

UNITED STATES OF AMERICA  
BEFORE THE  
FEDERAL ENERGY REGULATORY COMMISSION

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

2010 LOWER TUOLUMNE RIVER ANNUAL REPORT

Report 2010-3

2010 Seine Report and Summary Update

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## EXECUTIVE SUMMARY

The 2010 seining survey was conducted at two-week intervals from 26 January to 08 June for a total of 10 sample periods. This was the 25th consecutive annual seining study on the Tuolumne River conducted by the Turlock and Modesto Irrigation Districts.

A total of 386 natural Chinook salmon were caught in the Tuolumne River and none in the San Joaquin River. This was the 7<sup>th</sup> lowest number of salmon caught during the 1986-2010 period and salmon were captured downstream to the Charles Rd. location (RM 24.9). Peak density of salmon caught in the Tuolumne was 7.8 salmon per 1,000 square feet on 02 March. Maximum fork length (FL) in the Tuolumne River increased from 47 mm FL to 88 mm FL from 26 January to 30 March and minimum FL was 29 mm.

Flows during the sampling period ranged from about 220 to 3,300 cubic feet per second (cfs) in the Tuolumne River at La Grange and from about 1,200 to 6,000 cfs in the San Joaquin River at Vernalis. Flows in 2010 increased significantly beginning in early April due to above average precipitation.

Water temperature in the Tuolumne ranged from 10.1°C to 18.4°C and in the San Joaquin from 9.4°C to 25.8°C. Conductivity in the Tuolumne River ranged from 27 to 205  $\mu$ S and in the San Joaquin from 211 to 1,406  $\mu$ S.

A comparative review of fork length and salmon density for the 2005-2010 period is included. Increase in average fork length in 2010 was typical in timing and magnitude to the pattern observed in other years through early April. After that, average fork length remained fairly stable due to low catch numbers and the outmigration of smolts.

Density of fry ( $\leq$  50 mm) peaked on 17 February, similar in timing to other years of the 2005-2010 period. The density of juveniles ( $>$  50 mm) peaked on 30 March, which was also similar to other years in the period. In 2010, the average density of salmon in the Tuolumne River was 2.9 salmon per 1,000 ft<sup>2</sup>, most similar to 1997.

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# 1 INTRODUCTION

Stillwater Sciences with assistance from FISHBIO conducted seine studies in the Tuolumne and San Joaquin Rivers in 2010 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 2010 were the progeny of the 2009 fall spawning run, estimated at about 300 fish counted at the Tuolumne River weir. This was the 25th consecutive annual TID/MID seining study and a summary of salmonid data since 1986 is contained in this report.

## 1.1 STUDY SITES

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 79.4) (Fig. 1). A total of ten sites were sampled each survey period, eight on the Tuolumne and two on the San Joaquin. The locations of the sites were as follows:

<u>Site</u>	<u>Location</u>	<u>River Mile</u>
<u>Tuolumne River</u>		
1	Old La Grange Bridge (OLGB)	50.5 <sup>a</sup>
2	Riffle 5	48.0
3	Tuolumne River Resort (TRR)	42.4
4	Hickman Bridge	31.6
5	Charles Road	24.9
6	Legion Park	17.2
7	Service Rd.,(Big Bend)	8.7,(6.4)
8	Shiloh Road	3.4
<u>San Joaquin River</u>		
9	Laird Park	90.2 <sup>b</sup>
10	Gardner Cove	79.4

- 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.

## **1.2 2010 TUOLUMNE AND SAN JOAQUIN RIVER SAMPLING CONDITIONS**

Flows released in the Tuolumne River below La Grange Dam were approximately 220 cfs in January when the surveys began. Several winter rain runoff events occurred from late January to early March as was evident in flows at Modesto. Releases began increasing in early April due to above average precipitation in the watershed (Fig. 2). During April and May, there were several pulse flows of about 3,300 cfs. In mid-June flows increased to a high of 5,520 cfs .

Flows in the San Joaquin River at Vernalis (RM 72.5) ranged from 1,200-6,000 cfs from January through June.

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 10.1 °C (50.2 °F) at Shiloh Rd on 26 January and at OLGB on 16 March, and the maximum temperature was 18.4 °C (65.1 °F) at Shiloh Road on 30 March (Fig. 3). The lowest San Joaquin River water temperature, 9.4 °C (48.9 °F) was at Laird Park on 26 January; the highest was 25.8 °C (78.4°F) at Laird Park on 08 June.

Dissolved oxygen concentration in the Tuolumne River ranged from 8.6 to 15.2 mg/L (ppm) and from 8.3 to 14.3 mg/L in the San Joaquin River (Fig. 3).

## **2 METHODS**

### **2.1 STUDY TIMING**

The 2010 seining study began on 26 January and ended on 08 June. Sampling was done at two-week intervals, with a total of 10 sampling dates.

### **2.2 SAMPLING METHODS AND DATA RECORDING**

Seining was done using a 4-ft high, 1/8-inch mesh nylon seine net 20 feet in length. 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, especially after early April. 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, turbidity, dissolved oxygen, 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.

## 2.3 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  $\leq 50$  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 386 salmon were caught in the Tuolumne River and 0 in the San Joaquin (Table 1). All salmon were measured and riverwide peak density for the Tuolumne was 7.8 salmon per 1,000 ft<sup>2</sup> on 02 March. Peak density is normally observed in mid to late February.

#### 3.1.1 Density of Fry and Juvenile Salmon

Salmon up to 47 mm fork length (FL) were caught in the Tuolumne River on 26 January. The highest density of salmon fry in the Tuolumne was 6.1 fry/1,000 ft<sup>2</sup> found on 17 February (Table 2). The highest density of juvenile salmon in the Tuolumne was 3.6 juveniles/1,000 ft<sup>2</sup> found on 30 March.

The density of salmon fry exhibited a peak at all sites from 17 February to 02 March. The density of juveniles generally peaked from 02 March to 13 April for all locations (Fig. 4).

The density of salmon fry in the Tuolumne River peaked in the upper section on 17 February, in the middle section on 02 March and none were caught in the lower section (Fig. 5).

The density of juveniles peaked in the upper section on 13 April, the middle section on 30 March and again, none were caught in the lower section. No salmon were caught in the San Joaquin River.

#### 3.1.2 Size, Growth, and Smoltification

The fork length of salmon caught ranged from 29 mm to 101 mm. The average fork length (FL) of salmon generally increased from 26 January to 13 April (Fig. 6). An indirect method to estimate growth rate was made by dividing the increase in maximum FL, over a period of time. Maximum FL in the Tuolumne River increased from 47 to 88 mm during the 26 January to 30 March period (Fig. 6), indicating a potential FL increase of approximately .65 mm per day (41 mm / 63 days).

Length frequency distributions by survey period are in Figs. 7 & 8. The change in FL by location generally shows an increase from late January to late April at most of the Tuolumne River sampling locations (Fig. 9). The first salmon exhibiting smolting characteristics were

caught on 16 March with the exception of a 101 mm FL salmon caught on 17 February. For the year, smolting salmon ranged from 55-101 mm FL. Fry were present through 08 June during the 2010 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 27  $\mu$ S at OLG B to a high of 205  $\mu$ S at Shiloh Road (Table 3). Conductivity also decreased as flows increased beginning in April (Fig. 10).

Conductivity in the San Joaquin River was much higher than in the Tuolumne and ranged from a low of 211  $\mu$ S at Gardner Cove to a high of 1406  $\mu$ S at Laird Park.

Turbidity in the Tuolumne River was less than 10.2 Nephelometric Turbidity Units (NTU) except for readings downstream of Fox Grove on 26 January and 02 March that were likely the result of storm runoff. 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 14.5 at Gardner Cove to 81.4 NTU measured 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 10 other species in the San Joaquin River. Nine of these species were common to both rivers and 15 species were caught overall. Twenty-nine rainbow trout fry (21-51 mm FL) were caught in the Tuolumne River between 17 February to 11 May at OLG B, R5, and TRR.

2010 Summary of Rainbow Trout caught during the Seining Study

Date	Location	River Mile	Rainbow Catch	Minimum Fork Length (mm)	Maximum Fork Length (mm)	Average Fork Length (mm)
2/17/10	OLGB	50.5	10	24	36	27.9
3/2/10	OLGB	50.5	2	29	30	29.5
3/2/10	TRR	42.3	1	22	22	22.0
3/16/10	OLGB	50.5	5	21	33	29.6
3/16/10	R5	48.0	1	41	41	41.0
3/30/10	OLGB	50.5	1	25	25	25.0
3/30/10	R5	48.0	2	34	35	34.5
4/13/10	R5	48.0	5	29	51	39.8
5/11/10	OLGB	50.5	1	37	37	37.0
5/11/10	R5	48.0	1	37	37	37.0

## 4 COMPARATIVE REVIEW

### 4.1 SEINE: 1986-2010

Annual TID/MID Tuolumne River seining surveys began in 1986, with the number, location, and sampling frequency of sites having varied over time (Tables 5 & 6). The number of salmon captured in the Tuolumne has ranged from 120 (1991) to 14,825 (1987) - the total number of salmon captured was 386 in 2010 which is the seventh lowest for all years. In 2010, the average density of salmon in the river was 2.9 salmon per 1,000 ft<sup>2</sup> and was most similar to densities found in 1997.

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 5). No salmon were captured in the San Joaquin River this year and in eight other years.

#### 4.1.1 Size and Growth

The comparative review of fork length and density is primarily for the 2005-2010 period in this report. Minimum FL found in 2010 remained low, less than 40 mm FL, through April (Fig. 11). In 2010, the increase in average FL during the January to March period was similar in timing and magnitude to the pattern observed in the 2005-2010 period (Fig. 12). After mid-April the average FL declined and then remained somewhat constant due to low numbers of salmon caught and the outmigration of smolts. Maximum FL in 2010 was about average from January through April (Fig. 13). The estimated 2010 growth rate of .65 mm per day was slightly above average for 1986-2010 (Table 5).

#### 4.1.2 Fry and Juvenile Salmon Density

In 2010, the density of salmon fry ( $\leq 50$  mm) in the Tuolumne River peaked on 17 February at a lower level than 2009 (Fig. 14).

The density of salmon juveniles ( $>50$  mm) in 2010 peaked on 30 March most similar in timing to 2006 (Fig. 15).

Combined fry and juvenile densities for the Tuolumne River are shown for the years 2005-2010 (Fig. 16). The 2010 densities peaked on 02 March at 7.8 salmon per 1,000 ft<sup>2</sup>.

##### 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 2010, the density of fry peaked on 17 February and declined to low levels by mid-March. Upper section density of juveniles typically increases beginning in late February and peaks in early April to late May. In 2010, juvenile salmon density peaked on 13 April.

Middle section density of fry generally peaks from early February to mid-March similar timing to the upper section. In 2010, the density of fry peaked on 02 March. Middle section density of



juveniles often peak from late February to late March. In 2010 juvenile density peaked on 30 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 March (2005) to mid-March (2006) during the 2005-2010 period. In 2010, no salmon fry were caught in the lower section. Peak density of juveniles ranged from late March (2006) to late April (2005) with no juvenile captured in 2010.

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 2010 the standardized section abundance indices were in the middle range for the upper and middle 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 1986-2010 period (Fig. 19). The total number of wild salmon caught at Laird Park during this period was 148. No salmon were caught at Laird Park in 2010. 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 1986-2010 period, 509 of which were caught in 1999. No salmon were caught at Gardner Cove in 2010.

#### 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 .725 for the 1986-2010 period (Fig. 20, Table 7). A similar result with R-squared of .774 was found using average fry density from 15 January -15 March (Figure 21).

#### 4.1.4 Other Fish Species

The number of fish species, other than Chinook salmon, caught during 1992-2010 has ranged from 10 to 16 in the Tuolumne River (Table 8). The counts from each site, by date, for fish species caught in 2010 are in Table 4. Fifteen other species were caught, including 5 native species, in the Tuolumne; 10 fish species, including 2 native, were caught in the San Joaquin River in 2010. The number of species caught in the San Joaquin River was low, similar to the three previous years.

Of native species, rainbow trout, hardhead, and riffle sculpin were caught only in the Tuolumne

River and Sacramento pikeminnow and Sacramento sucker were caught in both rivers. Native species recorded in prior years, but not caught in either river in 2010, were Pacific lamprey, Sacramento blackfish, hitch, Sacramento splittail, tule perch, and prickly sculpin. The number of species observed in the Tuolumne River during the 1992-2010 period of years has remained fairly constant (Table 8). The number of species observed in the San Joaquin River since 2007 has decreased significantly from earlier years.

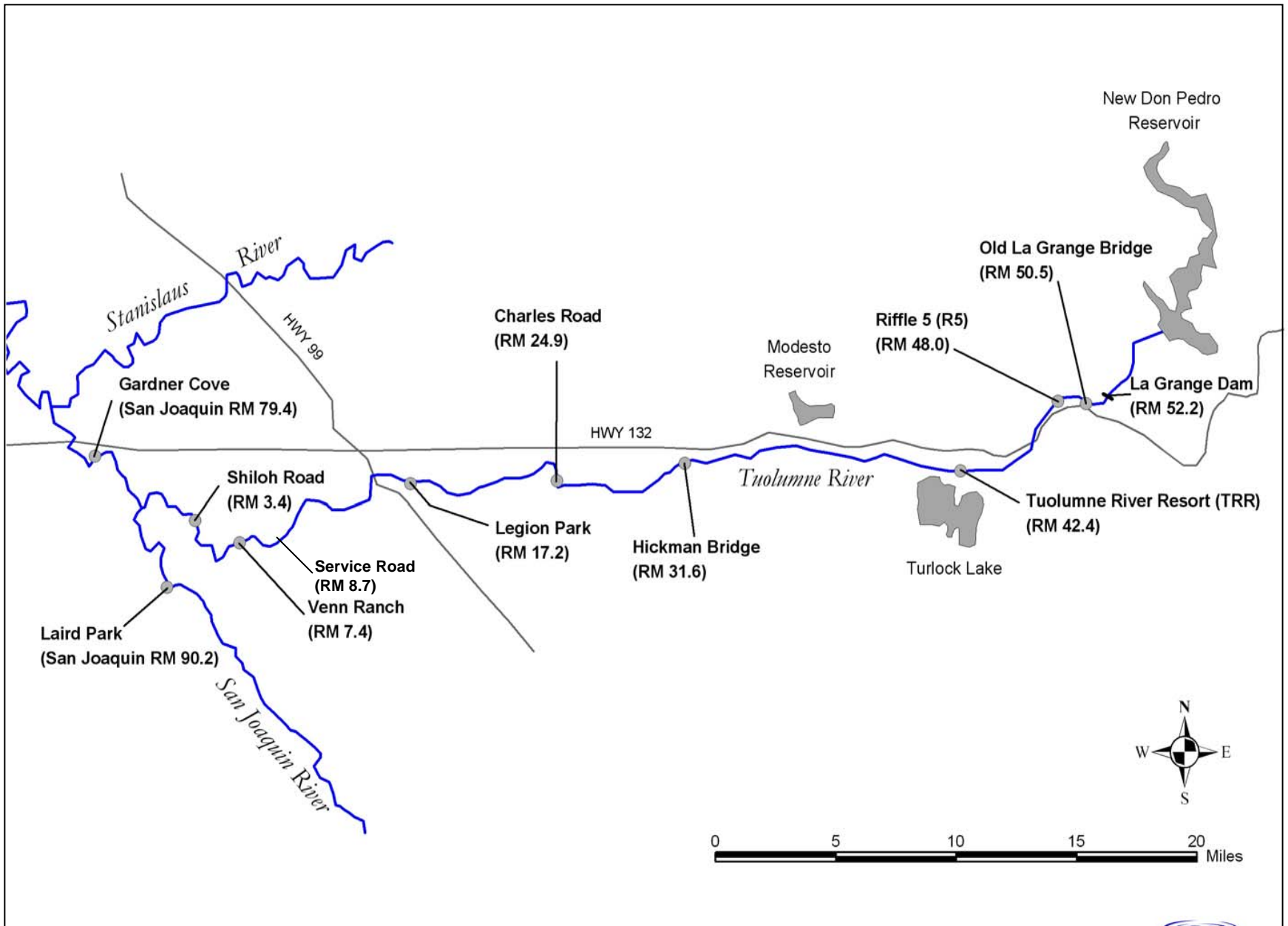
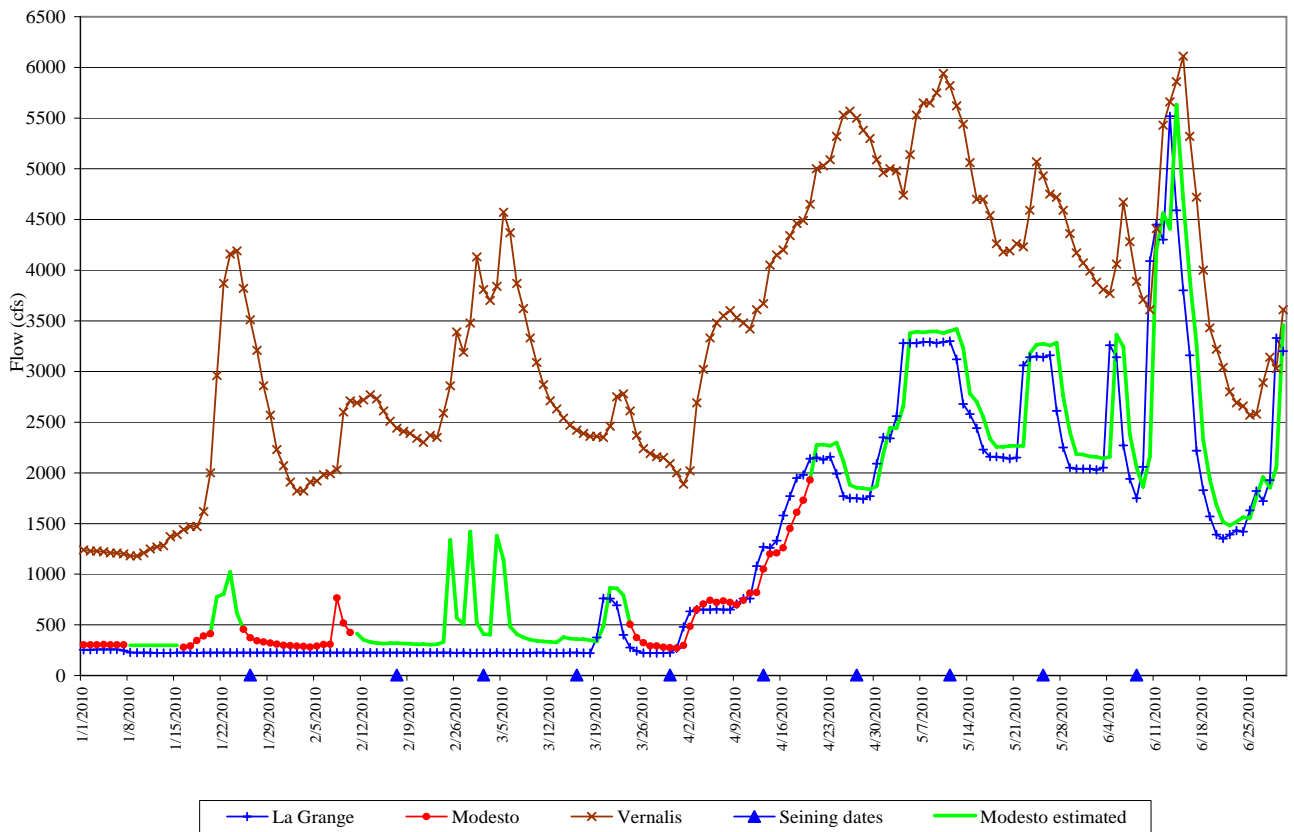


Figure 1. Locations of seine sampling sites on the lower Tuolumne and San Joaquin Rivers, 2010.

2010 Tuolumne and San Joaquin River daily mean flow  
Provisional USGS data



2010 San Joaquin River daily mean flow  
Provisional CDEC data

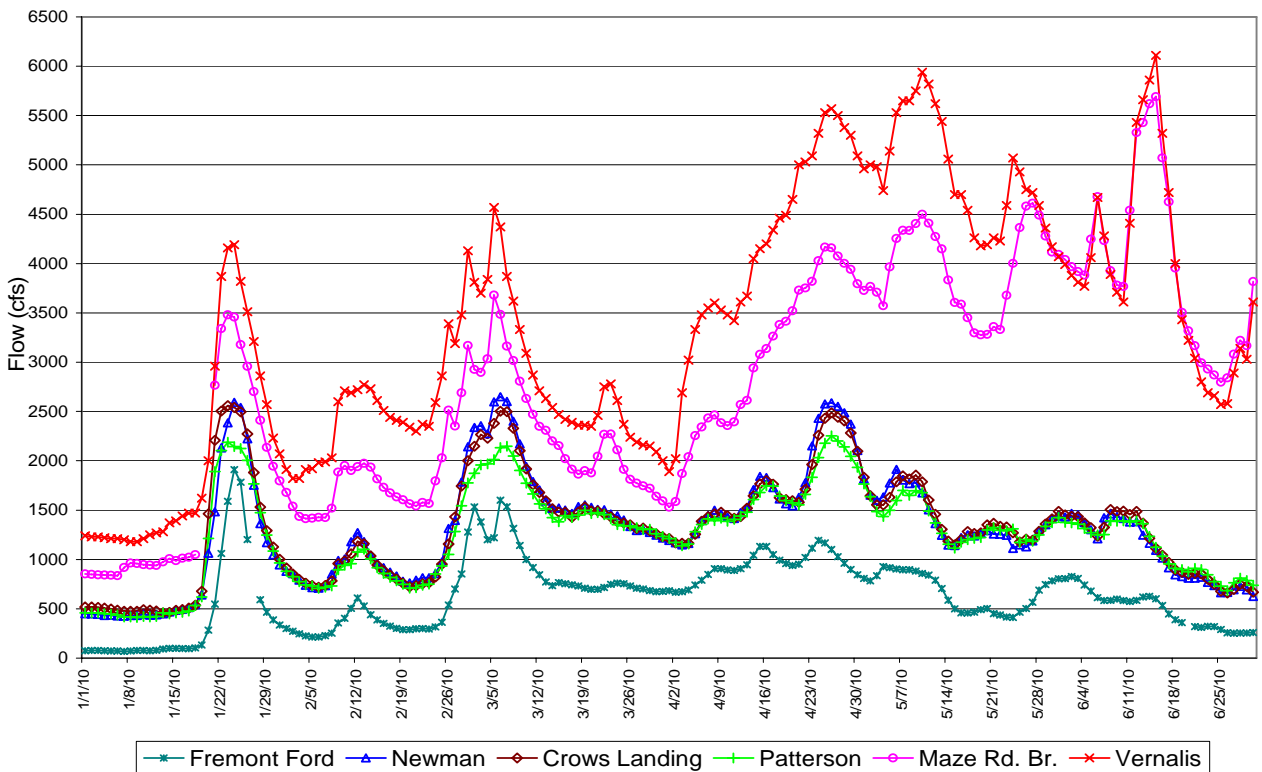
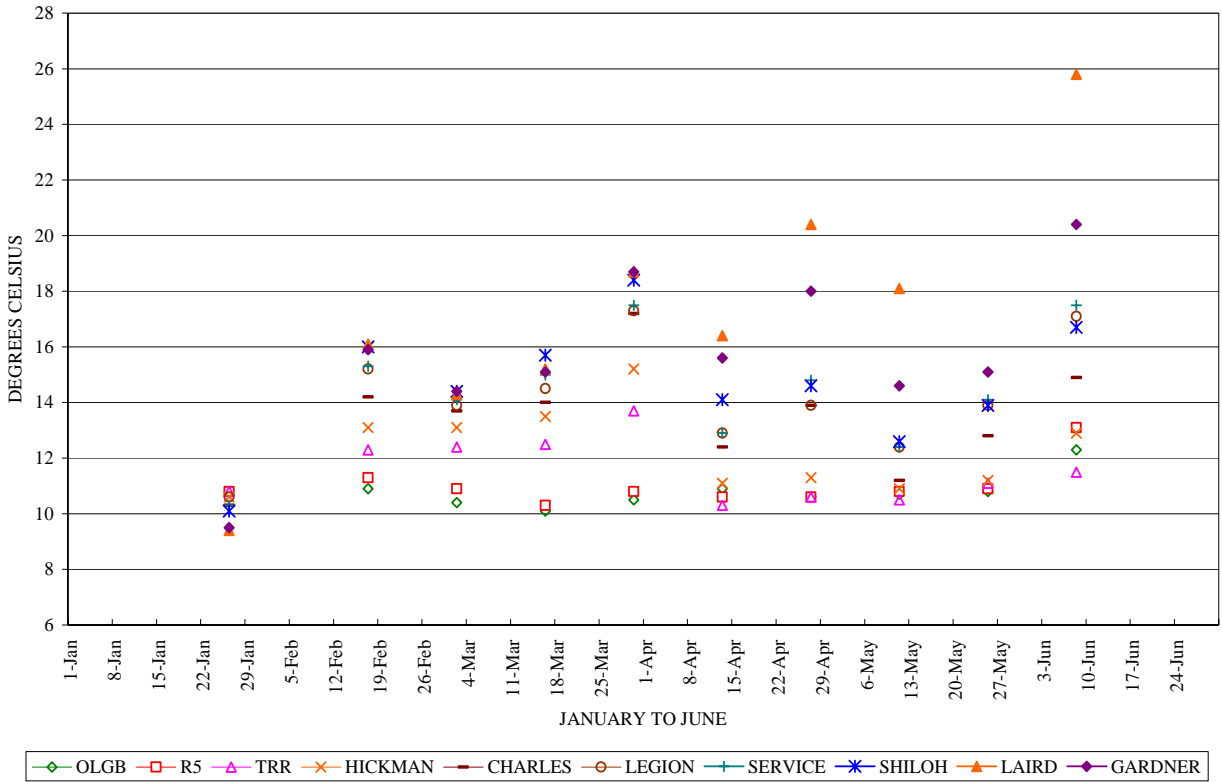


Figure 2. Tuolumne and San Joaquin River daily average flow.

2010 TUOLUMNE AND SAN JOAQUIN RIVER WATER TEMPERATURE



2010 TUOLUMNE AND SAN JOAQUIN RIVER DISSOLVED OXYGEN

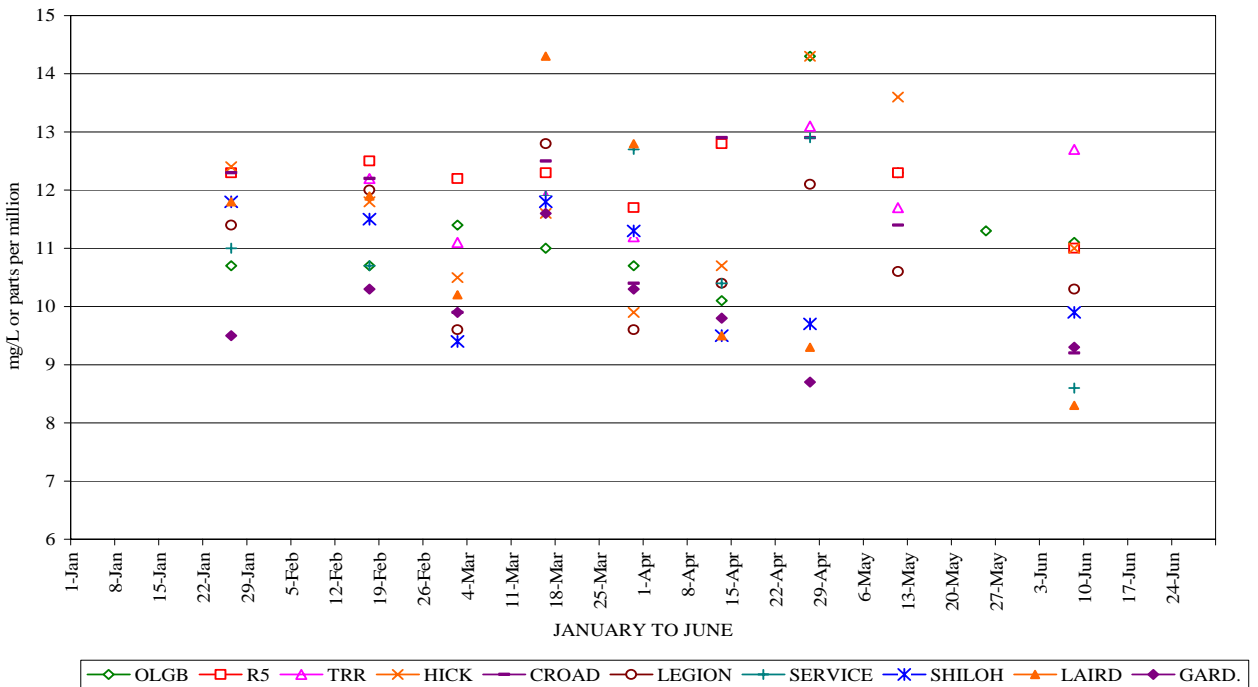
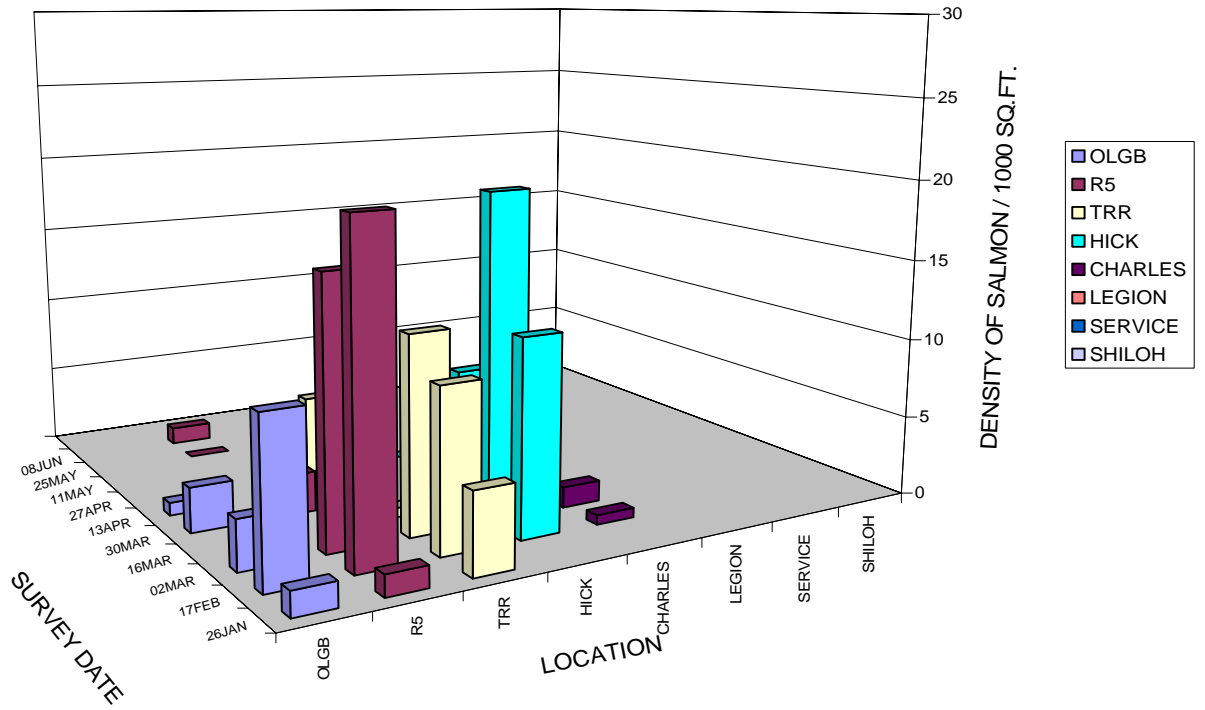


Figure 3. 2010 Tuolumne and San Joaquin River water temperature and dissolved oxygen.

TUOLUMNE RIVER JUVENILE SALMON STUDY  
2010 SEINING - DENSITY OF FRY BY LOCATION



TUOLUMNE RIVER JUVENILE SALMON STUDY  
2010 SEINING - DENSITY OF JUVENILES BY LOCATION

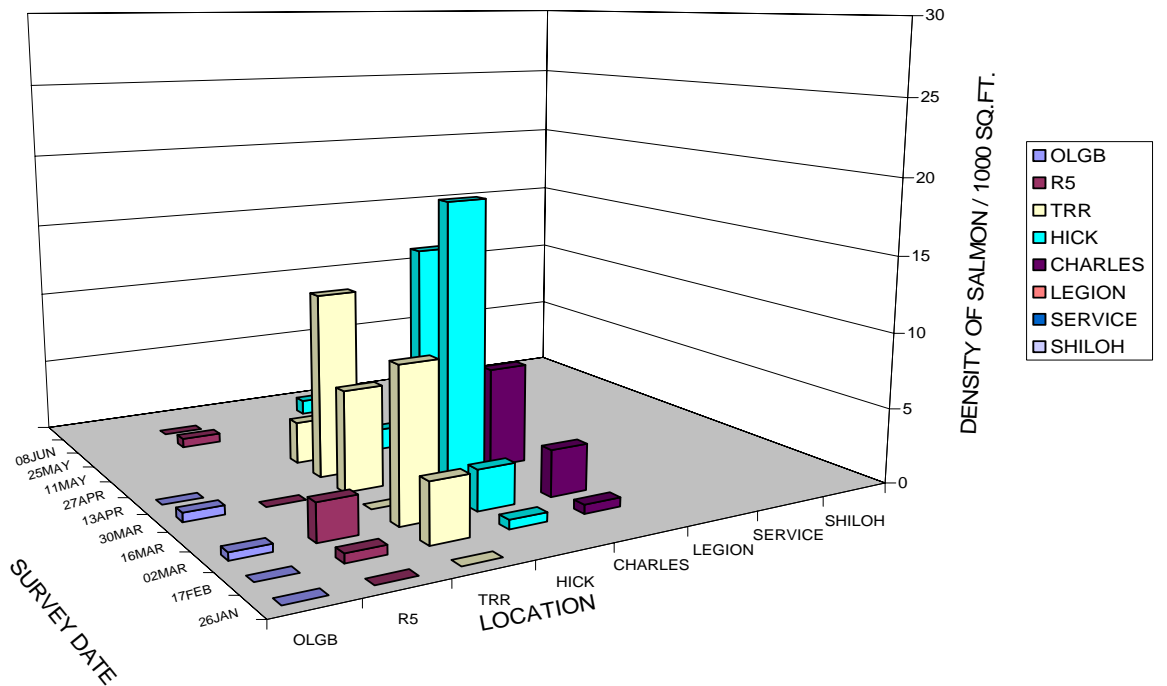


Figure 4. Tuolumne River density of fry and juvenile salmon by location.

2010 Tuolumne River fry and juvenile salmon density by section

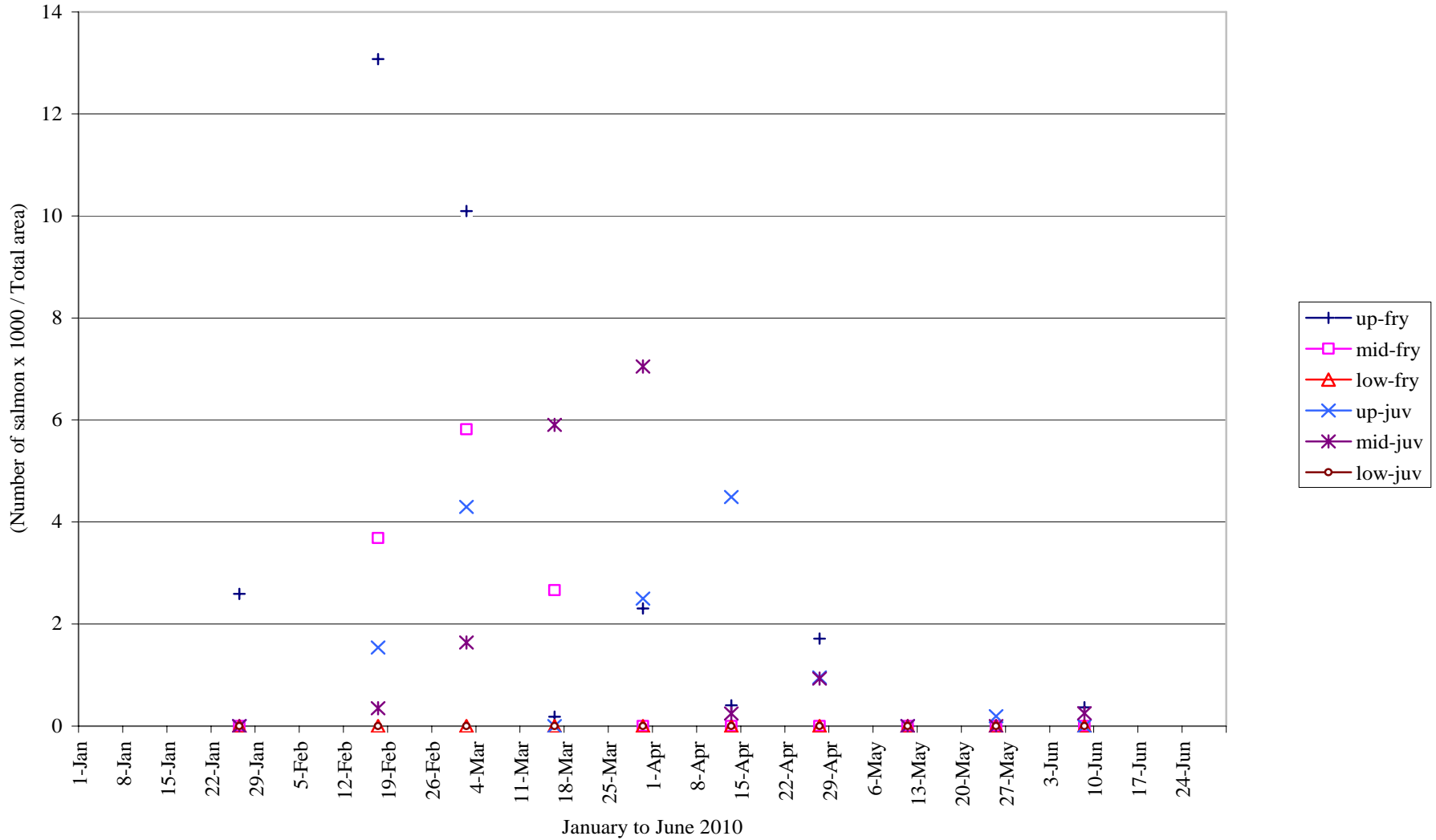


Figure 5. 2010 Tuolumne River fry and juvenile salmon density by section.

2010 TUOLUMNE RIVER JUVENILE SALMON SEINING STUDY

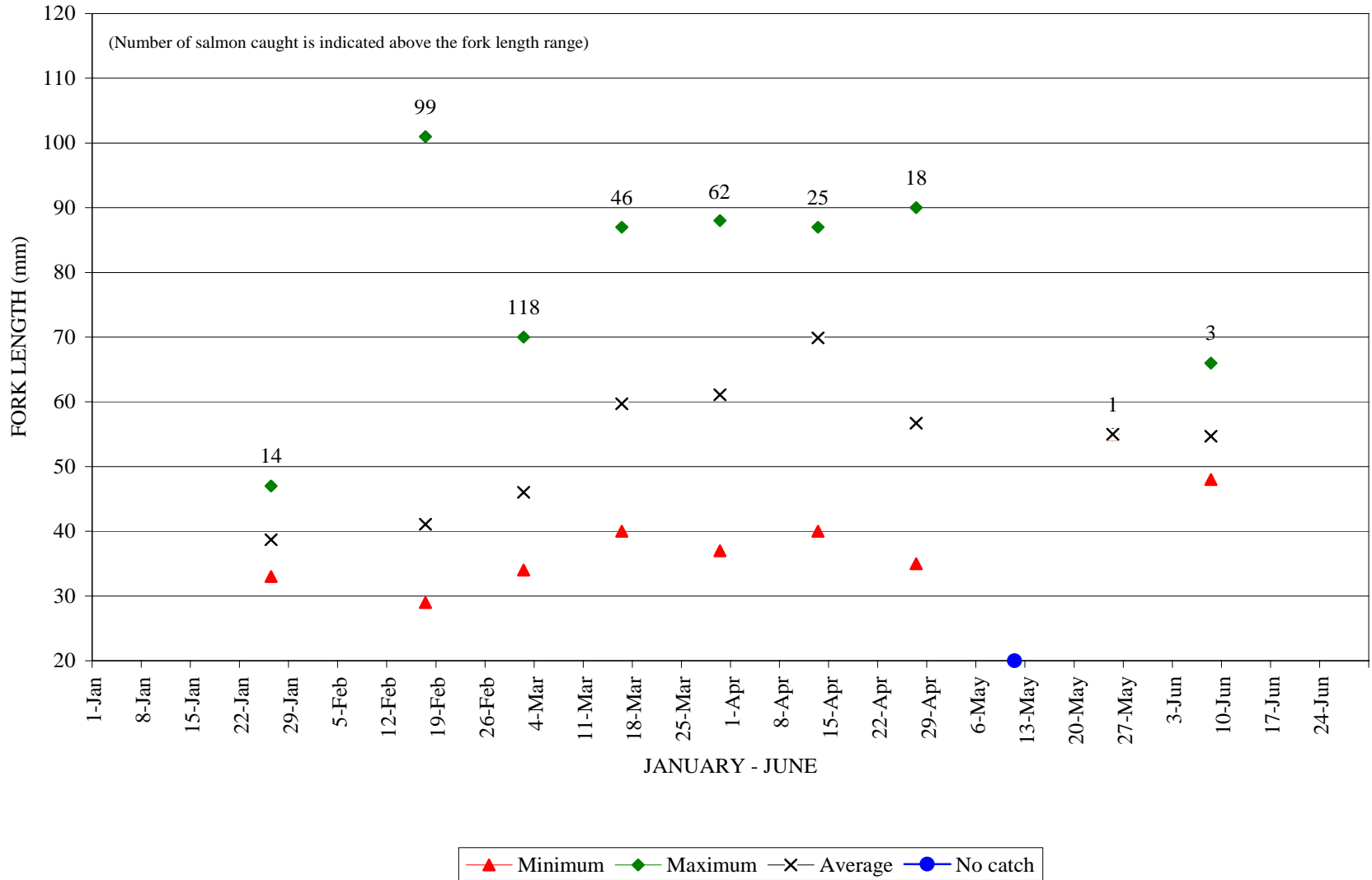
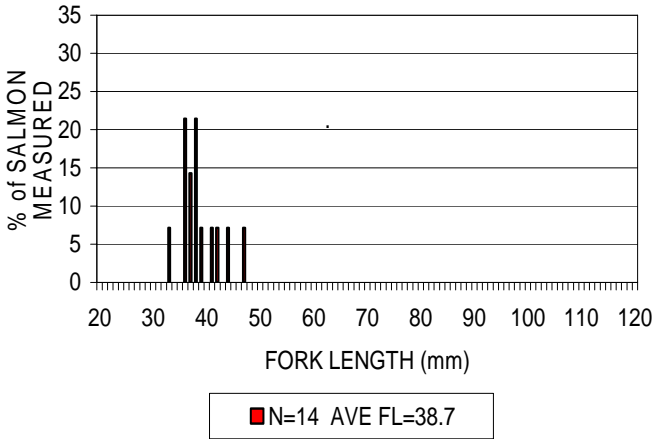


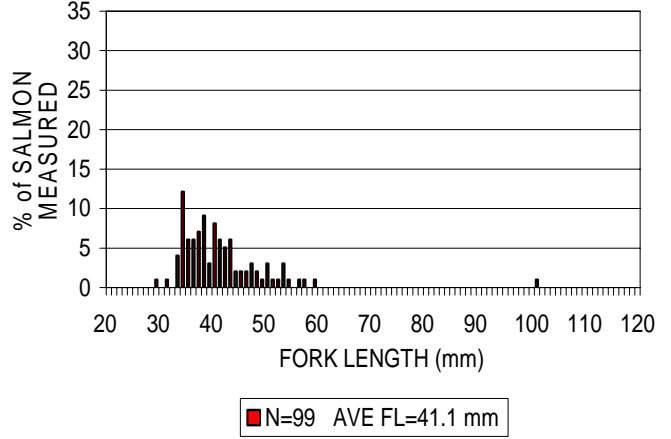
Figure 6. Fork length ranges of wild salmon in the Tuolumne River, 2010.



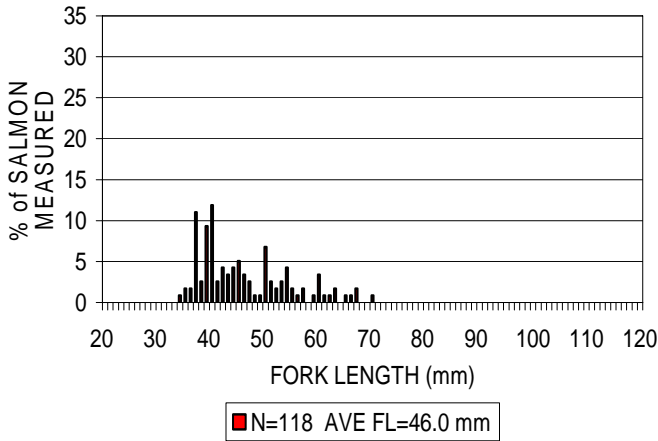
26JAN10 TUOLUMNE RIVER JUVENILE SALMON  
LENGTH FREQUENCY DISTRIBUTION



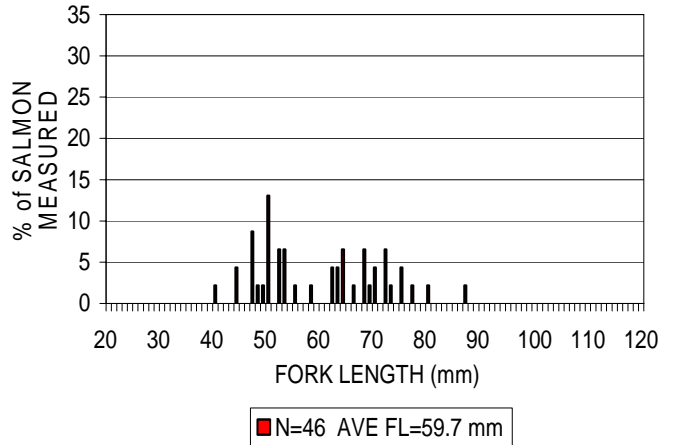
17FEB10 TUOLUMNE RIVER JUVENILE SALMON  
LENGTH FREQUENCY DISTRIBUTION



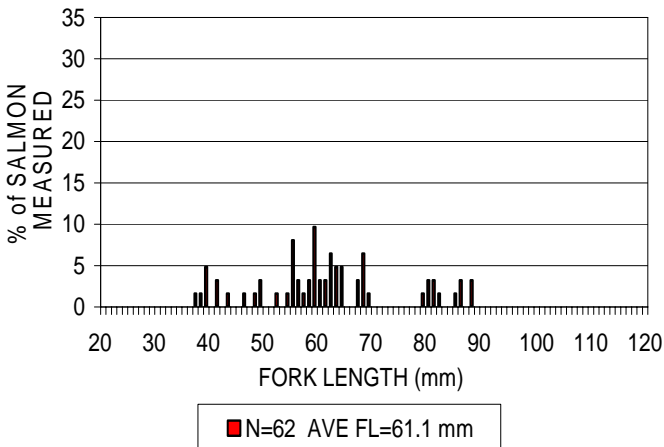
02MAR10 TUOLUMNE RIVER JUVENILE SALMON  
LENGTH FREQUENCY DISTRIBUTION



16MAR10 TUOLUMNE RIVER JUVENILE SALMON  
LENGTH FREQUENCY DISTRIBUTION



30MAR10 TUOLUMNE RIVER JUVENILE SALMON  
LENGTH FREQUENCY DISTRIBUTION



13APR10 TUOLUMNE RIVER JUVENILE SALMON  
LENGTH FREQUENCY DISTRIBUTION

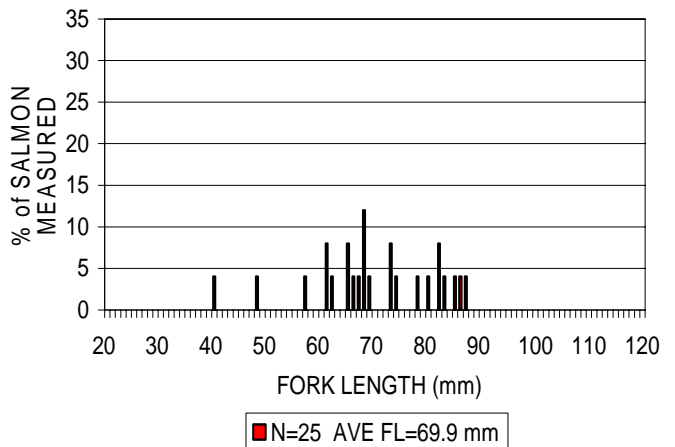
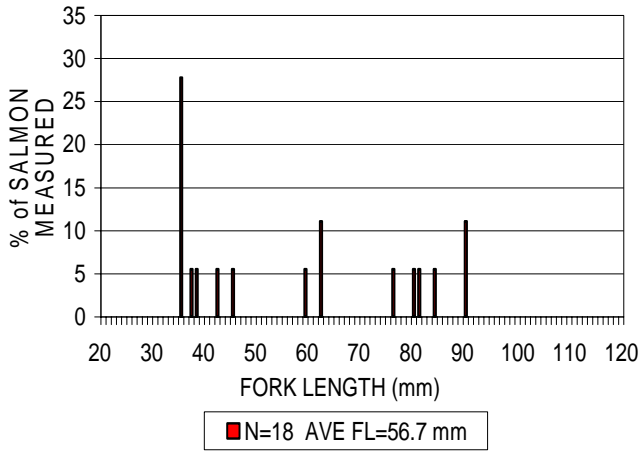
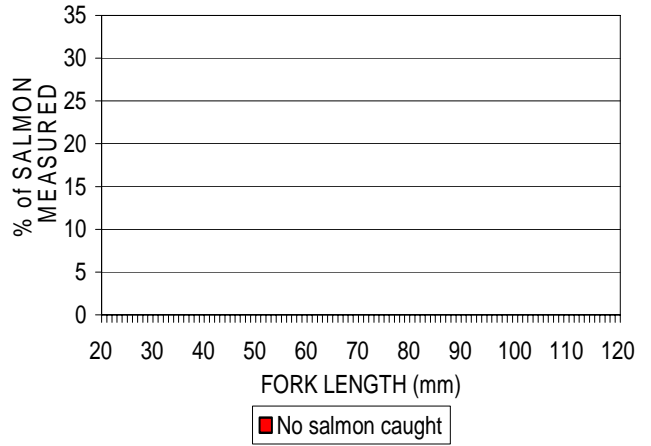


Figure 7. Length frequency distribution by date of salmon in the Tuolumne River, 2010.

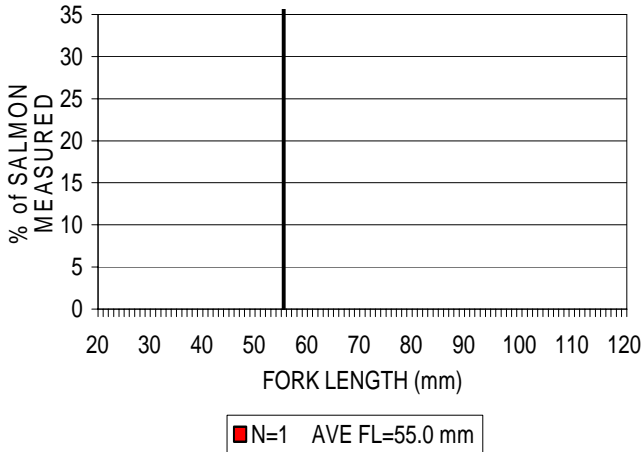
27APR10 TUOLUMNE RIVER JUVENILE SALMON  
LENGTH FREQUENCY DISTRIBUTION



11MAY10 TUOLUMNE RIVER JUVENILE SALMON  
LENGTH FREQUENCY DISTRIBUTION



25MAY10 TUOLUMNE RIVER JUVENILE SALMON  
LENGTH FREQUENCY DISTRIBUTION



08JUN10 TUOLUMNE RIVER JUVENILE SALMON  
LENGTH FREQUENCY DISTRIBUTION

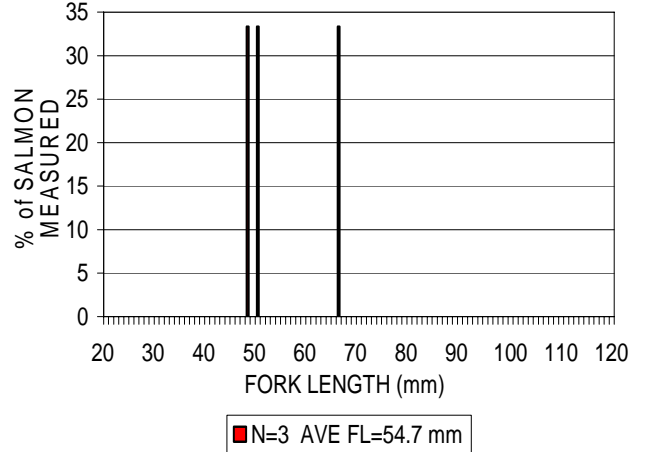
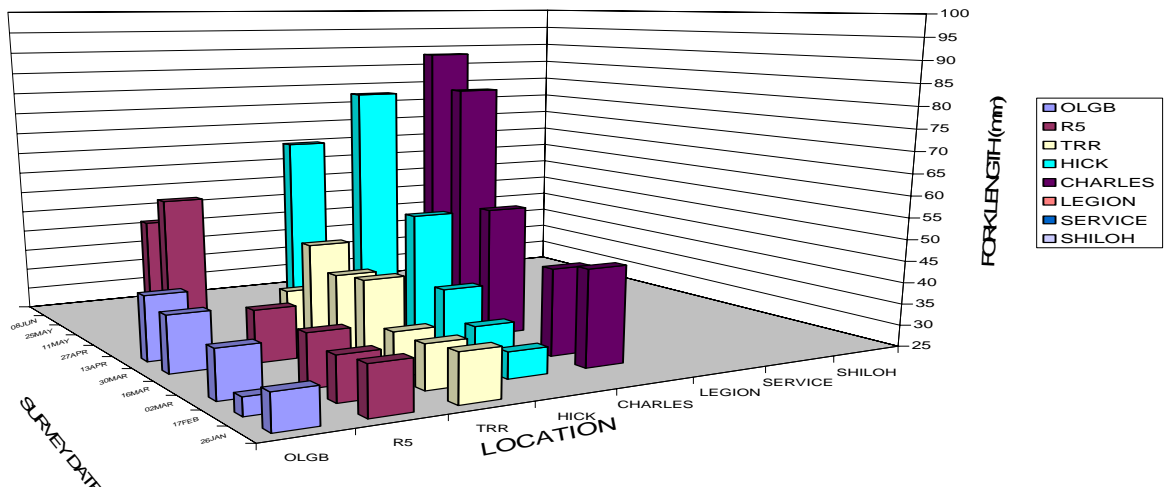
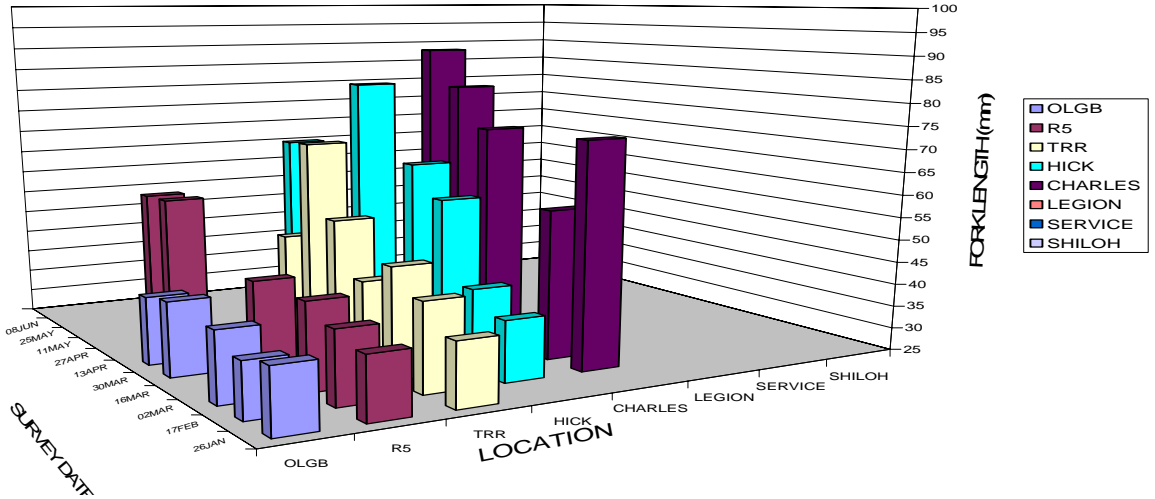


Figure 8. Length frequency distribution by date of salmon in the Tuolumne River, 2010.

TUOLUMNE RIVER JUVENILE SALMON STUDY  
2010 SEINING - MINIMUM FORK LENGTH



TUOLUMNE RIVER JUVENILE SALMON STUDY  
2010 SEINING - AVERAGE FORK LENGTH



TUOLUMNE RIVER JUVENILE SALMON STUDY  
2010 SEINING - MAXIMUM FORK LENGTH

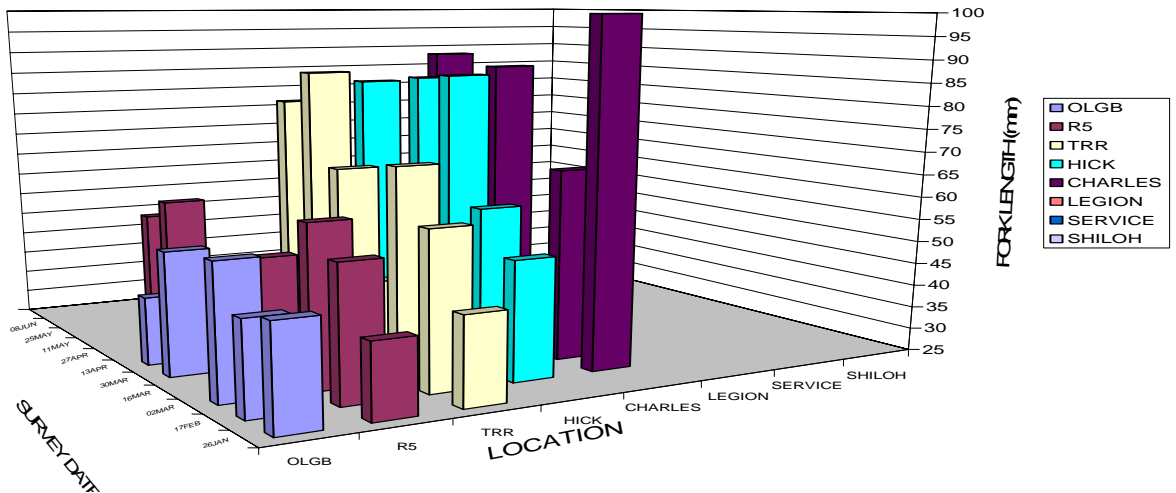
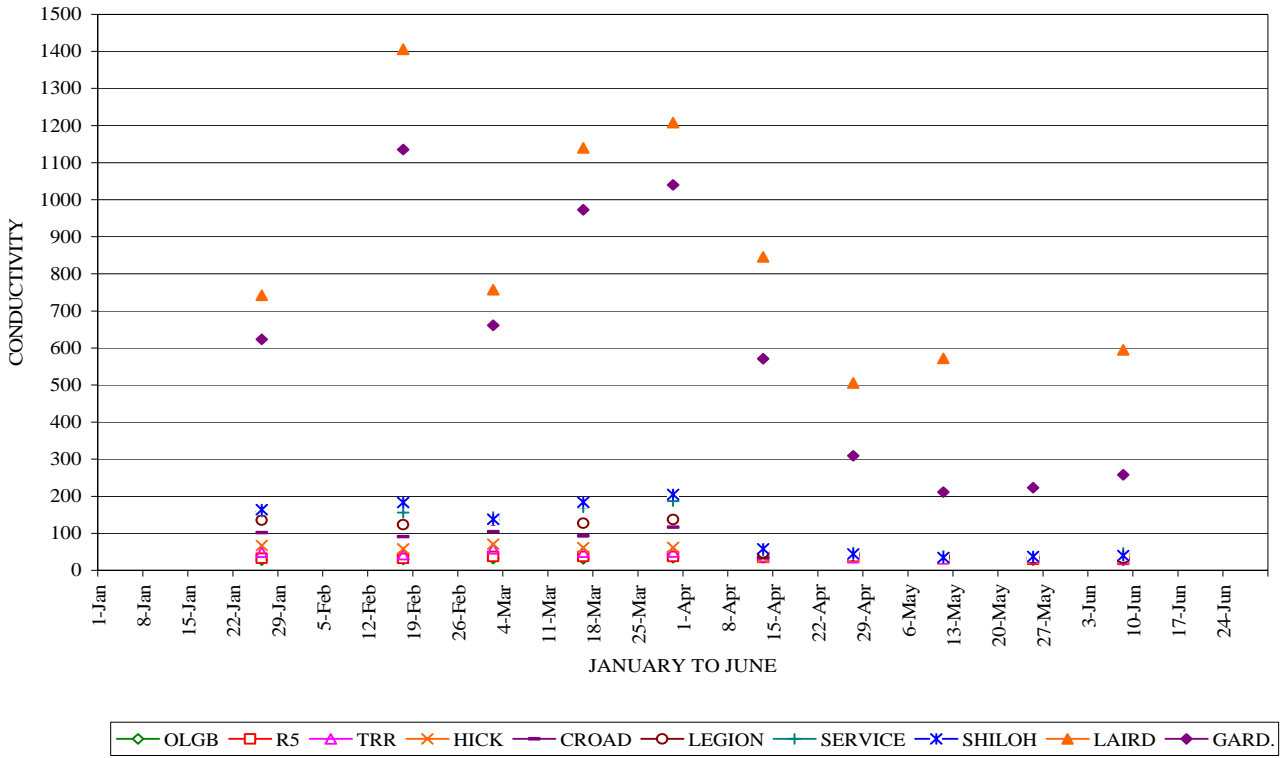


Figure 9. Minimum, average, and maximum fork length by location and survey period, 2010.

TUOLUMNE AND SAN JOAQUIN RIVERS  
2010 CONDUCTIVITY



TUOLUMNE AND SAN JOAQUIN RIVERS  
2010 TURBIDITY

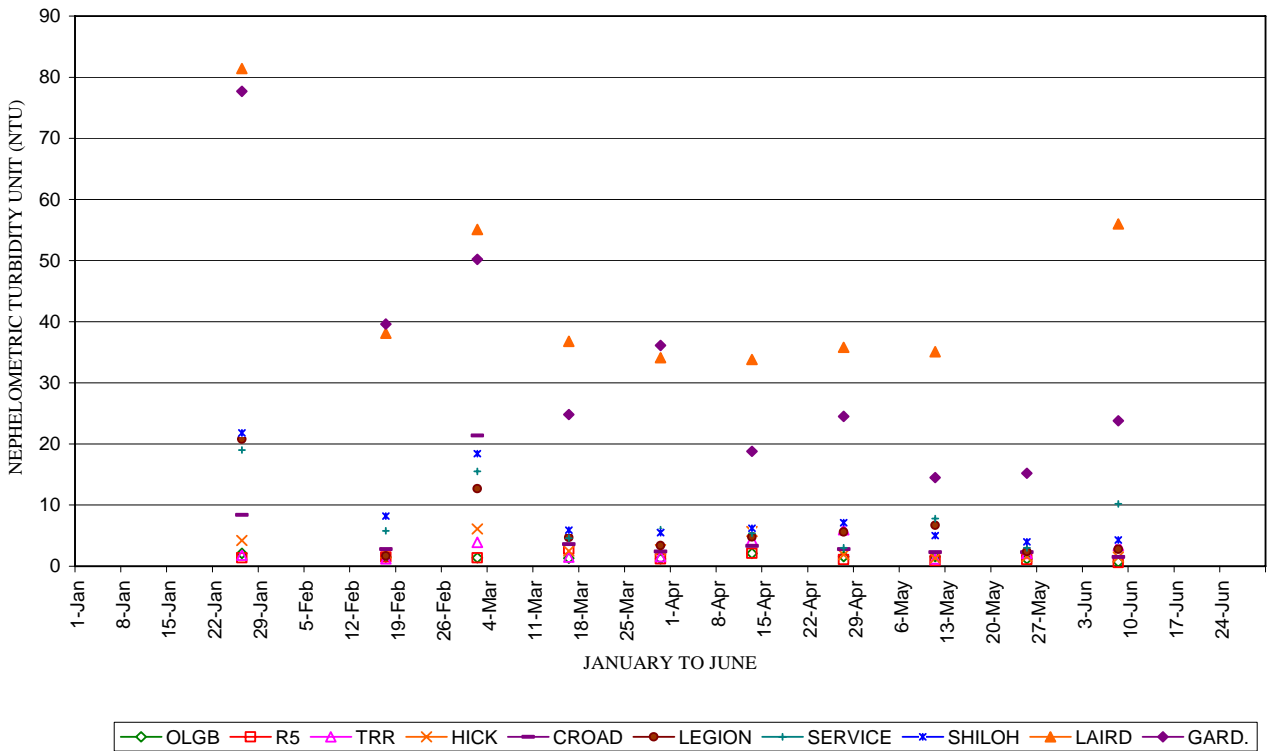
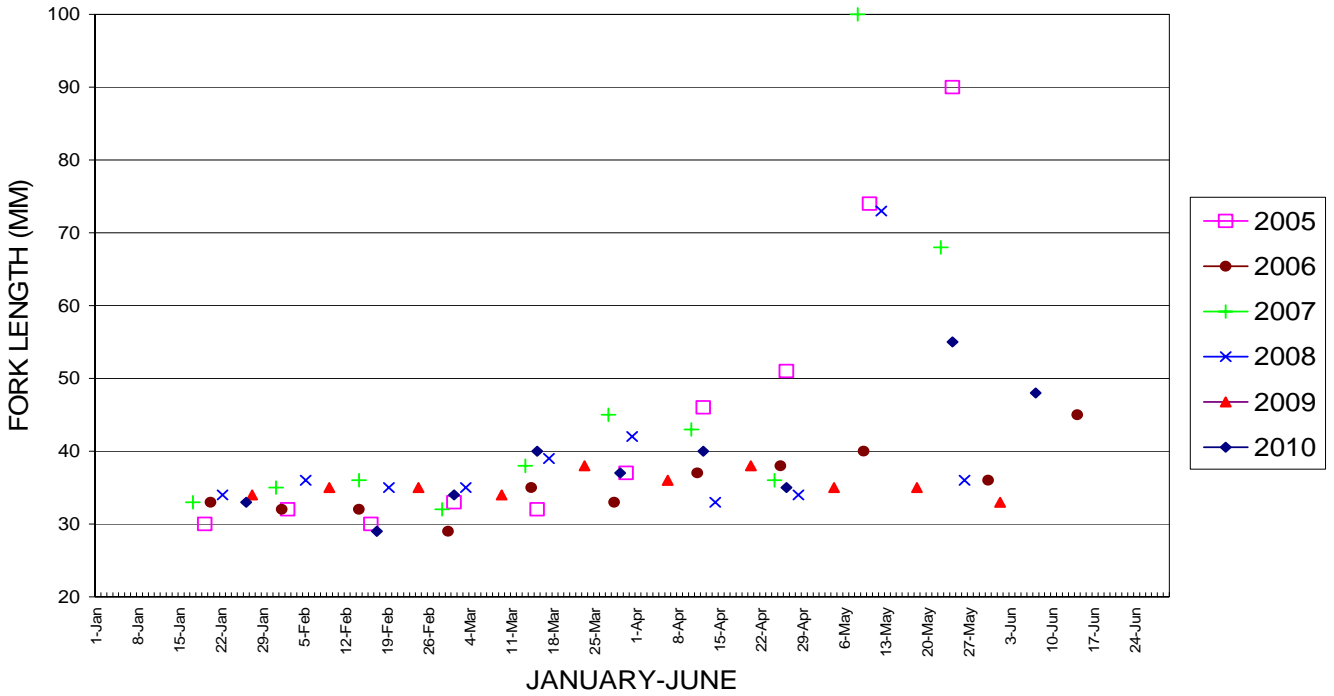
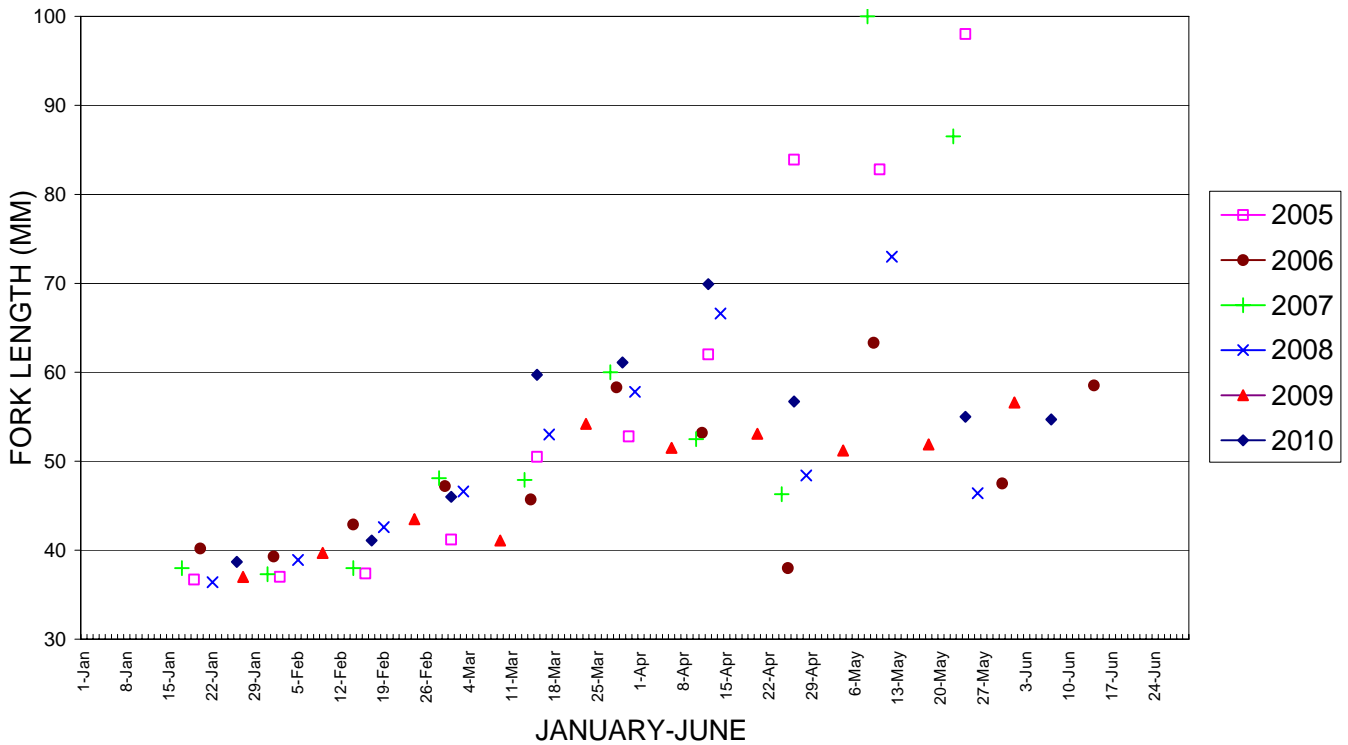


Figure 10. Conductivity and turbidity in the Tuolumne and San Joaquin Rivers, 2010

### 2005-2010 TUOLUMNE RIVER SEINING MINIMUM SALMON FORK LENGTH

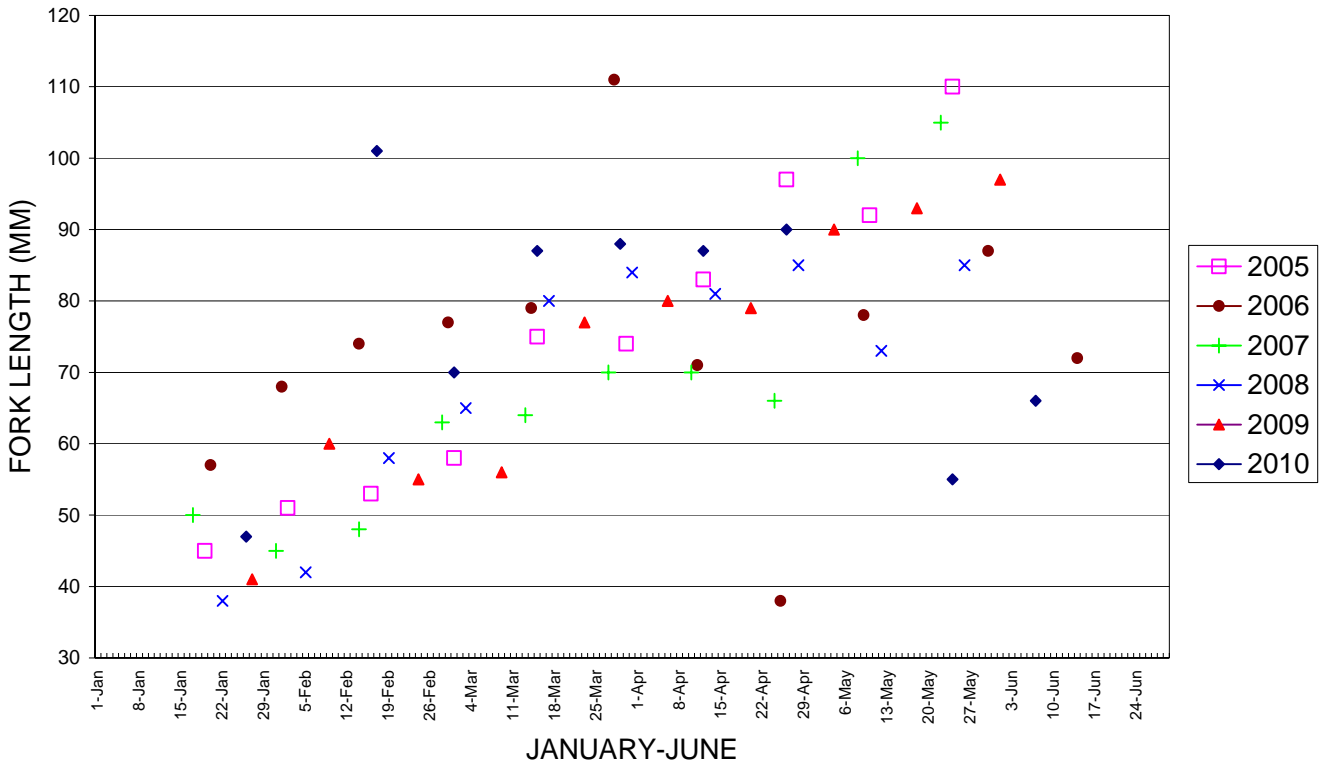


### 2005-2010 TUOLUMNE RIVER SEINING AVERAGE SALMON FORK LENGTH

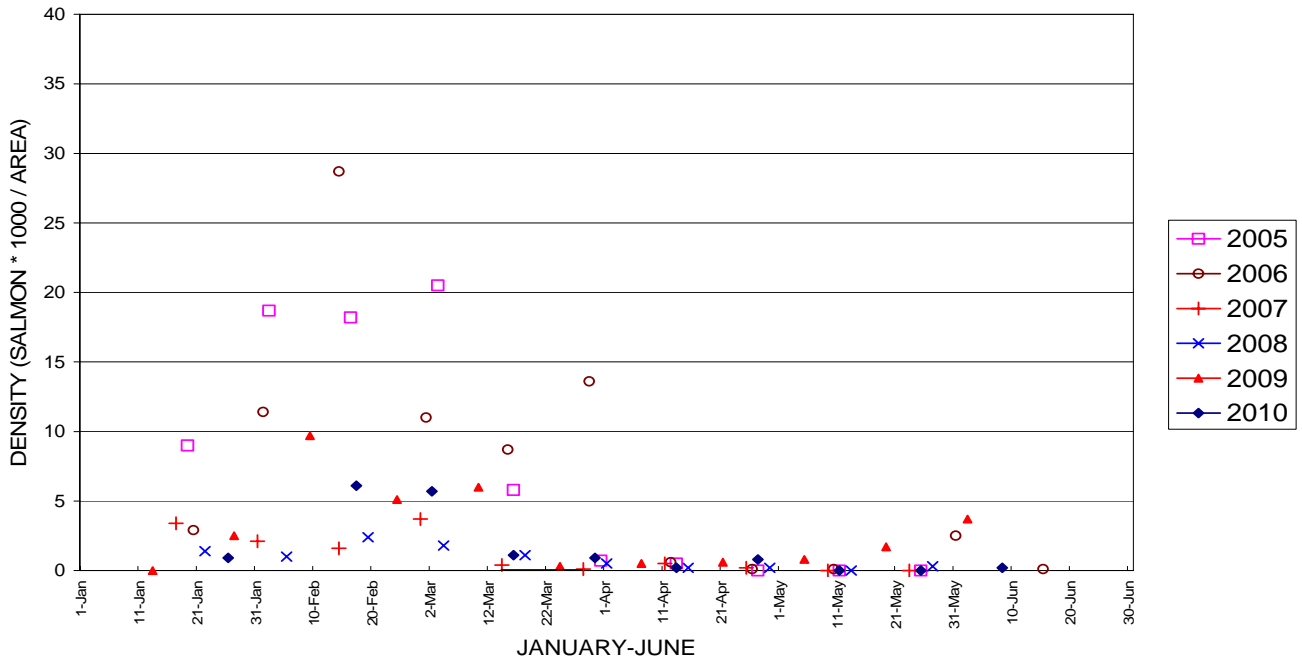


Figures 11 & 12. Minimum and average fork lengths of Tuolumne River salmon, 2005-2010.

### 2005-2010 TUOLUMNE RIVER SEINING MAXIMUM SALMON FORK LENGTH

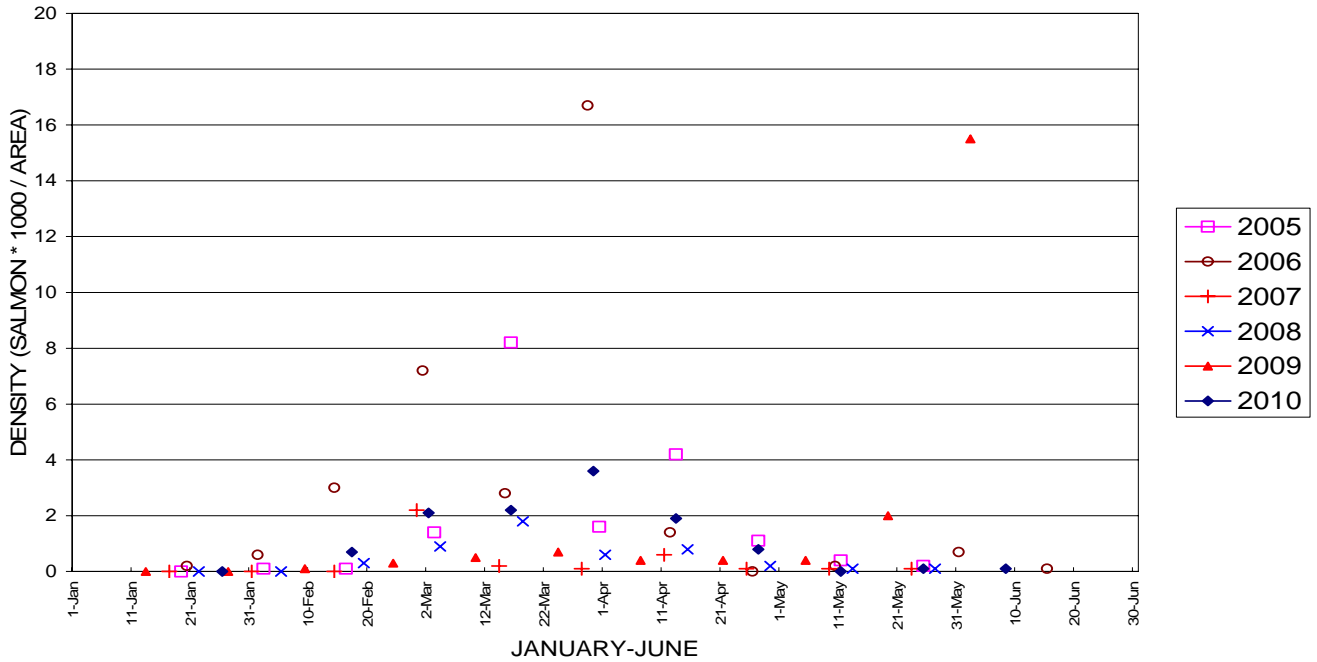


### 2005-2010 TUOLUMNE RIVER SEINING DENSITY OF SALMON FRY (< OR = 50 mm)

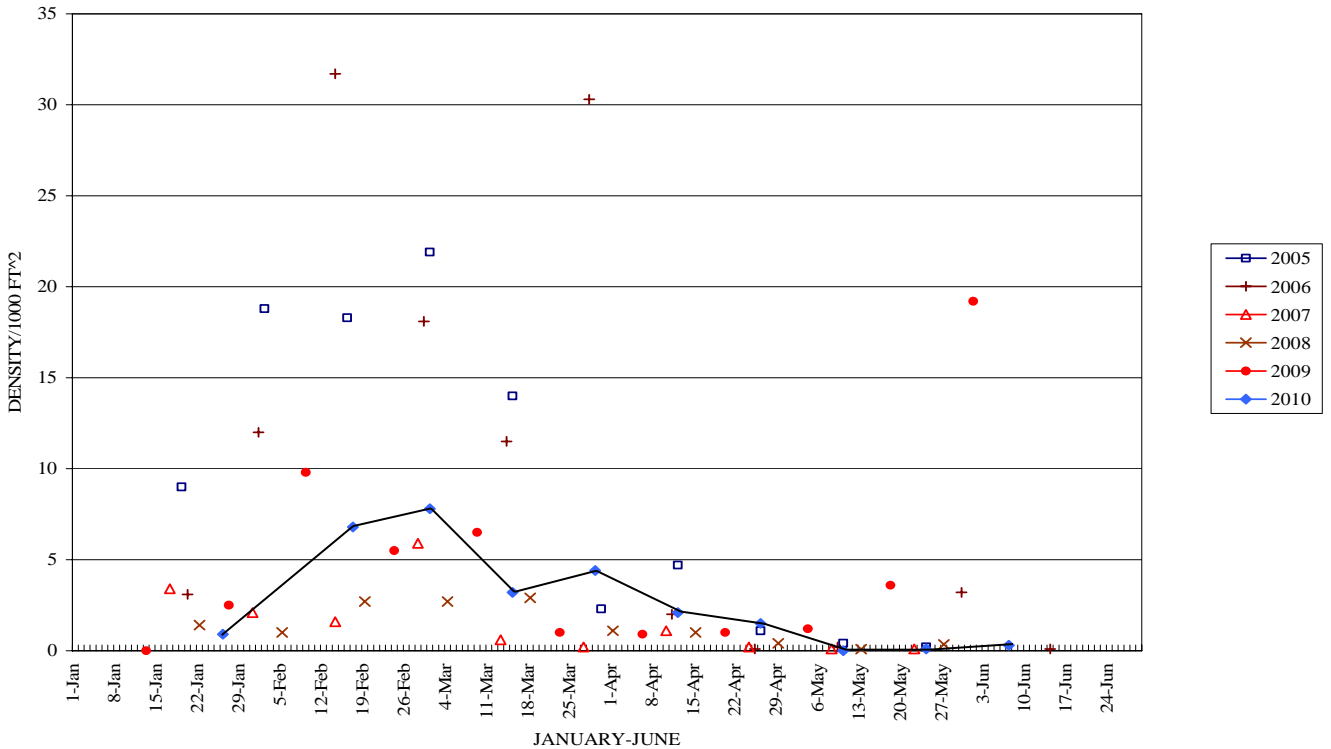


Figures 13 & 14. Maximum fork length and Density index of salmon fry, 2005-2010.

2005-2010 TUOLUMNE RIVER SEINING  
 DENSITY OF SALMON JUVENILES (> 50 mm)

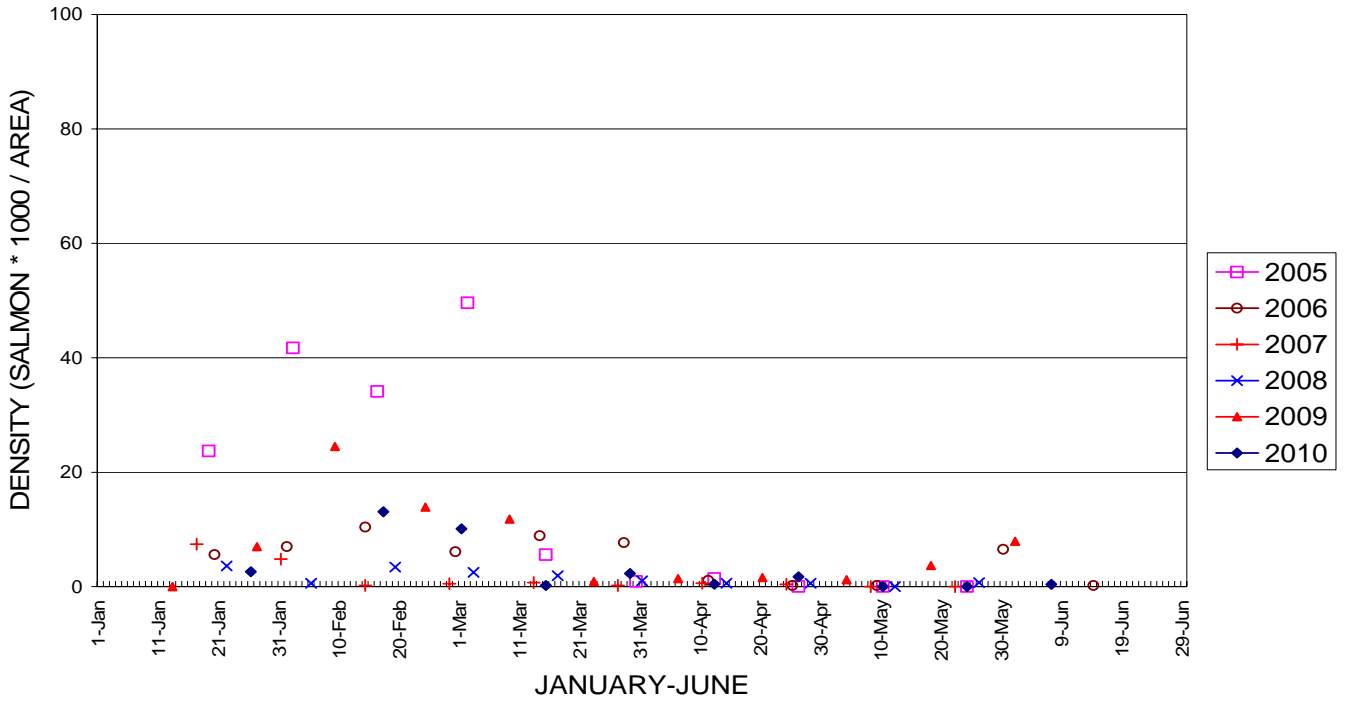


2005-2010 TUOLUMNE RIVER SEINING  
 COMBINED FRY AND JUVENILE SALMON DENSITY INDEX



Figures 15 & 16. Density index of salmon juveniles and total river salmon catch, 2005-2010.

2005-2010 TUOLUMNE RIVER SEINING  
UPPER SECTION SALMON FRY (< OR = 50MM)



2005-2010 TUOLUMNE RIVER SEINING  
UPPER SECTION SALMON JUVENILES (>50MM)

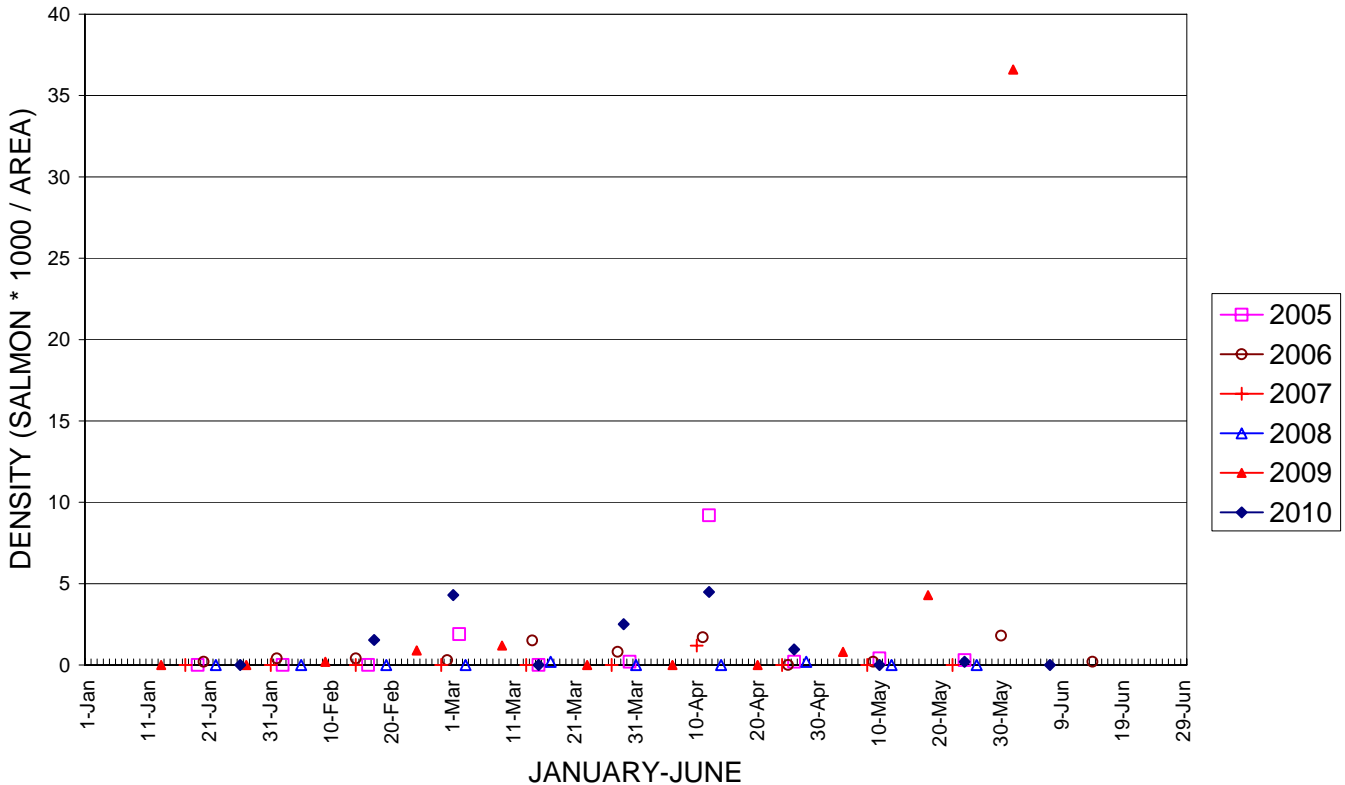
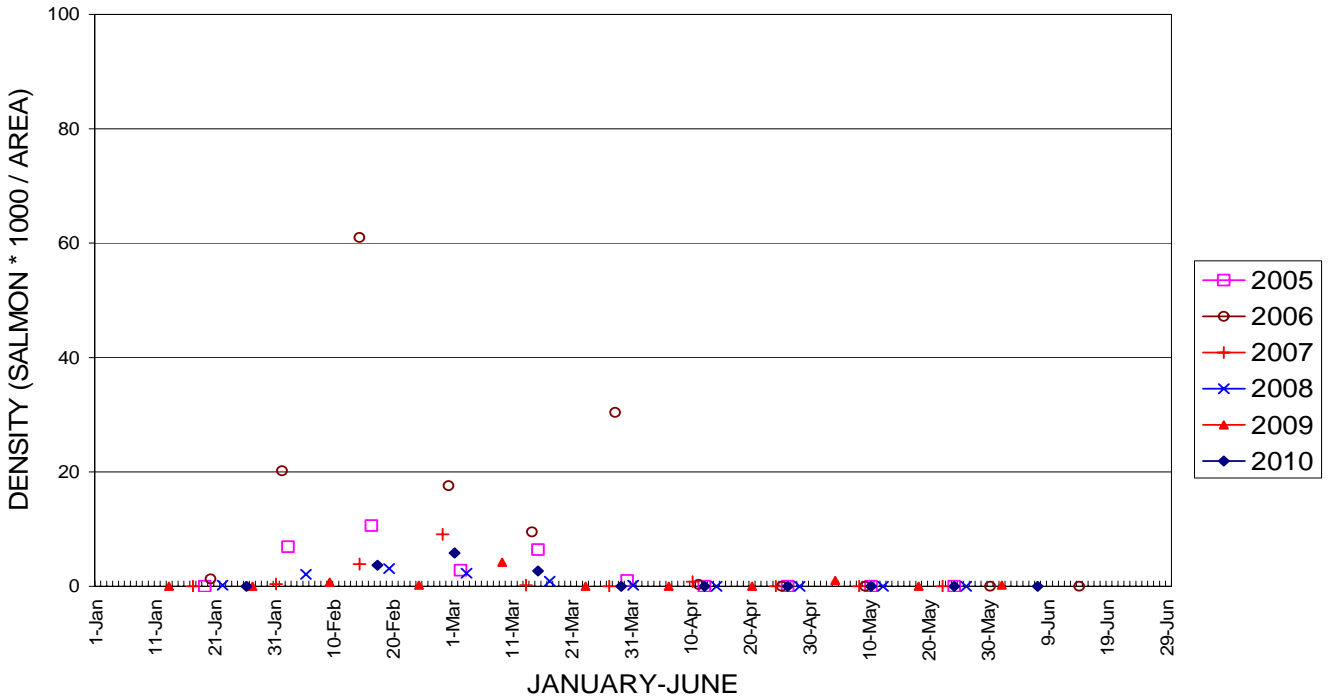


Figure 17. Upper section density indices for salmon fry and juveniles, 2005-2010



2005-2010 TUOLUMNE RIVER SEINING  
MIDDLE SECTION SALMON FRY (< OR = 50MM)



2005-2010 TUOLUMNE RIVER SEINING  
MIDDLE SECTION SALMON JUVENILES (>50MM)

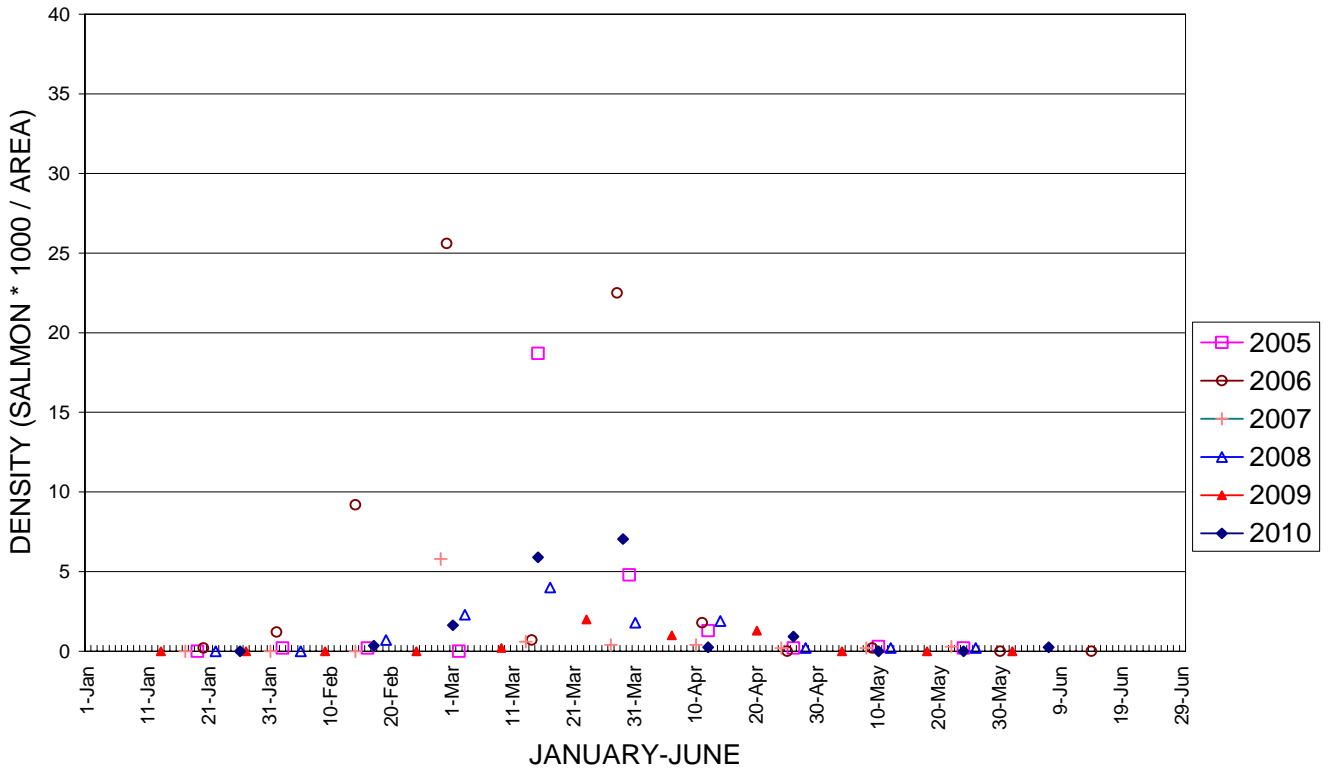
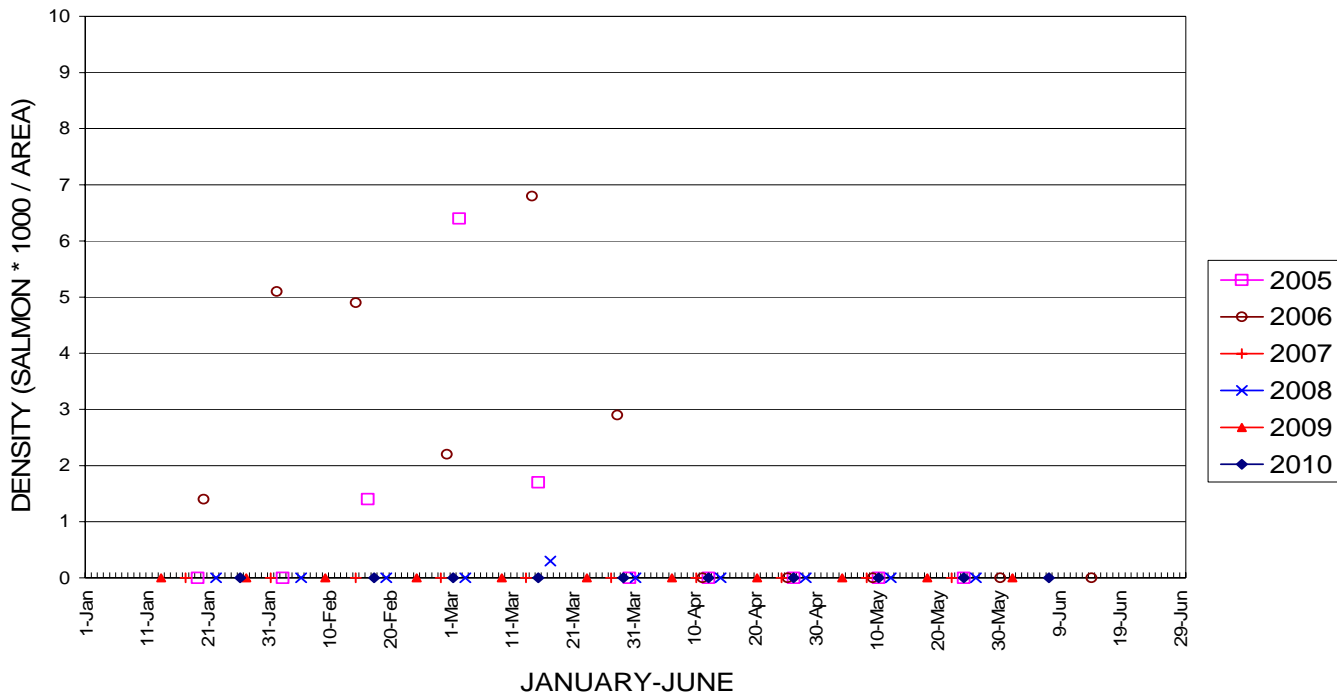


Figure 17. Middle section density indices for salmon fry and juveniles, 2005-2010.

2005-2010 TUOLUMNE RIVER SEINING  
LOWER SECTION SALMON FRY (< OR = 50MM)



2005-2010 TUOLUMNE RIVER SEINING  
LOWER SECTION SALMON JUVENILES (>50MM)

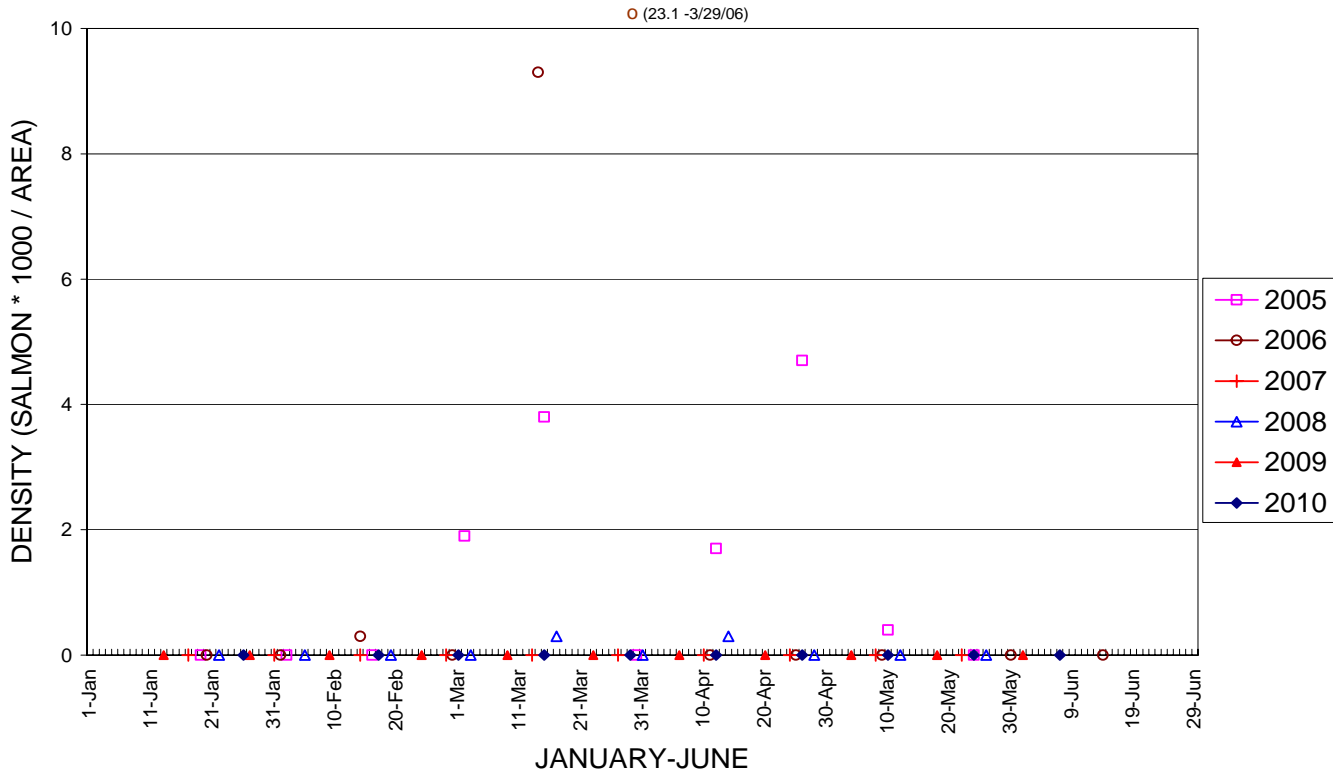


Figure 17. Lower section density indices for salmon fry and juveniles, 2005-2010.

TUOLUMNE RIVER ABUNDANCE INDICES  
STANDARDIZED BY SECTION

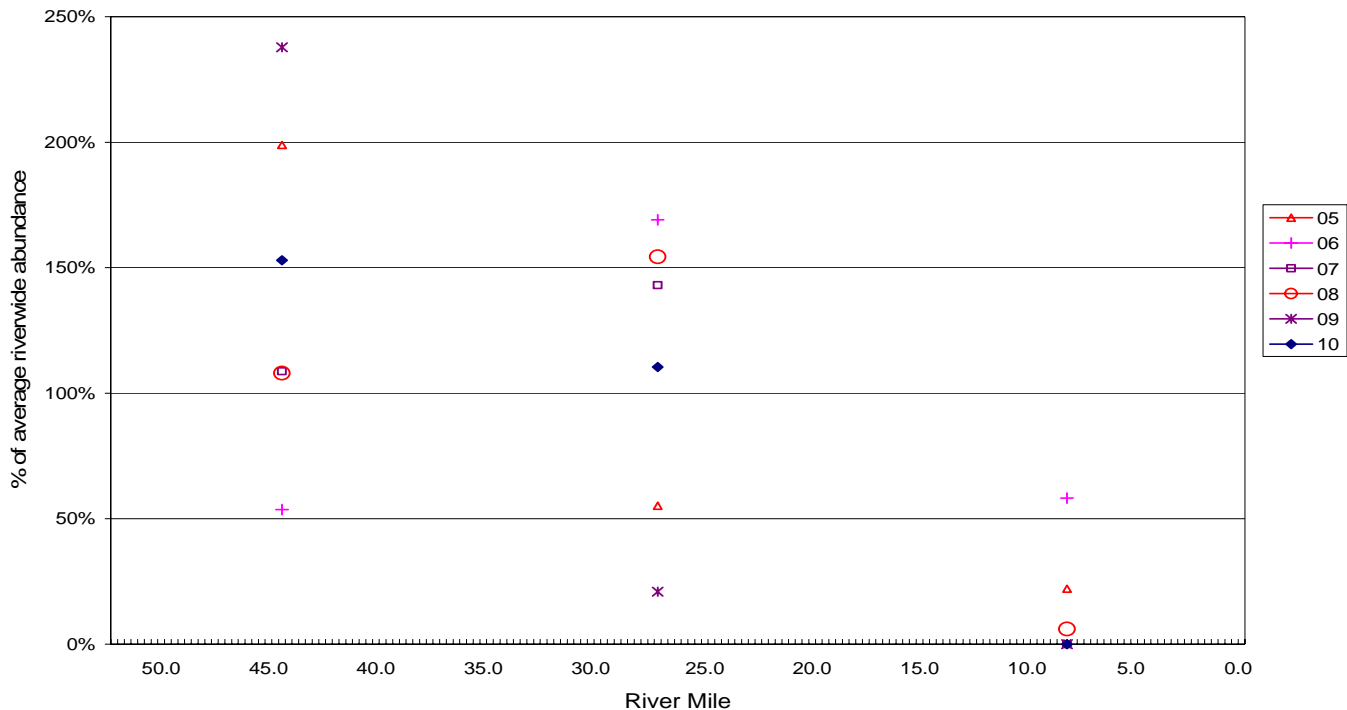


Figure 18. Tuolumne River abundance indices standardized by section, 2005-2010.

San Joaquin River Abundance Indices by Location

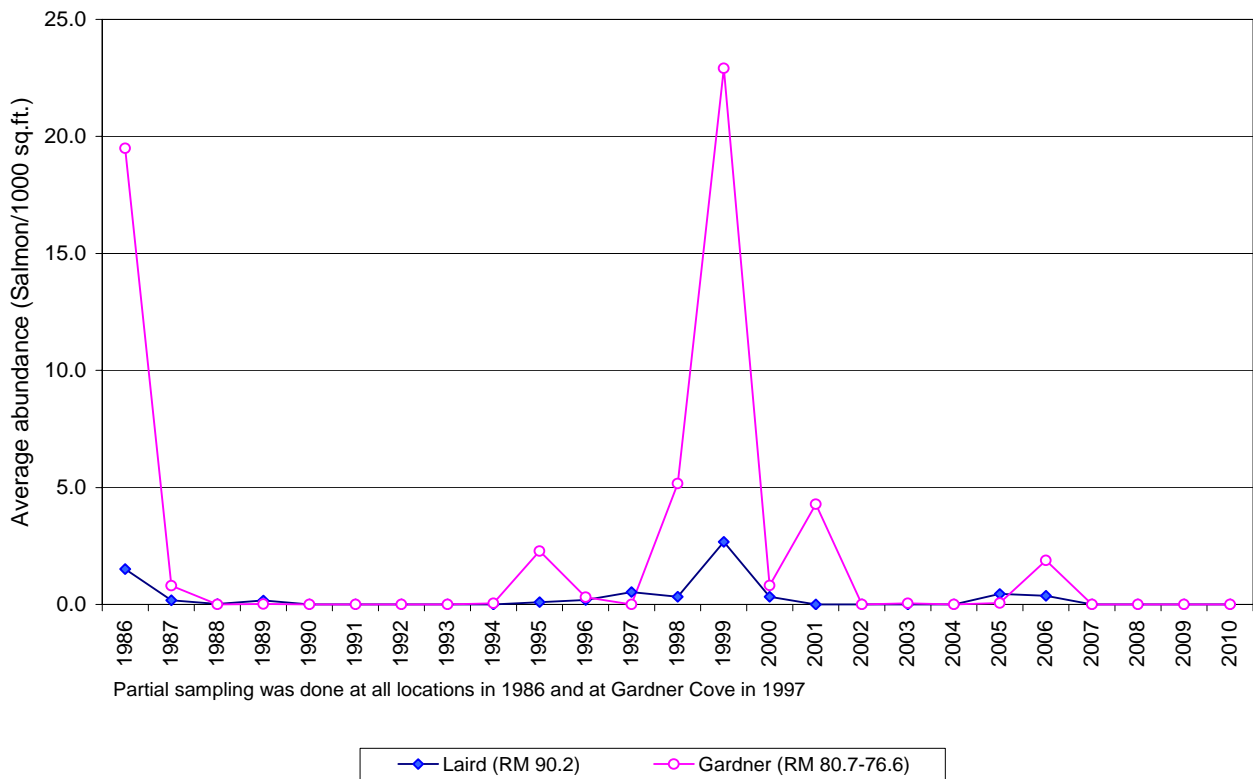


Figure 19. San Joaquin River abundance indices by location, 1986-2010.

PEAK FRY DENSITY VS FEMALE SPAWNER

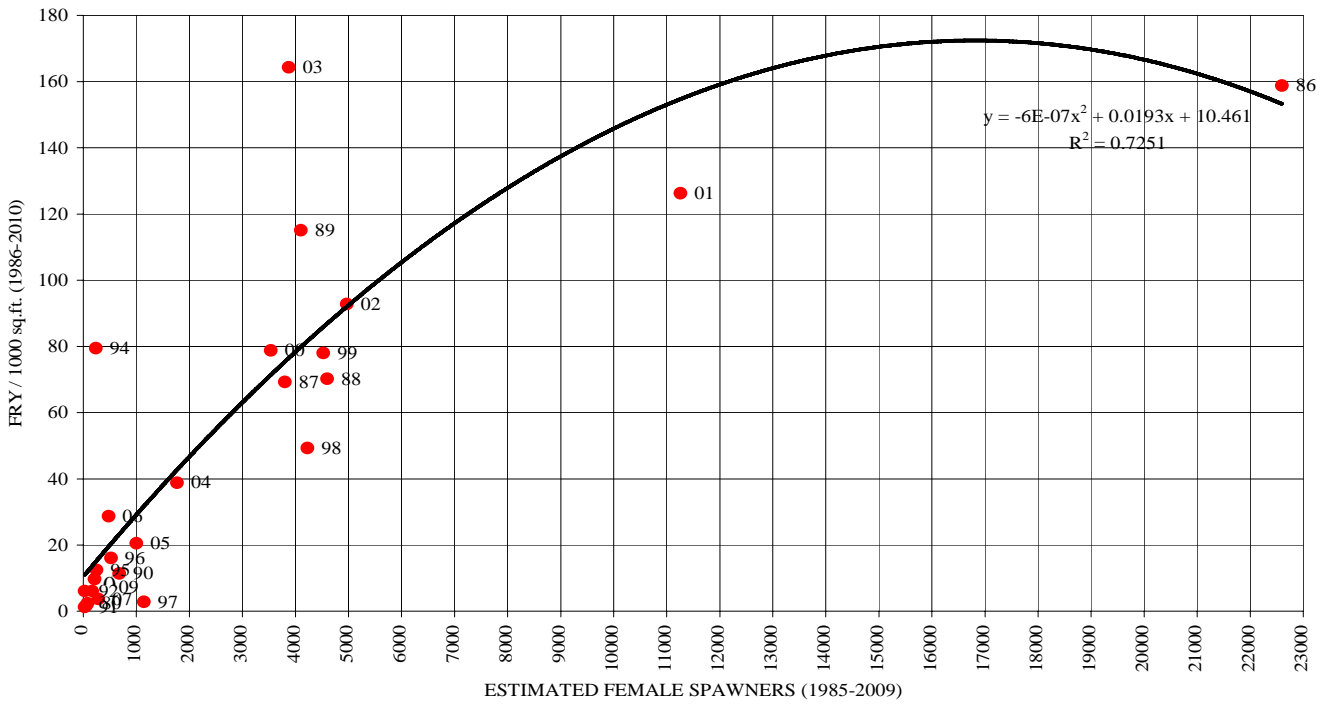


Figure 20. Tuolumne River peak fry density vs female spawners.

AVERAGE FRY DENSITY VS FEMALE SPAWNERS  
(15JAN-15MAR PERIOD)

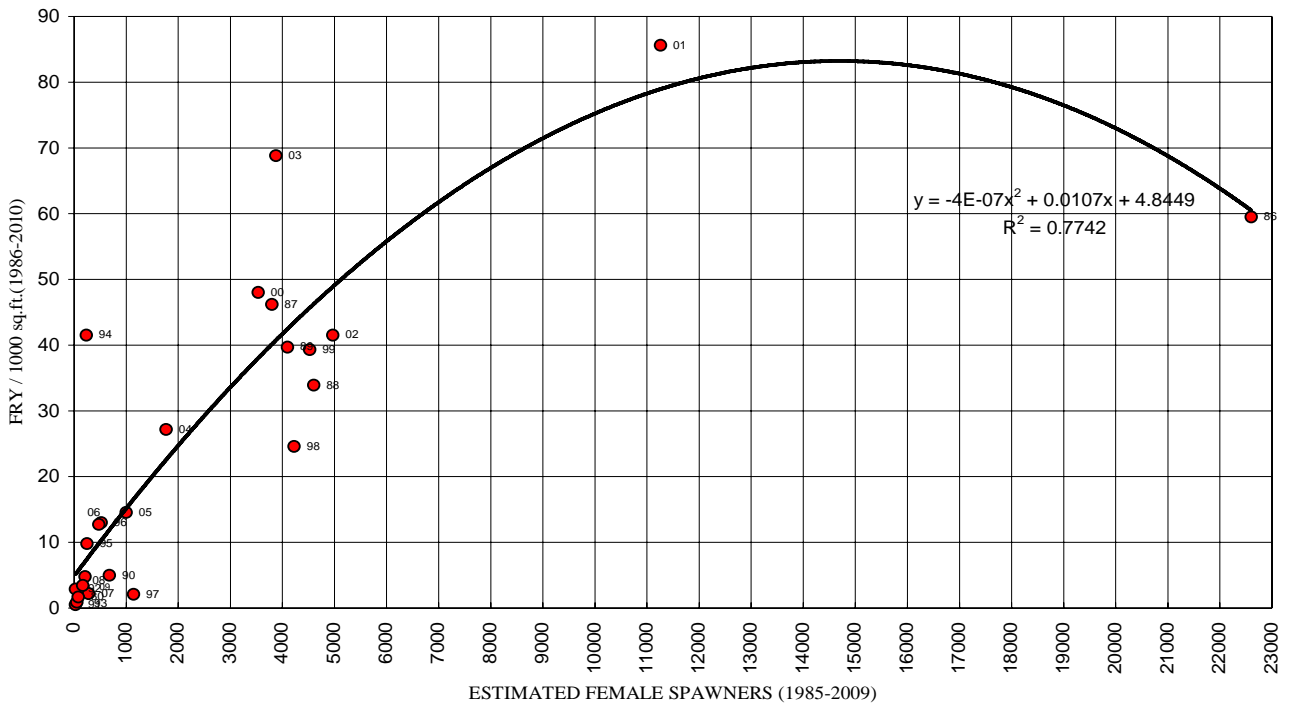


Figure 21. Tuolumne River average fry density vs female spawners.

Table 1. Summary table of weekly seine catch for the Tuolumne and San Joaquin Rivers.

TABLE 1. 2010 JUVENILE SALMON SEINING STUDY (TID/MID)

TUOLUMNE RIVER

DATE	SALMON CATCH	AREA (SQ. FT.)	DENSITY (/1000 ft <sup>2</sup> )	MINIMUM FL	MAXIMUM FL	AVERAGE FL	NUMBER MEAS.	SACFRY	NUMBER KILLED
26JAN	14	15,250	0.9	33	47	38.7	14	0	0
17FEB	99	14,500	6.8	29	101	41.1	99	0	2
02MAR	118	15,050	7.8	34	70	46.0	118	0	3
16MAR	46	14,250	3.2	40	87	59.7	46	0	0
30MAR	62	14,050	4.4	37	88	61.1	62	0	1
13APR	25	12,050	2.1	40	87	69.9	25	0	0
27APR	18	11,750	1.5	35	90	56.7	18	0	0
11MAY	0	12,700	0.0						
25MAY	1	12,000	0.1	55	55	55.0	1	0	0
08JUN	3	11,600	0.3	48	66	54.7	3	0	0
<hr/>									
TOTAL:	386	133,200	2.9				386	0	6

SAN JOAQUIN RIVER

DATE	SALMON CATCH	AREA (SQ. FT.)	DENSITY (/1000 ft <sup>2</sup> )	MINIMUM FL	MAXIMUM FL	AVERAGE FL	NUMBER MEAS.	SACFRY	NUMBER KILLED
26JAN	0	2,950	0.0						
17FEB	0	2,100	0.0						
02MAR	0	2,700	0.0						
16MAR	0	1,600	0.0						
30MAR	0	2300	0.0						
13APR	0	2,700	0.0						
27APR	0	2,000	0.0						
11MAY	0	1,750	0.0						
25MAY	0	1,400	0.0						
08JUN	0	2,700	0.0						
<hr/>									
TOTAL:	0	22,200	0.0						

Table 2. Summary table of weekly seine catch by location for the Tuolumne and San Joaquin Rivers, 2010

2010 Weekly Summary of TID/MID Seining Study  
 Salmon Density is the Number of Salmon / 1000 sq. ft.

Date	Location	Total Catch	Area	Measured Fry	Extrapolated			Density Total	Average FL	EXTRAPOLATED					
					Measured Juvenile	Density Fry	Density Juvenile			UPPER SECTION Density Fry	MIDDLE SECTION Density Fry	LOWER SECTION Density Fry	UPPER SECTION Density Juvenile	MIDDLE SECTION Density Juvenile	LOWER SECTION Density Juvenile
26JAN	OLGB	3	2,000	3	0	1.5	0.0	1.5	38.7	2.6	0.0	0.0	0.0	0.0	0.0
26JAN	R5	2	1,600	2	0	1.3	0.0	1.3	38.5						
26JAN	TRR	9	1,800	9	0	5.0	0.0	5.0	38.8						
26JAN	HICKMAN	0	1,800	0				0.0							
26JAN	CHARLES	0	1,800	0				0.0							
26JAN	LEGION	0	2,400	0				0.0							
26JAN	SERVICE	0	1,800	0				0.0							
26JAN	SHILOH	0	2,200	0				0.0							
26JAN	LAIRD	0	1,350	0				0.0							
26JAN	GARDNER	0	1,600	0				0.0							
TUOL.TOT.		14	15250	14	0	0.9	0.0	0.9	38.7						
SJR. TOT.		0	2950					0.0							

2010 Weekly Summary of TID/MID Seining Study  
 Salmon Density is the Number of Salmon / 1000 sq. ft.

Date	Location	Total Catch	Area	Measured Fry	Extrapolated			Density Total	Average FL	EXTRAPOLATED					
					Measured Juvenile	Density Fry	Density Juvenile			UPPER SECTION Density Fry	MIDDLE SECTION Density Fry	LOWER SECTION Density Fry	UPPER SECTION Density Juvenile	MIDDLE SECTION Density Juvenile	LOWER SECTION Density Juvenile
17FEB	OLGB	18	1800	18	0	10.0	0.0	10.0	36.9	13.1	3.7	0.0	1.5	0.4	0.0
17FEB	R5	33	1600	32	1	20.0	0.6	20.6	40.8						
17FEB	TRR	25	1800	18	7	10.0	3.9	13.9	44.3						
17FEB	HICKMAN	21	1650	20	1	12.1	0.6	12.7	38.3						
17FEB	CHARLES	2	1650	1	1	0.6	0.6	1.2	74.0						
17FEB	LEGION	0	2400	0				0.0							
17FEB	SERVICE	0	1800	0				0.0							
17FEB	SHILOH	0	1800	0				0.0							
17FEB	LAIRD	0	900	0				0.0							
17FEB	GARDNER	0	1200	0				0.0							
TUOL.TOT.		99	14500	89	10	6.1	0.7	6.8	41.1						
SJR. TOT.		0	2100					0.0							

2010 Weekly Summary of TID/MID Seining Study  
 Salmon Density is the Number of Salmon / 1000 sq. ft.

Date	Location	Total Catch	Area	Measured Fry	Extrapolated			Density Total	Average FL	EXTRAPOLATED					
					Measured Juvenile	Density Fry	Density Juvenile			UPPER SECTION Density Fry	MIDDLE SECTION Density Fry	LOWER SECTION Density Fry	UPPER SECTION Density Juvenile	MIDDLE SECTION Density Juvenile	LOWER SECTION Density Juvenile
02MAR	OLGB	7	1950	6	1	3.1	0.5	3.6	40.3	10.1	5.8	0.0	4.3	1.6	0.0
02MAR	R5	30	1600	26	4	16.3	2.5	18.8	44.0						
02MAR	TRR	40	1800	22	18	12.2	10.0	22.2	49.2						
02MAR	HICKMAN	34	1500	30	4	20.0	2.7	22.7	42.6						
02MAR	CHARLES	7	1600	2	5	1.3	3.1	4.4	57.9						
02MAR	LEGION	0	2400	0				0.0							
02MAR	SERVICE	0	1800	0				0.0							
02MAR	SHILOH	0	2400	0				0.0							
02MAR	LAIRD	0	1500	0				0.0							
02MAR	GARDNER	0	1200	0				0.0							
TUOL.TOT.		118	15050	86	32	5.7	2.1	7.8	46.0						
SJR. TOT.		0	2700	0	0			0.0							

2010 Weekly Summary of TID/MID Seining Study  
 Salmon Density is the Number of Salmon / 1000 sq. ft.

Date	Location	Total Catch	Area	Measured Fry	Extrapolated			Density Total	Average FL	EXTRAPOLATED					
					Measured Juvenile	Density Fry	Density Juvenile			UPPER SECTION Density Fry	MIDDLE SECTION Density Fry	LOWER SECTION Density Fry	UPPER SECTION Density Juvenile	MIDDLE SECTION Density Juvenile	LOWER SECTION Density Juvenile
16MAR	OLGB	0	2000	0				0.0		0.2	2.7	0.0	0.0	5.9	0.0
16MAR	R5	0	1600	0				0.0							
16MAR	TRR	1	1800	1	0	0.6	0.0	0.6	44.0						
16MAR	HICKMAN	45	1650	14	31	8.5	18.8	27.3	60.0						
16MAR	CHARLES	0	1800	0				0.0							
16MAR	LEGION	0	1800	0				0.0							
16MAR	SERVICE	0	1800	0				0.0							
16MAR	SHILOH	0	1800	0				0.0							
16MAR	LAIRD	0	Not Done	0				0.0							
16MAR	GARDNER	0	1600	0				0.0							
TUOL.TOT.		46	14250	15	31	1.1	2.2	3.2	59.7						
SJR. TOT.		0	1600	0	0			0.0							

2010 Weekly Summary of TID/MID Seining Study  
 Salmon Density is the Number of Salmon / 1000 sq. ft.

Date	Location	Total Catch	Area	Measured Fry	Extrapolated			Density Total	Average FL	EXTRAPOLATED					
					Measured Juvenile	Density Fry	Density Juvenile			UPPER SECTION Density Fry	MIDDLE SECTION Density Fry	LOWER SECTION Density Fry	UPPER SECTION Density Juvenile	MIDDLE SECTION Density Juvenile	LOWER SECTION Density Juvenile
30MAR	OLGB	6	1800	5	1	2.8	0.6	3.3	41.3	2.3	0.0	0.0	2.5	7.0	0.0
30MAR	R5	4	1600	4	0	2.5	0.0	2.5	43.8						
30MAR	TRR	15	1800	3	12	1.7	6.7	8.3	55.3						
30MAR	HICKMAN	25	1650	0	25	0.0	15.2	15.2	66.4						
30MAR	CHARLES	12	1800	0	12	0.0	6.7	6.7	73.3						
30MAR	LEGION	0	1800	0				0.0							
30MAR	SERVICE	0	1800	0				0.0							
30MAR	SHILOH	0	1800	0				0.0							
30MAR	LAIRD	0	900	0				0.0							
30MAR	GARDNER	0	1400	0				0.0							
TUOL.TOT.		62	14050	12	50	0.9	3.6	4.4	61.1						
SJR. TOT.		0	2300	0	0			0.0							

Table 2 (Continued)

2010 Weekly Summary of TID/MID Seining Study  
 Salmon Density is the Number of Salmon / 1000 sq. ft.

Date	Location	Total Catch	Area	Measured Fry	Extrapolated			Density Total	Average FL	EXTRAPOLATED					
					Measured Juvenile	Density Fry	Density Juvenile			UPPER SECTION Density Fry	MIDDLE SECTION Density Fry	LOWER SECTION Density Fry	UPPER SECTION Density Juvenile	MIDDLE SECTION Density Juvenile	LOWER SECTION Density Juvenile
13APR	OLGB	1	1200	1	0	0.8	0.0	0.8	40.0	0.4	0.0	0.0	4.5	0.2	0.0
13APR	R5	0	1900					0.0							
13APR	TRR	23	1800	1	22	0.6	12.2	12.8	70.7						
13APR	HICKMAN	0	1050					0.0							
13APR	CHARLES	1	1200	0	1	0.0	0.8	0.8	82.0						
13APR	LEGION	0	1800					0.0							
13APR	SERVICE	0	1500					0.0							
13APR	SHILOH	0	1600					0.0							
13APR	LAIRD	0	900					0.0							
13APR	GARDNER	0	1800					0.0							
TUOL.TOT.		25	12050	2	23	0.2	1.9	2.1	69.9						
SJR.TOT.		0	2700	0	0			0.0							

2010 Weekly Summary of TID/MID Seining Study  
 Salmon Density is the Number of Salmon / 1000 sq. ft.

Date	Location	Total Catch	Area	Measured Fry	Extrapolated			Density Total	Average FL	EXTRAPOLATED					
					Measured Juvenile	Density Fry	Density Juvenile			UPPER SECTION Density Fry	MIDDLE SECTION Density Fry	LOWER SECTION Density Fry	UPPER SECTION Density Juvenile	MIDDLE SECTION Density Juvenile	LOWER SECTION Density Juvenile
27APR	OLGB	0	1050					0.0							
27APR	R5	0	2400					0.0		1.7	0.0	0.0	1.0	0.9	0.0
27APR	TRR	14	1800	9	5	5.0	2.8	7.8	48.3						
27APR	HICKMAN	2	1400	0	2	0.0	1.4	1.4	82.5						
27APR	CHARLES	2	1700	0	2	0.0	1.2	1.2	90.0						
27APR	LEGION	0	1200					0.0							
27APR	SERVICE	0	1200					0.0							
27APR	SHILOH	0	1000					0.0							
27APR	LAIRD	0	1200					0.0							
27APR	GARDNER	0	900					0.0							
TUOL.TOT.		18	11750	9	9	0.8	0.8	1.5							
SJR.TOT.		0	2000					0.0							

2010 Weekly Summary of TID/MID Seining Study  
 Salmon Density is the Number of Salmon / 1000 sq. ft.

Date	Location	Total Catch	Area	Measured Fry	Extrapolated			Density Total	Average FL	EXTRAPOLATED					
					Measured Juvenile	Density Fry	Density Juvenile			UPPER SECTION Density Fry	MIDDLE SECTION Density Fry	LOWER SECTION Density Fry	UPPER SECTION Density Juvenile	MIDDLE SECTION Density Juvenile	LOWER SECTION Density Juvenile
11MAY	OLGB	0	2400					0.0							
11MAY	R5	0	1850					0.0		0.0	0.0	0.0	0.0	0.0	0.0
11MAY	TRR	0	1350					0.0							
11MAY	HICKMAN	0	1600					0.0							
11MAY	CHARLES	0	1800					0.0							
11MAY	LEGION	0	500					0.0							
11MAY	SERVICE	0	1600					0.0							
11MAY	SHILOH	0	1600					0.0							
11MAY	LAIRD	0	700					0.0							
11MAY	GARDNER	0	1050					0.0							
TUOL.TOT.		0	12700					0.0							
SJR.TOT.		0	1750					0.0							

2010 Weekly Summary of TID/MID Seining Study  
 Salmon Density is the Number of Salmon / 1000 sq. ft.

Date	Location	Total Catch	Area	Measured Fry	Extrapolated			Density Total	Average FL	EXTRAPOLATED					
					Measured Juvenile	Density Fry	Density Juvenile			UPPER SECTION Density Fry	MIDDLE SECTION Density Fry	LOWER SECTION Density Fry	UPPER SECTION Density Juvenile	MIDDLE SECTION Density Juvenile	LOWER SECTION Density Juvenile
25MAY	OLGB	0	1800					0.0							
25MAY	R5	1	1800	0	1	0.0	0.6	0.6	55.0	0.0	0.0	0.0	0.2	0.0	0.0
25MAY	TLSRA	0	1500					0.0							
25MAY	HICKMAN	0	1500					0.0							
25MAY	CHARLES	0	1800					0.0							
25MAY	LEGION	0	400					0.0							
25MAY	BIG BEND	0	1400					0.0							
25MAY	SHILOH	0	1800					0.0							
25MAY	LAIRD	Not Done													
25MAY	GARDNER	0	1400					0.0							
TUOL.TOT.		1	12000	0	1	0.0	0.1	0.1							
SJR.TOT.		0	1400					0.0							

2010 Weekly Summary of TID/MID Seining Study  
 Salmon Density is the Number of Salmon / 1000 sq. ft.

Date	Location	Total Catch	Area	Measured Fry	Extrapolated			Density Total	Average FL	EXTRAPOLATED					
					Measured Juvenile	Density Fry	Density Juvenile			UPPER SECTION Density Fry	MIDDLE SECTION Density Fry	LOWER SECTION Density Fry	UPPER SECTION Density Juvenile	MIDDLE SECTION Density Juvenile	LOWER SECTION Density Juvenile
08JUN	GASBURG	0	1800					0.0							
08JUN	R5	2	1800	2	0	1.1	0.0	1.1	49.0	0.4	0.0	0.0	0.0	0.3	0.0
08JUN	TRR	0	1800					0.0							
08JUN	HICK	1	1050	0	1	0.0	1.0	1.0	66.0						
08JUN	CHARLES	0	1800					0.0							
08JUN	LEGION	0	1150					0.0							
08JUN	BIG BEND	0	1200					0.0							
08JUN	SHILOH	0	1000					0.0							
08JUN	LAIRD	0	900					0.0							
08JUN	GARDNER	0	1800					0.0							
TUOL.TOT.		3	11600	2	1	0.2	0.1	0.3	54.7						
SJR.TOT.		0	2700					0.0							











Table 4. KEY TO OTHER SPECIES SAMPLED AND DISTRIBUTION  
 (List includes all species caught during 1986-2010 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
Salmonidae	rainbow trout	N	RT		X
Cyprinidae	carp		CP		
Cyprinidae	goldfish		GF		
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		
Cyprinidae	red shiner		PRS	X	X
Cyprinidae	fathead minnow		FHM		
Catostomidae	Sacramento sucker	N	SKR	X	X
Ictaluridae	channel catfish		CCF		X
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	X	
Centrarchidae	warmouth		WM		
Centrarchidae	green sunfish		GSF		X
Centrarchidae	bluegill		BG	X	X
Centrarchidae	redeer sunfish		RSF	X	X
Centrarchidae	largemouth bass		LMB	X	X
Centrarchidae	smallmouth bass		SMB	X	X
Percidae	bigscale logperch		BLP		
Embiotocidae	tule perch	N	TP		
Cottidae	prickly sculpin	N	PSCP		
Cottidae	rifle sculpin	N	RSCP		X
TOTAL:	32			10	16

2010 species presence designated with 'X'

Table 5. Tuolumne River Seining Summary, 1986-2010.

TUOLUMNE RIVER						SAN JOAQUIN			STANISLAUS			Start Date	End Date
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		
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
2007	10	204	8	1.5	0.58	0	2	0	---	---		17JAN	23MAY
2008	10	198	8	1.4	0.66	0	2	0	---	---		22JAN	27MAY
2009	11	779	8	4.7	0.64	0	2	0	---	---		13JAN	02JUN
2010	10	386	8	2.9	0.65	0	2	0	---	---		26JAN	08JUN

--- Not Sampled

\*All San Joaquin River locations were not always sampled

Table 6. Summary table of locations sampled, 1986-2010

1986 TO 2010 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	2007	2008	2009	2010
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	X	X	X	X
2	Riffle 4B	48.4	X	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	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	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	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	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	X	X	X	X
10	RDP / Service Rd. / Venn	12.3 - 7.4		X	X	X	X	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	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	2007	2008	2009	2010
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	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	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	2007	2008	2009	2010
19	Caswell State Park	8.5				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	2007	2008	2009	2010
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 7. Tuolumne River analysis of female spawners to fry density.

Tuolumne Fall-run Estimate	Total Female Spawners	Juvenile Seining		
		Peak	Average	
		Fry Density 15JAN-15MAR	Fry Density 15JAN-15MAR	
1985	22600	1986	158.8	59.5
1986	3800	1987	69.3	46.2
1987	4600	1988	70.2	33.9
1988	4100	1989	115.1	39.7
1989	680	1990	11.4	5.0
1990	28	1991	1.3	0.5
1991	28	1992	6.1	2.9
1992	55	1993	1.7	0.9
1993	237	1994	79.5	41.5
1994	249	1995	12.5	9.8
1995	522	1996	16.1	13.0
1996	1142	1997	2.8	2.1
1997	4224	1998	49.3	24.6
1998	4527	1999	78.0	39.3
1999	3535	2000	78.8	48.0
2000	11260	2001	126.3	85.6
2001	4970	2002	92.8	41.5
2002	3876	2003	164.3	68.8
2003	1768	2004	38.8	27.2
2004	1004	2005	20.5	14.6
2005	478	2006	28.7	12.7
2006	282	2007	3.7	2.2
2007	80	2008	2.4	1.7
2008	212	2009	9.7	4.8
2009	170	2010	6.1	3.5

Table 8. Summary table of fish species caught during the 1992-2010 seine studies.

Fish species caught in the Tuolumne River during the seine studies

FAMILY	COMMON NAME	NATIVE SPECIES	ABBREV.	1992	1993	1994	1995	1996	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Petromyzontidae	Pacific lamprey	N	LP											X		X					
Clupeidae	threadfin shad		TFS					X	X			X									
Salmonidae	Chinook salmon	N	CS	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Salmonidae	rainbow trout	N	RT						X	X	X	X	X	X	X	X	X	X	X	X	X
Cyprinidae	carp		CP														X				
Cyprinidae	goldfish		GF																		
Cyprinidae	golden shiner		GSH	X	X	X							X		X		X		X	X	X
Cyprinidae	Sacramento blackfish	N	SBF																		
Cyprinidae	hitch	N	HCH																		
Cyprinidae	hardhead	N	HH	X		X						X	X		X	X	X	X	X	X	X
Cyprinidae	Sacramento pikeminnow	N	PM	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Cyprinidae	Sacramento splittail	N	ST																		
Cyprinidae	red shiner		PRS	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Cyprinidae	fathead minnow		FHM								X	X									
Catostomidae	Sacramento sucker	N	SKR	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Ictaluridae	channel catfish		CCF								X			X							
Ictaluridae	white catfish		WCF		X	X						X									
Ictaluridae	brown bullhead		BBH			X															
Poeciliidae	western mosquitofish		GAM	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Atherinidae	inland silverside		ISS	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X		X
Percichthyidae	striped bass		SB									X									
Centrarchidae	white/black crappie		WCR/BCR																		
Centrarchidae	warmouth		WM		X																
Centrarchidae	green sunfish		GSF	X	X		X				X	X	X	X	X	X	X				X
Centrarchidae	bluegill		BG	X	X	X			X	X	X	X	X	X	X	X	X	X	X	X	X
Centrarchidae	redeer sunfish		RSF	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Centrarchidae	largemouth bass		LMB	X	X	X	X	X			X	X	X	X	X	X	X	X	X	X	X
Centrarchidae	smallmouth bass		SMB	X		X					X	X	X	X	X					X	X
Percidae	bigscale logperch		BLP	X			X		X	X								X	X		
Embiotocidae	tule perch	N	TP																		
Cottidae	prickly sculpin	N	PSCP				X	X	X					X	X	X					
Cottidae	riffle sculpin	N	RSCP	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
TOTAL:		32		15	13	15	12	11	14	11	14	17	15	15	16	15	16	12	15	15	16

(List includes all species caught during 1986-2010 seining studies)

Fish species caught in the San Joaquin River during the seine studies

FAMILY	COMMON NAME	NATIVE SPECIES	ABBREV.	1992	1993	1994	1995	1996	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Petromyzontidae	Pacific lamprey	N	LP																		
Clupeidae	threadfin shad		TFS		X		X		X	X	X			X							
Salmonidae	Chinook salmon	N	CS	X		X	X	X	X	X	X	X	X	X		X	X				
Salmonidae	rainbow trout	N	RT																		
Cyprinidae	carp		CP	X	X	X	X	X	X	X	X	X	X	X	X	X	X			X	
Cyprinidae	goldfish		GF	X	X	X	X	X	X	X	X	X	X	X	X	X					
Cyprinidae	golden shiner		GSH	X		X															
Cyprinidae	Sacramento blackfish	N	SBF	X	X	X	X	X	X	X	X										
Cyprinidae	hitch	N	HCH					X		X	X										
Cyprinidae	hardhead	N	HH																		
Cyprinidae	Sacramento pikeminnow	N	PM	X	X		X	X	X		X	X			X	X	X		X	X	X
Cyprinidae	Sacramento splittail	N	ST	X			X	X	X		X	X					X				
Cyprinidae	red shiner		PRS	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Cyprinidae	fathead minnow		FHM	X	X	X	X	X	X	X	X	X	X		X	X	X				
Catostomidae	Sacramento sucker	N	SKR	X	X	X	X	X	X	X	X			X	X	X	X	X	X	X	X
Ictaluridae	channel catfish		CCF			X		X										X			
Ictaluridae	white catfish		WCF											X							
Ictaluridae	brown bullhead		BBH					X													
Poeciliidae	western mosquitofish		GAM	X	X		X	X	X			X	X	X	X		X				X
Atherinidae	inland silverside		ISS	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Percichthyidae	striped bass		SB	X	X	X	X	X			X	X			X						
Centrarchidae	white/black crappie		WCR/BCR	X		X		X					X		X	X					X
Centrarchidae	warmouth		WM																		
Centrarchidae	green sunfish		GSF	X	X		X	X	X				X	X	X		X				
Centrarchidae	bluegill		BG	X	X	X	X		X	X	X	X	X	X	X	X	X		X	X	X
Centrarchidae	redeer sunfish		RSF	X	X	X	X			X			X	X	X						X
Centrarchidae	largemouth bass		LMB	X	X	X	X	X		X	X	X	X	X	X	X			X	X	X
Centrarchidae	smallmouth bass		SMB	X		X				X	X				X			X			X
Percidae	bigscale logperch		BLP			X	X	X	X	X	X	X	X	X	X						
Embiotocidae	tule perch	N	TP	X	X	X	X	X	X												
Cottidae	prickly sculpin	N	PSCP				X	X	X	X						X	X				
Cottidae	riffle sculpin	N	RSCP																		
TOTAL:		32		19	15	17	20	21	18	16	15	15	14	14	18	12	13	5	8	9	10

(List includes all species caught during 1986-2010 seining studies)