UNITED STATES OF AMERICA
BEFORE THE
FEDERAL ENERGY REGULATORY COMMISSION

Turlock Irrigation District	)	
	)	
and	)	Project No. 2299
	)	
Modesto Irrigation District	)	

2006 LOWER TUOLUMNE RIVER ANNUAL REPORT

Report 2006-3

2006 Seine/Snorkel Report and Summary Update

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EXECUTIVE SUMMARY

The 2006 seining survey was conducted at two-week intervals from 20 January to 15 June for a total of 11 sample periods. This was the 21st consecutive annual seining study on the Tuolumne River conducted by the Turlock and Modesto Irrigation Districts.

A total of 1,558 natural Chinook salmon were caught in the Tuolumne River and 39 in the San Joaquin River. Peak density of salmon caught in the Tuolumne was 31.7 salmon per 1,000 square feet on 14 February. Maximum fork length (FL) in the Tuolumne River increased from 57 mm FL to 111 mm FL from 20 January to 29 March and overall FL ranged from 29 mm to 111 mm.

Flows during the sampling period ranged from about 1,720 to 8,800 cubic feet per second (cfs) in the Tuolumne River at La Grange and from about 4,800 to 34,400 cfs in the San Joaquin River at Vernalis. Flows in 2006 were very high due to above average precipitation.

Water temperature in the Tuolumne ranged from 9.9°C to 15.2°C and in the San Joaquin from 10.4°C to 21.7°C. Conductivity in the Tuolumne River ranged from 29 to 57 μS and in the San Joaquin from 97 to 873 μS.

A comparative review of fork length and salmon density for the 2001-2006 period is included. Increase in average fork length in 2006 was typical in timing and magnitude to the pattern observed in other years through March. After that, average fork length was most similar to 2001 and 2002.

Density of fry (≤ 50 mm) peaked on 14 February generally similar in timing to most years for the 2001-2006 period of years. The density of juveniles (> 50 mm) peaked on 29 March, also similar in timing to most other years in the period. In 2006, the average density of salmon in the Tuolumne River was 10.2 salmon per 1,000 ft^2 and was in the lower range of values for the entire 1986-2006 period.

A snorkel survey was conducted on 19-21 September, within a 20-mile section below La Grange Dam. Preliminary USGS flow at La Grange was about 310 cfs and water temperature ranged from 12.0°C to 15.9°C. Forty juvenile Chinook salmon and 543 rainbow trout were observed. Other species observed were Sacramento sucker, Sacramento pikeminnow, riffle sculpin, and largemouth bass.

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1 INTRODUCTION

Stillwater Sciences and Cramer Fish Sciences conducted seine and snorkel fishery monitoring in the Tuolumne and San Joaquin Rivers in 2006 for the Turlock and Modesto irrigation districts (TID/MID).

Seine sampling was done in both rivers pursuant to the Don Pedro Project river-wide monitoring program. A primary objective was to document juvenile salmonid size, abundance and distribution, including the relationship of flow and other environmental variables. The salmon in 2006 were the progeny of the 2005 fall spawning run, estimated at about 719 fish. This was the 21st consecutive annual TID/MID seining study and a summary of salmonid data since 1986 is contained in this report.

Tuolumne River snorkel surveys began in 1982 with the number, location, and area sampled by site having varied over the years. Summer surveys occurring within the June to September period have been conducted in most years since 1988, although very wet years with high summer flows, such as 1995 and 1998, were not sampled. Locations were selected to include a range of habitat types (i.e., riffles, runs, pools) at sites where salmonids may occur and are spaced at intervals down the river in general areas of suitable access. The overall river section examined is limited to the reach with suitable underwater visibility, this generally being in the 20-mile section from La Grange Dam downstream to near Waterford.

Prior to 2005, a single June or July snorkel survey had been done as part of the FSA monitoring since 1996 to evaluate the abundance, size, and distribution of salmonids and other fish species - 12 sites per survey have been done since 2001. High flow conditions in 2006 precluded a comparable early summer snorkel survey, similar to 2005. A September snorkel survey, done since 2001, was conducted on 19-21 September 2006. A comparison of the salmonids observed in the 2001-2006 period is included.

1.1 STUDY SITES

1.1.1 Seine

The area studied was the Tuolumne River from La Grange Dam (river mile [RM] 52.0) to its confluence (RM 0) with the San Joaquin River at RM 83.8, and the San Joaquin River from Laird Park (RM 90.2) to Gardner Cove (RM 77.8) (Fig. 1). A total of ten sites were sampled each survey period, eight on the Tuolumne and two on the San Joaquin - due to the high flow conditions, locations #2 (Riffle 4B or 5), #3 (TRR or TLSRA), #5 (Charles rd. or Fox Grove) and #10 (Gardner Cove or O.F.C.) varied during the season. The locations of the sites were as follows:

Site	Location	River Mile
	Tuolumne River	
1	Old La Grange Bridge (OLGB)	50.5[a]
2	Riffle 4B, 5	48.4, 48.0
3	Tuolumne River Resort (TRR), TLSRA	42.4, 42.0
4	Hickman Bridge	31.6
5	Charles Road, Fox Grove	24.9, 26.0
6	Legion Park	17.2

7	Riverdale Park	12.3
8	Shiloh Road	3.4
	San Joaquin River	
9	Laird Park	90.2[b]
10	Gardner Cove, Old Fishermen's Club	79.4, 80.7

a. From the confluence with the San Joaquin River.
b. From the confluence with the Sacramento River.

The Tuolumne River was stratified into three sections. The upper section (RM 52 to 34), sites 1-3, is a higher gradient area that includes most of the primary spawning riffles in the river. The middle section (RM 34 to 17), sites 4-6, is the transitional area from the gravel-bedded to sand-bedded river reaches. This section contains much of the in-channel sand/gravel mined areas. The lower section (RM 17 to 0), sites 7-8, is a lower gradient, mostly sand-bottom reach downstream of the Dry Creek confluence.

1.1.2 Snorkel

The snorkel survey was conducted in a 20-mile reach from Riffle A7 (RM 50.7) downstream to Riffle 57 (RM 31.5) below Hickman Bridge near Waterford.

1.2 2006 TUOLUMNE AND SAN JOAQUIN RIVER SAMPLING CONDITIONS

1.2.1 Seine

Flows in the Tuolumne River below La Grange Dam were approximately 3,180 cfs in January when the surveys began. Flows began increasing in March to maintain Don Pedro Reservoir flood storage space (Fig. 2). Flows generally increased to about 8,800 cfs over the next 2 months. In late May flows began to decrease to about 2,600 by early June. Flows then increased to about 7,500 in late June.

Flows in the San Joaquin River at Vernalis (RM 72.5) ranged from 5,000-35,000 cfs from mid-January through June. April-May flows were extremely high due to flood control releases from the basin.

Flows upstream of Vernalis, at Patterson Bridge (RM 98.5) and Maze Road (RM 77.3), represent flow levels at the sampling locations of Laird Park upstream of the Tuolumne and Gardner Cove downstream of the Tuolumne, respectively.

The minimum water temperature recorded in the Tuolumne River during the study period, based on hand-held temperature measurements, was 9.9 °C (49.8 °F) at OLGB and TRR on 29 March, and the maximum temperature was 15.2 °C (59.4 °F) at Shiloh Road on 15 June (Fig. 3). The lowest San Joaquin River water temperature, 10.4 °C (50.7 °F) was at Laird Park on 20 January; the highest was 21.7 °C (71.1°F) at Laird Park on 31 May.

1.2.2 Snorkel

The flow at La Grange during the snorkel surveys in September was about 310 cfs. Water temperature ranged from 12.0 °C (53.6 °F) at Riffle 7 on 20 September to 15.9 °C (60.6 °F) at Riffle 41A on 21 September.

2 METHODS

2.1 STUDY TIMING

The 2006 seining study began on 20 January and ended on 15 June. Sampling was done at about two-week intervals, with a total of 11 sampling dates. The snorkel survey was conducted 19-21 September.

2.2 SAMPLING METHODS AND DATA RECORDING

2.2.1 Seine

Seining was done using 6-ft high, 1/8-inch mesh nylon seine nets in lengths of 20 or 30 feet. The same general areas were sampled each time, to permit comparisons through the sampling period, but sample areas varied somewhat as a result of changes in flow. Seine hauls were made with the current and parallel to shore. The salmon caught were anesthetized with MS-222, measured (FL in mm) and then revived before being released. Other measurements taken were area sampled, (determined from estimating average length and width of a seine haul) water temperature, visibility, conductivity, and maximum depth of the area sampled. Other observations include time of day, weather conditions, habitat type, and substrate type. Other fish species were recorded separately. Any salmon undergoing outward signs of smoltification, such as losing scales during handling, were also noted.

2.2.2 Snorkel

Underwater observations were conducted using an effort-based method where a snorkeler examined within a specified area for a given period of time and recorded the species, numbers, and size estimates of fish observed. A combination of different habitat types were observed, including riffles, runs, and pools. The overall river section examined is limited to the reach with suitable underwater visibility, this generally being a 20-mile section below La Grange Dam downstream to Waterford. The snorkeling method provided an index of species abundance.

Each habitat type sampled mostly involved one observer snorkeling a specified habitat area for a certain time period. Whenever feasible, the surveys were conducted moving upstream against the current - a side-to-side (zigzag) pattern was used as the width of the survey section required. Occasionally, two snorkelers moved upstream in tandem, with each person counting fish on their side of the center of the survey section. Whenever possible, the entire width of the habitat section selected was carefully surveyed. The only exceptions were the habitat areas that were too wide to effectively cover. If high water velocity precluded upstream movement, snorkelers would float downstream with the current, remaining as motionless as possible through the study area, although stream margins at those sites would still be viewed in an upstream direction.

Usually the total length of an observed fish was estimated using a ruler outlined on the diving slate to the nearest 10 mm. For some larger fish, the lengths may be estimated by viewing the fish in reference to adjacent objects and then measuring that estimated length. In cases where larger numbers of fish are observed, the observer estimated the length range and number of fish in the group. Care was taken to observe and count each fish just once in the survey area.

Other data recorded for each location included water temperature, electrical conductivity, turbidity, and horizontal visibility. Site-specific data that was recorded included area sampled, average depth, sample time, general habitat type, and substrate type.

2.3 DATA ANALYSIS

Seining catch data was examined by location, river section, and river. Catch densities of salmon were divided into two size groups for analysis. The density index for "fry" (fish ≤50 mm FL) and for "juveniles" (>50 mm), by site and by section, were computed by multiplying the number of salmon caught by 1,000 and dividing it by the area sampled. These indices of population density (relative abundance), were used for comparisons. Densities and sizes of salmon fry and juveniles by upper, middle, and lower river sections were examined.

3 RESULTS AND DISCUSSION

3.1 SEINE CATCH

A total of 1,558 salmon were caught in the Tuolumne River and 39 in the San Joaquin (Table 1). Of these, 1,023 salmon were measured and riverwide peak density for the Tuolumne was 31.7 salmon per 1,000 ft^2 on 14 February.

3.1.1 Density of Fry and Juvenile Salmon

Salmon up to 57 mm fork length (FL) were caught in the Tuolumne River on 20 January in the first sampling period. The highest density of salmon fry in the Tuolumne was 28.7 fry/1,000 ft^2 found on 14 February (Table 2). The highest density of juvenile salmon in the Tuolumne was 16.7 juveniles/1,000 ft^2 found on 29 March.

The density of salmon fry by location exhibited a peak for most sites from 14 February to 15 March. The density of juveniles by location generally peaked from 01 March to 12 April for most locations (Fig. 4).

The density of salmon fry in sections of the Tuolumne River had a peak in the upper and middle sections on 14 February and in the lower section on 15 March (Fig. 5). The density of juveniles by section shows a peak in the upper section on 12 April, a peak in the middle section on 01 March, and a peak in the lower section on 29 March. Thirty-nine wild salmon were caught in the San Joaquin River from 20 January to 29 March, 6 at Laird Park and 33 at Gardner Cove.

3.1.2 Size, Growth, and Smoltification

The fork length of salmon from the Tuolumne River caught in 2006 ranged from 29 mm to 111 mm. The average fork length (FL) of salmon generally showed a steady increase from 01 February to 29 March (Fig. 6).

An indirect method to estimate growth rate was made by dividing the amount of increase in maximum FL, over an extended period of time, by the number of days during the period. Maximum FL in the Tuolumne River increased from 57 to 111 mm during the 20 January to 29 March period (Fig. 6). This indicates a potential FL increase of approximately .79 mm per day (54 mm / 68 days).

Length frequency distributions reflect the change in average fork length through the entire study period (Fig. 7 & 8). The change in FL by location generally shows an increase from late January to late May at most of the Tuolumne River sampling locations (Fig. 9). Salmon estimated to be large enough to undergo smoltification (usually > 70 mm FL) were present by mid-February. The first salmon exhibiting smolting characteristics were caught on 29 March. Fry were present throughout the entire 2006 seine survey period.

3.1.3 Conductivity and Turbidity

Conductivity in the Tuolumne River generally increased with increasing distance below La Grange Dam, from a low of 30 µS at Old La Grange Bridge to a high of 57 µS at Shiloh Road (Table 3). Conductivity also increased as flows were reduced (Fig. 10).

Conductivity in the San Joaquin River was much higher than in the Tuolumne and ranged from a low of 97 µS at Gardner Cove to a high of 873 µS at Laird Park.

Turbidity in the Tuolumne River was less than 8.8 Nephelometric Turbidity Units (NTU) except for three readings at Legion Park, Riverdale Park and Shiloh Road on 29 March and again at Riverdale Park on 26 April. Turbidity also generally increased with increasing distance below La Grange Dam and generally decreased with higher flows.

Turbidity in the San Joaquin River ranged from 9.2 at Laird Park to 30.4 NTU at Laird Park.

3.1.4 Other Fish Species Caught

The numbers of other fish species caught during the seining study by species, location, and date are in Table 4. Fifteen species other than Chinook salmon were caught in the Tuolumne River and 12 other species in the San Joaquin River. Nine of these species were common to both rivers and 18 species were caught overall. Eight rainbow trout fry (25-45 mm FL) were caught in the Tuolumne River between 01 February to 03 May at OLGB, R4B and TRR. The San Joaquin River had a significantly lower number of fish species than in recent years, except 2005, perhaps due to much colder water temperatures observed during the last 2 years.

3.2 SNORKEL SURVEY

Survey conditions and fish observations from the snorkel survey conducted on 19-21 September are summarized in Table 5. The fish species observed were all native species characteristic of the lower elevation zone adjacent to the Sierra foothills with the exception of the largemouth bass. In 2006, fewer fish species were observed than in recent years similar to the 2005 observations. Noticeably missing were other members of the Centrarchidae.

Chinook salmon and rainbow trout were observed downstream to Riffle 36A (RM 36.7). Other species seen were Sacramento sucker, Sacramento pikeminnow, riffle sculpin, and largemouth bass.

4 COMPARATIVE REVIEW

4.1 SEINE: 1986-2006

Annual TID/MID Tuolumne River seining surveys began in 1986, with the number, location, and sampling frequency of sites having varied over time (Tables 6 & 7). The number of salmon captured in the Tuolumne has ranged from 120 (1991) to 14,825 (1987) - the total number of salmon captured in 2006 (1,558) is the second lowest since 1997. In 2006, the average density of salmon in the river was 10.2 salmon per 1,000 ft^2 and was similar to densities found in 2005.

The San Joaquin River has been sampled upstream and downstream of the Tuolumne River confluence in each of the study years. The total number of salmon caught has ranged from 0 to 854 with average density much lower than the Tuolumne (Table 6). In 2006, 39 salmon were captured in the San Joaquin River with an average density of 1.2 salmon per 1,000 ft^2

The comparative review of fork length and density is primarily for the 2001-2006 period in this report.

4.1.1 Size and Growth

Minimum FL found in 2006 remained low through the last survey conducted in mid-June (Fig. 11). In 2006, the increase in average FL during the January to March period was similar in timing and magnitude to the pattern observed in the 2001-2006 period (Fig. 12). Beginning in April the average FL declined with fewer smolt size salmon being caught. The average FL peaked on 10 May at 63.3. mm FL. Maximum FL in 2006 increased from January through March (Fig. 13). The estimated 2006 growth rate of .79 mm per day was the highest rate, along with the 1995 rate, for 1986-2006 (Table 6).

4.1.2 Fry and Juvenile Salmon Density

In 2006, the density of salmon fry (≤ 50 mm) in the Tuolumne River peaked on 14 February at the second lowest level for the 2001-2006 period (Fig. 14).

The density of salmon juveniles (>50 mm) in 2006 peaked on 29 March and was similar in timing to 2001, 2003 and 2004 (Fig. 15). The 2006 index peaked at the highest level for the 2001-2006 period of years.

Combined fry and juvenile densities for the Tuolumne River are shown for the years 2001-2006 (Fig. 16). The 2006 densities peaked twice on 14 February and 29 March corresponding with the peaks in fry and juveniles.

4.1.2.1 Tuolumne River Section Density

Upper section density of fry generally peaks from early February to early March and steadily declines through March (Fig. 17). For 2006, the density of fry peaked in mid-February and remained fairly constant through March. Upper section density of juveniles typically increases beginning in late February and peaks in early April to late May. In 2006, juvenile salmon density was low throughout the entire survey period and peaked in late May.

Middle section density of fry generally peaks from early February to mid-March similar timing to the upper section. In 2006, the density of fry peaked in mid February the same time as observed in the upper section. Middle section density of juveniles often peak from late February to late March. In 2006 juvenile density peaked in early March.

Lower section density of fry and juvenile salmon has been relatively low in most years. This section was often sampled only at the Shiloh Road location in prior years. Since 1999, two sites have been sampled. Peak density of fry ranged from early to late March during the 2001-2006 period. In 2006, fry density peaked on 15 March, most similar to 2001 and 2005 that also had higher flow conditions. Lower section density of juveniles also peaked in mid-March.

Section abundance indices of fry and juvenile salmon combined were standardized as a percent of the annual riverwide average abundance index and plotted at section midpoints for recent years (Fig. 18). In general, the abundance indices decline from the upper to lower sections. In 2006 the standardized section abundance indices exhibited a high flow pattern with the middle section substantially higher than the upper and lower sections.

4.1.2.2 San Joaquin River Density

Densities of salmon caught in the San Joaquin River at Laird Park and Gardner Cove or nearby sites were reviewed to compare relative abundance of salmon upstream and downstream of the Tuolumne River confluence. The abundance indices were calculated for fry and juvenile salmon combined due to low numbers caught. The average salmon abundance at Laird Park, downstream of the Merced confluence, was extremely low for all years during the 1986-2006 period (Fig. 19). The total number of wild salmon caught at Laird Park during this period was 148. Six wild salmon were caught at Laird Park in 2006 (sampled 9 times). The average abundance at Gardner Cove, downstream of the Tuolumne River confluence, was much higher in 1986 and 1999 and moderately higher in 1995, 1998, 2001 and 2006. A total of 1082 salmon were caught at this location during the 1986-2006 period, 509 of which were caught in 1999. Thirty-three wild salmon was caught at Gardner Cove in 2006.

4.1.3 Tuolumne River Fry Density Versus Number of Female Spawners

A polynomial equation analysis of peak fry density in the Tuolumne River and the estimated total number of female spawners (TID/MID data), from the preceding fall-run, resulted in an R-squared of .68 for the 1986-2006 period (Fig. 20, Table 8). A similar result with R-squared of .74 was found using average fry density from 15JAN-15MAR (Figure 21).

4.1.4 Other Fish Species

The number of fish species, other than Chinook salmon, caught during 1986-2006 has ranged from 11 to 16 on the Tuolumne River. Table 4 has the counts from each site and date for fish species caught in 2006. Fifteen other species were caught, including 6 native species, in the Tuolumne; 12 fish species, including 4 native, were caught on the San Joaquin River in 2006 (Table 4).

Of native species, rainbow trout, hardhead, and riffle sculpin were caught only in the Tuolumne River and Sacramento sucker, Sacramento pikeminnow, and prickly sculpin were caught in both rivers. Native species recorded in prior years, but not caught in either river in 2006, were Pacific lamprey, Sacramento blackfish, hitch, and tule perch.

4.2 SNORKEL: 2001-2006

Annual Tuolumne River snorkel surveys under the 1995 Don Pedro Project FERC Settlement Agreement began in 1996. The precursor to these surveys was the Districts'1988-1994 summer flow studies. This comparative review of 2001-2006 considers the total number and density of salmonids observed during the September surveys.

The locations sampled during the recent late season observations conducted in September were the same each year (Table 9). The total number of salmon and rainbow trout observed in September was 40 and 543 respectively in 2006. The low number of juvenile salmon observed in September 2006 was similar to the numbers observed in 2001-05. September 2006 observations of rainbow trout were the highest since the surveys began in 2001. Similar to 2005, rainbow trout were observed downstream to river mile 36.7.

5 SUPPLEMENTAL SEINE SAMPLING

Stillwater Sciences monitored the Big Bend restoration project from River Mile 5.8 to 7.4 on the lower Tuolumne River for fish presence on the inundated floodplain in 2005-2006 for the Tuolumne River Trust. The fishery surveys in 2006 were conducted on April 6 and May 2 and a total of 13 fish species were captured, including 5 native species. Thirteen Chinook salmon were captured on April 6 with an abundance index of .21 fish per 1,000 square feet sampled and ranged from 59 to 102 mm fork length. A draft report is being prepared by Stillwater Sciences.

Table 1. Summary table of weekly seine catch for the Tuolumne and San Joaquin rivers, 2006
2006 JUVENILE SALMON SEINING STUDY (TID/MID)

TUOLUMNE RIVER

DATE	SALMON CATCH	AREA (SQ. FT.)	DENSITY (/1000 ft^2)	MINIMUM FL	MAXIMUM FL	AVERAGE FL	NUMBER MEAS.	SACFRY	NUMBER KILLED
20JAN	39	12,690	3.1	33	57	40.2	39	2	0
01FEB	157	13,050	12.0	32	68	39.3	157	0	1
14FEB	423	13,350	31.7	32	74	42.9	179	1	0
01MAR	232	12,790	18.1	29	77	47.2	119	0	0
15MAR	156	13,550	11.5	35	79	45.7	156	0	0
29MAR	465	15,325	30.3	33	111	58.3	287	0	1
12APR	34	17,050	2.0	37	71	53.2	34	0	0
26APR	1	11,850	0.1	38	38	38.0	1	0	0
10MAY	3	12,950	0.2	40	78	63.3	3	0	0
31MAY	46	14,500	3.2	36	87	47.5	46	0	0
15JUN	2	15,400	0.1	45	72	58.5	2	0	0
TOTAL:	1,558	152,505	10.2				1,023	3	2

SAN JOAQUIN RIVER

DATE	SALMON CATCH	AREA (SQ. FT.)	DENSITY (/1000 ft^2)	MINIMUM FL	MAXIMUM FL	AVERAGE FL	NUMBER MEAS.	SACFRY	NUMBER KILLED
20JAN	3	4,600	0.7	38	41	39.7	3	0	0
01FEB	8	3,000	2.7	37	45	41.5	8	0	0
14FEB	6	2,700	2.2	42	50	45.5	6	0	0
01MAR	2	1,600	1.3	50	51	50.5	2	0	0
15MAR	17	4200	4.0	37	92	50.1	17	0	0
29MAR	3	3,350	0.9	85	104	93.3	3	0	0
12APR	0	1,800	0.0						
26APR	0	3,100	0.0						
10MAY	0	3,150	0.0						
31MAY	0	3,150	0.0						
15JUN	0	3,100	0.0						
TOTAL:	39	33,750	1.2				39	0	0

Table 2. Summary table of weekly seine catch by location for the Tuolumne and San Joaquin Rivers, 2006

2006 Weekly Summary of TID/MID Seining Study
Salmon Density is the Number of Salmon / 1000 sq. ft.

						Extrapolated				EXTRAPOLATED					
										UPPER SECTION	MIDDLE SECTION	LOWER SECTION	UPPER SECTION	MIDDLE SECTION	LOWER SECTION
		Total		Measured	Measured	Density	Density	Density	Average	Density	Density	Density	Density	Density	Density
Date	Location	Catch	Area	Fry	Juvenile	Fry	Juvenile	Total	FL	Fry	Fry	Fry	Juvenile	Juvenile	Juvenile
20JAN	OLGB	24	1,700	23	1	13.5	0.6	14.1	40.5	5.6	1.3	1.4	0.2	0.2	0.0
20JAN	R5	0	2,200					0.0							
20JAN	TRR	3	740	3	0	4.1	0.0	4.1	36.7						
20JAN	HICKMAN	2	2,000	1	1	0.5	0.5	1.0	46.5						
20JAN	CHARLES	0	2,400					0.0							
20JAN	LEGION	6	800	6	0	7.5	0.0	7.5	38.5						
20JAN	RDP	1	450	1	0	2.2	0.0	2.2	39.0						
20JAN	SHILOH	3	2,400	3	0	1.3	0.0	1.3	41.0						
20JAN	LAIRD	0	2,200					0.0							
20JAN	GARDNER	3	2,400	3	0	1.3	0.0	1.3	39.7						
TUOL.TOT.		39	12690	37	2	2.9	0.2	3.1	40.2						
SJR. TOT.		3	4600	3	0	0.7	0.0	0.7	39.7						

2006 Weekly Summary of TID/MID Seining Study
Salmon Density is the Number of Salmon / 1000 sq. ft.

						Extrapolated				EXTRAPOLATED					
										UPPER SECTION	MIDDLE SECTION	LOWER SECTION	UPPER SECTION	MIDDLE SECTION	LOWER SECTION
		Total		Measured	Measured	Density	Density	Density	Average	Density	Density	Density	Density	Density	Density
Date	Location	Catch	Area	Fry	Juvenile	Fry	Juvenile	Total	FL	Fry	Fry	Fry	Juvenile	Juvenile	Juvenile
01FEB	OLGB	14	1800	14	0	7.8	0.0	7.8	38.3	7.0	20.2	5.1	0.4	1.2	0.0
01FEB	R5	18	2200	16	2	7.3	0.9	8.2	40.7						
01FEB	TRR	2	600	2	0	3.3	0.0	3.3	35.0						
01FEB	HICKMAN	51	1900	45	6	23.7	3.2	26.8	40.7						
01FEB	CHARLES	54	2400	54	0	22.5	0.0	22.5	38.6						
01FEB	LEGION	0	600					0.0							
01FEB	RDP	5	1150	5	0	4.3	0.0	4.3	36.8						
01FEB	SHILOH	13	2400	13	0	5.4	0.0	5.4	36.9						
01FEB	LAIRD	0	1200					0.0							
01FEB	GARDNER	8	1800	8	0	4.4	0.0	4.4	41.5						
TUOL.TOT.		157	13050	149	8	11.4	0.6	12.0	39.3						
SJR. TOT.		8	3000	8	0	2.7	0.0	2.7	41.5						

2006 Weekly Summary of TID/MID Seining Study
Salmon Density is the Number of Salmon / 1000 sq. ft.

						Extrapolated				EXTRAPOLATED					
										UPPER SECTION	MIDDLE SECTION	LOWER SECTION	UPPER SECTION	MIDDLE SECTION	LOWER SECTION
		Total		Measured	Measured	Density	Density	Density	Average	Density	Density	Density	Density	Density	Density
Date	Location	Catch	Area	Fry	Juvenile	Fry	Juvenile	Total	FL	Fry	Fry	Fry	Juvenile	Juvenile	Juvenile
14FEB	OLGB	14	1800	14	0	7.8	0.0	7.8	38.0	10.4	61.0	4.9	0.4	9.2	0.3
14FEB	R5	3	2400	3	0	1.3	0.0	1.3	39.7						
14FEB	TRR	38	900	36	2	40.0	2.2	42.2	40.3						
14FEB	HICKMAN	134	2200	43	11	48.5	12.4	60.9	45.2						
14FEB	CHARLES	217	2200	50	3	93.1	5.6	98.6	44.5						
14FEB	LEGION	0	600					0.0							
14FEB	RDP	1	1050	1	0	1.0	0.0	1.0	45.0						
14FEB	SHILOH	16	2200	15	1	6.8	0.5	7.3	41.0						
14FEB	LAIRD	1	900	1	0	1.1	0.0	1.1	50.0						
14FEB	GARDNER	5	1800	5	0	2.8	0.0	2.8	44.6						
TUOL.TOT.		423	13350	162	17	28.7	3.0	31.7	42.9						
SJR. TOT.		6	2700	6	0	2.2	0.0	2.2	45.5						

2006 Weekly Summary of TID/MID Seining Study
Salmon Density is the Number of Salmon / 1000 sq. ft.

						Extrapolated				EXTRAPOLATED					
										UPPER SECTION	MIDDLE SECTION	LOWER SECTION	UPPER SECTION	MIDDLE SECTION	LOWER SECTION
		Total		Measured	Measured	Density	Density	Density	Average	Density	Density	Density	Density	Density	Density
Date	Location	Catch	Area	Fry	Juvenile	Fry	Juvenile	Total	FL	Fry	Fry	Fry	Juvenile	Juvenile	Juvenile
01MAR	OLGB	5	2400	5	0	2.1	0.0	2.1	38.2	6.1	17.6	2.2	0.3	25.6	0.0
01MAR	R5	16	2400	16	0	6.7	0.0	6.7	38.9						
01MAR	TRR	16	920	14	2	15.2	2.2	17.4	37.9						
01MAR	HICKMAN	171	2050	19	39	27.3	56.1	83.4	53.0						
01MAR	CHARLES	18	1800	12	6	6.7	3.3	10.0	47.0						
01MAR	LEGION	0	520					0.0							
01MAR	RDP	1	700	1	0	1.4	0.0	1.4	50.0						
01MAR	SHILOH	5	2000	5	0	2.5	0.0	2.5	45.0						
01MAR	LAIRD Not Sampled														
01MAR	GARDNER	2	1600	1	1	0.6	0.6	1.3	50.5						
TUOL.TOT.		232	12790	72	47	11.0	7.2	18.1	47.2						
SJR. TOT.		2	1600	1	1	0.6	0.6	1.3	50.5						

2006 Weekly Summary of TID/MID Seining Study
Salmon Density is the Number of Salmon / 1000 sq. ft.

						Extrapolated				EXTRAPOLATED					
										UPPER SECTION	MIDDLE SECTION	LOWER SECTION	UPPER SECTION	MIDDLE SECTION	LOWER SECTION
		Total		Measured	Measured	Density	Density	Density	Average	Density	Density	Density	Density	Density	Density
Date	Location	Catch	Area	Fry	Juvenile	Fry	Juvenile	Total	FL	Fry	Fry	Fry	Juvenile	Juvenile	Juvenile
15MAR	OLGB	55	2400	47	8	19.6	3.3	22.9	44.7	8.9	9.5	6.8	1.5	0.7	9.3
15MAR	R4B	0	2400					0.0							
15MAR	TRR	1	600	1	0	1.7	0.0	1.7	45.0						
15MAR	HICKMAN	4	2200	4	0	1.8	0.0	1.8	38.8						
15MAR	CHARLES	1	1800	1	0	0.6	0.0	0.6	38.0						
15MAR	LEGION	50	1350	46	4	34.1	3.0	37.0	41.5						
15MAR	RDP	1	600	1	0	1.7	0.0	1.7	40.0						
15MAR	SHILOH	44	2200	18	26	8.2	11.8	20.0	52.8						
15MAR	LAIRD	2	2400	0	2	0.0	0.8	0.8	87.0						
15MAR	GARDNER	15	1800	11	4	6.1	2.2	8.3	45.2						
TUOL.TOT.		156	13550	118	38	8.7	2.8	11.5	45.7						
SJR. TOT.		17	4200	11	6	2.6	1.4	4.0	50.1						

Table 2 (Continued)

2006 Weekly Summary of TID/MID Seining Study

Salmon Density is the Number of Salmon / 1000 sq. ft.

Date	Location	Total Catch	Area	Measured Fry	Measured Juvenile	Extrapolated Density Fry	Extrapolated Density Juvenile	Density Total	Average FL	EXTRAPOLATED UPPER SECTION Density Fry	MIDDLE SECTION Density Fry	LOWER SECTION Density Fry	UPPER SECTION Density Juvenile	MIDDLE SECTION Density Juvenile	LOWER SECTION Density Juvenile
29MAR	OLGB	0	2000					0.0		7.7	30.4	2.9	0.8	22.5	23.1
29MAR	R4B	42	2400	38	4	15.8	1.7	17.5	42.7						
29MAR	TRR	2	825	2	0	2.4	0.0	2.4	37.5						
29MAR	HICK	246	2000	22	46	39.8	83.2	123.0	59.5						
29MAR	CHARLES	44	1500	34	10	22.7	6.7	29.3	46.8						
29MAR	LEGION	22	2400	21	1	8.8	0.4	9.2	43.9						
29MAR	RDP	50	2400	5	45	2.1	18.8	20.8	72.4						
29MAR	SHILOH	59	1800	7	52	3.9	28.9	32.8	70.6						
29MAR	LAIRD	3	2400	0	3	0.0	1.3	1.3	93.3						
29MAR	GARDNER	0	950					0.0							
TUOL.TOT.		465	15325	129	158	13.6	16.7	30.3	58.3						
SJR. TOT.		3	3350	0	3	0.0	0.9	0.9	93.3						

2006 Weekly Summary of TID/MID Seining Study

Salmon Density is the Number of Salmon / 1000 sq. ft.

Date	Location	Total Catch	Area	Measured Fry	Measured Juvenile	Extrapolated Density Fry	Extrapolated Density Juvenile	Density Total	Average FL	EXTRAPOLATED UPPER SECTION Density Fry	MIDDLE SECTION Density Fry	LOWER SECTION Density Fry	UPPER SECTION Density Juvenile	MIDDLE SECTION Density Juvenile	LOWER SECTION Density Juvenile
12APR	OLGB	5	2400	4	1	1.7	0.4	2.1	42.8	1.1	0.3	0.0	1.7	1.8	0.0
12APR	R4B	15	2400	4	11	1.7	4.6	6.3	53.9						
12APR	TRR	0	2400					0.0							
12APR	HICK	0	2500					0.0							
12APR	FOX GROVE	0	1800					0.0							
12APR	LEGION	14	2400	2	12	0.8	5.0	5.8	56.1						
12APR	RDP	0	1350					0.0							
12APR	SHILOH	0	1800					0.0							
12APR	LAIRD	Not sampled													
12APR	O.F.C.	0	1800					0.0							
TUOL.TOT.		34	17050	10	24	0.6	1.4	2.0	53.2						
SJR. TOT.		0	1800					0.0							

2006 Weekly Summary of TID/MID Seining Study

Salmon Density is the Number of Salmon / 1000 sq. ft.

Date	Location	Total Catch	Area	Measured Fry	Measured Juvenile	Extrapolated Density Fry	Extrapolated Density Juvenile	Density Total	Average FL	EXTRAPOLATED UPPER SECTION Density Fry	MIDDLE SECTION Density Fry	LOWER SECTION Density Fry	UPPER SECTION Density Juvenile	MIDDLE SECTION Density Juvenile	LOWER SECTION Density Juvenile
26APR	OLGB	0	1800					0.0		0.2	0.0	0.0	0.0	0.0	0.0
26APR	R4B	1	2400	1	0	0.4	0.0	0.4	38.0						
26APR	TLSRA	0	1200					0.0							
26APR	HICK	0	1650					0.0							
26APR	FOX GROVE	0	1050					0.0							
26APR	LEGION	0	1800					0.0							
26APR	RDP	0	1050					0.0							
26APR	SHILOH	0	900					0.0							
26APR	LAIRD	0	1750					0.0							
26APR	O.F.C.	0	1350					0.0							
TUOL.TOT.		1	11850	1	0	0.1	0.0	0.1							
SJR. TOT.		0	3100					0.0							

2006 Weekly Summary of TID/MID Seining Study

Salmon Density is the Number of Salmon / 1000 sq. ft.

Date	Location	Total Catch	Area	Measured Fry	Measured Juvenile	Extrapolated Density Fry	Extrapolated Density Juvenile	Density Total	Average FL	EXTRAPOLATED UPPER SECTION Density Fry	MIDDLE SECTION Density Fry	LOWER SECTION Density Fry	UPPER SECTION Density Juvenile	MIDDLE SECTION Density Juvenile	LOWER SECTION Density Juvenile
10MAY	OLGB	1	1600	1	0	0.6	0.0	0.6	40.0	0.2	0.0	0.0	0.2	0.2	0.0
10MAY	R4B	0	1800					0.0							
10MAY	TLSRA	1	1300	0	1	0.0	0.8	0.8	78.0						
10MAY	HICK	1	1650	0	1	0.0	0.6	0.6	72.0						
10MAY	CHARLES	0	1800					0.0							
10MAY	LEGION	0	2400					0.0							
10MAY	RDP	0	1200					0.0							
10MAY	SHILOH	0	1200					0.0							
10MAY	LAIRD	0	1800					0.0							
10MAY	O.F.C.	0	1350					0.0							
TUOL.TOT.		3	12950	1	2	0.1	0.2	0.2	63.3						
SJR. TOT.		0	3150					0.0							

2006 Weekly Summary of TID/MID Seining Study

Salmon Density is the Number of Salmon / 1000 sq. ft.

Date	Location	Total Catch	Area	Measured Fry	Measured Juvenile	Extrapolated Density Fry	Extrapolated Density Juvenile	Density Total	Average FL	EXTRAPOLATED UPPER SECTION Density Fry	MIDDLE SECTION Density Fry	LOWER SECTION Density Fry	UPPER SECTION Density Juvenile	MIDDLE SECTION Density Juvenile	LOWER SECTION Density Juvenile
31MAY	OLGB	1	2400	0	1	0.0	0.4	0.4	85.0	6.5	0.0	0.0	1.8	0.0	0.0
31MAY	R4B	45	2400	36	9	15.0	3.8	18.8	46.7						
31MAY	TRR	0	700					0.0							
31MAY	HICK	0	2400					0.0							
31MAY	CHARLES	0	1350					0.0							
31MAY	LEGION	0	2400					0.0							
31MAY	RDP	0	1350					0.0							
31MAY	SHILOH	0	1500					0.0							
31MAY	LAIRD	0	1350					0.0							
31MAY	O.F.C.	0	1800					0.0							
TUOL.TOT.		46	14500	36	10	2.5	0.7	3.2	47.5						
SJR. TOT.		0	3150					0.0							

2006 Weekly Summary of TID/MID Seining Study

Salmon Density is the Number of Salmon / 1000 sq. ft.

Date	Location	Total Catch	Area	Measured Fry	Measured Juvenile	Extrapolated Density Fry	Extrapolated Density Juvenile	Density Total	Average FL	EXTRAPOLATED UPPER SECTION Density Fry	MIDDLE SECTION Density Fry	LOWER SECTION Density Fry	UPPER SECTION Density Juvenile	MIDDLE SECTION Density Juvenile	LOWER SECTION Density Juvenile
15JUN	OLGB	0	2400					0.0		0.2	0.0	0.0	0.2	0.0	0.0
15JUN	R4B	2	2400	1	1	0.4	0.4	0.8	58.5						
15JUN	TRR	0	850					0.0							
15JUN	HICK	0	1800					0.0							
15JUN	CHARLES	0	1800					0.0							
15JUN	LEGION	0	2400					0.0							
15JUN	RDP	0	1350					0.0							
15JUN	SHILOH	0	2400					0.0							
15JUN	LAIRD	0	2200					0.0							
15JUN	GARDNER	0	900					0.0							
TUOL.TOT.		2	15400	1	1	0.1	0.1	0.1	58.5						
SJR. TOT.		0	3100					0.0							

Table 3. Summary table of weekly seine catch by location for the Tuolumne and San Joaquin Rivers, 2006.

2006 TUOLUMNE RIVER SEINING STUDY (TID/MID)

DATE	LOCATION	RIVER MILE	CATCH	AREA	DENSITY (/1000ft^2)	FL MIN.	FL MAX.	FL AVG.	NO. MEAS.	SACFRY	NO. KILLED	WATER TEMP.	ELEC. COND.	SMOLT FL	SECTION DENSITY UPPER	MIDDLE	LOWER	TURB.	D.O. (ppm)
20JAN	OLGB	50.5	24	1,700	14.1	34	57	40.5	24	2		10.3	33		5.8	1.5	1.4	3.8	15.2
20JAN	R5	48.0	0	2,200	0.0				0			10.3	34					3.8	14.5
20JAN	TRR	42.3	3	740	4.1	36	37	36.7	3			10.2	37					4.2	14.6
20JAN	HICK	31.6	2	2,000	1.0	38	55	46.5	2			10.1	38					4.0	14.3
20JAN	CHARLES	24.9	0	2,400	0.0				0			10.3	42					4.1	13.4
20JAN	LEGION	17.2	6	800	7.5	37	42	38.5	6			10.6	43					3.8	13.6
20JAN	RDP	12.3	1	450	2.2	39	39	39.0	1			10.5	39					8.8	13.2
20JAN	SHILOH	3.4	3	2,400	1.3	33	50	41.0	3			10.5	57					8.8	13.5
20JAN	LAIRD	90.2	0	2,200	0.0				0			10.4	677					18.0	12.4
20JAN	GARDNER	79.5	3	2,400	1.3	38	41	39.7	3			10.5	338					13.4	12.7
TR TOT.			39	12690	3.1	33	57	40.2	39	2	0								
SJR TOT.			3	4600	0.7	38	41	39.7	3										

2006 TUOLUMNE RIVER SEINING STUDY (TID/MID)

DATE	LOCATION	RIVER MILE	CATCH	AREA	DENSITY (/1000ft^2)	FL MIN.	FL MAX.	FL AVG.	NO. MEAS.	SACFRY	NO. KILLED	WATER TEMP.	ELEC. COND.	SMOLT FL	SECTION DENSITY UPPER	MIDDLE	LOWER	TURB.	D.O. (ppm)
01FEB	OLGB	50.5	14	1800	7.8	34	46	38.3	14			10.5	33		7.4	21.4	5.1	3.1	13.6
01FEB	R5	48.0	18	2200	8.2	34	68	40.7	18			10.6	34					2.4	13.6
01FEB	TRR	42.3	2	600	3.3	33	37	35.0	2			10.6	37					3.0	13.6
01FEB	HICK	31.6	51	1900	26.8	32	64	40.7	51		1	10.7	37					4.2	13.0
01FEB	CHARLES	24.9	54	2400	22.5	35	47	38.6	54			10.8	40					4.2	13.1
01FEB	LEGION	17.2	0	600	0.0				0			11.0	40					6.5	13.6
01FEB	RDP	12.3	5	1150	4.3	33	41	36.8	5			11.2	42					5.4	13.2
01FEB	SHILOH	3.4	13	2400	5.4	33	42	36.9	13			11.2	43					7.1	11.6
01FEB	LAIRD	90.2	0	1200	0.0				0			12.2	865					17.7	11.0
01FEB	GARDNER	79.5	8	1800	4.4	37	45	41.5	8			11.4	364					14.3	12.3
TR TOT.			157	13050	12.0	32	68	39.3	157	0	1								
SJR TOT.			8	3000	2.7	37	45	41.5	8	0	0								

2006 TUOLUMNE RIVER SEINING STUDY (TID/MID)

DATE	LOCATION	RIVER MILE	CATCH	AREA	DENSITY (/1000ft^2)	FL MIN.	FL MAX.	FL AVG.	NO. MEAS.	SACFRY	NO. KILLED	WATER TEMP.	ELEC. COND.	SMOLT FL	SECTION DENSITY UPPER	MIDDLE	LOWER	TURB.	D.O. (ppm)
14FEB	OLGB	50.5	14	1800	7.8	34	46	38.0	14			10.5	33		10.8	70.2	5.2	1.9	12.0
14FEB	R5	48.0	3	2400	1.3	39	40	39.7	3			10.4	33					1.7	13.2
14FEB	TRR	42.3	38	900	42.2	32	68	40.3	38	1		10.6	36					2.5	12.4
14FEB	HICK	31.6	134	2200	60.9	35	74	45.2	54			10.7	36					2.8	10.9
14FEB	CHARLES	24.9	217	2200	98.6	35	66	44.5	53			11.2	39					2.8	10.2
14FEB	LEGION	17.2	0	600	0.0							12.5	39					4.3	10.2
14FEB	RDP	12.3	1	1050	1.0	45	45	45.0	1			12.2	42					4.3	10.2
14FEB	SHILOH	3.4	16	2200	7.3	34	51	41.0	16			12.4	41					4.9	10.6
14FEB	LAIRD	90.2	1	900	1.1	50	50	50.0	1			14.5	873					30.4	9.4
14FEB	GARDNER	79.5	5	1800	2.8	42	47	44.6	5			13.1	454					11.7	10.6
TR TOT.			423	13350	31.7	32	74	42.9	179	1	0								
SJR TOT.			6	2700	2.2	42	50	45.5	6	0	0								

2006 TUOLUMNE RIVER SEINING STUDY (TID/MID)

DATE	LOCATION	RIVER MILE	CATCH	AREA	DENSITY (/1000ft^2)	FL MIN.	FL MAX.	FL AVG.	NO. MEAS.	SACFRY	NO. KILLED	WATER TEMP.	ELEC. COND.	SMOLT FL	SECTION DENSITY UPPER	MIDDLE	LOWER	TURB.	D.O. (ppm)
01MAR	OLGB	50.5	5	2400	2.1	36	43	38.2	5			10.7	32		6.5	43.2	2.2	1.6	13.2
01MAR	R5	48.0	16	2400	6.7	35	45	38.9	16			10.4	33					1.6	13.2
01MAR	TRR	42.3	16	920	17.4	29	57	37.9	16			10.5	37					2.1	12.0
01MAR	HICK	31.6	171	2050	83.4	38	77	53.0	58			10.6	35					3.1	11.3
01MAR	CHARLES	24.9	18	1800	10.0	37	55	47.0	18			11.2	38					4.7	10.9
01MAR	LEGION	17.2	0	520	0.0				0			12.2	39					4.3	10.2
01MAR	RDP	12.3	1	700	1.4	50	50	50.0	1			12.1	40					5.3	10.3
01MAR	SHILOH	3.4	5	2000	2.5	40	48	45.0	5			12.2	40					5.5	10.7
01MAR	LAIRD	90.2	Not Sampled																
01MAR	GARDNER	79.5	2	1600	1.3	50	51	50.5	2			13.3	406					13.7	10.0
TR TOT.			232	12790	18.1	29	77	47.2	119	0	0								
SJR TOT.			2	1600	1.3	50	51	50.5	2	0	0								

2006 TUOLUMNE RIVER SEINING STUDY (TID/MID)

DATE	LOCATION	RIVER MILE	CATCH	AREA	DENSITY (/1000ft^2)	FL MIN.	FL MAX.	FL AVG.	NO. MEAS.	SACFRY	NO. KILLED	WATER TEMP.	ELEC. COND.	SMOLT FL	SECTION DENSITY UPPER	MIDDLE	LOWER	TURB.	D.O. (ppm)
15MAR	OLGB	50.5	55	2400	22.9	36	57	44.7	55			10.2	33		10.4	10.3	16.1	1.5	13.7
15MAR	R4B	48.4	0	2400	0.0				0			10.4	35					1.0	13.9
15MAR	TRR	42.3	1	600	1.7	45	45	45.0	1			10.3	38					2.3	10.7
15MAR	HICK	31.6	4	2200	1.8	35	42	38.8	4			10.4	37					3.0	11.1
15MAR	CHARLES	24.9	1	1800	0.6	38	38	38.0	1			10.8	37					3.1	10.8
15MAR	LEGION	17.2	50	1350	37.0	35	63	41.5	50			11.5	38					3.1	11.5
15MAR	RDP	12.3	1	600	1.7	40	40	40.0	1			11.4	39					4.4	11.0
15MAR	SHILOH	3.4	44	2200	20.0	37	79	52.8	44			11.6	40					8.2	11.1
15MAR	LAIRD	90.2	2	2400	0.8	82	92	87.0	2			11.2	459	82,92				19.9	10.5
15MAR	GARDNER	79.5	15	1800	8.3	37	62	45.2	15			11.4	252					12.1	10.8
TR TOT.			156	13550	11.5	35	79	45.7	156	0	0								
SJR TOT.			17	4200	4.0	37	92	50.1	17	0	0								

Table 3 (Continued)

2006 TUOLUMNE RIVER SEINING STUDY (TID/MID)

DATE	LOCATION	RIVER MILE	CATCH	AREA	DENSITY (/1000ft^2)	FL MIN.	FL MAX.	FL AVG.	NO. MEAS.	SACFRY	NO. KILLED	WATER TEMP.	ELEC. COND.	SMOLT FL	SECTION DENSITY UPPER	MIDDLE	LOWER	TURB.	D.O. (ppm)
29MAR	OLGB	50.5	0	2000	0.0							9.9	30		8.4	52.9	26.0	1.9	13.8
29MAR	R4B	48.4	42	2400	17.5	33	53	42.7	42	0	0	10.0	33					2.2	12.4
29MAR	TRR	42.3	2	825	2.4	35	40	37.5	2	0	0	9.9	37					3.7	11.1
29MAR	HICK	31.6	246	2000	123.0	37	93	59.5	68	0	0	10.2	37	5(71-93)				6.7	11.1
29MAR	CHARLES	24.9	44	1500	29.3	37	62	46.8	44	0	0	10.6	39					8.3	10.8
29MAR	LEGION	17.2	22	2400	9.2	38	53	43.9	22	0	0	11.0	36					12.0	10.8
29MAR	RDP	12.3	50	2400	20.8	40	102	72.4	50	0	0	11.6	56	29(66-102)				71.6	10.0
29MAR	SHILOH	3.4	59	1800	32.8	41	111	70.6	59	0	0	11.5	45	30(68-111)				14.8	10.7
29MAR	LAIRD	90.2	3	2400	1.3	85	104	93.3	3	0	0	13.4	432	3(85-104)				23.1	9.7
29MAR	GARDNER	79.5	0	950	0.0							12.5	213					N.A.	10.0
TR TOT.			465	15325	30.3	33	111	58.3	287	0	0								
SJR TOT.			3	3350	0.9	85	104	93.3	3	0	0								

2006 TUOLUMNE RIVER SEINING STUDY (TID/MID)

DATE	LOCATION	RIVER MILE	CATCH	AREA	DENSITY (/1000ft^2)	FL MIN.	FL MAX.	FL AVG.	NO. MEAS.	SACFRY	NO. KILLED	WATER TEMP.	ELEC. COND.	SMOLT FL	SECTION DENSITY UPPER	MIDDLE	LOWER	TURB.	D.O. (ppm)
12APR	OLGB	50.5	5	2400	2.1	37	53	42.8	5	0	0	10.1	35		2.8	2.1	0.0	2.4	12.5
12APR	R4B	48.4	15	2400	6.3	46	71	53.9	15	0	0	10.4	38					3.4	11.7
12APR	TRR	42.3	0	2400	0.0							11.5	55					2.3	9.1
12APR	HICK	31.6	0	2500	0.0							10.6	38					4.7	10.2
12APR	FOX GROVE	26.0	0	1800	0.0							10.7	39					3.8	10.6
12APR	LEGION	17.2	14	2400	5.8	50	67	56.1	14	0	0	11.4	39					5.3	10.4
12APR	RDP	12.3	0	1350	0.0							12.5	41					6.3	9.8
12APR	SHILOH	3.4	0	1800	0.0							12.8	42					3.0	9.2
12APR	LAIRD	90.2	Not sampled																
12APR	O.F.C.	80.7	0	1800	0.0							14.1	145					14.2	7.0
TR TOT.			34	17050	2.0	37	71	53.2	34	0	0								
SJR TOT.			0	1800	0.0														

2006 TUOLUMNE RIVER SEINING STUDY (TID/MID)

DATE	LOCATION	RIVER MILE	CATCH	AREA	DENSITY (/1000ft^2)	FL MIN.	FL MAX.	FL AVG.	NO. MEAS.	SACFRY	NO. KILLED	WATER TEMP.	ELEC. COND.	SMOLT FL	SECTION DENSITY UPPER	MIDDLE	LOWER	TURB.	D.O. (ppm)
26APR	OLGB	50.5	0	1800	0.0							10.3	39		0.2	0.0	0.0	2.9	13.0
26APR	R4B	48.4	1	2400	0.4	38	38	38.0	1			10.6	29					3.3	13.1
26APR	TLSRA	42.0	0	1200	0.0							10.6	42					3.6	10.9
26APR	HICK	31.6	0	1650	0.0							10.7	41					5.1	10.5
26APR	FOX GROVE	26.0	0	1050	0.0							11.2	43					4.2	10.9
26APR	LEGION	17.2	0	1800	0.0							12.0	42					6.2	11.0
26APR	RDP	12.3	0	1050	0.0							12.1	44					12.0	10.7
26APR	SHILOH	3.4	0	900	0.0							12.6	44					5.1	10.5
26APR	LAIRD	90.2	0	1750	0.0							17.1	154					9.2	7.7
26APR	O.F.C.	80.7	0	1350	0.0							15.9	116					9.7	8.0
TR TOT.			1	11850	0.1				1	0	0								
SJR TOT.			0	3100	0.0				0	0	0								

2006 TUOLUMNE RIVER SEINING STUDY (TID/MID)

DATE	LOCATION	RIVER MILE	CATCH	AREA	DENSITY (/1000ft^2)	FL MIN.	FL MAX.	FL AVG.	NO. MEAS.	SACFRY	NO. KILLED	WATER TEMP.	ELEC. COND.	SMOLT FL	SECTION DENSITY UPPER	MIDDLE	LOWER	TURB.	D.O. (ppm)
10MAY	OLGB	50.5	1	1600	0.6	40	40	40.0	1			10.8	39		0.4	0.2	0.0	2.5	N.A.
10MAY	R4B	48.4	0	1800	0.0							11.4	42					2.4	12.4
10MAY	TLSRA	42.0	1	1300	0.8	78	78	78.0	1			11.1	42	78				2.9	11.1
10MAY	HICK	31.6	1	1650	0.6	72	72	72.0	1			11.3	32					3.7	12.4
10MAY	CHARLES	24.9	0	1800	0.0							12.4	43					4.9	13.0
10MAY	LEGION	17.2	0	2400	0.0							13.0	44					3.7	11.3
10MAY	RDP	12.3	0	1200	0.0							13.3	45					4.2	12.3
10MAY	SHILOH	3.4	0	1200	0.0							13.9	44					4.1	12.5
10MAY	LAIRD	90.2	0	1800	0.0							21.1	147					13.1	7.9
10MAY	O.F.C.	80.7	0	1350	0.0							18.9	108					10.0	8.5
TR TOT.			3	12950	0.2	40	78	63.3	3	0	0								
SJR TOT.			0	3150	0.0														

2006 TUOLUMNE RIVER SEINING STUDY (TID/MID)

DATE	LOCATION	RIVER MILE	CATCH	AREA	DENSITY (/1000ft^2)	FL MIN.	FL MAX.	FL AVG.	NO. MEAS.	SACFRY	NO. KILLED	WATER TEMP.	ELEC. COND.	SMOLT FL	SECTION DENSITY UPPER	MIDDLE	LOWER	TURB.	D.O. (ppm)
31MAY	OLGB	50.5	1	2400	0.4	85	85	85.0	1	0	0	11.4	36	85	8.4	0.0	0.0	1.1	12.8
31MAY	R4B	48.4	45	2400	18.8	36	87	46.7	45	0	0	11.7	37	87				1.6	12.5
31MAY	TRR	42.3	0	700	0.0							11.8	39					2.8	12.0
31MAY	HICK	31.6	0	2400	0.0							12.1	40					1.6	11.5
31MAY	CHARLES	24.9	0	1350	0.0							12.8	43					3.1	11.0
31MAY	LEGION	17.2	0	2400	0.0							14.5	44					3.3	10.9
31MAY	RDP	12.3	0	1350	0.0							14.7	45					4.1	10.8
31MAY	SHILOH	3.4	0	1500	0.0							14.9	45					3.5	10.7
31MAY	LAIRD	90.2	0	1350	0.0							21.7	144					13.2	9.7
31MAY	O.F.C.	80.7	0	1800	0.0							19.1	103					12.3	8.3
TR TOT.			46	14500	3.2	36	87	47.5	46	0	0								
SJR TOT.			0	3150	0.0														

2006 TUOLUMNE RIVER SEINING STUDY (TID/MID)

DATE	LOCATION	RIVER MILE	CATCH	AREA	DENSITY (/1000ft^2)	FL MIN.	FL MAX.	FL AVG.	NO. MEAS.	SACFRY	NO. KILLED	WATER TEMP.	ELEC. COND.	SMOLT FL	SECTION DENSITY UPPER	MIDDLE	LOWER	TURB.	D.O. (ppm)
15JUN	OLGB	50.5	0	2400	0.0							11.8	32		0.4	0.0	0.0	0.7	12.3
15JUN	R4B	48.4	2	2400	0.8	45	72	58.5	2	0	0	12.4	34					1.8	12.2
15JUN	TRR	42.3	0	850	0.0							12.3	35					1.4	11.4
15JUN	HICK	31.6	0	1800	0.0							12.5	35					2.0	10.7
15JUN	CHARLES	24.9	0	1800	0.0							13.3	37					2.9	10.5
15JUN	LEGION	17.2	0	2400	0.0							14.9	38					3.3	10.2
15JUN	RDP	12.3	0	1350	0.0							14.9	39					2.8	10.2
15JUN	SHILOH	3.4	0	2400	0.0							15.2	39					3.1	10.3
15JUN	LAIRD	90.2	0	2200	0.0							21.2	125					24.5	7.0
15JUN	GARDNER	79.5	0	900	0.0							19.1	97					22.3	8.2
TR TOT.			2	15400	0.1	45	72	58.5	2	0	0								
SJR TOT.			0	3100	0.0														

Table 4. Key to other species caught and their distribution

(List includes all species caught during 1986-2006 seining studies)

FAMILY	COMMON NAME	NATIVE SPECIES	ABBREV.	SAN JOAQUIN	TUOL.
Petromyzontidae	Pacific lamprey	N	LP		
Clupeidae	threadfin shad		TFS		
Salmonidae	Chinook salmon	N	CS	X	X
Salmonidae	rainbow trout	N	RT		X
Cyprinidae	carp		CP	X	X
Cyprinidae	goldfish		GF	X	
Cyprinidae	golden shiner		GSH		X
Cyprinidae	Sacramento blackfish	N	SBF		
Cyprinidae	hitch	N	HCH		
Cyprinidae	hardhead	N	HH		X
Cyprinidae	Sacramento pikeminnow	N	PM	X	X
Cyprinidae	Sacramento splittail	N	ST	X	
Cyprinidae	red shiner		PRS	X	X
Cyprinidae	fathead minnow		FHM	X	
Catostomidae	Sacramento sucker	N	SKR	X	X
Ictaluridae	channel catfish		CCF		
Ictaluridae	white catfish		WCF		
Ictaluridae	brown bullhead		BBH		
Poeciliidae	western mosquitofish		GAM	X	X
Atherinidae	inland silverside		ISS	X	X
Percichthyidae	striped bass		SB		
Centrarchidae	white/black crappie		WCR/BCR		
Centrarchidae	warmouth		WM		
Centrarchidae	green sunfish		GSF	X	X
Centrarchidae	bluegill		BG	X	X
Centrarchidae	redear sunfish		RSF		X
Centrarchidae	largemouth bass		LMB		X
Centrarchidae	smallmouth bass		SMB		
Percidae	bigscale logperch		BLP		
Embiotocidae	tule perch	N	TP		
Cottidae	prickly sculpin	N	PSCP	X	X
Cottidae	riffle sculpin	N	RSCP		X
TOTAL:	32			13	16

2006 species presence designated with 'X'

Table 4. 2006 OTHER SPECIES SAMPLED DURING SEINING STUDIES ON JUVENILE SALMON

2006 OTHER SPECIES SAMPLED DURING SEINING STUDIES ON JUVENILE SALMON

OTHER SPECIES SAMPLED (ACTUAL COUNTS OR ESTIMATED ABUNDANCE)

DATE	SITE	LOCATION	MILE	LP	TFS	RT	CP	GF	GSH	SBF	HH	HCH	PM	ST	PRS	FHM	SKR	WCF	GAM	ISS	SB	WCR	GSF	BG	LMB	SMB	BLP	TP	RSCP	RSF	CCF	CENT
20JAN	1	OLGB	50.5														4														
20JAN	2	R5	48.0																												
20JAN	3	TRR	42.3																2												
20JAN	4	HICK	31.6										1																		
20JAN	5	CHARLES	24.9																												
20JAN	6	LEGION	17.2														1		1												
20JAN	7	VENN	7.4												60																
20JAN	8	SHILOH	3.4												3																
20JAN	9	LAIRD	90.2												120		1			60			1	1							
20JAN	10	GARDNER	77.8												50		1			20											

DATE	SITE	LOCATION	MILE	LP	TFS	RT	CP	GF	GSH	SBF	HH	HCH	PM	ST	PRS	FHM	SKR	WCF	GAM	ISS	SB	WCR	GSF	BG	LMB	SMB	BLP	TP	RSCP	RSF	CCF	CENT
01FEB	1	OLGB	50.5														2		1										1			
01FEB	2	R5	48.0														1												1			
01FEB	3	TRR	42.3			1											1												1			
01FEB	4	HICK	31.6														2															
01FEB	5	CHARLES	24.9														1															
01FEB	6	LEGION	17.2														1		1													
01FEB	7	VENN	7.4												30																	
01FEB	8	SHILOH	3.4												6		1															
01FEB	9	LAIRD	90.2												200					150												
01FEB	10	GARDNER	77.8												30																	

DATE	SITE	LOCATION	MILE	LP	TFS	RT	CP	GF	GSH	SBF	HH	HCH	PM	ST	PRS	FHM	SKR	WCF	GAM	ISS	SB	WCR	GSF	BG	LMB	SMB	BLP	TP	RSCP	RSF	CCF	CENT
14FEB	1	OLGB	50.5														2		3										1			
14FEB	2	R5	48.0														1												1			
14FEB	3	TRR	42.3														1												1			
14FEB	4	HICK	31.6										2				1															
14FEB	5	CHARLES	24.9														1															
14FEB	6	LEGION	17.2														1															
14FEB	7	VENN	7.4												3																	
14FEB	8	SHILOH	3.4												2					2												
14FEB	9	LAIRD	90.2												200	1				6				3								
14FEB	10	GARDNER	77.8												10																	

DATE	SITE	LOCATION	MILE	LP	TFS	RT	CP	GF	GSH	SBF	HH	HCH	PM	ST	PRS	FHM	SKR	WCF	GAM	ISS	SB	WCR	GSF	BG	LMB	SMB	BLP	TP	RSCP	RSF	CCF	CENT
01MAR	1	OLGB	50.5																													
01MAR	2	R5	48.0														1												2			
01MAR	3	TRR	42.3			3													5										1			
01MAR	4	HICK	31.6								1		2																			
01MAR	5	CHARLES	24.9																													
01MAR	6	LEGION	17.2										1						1													
01MAR	7	RDP	12.3																													
01MAR	8	SHILOH	3.4												30																	
01MAR	9	LAIRD	90.2																													
01MAR	10	GARDNER	77.8																4													

DATE	SITE	LOCATION	MILE	LP	TFS	RT	CP	GF	GSH	SBF	HH	HCH	PM	ST	PRS	FHM	SKR	WCF	GAM	ISS	SB	WCR	GSF	BG	LMB	SMB	BLP	TP	RSCP	RSF	CCF	CENT
15MAR	1	OLGB	50.5																													
15MAR	2	R5	48.0																													
15MAR	3	TRR	42.3														1															
15MAR	4	HICK	31.6																													
15MAR	5	CHARLES	24.9														1															
15MAR	6	LEGION	17.2										2				2															
15MAR	7	RDP	12.3												20																	
15MAR	8	SHILOH	3.4																													
15MAR	9	LAIRD	90.2												200					20												
15MAR	10	GARDNER	77.8																													

DATE	SITE	LOCATION	MILE	LP	TFS	RT	CP	GF	GSH	SBF	HH	HCH	PM	ST	PRS	FHM	SKR	WCF	GAM	ISS	SB	WCR	GSF	BG	LMB	SMB	BLP	TP	RSCP	RSF	CCF	CENT
29MAR	1	OLGB	50.5																													
29MAR	2	R4B	48.4			2																										
29MAR	3	TRR	42.3																1													
29MAR	4	HICK	31.6										3																			
29MAR	5	CHARLES	24.9														1															
29MAR	6	LEGION	17.2																1													
29MAR	7	RDP	12.3						1						24																	
29MAR	8	SHILOH	3.4												3																	
29MAR	9	LAIRD	90.2												200					10												
29MAR	10	GARDNER	77.8												50																	

DATE	SITE	LOCATION	MILE	LP	TFS	RT	CP	GF	GSH	SBF	HH	HCH	PM	ST	PRS	FHM	SKR	WCF	GAM	ISS	SB	WCR	GSF	BG	LMB	SMB	BLP	TP	RSCP	RSF	CCF	CENT
12APR	1	OLGB	50.5																													
12APR	2	R4B	48.4																													
12APR	3	TRR	42.3																													
12APR	4	HICK	31.6										1																			
12APR	5	CHARLES	24.9																													
12APR	6	LEGION	17.2																													
12APR	7	RDP	12.3										1		1														Pscp(1)			
12APR	8	SHILOH	3.4														YOY															
12APR	9	LAIRD	90.2																													
12APR	10	GARDNER	77.8												20					6												

DATE	SITE	LOCATION	MILE	LP	TFS	RT	CP	GF	GSH	SBF	HH	HCH	PM	ST	PRS	FHM	SKR	WCF	GAM	ISS	SB	WCR	GSF	BG	LMB	SMB	BLP	TP	RSCP	RSF	CCF	CENT
26APR	1	OLGB	50.5														2												1			
26APR	2	R5	48.0																													
26APR	3	TRR	42.3														1		1										1			
26APR	4	HICK	31.6										2				1															
26APR	5	CHARLES	24.9																													
26APR	6	LEGION	17.2														2		1													
26APR	7	RDP	12.3																											1		
26APR	8	SHILOH	3.4																													
26APR	9	LAIRD	90.2																10	10												
26APR	10	GARDNER	77.8												2				2										Pscp(5)			

DATE	SITE	LOCATION	MILE	LP	TFS	RT	CP	GF	GSH	SBF	HH	HCH	PM	ST	PRS	FHM	SKR	WCF	GAM	ISS	SB	WCR	GSF	BG	LMB	SMB	BLP	TP	RSCP	RSF	CCF	CENT
10MAY	1	OLGB	50.5																										1			
10MAY	2	R4B	48.4																													
10MAY	3	TRR	42.3																													
10MAY	4	HICK	31.6																													
10MAY	5	CHARLES	24.9																				1									
10MAY	6	LEGION	17.2																1										PSCP(2)			
10MAY	7	RDP	12.3												5		YOY															
10MAY	8	SHILOH	3.4												2				2										PSCP(2)			
10MAY	9	LAIRD	90.2				90	10							200		20			20												
10MAY	10	GARDNER	77.8					1							200																	

DATE	SITE	LOCATION	MILE	LP	TFS	RT	CP	GF	GSH	SBF	HH	HCH	PM	ST	PRS	FHM	SKR	WCF	GAM	ISS	SB	WCR	GSF	BG	LMB	SMB	BLP	TP	RSCP	RSF	CCF	CENT
31MAY	1	OLGB	50.5			2																							10			
31MAY	2	R4B	48.4														YOY												5			
31MAY	3	TRR	42.3														YOY												6			
31MAY	4	HICK	31.6														YOY															
31MAY	5	CHARLES	24.9														YOY								1							
31MAY	6	LEGION	17.2														YOY							1					1			
31MAY	7	RDP	12.3														YOY															
31MAY	8	SHILOH	3.4				20								6																	
31MAY	9	LAIRD	90.2				30								100		10															
31MAY	10	GARDNER	77.8				10								100		1															

DATE	SITE	LOCATION	MILE	LP	TFS	RT	CP	GF	GSH	SBF	HH	HCH	PM	ST	PRS	FHM	SKR	WCF	GAM	ISS	SB	WCR	GSF	BG	LMB	SMB	BLP	TP	RSCP	RSF	CCF	CENT
15JUN	1	OLGB	50.5														YOY												50			
15JUN	2	R4B	48.4														YOY												10			
15JUN	3	TRR	42.3														YOY												3			
15JUN	4	HICK	31.6														YOY															
15JUN	5	CHARLES	24.9														YOY												1			
15JUN	6	LEGION	17.2														YOY															
15JUN	7	RDP	12.3														YOY								2							
15JUN	8	SHILOH	3.4				8								10																	
15JUN	9	LAIRD	90.2				100							15	20																	

15JUN	10	GARDNER	77.8		3	6	6

Table 5. Tuolumne River snorkel summary, 2006.

2006 TUOLUMNE RIVER SNORKEL SUMMARY (TID/MID)

															NUMBER COUNTED (ESTIMATED TOTAL LENGTH OR SIZE RANGE IN MM)								
DATE	START TIME	LOCATION	RIVER MILE	SITE	AREA (Sq. Ft.)	AVG. DEPTH (FEET)	TIME (Min.)	HABITAT	SUBSTRATE	WATER TEMP. (C)	DO (mg/l)	EC	TURB. (NTU)	HORIZ. VISIB. (FEET)	CHINOOK count/est.	CHINOOK size	RAINBOW count/est.	RAINBOW size	SACRAMENTO SUCKER	SACRAMENTO PIKEMINNOW	HARDHEAD	RIFFLE SCULPIN	LARGEMOUTH BASS
19SEP	0923	Riffle A7	50.7	1	8,000	1.5	20.0	Riffle	cobble,gravel,boulder	12.4	N.A.	27	0.5	22.4			52	(120-350)				(65,65)	
	0925			2	4,000	4.0	20.0	Run	cobble,gravel,sand								63	(100-420)					
19SEP	1051	Riffle 2	49.9	1	7,500	1.3	20.0	Riffle	cobble,gravel,sand	13.3	N.A.	29	0.8	23.8								4(35-75)	
	1107			2	4,500	7.0	20.0	Pool	cobble,bedrock,boulder								9	(250-400)					
	1107			3	5,000	5.0	14.0	Run-Pool	cobble,boulder,bedrock								6	(260-320)					
19SEP	1255	Riffle 3B	49.1	1	4,000	2.0	21.0	Riffle	cobble,gravel,sand	14.3	N.A.	29	0.4	22.1	10	(100-120)	48	(110-525)				(40,70,80)	
	1255			2	5,000	2.5	15.0	Run-Riffle	cobble,gravel,boulder								18	(100-350)		(500)			
19SEP	1405	Riffle 5B	47.9	1	3,000	2.0	18.0	Riffle	cobble,gravel,sand	15.2	N.A.	30	0.5	20.0			21	(110-400)				(60)	
	1432			2	12,000	5.0	30.0	Run	cobble,bedrock,sand								8	(150-450)		(560)		(50,90)	
	1400			3	7,500	6.0	16.0	Run-Pool	bedrock,boulder,cobble								25	(100-380)		(600)			
					60,500		194.0		**Subtotal**						**10**		**250**		**0**	**3**		**12**	
20SEP	0928	Riffle 7	46.9	1	7,500	1.5	22.0	Riffle	boulder,cobble,gravel	12.0	10.7	29	0.4	21.1			21	(50-280)				(100,120)	
	0927			2	8,000	4.0	21.0	Run	bedrock,cobble,sand								85	(100-440)	26(400-550)	(350,450,480)			
20SEP	1046	Riffle 13B	45.5	1	5,000	2.0	22.0	Run-Riffle	cobble,gravel,sand	13.0	10.4	24	0.4	20.3	8	(110-120)	32	(50-300)				(50)	
	1054			2	5,000	1.5	20.0	Riffle	gravel,sand,cobble								71	(100-220)					
20SEP	1255	Riffle 21	42.9	1	2,250	3.0	19.0	Riffle	cobble,gravel,sand	14.2	10.5	32	0.4	17.4	10	(110-150)	21	(120-350)				(100)	
	1303			2	9,000	5.0	18.0	Run-Pool	cobble,sand,vegetation								11	(100-420)		(200,250)			
20SEP	1410	Riffle 23C	42.3	1	1,500	3.0	10.0	Run	sand,gravel,bedrock	15.3	10.4	27	0.8	17.0	8	(100-120)	3	(180-220)					
	1414			2	5,000	2.0	18.0	Riffle	cobble,bedrock,sand								24	(100-220)		(260)			
					43,250		150.0		**Subtotal**						**26**		**268**		**26**	**6**		**4**	
21SEP	0916	Riffle 31	38.0	1	6,000	2.0	22.0	Riffle	cobble,gravel,boulder	14.9	10.3	41	0.7	14.1			21	(60-160)	12(60-110)				
	0918			2	9,750	3.0	23.0	Run-Pool	cobble,gravel,sand										(60)				
21SEP	1036	Riffle 36A	36.7	1	4,000	1.0	18.0	Riffle	boulder,cobble,gravel	15.4	9.9	42	0.9	10.0	4	(35-40)			4(60-90)			(60)	
	1035			2	10,000	3.5	19.0	Run	sand, cobble,gravel								4	(60-70)		(320)			(360)
21SEP	1207	Riffle 41A	35.3	1	3,000	2.0	12.0	Riffle-Run	cobble,gravel,sand	15.9	10.2	43	1.7	5.0					(100)				
				2	(not sampled, poor visib.)			Pool	gravel,sand,bedrock														
	1212			3	6,000	2.0	16.0	Run-Riffle	cobble,gravel,sand										(60)				
21SEP		Riffle 57	31.5	1	(not sampled, poor visib.)			Riffle	cobble,gravel,sand	16.9	10.2	47	1.0	5.0									
				2	(not sampled, poor visib.)			Run-Riffle	cobble,bedrock,sand														
					38,750		110.0		**Subtotal**						**4**		**25**		**19**	**1**		**1**	**1**
									TOTAL#						**40**		**543**		**45**	**10**	**0**	**17**	**1**

Young of the year sucker were commonly observed along the banks.

Table 6. Yearly seining summary for the Tuolumne, San Joaquin, and Stanislaus Rivers, 1986-2006.
Tuolumne River Seining Study Summary (Tuolumne, San Joaquin and Stanislaus Rivers)

	TUOLUMNE RIVER					SAN JOAQUIN			STANISLAUS				
Sampling Year	Sampling Periods	Salmon Captured	Sites Sampled	Average Density	Growth Rate Index (mm/day)	Salmon Captured	Sites Sampled	Average Density	Salmon Captured	Sites Sampled	Average Density	Start Date	End Date
1986	18	5514	8	20.7	0.45	854	3	14.2	---	---		22JAN	27JUN
1987	21	14825	11	22.4	0.45	734	6	1.9	---	---		05JAN	04JUN
1988	14	6134	11	14.3	0.58	295	4	2.1	84	1	2.9	05JAN	17MAY
1989	13	10043	11	27.0	0.64	83	3	0.6	1206	1	45.4	05JAN	12MAY
1990	14	2286	11	6.0	0.57	48	3	0.5	---	---		04JAN	11MAY
1991	8	120	11	0.5	No estimate	0	3	0	3	1	0.2	15JAN	24MAY
1992	5	144	7	1.2	No estimate	0	3	0	54	1	3.9	27JAN	13MAY
1993	7	124	8	0.8	0.68	0	3	0	6	1	0.3	26JAN	12MAY
1994	7	2068	5	21.6	0.65	2	2	0	---	---		25JAN	20MAY
1995	8	512	5	6.1	0.79	43	2	1.1	---	---		09FEB	12JUL
1996	8	785	6	7.6	0.66	7	2*	0.2	---	---		17JAN	13JUN
1997	10	379	7	2.7	0.48	11	2*	0.4	---	---		14JAN	28MAY
1998	10	1950	7	14.4	0.46	99	2	2.5	---	---		14JAN	21MAY
1999	10	3443	8	24.6	0.54	560	2	13.6	---	---		14JAN	19MAY
2000	10	3213	8	27.0	0.46	19	2	0.6	---	---		11JAN	17MAY
2001	11	5567	8	41.3	0.67	83	2	2.6	---	---		09JAN	30MAY
2002	10	3486	8	25.6	0.64	0	2	0	---	---		15JAN	21MAY
2003	10	5983	8	39.3	0.68	1	2	0	---	---		21JAN	28MAY
2004	11	3280	8	19.3	0.55	0	2	0	---	---		20JAN	25MAY
2005	10	1341	8	8.9	0.53	8	2*	0.2	---	---		19JAN	25MAY
2006	11	1558	8	10.2	0.79	39	2	1.2	---	---		20JAN	15JUN

--- Not Sampled

*All San Joaquin River locations were not always sampled

Table 7. Summary table of locations sampled, 1986-2006

1986 TO 2006 SEINING LOCATIONS

TUOLUMNE RIVER

Site	Location	River Mile	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
1	Old La Grange Bridge	50.5	X	X	X	X	X	X	X	X			X	X	X	X	X	X	X	X	X	X	X
2	Riffle 4B	48.4	X	X	X	X	X	X				X	X	X	X								
3	Riffle 5	47.9		X	X	X	X	X	X	X	X					X	X	X	X	X	X	X	X
4	Tuolumne River Resort	42.4			X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
5	Turlock Lake State Rec. Area	42.0	X	X																			
6	Reed Gravel	34.0	X	X	X	X	X	X															
7	Hickman Bridge	31.6	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
8	Charles Road	24.9		X	X	X	X	X	X	X				X	X	X	X	X	X	X	X	X	X
9	Legion Park	17.2	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
10	Riverdale Park / Venn	12.3 / 7.4		X	X	X	X	X								X	X	X	X	X	X	X	X
11	McCleskey Ranch	6.0	X	X	X	X	X	X	X	X	X												
12	Shiloh Bridge	3.4	X	X	X	X	X	X		X		X	X	X	X	X	X	X	X	X	X	X	X

SAN JOAQUIN RIVER

Site	Location	River Mile	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
13	Laird Park	90.2	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
14	Gardner Cove	77.8		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
15	Maze Road	76.6	X	X	X																		
16	Sturgeon Bend	74.3		X	X																		
17	Durham Ferry Park	71.3	X	X	X	X	X	X	X	X													
18	Old River	53.7		X																			

STANISLAUS RIVER

Site	Location	River Mile	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
19	Caswell State Park	8.5			X	X		X	X	X													

DRY CREEK

Site	Location	River Mile	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
20	Beard Brook Park	0.5							X	X													

In 1987 additional sites on the Tuolumne, San Joaquin, Merced and Stanislaus Rivers were sampled occasionally (1987 annual report).

Table 8. Tuolumne River analysis of female spawners to fry density.

TUOLUMNE RIVER ANALYSIS OF FEMALE SPAWNERS TO FRY DENSITY (TID/MID)

			JUVENILE SEINING			LOG TRANSFORMATION		
TUOL.R. FALL-RUN	TOTAL FEMALE SPAWNERS			PEAK FRY DENSITY	AVERAGE FRY DENSITY 15JAN-15MAR	TOTAL FEMALE SPAWNERS	PEAK FRY DENSITY	AVERAGE FRY DENSITY 15JAN-15MAR
1985	22600		86	158.8	59.5	4.4	2.2	1.8
1986	3800		87	69.3	46.2	3.6	1.8	1.7
1987	4600		88	70.2	33.9	3.7	1.8	1.5
1988	4100		89	115.1	39.7	3.6	2.1	1.6
1989	680		90	11.4	5.0	2.8	1.1	0.7
1990	28		91	1.3	0.5	1.4	0.1	-0.3
1991	28		92	6.1	2.9	1.4	0.8	0.5
1992	55		93	1.7	0.9	1.7	0.2	0.0
1993	237		94	79.5	41.5	2.4	1.9	1.6
1994	249		95	12.5	9.8	2.4	1.1	1.0
1995	522		96	16.1	13.0	2.7	1.2	1.1
1996	1142		97	2.8	2.1	3.1	0.4	0.3
1997	4224		98	49.3	24.6	3.6	1.7	1.4
1998	4527		99	78.0	39.3	3.7	1.9	1.6
1999	3535		00	78.8	48.0	3.5	1.9	1.7
2000	11260		01	126.3	85.6	4.1	2.1	1.9
2001	4970		02	92.8	41.5	3.7	2.0	1.6
2002	3876		03	164.3	68.8	3.6	2.2	1.8
2003	1768		04	38.8	27.2	3.2	1.6	1.4
2004	1004		05	20.5	14.56	3.0	1.3	1.2
2005	478		06	28.7	12.74	2.7	1.5	1.1

LINEAR REGRESSION ON LOG VALUES
Total females to peak fry density (1986-2006)
SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.828102954
R Square	0.685754502
Adjusted R Square	0.669215265
Standard Error	0.369802175
Observations	21

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	5.670118374	5.670118374	41.46228	3.57909E-06
Residual	19	2.59831932	0.136753648		
Total	20	8.268437694			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	-0.52025876	0.31974555	-1.627102428	0.120186	-1.189494096	0.148976574	-1.189494096	0.148976574
X Variable 1	0.650471732	0.101018712	6.439121236	3.58E-06	0.439037073	0.861906391	0.439037073	0.861906391

LINEAR REGRESSION ON LOG VALUES
Total females to average fry density (1986-2006)
SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.834148178
R Square	0.695803182
Adjusted R Square	0.679792823
Standard Error	0.358262972
Observations	21

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	5.578137218	5.578137218	43.45956	2.61171E-06
Residual	19	2.438694785	0.128352357		
Total	20	8.016832002			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	-0.77671467	0.3097683	-2.507405279	0.021404	-1.425067375	-0.12836197	-1.425067375	-0.128361966
X Variable 1	0.645174155	0.097866552	6.592386667	2.61E-06	0.440337043	0.850011267	0.440337043	0.850011267

Table 9. Summary table of salmonids observed during the 2001-2006 (September) snorkel surveys.

Late summer snorkel survey comparison

	TUOLUMNE RIVER SNORKEL SUMMARY -- YEARLY COMPARISON OF CHINOOK OBSERVED								TUOLUMNE RIVER SNORKEL SUMMARY -- YEARLY COMPARISON OF O. mykiss OBSERVED					
	CHINOOK 2001	**CHINOOK 2002**	**CHINOOK 2003**	**CHINOOK 2004**	**CHINOOK 2005**	**CHINOOK 2006**			**RAINBOW 2001**	**RAINBOW 2002**	**RAINBOW 2003**	**RAINBOW 2004**	**RAINBOW 2005**	**RAINBOW 2006**
DATES	Sept. 18-20	Sept. 24-26	Sept. 17-19	Sept. 15-17	Sept. 20-22	Sept. 19-21			Sept. 18-20	Sept. 24-26	Sept. 17-19	Sept. 15-17	Sept. 20-22	Sept. 19-21
LOCATIONS														
Riffle A7 (RM 50.7)	21	2	2	0	1	0			3	1	16	11	10	115
Riffle 2 (RM 49.9)	0	0	1	0	0	0			3	4	2	7	7	15
Riffle 3B (RM 49.1)	0	0	3	0	3	10			1	1	21	7	6	66
Riffle 5B (RM 47.9)	0	0	4	0	0	0			2	0	10	6	36	54
Sec. Total	**21**	**2**	**10**	**0**	**4**	**10**			**9**	**6**	**49**	**31**	**59**	**250**
Riffle 7 (RM 46.9)	0	1	0	0	0	0			0	2	9	2	2	106
Riffle 13B,13A (RM 45.5 / 45.6)	0	0	0	0	1	8			0	4	6	0	46	103
Riffle 21 (RM 43.1)	0	0	1	0	0	10			3	0	6	7	15	32
Riffle 23B-C (RM 42.3)	0	0	0	0	0	8			0	0	1	0	14	27
Sec. Total	**0**	**1**	**1**	**0**	**1**	**26**			**3**	**6**	**22**	**9**	**77**	**268**
Riffle 31 / 30B (RM 38.1 / 38.5)	0	0	0	0	0	0			0	0	0	0	1	21
Riffle 37 / 35A (RM 36.2 / 37.1)	0	0	1	0	0	4			0	0	0	0	2	4
Sec. Total	**0**	**0**	**1**	**0**	**0**	**4**			**0**	**0**	**0**	**0**	**3**	**25**
Riffle 41A (RM 35.3)	0	0	1	0	0	0			0	0	0	0	0	0
Riffle 57 (RM 31.5)	0	0	0	0	0				0	0	0	0	0	
Sec. Total	**0**	**0**	**1**	**0**	**0**	**0**			**0**	**0**	**0**	**0**	**0**	**0**
Grand Total	**21**	**3**	**13**	**0**	**5**	**40**			**12**	**12**	**71**	**40**	**139**	**543**

Table 9. (Continued)

TUOLUMNE RIVER SNORKEL SUMMARY -- YEARLY COMPARISON OF DENSITY INDICES (CHINOOK OBSERVED / 1000 SQ. FT.)									YEARLY COMPARISON OF DENSITY INDICES (O. mykiss OBSERVED / 1000 SQ. FT.)					
	CHINOOK 2001	**CHINOOK 2002**	**CHINOOK 2003**	**CHINOOK 2004**	**CHINOOK 2005**	**CHINOOK 2006**			**RAINBOW 2001**	**RAINBOW 2002**	**RAINBOW 2003**	**RAINBOW 2004**	**RAINBOW 2005**	**RAINBOW 2006**
DATES	Sept. 18-20	Sept. 24-26	Sept. 17-19	Sept. 15-17	Sept. 20-22	Sept. 19-21			Sept. 18-20	Sept. 24-26	Sept. 17-19	Sept. 15-17	Sept. 20-22	Sept. 19-21
LOCATIONS														
Riffle A7 (RM 50.7)	2.97	0.14	0.21	0.00	0.08	0.00			0.42	0.07	1.68	1.06	0.83	9.58
Riffle 2 (RM 49.9)	0.00	0.00	0.09	0.00	0.00	0.00			0.20	0.21	0.19	0.31	0.23	0.88
Riffle 3B (RM 49.1)	0.00	0.00	0.33	0.00	0.26	1.11			0.08	0.12	2.33	0.60	0.53	7.33
Riffle 5B (RM 47.9)	0.00	0.00	0.32	0.00	0.00	0.00			0.16	0.00	0.80	0.26	1.56	2.40
Sec. Total	**0.45**	**0.03**	**0.24**	**0.00**	**0.05**	**0.17**			**0.19**	**0.09**	**1.18**	**0.46**	**0.77**	**4.13**
Riffle 7 (RM 46.9)	0.00	0.19	0.00	0.00	0.00	0.00			0.00	0.38	1.15	0.15	0.14	6.84
Riffle 13B,13A (RM 45.5 / 45.6)	0.00	0.00	0.00	0.00	0.12	0.80			0.00	0.48	0.74	0.00	5.41	10.30
Riffle 21 (RM 43.1)	0.00	0.00	0.17	0.00	0.00	0.89			0.67	0.00	1.03	0.52	1.25	2.84
Riffle 23B-C (RM 42.3)	0.00	0.00	0.00	0.00	0.00	1.23			0.00	0.00	0.19	0.00	2.00	4.15
Sec. Total	**0.00**	**0.04**	**0.04**	**0.00**	**0.02**	**0.60**			**0.12**	**0.22**	**0.82**	**0.22**	**1.86**	**6.20**
Riffle 31 (RM 38.1)	0.00	0.00	0.00	0.00	0.00	0.00			0.00	0.00	0.00	0.00	0.06	1.33
Riffle 37 (RM 36.2)	0.00	0.00	0.14	0.00	0.00	0.29			0.00	0.00	0.00	0.00	0.18	0.29
Sec. Total	**0.00**	**0.00**	**0.07**	**0.00**	**0.00**	**0.13**			**0.00**	**0.00**	**0.00**	**0.00**	**0.11**	**0.84**
Riffle 41A (RM 35.3)	0.00	0.00	0.13	0.00	0.00	0.00			0.00	0.00	0.00	0.00	0.00	0.00
Riffle 57 (RM 31.5)	0.00	0.00	0.00	0.00	0.00				0.00	0.00	0.00	0.00	0.00	
Sec. Total	**0.00**	**0.00**	**0.05**	**0.00**	**0.00**	**0.00**			**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
Grand Total														

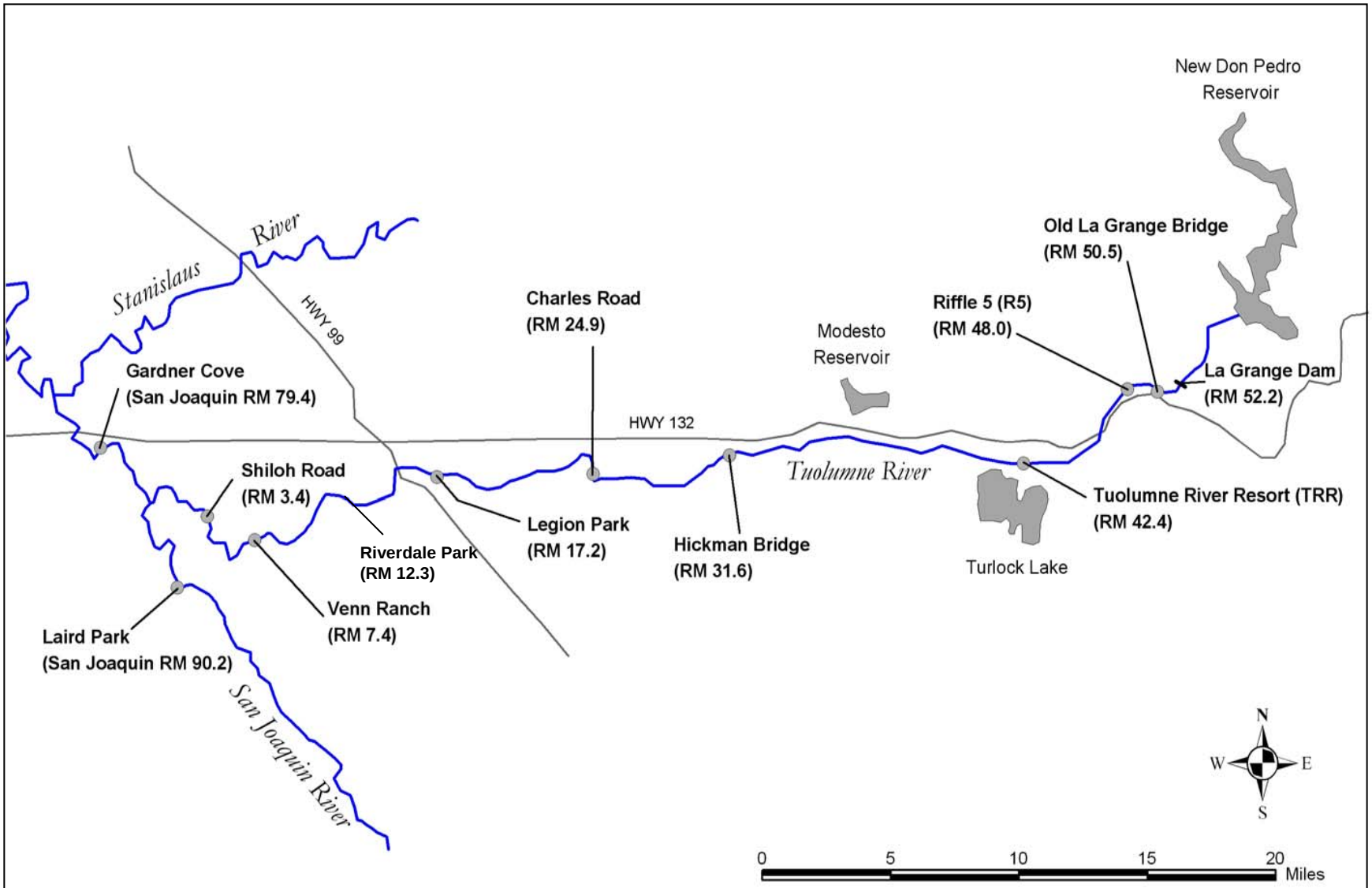

Figure 1. Locations of seine sampling sites on the lower Tuolumne and San Joaquin Rivers, 2006.

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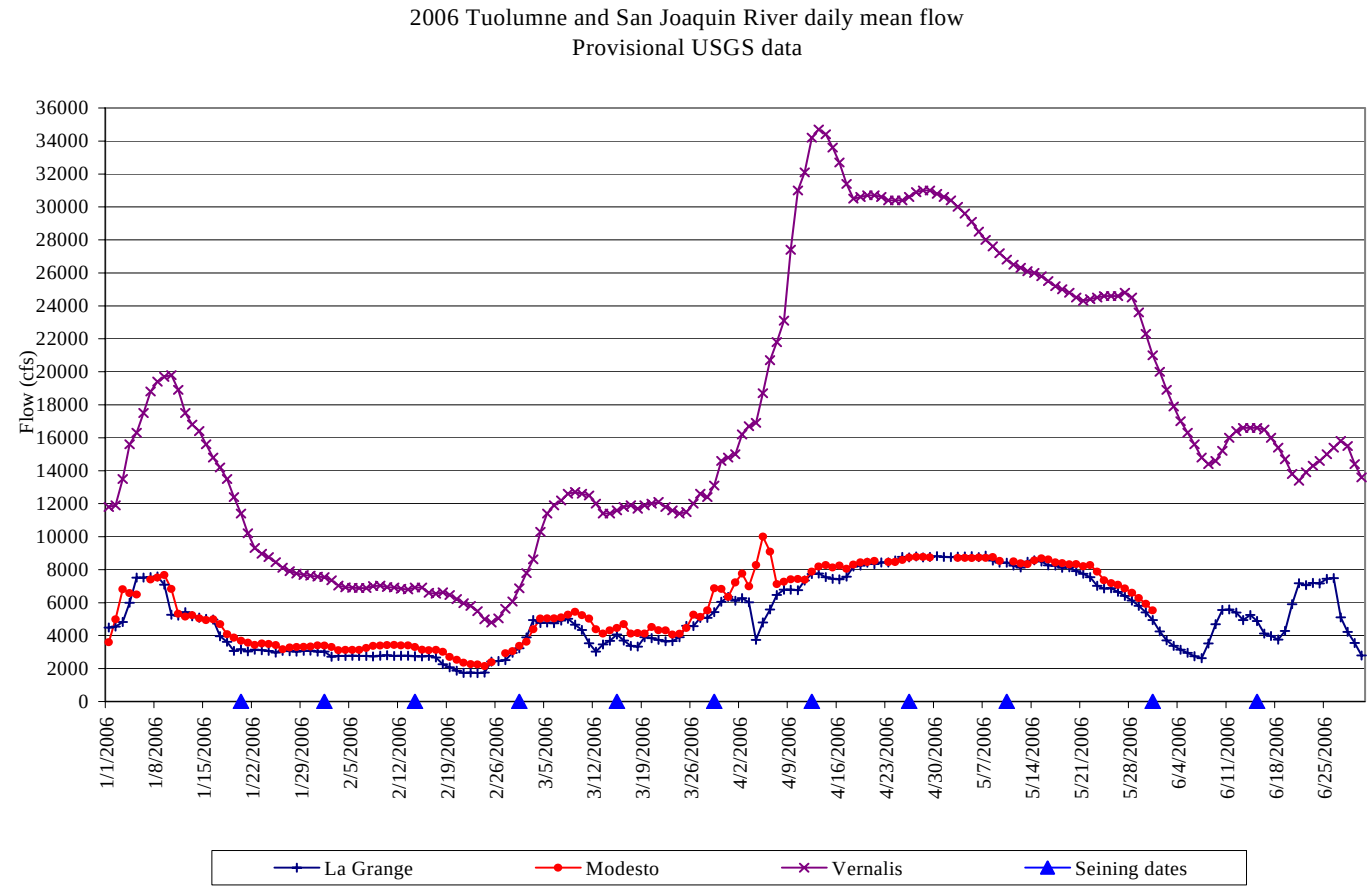


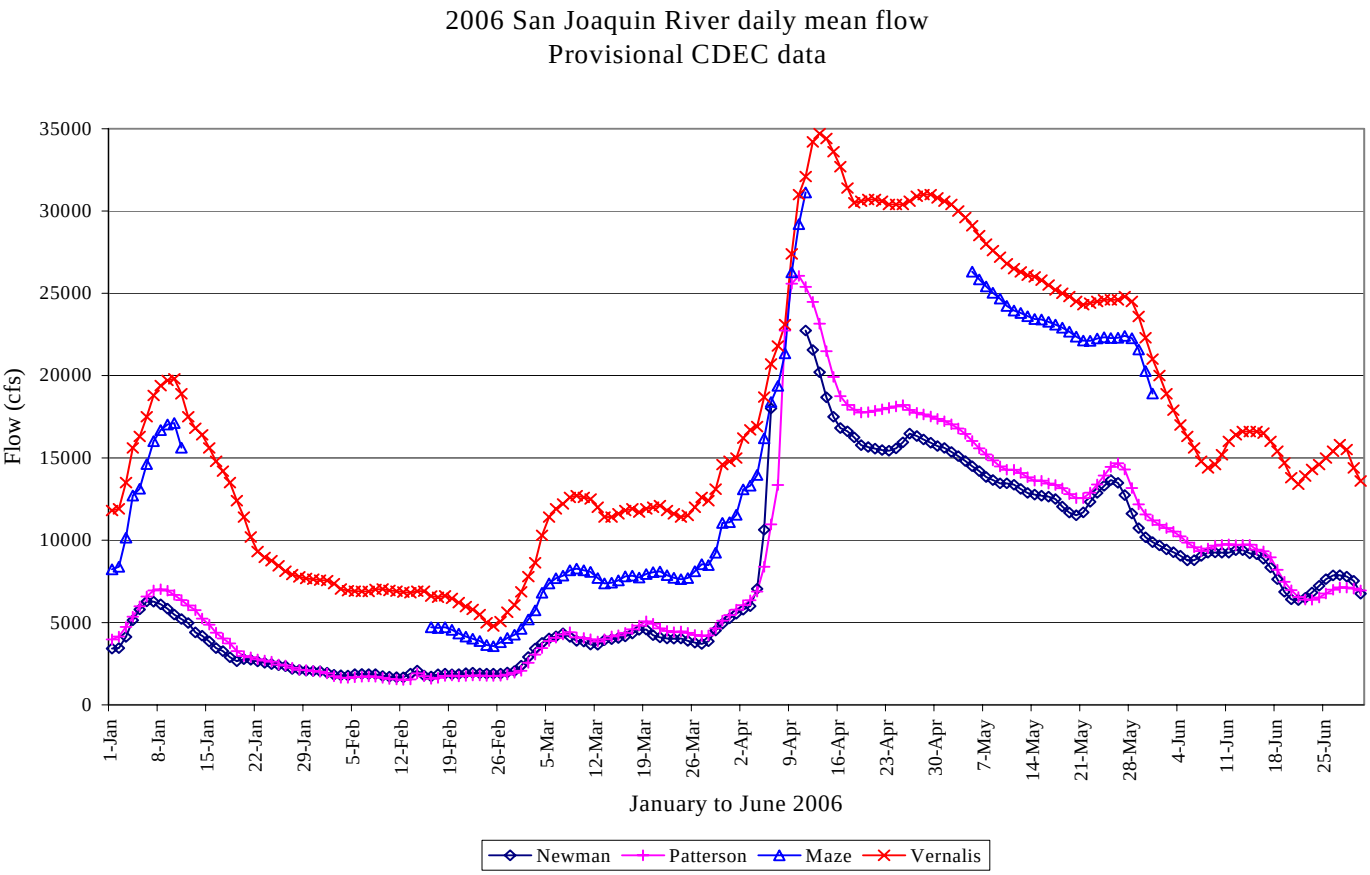


Figure 2. Tuolumne and San Joaquin River daily average flow.

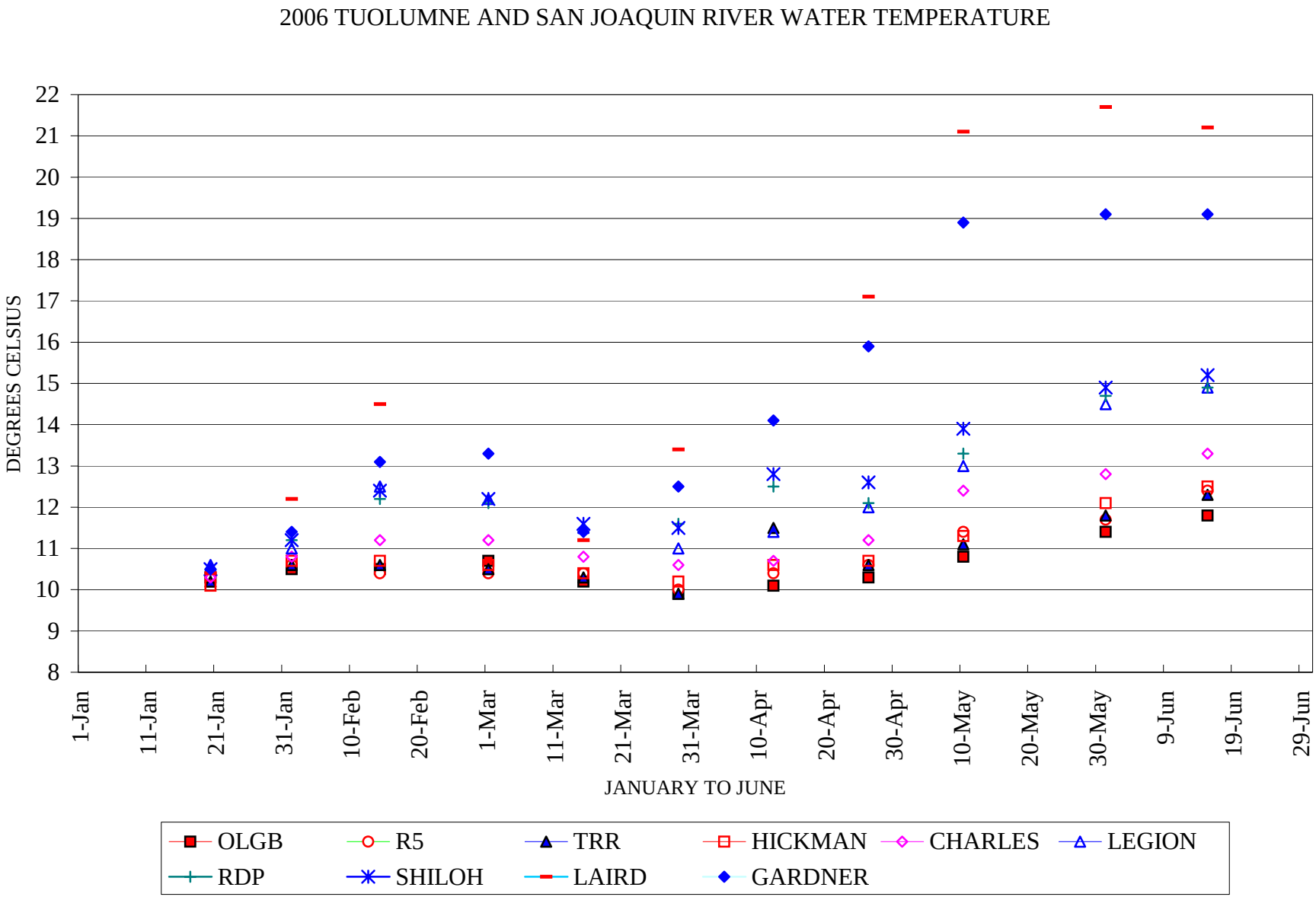


Figure 3. 2006 San Joaquin and Tuolumne River water temperature.

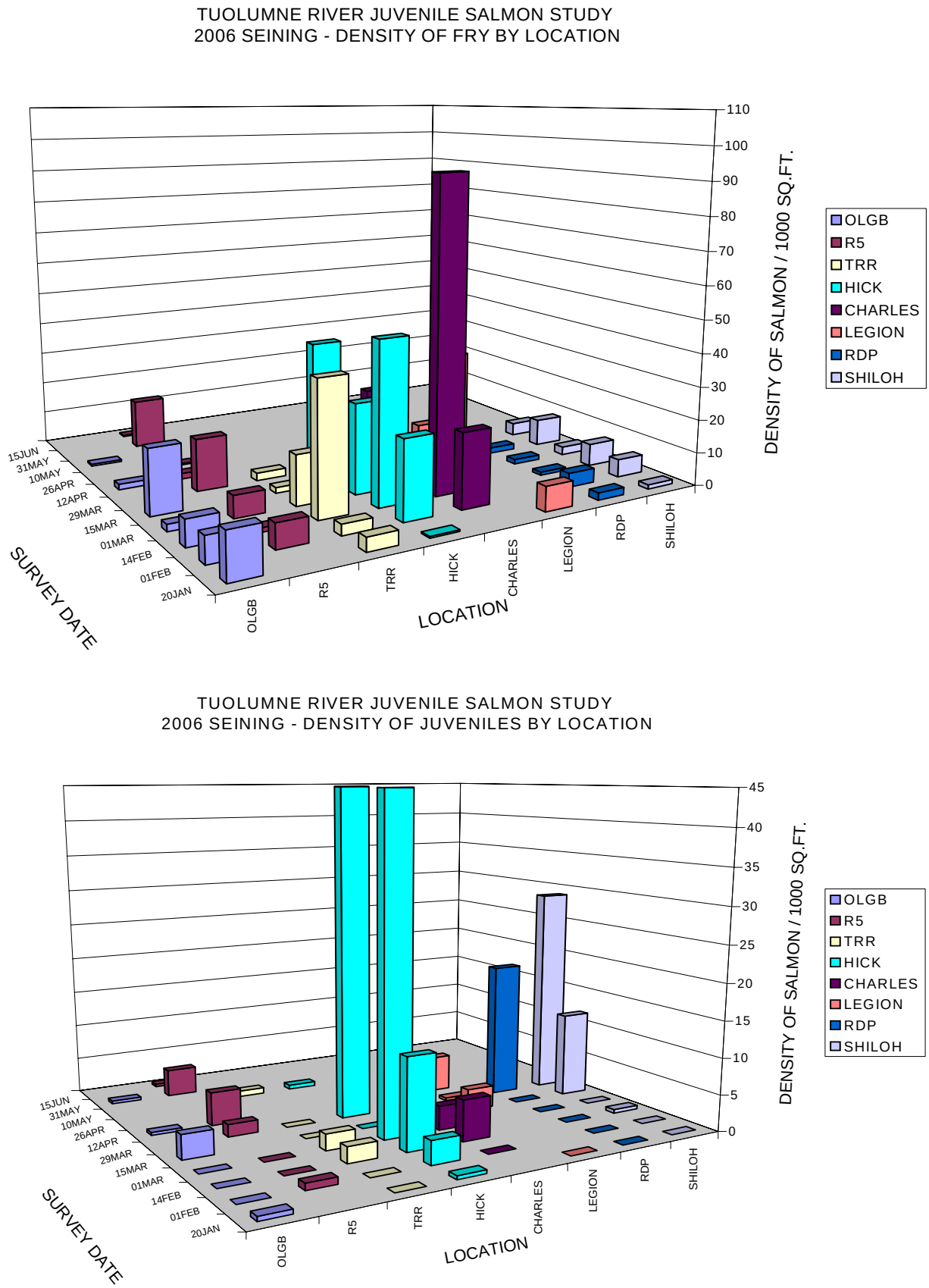


Figure 4. Tuolumne River density of fry and juvenile salmon by location.

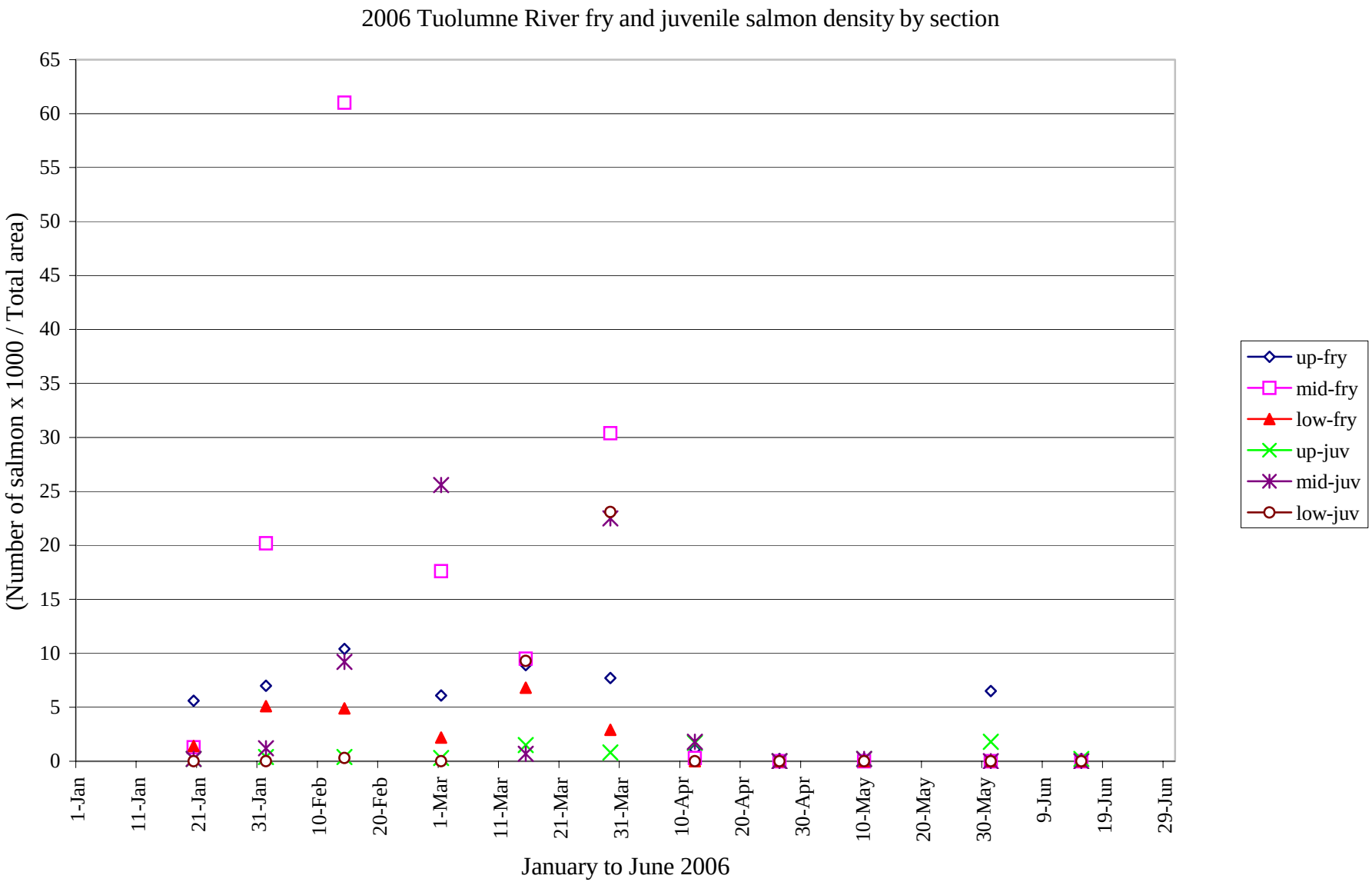


Figure 5. 2006 Tuolumne River fry and juvenile salmon density by section.

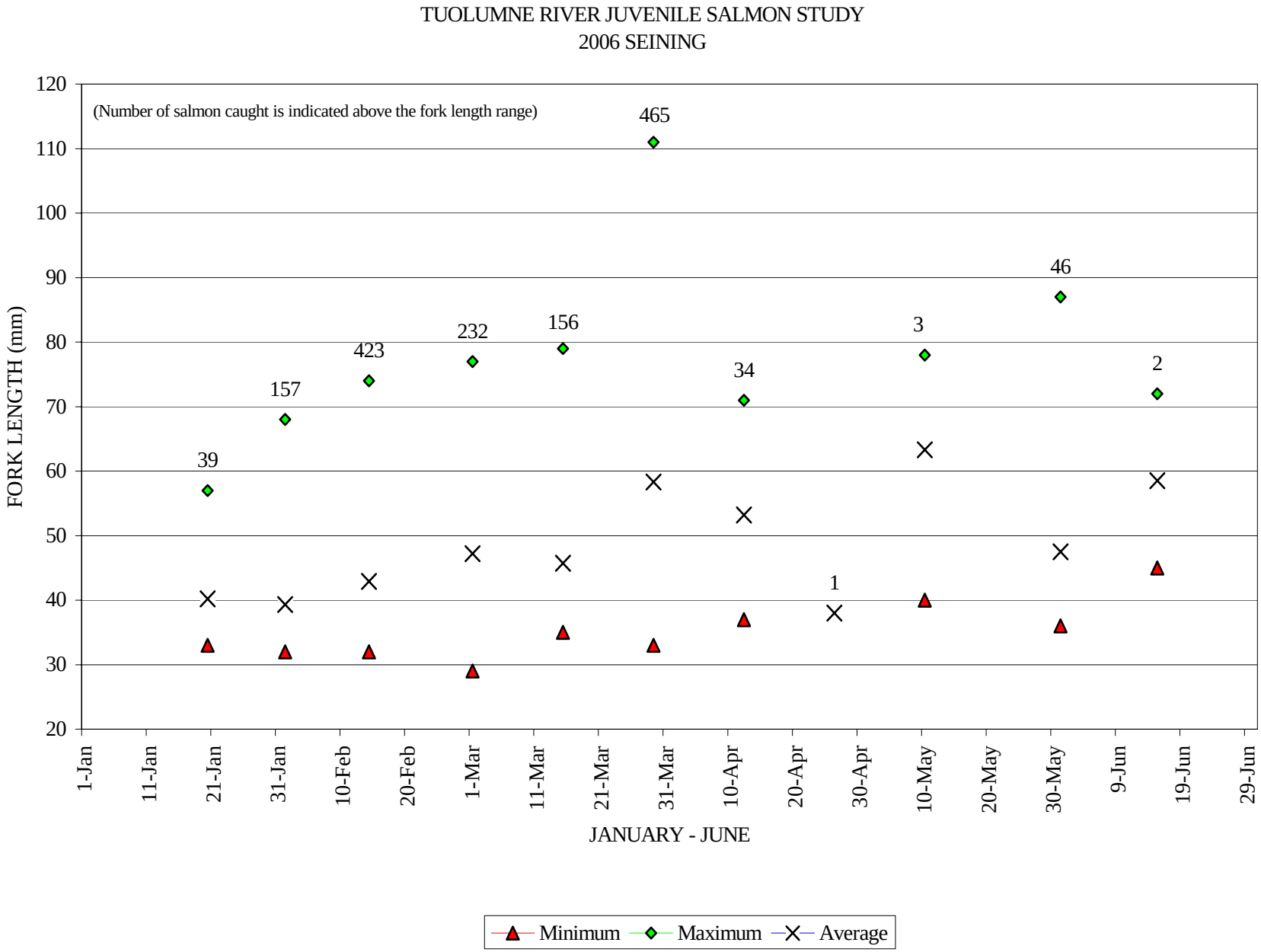


Figure 6. Fork length ranges of wild salmon in the Tuolumne River, 2006.

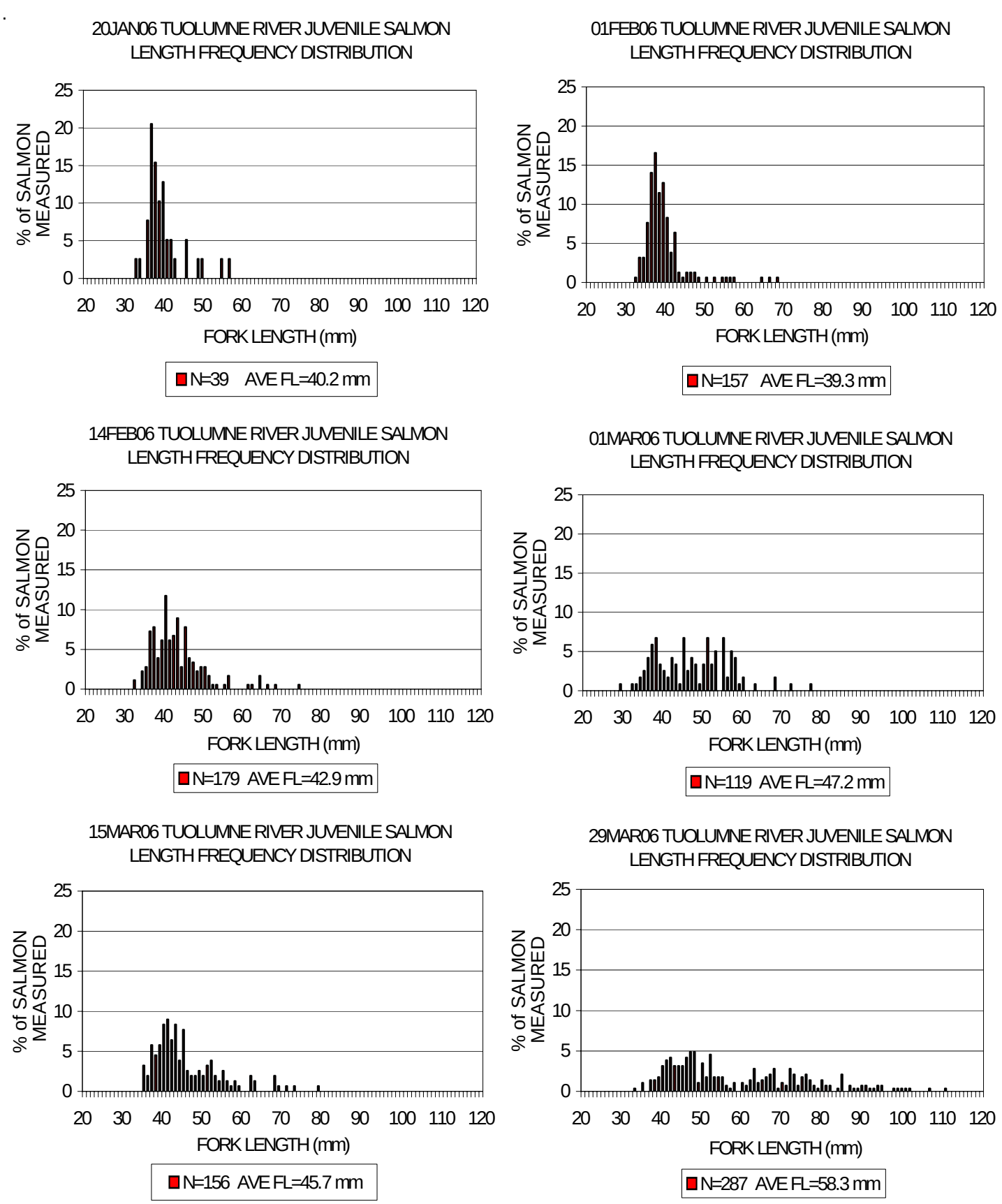
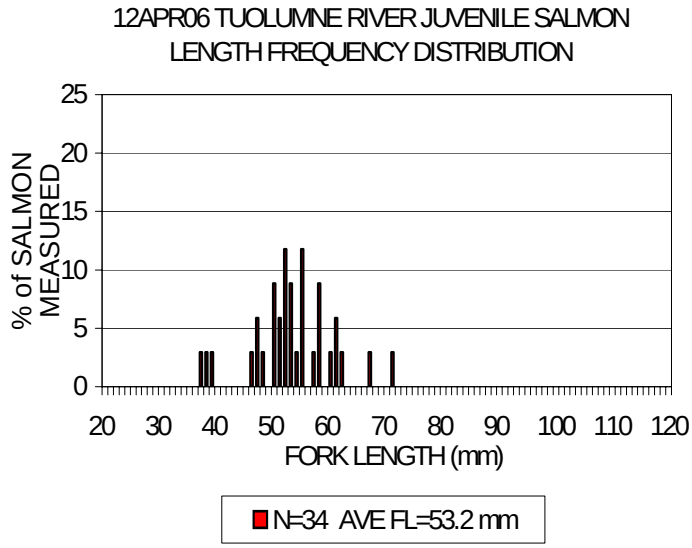
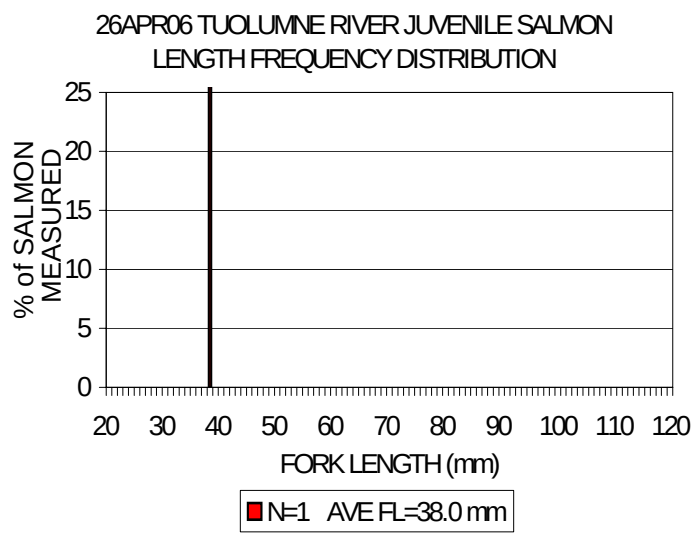
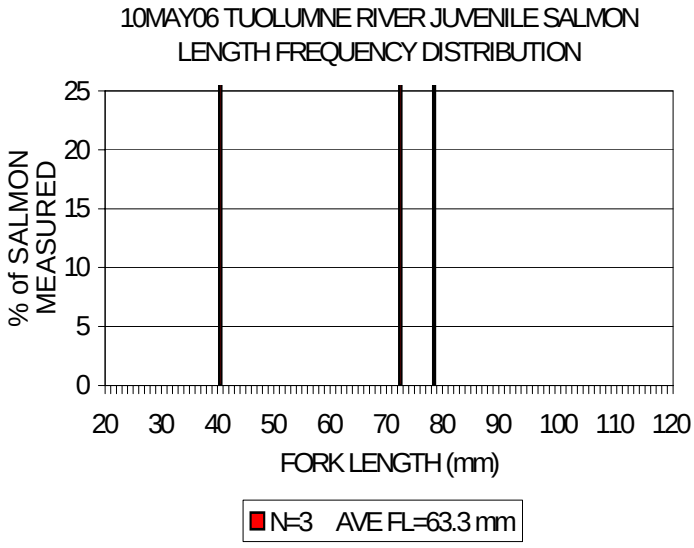
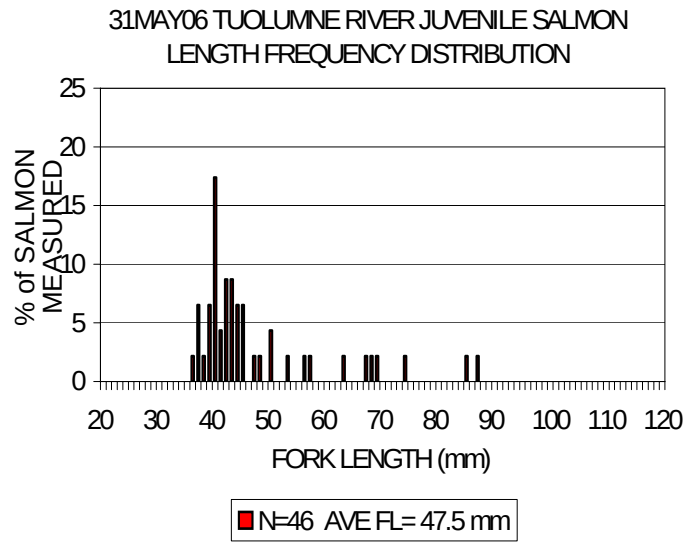


Figure 7. Length frequency distribution by date of salmon in the Tuolumne River, 2006.









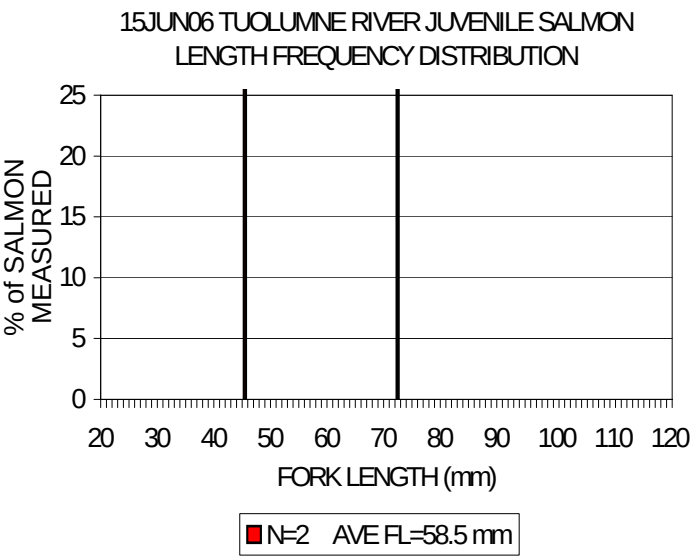


Figure 8. Length frequency distribution by date of salmon in the Tuolumne River, 2006.

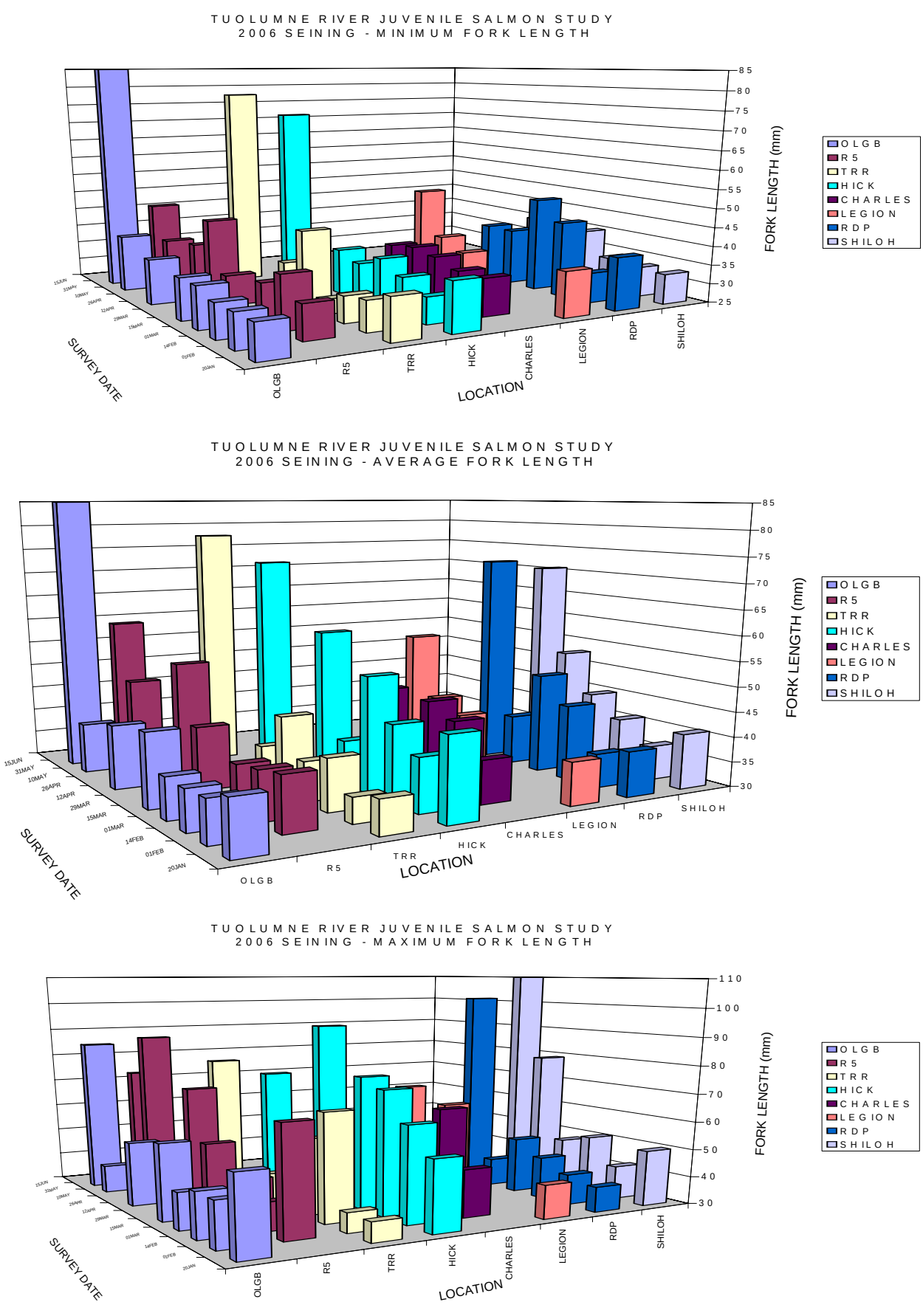
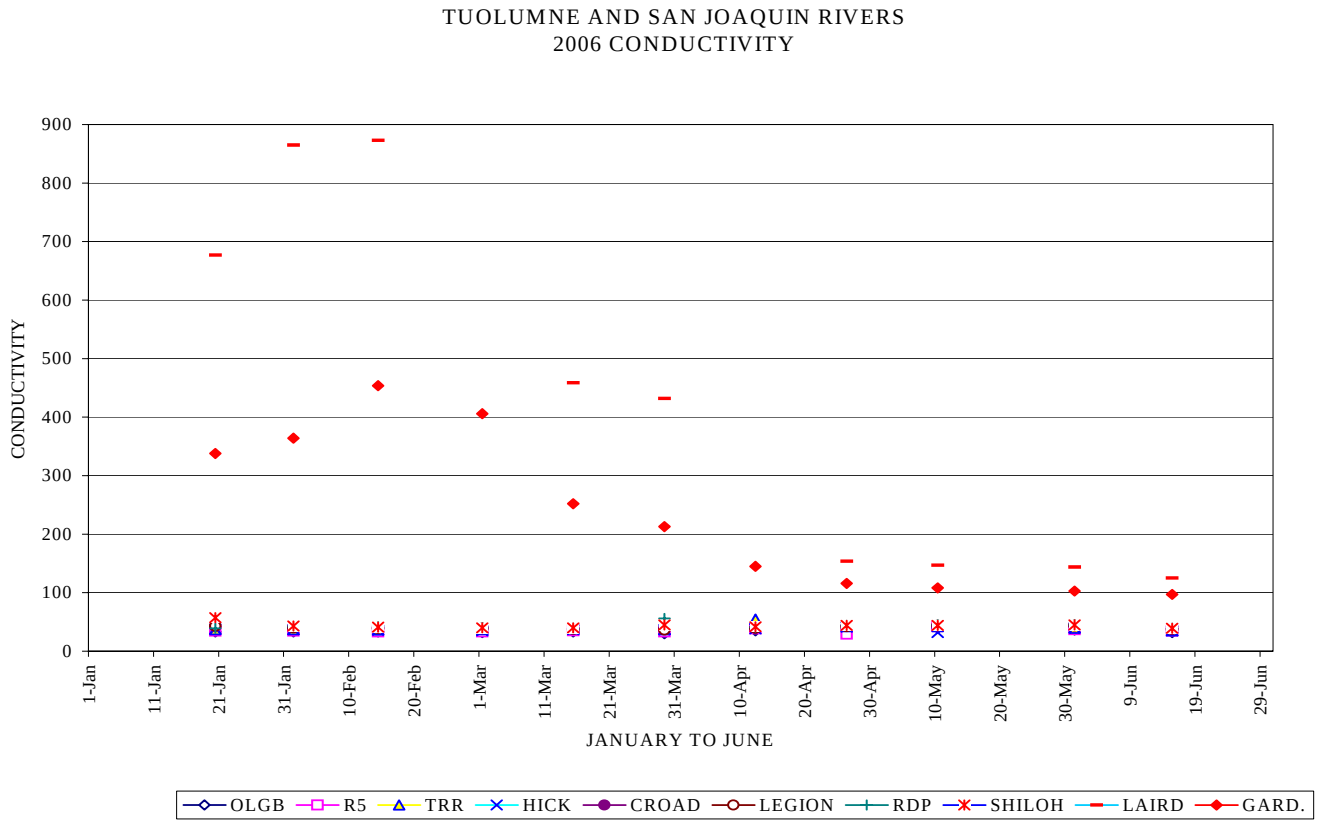


Figure 9. Minimum, average, and maximum fork length by location and survey period, 2006.



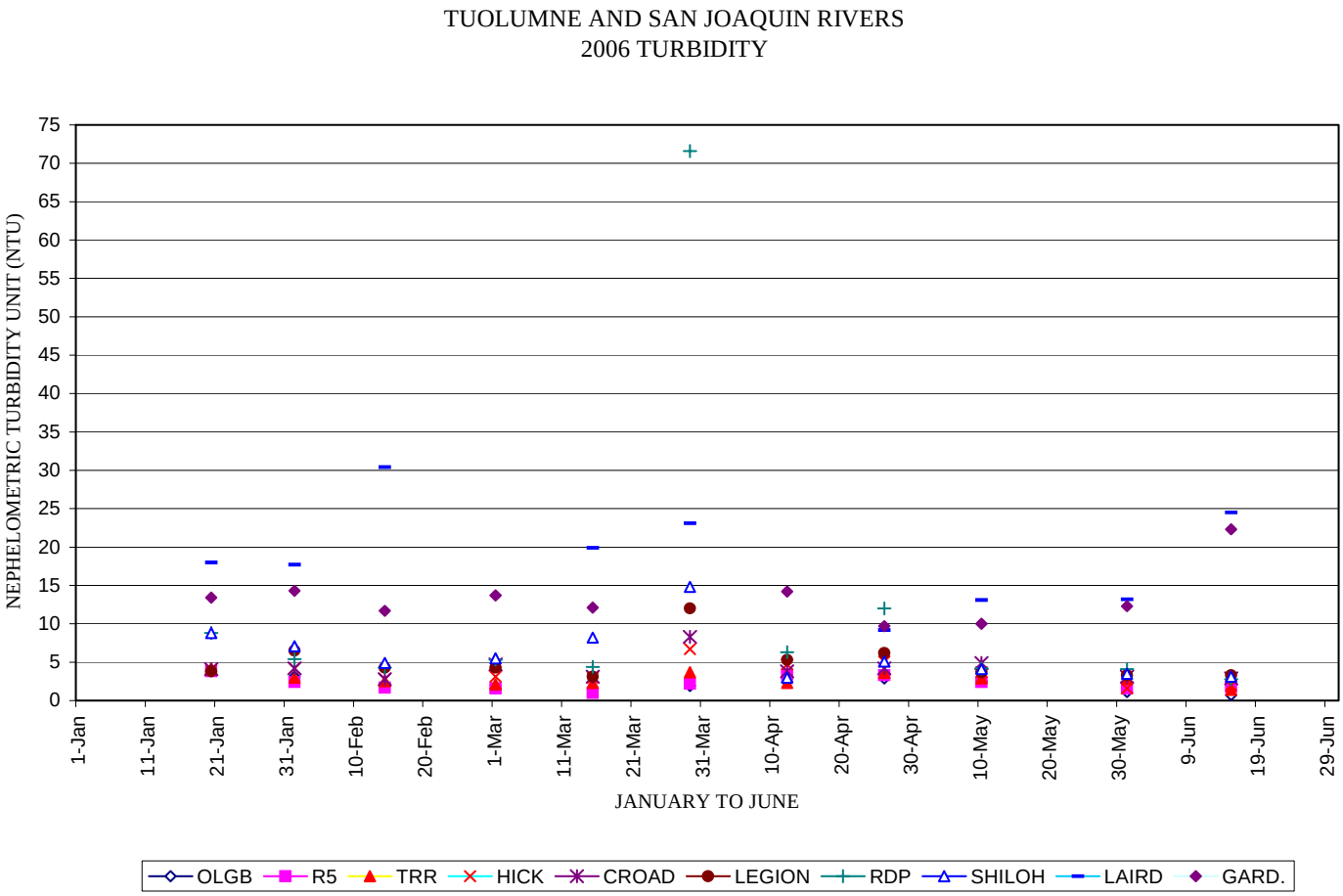
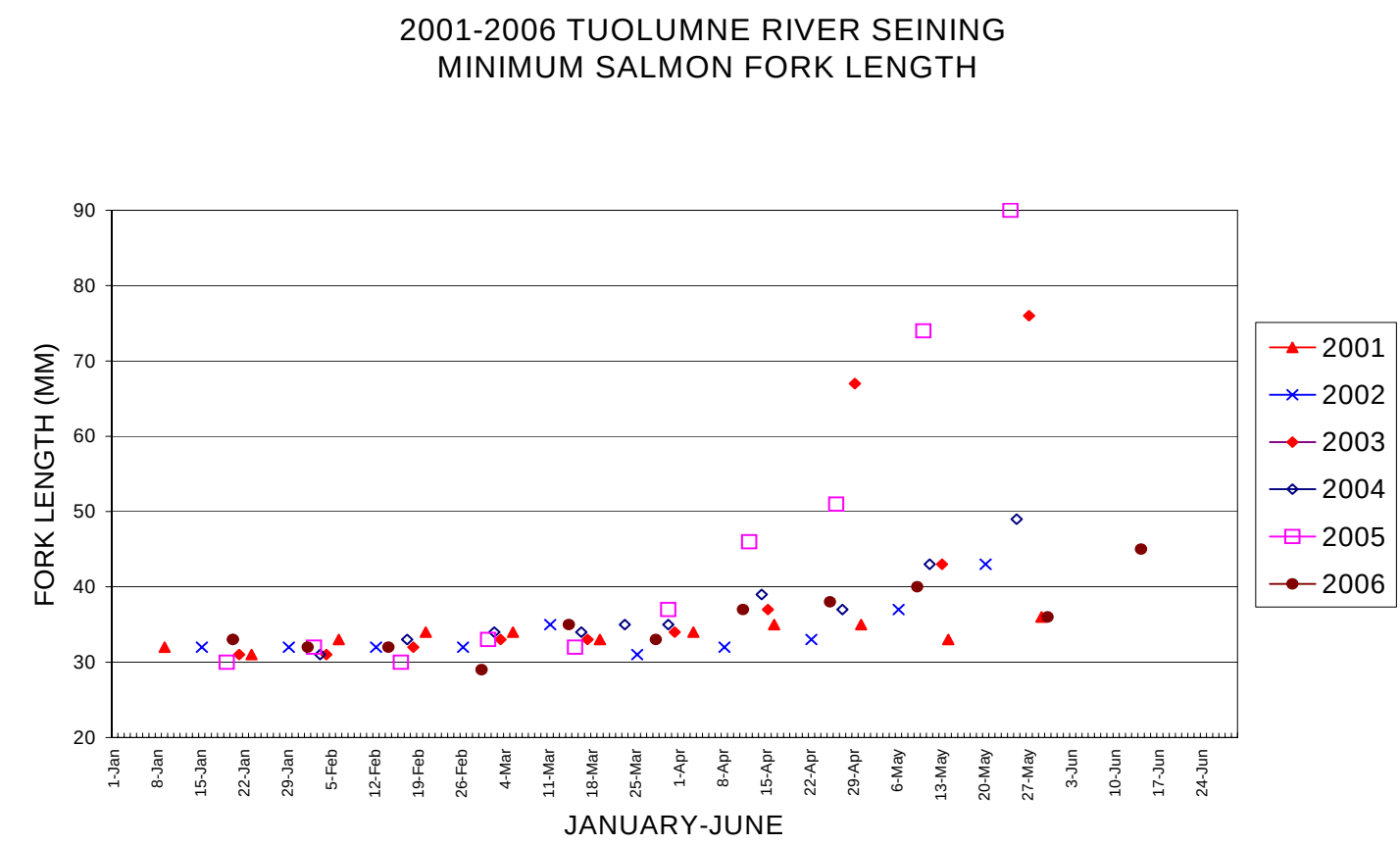
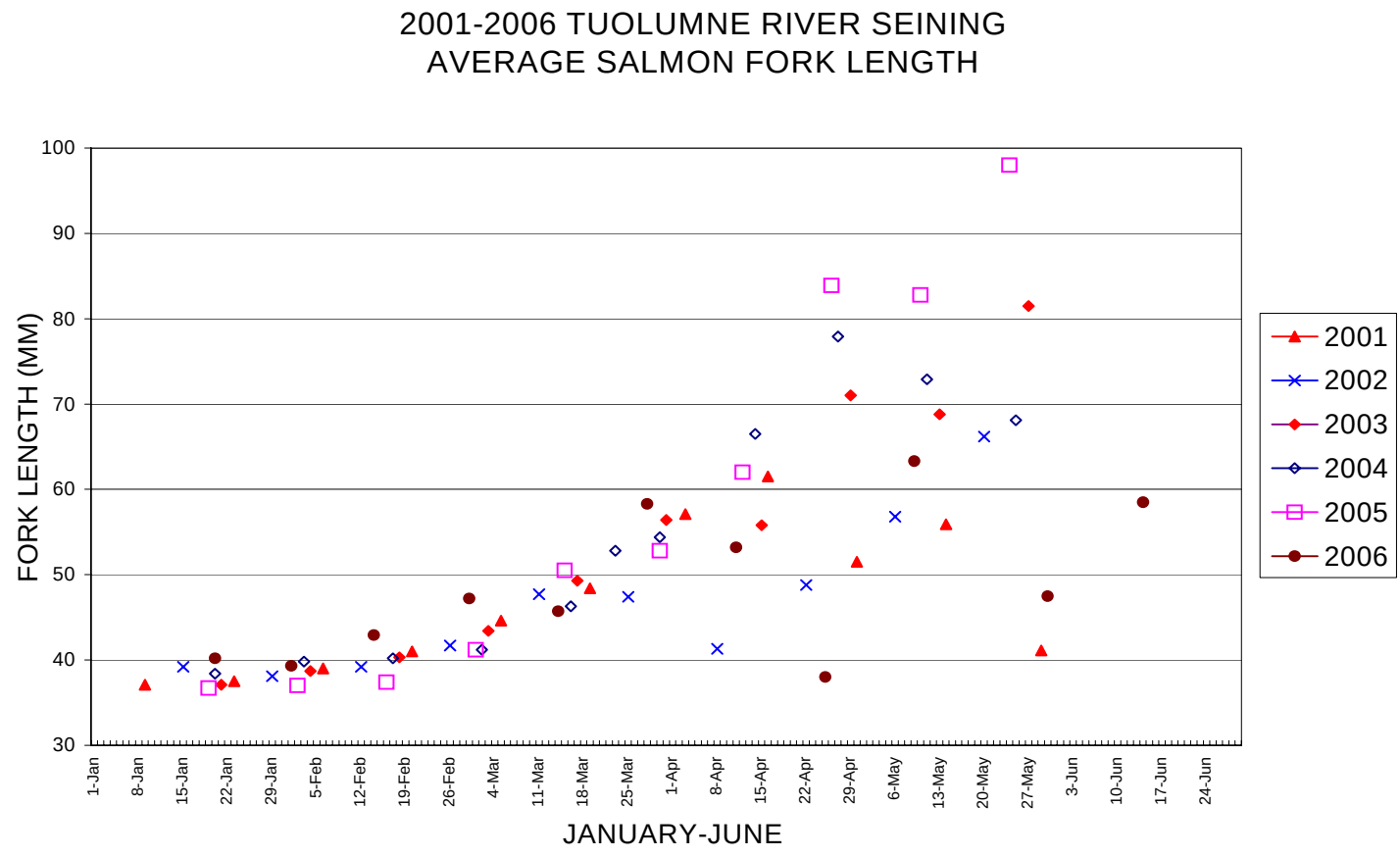
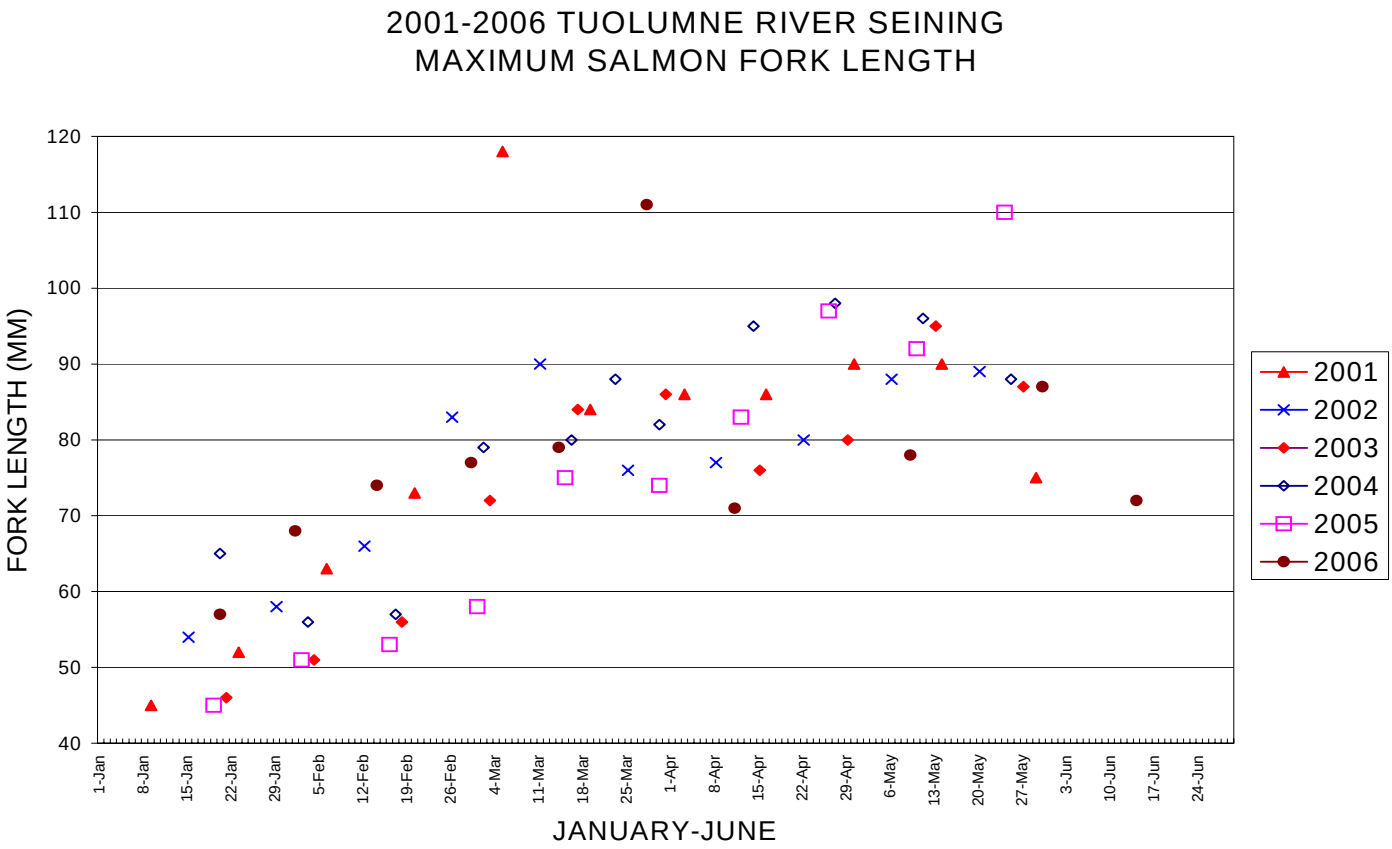


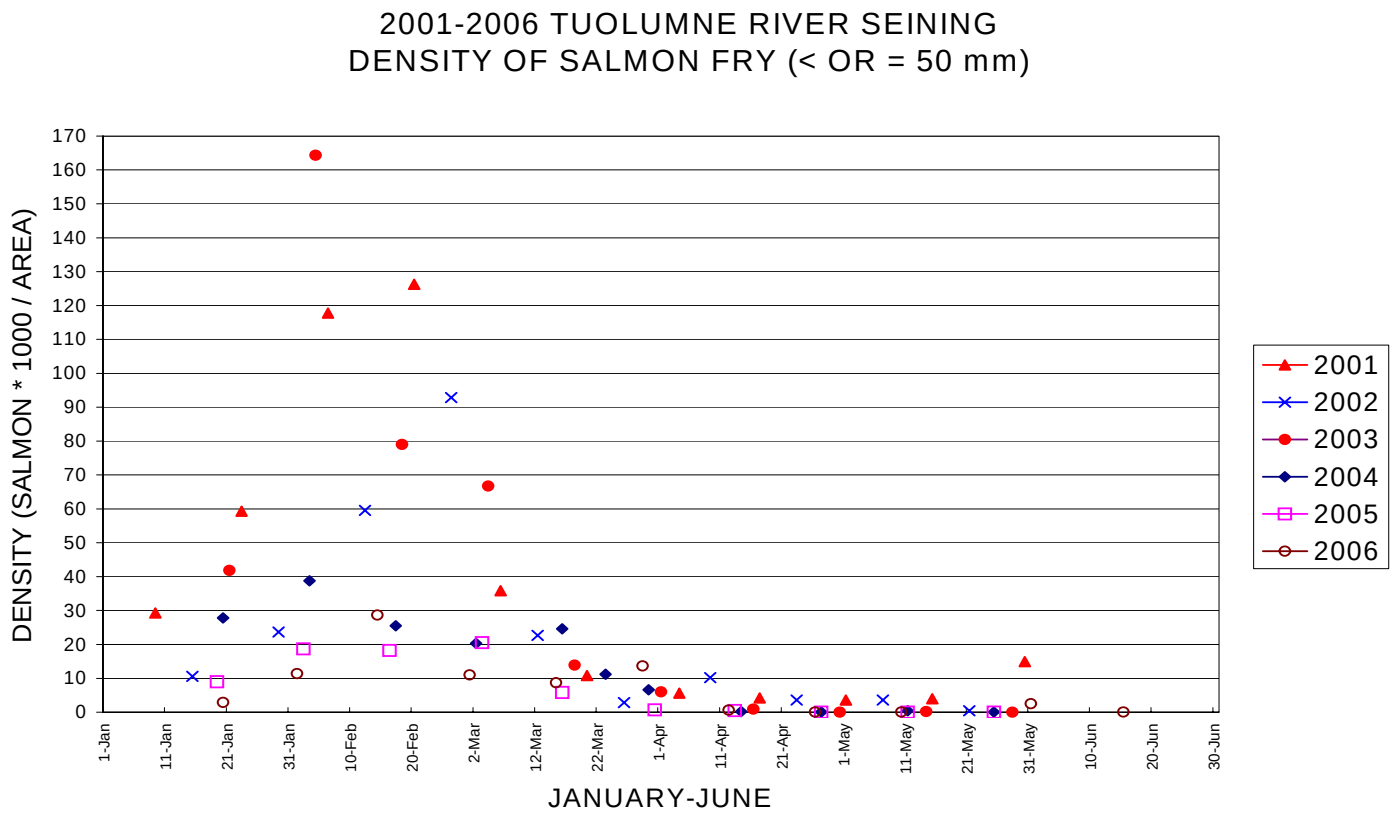
Figure 10. Conductivity and turbidity in the Tuolumne and San Joaquin Rivers, 2006



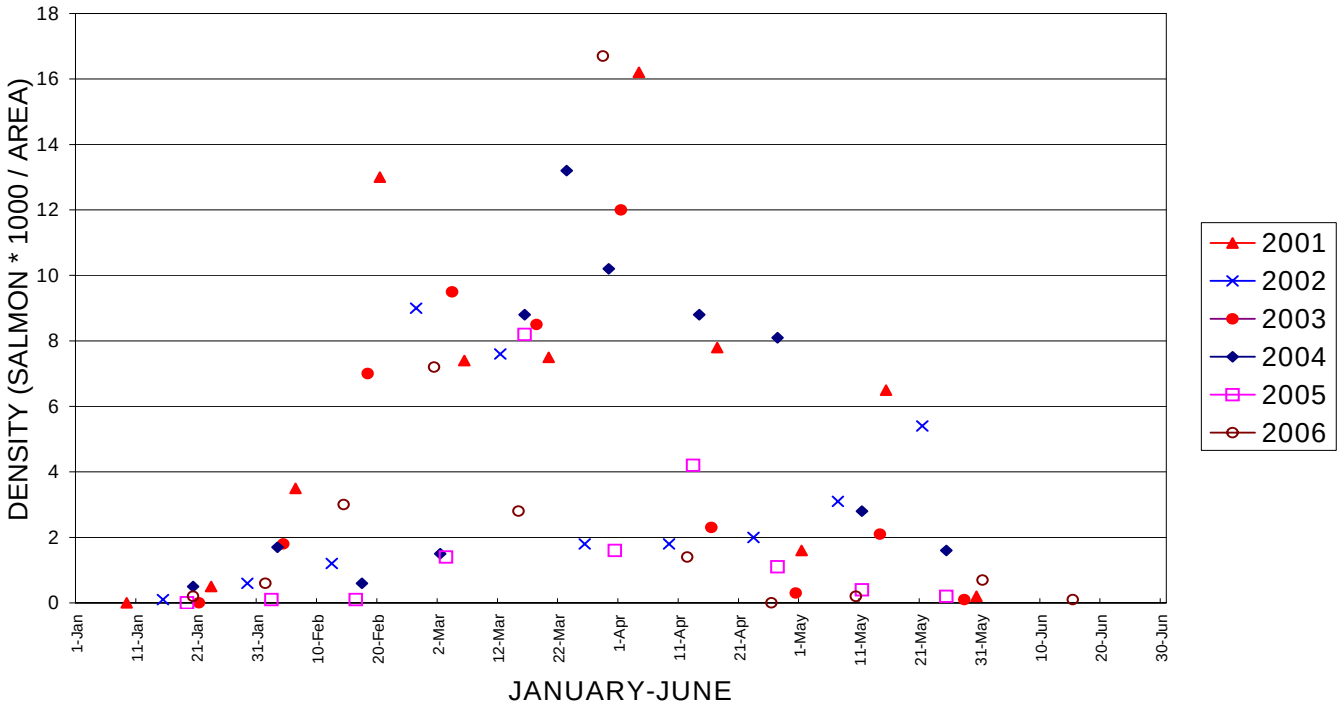


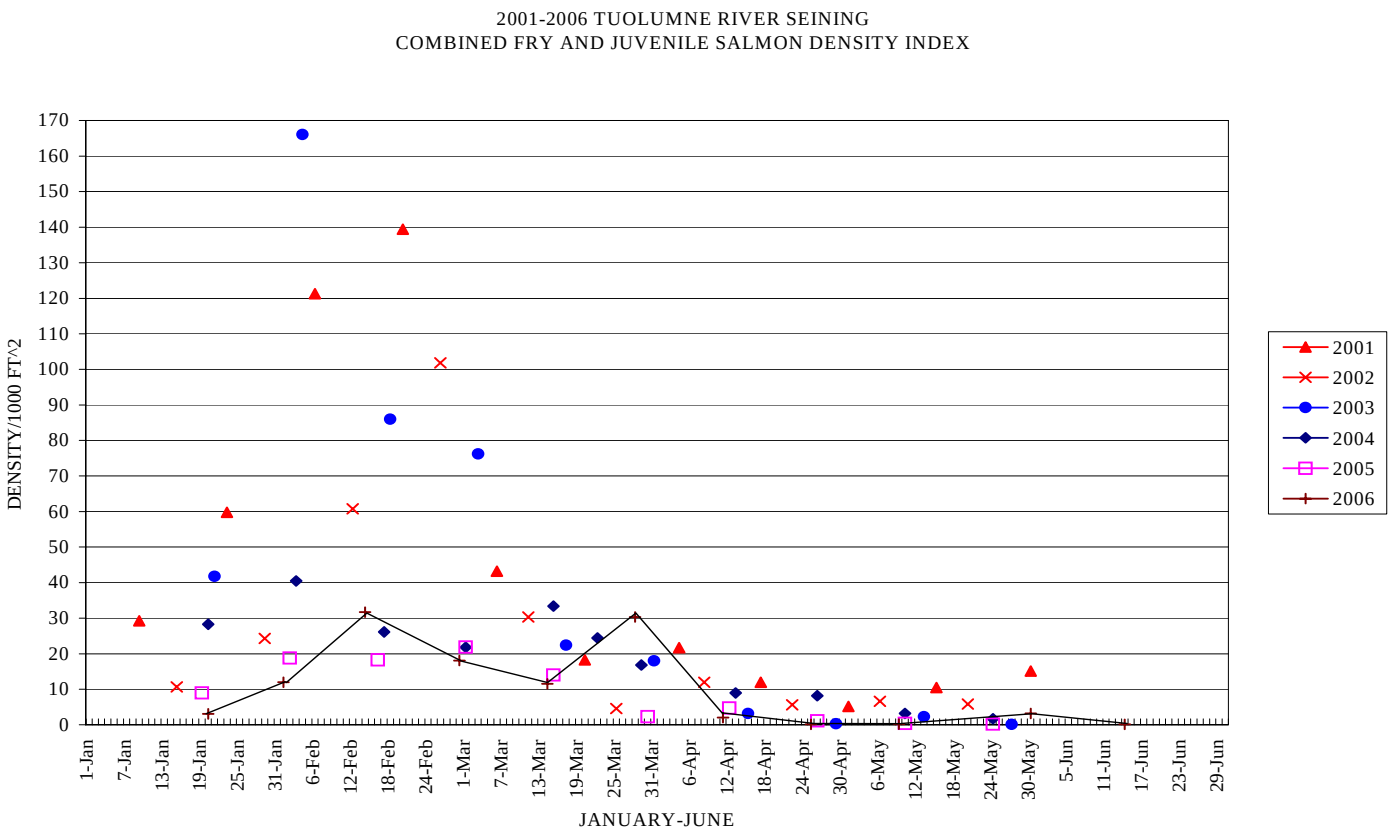
Figures 11 & 12. Minimum and average fork lengths of Tuolumne River salmon, 2001-2006.



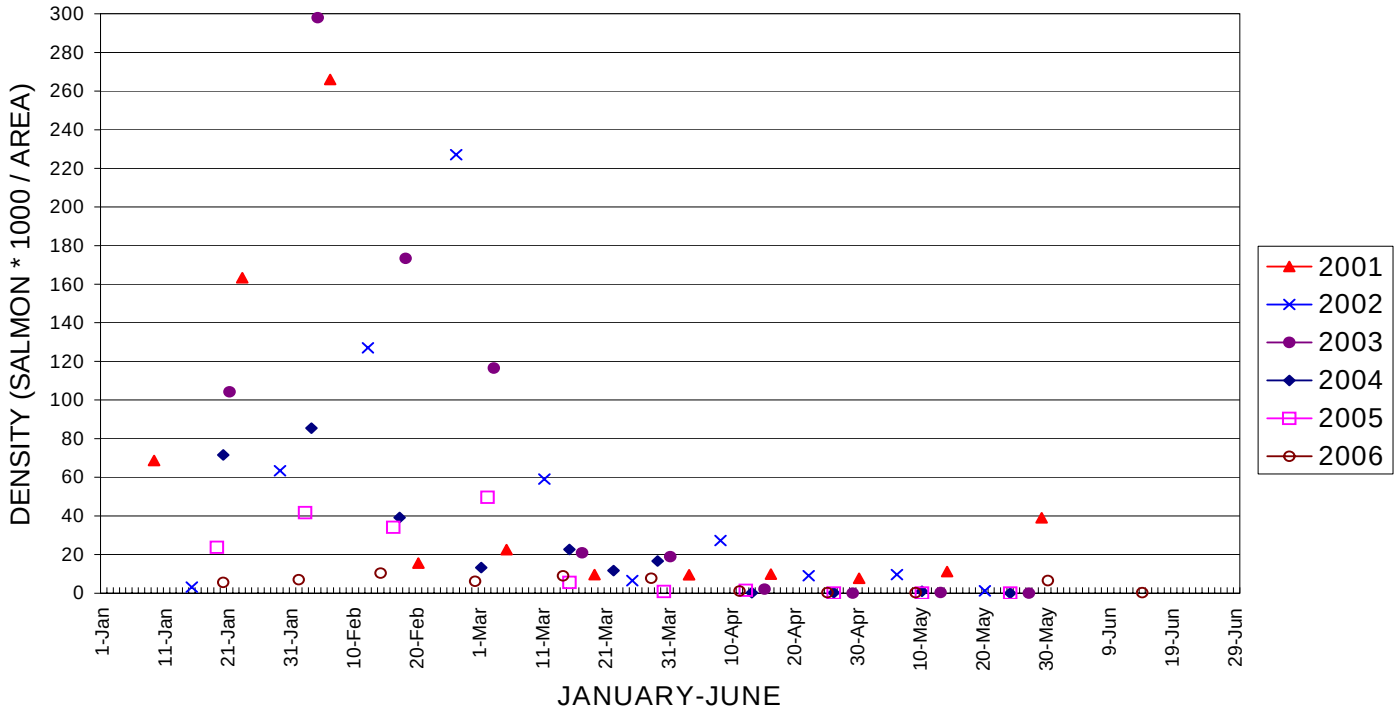


Figures 13 & 14. Maximum fork length and Density index of salmon fry, 2001-2006.





Figures 15 & 16. Density index of salmon juveniles and total river salmon catch, 2001-2006.



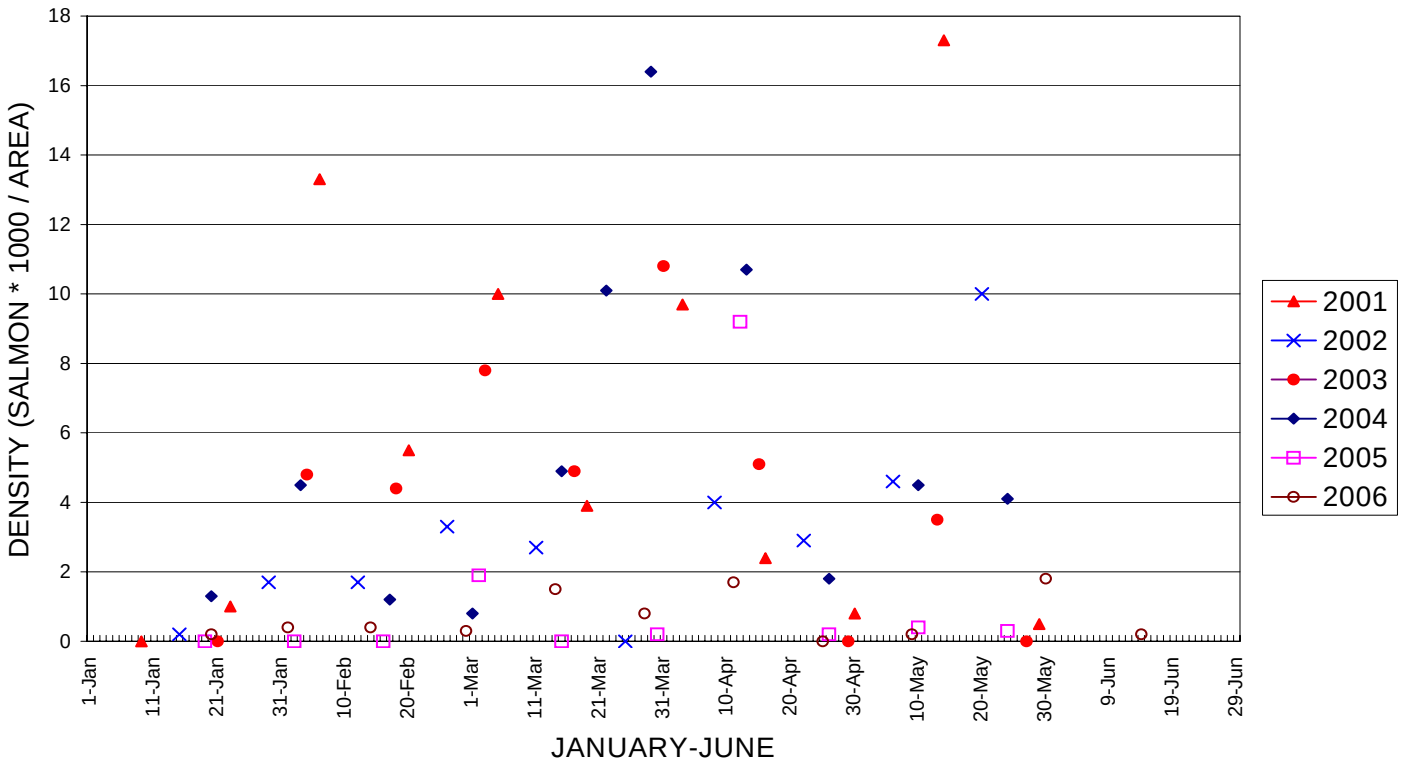


Figure 17. Upper section density indices for salmon fry and juveniles, 2001-2006

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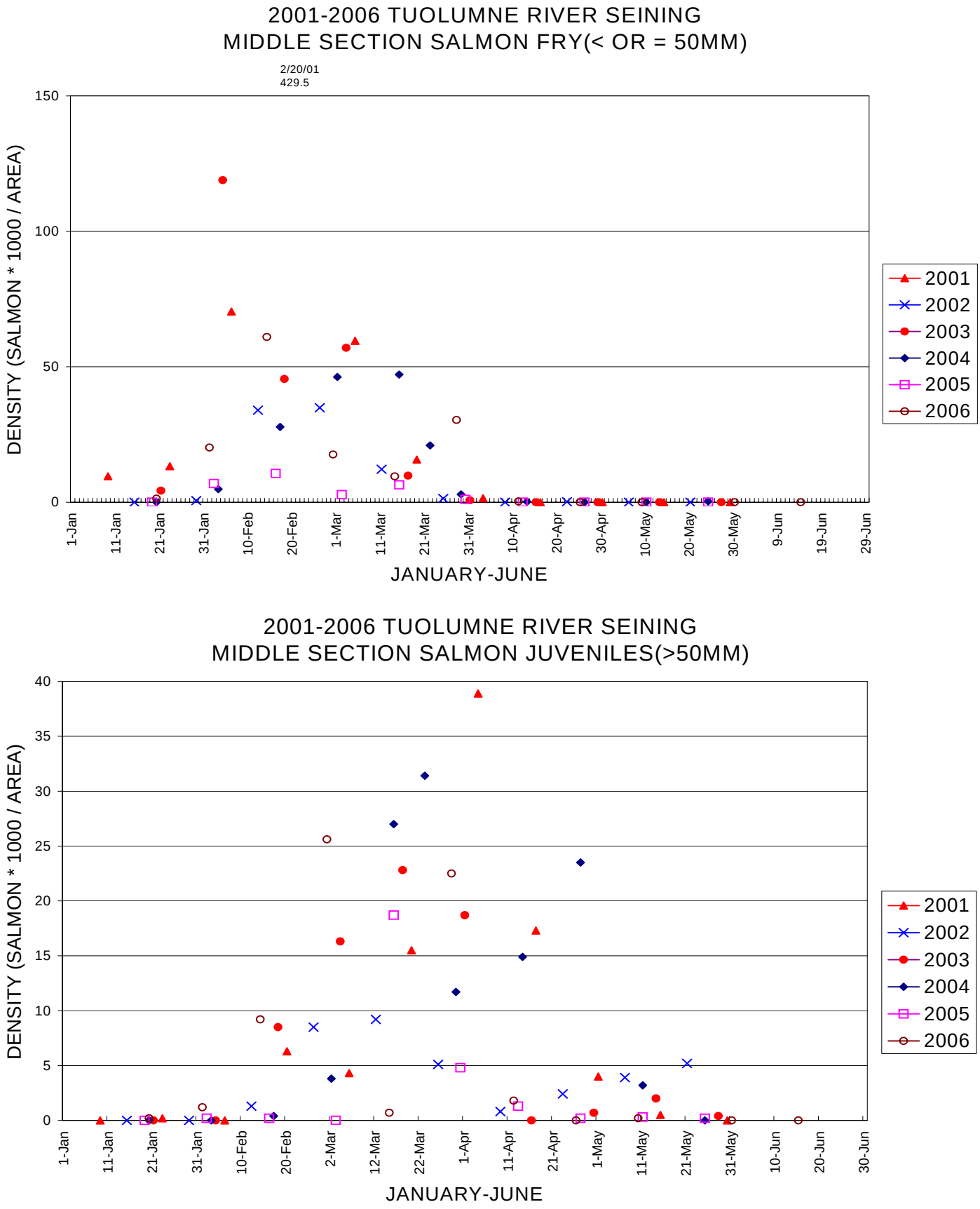
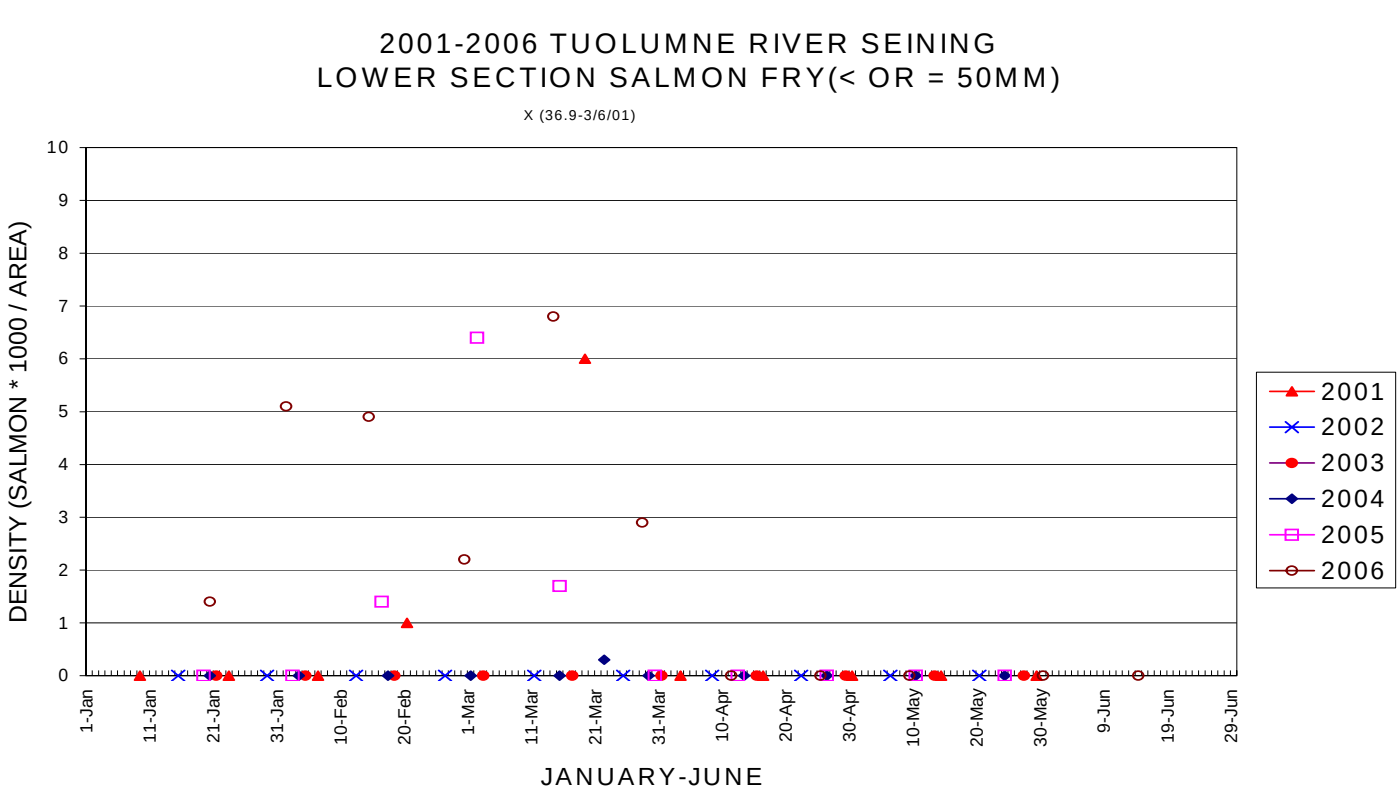


Figure 17. Middle section density indices for salmon fry and juveniles, 2001-2006.



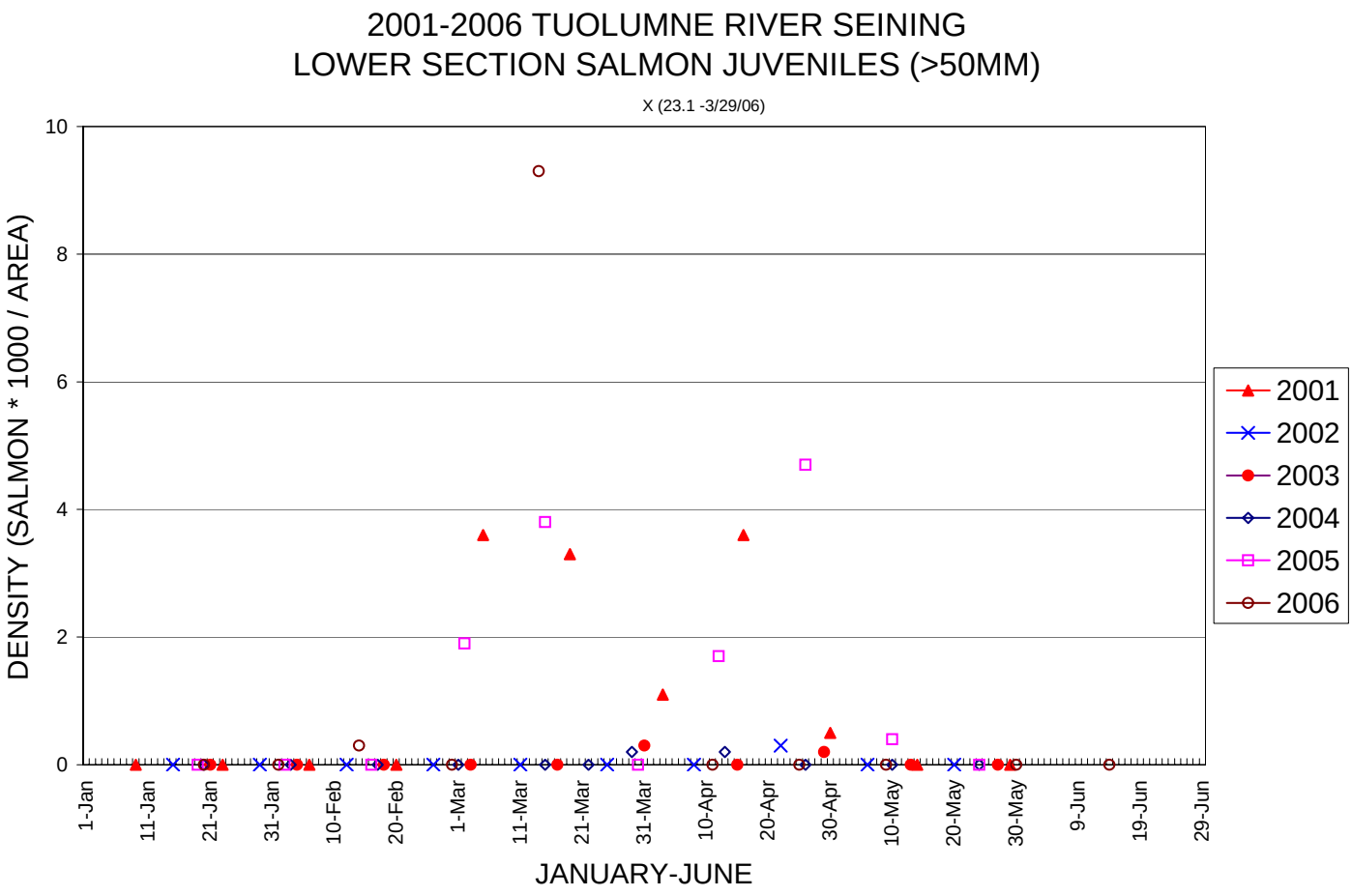


Figure 17. Lower section density indices for salmon fry and juveniles, 2001-2006.

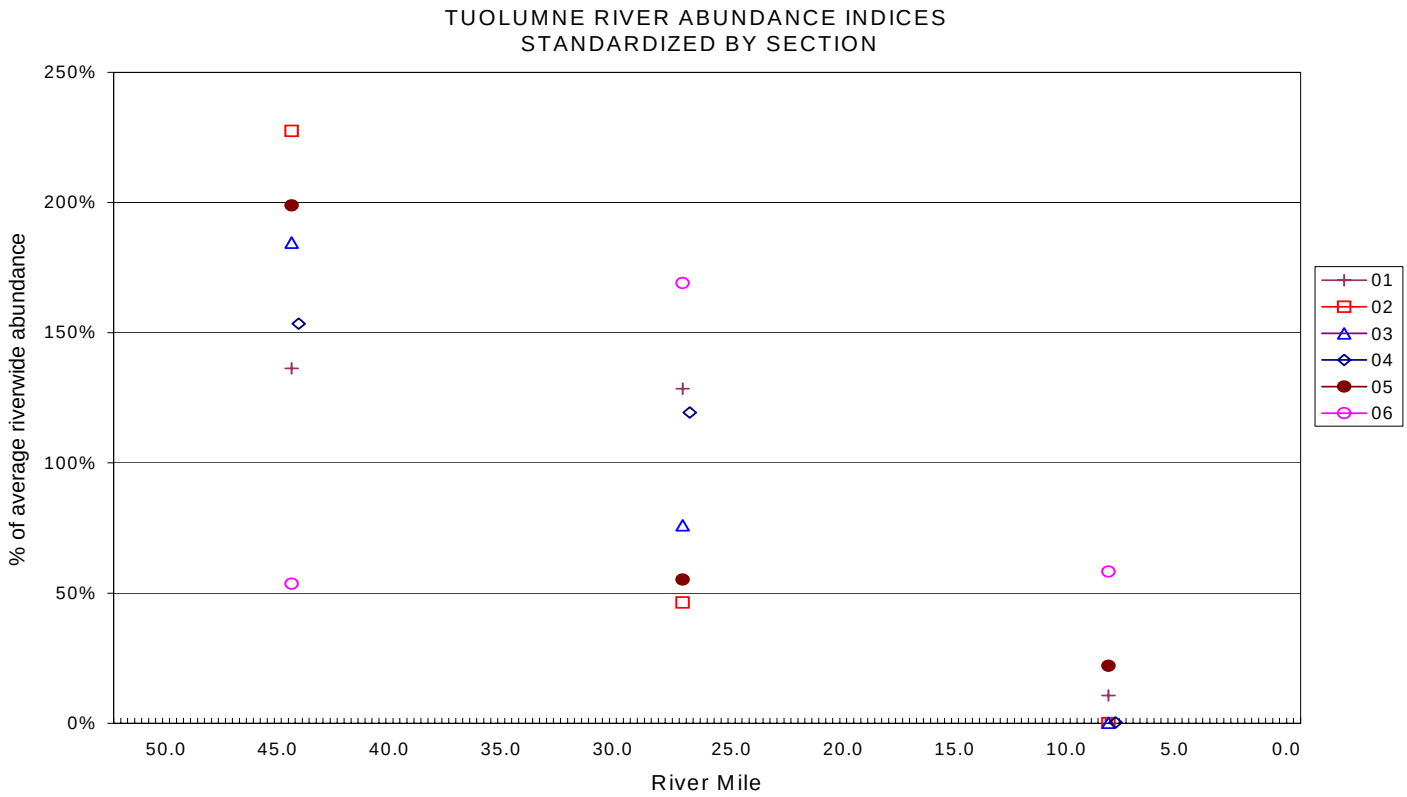


Figure 18. Tuolumne River abundance indices standardized by section, 2001-2006.

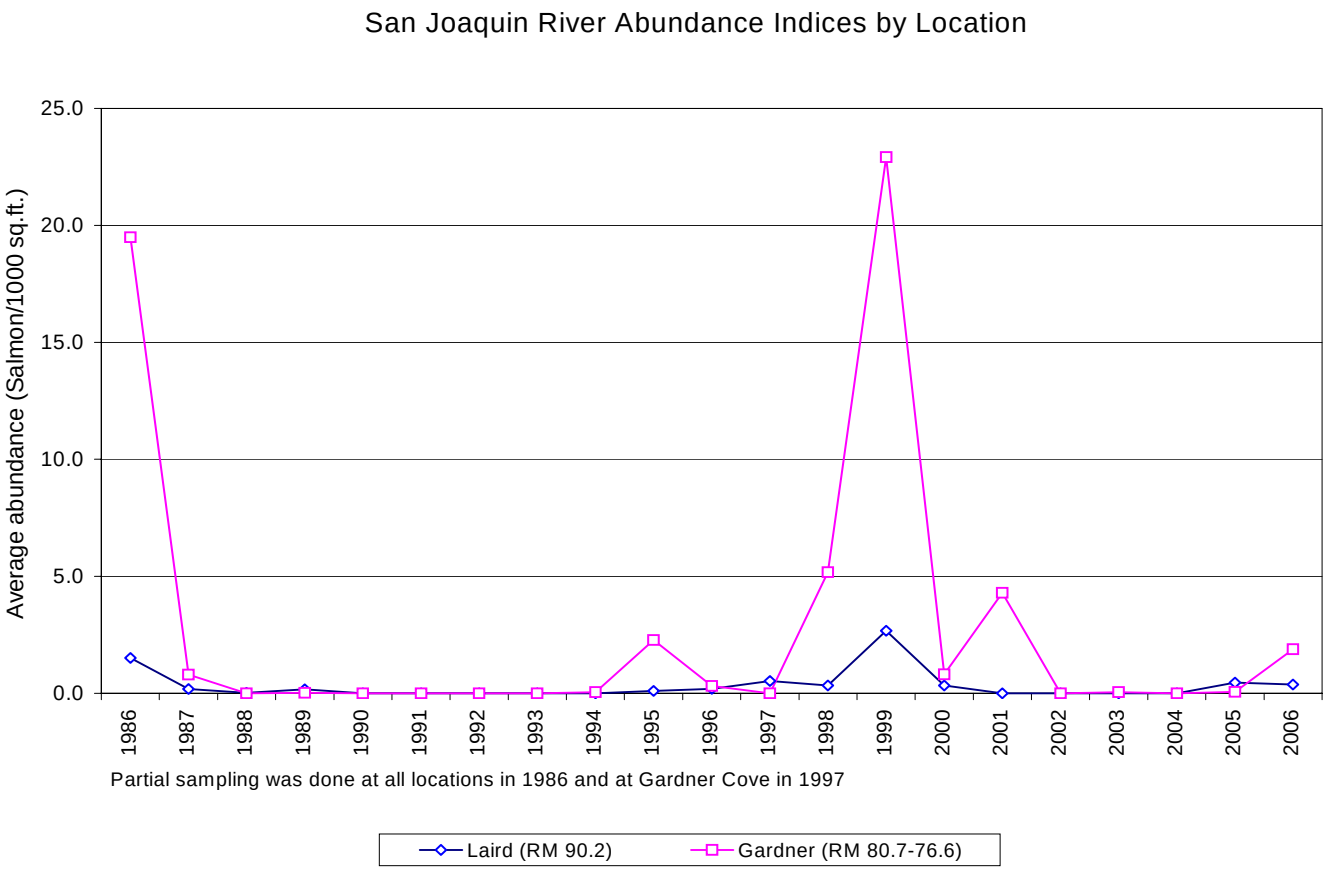


Figure 19. San Joaquin River abundance indices by location, 1986-2006.

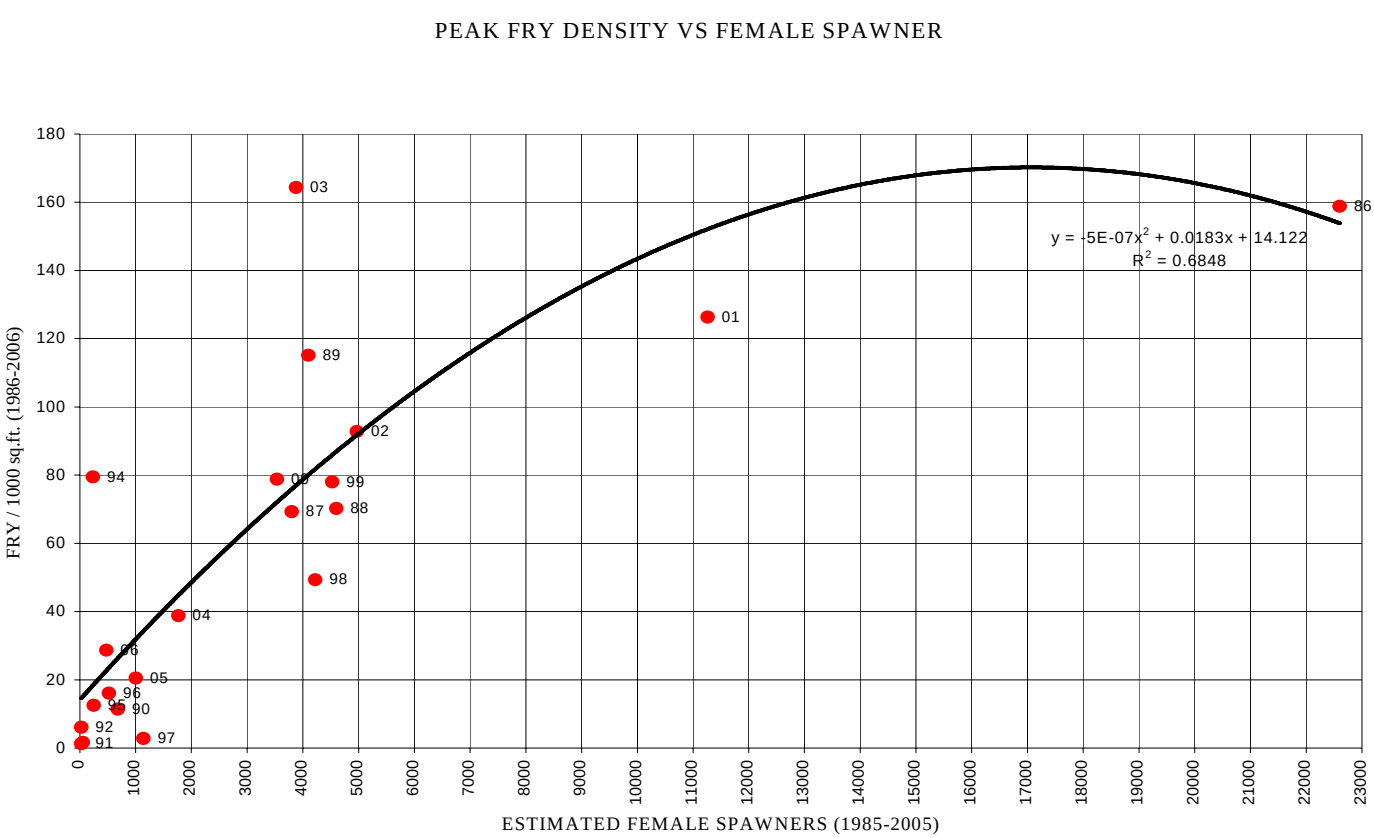


Figure 20. Tuolumne River peak fry density vs female spawners.

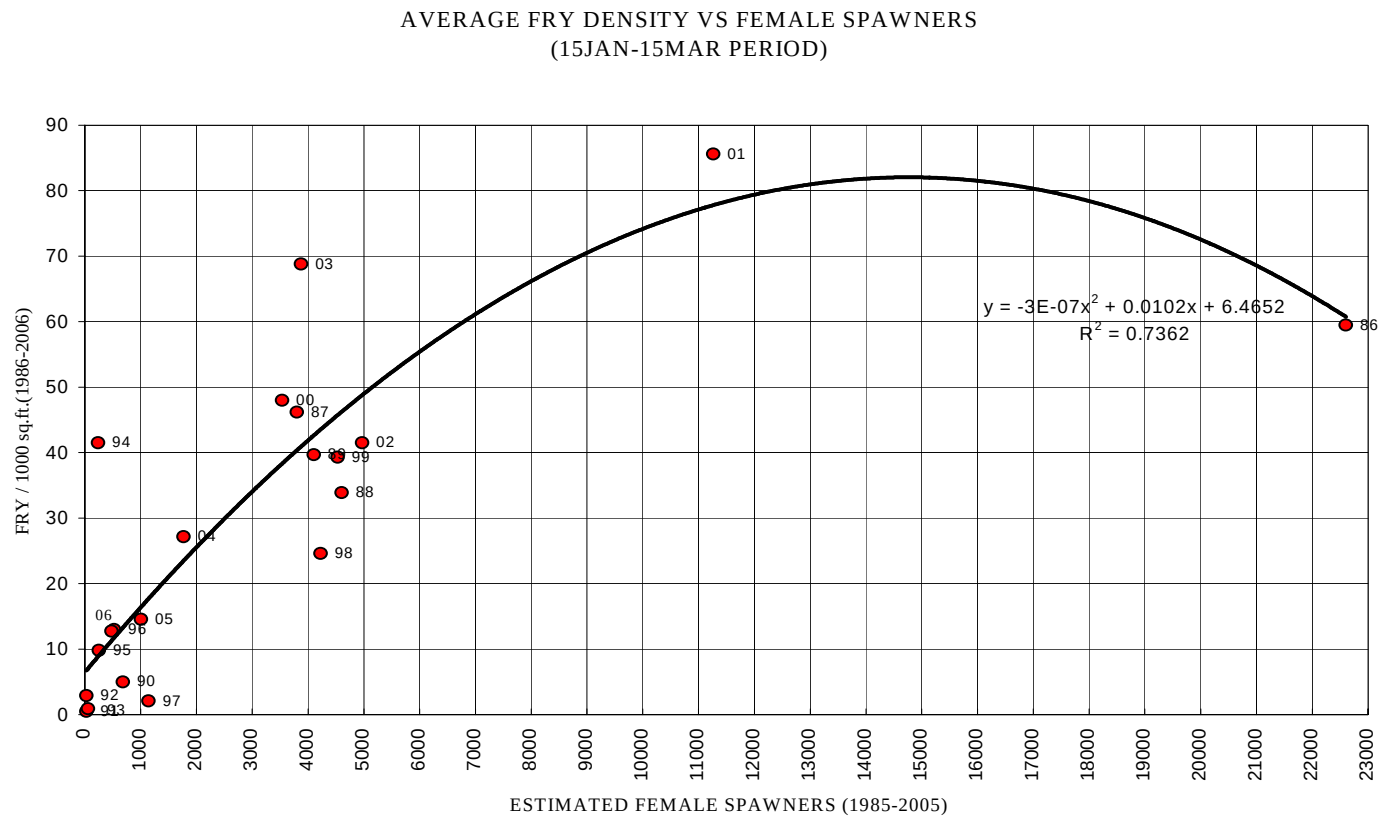


Figure 21. Tuolumne River average fry density vs female spawners.