

# Annual Project Performance Report *(rev. 7/07)*

**1. State:** California

**Grant number:** F-119-R-3

**Grant name:** Central Valley Angler Survey

**Project number and name:** F-119-R, Central Valley Angler Survey

**2. Report Period:** July 1, 2007 to June 30, 2008

**Report due date:** September 30, 2008

**Date prepared:** December 15, 2008, per December 27, 2008 extension

**3. Location of work:** Central Valley, California including portions of the Sacramento, Feather, Yuba, American, Mokelumne, Calaveras, and Stanislaus rivers, and portions of the Sacramento-San Joaquin Delta within Congressional Districts 1 – 5, 7, 10 – 11, and 19; Shasta, Tehama, Glenn, Butte, Colusa, Sutter, Yuba, Yolo, Sacramento, San Joaquin, Calaveras, Stanislaus, Solano, and Contra Costa counties. The project is based in Sacramento, with a satellite office in Red Bluff.

#### **4. Objectives:**

a. Conduct an angler survey on the Sacramento River and its associated tributaries. The survey will ultimately also include the Stanislaus River in the lowermost San Joaquin River system, and a portion of the Sacramento-San Joaquin Delta, in part through collaboration with another California Department of Fish and Game (CDFG) project.

b. Analyze collected data and prepare reports describing angler effort, catch, and harvest for all species contacted by anglers. Emphasis is on fisheries involving key anadromous species where contact with naturally produced Central Valley steelhead is most likely: Chinook salmon, steelhead/rainbow trout, sturgeon, striped bass, and American shad.

c. Estimate the proportionate contribution of hatchery and natural production in the Central Valley sport catch of Chinook salmon. Estimate the age structure of the Central Valley sport catch of Chinook salmon and steelhead. Develop trends in relative abundance and age structure of Central Valley steelhead, based upon returns of spawning adults to Central Valley anadromous salmonid hatcheries.

#### **5. If the work in this grant was part of a larger undertaking with other components and funding, present a brief overview of the larger activity and the role of this project.**

The Central Valley Angler Survey is the primary angler survey for anadromous fishes in the Central Valley, California. However, we endeavor to coordinate this survey with the existing striped bass and sturgeon tag-recovery survey being conducted in the Sacramento-San Joaquin Delta (SFRA grant F-51-R, project: #71: Bay-Delta Sport Fish Resource Assessment Project - Striped Bass), to achieve greater geographic coverage while meeting co-equal project objectives.

The Central Valley Angler Survey also provides an estimate of Chinook salmon harvest

in the Central Valley recreational fishery. This estimate complements Chinook salmon harvest estimates for California ocean commercial and recreational fisheries generated by CDFG's Ocean Salmon Project. Combined, these estimates are used by the Pacific Fishery Management Council to forecast Chinook salmon harvest quotas in ocean waters off the coasts of Washington, Oregon, and California. The inland recreational harvest component, for Chinook salmon of both hatchery and wild origin, has been lacking throughout most of the management history of Chinook salmon fisheries supported by the Central Valley. The Central Valley Angler Survey fills this essential information gap.

## 6. Describe how the objectives were met.

### Introduction

Phased field implementation of the Central Valley Angler Survey continued during the reporting period (Tables 1 and 2). Section 7 was added in August 2007, in November section 8 was added in November 2007, and sections 1 and 1.1 were added in April 2008, extending the survey on the Sacramento River all the way from the Carquinez Bridge upstream to Keswick Dam. The Yuba, Mokelumne and Calaveras rivers were also added to the survey in January 2008. In all, 183 survey months were expended from July 2007 through June 2008 (Table 2).

**Table 1.** Survey section numbers and descriptions for river sections surveyed by the Central Valley Angler Survey, July 2007 through June 2008.

Section No.	Section Description
<b>Sacramento River and Delta</b>	
1	Carquinez Bridge to Rio Vista Bridge.
1.1	Suisun Bay, Suisun Cutoff to Middle Grounds.
2	Rio Vista Bridge to mouth of American River.
3	American River to Knights Landing (Hwy. 113 Bridge).
4	Knights Landing to Colusa (River Rd. Bridge).
5	Colusa to Hamilton City (Hwy. 32 Bridge).
6	Hamilton City to Red Bluff Diversion Dam.
7	Red Bluff Diversion Dam to Balls Ferry Boat Ramp.
8	Balls Ferry Boat Ramp to Deschutes Road Bridge.
<b>American River</b>	
10	Interstate 80 Bridge to Hazel Avenue Bridge.
10.1	Hazel Avenue Bridge to Nimbus Dam (aka: Nimbus Basin).
<b>Feather River</b>	
11.1	Verona to Shanghai Rapids.
11.2	Shanghai Rapids to Sunset Pumps.
12	Palm Avenue Riffle to Feather River Hatchery.
12.1	Thermalito Afterbay Outlet (TAO).
12.2	Sunset Pumps to Palm Avenue Riffle.
<b>Yuba River</b>	
13	Marysville to Daguerre Point Dam.
14	Daguerre Point Dam to 1 mile upstream of Hwy, 20 Bridge.
<b>Mokelumne River</b>	
19	3 miles downstream of Pardee Dam to Pardee Dam (upper Mokelumne).
<b>Calaveras River</b>	

**Table 2.** Implementation schedule for each river section surveyed by the Central Valley Angler Survey, July 2007 through June 2008. X = survey conducted, NS = no survey conducted.

River:	Sacramento								American			Feather			-- Yuba --		Mok	Cal.		
Section:	1	1.1	2	3	4	5	6	7	8	10	10.1	11.1	11.2	12	12.1	12.2	13	14	19	20
July	NS	NS	X	X	X	X	X	NS	NS	X	X	X	X	X	X	NS	NS	NS	NS	NS
August	NS	NS	X	X	X	X	X	X	NS	X	X	X	X	X	X	NS	NS	NS	NS	NS
September	NS	NS	X	X	X	X	X	X	NS	X	X	X	X	X	X	NS	NS	NS	NS	NS
October	NS	NS	X	X	X	X	X	X	NS	X	X	X	X	X	X	NS	NS	NS	NS	NS
November	NS	NS	X	X	X	X	X	X	X	X	X	X	X	X	X	NS	NS	NS	NS	NS
December	NS	NS	X	X	X	X	X	X	X	X	X	X	X	X	X	NS	NS	NS	NS	NS
January	NS	NS	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
February	NS	NS	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
March	NS	NS	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
April	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	NS	NS
May	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	NS	NS
June	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
TOTAL	3	3	12	12	12	12	12	11	8	12	12	12	12	12	12	6	6	6	4	4

## Job 1. Angler Survey – Field Component

### Statistical Design

A stratified random sample design, based on the design used by the Sacramento River System Sport Fish Inventory (Wixom 1995) and Upper Sacramento River Sport Fishery (Smith 1950) was used to estimate the in-river harvest during the daytime sport fishery.

A three-stage creel survey was used consisting of roving counts, roving interview, and access point interviews. Roving counts and access interviews were used to estimate total effort, while roving interviews were used to estimate catch per unit effort (as catch/hour). Access interviews were used to construct an effort distribution model, evaluate fish contact rates between roving and access interview types, and to gather completed angler trip data. The effort distribution model determined the proportion of the whole represented by a single angler count. While a night fishery exists on Central Valley rivers, no effort was made during this reporting period to evaluate the harvest by nighttime sport anglers.

A total of 20 sections was surveyed (Table 1), a two-fold increase from the 2006-2007 reporting period. Seventeen of the survey sections ranged in length from 4 to 56 river miles. Three survey sections, that represented unique fishery locations, were approximately one river mile in length. Sampling schedules and data summaries were compiled on a monthly basis. Months were chosen as a convenient time step for survey periods, in part because historical Central Valley angler surveys (e.g., Wixom 1995, Murphy et al. 1999) used a monthly time step, which allows for time-based comparisons.

Each survey section was surveyed on eight randomly selected days per month: four weekdays and four weekend days. Weekdays and weekend days were placed in separate strata because more angling effort is commonly associated with weekend

days.

Each survey section was surveyed by kayak or power boat, both propeller and jet driven. Kayaks and drift boats were used in shallow, upstream reaches that could be routinely surveyed in a downstream direction. Power boats were used in rivers where tides, wind, and waves demanded the use of more seaworthy boats, and where the survey section was to be navigated against the current.

For each section surveyed on the main stem of the Sacramento River, a systematic start time and launch location were chosen. Start times were classified based on systematic sampling of access locations. Launch locations would either be at the upstream or downstream end of the sections to be surveyed. In those sections where kayaks or drift boats were used, the launch location was always at the upstream end of the section and one of three start times representing the start, middle, and end of the day was randomly chosen for a given survey day.

All data collected were linked by river mile. Actual river miles were used for the Sacramento River sections. Each tributary was given a unique number series to identify it from other rivers in the database. The number series assigned to each tributary were as follows: Feather River, 400 series; American River, 500 series; Yuba river, 600 series; Mokelumne River, 1900 series, and the Calaveras River 2000 series. River mile designations were marked in ascending order from downstream to upstream.

#### Data Collection

Three field data sets were required to calculate angler effort and catch: hourly angling effort distribution models by month and survey section, angler counts, and angler catch data through interviews. Effort distribution models provide the proportion of the whole represented by the survey day angler count. Development of updated effort distribution models for the current survey is incomplete; instead, we used analogous data sets of hourly angler counts for each month and survey section developed by Wixom (1995). We assumed that effort distributions have not changed significantly over the past 15 years.

On each survey day, a high-speed pass was made through a given survey section, during which anglers were counted. Data collected during the angler count included: time of observation, location by river mile, number of boats, number of boat anglers, and the number of shore anglers. At the end of the angler count, a second pass was made traveling back through the section to conduct angler interviews. Prior to beginning the interviews, the survey crew determined the feasibility of interviewing all anglers counted during the angler count. If it was determined that this was not feasible given time restrictions, then they chose every  $N^{\text{th}}$  angler to be interviewed. Once an  $N^{\text{th}}$  angler interval was chosen, that interval was maintained through the entire survey section for that survey date. Data collected during each interview included: location by river mile, time of interview, fishing method, number of hours fished, number of anglers in the group, target species, zip code, whether the trip was completed, and the number of fish kept and released by species. Access interviews were conducted at popular launch locations and were temporally scheduled to encompass all hours of a virtual day to be used in the effort distribution model, for that survey section, month, and day-type

(weekday or weekend) stratum.

All common sport-fish species found in Central Valley rivers were considered “Target Species.” Those species were: Chinook salmon, steelhead, rainbow trout, striped bass, white sturgeon, green sturgeon (as incidental catch), American shad, Sacramento splittail, carp, catfish (all species), sunfish (all species), and black bass (all species).

The number of fish kept and released was recorded separately for each of the 11 target species. All other fish species caught were recorded separately by species in a column labeled “Other.”

A length measurement was used to differentiate between steelhead and rainbow trout. All *O. mykiss* greater than 16 inches or marked externally with an adipose fin clip were considered to be steelhead. For reporting purposes, *O. mykiss* on the Sacramento River below Colusa, Feather River, and American River were considered to be juvenile steelhead. This length criterion was not used to distinguish target species by steelhead and rainbow trout; it was only applied to reported catch and fish measurements.

#### **LITERATURE CITED**

- Murphy, K, L. Hanson, M. Harris, and T. Schroyer. 1999. Central Valley Salmon and Steelhead Harvest Monitoring Project, 1998 angler survey. California Department of Fish and Game, Sacramento Valley – Central Sierra Region.
- Smith, S. H. 1950. Upper Sacramento River Sport Fishery. U.S. Department of Interior, Fish and Wildlife Service, Special Scientific Report – Fisheries, No. 34.
- Wixom, L. H., J. Pisciotto, and C. Lake. 1995. Final performance report: Sacramento River system sport fish catch inventory. California Department of Fish and Game, Inland Fisheries Division.

#### **Job 2. Angler Survey Data Analysis and Reporting**

A total of 1,408 survey days was conducted during the current reporting period, although the overall allocation of survey effort by survey section and month varied given the phased start dates for each section (Table 3). An average of 8.0 survey days was expended in each survey section and month, thus achieving the monthly target of 8 survey days per section. The cumulative survey effort resulted in an estimated 2,179,430 angler hours (Table 4), for an average of 12,313 angler hours per survey section and month.

#### **Chinook Salmon Fishery**

During the current reporting period, the angler survey covered all of the fall-run and late-fall-run Chinook salmon fisheries on the Sacramento River from Rio Vista to Keswick Dam, and all of the fall-run, late-fall-run, and spring-run Chinook salmon fisheries on the American and Feather rivers (Table 2). An estimated 649,530 angler hours targeted Chinook salmon (Table 5), resulting in an estimated Chinook salmon harvest of 15,298 fish, and the catch-and-release of 3,857 Chinook salmon (Appendix Table 2). Thus, about 80% of Chinook salmon caught were harvested. The overall catch-per-unit-effort (CPUE) for Chinook salmon was very low: about 0.03 / hr. The Chinook salmon fishery accounted for 30% of the total fishing effort and was the second most popular fishery in the survey (Table 5).

**Table 3.** Total number of sample days by survey section and month, as determined by the Central Valley Angler Survey, July 2007 through June 2008. \* = Not Surveyed.

River:	----- Sacramento -----								American			----- Feather -----			- Yuba -		Mok	Cal		
Section:	1	1.1	2	3	4	5	6	7	8	10	10.1	11.1	11.2	12	12.1	12.2	13	14	19	20
July	*	*	6	8	7	7	7	*	*	7	7	6	6	7	6	*	*	*	*	*
August	*	*	7	8	8	8	10	6	*	6	6	6	6	7	7	*	*	*	*	*
September	*	*	8	7	8	5	7	11	*	7	7	7	6	8	8	*	*	*	*	*
October	*	*	11	6	6	6	7	10	*	7	8	8	8	8	8	*	*	*	*	*
November	*	*	11	6	6	6	10	8	5	8	8	7	7	8	8	*	*	*	*	*
December	*	*	8	8	8	8	10	6	8	8	8	7	7	8	8	*	*	*	*	*
January	*	*	7	8	8	8	7	7	7	8	8	6	6	7	7	6	7	7	8	8
February	*	*	8	8	7	8	8	8	8	8	8	6	6	8	8	8	8	8	8	8
March	*	*	8	8	8	8	8	8	8	7	7	7	7	8	8	9	8	8	8	5
April	5	5	8	7	9	11	6	8	8	5	5	8	7	9	8	6	8	8	*	*
May	6	6	8	8	8	10	6	8	8	7	7	8	7	8	8	5	8	8	*	*
June	6	6	6	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	6	6
TOTALS:	17	17	96	90	91	93	94	88	60	86	87	84	81	94	92	42	47	47	30	27

**Table 4.** Expanded estimates of total angler hours by river and month, as determined by the Central Valley Angler Survey, July 2007 through June 2008. \* = one or more river sections were not surveyed; \*\* = not surveyed.

River:	----- Sacramento -----			American	Feather	Yuba	Mokelumne	Calaveras
Sub River:	Lower	Mid	Upper	Lower	11.1 - 12.2*	13 - 14*	Upper	20*
Section:	1 - 3*	4 - 7*	8*	10 - 10.1	11.1 - 12.2*	13 - 14*	19*	20*
July	45,345	35,298	**	29,330	43,260	**	**	**
August	53,316	88,317	**	21,561	48,034	**	**	**
September	82,546	102,242	**	24,106	57,182	**	**	**
October	82,690	64,990	**	37,502	23,303	**	**	**
November	44,726	28,521	10,137	20,647	11,411	**	**	**
December	16,716	27,574	3,173	14,130	4,305	2,120	**	**
January	21,448	9,766	3,993	24,007	5,405	2,860	1,140	400
February	50,171	12,637	3,109	18,329	9,307	5,971	1,415	468
March	93,257	38,904	11,424	12,839	24,690	9,947	4,586	332
April	180,424	102,422	7,384	9,580	30,295	3,953	**	**
May	128,328	76,495	7,319	15,119	25,818	4,537	**	**
June	67,605	41,228	6,869	37,409	19,701	2,413	3,029	379
TOTALS:	866,573	628,394	53,409	264,560	302,712	31,803	10,171	1,578

**Table 5.** Expanded estimates of angler hours by survey section and species, as determined by the Central Valley Angler Survey, July 2007 through June 2008.

River	----- Sacramento -----				American	Feather	Yuba	Mokelumne	Calaveras
Sections	ALL	1-3	4-7	8	10-10.1	11-12.2	13-14	19	20
ANY	125,314	60,887	15,954	820	25,672	18,791	3,008	182	0
Chinook Salmon	649,530	141,956	278,606	2,200	78,898	147,870	0	0	0
Steelhead	113,145	74	7,114	997	66,740	26,197	7,209	4,626	188
Rainbow Trout	133,941	108	53,375	48,886	2,196	4,449	18,174	5,362	1,391
Striped Bass	749,230	442,532	191,600	0	53,087	61,952	59	0	0
Sturgeon	159,912	110,467	47,690	0	224	1,531	0	0	0
American Shad	126,228	55,027	26,406	0	28,721	14,998	1,076	0	0
Sacramento Splittail	31,958	26,429	56	0	0	5,473	0	0	0
Other	90,046	51,438	7,572	497	9,004	21,391	144	0	0
TOTAL:	2,179,304	888,918	628,373	53,400	264,542	302,652	29,670	10,170	1,579

### Steelhead Fishery

The majority (82.1%) of the sport angling effort estimated for steelhead during the current reporting period was expended on the American and Feather rivers (Table 5). The percent of overall estimated effort on the Sacramento, Yuba, Mokelumne and Calaveras rivers were 7.2%, 6.4%, 4.1%, and 0.2%, respectively. An estimated total of 113,145 angler hours targeted steelhead (Table 5), resulting in an estimated harvest of 1,621 fish, and a release of 36,155 fish (Appendix Table 3). Thus, only about 4.3% of the catch was harvested. The overall CPUE for steelhead was 0.33 / hr.

### Rainbow Trout Fishery

All harvested fish reported as rainbow trout within the lower Sacramento, Feather, and American river survey sections covered were recorded as steelhead, given the strongly anadromous life history of the species in the lower Sacramento River system. Recognized resident rainbow trout fisheries on the upper Sacramento, Yuba, Mokelumne, and Calaveras rivers were at least partially surveyed during the current reporting period and the catch characterized by the length criteria described in Job 1 above.

Much of the rainbow trout fishery was surveyed on the Sacramento, Yuba, Mokelumne, and Calaveras rivers (Table 2). Five out of 24 possible survey months on the upper Sacramento River (survey sections 7 and 8) did not get surveyed due to the phased implementation of survey sections. Surveys on the Yuba, Mokelumne and Calaveras rivers were added in January 2008. No surveys were conducted on the Calaveras and Mokelumne rivers during the closure to all fishing in April and May 2008.

An estimated 133,941 angler hours targeted rainbow trout (Table 5), resulting in an estimated harvest of 700 fish, the catch-and-release of an estimated 47,484 fish (Appendix Table 4), and thus a retention rate of about 1.5%. Rainbow trout effort on the Sacramento River in survey sections 6, 7 and 8 comprised the majority (76.1%) of the overall effort for rainbow trout throughout the survey area (Appendix Table 4). Effort on the Yuba River accounted for 13.6% of the total rainbow trout effort. The overall CPUE for rainbow trout was 0.36/hr.

### Striped Bass Fishery

The angler survey work conducted during the current reporting period captured the heart of the striped bass fishery in the Sacramento River system, including the addition of survey sections 1 and 1.1 (Carquinez Bridge to Rio Vista, and Suisun Bay) in April 2008 (Table 2). An estimated total of 749,230 angler hours targeted striped bass (Table 5). About 85% of that effort occurred on the Sacramento River from Carquinez Bridge to the Red Bluff Diversion Dam, 8% on the Feather River, and 7% on the lower American River (Table 5). Total angler effort resulted in an estimated striped bass harvest of 25,828 fish, and a catch-and-release of 155,620 fish (Appendix Table 5). About 14% of striped bass caught were harvested. The overall CPUE for striped bass was 0.24 / hr. The striped bass fishery was the most popular fishery in the survey and accounted for 34% of total angling effort, exceeding the Chinook salmon fishery by 100,000 hours of dedicated effort.

### Sturgeon Fishery

An estimated 159,912 angler hours targeted sturgeon during the current reporting period, and essentially all of this effort occurred on the mainstem Sacramento River from the Carquinez Bridge to the Red Bluff Diversion Dam (Table 5; Appendix Table 6). The fishery resulted in an estimated harvest of 1,414 white sturgeon, and the catch-and-release of 1,541 white sturgeon (Appendix Table 6), for a harvest rate of about 48%. No green sturgeon were reported kept and an estimated 127 were released (Appendix Table 7). Reported green sturgeon catch occurred only in Suisun Bay and in section 6 (Hamilton City to Red Bluff Diversion Dam) on the Sacramento River. Anglers had reportedly differentiated between white and green sturgeon for 79% of sturgeon released; among those fish, 89% were identified as white sturgeon and 11% as green sturgeon (Appendix Tables 6–8). The overall CPUE for sturgeon was low: about 0.02 / hr.

### American Shad Fishery

With the exclusion of surveys conducted in July 2008, much of the Central Valley American shad fishery for 2008 was surveyed during the current reporting period. An estimated 126,228 angler hours targeted American shad (Table 5). About 65% of this effort occurred on the Sacramento River from Rio Vista to Red Bluff Diversion Dam, 23% on the lower American River, 12% on the Feather River, and < 0.9% on the Yuba River. This effort resulted in an estimated harvest of 44,980 shad, and the catch-and-release of 61,460 shad (Appendix Table 9), for a harvest rate of about 42%. The American shad fishery was very successful as reflected in an overall CPUE of 0.84 / hr, the highest catch rate among the fisheries monitored in the angler survey. The American shad fishery, which accounted for 6% of the total fishing effort in the survey, ranked as the fourth most popular fishery along with rainbow trout (Table 5).

### Sacramento Splittail Fishery

About 83% of the Sacramento splittail fishery surveyed during the current reporting period occurred on the lower Sacramento River from Rio Vista to Knights Landing (survey sections 1–3; Table 5). The remaining 17% was on the Feather River from Verona to Shanghai Rapids. At an estimated total effort of 31,958 angler hours, the Sacramento splittail fishery was the smallest fishery targeted in the angler survey (Table 5). But with an estimated harvest of 11,191 splittail and a catch-and-release of only 356 splittail (Appendix Table 10), this fishery had the highest harvest rate of 97%. The overall CPUE for splittail was 0.36 / hr.

## **Job 3. Stock Assessment**

### Composition of Chinook Salmon Sport Catch

The basis for determining the stock origin (hatchery vs. natural production by run) of Chinook salmon caught in Central Valley sport fisheries is the recovery of coded-wire tags. A fraction of the production of fall-run Chinook salmon (currently 25%) from Central Valley hatcheries is coded-wire tagged and identifiable with an adipose fin clip, while 100% of spring run from Feather River Hatchery, late-fall run from Coleman

National Fish Hatchery, and winter run from Livingston Stone National Fish Hatchery is clipped and tagged. Of the 845 Chinook salmon observed in the catch during the current reporting period, 143, or 17%, had an adipose fin clip and were thus identified as being of hatchery origin. Anglers surrendered the head from 127 (89%) of clipped salmon, and tags were recovered and read from 118 (93%) heads collected. The proportionate breakdown of coded-wire-tag recoveries from the Sacramento, Feather, and American rivers was 76%, 2%, and 22%, respectively, reflecting the relative level of tagging frequency at salmon hatcheries in the upper Sacramento, Feather, and American river basins.

Scale samples from 104 Chinook salmon of known age (clipped and tagged hatchery origin fish), and of 357 Chinook salmon of unknown origin (unclipped and untagged fish or hatchery or natural origin), were read to estimate age structure of the sport catch. The weighted percentage of correct age determinations of known-age salmon by two readers was 89% and 99%, respectively. The weighted agreement between two independent reads of scales taken from Chinook salmon of unknown origin caught in the Sacramento, Feather, and American rivers was 87%. Estimates of age structure of the Chinook salmon catch for the current reporting period are still being finalized.

#### Age Structure of Adult Steelhead

A total of 1,004 scale samples was collected from adult steelhead at state-run Central Valley anadromous fish hatcheries. Of those, 125 (12.5%) were steelhead of natural origin, given their lack of an adipose fin clip. Comparative assessment of steelhead of hatchery and natural origin is pending.

#### **7. Discuss differences between work anticipated in grant proposal and grant agreement, and that actually carried out with Federal Aid grant funds; include differences between expected and actual costs.**

N/A.

#### **8. List any publications or in-house reports resulting from this work. Provide citations, including status (indicate if not completed), note any that are included with this report, and note where reports or publications may be obtained.**

Data generated by F-119-R for inland recreational harvest of Chinook salmon are being used by the Pacific Fishery Management Council Salmon Technical Team to develop an index for Sacramento River fall-run Chinook salmon for fishery management purposes, as presented in the following report:

O'Farrell, M. R., M. S. Mohr, M. L. Palmer-Zwahlen, and A. M. Grover. 2008. The Sacramento Index. Report prepared by National Marine Fisheries Service and California Department of Fish and Game for the Pacific Fishery Management Council, Salmon Technical Team.

#### **9. Name, title, phone number, and e-mail address of person(s) compiling this report**

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## **Job 2 Appendix Tables**

**Appendix Table 1.** Expanded estimates of angler hours targeting Chinook salmon, and numbers of Chinook salmon kept and released, by survey section and month, as determined by the Central Valley Angler Survey, July 2007 through June 2008.

**CENTRAL VALLEY ANGLER SURVEY**

2007 - 2008 Angler Survey Effort Estimate Summary

**TOTAL NUMBER OF ANGLER-HOURS**

River Section No.	Sacramento								American			Feather				Yuba		Mokelumne		Calaveras
	1	1.1	2	3	4	5	6	7	8	10	10.1	11.1	11.2	12	12.1	12.2	13	14	19	20
July	-	-	28,840	16,505	10,134	16,311	8,853	-	-	19,456	9,874	6,895	6,689	10,064	19,612	-	-	-	-	-
August	-	-	31,872	21,443	20,776	29,189	28,071	10,281	-	12,679	8,883	6,675	5,556	21,012	14,791	-	-	-	-	-
September	-	-	54,513	28,034	25,276	22,065	26,429	28,473	-	14,250	9,857	9,148	8,843	25,790	13,400	-	-	-	-	-
October	-	-	65,672	17,018	10,929	13,365	13,073	27,624	-	29,084	8,418	7,563	7,785	5,785	2,170	-	-	-	-	-
November	-	-	32,736	11,990	7,679	4,473	7,436	8,932	10,137	13,848	6,799	3,491	2,857	4,954	109	-	-	-	-	-
December	-	-	11,969	4,747	4,293	6,451	7,192	9,637	3,173	8,373	5,757	1,561	181	2,538	24	-	-	-	-	-
January	-	-	16,379	5,069	2,040	314	781	6,632	3,993	19,187	4,820	3,341	142	1,832	32	58	162	2,698	1,140	400
February	-	-	38,781	11,390	9,133	1,866	591	1,047	3,109	14,059	4,270	5,950	1,005	2,135	179	39	681	5,290	1,415	468
March	-	-	58,007	35,250	25,364	8,424	1,788	3,327	11,424	11,695	1,145	17,420	2,357	3,222	604	1,087	2,852	7,095	4,586	332
April	34,015	14,778	84,499	61,910	82,024	13,673	1,699	5,026	7,384	8,839	741	24,904	1,842	2,445	380	724	259	3,694	-	-
May	18,297	4,466	63,652	46,380	52,396	15,168	3,905	5,027	7,319	14,874	245	19,042	2,030	2,681	1,218	847	1,007	3,531	-	-
June	10,506	3,106	36,749	20,350	12,302	15,343	8,482	5,101	6,869	34,469	2,940	8,592	3,015	3,979	3,020	1,096	871	1,542	3,029	379
TOTAL:	62,818	22,350	523,669	280,086	262,346	146,642	108,300	111,107	53,408	200,813	63,749	114,582	42,302	86,437	55,539	3,851	5,832	23,850	10,170	1,579
CI 80%	9,121	6,876	26,295	16,335	15,716	12,845	11,426	10,154	5,611	15,357	5,190	12,402	5,597	7,362	7,126	1,005	2,366	5,866	3,925	453

**TOTAL NUMBER OF ANGLER-HOURS BY SPECIES**

River Section No.	Sacramento								American			Feather				Yuba		Mokelumne		Calaveras
	1	1.1	2	3	4	5	6	7	8	10	10.1	11.1	11.2	12	12.1	12.2	13	14	19	20
ANY	4,687	668	36,377	19,155	5,832	6,421	1,992	1,709	820	20,899	4,773	7,946	6,459	2,835	316	1,235	2,944	64	182	0
CHINOOK SALMON	0	0	84,842	57,114	64,054	75,016	77,354	62,182	2,200	36,190	42,708	18,282	20,739	55,984	52,248	617	0	0	0	0
STEELHEAD	0	0	74	0	147	1,413	2,440	3,114	997	53,029	13,711	473	95	22,997	2,490	142	602	6,607	4,626	188
Rainbow Trout	0	0	0	108	0	346	9,290	43,739	48,886	1,568	628	304	0	3,937	87	121	1,014	17,160	5,362	1,391
Striped Bass	43,617	7,320	254,100	137,495	148,899	35,864	6,707	130	0	51,542	1,545	51,930	9,086	55	4	877	59	0	0	0
Sturgeon	13,138	14,363	65,044	17,922	35,459	9,244	2,987	0	0	224	0	1,464	67	0	0	0	0	0	0	0
American Shad	0	0	32,103	22,924	3,537	16,405	6,464	0	0	28,721	0	14,560	216	26	180	16	1,056	20	0	0
Splittail	0	0	17,617	8,812	56	0	0	0	0	0	0	5,473	0	0	0	0	0	0	0	0
other	1,375	0	33,510	16,553	4,358	1,928	1,060	226	497	8,630	374	14,139	5,629	591	202	831	144	0	0	0
TOTAL:	62,818	22,350	523,669	280,086	262,346	146,642	108,300	111,107	53,408	200,813	63,749	114,582	42,302	86,437	55,539	3,851	5,832	23,850	10,170	1,579

**Appendix Table 2.** Expanded estimates of angler hours targeting Chinook salmon, and numbers of Chinook salmon kept and released, by survey section and month, as determined by the Central Valley Angler Survey, July 2007 through June 2008.

**CENTRAL VALLEY ANGLER SURVEY**

2007 - 2008 Angler Survey Effort Estimate Summary

**TOTAL NUMBER OF ANGLER-HOURS TARGETING CHINOOK SALMON**

River	Sacramento								American				Feather				Yuba		Mokelumne	Calaveras	
	Section No.	1	1.1	2	3	4	5	6	7	8	10	10.1	11.1	11.2	12	12.1	12.2	13	14	19	20
July	-	-	1,152	9,139	6,708	8,358	6,745	-	-	219	7,747	1,453	2,916	9,266	19,433	-	-	-	-	-	-
August	-	-	2,213	10,230	18,266	25,601	24,992	6,067	-	65	8,132	2,717	2,360	20,025	14,663	-	-	-	-	-	-
September	-	-	28,283	19,365	22,519	20,303	24,537	21,415	-	5,439	9,050	5,493	6,872	24,261	13,344	-	-	-	-	-	-
October	-	-	41,535	10,785	8,932	11,491	10,788	18,263	-	18,222	8,412	6,292	6,096	274	454	-	-	-	-	-	-
November	-	-	11,615	5,969	5,439	3,483	4,005	2,536	518	9,413	5,512	1,555	2,322	0	0	-	-	-	-	-	-
December	-	-	0	1,626	2,190	5,780	6,287	8,509	514	2,777	1,590	772	155	0	0	-	-	-	-	-	-
January	-	-	0	0	0	0	0	5,392	1,168	19	586	0	0	0	0	0	0	0	0	0	0
February	-	-	44	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
March	-	-	0	0	0	0	0	0	0	36	0	0	0	0	0	0	0	0	0	0	0
April	0	0	0	0	0	0	0	0	0	0	0	0	0	28	207	0	0	0	0	-	-
May	0	0	0	0	0	0	0	0	0	0	0	0	0	212	1,127	426	0	0	0	-	-
June	0	0	0	0	0	0	0	0	0	0	1,679	0	18	1,918	3,020	191	0	0	0	0	0
TOTAL:	0	0	84,842	57,114	64,054	75,016	77,354	62,182	2,200	36,190	42,708	18,282	20,739	55,984	52,248	617	0	0	0	0	0

**TOTAL KEPT CHINOOK SALMON**

River	Sacramento								American				Feather				Yuba		Mokelumne	Calaveras	
	Section No.	1	1.1	2	3	4	5	6	7	8	10	10.1	11.1	11.2	12	12.1	12.2	13	14	19	20
July	-	-	0	21	24	122	101	-	-	0	0	0	0	295	486	-	-	-	-	-	-
August	-	-	0	102	154	634	549	151	-	0	371	0	33	564	239	-	-	-	-	-	-
September	-	-	240	110	355	540	550	584	-	0	170	61	189	1921	679	-	-	-	-	-	-
October	-	-	611	101	55	138	196	547	-	156	228	172	288	0	0	-	-	-	-	-	-
November	-	-	143	28	258	146	113	194	0	860	125	35	24	0	0	-	-	-	-	-	-
December	-	-	9	9	51	422	232	390	0	69	41	35	0	0	0	-	-	-	-	-	-
January	-	-	0	0	0	0	0	77	59	19	53	0	0	0	0	0	0	0	0	0	0
February	-	-	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
March	-	-	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
April	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-
May	0	0	0	0	0	0	0	0	0	0	0	0	0	18	16	44	0	0	0	-	-
June	0	0	0	0	0	0	0	0	0	0	28	0	0	17	46	0	0	0	0	0	0
TOTAL:	0	0	1,003	371	897	2,002	1,741	1,943	59	1,104	1,016	303	534	2,815	1,466	44	0	0	0	0	0

**TOTAL RELEASED CHINOOK SALMON**

River	Sacramento								American				Feather				Yuba		Mokelumne	Calaveras	
	Section No.	1	1.1	2	3	4	5	6	7	8	10	10.1	11.1	11.2	12	12.1	12.2	13	14	19	20
July	-	-	0	0	24	0	0	-	-	0	0	0	0	270	0	-	-	-	-	-	-
August	-	-	0	0	13	185	17	0	-	0	93	0	0	117	17	-	-	-	-	-	-
September	-	-	0	0	0	0	15	14	-	0	68	0	0	723	19	-	-	-	-	-	-
October	-	-	59	0	14	59	0	38	-	31	203	19	0	75	0	-	-	-	-	-	-
November	-	-	0	0	0	13	9	39	0	182	143	0	24	83	0	-	-	-	-	-	-
December	-	-	0	0	0	0	12	0	0	23	350	0	0	0	0	-	-	-	-	-	-
January	-	-	0	0	0	0	0	0	0	97	355	0	0	0	0	0	0	0	0	0	0
February	-	-	0	0	0	0	6	0	0	93	34	0	0	0	0	0	0	0	14	0	0
March	-	-	0	15	25	0	12	31	0	36	0	0	0	0	29	0	0	0	0	0	0
April	0	0	0	0	45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-
May	0	0	39	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-
June	0	0	0	0	0	14	0	0	0	0	0	0	0	0	9	0	0	0	0	0	0
TOTAL:	0	0	98	15	121	271	71	122	0	462	1,246	19	24	1,268	74	0	0	14	0	0	0

**Appendix Table 3.** Expanded estimates of angler hours targeting steelhead, and numbers of steelhead kept and released, by survey section and month, as determined by the Central Valley Angler Survey, July 2007 through June 2008.

**CENTRAL VALLEY ANGLER SURVEY**

2007 - 2008 Angler Survey Effort Estimate Summary

**TOTAL NUMBER OF ANGLER-HOURS TARGETING STEELHEAD**

River Section No.	Sacramento								American				Feather			Yuba		Mokelumne		Calaveras
	1	1.1	2	3	4	5	6	7	8	10	10.1	11.1	11.2	12	12.1	12.2	13	14	19	20
July	-	-	0	0	0	147	8	-	-	401	0	0	0	553	0	-	-	-	-	-
August	-	-	0	0	0	0	91	0	-	423	70	0	0	129	0	-	-	-	-	-
September	-	-	0	0	0	238	416	384	-	2,085	0	0	71	351	0	-	-	-	-	-
October	-	-	0	0	10	237	400	1,606	-	5,929	0	134	0	5,406	1,636	-	-	-	-	-
November	-	-	0	0	137	419	984	948	27	2,426	1,190	0	24	4,524	109	-	-	-	-	-
December	-	-	0	0	0	253	52	0	83	4,059	4,059	0	0	1,892	24	-	-	-	-	-
January	-	-	0	0	0	0	0	69	887	17,423	3,746	0	0	1,832	32	0	0	1,187	779	55
February	-	-	74	0	0	114	333	37	0	10,928	3,606	98	0	1,355	159	0	102	2,633	1,126	126
March	-	-	0	0	0	5	156	70	0	6,958	884	117	0	2,206	459	0	385	2,043	2,721	7
April	0	0	0	0	0	0	0	0	0	2,364	156	0	0	1,867	0	0	6	94	-	-
May	0	0	0	0	0	0	0	0	0	33	0	124	0	1,661	71	142	0	610	-	-
June	0	0	0	0	0	0	0	0	0	0	0	0	0	1,221	0	0	109	40	0	0
TOTAL:	0	0	74	0	147	1,413	2,440	3,114	997	53,029	13,711	473	95	22,997	2,490	142	602	6,607	4,626	188

**TOTAL KEPT STEELHEAD**

River Section No.	Sacramento								American				Feather			Yuba		Mokelumne		Calaveras
	1*	1.1*	2*	3*	4*	5	6	7	8	10*	10.1*	11.1*	11.2*	12*	12.1*	12.2*	13	14	19	20
July	-	-	0	0	0	0	17	-	-	36	0	0	0	49	0	-	-	-	-	-
August	-	-	0	0	0	0	0	0	-	0	0	0	0	94	0	-	-	-	-	-
September	-	-	0	0	0	0	30	14	-	34	0	0	0	104	0	-	-	-	-	-
October	-	-	39	0	0	20	15	29	-	93	51	0	0	25	0	-	-	-	-	-
November	-	-	0	0	30	0	0	52	0	83	71	0	0	55	0	-	-	-	-	-
December	-	-	0	0	0	0	12	30	0	69	62	0	0	0	0	-	-	-	-	-
January	-	-	0	0	0	0	31	0	30	97	18	0	0	26	0	0	0	0	0	0
February	-	-	0	16	0	0	25	0	0	93	0	0	0	22	0	0	0	0	0	0
March	-	-	0	0	0	10	0	0	0	0	0	0	0	33	0	0	0	0	0	0
April	0	0	0	0	0	14	0	0	0	0	0	0	0	0	0	0	0	0	-	-
May	0	0	0	0	0	9	0	0	0	0	0	25	0	0	0	0	0	0	-	-
June	0	0	0	0	0	0	15	26	0	0	0	0	0	17	0	0	0	0	0	0
TOTAL:	0	0	39	16	30	53	145	151	30	505	202	25	0	425	0	0	0	0	0	0

**TOTAL RELEASED STEELHEAD**

River Section No.	Sacramento								American				Feather			Yuba		Mokelumne		Calaveras
	1*	1.1*	2*	3*	4*	5	6	7	8	10*	10.1*	11.1*	11.2*	12*	12.1*	12.2*	13	14	19	20
July	-	-	0	41	0	0	0	-	-	0	50	0	0	197	0	-	-	-	-	-
August	-	-	0	0	0	0	50	170	-	260	0	0	0	23	17	-	-	-	-	-
September	-	-	0	0	0	381	0	427	-	961	0	0	0	145	0	-	-	-	-	-
October	-	-	0	10	0	118	151	2,122	-	809	152	0	0	771	136	-	-	-	-	-
November	-	-	0	0	0	27	244	440	1,621	545	107	0	0	647	0	-	-	-	-	-
December	-	-	0	0	8	53	23	120	389	1,109	226	0	0	355	0	-	-	-	-	-
January	-	-	0	0	0	0	0	46	739	1,539	249	0	0	359	0	0	0	130	206	0
February	-	-	0	16	0	0	38	93	633	1,325	445	0	0	237	0	0	0	488	154	90
March	-	-	0	0	0	0	108	745	2,903	995	0	0	0	561	29	0	0	576	489	0
April	0	0	0	24	0	0	63	907	1,769	347	0	0	0	275	0	0	0	225	-	-
May	0	0	0	0	0	18	110	1,240	1,630	0	0	0	0	389	0	0	0	191	-	-
June	0	0	0	0	0	14	45	459	1,896	0	0	0	0	168	0	0	0	100	0	0
TOTAL:	0	0	0	91	8	611	832	6,769	11,580	7,890	1,229	0	0	4,127	182	0	0	1,710	849	90

\* Any Rainbow Trout reported as kept or released on the American. Feather and lower Sacramento Rivers were assumed to be a Steelhead

**Appendix Table 4.** Expanded estimates of angler hours targeting rainbow trout, and numbers of rainbow trout kept and released, by survey section and month, as determined by the Central Valley Angler Survey, July 2007 through June 2008.

**TOTAL NUMBER OF ANGLER-HOURS TARGETING RAINBOW TROUT**

River	Sacramento								American				Feather				Yuba		Mokelumne	Calaveras
Section No.	1	1.1	2	3	4	5	6	7	8	10	10.1	11.1	11.2	12	12.1	12.2	13	14	19	20
July	-	-	0	0	0	37	767	-	-	55	0	0	0	74	0	-	-	-	-	-
August	-	-	0	20	0	0	366	3,863	-	0	31	0	0	12	0	-	-	-	-	-
September	-	-	0	46	0	16	1,041	6,406	-	180	0	304	0	1,043	0	-	-	-	-	-
October	-	-	0	0	0	0	1,222	7,515	-	171	0	0	0	0	0	-	-	-	-	-
November	-	-	0	0	0	206	1,151	5,296	9,579	0	0	0	0	76	0	-	-	-	-	-
December	-	-	0	0	0	29	203	1,120	2,576	0	0	0	0	647	0	-	-	-	-	-
January	-	-	0	0	0	0	250	990	1,937	39	0	0	0	0	0	0	155	1,511	350	345
February	-	-	0	0	0	0	30	941	2,879	447	17	0	0	204	0	0	483	2,657	289	342
March	-	-	0	0	0	58	682	2,916	10,905	124	42	0	0	595	87	121	77	5,052	1,743	325
April	0	0	0	0	0	0	661	4,976	7,189	347	468	0	0	532	0	0	47	3,600	-	-
May	0	0	0	42	0	0	1,773	4,761	7,254	57	0	0	0	746	0	0	0	2,858	-	-
June	0	0	0	0	0	0	1,144	4,955	6,567	148	70	0	0	8	0	0	252	1,482	2,980	379
TOTAL:	0	0	0	108	0	346	9,290	43,739	48,886	1,568	628	304	0	3,937	87	121	1,014	17,160	5,362	1,391

**TOTAL KEPT RAINBOW TROUT**

River	Sacramento								American				Feather				Yuba		Mokelumne	Calaveras
Section No.	1*	1.1*	2*	3*	4*	5	6	7	8	10*	10.1*	11.1*	11.2*	12*	12.1*	12.2*	13	14	19	20
July	-	-	0	0	0	0	0	-	-	0	0	0	0	0	0	-	-	-	-	-
August	-	-	0	0	0	0	100	38	-	0	0	0	0	0	0	-	-	-	-	-
September	-	-	0	0	0	0	15	85	-	0	0	0	0	0	0	-	-	-	-	-
October	-	-	0	0	0	0	0	19	-	0	0	0	0	0	0	-	-	-	-	-
November	-	-	0	0	0	27	0	13	0	0	0	0	0	0	0	-	-	-	-	-
December	-	-	0	0	0	0	46	0	28	0	0	0	0	0	0	-	-	-	-	-
January	-	-	0	0	0	0	0	15	30	0	0	0	0	0	0	0	0	0	0	0
February	-	-	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15	0
March	-	-	0	0	0	0	0	47	0	0	0	0	0	0	0	0	0	0	0	0
April	0	0	0	0	0	0	0	35	30	0	0	0	0	0	0	0	0	0	-	-
May	0	0	0	0	0	0	0	40	0	0	0	0	0	0	0	0	0	0	-	-
June	0	0	0	0	0	0	15	102	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL:	0	0	0	0	0	27	176	394	88	0	0	0	0	0	0	0	0	0	15	0

**TOTAL RELEASED RAINBOW TROUT**

River	Sacramento								American				Feather				Yuba		Mokelumne	Calaveras
Section No.	1*	1.1*	2*	3*	4*	5	6	7	8	10*	10.1*	11.1*	11.2*	12*	12.1*	12.2*	13	14	19	20
July	-	-	0	0	0	0	34	-	-	0	0	0	0	0	0	-	-	-	-	-
August	-	-	0	0	0	0	233	1475	-	0	0	0	0	0	0	-	-	-	-	-
September	-	-	0	0	0	190	74	3075	-	0	0	0	0	0	0	-	-	-	-	-
October	-	-	0	0	0	0	332	4571	-	0	0	0	0	0	0	-	-	-	-	-
November	-	-	0	0	0	0	526	1799	1408	0	0	0	0	0	0	-	-	-	-	-
December	-	-	0	0	0	11	46	375	709	0	0	0	0	0	0	-	-	-	-	-
January	-	-	0	0	0	0	0	324	651	0	0	0	0	0	0	0	13	345	138	73
February	-	-	0	0	0	0	13	222	1280	0	0	0	0	0	0	0	68	542	139	162
March	-	-	0	0	0	10	179	1864	4656	0	0	0	0	0	0	0	308	632	1957	54
April	0	0	0	0	0	0	598	3394	2429	0	0	0	0	0	0	0	6	279	-	-
May	0	0	0	0	0	0	184	3441	3304	0	0	0	0	0	0	0	0	191	-	-
June	0	0	0	0	0	0	209	1556	2291	0	0	0	0	0	0	0	59	60	914	81
TOTAL:	0	0	0	0	0	211	2,428	22,096	16,728	0	0	0	0	0	0	0	454	2,049	3,148	370

\* Any Rainbow Trout reported as kept or released on the American, Feather and lower Sacramento Rivers were assumed to be a Steelhead

**Appendix Table 5.** Expanded estimates of angler hours targeting striped bass, and numbers of striped bass kept and released, by survey section and month, as determined by the Central Valley Angler Survey, July 2007 through June 2008.

**CENTRAL VALLEY ANGLER SURVEY**

2007 - 2008 Angler Survey Effort Estimate Summary

**TOTAL NUMBER OF ANGLER-HOURS TARGETING STRIPED BASS**

River Section No.	Sacramento								American				Feather			Yuba		Mokelumne Calaveras		
	1	1.1	2	3	4	5	6	7	8	10	10.1	11.1	11.2	12	12.1	12.2	13	14	19	20
July	-	-	14,939	3,475	2,282	6,092	767	-	-	13,238	375	3,818	2,301	0	0	-	-	-	-	-
August	-	-	20,131	8,112	1,416	2,670	2,389	0	-	8,079	348	1,327	2,694	0	0	-	-	-	-	-
September	-	-	19,133	5,382	2,111	865	435	28	-	3,423	170	1,786	815	0	0	-	-	-	-	-
October	-	-	16,304	3,847	1,433	956	30	0	-	3,494	0	487	556	0	0	-	-	-	-	-
November	-	-	15,834	2,940	771	27	47	0	0	731	9	1,052	18	55	0	-	-	-	-	-
December	-	-	4,485	1,553	483	230	78	0	0	266	0	430	0	0	0	-	-	-	-	-
January	-	-	511	417	5	0	0	0	0	234	0	417	0	0	0	0	0	0	0	0
February	-	-	3,336	1,113	171	76	0	0	0	511	73	2,872	259	0	0	0	0	0	0	0
March	-	-	28,581	22,959	10,463	1,090	233	0	0	2,239	42	11,579	877	0	0	258	0	0	0	0
April	25,419	5,623	73,102	51,077	74,777	9,689	189	0	0	3,622	0	19,925	182	0	0	111	0	0	-	-
May	13,861	837	38,063	25,104	45,070	5,720	588	0	0	4,923	82	6,401	241	0	4	0	0	0	-	-
June	4,337	860	19,681	11,516	9,917	8,449	1,951	102	0	10,782	446	1,836	1,143	0	0	508	59	0	0	0
TOTAL:	43,617	7,320	254,100	137,495	148,899	35,864	6,707	130	0	51,542	1,545	51,930	9,086	55	4	877	59	0	0	0
							634,002									61,952				

**TOTAL KEPT STRIPED BASS**

River Section No.	Sacramento								American				Feather			Yuba		Mokelumne Calaveras		
	1	1.1	2	3	4	5	6	7	8	10	10.1	11.1	11.2	12	12.1	12.2	13	14	19	20
July	-	-	461	82	145	171	17	-	-	255	0	124	0	0	0	-	-	-	-	-
August	-	-	1,249	246	39	106	33	0	-	390	31	23	167	23	0	-	-	-	-	-
September	-	-	390	37	71	127	30	0	-	0	0	91	94	0	0	-	-	-	-	-
October	-	-	414	40	55	59	0	0	-	0	0	0	0	0	0	-	-	-	-	-
November	-	-	367	0	30	0	0	0	0	0	0	35	0	0	0	-	-	-	-	-
December	-	-	53	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-
January	-	-	0	0	0	0	0	0	0	0	18	0	0	0	0	0	0	0	0	0
February	-	-	44	0	0	12	0	0	0	0	34	66	0	0	0	0	0	0	0	0
March	-	-	984	497	421	73	0	0	0	36	0	293	0	0	0	0	0	0	0	0
April	1,693	347	2,559	1,627	3,527	277	0	0	0	87	0	546	0	0	0	0	0	0	-	-
May	777	26	892	733	2,465	132	0	0	0	196	0	50	0	0	0	0	0	0	-	-
June	121	48	325	199	385	330	45	0	0	332	56	120	0	0	0	0	0	0	0	0
TOTAL:	2,591	421	7,738	3,461	7,138	1,287	125	0	0	1,296	139	1,348	261	23	0	0	0	0	0	0

**TOTAL RELEASED STRIPED BASS**

River Section No.	Sacramento								American				Feather			Yuba		Mokelumne Calaveras		
	1	1.1	2	3	4	5	6	7	8	10	10.1	11.1	11.2	12	12.1	12.2	13	14	19	20
July	-	-	9,681	3,773	896	2,523	50	-	-	4,224	0	2,968	321	0	0	-	-	-	-	-
August	-	-	11,592	3,521	655	238	299	0	-	1,495	0	1,241	335	0	0	-	-	-	-	-
September	-	-	9,293	2,885	782	32	74	0	-	549	0	760	850	0	0	-	-	-	-	-
October	-	-	4,353	1,916	330	39	0	0	-	591	0	96	0	0	0	-	-	-	-	-
November	-	-	1,944	466	106	0	0	0	0	17	18	18	0	0	0	-	-	-	-	-
December	-	-	328	9	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-
January	-	-	13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
February	-	-	163	0	0	0	0	0	0	46	0	98	0	0	0	0	0	0	0	0
March	-	-	2,392	768	446	10	0	0	0	36	0	468	0	0	0	0	0	0	0	0
April	4,089	347	13,064	4,931	4,590	360	94	0	0	217	0	3,932	0	0	0	0	0	0	-	-
May	2,434	209	8,497	6,453	4,804	1,022	0	0	0	196	0	1,735	0	0	0	0	0	0	-	-
June	1,872	96	9,154	4,947	4,038	2,628	299	0	0	1,625	0	279	0	0	0	0	0	0	0	0
TOTAL:	8,395	652	70,474	29,669	16,647	6,852	816	0	0	8,996	18	11,595	1,506	0	0	0	0	0	0	0







**Appendix Table 9.** Expanded estimates of angler hours targeting American shad, and numbers of American shad kept and released, by survey section and month, as determined by the Central Valley Angler Survey, July 2007 through June 2008.

**CENTRAL VALLEY ANGLER SURVEY**

2007 - 2008 Angler Survey Effort Estimate Summary

**TOTAL NUMBER OF ANGLER-HOURS TARGETING AMERICAN SHAD**

River Section No.	Sacramento								American				Feather			Yuba		Mokelumne Calaveras		
	1	1.1	2	3	4	5	6	7	8	10	10.1	11.1	11.2	12	12.1	12.2	13	14	19	20
July	-	-	2,074	0	0	643	297	-	-	2,140	0	0	0	0	180	-	-	-	-	-
August	-	-	0	0	0	0	0	0	-	0	0	0	0	0	0	-	-	-	-	-
September	-	-	0	55	0	0	0	0	-	0	0	0	0	0	0	-	-	-	-	-
October	-	-	0	0	0	0	0	0	-	0	0	0	0	0	0	-	-	-	-	-
November	-	-	28	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-
December	-	-	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-
January	-	-	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
February	-	-	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
March	-	-	0	0	43	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
April	0	0	6,348	2,970	0	197	0	0	0	0	0	2,139	0	0	0	0	0	0	-	-
May	0	0	18,042	16,001	2,300	8,967	1,259	0	0	6,716	0	8,923	161	26	0	16	630	0	-	-
June	0	0	5,611	3,898	1,194	6,598	4,908	0	0	19,865	0	3,498	55	0	0	0	426	20	0	0
TOTAL:	0	0	32,103	22,924	3,537	16,405	6,464	0	0	28,721	0	14,560	216	26	180	16	1,056	20	0	0
							81,433				28,721					14,998				

**TOTAL KEPT AMERICAN SHAD**

River Section No.	Sacramento								American				Feather			Yuba		Mokelumne Calaveras		
	1	1.1	2	3	4	5	6	7	8	10	10.1	11.1	11.2	12	12.1	12.2	13	14	19	20
July	-	-	1,268	0	0	0	0	-	-	437	0	0	0	0	0	-	-	-	-	-
August	-	-	0	0	0	0	0	0	-	0	0	0	0	0	0	-	-	-	-	-
September	-	-	0	0	0	0	0	0	-	0	0	0	0	0	0	-	-	-	-	-
October	-	-	0	0	0	0	0	0	-	0	0	0	0	0	0	-	-	-	-	-
November	-	-	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-
December	-	-	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-
January	-	-	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
February	-	-	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
March	-	-	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
April	0	0	3,760	1,895	0	0	0	0	0	0	0	364	0	0	0	0	0	0	-	-
May	0	0	10,360	7,165	1,118	97	0	0	0	587	0	3,867	0	0	0	0	0	0	-	-
June	0	0	4,311	1,590	1,125	110	179	0	0	4,911	0	1,836	0	0	0	0	0	0	0	0
TOTAL:	0	0	19,699	10,650	2,243	207	179	0	0	5,935	0	6,067	0	0	0	0	0	0	0	0

**TOTAL RELEASED AMERICAN SHAD**

River Section No.	Sacramento								American				Feather			Yuba		Mokelumne Calaveras		
	1	1.1	2	3	4	5	6	7	8	10	10.1	11.1	11.2	12	12.1	12.2	13	14	19	20
July	-	-	0	41	0	220	369	-	-	182	50	0	0	25	127	-	-	-	-	-
August	-	-	27	0	0	0	0	0	-	65	0	0	0	0	0	-	-	-	-	-
September	-	-	0	0	0	0	0	0	-	0	0	0	0	0	0	-	-	-	-	-
October	-	-	20	0	0	0	0	0	-	0	0	0	0	0	0	-	-	-	-	-
November	-	-	16	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-
December	-	-	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-
January	-	-	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
February	-	-	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
March	-	-	0	30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
April	0	0	2,132	1,142	23	0	0	0	0	0	0	3,641	0	0	0	0	0	0	-	-
May	0	0	660	5,992	2,262	10,382	662	0	0	2,739	0	10,683	161	0	0	0	0	0	-	-
June	0	0	89	420	77	7,458	4,680	0	0	6,868	0	200	0	17	0	0	0	0	0	0
TOTAL:	0	0	2,944	7,625	2,362	18,060	5,711	0	0	9,854	50	14,524	161	42	127	0	0	0	0	0



