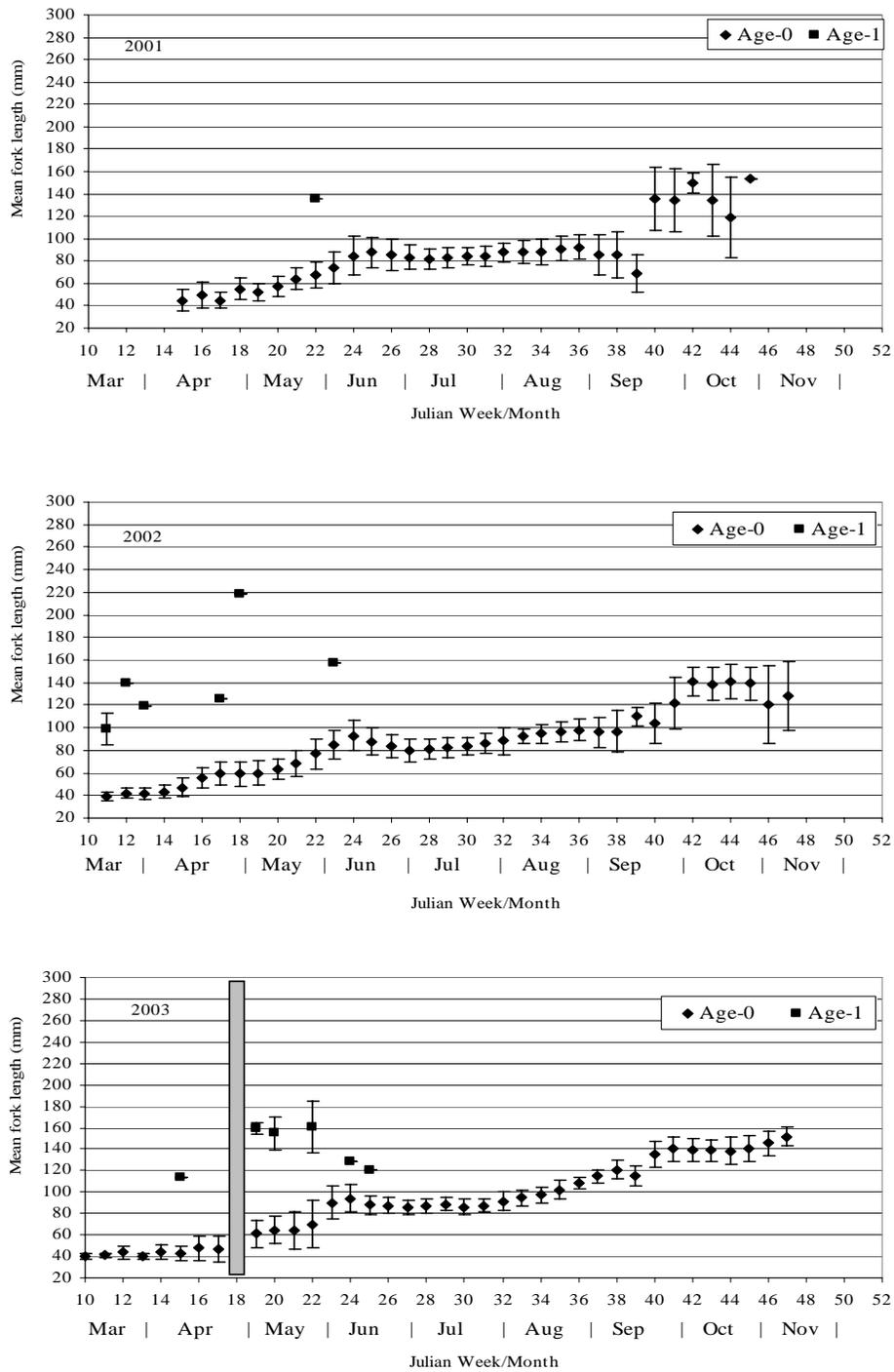


Figure 7. Weekly mean fork lengths for natural age-0 and age-1 Chinook salmon captured at the Trinity River rotary screw traps near Willow Creek (rkm 34), California. Shaded blocks represent Julian Weeks when traps were not in operation. Error bars represent one standard deviation of the mean.

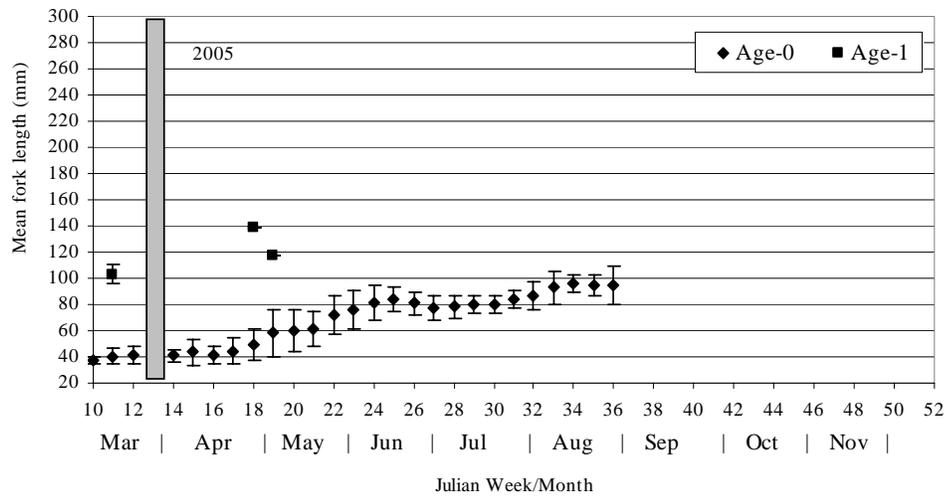
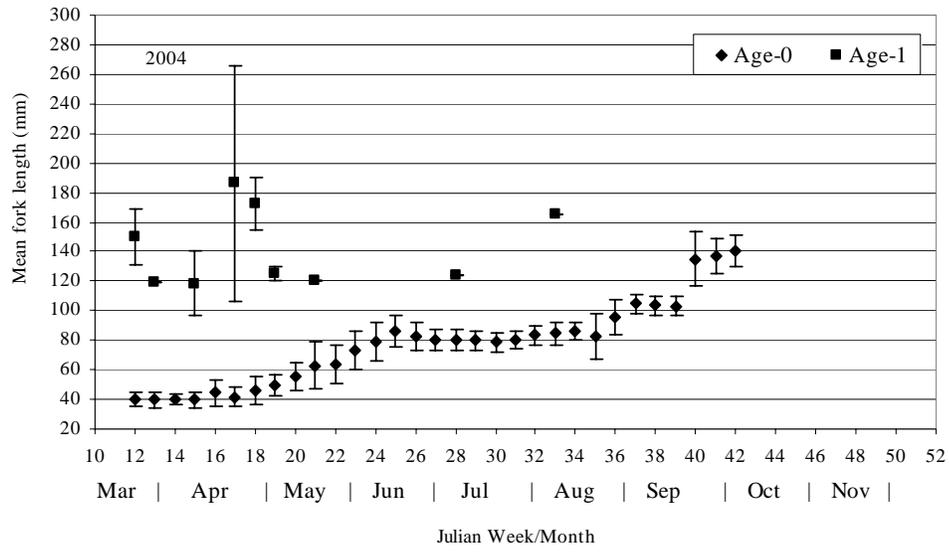


Figure 7 (continued). Weekly mean fork lengths for natural age-0 and age-1 Chinook salmon captured at the Trinity River rotary screw traps near Willow Creek (rkm 34), California, 2001-2005. Shaded blocks represent Julian Weeks when traps were not in operation. Error bars represent one standard deviation of the mean.

*2004*

Mean FL of age-0 Chinook salmon generally increased over the 2004 sampling season (Figure 7; Appendix 23). Mean FL increased noticeably in Julian Week 40 with the arrival of fall released hatchery fish.

2005

Mean FL of age-0 Chinook salmon generally increased over the 2005 sampling season (Figure 7; Appendix 24).

*Coho salmon*

2001

Mean FL of age-0 coho salmon generally increased over the 2001 sampling season (Figure 8; Appendix 20). Mean FL of natural and hatchery age-1 coho salmon generally decreased over the 2001 sampling season.

2002

Mean FL of age-0 coho salmon generally increased over the 2002 sampling season (Figure 8; Appendix 21). Mean FL of natural and hatchery age-1 coho salmon generally decreased over the 2002 sampling season.

2003

Mean FL of age-0 and natural age-1 coho salmon generally increased over the 2003 sampling season (Figure 8; Appendix 22). Mean FL of hatchery age-1 coho salmon was relatively stable over the 2003 sampling season.

2004

Mean FL of age-0 coho salmon generally increased over the 2004 sampling season (Figure 8; Appendix 23). Mean FL of natural and hatchery age-1 coho salmon were relatively stable over the 2004 sampling season.

2005

Mean FL of age-0 and natural age-1 coho salmon generally increased over the 2005 sampling season (Figure 8; Appendix 24). Mean FL hatchery age-1 coho salmon was relatively stable over the 2005 sampling season.

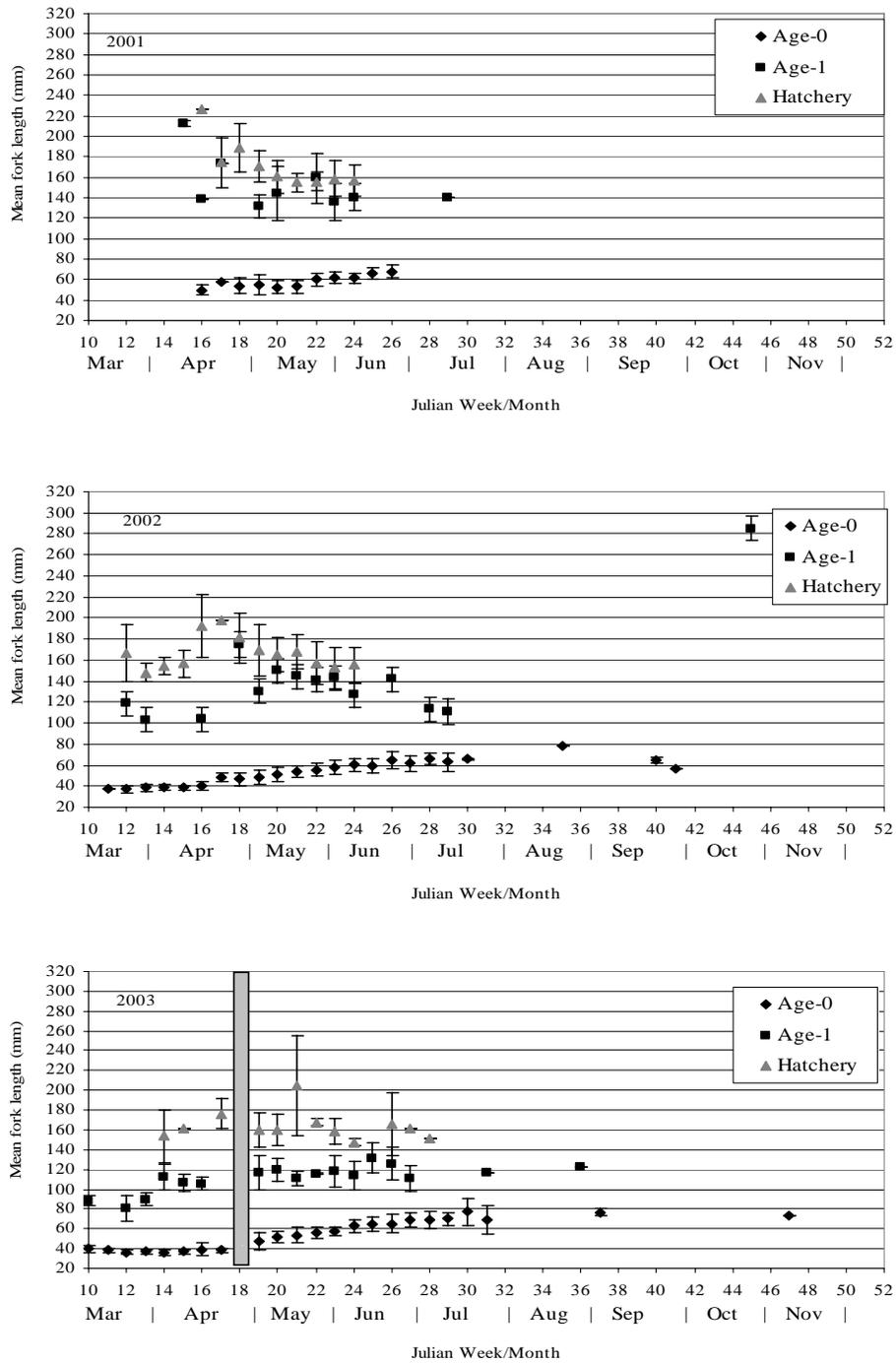


Figure 8. Weekly mean fork lengths for natural age-0, age-1 and hatchery coho salmon captured at the Trinity River rotary screw traps near Willow Creek (rkm 34), California, 2001-2005. Shaded blocks represent Julian Weeks when traps were not in operation. Error bars represent one standard deviation of the mean.

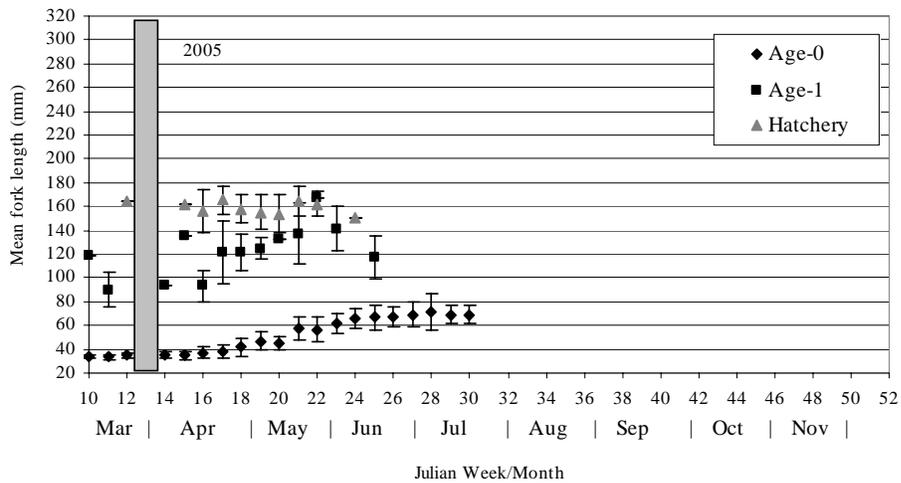
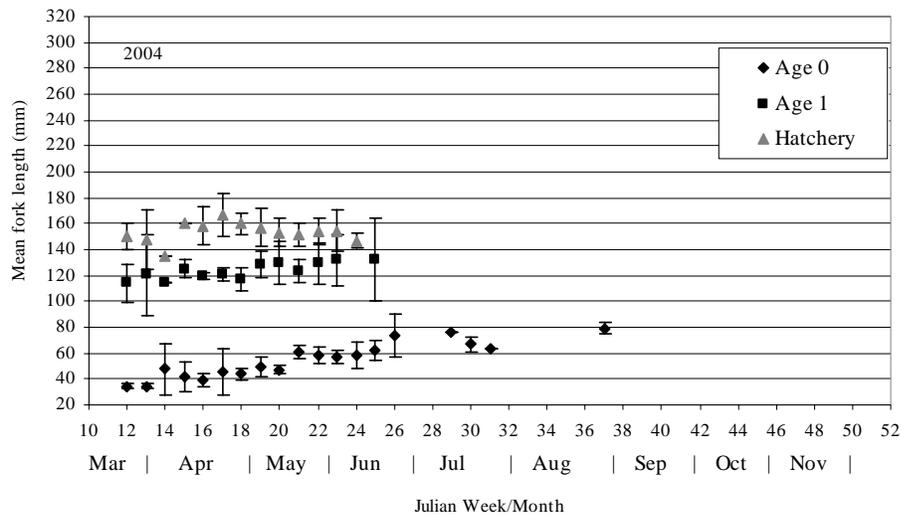


Figure 8 (continued). Weekly mean fork lengths for natural age-0, age-1 and hatchery coho salmon captured at the Trinity River rotary screw traps near Willow Creek (rkm 34), California, 2001-2005. Shaded blocks represent Julian Weeks when traps were not in operation. Error bars represent one standard deviation of the mean.

*Steelhead*

*2001*

Mean FL of age-0 steelhead generally increased over the 2001 sampling season (Figure 9; Appendix 25). Mean FL of natural age-1 steelhead increased then was relatively constant while natural age-2 steelhead mean FL generally decreased over the 2001 sampling season. Mean FL of hatchery age-1 steelhead was relatively constant.

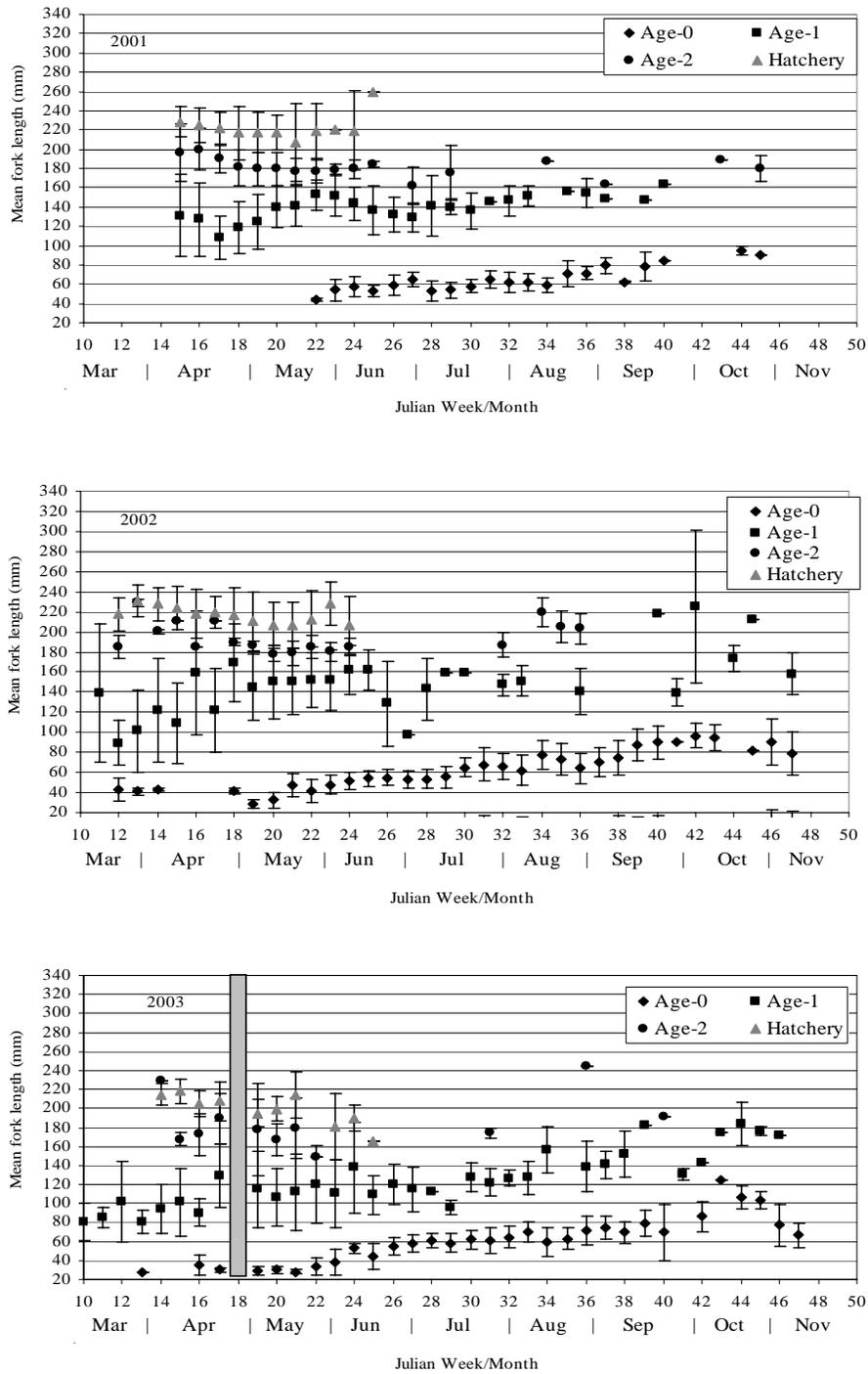


Figure 9. Weekly mean fork lengths for natural age-0, age-1, age-2, and hatchery steelhead captured at the Trinity River rotary screw traps near Willow Creek (rkm 34), California, 2001-2005. Shaded blocks represent Julian Weeks when traps were not in operation. Error bars represent one standard deviation of the mean.

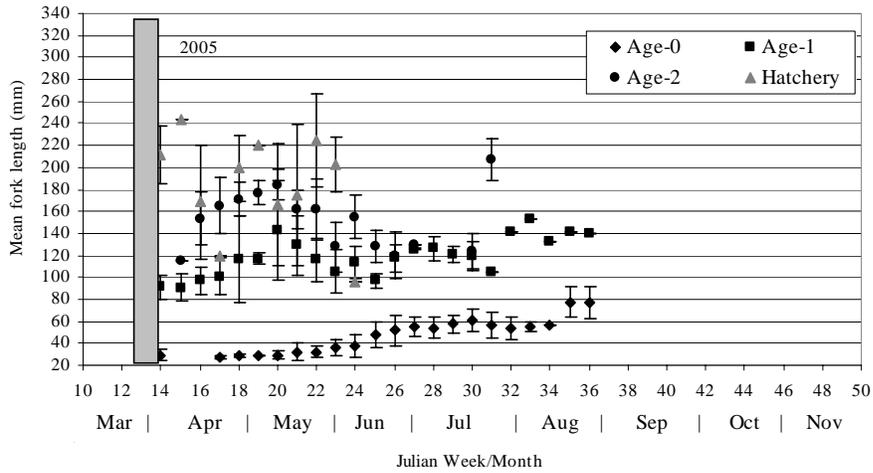
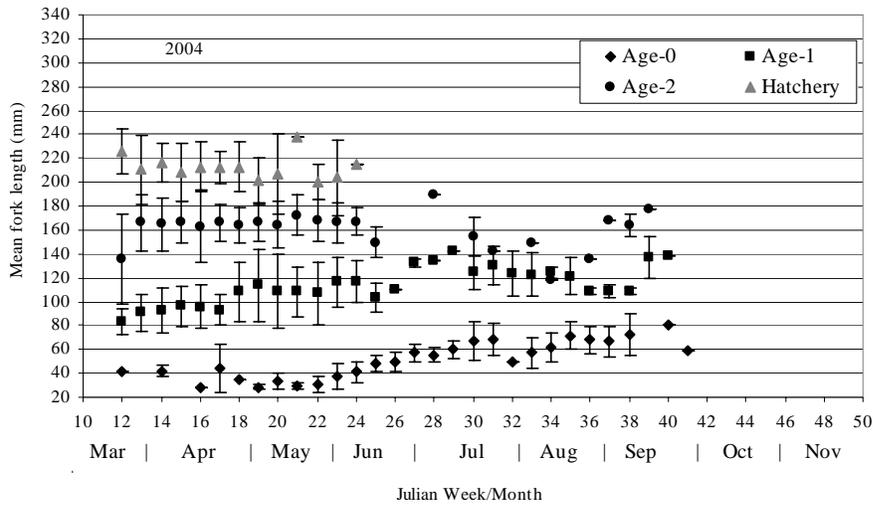


Figure 9 (continued). Weekly mean fork lengths for natural age-0, age-1, age-2, and hatchery steelhead captured at the Trinity River rotary screw traps near Willow Creek (rkm 34), California, 2001-2005. Shaded blocks represent Julian Weeks when traps were not in operation. Error bars represent one standard deviation of the mean.

### 2002

Mean FL of age-0 and natural age-1 steelhead generally increased over the 2002 sampling season (Figure 9; Appendix 26). Mean FL of hatchery age-1 and natural age-2 steelhead generally decreased over the 2002 sampling season.

2003

Mean FL of age-0 and natural age-1 steelhead generally increased over the 2003 sampling season while mean FL of hatchery age-1 steelhead generally decreased (Figure 9; Appendix 27). Mean FL of age-2 steelhead was highly variable with no obvious trend.

2004

Mean FL of age-0 and natural age-1 steelhead generally increased over the 2004 sampling season (Figure 9; Appendix 28). Mean FL of hatchery age-1 steelhead generally decreased while natural age-2 steelhead mean FL was relative constant over the 2004 sampling season.

2005

Mean FL of age-0 steelhead generally increased over the 2005 sampling season (Figure 9; Appendix 29). Mean FL of natural age-1 and age-2 steelhead generally increased through mid-May the gradually decreased. Not trend was observed in the mean FL of hatchery age-1 during the 2005 sampling season.

## **Summary/Discussion**

Juvenile salmonid emigration from the mainstem Trinity River has been monitored at the Willow Creek site since 1989 with rotary screw traps. This data series report summarizes the outmigrant monitoring data collected from 2001 through 2005 cooperatively by the Arcata Fish and Wildlife Office and Yurok Tribal Fisheries Program. It is intended that this information will provide basic biological information that can be used by managers to evaluate the effectiveness of habitat restoration efforts, especially the new flow regimes recommended in the Record of Decision, in restoring the fishery resources of the Trinity River. In addition to providing summarized information, topic specific information collected by this project and combined with data from other projects will be presented in separate technical reports.

### *Sampling Efforts*

The utilization of multiple traps beginning in 2002 has improved the ability to generate population estimates due to greater capture efficiency at the site and prevents the loss of catch data for a day if one trap has a flawed set, typically due to becoming clogged with debris. It is recommended that multiple traps continue to be utilized at the lower Trinity River trap site. While trapping operations have been refined to operate the traps at higher flows,  $>12,000 \text{ ft}^3/\text{s}$ , high and highly variable flows during the beginning of the trapping seasons create challenges in maintaining effective sampling. In 2003 and 2005 a week of

sampling was missed due to high flows and damaged trapping equipment. Missing sampling weeks during these years make it difficult to ascertain emigration timing and peaks.

In most years trapping efforts were initiated in early to mid-March with the exception of 2001, when trapping was initiated in the second week of April. To ensure that the early peak of the natural Chinook salmon emigration, as well as, the hatchery and natural coho salmon and steelhead smolt emigration is sufficiently sampled, efforts should be made to install the traps as early as possible. In some years, the traps were installed after the hatchery release of steelhead and coho salmon, precluding the estimation of emigration period duration and migration rate. In addition to potentially missing parts of the early juvenile salmonid emigration, it is important to initiate sampling as early as possible so that comparable data, especially similar time periods, are collected to allow between year comparisons in emigration timing (duration and peak) and abundance.

### *Salmonid Biological Information*

Chinook salmon were captured throughout the year with the spring emigration dominated by naturally produced fish, comprising 77% to 87% of the spring emigration based on abundance indices. From mid-August to early October very few Chinook salmon were captured. The fall emigration of Chinook salmon occurred over a fairly short period of time, with the peak typically lasting two to three weeks, and was composed of primarily hatchery produced fish (64% to 85%) except in 2003 (46%). Mean length of age-0 Chinook salmon generally increased throughout the spring monitoring period, remained fairly stably from mid-June through July, then gradually increased again. Evaluation of the data on the condition (length-weight) of Chinook salmon outmigrants will be presented in a separate report.

Natural and hatchery produced age-1 coho salmon generally emigrated through the lower Trinity River beginning in early March through early June. Emigration of age-1 coho salmon may occur earlier but trapping is typically initiated in early to mid-March. Based on abundance indices, the age-1 coho salmon emigration is composed of primarily hatchery produced fish, ranging from 58% to 89%. Age-0 coho salmon were captured at the Willow Creek trap site from March to the end of July except in 2001 when no coho salmon were captured after late June. Very few coho salmon of any age were captured after July or during the fall trapping season. While mean length of hatchery and natural age-1 coho salmon was variable within and between years, the mean length of hatchery produced age-1 coho was generally greater than 140mm. The mean length of naturally produced coho salmon was typically less than that of hatchery produced fish except in 2001 when they were generally similar. Mean length of age-0 coho salmon generally increased throughout the sampling season.

The steelhead population in the Trinity River is composed of both tributary and mainstem spawning and rearing populations that exhibit highly variable juvenile life history patterns. Steelhead, especially age-0 and age-1 natural steelhead, were generally

captured throughout the sampling season during all years, with peaks in abundance occurring during the spring portion of the sampling efforts. Age-0 steelhead were captured throughout the sampling season with peaks in abundance occurring in June through July. The majority of age-1 or older natural steelhead generally emigrated by mid-June while the majority of hatchery produced age-1 steelhead emigrated by mid-May. Steelhead mean length data was highly variable, most likely due to the various populations and races being sampled at the Willow Creek trapping site. Mean length of hatchery produced age-1 and age-2 steelhead generally decreased throughout the sampling season except in 2005. Mean length of age-0 and age-1 natural steelhead generally increased throughout the sampling season.

### *Chinook Salmon Population Estimation*

Since 2002, intensive mark-recapture efforts to estimate the size of the emigrating Chinook salmon population, as well as estimating the precision of these estimates, were incorporated into trapping operations. Previous efforts to implement mark-recapture techniques into the trapping efforts were limited due to lack of sufficient funding. Abundance indices based on catches and the proportion of flow sampled by the trap(s) have been the quantification method employed for many years (USFWS 1991, 1994, 1995, 1998, 1999, and 2001) and are generally thought to be adequate indicators of emigration timing and duration if sampling occurred in all weeks of the sampling period. A shortcoming of the abundance indices is that they do not provide a measure of the accuracy of the indices and make inter-year comparisons questionable. Mark-recapture efforts employed since 2002 indicate that precise population estimates can be obtained (95% confidence intervals ranging from +/- 8.9% to 54.9% of the estimate) depending on the proportion of the population marked (marking rate), and capture efficiency (recapture rate).

Low catches early in the sampling season precluded conducting mark-recapture efforts during these periods, therefore the generated estimates only represent times when mark-recapture efforts were conducted. Future efforts should explore the possibility of obtaining hatchery fish in sufficient numbers to estimate capture efficiency during periods when mark-recapture is not feasible. Estimating capture efficiency in periods of low catches would allow calculation of a complete spring season population estimate.

While the magnitude of abundance indices and mark-recapture population estimates are different, the data from 2002 through 2005 for similar time periods indicate that these two measures of population abundance are highly correlated ( $r=0.98$ ), suggesting that abundance indices may be an acceptable surrogate for population abundance. While the relationship between mark-recapture populations estimates and flow based abundance indices is very strong, a larger dataset is necessary to evaluate the strength of this relationship to determine if reducing or eliminating mark-recapture populations efforts is warranted. Additionally, the weakness of the abundance indices is that precision of the estimates cannot be assessed which limits the ability to make between year comparisons of populations estimates. At this time the only measure of coho salmon and steelhead

population size are the flow-based abundance indices. While the relationship between the Chinook salmon mark-recapture populations estimates and flow based abundance indices suggest that the indices may be an acceptable surrogate, it is unknown if this strong correlation applies to coho salmon and steelhead smolts. This is especially important for assessing the magnitude and emigration timing of coho salmon and steelhead populations because there are not sufficient numbers of these species captured to conduct mark-recapture efforts. Additional efforts are needed to assess how a mark-recapture based estimate correlates with a flow based abundance index for these two species.

#### *Future Efforts and Products*

The USFWS and YTFP, in cooperation with other TRRP partners, will continue to refine trapping efforts to provide salmonid outmigrant data for use in evaluating the effectiveness of restoration efforts in the Trinity River Basin. Additional reports that are currently under development from data collected by this project include: evaluating the accuracy and precision of population estimates, including addressing periods when mark-recapture techniques cannot be employed; evaluation of the relationship between mark-recapture population estimates and abundance indices; evaluation of outmigrant timing in relation to thermal regimes, and evaluation of outmigrant condition in relation to thermal regimes.

### **Acknowledgements**

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## Appendices

Appendix 1. Trinity River at Willow Creek, California weekly Chinook salmon catches and abundance indices, 2001. NC = no clip, AD = ad-clip.

Week Starting	Julian week	Mean Discharge	Trap-Days Sampled	Weekly Chinook Salmon Catch						Weekly Chinook Salmon Index Totals					
				Hatchery		Natural		Catch Total	Hatchery		Natural		Index Total		
				NC	AD	Age-0 NC	Age-1 NC		AD	Age-0 NC	Age-1 NC	AD			
04/09/01	15	2,366	3	0	0	93	0	0	93	0	0	5,355	0	0	5,355
04/16/01	16	2,514	4	0	0	194	0	0	194	0	0	11,827	0	0	11,827
04/23/01	17	3,665	4	0	0	255	0	0	255	0	0	20,388	0	0	20,388
04/30/01	18	2,559	4	0	0	269	0	0	269	0	0	22,404	0	0	22,404
05/07/01	19	3,526	4	0	0	89	0	0	89	0	0	6,939	0	0	6,939
05/14/01	20	3,809	4	0	0	548	0	0	548	0	0	44,100	0	0	44,100
05/21/01	21	3,069	4	0	0	703	0	0	703	0	0	50,925	0	0	50,925
05/28/01	22	2,504	7	0	0	2,412	1	0	2,413	0	0	90,857	38	0	90,895
06/04/01	23	1,930	7	19	6	2,716	0	0	2,741	520	166	78,212	0	0	78,898
06/11/01	24	1,495	7	1,344	429	6,088	0	0	7,861	31,150	9,945	141,261	0	0	182,356
06/18/01	25	1,152	7	2,694	860	4,594	0	0	8,148	52,462	16,749	83,359	0	0	152,570
06/25/01	26	1,298	7	1,497	478	3,126	0	0	5,101	31,664	10,109	56,576	0	0	98,349
07/02/01	27	942	7	442	141	2,652	0	0	3,235	7,069	2,257	41,678	0	0	51,004
07/09/01	28	846	7	116	37	1,446	0	0	1,599	1,664	531	20,766	0	0	22,961
07/16/01	29	800	7	97	31	1,072	0	0	1,200	1,471	469	14,149	0	0	16,089
07/23/01	30	732	6	47	15	688	0	0	750	905	289	9,554	0	0	10,748
07/30/01	31	700	7	25	8	243	0	0	276	337	108	3,373	0	0	3,818
08/06/01	32	673	7	19	6	306	0	0	331	214	68	3,571	0	0	3,853
08/13/01	33	648	6	13	4	99	0	0	116	155	50	1,318	0	0	1,523
08/20/01	34	653	6	0	0	150	0	0	150	0	0	1,985	0	0	1,985
08/27/01	35	878	3	0	0	38	0	0	38	0	0	1,062	0	0	1,062
09/03/01	36	605	4	6	2	25	0	0	33	115	37	476	0	0	628
09/10/01	37	626	4	0	0	52	0	0	52	0	0	1,003	0	0	1,003
09/17/01	38	611	4	0	0	36	0	0	36	0	0	684	0	0	684
09/24/01	39	695	4	0	0	67	0	0	67	0	0	1,372	0	0	1,372
10/01/01	40	669	2	30	10	0	0	0	40	1,067	340	200	0	0	1,607
10/08/01	41	658	1	21	7	2	0	0	30	1,650	527	154	0	0	2,331
10/15/01	42	568	2	18	6	2	0	0	26	481	153	336	0	0	970
10/22/01	43	520	3	13	6	0	0	0	19	357	114	0	0	0	471
10/29/01	44	717	4	21	7	7	0	0	35	481	154	165	0	0	800
11/05/01	45	591	1	0	0	1	0	0	1	0	0	77	0	0	77
Spring Total			134	6,318	2,017	27,962	1	0	36,298	127,726	40,778	713,194	38	0	881,736
Fall Total			13	104	36	11	0	0	151	4,036	1,288	932	0	0	6,256
Season Total			147	6,422	2,053	27,973	1	0	36,449	131,762	42,066	714,126	38	0	887,992

Appendix 2. Trinity River at Willow Creek, California weekly Chinook salmon catches and abundance indices, 2002. NC = no clip, AD = ad-clip.

Week Starting	Julian Week	Mean Discharge	Trap-Days Sampled	Weekly Chinook Salmon Catch					Weekly Chinook Salmon Indices				
				Hatchery		Natural		Catch Total	Hatchery		Natural		Index Total
				NC	AD	Age-0	Age-1		NC	AD	Age-0	Age-1	
03/12/02	11	5,275	4	0	0	73	3	76	0	0	4,378	179	4,557
03/19/02	12	4,804	12	0	0	162	1	163	0	0	4,513	32	4,545
03/26/02	13	4,541	14	0	0	199	1	200	0	0	4,319	22	4,341
04/02/02	14	5,209	14	0	0	244	0	244	0	0	6,089	0	6,089
04/09/02	15	4,913	14	0	0	290	0	290	0	0	7,279	0	7,279
04/16/02	16	3,753	14	0	0	1,424	0	1,424	0	0	27,409	0	27,409
04/23/02	17	3,177	13	0	0	692	1	693	0	0	13,411	18	13,429
04/30/02	18	6,271	13	0	0	1,012	1	1,013	0	0	30,552	59	30,611
05/07/02	19	6,543	12	0	0	814	0	814	0	0	45,169	0	45,169
05/14/02	20	4,833	13	0	0	2,094	0	2,094	0	0	64,713	0	64,713
05/21/02	21	3,743	14	0	0	1,098	0	1,098	0	0	23,050	0	23,050
05/28/02	22	3,330	13	0	0	677	0	677	0	0	13,482	0	13,482
06/04/02	23	2,473	14	482	154	3,757	1	4,394	3,048	973	52,762	12	56,795
06/11/02	24	1,966	14	4,420	1,411	4,499	0	10,330	33,795	10,790	77,713	0	122,298
06/18/02	25	1,590	14	4,031	1,287	2,678	0	7,996	46,690	14,906	33,694	0	95,290
06/25/02	26	1,287	14	3,398	1,085	5,820	0	10,303	25,768	8,227	47,640	0	81,635
07/02/02	27	1,071	14	1,322	422	4,295	0	6,039	5,190	1,657	34,316	0	41,163
07/09/02	28	964	14	783	250	3,374	0	4,407	4,826	1,541	20,611	0	26,978
07/16/02	29	859	13	276	88	962	0	1,326	1,401	447	7,060	0	8,908
07/23/02	30	810	12	103	33	473	0	609	662	212	3,250	0	4,124
07/30/02	31	754	13	34	11	112	0	157	89	28	814	0	931
08/06/02	32	734	13	38	12	56	0	106	174	56	360	0	590
08/13/02	33	675	13	31	10	114	0	155	159	51	715	0	925
08/20/02	34	670	13	19	6	180	0	205	84	27	1,035	0	1,146
08/27/02	35	654	10	34	11	123	0	168	227	73	826	0	1,126
09/03/02	36	659	11	13	4	49	0	66	54	17	424	0	495
09/10/02	37	640	14	22	7	33	0	62	94	30	283	0	407
09/17/02	38	622	14	9	3	27	0	39	17	5	182	0	204
09/24/02	39	598	11	3	1	2	0	6	18	6	11	0	35
10/01/02	40	628	13	9	3	89	0	101	39	12	568	0	619
10/08/02	41	623	14	1,215	403	95	0	1,713	5,193	1,658	8,596	0	15,447
10/15/02	42	554	14	5,936	1,968	88	0	7,992	26,917	8,925	3,256	0	39,098
10/22/02	43	512	14	471	156	52	0	679	1,720	570	1,149	0	3,439
10/29/02	44	526	12	635	212	0	0	847	3,141	1,042	648	0	4,831
11/05/02	45	636	5	103	34	28	0	165	1,488	494	566	0	2,548
11/12/02	46	1,138	4	9	3	22	0	34	214	71	537	0	822
11/19/02	47	927	3	12	4	5	0	21	326	108	182	0	616
Spring Total			367	15,019	4,795	35,332	8	55,154	122,297	39,045	526,060	322	687,724
Fall Total			72	8,389	2,783	380	0	11,552	39,039	12,879	15,502	0	67,420
Season Total			439	23,408	7,578	35,712	8	66,706	161,336	51,924	541,562	322	755,144

Appendix 3. Trinity River at Willow Creek, California weekly Chinook salmon catches and abundance indices, 2003. NC = no clip, AD = ad-clip.

Week Starting	Julian Week	Mean Discharge	Trap-Days Sampled	Weekly Chinook Salmon Catch					Weekly Chinook Salmon Indices				
				Hatchery		Natural		Catch Total	Hatchery		Natural		Index Total
			NC	AD	Age-0	Age-1	NC		AD	Age-0	Age-1		
03/05/03	10	3,484	5	0	0	242	0	242	0	0	14,157	0	14,157
03/12/03	11	9,111	1	0	0	109	0	109	0	0	32,732	0	32,732
03/19/03	12	7,370	4	0	0	44	0	44	0	0	5,531	0	5,531
03/26/03	13	10,561	2	0	0	23	0	23	0	0	9,405	0	9,405
04/02/03	14	6,844	7	0	0	95	0	95	0	0	8,263	0	8,263
04/09/03	15	7,419	8	0	0	162	1	163	0	0	23,391	49	23,440
04/16/03	16	7,117	13	0	0	201	0	201	0	0	10,863	105	10,968
04/23/03	17	12,080	4	0	0	66	0	66	0	0	12,891	0	12,891
04/30/03	18	16,271	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
05/07/03	19	10,401	10	0	0	248	2	250	0	0	31,328	220	31,548
05/14/03	20	8,457	13	0	0	231	8	239	0	0	14,157	607	14,764
05/21/03	21	7,489	13	0	0	37	0	37	0	0	2,365	0	2,365
05/28/03	22	6,397	12	0	0	19	3	22	0	0	971	248	1,219
06/04/03	23	5,463	13	3	1	62	0	66	0	0	2,515	0	2,515
06/11/03	24	4,339	14	336	108	216	1	661	5,222	1,676	9,302	27	16,227
06/18/03	25	3,851	13	935	300	389	1	1,625	17,535	5,629	17,186	24	40,374
06/25/03	26	3,451	13	869	279	479	0	1,627	9,611	3,085	19,240	0	31,936
07/02/03	27	3,154	14	882	283	401	0	1,566	9,565	3,071	15,089	0	27,725
07/09/03	28	2,546	14	595	191	442	0	1,228	5,932	1,904	10,353	0	18,189
07/16/03	29	1,559	14	249	80	419	0	748	2,030	652	6,636	0	9,318
07/23/03	30	1,143	13	174	56	425	0	655	1,763	566	5,898	0	8,227
07/30/03	31	1,118	14	72	23	171	0	266	638	205	1,782	0	2,625
08/06/03	32	1,049	13	28	9	91	0	128	230	74	887	0	1,191
08/13/03	33	931	9	9	3	42	0	54	74	24	784	0	882
08/20/03	34	1,023	10	6	2	44	0	52	88	28	619	0	735
08/27/03	35	1,741	10	0	0	14	0	14	0	0	167	0	167
09/03/03	36	1,566	14	16	5	2	0	23	51	16	166	0	233
09/10/03	37	1,408	14	3	1	17	0	21	33	11	178	0	222
09/17/03	38	816	14	0	0	32	0	32	0	0	230	0	230
09/24/03	39	706	14	3	1	38	0	42	26	8	320	0	355
10/01/03	40	710	14	1,089	359	66	0	1,514	3,330	1,098	3,904	0	8,332
10/08/03	41	730	14	1,640	541	79	0	2,260	4,149	1,368	6,736	0	12,253
10/15/03	42	658	11	245	82	0	0	327	1,147	378	1,142	0	2,667
10/22/03	43	583	12	497	164	57	0	718	2,351	775	2,105	0	5,231
10/29/03	44	604	14	653	239	0	0	892	475	156	4,375	0	5,006
11/05/03	45	935	11	60	21	0	0	81	727	240	579	0	1,545
11/12/03	46	1,005	13	12	4	12	0	28	181	60	177	0	417
11/19/03	47	919	4	4	6	0	0	10	79	26	375	0	480
Spring			312	4,181	1,342	4,760	16	10,299	52,799	16,949	257,406	1,281	328,435
Fall			93	4,200	1,416	214	0	5,830	12,437	4,102	19,393	0	35,932
Season Total			405	8,381	2,758	4,974	16	16,129	65,237	21,051	276,799	1,281	364,367

Appendix 4. Trinity River at Willow Creek, California weekly Chinook salmon catches and abundance indices, 2004. NC = no clip, AD = ad-clip.

Week Starting	Julian Week	Mean Discharge	Trap-Days Sampled	Weekly Chinook Salmon Catch					Weekly Chinook Salmon Indices				
				Hatchery		Natural		Catch	Hatchery		Natural		Index
				NC	AD	Age-0	Age-1	Total	NC	AD	Age-0	Age-1	Total
03/19/04	12	7,013	8	0	0	166	7	173	0	0	14,648	516	15,164
03/26/04	13	6,377	13	0	0	134	1	135	0	0	6,294	43	6,337
04/02/04	14	5,154	13	0	0	246	0	246	0	0	10,280	0	10,280
04/09/04	15	4,634	14	0	0	266	2	268	0	0	8,026	56	8,082
04/16/04	16	4,437	12	0	0	385	0	385	0	0	13,824	0	13,824
04/23/04	17	4,627	14	0	0	203	2	205	0	0	5,593	53	5,646
04/30/04	18	4,146	14	0	0	74	2	76	0	0	1,862	50	1,912
05/07/04	19	5,161	14	0	0	102	3	105	0	0	3,394	90	3,484
05/14/04	20	6,869	7	0	0	32	0	32	0	0	2,992	0	2,992
05/21/04	21	7,171	14	0	0	149	1	150	0	0	7,317	52	7,369
05/28/04	22	6,114	14	0	0	256	0	256	0	0	10,049	0	10,049
06/04/04	23	4,470	14	0	0	541	0	541	0	0	14,768	0	14,768
06/11/04	24	3,604	14	36	12	447	0	495	67	22	10,987	0	11,076
06/18/04	25	3,094	13	79	26	190	0	295	1,393	460	4,950	0	6,803
06/25/04	26	2,937	14	158	52	149	0	359	2,546	839	3,811	0	7,196
07/02/04	27	2,799	14	218	72	275	0	565	2,663	878	6,378	0	9,919
07/09/04	28	2,117	14	115	38	272	1	426	1,334	440	4,543	13	6,330
07/16/04	29	1,266	13	170	56	435	0	661	2,127	702	5,580	0	8,409
07/23/04	30	950	14	925	305	2,293	0	3,523	6,668	2,199	16,627	0	25,494
07/30/04	31	873	14	64	21	476	0	561	468	155	3,466	0	4,089
08/06/04	32	839	13	55	18	175	0	248	217	71	1,722	0	2,010
08/13/04	33	804	14	21	7	65	1	94	67	22	577	8	674
08/20/04	34	1,198	10	0	0	39	0	39	0	0	377	0	377
08/27/04	35	1,740	14	3	1	7	0	11	52	17	119	0	188
09/03/04	36	1,483	14	0	0	18	0	18	0	0	166	0	166
09/10/04	37	1,093	14	12	4	44	0	60	127	42	460	0	629
09/17/04	38	769	14	12	4	231	0	247	20	6	1,638	0	1,664
09/24/04	39	732	14	3	1	58	0	62	22	7	417	0	446
10/01/04	40	711	14	53	17	9	0	79	3,274	1,051	559	0	4,884
10/08/04	41	744	13	4,146	1,331	1,279	0	6,756	25,177	8,082	8,475	0	41,734
10/15/04	42	806	3	910	292	187	0	1,389	18,836	6,047	26,726	0	51,609
Spring			368	1,871	617	7,728	20	10,236	17,771	5,860	160,865	881	185,377
Fall			30	5,109	1,640	1,475	0	8,224	47,288	15,180	35,760	0	98,227
Season Total			398	6,980	2,257	9,203	20	18,460	65,058	21,040	196,625	881	283,604

Appendix 5. Trinity River at Willow Creek, California weekly Chinook salmon catches and abundance indices, 2005. NC = no clip, AD = ad-clip.

Week Starting	Julian Week	Mean Discharge	Trap-Days Sampled	Weekly Chinook Salmon Catch					Weekly Chinook Salmon Indices				
				Hatchery		Natural		Catch Total	Hatchery		Natural		Index Total
				NC	AD	Age-0	Age-1		NC	AD	Age-0	Age-1	
03/05/05	10	4,510	9	0	0	320	0	320	0	0	14,960	0	14,960
03/12/05	11	3,725	14	0	0	1,145	2	1,147	0	0	25,815	57	25,872
03/19/05	12	10,235	3	0	0	288	0	288	0	0	47,885	0	47,885
03/26/05	13	12,690	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
04/02/05	14	8,710	9	0	0	2,559	0	2,559	0	0	389,457	0	389,457
04/09/05	15	8,675	4	0	0	758	0	758	0	0	143,581	0	143,581
04/16/05	16	6,610	14	0	0	1,947	0	1,947	0	0	52,947	0	52,947
04/23/05	17	6,295	15	0	0	512	0	512	0	0	17,515	0	17,515
04/30/05	18	8,570	16	0	0	193	1	194	0	0	11,053	42	11,095
05/07/05	19	15,550	6	0	0	29	0	29	0	0	11,704	546	12,250
05/14/05	20	16,400	7	0	0	145	0	145	0	0	31,526	0	31,526
05/21/05	21	11,350	7	0	0	691	0	691	0	0	87,866	0	87,866
05/28/05	22	8,245	14	0	0	4,928	0	4,928	0	0	189,768	0	189,768
06/04/05	23	5,980	14	897	274	7,374	0	8,545	27,339	8,352	208,504	0	244,195
06/11/05	24	5,105	14	2,046	625	1,760	0	4,431	53,244	16,265	37,304	0	106,813
06/18/05	25	6,650	14	3,044	930	1,808	0	5,782	96,281	29,412	40,879	0	166,572
06/25/05	26	4,740	17	1,214	371	1,376	0	2,961	29,328	8,959	38,005	0	76,292
07/02/05	27	4,090	21	802	245	2,321	0	3,368	14,002	4,277	38,314	0	56,593
07/09/05	28	3,200	17	412	126	1,304	0	1,842	10,721	3,275	19,104	0	33,100
07/16/05	29	2,105	14	484	148	4,191	0	4,823	4,251	1,298	51,845	0	57,394
07/23/05	30	1,465	14	363	111	2,664	0	3,138	3,215	982	22,320	0	26,517
07/30/05	31	1,245	14	49	15	733	0	797	152	47	5,407	0	5,606
08/06/05	32	1,070	11	10	3	158	0	171	112	34	1,803	0	1,949
08/13/05	33	981	11	7	2	53	0	62	24	7	699	0	730
08/20/05	34	916	11	0	0	13	0	13	0	0	151	0	151
08/27/05	35	1,159	9	0	0	12	0	12	0	0	166	0	166
09/03/05	36	843	1	0	0	8	0	8	0	0	546	0	546
Spring			300	9,329	2,850	37,289	3	49,471	238,668	72,909	1,489,124	645	1,801,346
Fall			0	0	0	0	0	0	0	0	0	0	0
Season Total			300	9,329	2,850	37,289	3	49,471	238,668	72,909	1,489,124	645	1,801,346

Appendix 6. Trinity River at Willow Creek, California weekly coho salmon catch and abundance indices, 2001. R-MAX = right-maxillary clip.

Week Starting	Julian Week	Mean Discharge	Trap-Days Sampled	Weekly Coho Salmon Catches				Weekly Coho Salmon Indices			
				Hatchery R-MAX	Natural Age-0	Natural Age-1	Catch Total	Hatchery R-MAX	Natural Age-0	Natural Age-1	Index Total
04/09/01	15	2,366	3	0	0	2	2	0	0	116	116
04/16/01	16	2,514	4	1	3	1	5	63	184	63	310
04/23/01	17	3,665	4	13	1	1	15	1,131	86	87	1,304
04/30/01	18	2,559	4	5	3	0	8	424	252	0	676
05/07/01	19	3,526	4	50	4	4	58	3,885	310	311	4,506
05/14/01	20	3,809	4	193	9	31	233	16,111	746	2,588	19,445
05/21/01	21	3,069	4	4	12	0	16	303	882	0	1,185
05/28/01	22	2,504	7	33	53	2	88	1,237	1,975	75	3,287
06/04/01	23	1,930	7	8	25	4	37	238	754	119	1,111
06/11/01	24	1,495	7	7	20	7	34	170	466	170	806
06/18/01	25	1,152	7	0	13	0	13	0	248	0	248
06/25/01	26	1,298	7	0	7	0	7	0	140	0	140
07/02/01	27	942	7	0	0	0	0	0	0	0	0
07/09/01	28	846	7	0	0	0	0	0	0	0	0
07/16/01	29	800	7	0	0	1	1	0	0	13	13
07/23/01	30	732	6	0	0	0	0	0	0	0	0
07/30/01	31	700	7	0	0	0	0	0	0	0	0
08/06/01	32	673	7	0	0	0	0	0	0	0	0
08/13/01	33	648	6	0	0	0	0	0	0	0	0
08/20/01	34	653	6	0	0	0	0	0	0	0	0
08/27/01	35	878	3	0	0	0	0	0	0	0	0
09/03/01	36	605	4	0	0	0	0	0	0	0	0
09/10/01	37	626	4	0	0	0	0	0	0	0	0
09/17/01	38	611	4	0	0	0	0	0	0	0	0
09/23/01	39	695	4	0	0	0	0	0	0	0	0
10/01/01	40	669	2	0	0	0	0	0	0	0	0
10/08/01	41	658	1	0	0	0	0	0	0	0	0
10/15/01	42	568	2	0	0	0	0	0	0	0	0
10/22/01	43	520	3	0	0	0	0	0	0	0	0
10/29/01	44	717	4	0	0	0	0	0	0	0	0
11/05/01	45	591	1	0	0	0	0	0	0	0	0
Spring total			134	314	150	53	517	23,562	6,043	3,542	33,147
Fall total			13	0	0	0	0	0	0	0	0
Season Total			147	314	150	53	517	23,562	6,043	3,542	33,147

Appendix 7. Trinity River at Willow Creek, California weekly coho salmon catch and abundance indices, 2002. R-MAX = right-maxillary clip.

Week Starting	Julian Week	Mean Discharge	Trap-Days Sampled	Weekly Coho Salmon Catches				Weekly Coho Salmon Indices			
				Hatchery R-MAX	Natural Age-0	Natural Age-1	Catch Total	Hatchery R-MAX	Natural Age-0	Natural Age-1	Index Total
03/12/02	11	5,275	4	0	1	0	1	0	60	0	60
03/19/02	12	4,804	12	70	5	2	77	1,916	134	55	2,105
03/26/02	13	4,541	14	12	16	1	29	260	353	22	635
04/02/02	14	5,209	14	4	188	89	281	97	4,822	2,158	7,077
04/09/02	15	4,913	14	4	114	7	125	100	2,965	175	3,240
04/16/02	16	3,753	14	8	96	2	106	190	1,976	48	2,214
04/23/02	17	3,177	13	1	32	0	33	17	585	0	602
04/30/02	18	6,271	13	301	203	243	747	11,844	7,784	9,562	29,190
05/07/02	19	6,543	12	95	65	76	236	5,311	4,365	4,249	13,925
05/14/02	20	4,833	13	66	129	18	213	1,932	4,164	527	6,623
05/21/02	21	3,743	14	134	106	56	296	2,956	2,081	1,235	6,272
05/28/02	22	3,330	13	75	76	23	174	1,489	1,460	457	3,406
06/04/02	23	2,473	14	62	99	42	203	812	1,284	550	2,646
06/11/02	24	1,966	14	26	92	7	125	314	1,094	85	1,493
06/18/02	25	1,590	14	0	49	0	49	0	620	0	620
06/25/02	26	1,287	14	0	57	4	61	0	455	31	486
07/02/02	27	1,071	14	0	20	0	20	0	135	0	135
07/09/02	28	964	14	0	16	1	17	0	97	6	103
07/16/02	29	859	13	0	15	2	17	0	95	12	107
07/23/02	30	810	12	0	2	0	2	0	14	0	14
07/30/02	31	754	13	0	0	0	0	0	0	0	0
08/06/02	32	734	13	0	0	0	0	0	0	0	0
08/13/02	33	675	13	0	0	0	0	0	0	0	0
08/20/02	34	670	13	0	0	0	0	0	0	0	0
08/27/02	35	654	10	0	1	0	1	0	7	0	7
09/03/02	36	659	11	0	0	0	0	0	0	0	0
09/10/02	37	640	14	0	0	0	0	0	0	0	0
09/17/02	38	622	14	0	0	0	0	0	0	0	0
09/24/02	39	598	11	0	0	0	0	0	0	0	0
10/01/02	40	628	13	0	2	0	2	0	42	0	42
10/08/02	41	623	14	0	1	1	2	0	8	5	13
10/15/02	42	554	14	0	0	0	0	0	0	0	0
10/22/02	43	512	14	0	0	0	0	0	0	0	0
10/29/02	44	526	12	0	0	0	0	0	0	0	0
11/05/02	45	636	5	0	0	1	1	0	0	17	17
11/12/02	46	1,138	4	0	0	0	0	0	0	0	0
11/19/02	47	927	3	0	0	0	0	0	0	0	0
Spring total			371	858	1,382	573	2,813	27,238	34,550	19,170	80,958
Fall total			79	0	3	2	5	0	50	22	72
Season Total			450	858	1,385	575	2,818	27,238	34,600	19,192	81,030

Appendix 8. Trinity River at Willow Creek, California weekly coho salmon catch and abundance indices, 2003. R-MAX = right-maxillary clip.

Week Starting	Julian Week	Mean Discharge	Trap-Days Sampled	Weekly Coho Salmon Catches				Weekly Coho Salmon Indices			
				Hatchery R-MAX	Natural Age-0	Natural Age-1	Catch Total	Hatchery R-MAX	Natural Age-0	Natural Age-1	Index Total
03/05/03	10	3,484	5	0	2	4	6	0	123	231	354
03/12/03	11	9,111	1	0	2	0	2	0	602	0	602
03/19/03	12	7,370	4	0	31	2	33	0	3,822	270	4,092
03/26/03	13	10,561	2	0	55	2	57	0	21,053	1,082	22,135
04/02/03	14	6,844	7	7	191	3	201	584	16,888	250	17,722
04/09/03	15	7,419	8	1	44	13	58	86	6,647	1,118	7,851
04/16/03	16	7,117	13	0	45	2	47	0	2,525	104	2,629
04/23/03	17	12,080	4	7	17	0	24	1,170	4,026	0	5,196
04/30/03	18	16,271	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
05/07/03	19	10,401	10	62	12	18	92	9,541	2,043	2,770	14,354
05/14/03	20	8,457	13	51	17	23	91	3,114	1,101	1,404	5,619
05/21/03	21	7,489	13	2	25	13	40	111	1,793	722	2,626
05/28/03	22	6,397	12	2	13	2	17	124	858	124	1,106
06/04/03	23	5,463	13	3	15	8	26	121	564	323	1,008
06/11/03	24	4,339	14	2	37	9	48	47	981	212	1,240
06/18/03	25	3,851	13	0	29	4	33	0	696	100	796
06/25/03	26	3,451	13	2	29	9	40	37	638	167	842
07/02/03	27	3,154	14	1	24	3	28	18	429	54	501
07/09/03	28	2,546	14	1	33	0	34	14	479	0	493
07/16/03	29	1,559	14	0	14	0	14	0	174	0	174
07/23/03	30	1,143	13	0	13	0	13	0	177	0	177
07/30/03	31	1,118	14	0	4	1	5	0	39	10	49
08/06/03	32	1,049	13	0	1	0	1	0	9	0	9
08/13/03	33	931	9	0	0	0	0	0	0	0	0
08/20/03	34	1,023	10	0	0	0	0	0	0	0	0
08/27/03	35	1,741	10	0	3	0	3	0	58	0	58
09/03/03	36	1,566	14	0	0	1	1	0	0	9	9
09/10/03	37	1,408	14	0	4	0	4	0	36	0	36
09/17/03	38	816	14	0	0	0	0	0	0	0	0
09/24/03	39	706	14	0	0	0	0	0	0	0	0
10/01/03	40	710	14	0	0	0	0	0	0	0	0
10/08/03	41	730	14	0	0	0	0	0	0	0	0
10/15/03	42	658	11	0	0	0	0	0	0	0	0
10/22/03	43	583	12	0	0	0	0	0	0	0	0
10/29/03	44	604	14	0	0	0	0	0	0	0	0
11/05/03	45	935	11	0	0	0	0	0	0	0	0
11/12/03	46	1,005	13	0	0	0	0	0	0	0	0
11/19/03	47	919	4	0	1	0	1	0	21	0	21
Spring total			312	141	660	117	918	14,967	65,761	8,949	89,677
Fall total			93	0	1	0	1	0	21	0	21
Season Total			405	141	661	117	919	14,967	65,782	8,949	89,698

Appendix 9. Trinity River at Willow Creek, California weekly coho salmon catch and abundance indices, 2004. R-MAX = right-maxillary clip.

Week Starting	Julian Week	Mean Discharge	Trap-Days Sampled	Weekly Coho Salmon Catches				Weekly Coho Salmon Indices			
				Hatchery R-MAX	Natural Age-0	Natural Age-1	Catch Total	Hatchery R-MAX	Natural Age-0	Natural Age-1	Index Total
03/18/04	12	7,013	8	57	17	7	81	6,010	1,344	738	8,092
03/25/04	13	6,377	13	31	10	6	47	1,335	646	258	2,239
04/01/04	14	5,154	13	1	10	1	12	40	373	40	453
04/08/04	15	4,634	14	1	11	2	14	33	340	66	439
04/15/04	16	4,437	12	44	10	5	59	1,596	370	181	2,147
04/22/04	17	4,627	14	42	7	3	52	1,148	198	82	1,428
04/29/04	18	4,146	14	17	2	2	21	430	50	51	531
05/06/04	19	5,161	14	162	8	12	182	4,974	268	368	5,610
05/13/04	20	6,869	7	46	6	5	57	4,012	508	436	4,956
05/20/04	21	7,171	14	48	5	5	58	2,353	242	245	2,840
05/27/04	22	6,114	14	44	12	9	65	1,742	441	356	2,539
06/03/04	23	4,470	14	8	15	8	31	235	417	235	887
06/10/04	24	3,604	14	5	11	0	16	113	240	0	353
06/17/04	25	3,094	13	0	4	2	6	0	89	45	134
06/24/04	26	2,937	14	0	5	0	5	0	95	0	95
07/01/04	27	2,799	14	0	0	0	0	0	0	0	0
07/08/04	28	2,117	14	0	0	0	0	0	0	0	0
07/15/04	29	1,266	13	0	2	0	2	0	26	0	26
07/22/04	30	950	14	0	3	0	3	0	21	0	21
07/29/04	31	873	14	0	1	0	1	0	7	0	7
08/05/04	32	839	13	0	0	0	0	0	0	0	0
08/12/04	33	804	14	0	0	0	0	0	0	0	0
08/19/04	34	1,198	10	0	0	0	0	0	0	0	0
08/26/04	35	1,740	14	0	0	0	0	0	0	0	0
09/02/04	36	1,483	14	0	0	0	0	0	0	0	0
09/09/04	37	1,093	14	0	2	0	2	0	17	0	17
09/16/04	38	769	14	0	0	0	0	0	0	0	0
09/23/04	39	732	14	0	0	0	0	0	0	0	0
09/30/04	40	711	14	0	0	0	0	0	0	0	0
10/07/04	41	744	13	0	0	0	0	0	0	0	0
10/14/04	42	806	3	0	0	0	0	0	0	0	0
Spring total			374	506	141	67	714	24,021	5,692	3,102	32,815
Fall total			84	0	0	0	0	0	0	0	0
Season Total			458	506	141	67	714	24,021	5,692	3,102	32,815

Appendix 10. Trinity River at Willow Creek, California weekly coho salmon catch and abundance indices, 2005. R-MAX = right-maxillary clip.

Week Starting	Julian Week	Mean Discharge	Trap-Days Sampled	Weekly Coho Salmon Catches			Weekly Coho Salmon Indices			Index Total	
				Hatchery R-MAX	Natural Age-0	Natural Age-1	Catch Total	Hatchery R-MAX	Natural Age-0		Natural Age-1
03/05/05	10	4,510	9	0	256	1	257	0	15,958	37	15,995
03/12/05	11	3,725	14	0	160	7	167	0	3,576	161	3,737
03/19/05	12	10,235	3	1	167	0	168	271	42,826	0	43,097
03/26/05	13	12,690	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
04/02/05	14	8,710	9	11	313	1	325	1,871	47,042	152	49,065
04/09/05	15	8,675	4	1	57	1	59	231	10,224	231	10,686
04/16/05	16	6,610	14	5	76	2	83	112	2,308	45	2,465
04/23/05	17	6,295	15	57	76	4	137	1,982	3,987	139	6,108
04/30/05	18	8,570	16	136	77	18	231	8,488	4,239	1,123	13,850
05/07/05	19	15,550	6	64	13	5	82	16,893	5,180	1,320	23,393
05/14/05	20	16,400	7	13	10	1	24	3,045	3,000	234	6,279
05/21/05	21	11,350	7	15	17	5	37	2,352	2,020	784	5,156
05/28/05	22	8,245	14	13	89	1	103	564	3,460	43	4,067
06/04/05	23	5,980	14	0	151	2	153	0	4,446	57	4,503
06/11/05	24	5,105	14	1	91	0	92	25	2,214	0	2,239
06/18/05	25	6,650	14	0	49	2	51	0	1,416	54	1,470
06/25/05	26	4,740	17	0	46	0	46	0	1,214	0	1,214
07/02/05	27	4,090	21	0	51	1	52	0	730	13	743
07/09/05	28	3,200	17	0	19	0	19	0	324	0	324
07/16/05	29	2,105	14	0	31	0	31	0	377	0	377
07/23/05	30	1,465	14	0	11	0	11	0	77	0	77
07/30/05	31	1,245	14	0	0	0	0	0	0	0	0
08/06/05	32	1,070	11	0	0	0	0	0	0	0	0
08/13/05	33	981	11	0	0	0	0	0	0	0	0
08/20/05	34	916	11	0	0	0	0	0	0	0	0
08/27/05	35	1,159	9	0	0	0	0	0	0	0	0
09/03/05	36	843	1	0	0	0	0	0	0	0	0
Spring total			300	317	1,760	51	2,128	35,834	154,618	4,394	194,846
Fall total			0	0	0	0	0	0	0	0	0
Season Total			300	317	1,760	51	2,128	35,834	154,618	4,394	194,846

Appendix 11. Trinity River at Willow Creek, California weekly steelhead catch and abundance indices, 2001. AD = ad-clip.

Week Starting	Julian Week	Mean Discharge	Trap-Days Sampled	Steelhead Weekly Catch				Steelhead Weekly Abundance Indices					
				Hatchery AD	Natural Age-0	Natural Age-1	Natural Age-2	Catch Total	Hatchery AD	Natural Age-0	Natural Age-1	Natural Age-2	Index Total
04/09/01	15	2,366	3	113	0	30	16	159	6,577	0	1,754	910	9,241
04/16/01	16	2,514	4	156	3	106	44	309	9,506	184	6,451	2,601	18,742
04/23/01	17	3,665	4	30	0	22	25	77	2,387	0	1,757	2,025	6,169
04/30/01	18	2,559	4	30	0	28	34	92	2,499	0	2,338	2,735	7,572
05/07/01	19	3,526	4	24	1	8	39	72	1,848	75	621	3,028	5,572
05/14/01	20	3,809	4	19	1	46	61	127	1,594	84	3,763	5,000	10,441
05/21/01	21	3,069	4	8	3	29	52	92	578	226	2,118	3,808	6,730
05/28/01	22	2,504	7	14	3	29	55	101	520	113	1,027	2,061	3,721
06/04/01	23	1,930	7	1	7	17	21	46	33	197	494	602	1,326
06/11/01	24	1,495	7	4	17	19	17	57	96	384	446	414	1,340
06/18/01	25	1,152	7	1	44	17	2	64	18	811	313	38	1,180
06/25/01	26	1,298	7	0	23	13	0	36	0	456	265	0	721
07/02/01	27	942	7	0	14	3	2	19	0	221	46	32	299
07/09/01	28	846	7	0	9	2	0	11	0	128	29	0	157
07/16/01	29	800	7	0	9	5	2	16	0	123	68	26	217
07/23/01	30	732	6	0	16	6	0	22	0	231	86	0	317
07/30/01	31	700	7	0	4	1	0	5	0	56	14	0	70
08/06/01	32	673	7	0	5	3	0	8	0	58	33	0	91
08/13/01	33	648	6	0	9	3	0	12	0	117	39	0	156
08/20/01	34	653	6	0	7	0	1	8	0	93	0	14	107
08/27/01	35	878	3	0	13	1	0	14	0	378	26	0	404
09/03/01	36	605	4	0	3	3	0	6	0	58	56	0	114
09/10/01	37	626	4	0	6	1	1	8	0	116	19	19	154
09/17/01	38	611	4	0	2	0	0	2	0	39	0	0	39
09/24/01	39	695	4	0	4	1	0	5	0	81	21	0	102
10/01/01	40	669	2	0	1	1	0	2	0	39	39	0	78
10/08/01	41	658	1	0	0	0	0	0	0	0	0	0	0
10/15/01	42	568	2	0	0	0	0	0	0	0	0	0	0
10/22/01	43	520	3	0	0	0	1	1	0	0	0	26	26
10/29/01	44	717	4	0	2	0	0	2	0	46	0	0	46
11/05/01	45	591	1	0	1	0	2	3	0	77	0	161	238
Spring total			134	400	203	393	372	1,368	25,656	4,229	21,784	23,313	74,982
Fall total			13	0	4	1	3	8	0	162	39	187	388
Season Total			147	400	207	394	375	1,376	25,656	4,391	21,823	23,500	75,370

Appendix 12. Trinity River at Willow Creek, California weekly steelhead catch and abundance indices, 2002. AD = ad-clip.

Week Starting	Julian Week	Mean Discharge	Trap-Days Sampled	Steelhead Weekly Catch					Steelhead Weekly Abundance Indices				
				Hatchery AD	Natural Age-0	Natural Age-1	Natural Age-2	Catch Total	Hatchery AD	Natural Age-0	Natural Age-1	Natural Age-2	Index Total
03/12/02	11	5,275	4	0	0	3	0	3	0	0	176	0	176
03/19/02	12	4,804	12	7	2	16	6	31	204	50	462	144	860
03/26/02	13	4,541	14	65	9	31	1	106	1,428	198	676	22	2,324
04/02/02	14	5,209	14	113	7	34	7	161	2,816	181	839	180	4,016
04/09/02	15	4,913	14	103	1	14	9	127	2,591	25	349	205	3,170
04/16/02	16	3,753	14	177	0	58	9	244	3,602	0	1,332	173	5,107
04/23/02	17	3,177	13	100	0	31	4	135	1,789	0	557	72	2,418
04/30/02	18	6,271	13	113	4	34	10	161	3,616	153	1,186	286	5,241
05/07/02	19	6,543	12	18	56	18	31	123	930	3,463	939	1,632	6,964
05/14/02	20	4,833	13	19	49	44	8	120	571	1,640	1,291	222	3,724
05/21/02	21	3,743	14	19	14	52	10	95	393	286	1,036	196	1,911
05/28/02	22	3,330	13	16	71	37	5	129	347	1,304	691	97	2,439
06/04/02	23	2,473	14	15	213	90	15	333	194	2,756	1,168	199	4,317
06/11/02	24	1,966	14	7	385	37	9	438	84	4,572	441	108	5,205
06/18/02	25	1,590	14	0	310	48	0	358	0	3,762	590	0	4,352
06/25/02	26	1,287	14	0	432	6	0	438	0	3,427	46	0	3,473
07/02/02	27	1,071	14	0	307	7	0	314	0	2,075	47	0	2,122
07/09/02	28	964	14	0	230	4	0	234	0	1,403	24	0	1,427
07/16/02	29	859	13	0	52	1	0	53	0	341	6	0	347
07/23/02	30	810	12	0	31	3	0	34	0	195	18	0	213
07/30/02	31	754	13	0	29	0	0	29	0	166	0	0	166
08/06/02	32	734	13	0	93	2	1	96	0	495	11	5	511
08/13/02	33	675	13	0	30	3	0	33	0	174	17	0	191
08/20/02	34	670	13	0	30	0	1	31	0	183	0	5	188
08/27/02	35	654	10	0	17	0	1	18	0	116	0	7	123
09/03/02	36	659	11	0	51	3	1	55	0	387	22	10	419
09/10/02	37	640	14	0	44	1	0	45	0	202	5	0	207
09/17/02	38	622	14	0	21	0	0	21	0	108	0	0	108
09/24/02	39	598	11	0	3	0	0	3	0	15	0	0	15
10/01/02	40	628	13	0	58	1	0	59	0	379	0	0	379
10/08/02	41	623	14	0	11	2	0	13	0	56	16	0	72
10/15/02	42	554	14	0	2	3	0	5	0	10	18	0	28
10/22/02	43	512	14	0	2	0	0	2	0	10	0	0	10
10/29/02	44	526	12	0	0	2	0	2	0	0	12	0	12
11/05/02	45	636	5	0	1	1	0	2	0	17	36	0	53
11/12/02	46	1,138	4	0	14	0	0	14	0	390	0	0	390
11/19/02	47	927	3	0	4	3	0	7	0	119	91	0	210
Spring total			371	772	2,491	577	128	3,968	18,565	27,677	11,929	3,563	61,734
Fall total			79	0	92	12	0	104	0	981	173	0	1,154
Season Total			450	772	2,583	589	128	4,072	18,565	28,658	12,102	3,563	62,888

Appendix 13. Trinity River at Willow Creek, California weekly steelhead catch and abundance indices, 2003. AD = ad-clip.

Week Starting	Julian Week	Mean Discharge	Trap-Days Sampled	Steelhead Weekly Catch					Steelhead Weekly Abundance Indices				
				Hatchery AD	Age-0	Natural Age-1	Age-2	Catch Total	Hatchery AD	Age-0	Natural Age-1	Age-2	Index Total
03/05/03	10	3,484	5	0	0	4	0	4	0	0	238	0	238
03/12/03	11	9,111	1	0	0	5	1	6	0	0	1498	0	1,498
03/19/03	12	7,370	4	0	0	3	0	3	0	0	350	0	350
03/26/03	13	10,561	2	0	1	2	0	3	0	340	679	0	1,019
04/02/03	14	6,844	7	13	1	18	1	33	1,046	92	1,570	92	2,800
04/09/03	15	7,419	8	10	0	18	5	33	1,047	0	2,506	425	3,978
04/16/03	16	7,117	13	18	5	15	5	43	935	260	779	264	2,238
04/23/03	17	12,080	4	62	12	11	10	95	13,689	2,705	2,402	1,621	20,417
04/30/03	18	16,271	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
05/07/03	19	10,401	10	20	21	11	2	54	3,303	3,734	1,407	195	8,639
05/14/03	20	8,457	13	22	9	44	11	86	1,535	699	2,808	690	5,732
05/21/03	21	7,489	13	6	17	14	4	41	328	1,018	764	222	2,332
05/28/03	22	6,397	12	0	11	7	1	19	0	717	442	81	1,240
06/04/03	23	5,463	13	4	10	4	0	18	145	366	154	0	665
06/11/03	24	4,339	14	2	27	9	0	38	50	670	222	0	942
06/18/03	25	3,851	13	1	85	7	0	93	28	2,031	180	0	2,239
06/25/03	26	3,451	13	0	150	7	0	157	0	3,040	135	0	3,175
07/02/03	27	3,154	14	0	323	4	0	327	0	5,643	71	0	5,714
07/09/03	28	2,546	14	0	553	1	0	554	0	7,963	14	0	7,977
07/16/03	29	1,559	14	0	288	4	0	292	0	3,624	54	0	3,678
07/23/03	30	1,143	13	0	239	27	0	266	0	2,885	326	0	3,211
07/30/03	31	1,118	14	0	65	11	2	78	0	642	110	19	771
08/06/03	32	1,049	13	0	37	8	0	45	0	330	81	0	411
08/13/03	33	931	9	0	21	3	0	24	0	374	32	0	406
08/20/03	34	1,023	10	0	16	2	0	18	0	174	20	0	194
08/27/03	35	1,741	10	0	74	0	0	74	0	911	0	0	911
09/03/03	36	1,566	14	0	53	3	1	57	0	525	27	9	561
09/10/03	37	1,408	14	0	36	3	0	39	0	361	33	0	394
09/17/03	38	816	14	0	59	6	0	65	0	425	42	0	467
09/24/03	39	706	14	0	9	1	0	10	0	67	7	0	74
10/01/03	40	710	14	0	3	0	1	4	0	20	0	6	26
10/08/03	41	730	14	0	0	2	0	2	0	0	11	0	11
10/15/03	42	658	11	0	3	1	0	4	0	25	10	0	35
10/22/03	43	583	12	0	1	1	0	2	0	7	7	0	14
10/29/03	44	604	14	1	4	10	0	15	5	22	55	0	82
11/05/03	45	935	11	0	7	3	0	10	0	57	22	0	79
11/12/03	46	1,005	13	0	20	1	0	21	0	149	8	0	157
11/19/03	47	919	4	0	7	0	0	7	0	270	0	0	270
Spring total			312	158	2,122	252	43	2,575	22,106	39,596	16,951	3,618	82,271
Fall total			93	1	45	18	1	65	5	550	113	6	674
Season Total			405	159	2,167	270	44	2,640	22,111	40,146	17,064	3,624	82,945

Appendix 14. Trinity River at Willow Creek, California weekly steelhead catch and abundance indices, 2004. AD = ad-clip.

Week Starting	Julian Week	Mean Discharge	Trap-Days Sampled	Steelhead Weekly Catch				Steelhead Weekly Abundance Indices					
				Hatchery AD	Natural Age-0	Natural Age-1	Natural Age-2	Catch Total	Hatchery AD	Natural Age-0	Natural Age-1	Natural Age-2	Index Total
03/19/04	12	7,013	8	3	1	45	7	56	217	165	3922	285	4,589
03/26/04	13	6,377	13	59	0	118	31	208	2,519	0	5080	1246	8,845
04/02/04	14	5,154	13	28	3	69	29	129	1,026	168	2484	995	4,673
04/09/04	15	4,634	14	44	0	128	44	216	1,303	0	3819	1256	6,378
04/16/04	16	4,437	12	60	1	91	83	235	2,055	39	3110	2777	7,981
04/23/04	17	4,627	14	44	2	130	58	234	1,204	55	3531	1522	6,312
04/30/04	18	4,146	14	38	1	37	30	106	955	25	928	731	2,639
05/07/04	19	5,161	14	18	9	25	44	96	544	272	796	1358	2,970
05/14/04	20	6,869	7	9	3	12	17	41	728	218	1154	1368	3,468
05/21/04	21	7,171	14	1	5	30	24	60	46	250	1476	1163	2,935
05/28/04	22	6,114	14	7	6	14	19	46	271	241	538	750	1,800
06/04/04	23	4,470	14	5	33	22	19	79	139	882	594	504	2,119
06/11/04	24	3,604	14	1	37	21	7	66	23	828	474	137	1,462
06/18/04	25	3,094	13	0	30	5	7	42	0	732	111	162	1,005
06/25/04	26	2,937	14	0	22	2	0	24	0	439	39	0	478
07/02/04	27	2,799	14	0	12	2	0	14	0	238	35	0	273
07/09/04	28	2,117	14	0	51	1	1	53	0	748	13	17	778
07/16/04	29	1,266	13	0	22	1	0	23	0	283	12	0	295
07/23/04	30	950	14	1	53	37	4	95	7	384	267	28	686
07/30/04	31	873	14	0	5	10	1	16	0	36	74	7	117
08/06/04	32	839	13	0	2	3	0	5	0	16	24	0	40
08/13/04	33	804	14	0	4	5	1	10	0	29	36	7	72
08/20/04	34	1,198	10	0	3	3	1	7	0	42	27	8	77
08/27/04	35	1,740	14	0	25	2	0	27	0	267	22	0	289
09/03/04	36	1,483	14	0	8	4	1	13	0	74	36	9	119
09/10/04	37	1,093	14	0	20	5	1	26	0	167	43	9	219
09/17/04	38	769	14	0	13	3	3	19	0	89	20	20	129
09/24/04	39	732	14	0	0	3	2	5	0	0	21	7	28
10/01/04	40	711	14	0	1	1	0	2	0	7	7	0	14
10/08/04	41	744	13	0	2	0	0	2	0	13	0	0	13
10/15/04	42	806	3	0	0	0	0	0	0	0	0	0	0
Spring total			368	318	371	828	434	1,951	11,037	6,687	28,686	14,366	60,776
Fall total			30	0	3	1	0	4	0	20	7	0	27
Season Total			398	318	374	829	434	1,955	11,037	6,707	28,693	14,366	60,803

Appendix 15. Trinity River at Willow Creek, California weekly steelhead catch and abundance indices, 2005. AD = ad-clip.

Week Starting	Julian Week	Mean Discharge	Trap-Days Sampled	Steelhead Weekly Catch					Steelhead Weekly Abundance Indices				
				Hatchery AD	Natural Age-0	Natural Age-1	Natural Age-2	Catch Total	Hatchery AD	Natural Age-0	Natural Age-1	Natural Age-2	Index Total
03/05/05	10	4,510	9	0	1	45	1	47	0	37	2,210	33	2,280
03/12/05	11	3,725	14	0	0	140	7	147	0	0	3,053	118	3,171
03/19/05	12	10,235	3	0	0	20	0	20	0	0	2,226	0	2,226
03/26/05	13	12,690	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
04/02/05	14	8,710	9	10	8	54	0	72	1,533	1,034	7,233	0	9,800
04/09/05	15	8,675	4	4	24	8	1	37	665	2,898	1,922	231	5,716
04/16/05	16	6,610	14	16	88	36	4	144	380	2,103	901	101	3,485
04/23/05	17	6,295	15	45	84	27	9	165	1,530	2,857	927	267	5,581
04/30/05	18	8,570	16	28	40	17	7	92	1,368	2,659	973	564	5,564
05/07/05	19	15,550	6	6	2	7	4	19	2,987	546	4,349	1,638	9,520
05/14/05	20	16,400	7	11	15	8	3	37	2,522	4,365	1,580	483	8,950
05/21/05	21	11,350	7	3	10	12	9	34	352	1,230	2,054	1,358	4,994
05/28/05	22	8,245	14	5	35	25	6	71	231	1,325	997	285	2,838
06/04/05	23	5,980	14	2	18	20	4	44	52	552	633	106	1,343
06/11/05	24	5,105	14	1	16	21	5	43	23	396	511	118	1,048
06/18/05	25	6,650	14	0	18	4	2	24	0	535	115	65	715
06/25/05	26	4,740	17	1	33	4	2	40	27	838	101	51	1,017
07/02/05	27	4,090	21	0	57	3	1	61	0	886	38	12	936
07/09/05	28	3,200	17	0	55	1	0	56	0	1,003	15	0	1,018
07/16/05	29	2,105	14	0	90	1	0	91	0	1,106	10	0	1,116
07/23/05	30	1,465	14	0	173	2	3	178	0	1,527	14	43	1,584
07/30/05	31	1,245	14	2	44	1	1	48	14	301	6	7	328
08/06/05	32	1,070	11	0	17	1	0	18	0	215	0	0	215
08/13/05	33	981	11	0	2	1	0	3	0	25	8	0	33
08/20/05	34	916	11	0	2	1	0	3	0	15	14	0	29
08/27/05	35	1,159	9	0	4	0	0	4	0	73	0	0	73
09/03/05	36	843	1	0	4	1	0	5	0	273	70	0	343
Spring total			300	134	840	460	69	1,503	11,684	26,799	29,960	5,480	73,923
Season Total			300	134	840	460	69	1,503	11,684	26,799	29,960	5,480	73,923

Appendix 16. Trinity River at Willow Creek, California weekly Chinook salmon population estimates, 2002.

Julian	Smolts captured	recaps	mark released	pop size	Confidence Interval		
Week	$u_h^*$	$m_h$	$M_h$	$U_h$	95% LCL	95% UCL	$V(U_h)$
11	73	0	0	0	0	0	0
12	162	0	0	0	0	0	0
13	199	0	0	0	0	0	0
14	244	0	0	0	0	0	0
15	290	0	0	0	0	0	0
16	1,424	0	0	0	0	0	0
17	692	2	87	20,299	706	39,892	99,928,644
18	1,012	13	790	57,178	28,301	86,055	217,059,124
19	814	2	191	52,096	1,349	102,843	670,358,304
20	2,094	8	750	174,733	66,852	282,613	3,029,526,624
21	1,098	27	751	29,489	18,824	40,154	29,606,228
22	677	3	131	22,341	3,000	41,682	97,371,014
23	4,393	32	818	109,026	72,990	145,063	338,043,246
24	10,330	40	1,200	302,593	212,476	392,711	2,113,999,833
25	7,996	12	601	370,276	178,264	562,289	9,597,279,102
26	10,303	22	212	95,415	59,321	131,509	339,126,799
27	6,039	51	831	96,624	71,328	121,920	166,567,014
28	4,407	0	0	0	0	0	0
29	1,326	0	0	0	0	0	0
30	609	0	0	0	0	0	0
31	157	0	0	0	0	0	0
32	106	0	0	0	0	0	0
33	155	0	0	0	0	0	0
34	205	0	0	0	0	0	0
35	168	0	0	0	0	0	0
36	66	0	0	0	0	0	0
37	62	0	0	0	0	0	0
38	39	0	0	0	0	0	0
39	6	0	0	0	0	0	0
<b>Total:</b>	55,146	212	6,362				
<b>Stratified Estimator</b>				<b>1,330,070</b>	<b>1,076,791</b>	<b>1,583,349</b>	<b>16,698,865,933</b>

Note \* Smolts captured column does not include recaps.

Appendix 17. Trinity River at Willow Creek, California weekly Chinook salmon population estimates, 2003.

Julian Week	Smolts captured	recaps	mark released	pop size	Confidence Interval		V(U <sub>h</sub> )
	u <sub>h</sub> *	m <sub>h</sub>	M <sub>h</sub>	U <sub>h</sub>	95% LCL	95% UCL	
10	242	0	0	0	0	0	0
11	109	0	0	0	0	0	0
12	44	0	0	0	0	0	0
13	23	0	0	0	0	0	0
14	95	0	0	0	0	0	0
15	162	0	0	0	0	0	0
16	201	0	0	0	0	0	0
17	66	0	0	0	0	0	0
18	0	0	0	0	0	0	0
19	248	0	0	0	0	0	0
20	231	0	0	0	0	0	0
21	37	0	0	0	0	0	0
22	19	0	0	0	0	0	0
23	66	0	0	0	0	0	0
24	660	2	69	15,400	601	30,199	57,006,950
25	1,624	5	454	123,153	32,356	213,950	2,146,005,478
26	1,627	2	659	357,940	7,634	708,246	31,943,460,450
27	1,566	9	481	75,481	31,199	119,763	510,439,556
28	1,228	8	311	42,571	16,473	68,668	177,288,379
29	748	2	190	47,623	1,228	94,018	560,312,422
30	655	2	44	9,825	502	19,148	22,626,975
31	266	0	0	0	0	0	0
32	128	0	0	0	0	0	0
33	54	0	0	0	0	0	0
34	52	0	0	0	0	0	0
35	14	0	0	0	0	0	0
36	23	0	0	0	0	0	0
37	21	0	0	0	0	0	0
38	32	0	0	0	0	0	0
39	42	0	0	0	0	0	0
<b>Total:</b>	10,283	30	2,208				
	<b>Stratified Estimator</b>			<b>671,993</b>	<b>303,132</b>	<b>1,040,854</b>	<b>35,417,140,210</b>

Note \* Smolts captured column does not include recaps.

Appendix 18. Trinity River at Willow Creek, California weekly Chinook salmon population estimates, 2004.

Julian	Smolts captured	recaps	mark released	pop size	Confidence Interval		
Week	$u_h^*$	$m_h$	$M_h$	$U_h$	95% LCL	95% UCL	$V(U_h)$
12	166	0	0	0	0	0	0
13	134	1	87	5,896	-749	12,541	11,493,269
14	246	0	27	6,888	-2,505	16,281	22,968,036
15	266	1	80	10,773	-1,312	22,858	38,014,326
16	385	2	101	13,090	403	25,777	41,901,090
17	203	1	73	7,511	-914	15,936	18,477,060
18	74	0	40	3,034	-1,147	7,215	4,551,000
19	102	2	102	3,502	71	6,933	3,064,250
20	32	0	0	0	0	0	0
21	149	1	149	11,175	-1,470	23,820	41,623,150
22	256	2	230	19,712	408	39,016	97,002,752
23	541	5	513	46,346	12,025	80,667	306,627,345
24	495	2	302	49,995	1,096	98,894	622,437,750
25	295	2	131	12,980	341	25,619	41,581,430
26	359	2	221	26,566	600	52,532	175,508,279
27	565	3	150	21,329	2,817	39,840	89,200,032
28	425	2	324	46,042	971	91,112	528,773,194
29	661	3	441	73,041	9,115	136,966	1,063,725,322
30	3,523	2	61	72,809	3,174	142,443	1,262,223,180
31	561	0	0	0	0	0	0
32	248	0	0	0	0	0	0
33	93	0	0	0	0	0	0
34	39	0	0	0	0	0	0
35	11	0	0	0	0	0	0
36	18	0	0	0	0	0	0
37	60	0	0	0	0	0	0
38	247	0	0	0	0	0	0
39	62	0	0	0	0	0	0
<b>Total:</b>	10,216	31	3,032				
<b>Stratified Estimator</b>				<b>430,687</b>	<b>302,839</b>	<b>558,536</b>	<b>4,254,794,744</b>

Appendix 19. Trinity River at Willow Creek, California weekly Chinook salmon population estimates, 2005.

Julian	Smolts captured	recaps	mark released	pop size	Confidence Interval		
Week	$u_h^*$	$m_h$	$M_h$	$U_h$	95% LCL	95% UCL	$V(U_h)$
10	320			0	0	0	0
11	1145			0	0	0	0
12	288			0	0	0	0
13	N/A			0	0	0	0
14	2559	13	1233	225558	111749	339366	3371613096
15	758	3	712	135114	16703	253524	3649807464
16	1947	40	1459	69332	48444	90221	113579663.8
17	512	9	512	26266	10746	41785	62695032.09
18	193	0	186	36091	-13924	86106	651153822
19	29	0	29	870	-336	2076	378450
20	145	0	0	0	0	0	0
21	691	3	621	107451	13298	201603	2307553213
22	4928	46	2959	310359	222844	397875	1993696409
23	8545	146	8443	490843	411783	569904	1627064294
24	4431	61	4449	318031	239503	396560	1605243315
25	5782	69	5067	418617	321334	515900	2463546897
26	2961	72	2484	100796	77892	123699	136546395.5
27	3368	174	2743	52810	45067	60553	15606398.11
28	1842			0	0	0	0
29	4823			0	0	0	0
30	3138			0	0	0	0
31	797			0	0	0	0
32	171			0	0	0	0
33	62			0	0	0	0
34	13			0	0	0	0
35	12			0	0	0	0
36	8			0	0	0	0
<b>Total:</b>	49468	636	30897				
	<b>Stratified Estimator</b>			<b>2292137</b>	<b>2087850</b>	<b>2496424</b>	<b>10863484226</b>

Note \* Smolts captured column does not include recaps.

Appendix 20. Trinity River at Willow Creek, California weekly Chinook salmon and coho salmon mean fork lengths, 2001. SD = one standard deviation of the mean.

Week Starting	Julian Week	Chinook Salmon*										Natural Coho Salmon						Hatchery Coho Salmon									
		n	X	Age-0			Age-1				n	X	Age-0			Age-1			n	X	Age-1						
				min	max	SD	n	X	min	max	SD	n	X	min	max	SD	n	X	min	max	SD	n	X	min	max	SD	
03/05/01	10																										
03/12/01	11																										
03/19/00	12																										
03/26/01	13																										
04/02/01	14																										
04/09/01	15	83	45	37	75	9.12	0	0	0	0	----	0	0	0	0	----	2	212	210	214	2.83	0	0	0	0	----	
04/16/01	16	100	49	37	85	11.66	0	0	0	0	----	3	50	45	55	5.00	1	138	138	138	----	1	227	227	227	----	
04/23/01	17	120	45	38	73	7.00	0	0	0	0	----	1	58	58	58	----	1	173	173	173	----	13	175	115	218	24.45	
04/30/01	18	120	55	39	82	9.36	0	0	0	0	----	3	54	48	63	7.94	0	0	0	0	----	5	188	164	223	23.86	
05/07/01	19	74	52	39	88	8.02	0	0	0	0	----	4	55	44	63	9.56	4	132	120	145	11.17	50	171	131	222	15.56	
05/14/01	20	120	57	36	89	8.91	0	0	0	0	----	9	53	38	62	6.80	8	145	120	185	26.26	119	160	113	216	15.83	
05/21/01	21	120	64	45	108	9.79	0	0	0	0	----	10	53	44	61	5.93	0	0	0	0	----	4	155	144	167	9.42	
05/28/01	22	210	67	45	107	11.86	1	136	136	136	----	53	60	45	79	6.09	2	159	142	176	24.04	33	156	136	174	8.95	
06/04/01	23	215	73	46	114	13.99	0	0	0	0	----	25	62	52	74	5.81	4	136	115	157	18.21	8	159	140	196	17.24	
06/11/01	24	251	85	44	121	17.49	0	0	0	0	----	20	61	53	70	4.56	6	140	125	158	13.15	7	156	127	173	15.57	
06/18/01	25	228	87	45	120	13.95	0	0	0	0	----	13	65	54	72	5.49	0	0	0	0	----	0	0	0	0	----	
06/25/01	26	227	86	43	117	13.81	0	0	0	0	----	7	68	60	75	6.55	0	0	0	0	----	0	0	0	0	----	
07/02/01	27	229	83	49	117	10.92	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	
07/09/01	28	233	82	54	102	8.45	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	
07/16/01	29	230	83	49	107	8.81	0	0	0	0	----	0	0	0	0	----	1	140	140	140	----	0	0	0	0	----	
07/23/01	30	193	84	63	102	7.70	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	
07/30/01	31	178	84	55	102	8.81	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	
08/06/01	32	200	88	57	107	8.18	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	
08/13/01	33	115	88	48	109	9.96	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	
08/20/01	34	133	88	47	107	11.42	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	
08/27/01	35	38	91	73	111	10.50	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	
09/03/01	36	33	92	55	106	10.90	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	
09/10/01	37	52	86	50	107	18.02	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	
09/17/01	38	36	86	54	109	20.56	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	
09/23/01	39	66	69	52	111	16.47	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	
10/01/01	40	34	135	63	175	28.09	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	
10/08/01	41	30	134	51	160	28.53	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	
10/15/01	42	25	150	132	167	8.86	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	
10/22/01	43	19	134	56	178	31.78	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	
10/29/01	44	35	119	55	165	36.08	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	
11/05/01	45	1	153	153	153	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	
11/12/01	46	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	
11/19/01	47	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	
11/26/01	48	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	
12/03/01	49	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	
Spring Totals		3,604	62	0	121	----	1	5	0	136	----	148	21	0	79	----	29	46	0	214	----	240	52	0	227	----	
Fall Totals		144	83	0	178	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	
Season Totals		0	0	0	0	----	0	0	0	0	----	148	60	38	79	7.05	29	147	115	214	25.97	240	163	113	227	17.41	

\* Includes Hatchery Releases

Appendix 21. Trinity River at Willow Creek, California weekly Chinook salmon and coho salmon mean fork lengths, 2002. SD = one standard deviation of the mean.

Week Starting	Julian Week	Chinook Salmon*										Natural Coho Salmon										Hatchery Coho Salmon					
		Age-0					Age-1					Age-0					Age-1					Age-1					
		n	X	min	max	SD	n	X	min	max	SD	n	X	min	max	SD	n	X	min	max	SD	n	X	min	max	SD	
03/05/02	10																										
03/12/02	11	73	39	29	56	3.92	3	98	84	112	14.01	1	38	38	38	----	0	0	0	0	----	0	0	0	0	----	
03/19/02	12	147	42	34	61	4.48	1	140	140	140	----	5	37	33	40	3.03	1	119	119	119	----	70	167	73	246	26.73	
03/26/02	13	197	42	32	71	4.94	1	119	119	119	----	16	39	35	49	3.28	1	103	103	103	----	11	148	136	163	9.21	
04/02/02	14	200	43	25	69	5.89	0	0	0	0	----	188	39	34	48	2.60	0	0	0	0	----	4	155	143	162	8.35	
04/09/02	15	194	47	31	75	8.45	0	0	0	0	----	114	38	34	47	2.61	0	0	0	0	----	4	157	146	175	12.87	
04/16/02	16	412	56	36	76	8.92	0	0	0	0	----	96	41	34	50	3.90	2	104	94	114	14.14	8	193	134	235	30.12	
04/23/02	17	287	60	38	87	9.84	1	126	126	126	----	32	48	40	57	4.26	0	0	0	0	----	1	198	198	198	----	
04/30/02	18	331	59	33	87	10.91	1	219	219	219	----	202	47	28	62	6.19	19	175	115	224	28.07	186	181	135	286	24.01	
05/07/02	19	302	60	35	90	11.00	0	0	0	0	----	65	49	33	61	7.19	14	130	102	172	22.71	95	170	115	275	24.66	
05/14/02	20	390	64	38	98	9.21	0	0	0	0	----	128	52	32	75	6.82	18	150	115	189	23.98	66	165	120	210	16.08	
05/21/02	21	384	68	45	110	11.50	0	0	0	0	----	106	54	37	65	5.85	29	144	109	185	20.34	104	168	139	220	16.12	
05/28/02	22	288	77	44	114	13.22	0	0	0	0	----	68	56	35	66	6.31	23	141	111	184	17.59	74	157	103	221	20.18	
06/04/02	23	430	85	45	130	12.60	1	158	158	158	----	96	57	40	71	6.84	34	143	99	210	26.38	62	152	100	192	19.17	
06/11/02	24	435	93	46	125	13.97	0	0	0	0	----	90	60	46	79	6.00	7	127	115	154	13.67	26	155	116	188	16.78	
06/18/02	25	426	88	46	118	12.54	0	0	0	0	----	49	59	45	76	6.72	0	0	0	0	----	0	0	0	0	----	
06/25/02	26	433	84	56	119	10.53	0	0	0	0	----	55	64	50	90	8.02	3	142	136	151	7.94	0	0	0	0	----	
07/02/02	27	430	79	43	113	9.91	0	0	0	0	----	20	62	48	74	7.80	0	0	0	0	----	0	0	0	0	----	
07/09/02	28	450	81	55	119	9.31	0	0	0	0	----	16	66	58	76	5.28	1	113	113	113	----	0	0	0	0	----	
07/16/02	29	408	82	60	112	8.86	0	0	0	0	----	15	63	39	76	8.73	2	111	110	112	1.41	0	0	0	0	----	
07/23/02	30	355	84	59	109	7.67	0	0	0	0	----	2	66	65	66	0.71	0	0	0	0	----	0	0	0	0	----	
07/30/02	31	148	86	38	107	8.85	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	
08/06/02	32	106	88	48	118	11.80	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	
08/13/02	33	141	93	77	111	6.47	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	
08/20/02	34	189	95	52	110	8.25	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	
08/27/02	35	159	97	48	114	9.09	0	0	0	0	----	1	78	78	78	----	0	0	0	0	----	0	0	0	0	----	
09/03/02	36	64	98	69	130	9.64	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	
09/10/02	37	61	96	54	136	13.69	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	
09/17/02	38	39	97	52	115	18.47	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	
09/23/02	39	6	110	101	120	8.21	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	
10/01/02	40	100	104	54	131	17.50	0	0	0	0	----	2	65	63	67	2.83	0	0	0	0	----	0	0	0	0	----	
10/08/02	41	118	122	51	166	23.04	0	0	0	0	----	1	56	56	56	----	0	0	0	0	----	0	0	0	0	----	
10/15/02	42	345	141	84	180	12.61	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	
10/22/02	43	242	139	56	179	14.59	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	
10/29/02	44	221	141	61	186	15.00	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	
11/05/02	45	77	139	99	176	15.00	0	0	0	0	----	0	0	0	0	----	1	285	285	285	----	0	0	0	0	----	
11/12/02	46	33	120	50	179	34.15	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	
11/19/02	47	21	128	63	174	30.77	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	
11/26/02	48	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	
12/03/02	49	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	
Spring Totals		7,485	73	0	136	----	8	29	0	219	----	1,365	37	0	90	----	154	57	0	224	----	711	72	0	286	----	
Fall Totals		1,157	103	0	186	----	0	0	0	0	----	3	12	0	67	----	1	29	0	285	----	0	0	0	0	----	
Season Totals		0	0	0	0	----	0	0	0	0	----	1368	49	28	90	10.16	155	145	94	285	28.52	711	168	73	286	23.61	

\* Includes Hatchery Releases

Appendix 22. Trinity River at Willow Creek, California weekly Chinook salmon and coho salmon mean fork lengths, 2003. SD = one standard deviation of the mean.

Week Starting	Julian Week	Chinook Salmon*										Natural Coho Salmon						Hatchery Coho Salmon								
		Age-0					Age-1					Age-0			Age-1			Age-1								
		n	X	min	max	SD	n	X	min	max	SD	n	X	min	max	SD	n	X	min	max	SD	n	X	min	max	SD
03/05/03	10	140	40	33	51	2.59	0	0	0	0	----	2	40	37	42	3.54	4	88	81	92	4.92	0	0	0	0	----
03/12/03	11	30	41	35	45	2.11	0	0	0	0	----	2	39	37	40	2.12	0	0	0	0	----	0	0	0	0	----
03/19/03	12	44	44	33	58	6.04	0	0	0	0	----	31	36	31	40	1.96	2	81	72	90	12.73	0	0	0	0	----
03/26/03	13	23	40	37	44	2.16	0	0	0	0	----	35	37	30	40	1.92	2	90	85	94	6.36	0	0	0	0	----
04/02/03	14	95	44	32	71	7.15	0	0	0	0	----	141	36	32	57	2.74	3	113	105	128	13.00	7	153	116	204	27.17
04/09/03	15	120	42	36	75	6.75	1	114	114	114	----	44	37	33	42	2.03	2	106	100	112	8.49	1	161	161	161	----
04/16/03	16	201	48	35	113	11.37	0	0	0	0	----	45	39	32	72	6.70	2	106	101	110	6.36	0	0	0	0	----
04/23/03	17	66	47	36	76	11.90	0	0	0	0	----	17	38	33	43	2.33	0	0	0	0	----	7	176	160	206	15.36
04/30/03	18	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
05/07/03	19	217	61	39	118	12.47	2	159	155	163	5.66	12	47	36	63	8.46	18	116	95	160	17.65	62	160	132	221	17.05
05/14/03	20	214	65	39	118	12.69	8	155	122	176	15.56	18	52	43	61	5.30	23	120	96	151	11.73	51	160	114	202	15.93
05/21/03	21	37	64	40	116	17.92	0	0	0	0	----	25	53	40	72	7.72	12	110	101	125	7.22	2	205	169	240	50.20
05/28/03	22	15	70	44	115	22.04	4	161	137	193	24.22	12	56	42	65	6.38	2	116	115	116	0.71	2	168	165	170	3.54
06/04/03	23	66	90	50	119	15.61	0	0	0	0	----	14	57	51	65	4.31	8	118	97	141	15.31	3	158	145	170	12.58
06/11/03	24	288	94	52	119	12.95	1	129	129	129	----	41	63	50	80	6.76	9	114	98	137	14.99	2	148	145	150	3.54
06/18/03	25	355	88	58	111	9.06	1	121	121	121	----	29	65	52	80	7.77	4	131	121	154	15.31	0	0	0	0	----
06/25/03	26	295	87	52	109	7.12	0	0	0	0	----	29	65	40	87	9.84	9	126	100	157	16.65	2	166	143	188	31.82
07/02/03	27	336	86	58	112	6.40	0	0	0	0	----	24	69	56	86	7.21	3	111	99	125	13.05	1	162	162	162	----
07/09/03	28	356	87	49	113	6.87	0	0	0	0	----	33	69	45	95	8.47	0	0	0	0	----	1	151	151	151	----
07/16/03	29	368	89	65	114	6.24	0	0	0	0	----	14	70	58	80	6.67	0	0	0	0	----	0	0	0	0	----
07/23/03	30	310	86	57	104	7.38	0	0	0	0	----	13	77	57	107	13.41	0	0	0	0	----	0	0	0	0	----
07/30/03	31	221	88	71	115	6.54	0	0	0	0	----	3	69	56	84	14.05	1	116	116	116	----	0	0	0	0	----
08/06/03	32	123	91	41	115	8.72	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----
08/13/03	33	53	95	72	116	7.29	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----
08/20/03	34	52	97	82	115	7.36	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----
08/27/03	35	10	102	81	115	9.03	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----
09/03/03	36	23	109	98	122	5.43	0	0	0	0	----	0	0	0	0	----	1	122	122	122	----	0	0	0	0	----
09/10/03	37	20	115	104	128	6.06	0	0	0	0	----	4	77	72	80	3.59	0	0	0	0	----	0	0	0	0	----
09/17/03	38	31	121	106	142	8.88	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----
09/23/03	39	42	115	71	130	9.26	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----
10/01/03	40	113	135	103	166	12.15	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----
10/08/03	41	225	140	109	176	11.21	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----
10/15/03	42	168	139	98	170	10.84	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----
10/22/03	43	168	139	115	170	10.23	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----
10/29/03	44	216	138	100	172	12.29	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----
11/05/03	45	52	141	110	172	12.09	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----
11/12/03	46	27	145	111	169	11.82	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----
11/19/03	47	10	152	140	163	8.36	0	0	0	0	----	1	73	73	73	----	0	0	0	0	----	0	0	0	0	----
11/26/03	48	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----
12/03/03	49	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----
Spring Totals		4,151	75	0	142	----	17	28	0	193	----	588	40	0	107	----	105	63	0	160	----	141	66	0	240	----
Fall Totals		979	113	0	176	----	0	0	0	0	----	1	7	0	73	----	0	0	0	0	----	0	0	0	0	----
Season Totals		0	0	0	0	----	0	0	0	0	----	589	49	30	107	15.19	105	115	72	160	15.91	141	161	114	240	18.25

\* Includes Hatchery Releases

Appendix 23. Trinity River at Willow Creek, California weekly Chinook salmon and coho salmon mean fork lengths, 2004. SD = one standard deviation of the mean.

Week Starting	Julian Week	Chinook Salmon*										Natural Coho Salmon						Hatchery Coho Salmon								
		n	X	Age-0			Age-1				n	X	Age-0			Age-1			n	X	Age-1					
				min	max	SD	n	X	min	max	SD	n	X	min	max	SD	n	X	min	max	SD	n	X	min	max	SD
03/05/04	10																									
03/12/04	11																									
03/19/04	12	101	40	34	74	4.90	7	150	129	177	18.69	6	35	32	36	1.52	7	114	90	135	14.40	57	150	132	189	10.23
03/26/04	13	133	40	32	74	5.28	1	119	119	119	----	10	34	32	39	1.99	6	120	100	184	31.66	32	148	100	242	23.41
04/02/04	14	187	40	34	67	3.50	0	0	0	0	----	10	48	34	87	20.10	1	114	114	114	----	1	135	135	135	----
04/09/04	15	194	40	32	67	5.36	2	119	103	134	21.92	11	42	33	75	11.63	2	125	120	130	7.07	1	160	160	160	----
04/16/04	16	209	44	35	70	8.43	0	0	0	0	----	10	39	35	49	4.92	5	119	115	122	2.97	44	158	136	199	14.26
04/23/04	17	167	42	34	76	6.87	2	186	130	242	79.20	7	46	35	85	17.67	3	121	117	126	4.73	42	167	142	230	16.99
04/30/04	18	72	46	38	81	9.13	2	173	160	185	17.68	2	44	41	47	4.24	2	117	111	123	8.49	17	160	148	173	7.80
05/07/04	19	103	50	37	72	7.09	3	125	120	130	5.03	8	50	37	59	7.41	12	129	108	147	10.26	96	157	121	229	14.77
05/14/04	20	33	55	38	80	9.69	0	0	0	0	----	6	47	42	51	3.29	5	130	115	155	15.99	47	153	130	180	10.53
05/21/04	21	145	63	38	125	15.57	1	120	120	120	----	5	61	54	66	4.87	5	124	117	137	8.76	48	152	131	170	9.30
05/28/04	22	225	64	44	101	12.99	0	0	0	0	----	12	58	49	67	6.36	9	129	112	164	15.86	44	155	132	178	10.11
06/04/04	23	362	73	49	110	13.32	0	0	0	0	----	15	57	45	65	5.23	8	132	115	162	19.64	8	154	132	176	15.71
06/11/04	24	393	79	47	109	13.19	0	0	0	0	----	11	58	41	77	9.94	0	0	0	0	----	5	147	140	156	5.86
06/18/04	25	259	86	40	110	11.11	0	0	0	0	----	4	63	56	72	7.51	2	133	110	155	31.82	0	0	0	0	----
06/25/04	26	289	82	42	104	9.34	0	0	0	0	----	5	73	64	103	16.59	0	0	0	0	----	0	0	0	0	----
07/02/04	27	393	80	52	110	7.11	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----
07/09/04	28	387	81	55	110	6.91	1	124	124	124	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----
07/16/04	29	393	80	52	100	6.34	0	0	0	0	----	2	76	76	76	----	0	0	0	0	----	0	0	0	0	----
07/23/04	30	651	79	58	103	6.25	0	0	0	0	----	3	67	60	72	6.11	0	0	0	0	----	0	0	0	0	----
07/30/04	31	373	80	62	100	6.21	0	0	0	0	----	1	63	63	63	----	0	0	0	0	----	0	0	0	0	----
08/06/04	32	231	83	59	102	6.00	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----
08/13/04	33	94	85	53	102	7.56	1	165	165	165	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----
08/20/04	34	39	86	73	97	5.69	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----
08/27/04	35	11	82	62	103	15.31	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----
09/03/04	36	19	96	68	117	12.01	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----
09/10/04	37	62	105	88	125	6.76	0	0	0	0	----	2	79	76	82	4.24	0	0	0	0	----	0	0	0	0	----
09/17/04	38	224	104	76	119	6.66	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----
09/23/04	39	62	103	89	118	6.86	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----
10/01/04	40	77	135	63	181	18.20	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----
10/08/04	41	458	137	95	179	11.63	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----
10/15/04	42	141	140	115	169	10.77	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----
10/22/04	43	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----
10/29/04	44	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----
11/05/04	45	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----
11/12/04	46	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----
11/19/04	47	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----
11/26/04	48	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----
12/03/04	49	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----
Spring Totals		5,811	66	0	125	----	20	43	0	242	----	130	35	0	103	----	67	54	0	184	----	442	67	0	242	----
Fall Totals		676	41	0	181	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----
Season Totals		0	0	0	0	----	0	0	0	0	----	130	51	32	103	14.54	67	125	90	184	16.08	442	155	100	242	14.47

\* Includes Hatchery Releases

Appendix 24. Trinity River at Willow Creek, California weekly Chinook salmon and coho salmon mean fork lengths, 2005. SD = one standard deviation of the mean.

Week Starting	Julian Week	Chinook Salmon*										Natural Coho Salmon										Hatchery Coho Salmon				
		Age-0					Age-1					Age-0					Age-1					Age-1				
		n	X	min	max	SD	n	X	min	max	SD	n	X	min	max	SD	n	X	min	max	SD	n	X	min	max	SD
03/05/05	10	230	37	31	49	2.45	0	0	0	0	----	210	34	25	38	1.48	1	118	118	118	----	0	0	0	0	----
03/12/05	11	406	40	31	65	6.21	2	103	98	108	7.07	159	33	29	40	2.33	7	90	74	112	14.57	0	0	0	0	----
03/19/05	12	89	41	32	67	6.82	0	0	0	0	----	42	35	30	40	2.47	0	0	0	0	----	1	165	165	165	----
03/26/05	13	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
04/02/05	14	275	41	31	65	4.59	0	0	0	0	----	220	35	27	48	3.00	1	93	93	93	----	0	0	0	0	----
04/09/05	15	123	43	34	79	9.93	0	0	0	0	----	41	35	30	45	3.65	1	135	135	135	----	1	161	161	161	----
04/16/05	16	460	41	32	75	6.46	0	0	0	0	----	64	37	30	57	4.87	2	93	84	102	12.73	5	156	130	180	18.08
04/23/05	17	357	45	31	88	10.19	0	0	0	0	----	76	38	30	55	5.49	4	121	105	160	26.17	18	165	146	189	11.21
04/30/05	18	152	49	34	86	11.43	1	139	139	139	----	51	42	30	68	7.57	8	122	110	157	14.90	115	158	122	220	11.80
05/07/05	19	29	58	36	98	18.37	1	117	117	117	----	13	47	37	62	8.25	5	125	118	141	9.20	63	155	120	228	14.90
05/14/05	20	103	60	27	98	15.99	0	0	0	0	----	9	45	33	55	6.03	1	132	132	132	----	13	154	113	172	16.00
05/21/05	21	212	61	42	102	13.36	0	0	0	0	----	17	57	40	70	9.69	5	137	97	157	25.50	15	165	142	194	12.47
05/28/05	22	451	72	33	110	14.73	0	0	0	0	----	89	57	33	86	10.02	1	167	167	167	----	10	162	145	175	10.03
06/04/05	23	637	76	33	124	14.76	0	0	0	0	----	151	62	35	98	8.37	2	142	128	155	19.09	0	0	0	0	----
06/11/05	24	555	81	40	122	13.33	0	0	0	0	----	91	66	43	88	8.19	0	0	0	0	----	1	150	150	150	----
06/18/05	25	566	84	45	112	9.17	0	0	0	0	----	49	67	42	100	10.08	2	118	105	130	17.68	0	0	0	0	----
06/25/05	26	559	81	42	110	8.87	0	0	0	0	----	33	67	49	91	8.42	0	0	0	0	----	0	0	0	0	----
07/02/05	27	628	78	52	115	8.98	0	0	0	0	----	24	69	54	95	10.25	0	0	0	0	----	0	0	0	0	----
07/09/05	28	420	78	40	109	8.63	0	0	0	0	----	12	72	46	99	15.42	0	0	0	0	----	0	0	0	0	----
07/16/05	29	346	80	57	101	6.97	0	0	0	0	----	31	69	56	93	7.66	0	0	0	0	----	0	0	0	0	----
07/23/05	30	471	80	57	105	6.58	0	0	0	0	----	10	69	55	80	7.61	0	0	0	0	----	0	0	0	0	----
07/30/05	31	294	84	67	110	7.18	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----
08/06/05	32	160	87	54	127	10.26	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----
08/13/05	33	61	93	75	145	12.35	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----
08/20/05	34	13	96	82	108	6.75	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----
08/27/05	35	12	95	79	107	7.77	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----
09/03/05	36	8	95	62	108	14.54	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----
09/10/05	37	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----
09/17/05	38	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----
09/23/05	39	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----
10/01/05	40	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----
10/08/05	41	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----
10/15/05	42	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----
10/22/05	43	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----
10/29/05	44	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----
11/05/05	45	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----
11/12/05	46	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----
11/19/05	47	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----
11/26/05	48	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----
12/03/05	49	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----
Spring Totals		7,617	59	0	145	----	4	12	0	139	----	1,392	35	0	100	----	40	53	0	167	----	242	53	0	228	----
Fall Totals		0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----
Season Totals		0	0	0	0	----	0	0	0	0	----	1392	46	25	100	15.22	40	119	74	167	23.85	242	158	113	228	13.19

\* Includes Hatchery Releases

Appendix 25. Trinity River at Willow Creek, California weekly steelhead mean fork lengths, 2001. SD = one standard deviation of the mean.

Week Starting	Julian Week	Natural Steelhead																Hatchery Steelhead								
		Age-0				Age-1				Age-2				Age-3				Age-1								
n	X	min	max	SD	n	$\bar{X}$	min	max	SD	n	X	min	max	SD	n	X	min	max	SD	n	X	min	max	SD		
03/05/01	10																									
03/12/01	11																									
03/19/01	12																									
03/26/01	13																									
04/02/01	14																									
04/09/01	15	0	0	0	0	----	30	131	84	198	42.73	16	196	117	227	29.89	0	0	0	0	----	113	228	189	271	16.04
04/16/01	16	0	0	0	0	----	67	127	76	200	38.63	43	200	110	241	21.97	1	264	264	264	----	107	225	175	266	17.88
04/23/01	17	0	0	0	0	----	22	108	83	180	22.09	25	190	170	222	14.56	0	0	0	0	----	30	221	183	264	17.32
04/30/01	18	0	0	0	0	----	28	119	81	186	27.19	33	181	152	223	18.92	1	229	229	229	----	30	217	119	255	27.57
05/07/01	19	0	0	0	0	----	8	124	92	157	28.49	39	180	145	233	16.90	0	0	0	0	----	23	217	177	257	21.67
05/14/01	20	0	0	0	0	----	30	140	99	167	21.78	61	180	145	230	16.82	0	0	0	0	----	17	218	195	252	18.11
05/21/01	21	0	0	0	0	----	28	141	94	167	20.61	52	177	159	219	13.31	0	0	0	0	----	8	207	164	298	40.23
05/28/01	22	3	43	42	45	1.53	29	153	97	167	15.79	54	177	161	226	12.02	1	199	199	199	----	14	219	180	268	28.14
06/04/01	23	7	54	40	72	11.13	17	152	101	168	21.55	21	178	170	191	6.39	0	0	0	0	----	1	221	221	221	----
06/11/01	24	17	57	41	79	10.40	18	143	93	165	17.68	17	180	160	199	9.67	0	0	0	0	----	4	220	174	273	40.70
06/18/01	25	44	53	38	62	5.61	17	137	98	178	25.92	2	184	182	186	2.83	0	0	0	0	----	1	260	260	260	----
06/25/01	26	23	59	44	82	10.37	13	132	104	164	17.68	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----
07/02/01	27	14	65	54	81	7.26	2	130	119	140	14.85	2	162	148	176	19.80	0	0	0	0	----	0	0	0	0	----
07/09/01	28	8	53	39	73	10.49	2	141	119	163	31.11	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----
07/16/01	29	9	54	44	72	8.37	5	140	130	149	8.70	2	175	155	195	28.28	0	0	0	0	----	0	0	0	0	----
07/23/01	30	16	58	45	70	6.76	6	136	109	162	18.71	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----
07/30/01	31	4	65	54	76	9.22	1	145	145	145	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----
08/06/01	32	5	62	52	77	9.98	3	147	136	165	15.95	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----
08/13/01	33	9	61	51	77	9.23	3	152	140	160	10.41	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----
08/20/01	34	7	59	51	68	7.72	0	0	0	0	----	1	188	188	188	----	0	0	0	0	----	0	0	0	0	----
08/27/01	35	13	71	47	90	13.93	1	156	156	156	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----
09/03/01	36	3	71	65	79	7.09	3	155	139	167	14.29	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----
09/10/01	37	6	79	69	90	8.45	1	149	149	149	----	1	164	164	164	----	0	0	0	0	----	0	0	0	0	----
09/17/01	38	2	63	62	63	0.71	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----
09/23/01	39	4	79	59	96	15.17	1	147	147	147	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----
10/01/01	40	1	85	85	85	----	1	164	164	164	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----
10/08/01	41	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----
10/15/01	42	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----
10/22/01	43	0	0	0	0	----	0	0	0	0	----	1	189	189	189	----	0	0	0	0	----	0	0	0	0	----
10/29/01	44	2	95	91	98	4.95	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----
11/05/01	45	1	91	91	91	----	0	0	0	0	----	2	180	170	190	14.14	0	0	0	0	----	0	0	0	0	----
11/12/01	46	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----
11/19/01	47	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----
11/26/01	48	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----
Spring Totals		194	37	0	96	----	335	107	0	200	----	369	90	0	241	----	3	23	0	264	----	348	82	0	298	----
Fall Totals		4	30	0	98	----	1	18	0	164	----	3	41	0	190	----	0	0	0	0	----	0	0	0	0	----
Season Totals		198	60	38	98	12.04	336	134	76	200	30.02	372	183	110	241	18.12	3	231	199	264	32.53	348	224	119	298	20.46

Appendix 26. Trinity River at Willow Creek, California weekly steelhead mean fork lengths, 2002. SD = one standard deviation of the mean.

Week Starting	Julian Week	Natural Steelhead															Hatchery Steelhead									
		Age-0					Age-1					Age-2					Age-3					Age-1				
n	X	min	max	SD	n	X	min	max	SD	n	X	min	max	SD	n	X	min	max	SD	n	X	min	max	SD		
03/05/02	10																									
03/12/02	11	0	0	0	0	----	3	139	98	219	69.01	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----
03/19/02	12	2	43	35	51	11.31	16	89	59	147	22.01	5	185	152	221	24.72	1	328	328	328	----	6	218	198	242	16.69
03/26/02	13	9	41	34	45	3.18	31	101	69	255	40.44	1	229	229	229	----	0	0	0	0	----	65	231	192	278	16.09
04/02/02	14	4	43	41	45	1.71	33	122	64	249	51.22	7	200	179	233	22.70	0	0	0	0	----	113	227	188	279	16.14
04/09/02	15	0	0	0	0	----	13	109	82	230	39.84	8	211	176	276	33.91	1	230	230	230	----	103	224	167	297	21.77
04/16/02	16	0	0	0	0	----	57	159	73	285	62.02	9	185	163	212	16.87	0	0	0	0	----	176	218	78	262	24.43
04/23/02	17	0	0	0	0	----	29	122	66	219	41.61	4	212	202	219	8.35	0	0	0	0	----	97	220	162	255	16.11
04/30/02	18	4	42	38	46	3.32	22	169	76	209	38.50	10	190	160	210	16.96	0	0	0	0	----	94	217	103	281	27.75
05/07/02	19	37	29	22	46	4.46	16	144	66	200	32.96	31	186	162	210	14.09	0	0	0	0	----	17	210	116	250	29.81
05/14/02	20	49	32	24	57	7.85	40	150	80	246	36.72	8	179	164	194	9.09	0	0	0	0	----	19	207	155	233	22.37
05/21/02	21	14	47	30	62	11.96	52	150	79	209	32.99	10	179	160	201	12.19	0	0	0	0	----	19	207	152	238	23.17
05/28/02	22	60	42	26	68	11.98	30	152	90	196	27.54	5	185	165	222	22.17	0	0	0	0	----	16	213	162	266	28.00
06/04/02	23	211	48	27	72	9.14	65	153	85	224	30.11	15	180	170	207	10.77	0	0	0	0	----	14	228	190	261	21.31
06/11/02	24	384	51	25	86	8.75	29	161	100	242	24.38	9	185	171	201	11.08	0	0	0	0	----	7	207	153	240	28.83
06/18/02	25	310	54	32	80	7.31	4	162	136	184	19.74	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----
06/25/02	26	403	55	24	87	7.86	4	129	100	190	41.90	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----
07/02/02	27	305	53	24	82	8.94	1	98	98	98	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----
07/09/02	28	226	54	27	80	9.47	4	143	114	186	31.02	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----
07/16/02	29	49	56	34	79	10.79	1	159	159	159	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----
07/23/02	30	30	65	48	94	9.13	1	159	159	159	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----
07/30/02	31	28	68	41	106	16.53	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----
08/06/02	32	92	66	35	89	12.68	2	148	140	155	10.61	1	187	187	187	----	0	0	0	0	----	0	0	0	0	----
08/13/02	33	29	62	38	101	15.45	3	151	134	161	14.80	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----
08/20/02	34	29	78	48	112	14.13	0	0	0	0	----	1	219	219	219	----	0	0	0	0	----	0	0	0	0	----
08/27/02	35	17	73	53	105	15.28	0	0	0	0	----	1	205	205	205	----	0	0	0	0	----	0	0	0	0	----
09/03/02	36	51	64	42	107	14.74	3	140	124	167	23.29	1	203	203	203	----	0	0	0	0	----	0	0	0	0	----
09/10/02	37	44	70	46	99	14.15	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----
09/17/02	38	21	74	42	114	17.19	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----
09/23/02	39	3	88	74	105	15.72	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----
10/01/02	40	58	90	52	120	16.44	1	218	218	218	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----
10/08/02	41	11	90	60	116	0.00	2	140	130	149	13.44	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----
10/15/02	42	2	97	88	105	12.02	2	226	172	279	75.66	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----
10/22/02	43	2	95	85	104	13.44	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----
10/29/02	44	0	0	0	0	----	2	174	165	183	12.73	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----
11/05/02	45	1	81	81	81	----	1	213	213	213	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----
11/12/02	46	14	91	56	138	22.91	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----
11/19/02	47	4	79	47	92	21.69	3	158	144	182	20.65	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----
11/26/02	48	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----
Spring Totals		2411	47	0	114	----	459	107	0	285	----	126	111	0	276	----	2	19	0	328	----	746	94	0	297	----
Fall Totals		92	69	0	138	----	11	125	0	279	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----
Season Totals		2,503	55	22	138	14.22	470	143	59	285	44.57	126	188	152	276	18.88	2	279	230	328	69.30	746	221	78	297	22.60

Appendix 27. Trinity River at Willow Creek, California weekly steelhead mean fork lengths, 2003. SD = one standard deviation of the mean.

Week Starting	Julian Week	Natural Steelhead															Hatchery Steelhead									
		Age-0					Age-1					Age-2					Age-3					Age-1				
n	X	min	max	SD	n	X	min	max	SD	n	X	min	max	SD	n	X	min	max	SD	n	X	min	max	SD		
03/05/03	10	0	0	0	0	----	4	81	63	108	19.60	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----
03/12/03	11	0	0	0	0	----	5	85	73	101	10.12	0	0	0	0	----	1	312	312	312	----	0	0	0	0	----
03/19/03	12	0	0	0	0	----	3	102	75	151	42.77	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----
03/26/03	13	1	27	27	27	----	2	81	72	89	12.02	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----
04/02/03	14	0	0	0	0	----	18	94	59	184	26.04	1	230	230	230	----	0	0	0	0	----	11	215	192	231	11.84
04/09/03	15	0	0	0	0	----	18	101	74	205	36.17	5	168	160	176	7.30	0	0	0	0	----	9	218	191	235	12.74
04/16/03	16	5	35	28	53	10.32	15	90	72	117	14.23	5	173	153	208	21.91	0	0	0	0	----	16	205	178	224	14.14
04/23/03	17	11	30	27	33	2.19	11	129	90	192	33.92	9	189	158	236	26.39	1	243	243	243	----	60	208	129	288	20.30
04/30/03	18	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
05/07/03	19	21	29	23	41	4.02	11	115	75	176	40.54	2	178	143	212	48.79	0	0	0	0	----	19	195	166	221	14.56
05/14/03	20	9	30	26	39	3.80	44	106	64	181	30.67	11	167	145	191	16.13	0	0	0	0	----	21	200	175	224	13.14
05/21/03	21	17	28	25	31	2.02	14	112	76	174	40.32	4	179	144	217	31.95	0	0	0	0	----	6	214	185	242	24.33
05/28/03	22	11	33	28	61	9.55	7	120	80	172	40.55	1	149	149	149	----	0	0	0	0	----	0	0	0	0	----
06/04/03	23	10	38	23	65	13.96	4	111	89	164	35.85	0	0	0	0	----	0	0	0	0	----	4	181	129	204	35.03
06/11/03	24	27	53	40	66	5.85	9	138	90	214	47.83	0	0	0	0	----	0	0	0	0	----	2	190	180	200	14.14
06/18/03	25	85	45	21	84	13.54	7	109	85	150	20.80	0	0	0	0	----	0	0	0	0	----	1	165	165	165	----
06/25/03	26	147	55	30	75	9.15	7	120	87	148	21.46	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----
07/02/03	27	312	58	30	91	9.31	4	115	90	138	23.14	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----
07/09/03	28	466	60	31	84	7.60	1	112	112	112	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----
07/16/03	29	286	58	30	82	9.54	4	96	89	107	7.75	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----
07/23/03	30	215	62	32	100	9.63	27	128	104	169	15.22	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----
07/30/03	31	56	61	36	87	13.18	11	122	101	143	14.45	2	174	170	178	5.66	0	0	0	0	----	0	0	0	0	----
08/06/03	32	36	64	43	90	11.50	8	127	119	143	8.68	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----
08/13/03	33	20	70	51	89	10.72	3	127	113	147	17.78	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----
08/20/03	34	16	59	44	101	14.55	2	157	139	174	24.75	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----
08/27/03	35	71	63	37	84	11.56	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----
09/03/03	36	53	71	42	105	15.30	3	139	112	165	26.51	1	245	245	245	----	0	0	0	0	----	0	0	0	0	----
09/10/03	37	36	75	45	101	11.93	3	141	125	154	14.73	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----
09/17/03	38	59	69	43	94	11.88	6	152	120	173	24.04	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----
09/23/03	39	9	79	62	98	12.97	1	183	183	183	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----
10/01/03	40	3	69	44	101	29.02	0	0	0	0	----	1	191	191	191	----	0	0	0	0	----	0	0	0	0	----
10/08/03	41	0	0	0	0	----	2	131	126	135	6.36	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----
10/15/03	42	3	86	74	104	15.87	1	143	143	143	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----
10/22/03	43	1	125	125	125	----	1	175	175	175	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----
10/29/03	44	4	106	91	119	11.70	10	184	128	205	22.54	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----
11/05/03	45	7	104	90	115	9.20	3	177	174	182	4.62	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----
11/12/03	46	20	77	47	121	21.79	1	172	172	172	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----
11/19/03	47	7	66	51	84	13.19	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----
11/26/03	48	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----
Spring Totals		1979	42	0	105	----	252	110	0	214	----	41	62	0	245	----	2	19	0	312	----	149	66	0	288	----
Fall Totals		45	70	0	125	----	18	109	0	205	----	1	21	0	191	----	0	0	0	0	----	0	0	0	0	----
Season Totals		2,024	59	21	125	13.36	270	117	59	214	34.89	42	178	143	245	25.70	2	278	243	312	48.79	149	205	129	288	19.23

Appendix 28. Trinity River at Willow Creek, California weekly steelhead mean fork lengths, 2004. SD = one standard deviation of the mean.

Week Starting	Julian Week	Natural Steelhead																		Hatchery Steelhead							
		Age-0					Age-1					Age-2				Age-3				Age-1							
n	X	min	max	SD	n	X	min	max	SD	n	X	min	max	SD	n	X	min	max	SD	n	X	min	max	SD			
03/05/04	10																										
03/12/04	11																										
03/19/04	12	1	42	42	42	----	42	83	64	112	10.45	7	136	103	189	37.49	0	0	0	0	----	3	226	206	243	18.77	
03/26/04	13	0	0	0	0	----	101	91	59	150	15.81	29	166	107	210	23.72	2	241	240	242	1.41	58	211	100	256	29.06	
04/02/04	14	3	42	37	45	4.36	69	92	63	162	18.95	28	165	120	201	22.36	1	168	168	168	----	29	216	185	254	16.58	
04/09/04	15	0	0	0	0	----	113	96	56	160	16.28	42	166	112	210	17.44	2	203	195	211	11.31	44	208	121	260	23.98	
04/16/04	16	1	28	28	28	----	78	96	69	162	18.31	84	163	70	241	30.65	3	198	190	211	11.15	60	213	140	256	20.93	
04/23/04	17	2	45	30	59	20.51	125	93	49	130	13.06	56	166	133	198	15.34	2	200	194	206	8.49	46	212	180	250	13.96	
04/30/04	18	1	35	35	35	----	37	108	74	170	24.46	29	164	141	189	15.08	1	195	195	195	----	38	213	165	256	20.25	
05/07/04	19	9	29	26	31	1.67	25	114	76	164	30.40	44	166	135	212	15.36	0	0	0	0	----	18	202	172	250	18.64	
05/14/04	20	3	34	29	41	6.43	10	109	72	165	30.78	17	164	137	207	19.69	0	0	0	0	----	9	207	123	228	34.14	
05/21/04	21	5	29	27	33	2.51	28	108	68	154	20.96	24	172	141	204	16.86	0	0	0	0	----	1	238	238	238	----	
05/28/04	22	6	31	25	44	7.03	13	107	72	165	26.51	19	168	130	197	17.38	0	0	0	0	----	7	200	171	215	14.19	
06/04/04	23	33	38	23	66	10.97	22	117	85	172	20.90	18	166	128	197	17.26	1	165	165	165	----	5	204	169	249	32.00	
06/11/04	24	36	41	22	63	8.77	21	117	70	141	17.39	6	167	150	180	10.98	1	198	198	198	----	1	215	215	215	----	
06/18/04	25	29	48	35	63	6.22	5	103	88	117	11.83	7	150	136	172	13.05	0	0	0	0	----	0	0	0	0	----	
06/25/04	26	22	50	35	70	7.80	1	110	110	110	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	
07/02/04	27	12	57	45	70	7.01	2	133	130	135	3.54	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	
07/09/04	28	49	55	39	69	6.41	1	134	134	134	----	1	189	189	189	----	0	0	0	0	----	0	0	0	0	----	
07/16/04	29	21	60	50	81	7.53	1	142	142	142	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	
07/23/04	30	44	67	45	113	16.12	37	124	87	145	14.23	4	155	136	172	15.78	0	0	0	0	----	0	0	0	0	----	
07/30/04	31	3	69	56	83	13.58	10	130	102	159	16.06	1	142	142	142	----	0	0	0	0	----	0	0	0	0	----	
08/06/04	32	1	50	50	50	----	4	124	106	148	18.28	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	
08/13/04	33	2	57	48	66	12.73	5	122	100	138	18.14	1	149	149	149	----	0	0	0	0	----	0	0	0	0	----	
08/20/04	34	3	62	49	73	12.12	3	124	119	127	4.62	1	118	118	118	----	0	0	0	0	----	0	0	0	0	----	
08/27/04	35	25	72	51	90	11.04	2	122	111	132	14.85	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	
09/03/04	36	8	68	54	85	11.71	4	109	106	112	2.52	1	135	135	135	----	0	0	0	0	----	0	0	0	0	----	
09/10/04	37	20	67	53	99	12.83	5	109	104	116	5.07	1	168	168	168	----	0	0	0	0	----	0	0	0	0	----	
09/17/04	38	13	72	45	103	17.65	3	109	105	111	3.21	3	164	153	171	9.64	0	0	0	0	----	0	0	0	0	----	
09/23/04	39	0	0	0	0	----	3	137	123	157	17.62	1	177	177	177	----	1	275	275	275	----	0	0	0	0	----	
10/01/04	40	1	81	81	81	----	1	138	138	138	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	
10/08/04	41	2	59	38	80	0.00	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	
10/15/04	42	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	
10/22/04	43	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	
10/29/04	44	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	
11/05/04	45	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	
11/12/04	46	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	
11/19/04	47	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	
11/26/04	48	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	
Spring Totals			352	42	0	113	----	770	105	0	172	----	424	123	0	241	----	14	61	0	275	----	319	92	0	260	----
Fall Totals			3	16	0	81	----	1	15	0	138	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----
Season Totals			355	54	22	113	16.35	771	100	49	172	20.93	424	165	70	241	21.65	14	206	165	275	29.40	319	211	100	260	22.24

Appendix 29. Trinity River at Willow Creek, California weekly steelhead mean fork lengths, 2005. SD = one standard deviation of the mean.

Week Starting	Julian Week	Natural Steelhead															Hatchery Steelhead									
		Age-0					Age-1					Age-2					Age-3					Age-1				
		n	X	min	max	SD	n	X	min	max	SD	n	X	min	max	SD	n	X	min	max	SD	n	X	min	max	SD
03/05/05	10	1	24	24	24	----	45	85	53	120	14.29	1	115	115	115	----	0	0	0	0	----	0	0	0	0	----
03/12/05	11	0	0	0	0	----	137	86	56	120	11.23	6	139	122	186	24.16	1	199	199	199	----	0	0	0	0	----
03/19/05	12	0	0	0	0	----	20	85	64	99	9.06	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----
03/26/05	13	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
04/02/05	14	3	29	26	35	5.20	54	91	62	111	11.00	0	0	0	0	----	0	0	0	0	----	6	211	180	241	26.16
04/09/05	15	0	0	0	0	----	16	91	70	120	12.44	1	115	115	115	----	0	0	0	0	----	1	244	244	244	----
04/16/05	16	0	0	0	0	----	92	97	70	135	12.29	7	153	119	179	23.94	0	0	0	0	----	6	168	117	232	51.24
04/23/05	17	16	27	25	28	1.00	78	101	76	147	16.76	13	165	117	199	25.46	1	190	190	190	----	1	120	120	120	----
04/30/05	18	18	28	25	31	1.68	27	116	76	221	38.90	12	171	147	191	14.94	0	0	0	0	----	4	199	175	243	29.98
05/07/05	19	1	29	29	29	----	4	117	109	120	5.25	8	177	155	186	11.10	0	0	0	0	----	1	220	220	220	----
05/14/05	20	14	29	24	38	3.70	9	143	82	211	44.92	3	184	168	195	14.36	0	0	0	0	----	8	166	80	235	55.31
05/21/05	21	10	32	25	53	7.80	7	129	94	170	27.46	13	162	119	185	18.15	0	0	0	0	----	3	174	100	214	64.42
05/28/05	22	34	32	27	50	5.16	24	116	94	159	19.21	7	162	121	204	27.63	0	0	0	0	----	5	224	165	283	42.49
06/04/05	23	18	36	28	54	7.04	20	105	75	158	19.68	4	128	105	156	22.59	0	0	0	0	----	2	203	185	220	24.75
06/11/05	24	14	38	26	57	10.13	22	113	99	156	14.41	6	155	130	176	19.78	0	0	0	0	----	1	96	96	96	----
06/18/05	25	18	48	28	74	11.35	4	97	91	106	6.75	2	129	118	139	14.85	0	0	0	0	----	0	0	0	0	----
06/25/05	26	26	52	27	98	14.09	4	117	105	135	12.71	2	120	105	135	21.21	0	0	0	0	----	0	0	0	0	----
07/02/05	27	41	55	34	78	8.38	2	126	125	126	0.71	1	130	130	130	----	0	0	0	0	----	0	0	0	0	----
07/09/05	28	48	54	29	78	9.52	2	126	118	134	11.31	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----
07/16/05	29	85	58	40	85	8.18	2	121	116	126	7.07	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----
07/23/05	30	165	61	40	90	10.23	4	119	100	130	13.35	3	124	106	137	16.09	0	0	0	0	----	0	0	0	0	----
07/30/05	31	43	57	38	92	11.48	1	105	105	105	----	2	207	193	220	19.09	0	0	0	0	----	0	0	0	0	----
08/06/05	32	15	54	42	73	9.89	1	142	142	142	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----
08/13/05	33	2	55	52	58	4.24	1	153	153	153	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----
08/20/05	34	1	56	56	56	----	1	132	132	132	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----
08/27/05	35	3	77	67	93	13.80	1	142	142	142	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----
09/03/05	36	4	78	63	94	14.48	1	140	140	140	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----
09/10/05	37	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----
09/17/05	38	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----
09/23/05	39	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----
10/01/05	40	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----
10/08/05	41	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----
10/15/05	42	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----
10/22/05	43	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----
10/29/05	44	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----
11/05/05	45	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----
11/12/05	46	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----
11/19/05	47	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----
11/26/05	48	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----
Spring Totals		580	34	0	98	----	579	100	0	221	----	91	84	0	220	----	2	13	0	199	----	38	68	0	283	----
Fall Totals		0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----	0	0	0	0	----
Season Totals		580	52	24	98	14.87	579	98	53	221	20.91	91	158	105	220	26.40	2	195	190	199	6.36	38	188	80	283	49.70