



## **Napa Valley Watershed Resource Analysis**

### **Steelhead Bioenergetics Analysis (Task 10) Status Update, February 2006**



### Summary of Activity for December 2005–January 2006:

- Completed database entry and QC of October 26–November 4, 2005 fish sampling data
- Completed database entry and QC of invertebrate drift sampling data
- Began processing of invertebrate drift samples
- Began preparation for third fish sampling effort, scheduled to begin February 15, 2006
- Field inspection of water temperature monitors and water level loggers to determine status following January 2006 high flows
- Posting of status update (this document) and other project materials on WICC website

### Field Calendar:

Activity	Date	Status
Initial fish sampling and steelhead marking	August 2–10, 2005	Completed
Invertebrate drift sampling	September 22–October 4, 2005	Completed
Second fish sampling (steelhead recapture)	October 26–November 4, 2005	Completed
Third fish sampling (steelhead recapture)	February 15–21, 2006	Planned
Final fish sampling	Early summer 2006	Planned

### Initial Site Selection and Setup:

Steelhead growth monitoring is occurring in 12 study reaches in five streams tributary to the Napa River. The 12 reaches are listed below and displayed on a [map of the study reaches](#).

1. Upper Ritchey Creek
2. Mid Ritchey Creek
3. Lower Ritchey Creek
4. Upper York Creek
5. Lower York Creek
6. Upper Heath Canyon
7. Mid Heath Canyon
8. Lower Heath Canyon
9. Upper Pickle Creek
10. Lower Pickle Creek
11. Upper Redwood Creek
12. Lower Redwood Creek

Prior to the fish surveys, the stream within each reach was delineated by habitat type (i.e., run, riffle, pool, etc.) and automatic recording temperature monitors and water level

loggers were installed. The temperature monitors and water level loggers have been recording water temperature and flow conditions every hour since installation. High flows in January, 2006, however, damaged several of the temperature monitors and water level loggers. Efforts are currently under way to repair or replace damaged equipment.

### **Steelhead Marking (summer 2005):**

The first round of fish sampling occurred in early August 2005. The field sampling was timed to coincide with the onset of summer base flows, which was delayed due to late spring rains.

Prior to the fish surveys, block nets were placed at the upper and lower ends of each individual habitat unit preventing fish movement into, or out of, each unit. Fish from individual habitat units were collected using backpack electrofishers. Sampling was conducted in a manner to allow for the calculation of steelhead density estimates for each unit. Sampling at each of the 12 study reaches continued in an upstream direction until a minimum of 50 steelhead were captured.



**Electrofishing to capture juvenile steelhead.**

Once captured, steelhead were implanted with PIT tags or elastomer markings (if less than 55 mm in fork length) and then returned to the habitat unit where they were captured.



**A juvenile steelhead being implanted with a PIT tag.**

In total, 1,389 fish were captured of which 1,214 (87%) were steelhead (Table 1). Steelhead captured ranged in size from 40mm to 248mm (1.6 to 9.7 inches).

**Table 1. Total number of fish observed in each study reach during the August 2005 fish sampling.**

Location		Species and Number						
Stream	Reach	Bluegill	Chinook	Mosquitofish	Roach	Sculpin	Steelhead	Total
Heath Canyon	Lower	8					150	158
	Middle	2					100	102
	Upper						53	53
Heath Canyon Total		10					303	313
Pickle Creek	Lower						118	118
	Upper			2			54	56
Pickle Creek Total				2			172	174
Redwood Creek	Lower		10				201	211
	Upper				12	5	195	212
Redwood Creek Total			10		12	5	396	423
Ritchey Creek	Lower					11	68	79
	Middle					9	78	87
	Upper					3	73	76
Ritchey Creek Total						23	219	242
York Creek	Lower				3	75	74	152
	Upper					35	50	85
York Creek Total					3	110	124	237
Grand Total		10	10	2	15	138	1214	1389

*Note: data are preliminary and subject to revision.*

### **Invertebrate Drift Sampling:**

Sampling to assess invertebrate drift in each of the five study tributary streams was conducted from September 22–October 4, 2005. The invertebrate drift study was designed to quantify the amount of prey available to rearing steelhead during the summer low flow period, when low stream flows may reduce the abundance (i.e., delivery rate) of drifting invertebrates. Drifting invertebrates are typically the primary food source for stream-dwelling salmonids.

The objectives of the drift study were to (1) characterize drift (i.e., food availability) in study streams with different flow regimes and channel types, and (2) determine the influence of riffle length and flow on drift delivery to downstream pools used by steelhead. The sample design was set up to detect differences in drift at multiple locations in a single riffle (i.e., influence of riffle length) by simultaneous deployment of drift nets in varying combinations in a pool-riffle-pool sequence in each of the five study streams.

Sampling took place each evening over the course of 12 consecutive days. Because invertebrate drift activity typically peaks near sunset, drift nets were left in place for three hours each evening bracketing sunset: 1½ hours before sunset and 1½ hours after sunset. Nets were removed following sampling each evening and contents were preserved for enumeration and identification in the laboratory. All invertebrates in the samples will be identified to the lowest practicable taxonomic group, counted, and biomass will be determined using a length-weight regression. These data will allow comparative analysis of the prey available to rearing steelhead in study streams with different channel types and flow magnitude. Prey availability is a key factor influencing steelhead growth and bioenergetics, especially during summer periods of low stream flow.

### **Steelhead Recapture (fall 2005):**

The second round of fish sampling occurred from October 26– November 4, 2005. The timing of this field effort was targeted to begin just prior to the onset of the rainy season in order to capture the full period of the summer base flows, prior to winter flow increases. This was the first of three planned recapture efforts to monitor growth of individually-marked steelhead.

The reaches and streams sampled in fall 2005 are the same as those where steelhead were captured and marked during the summer 2005 sampling effort.

Habitats were separated by block nets in the same places as they were for the summer 2005 sampling event, preventing fish movement into, or out of, each unit. Fish from individual habitat units were collected by backpack electrofishing. Sampling was conducted in a manner to allow for the calculation of steelhead density estimates for each unit. Sampling continued in all of the units sampled in the summer 2005 survey as well as in the units upstream and downstream of these units in an attempt to recapture as many

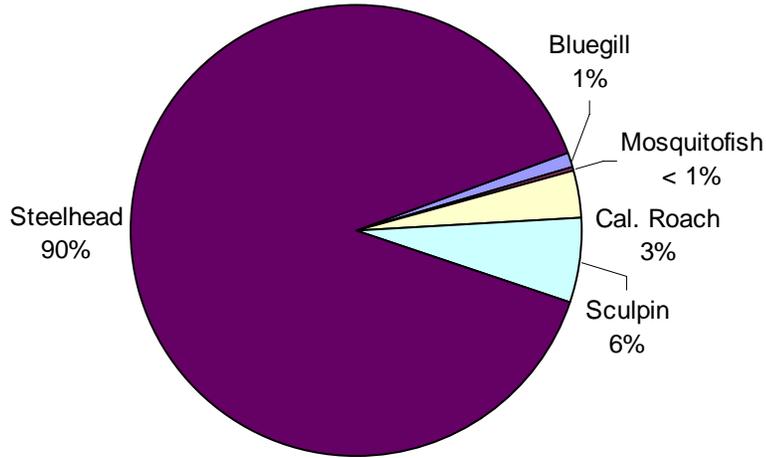
previously-marked steelhead as possible, including those that may have moved downstream a short distance from the original (summer 2005) capture location.



**Electrofishing in fall 2005.**

Once captured, steelhead were checked for existing PIT tags or elastomer markings. Existing marks were recorded and fish with no existing mark were implanted with PIT tags or elastomer markings (Figure 1). All fish captured were identified, measured, and weighed. Fish were again returned to the habitat unit where they were captured.

In total, 640 fish were captured during the fall 2005 sampling, of which 571 (90%) were steelhead (Table 2).



**Fall 2005 relative species composition for all study reaches.**

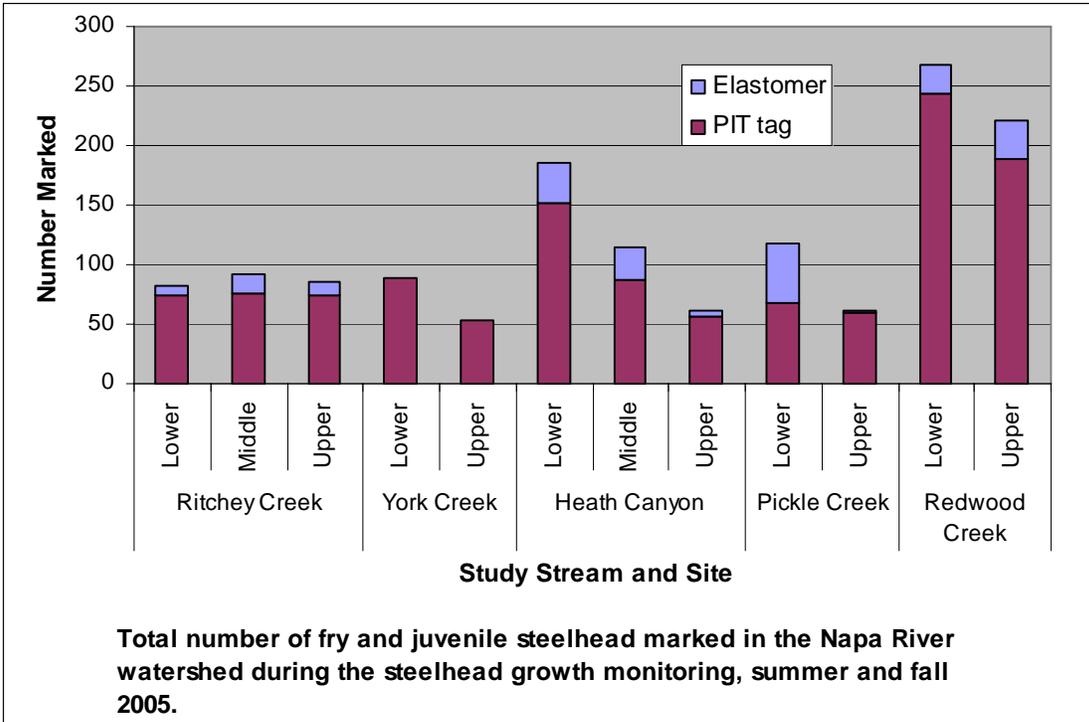
*Note: data are preliminary and subject to revision.*

Of the 571 steelhead captured, 340 (59%) had existing marks from the summer marking event (Table 2, Figure 2). A total of 231 steelhead were unmarked and were therefore given a new mark during the fall 2005 survey (Table 2). The recapture rate of the steelhead marked in the summer of 2005 was 28 percent.

**Table 2. Total number of fish observed in each study reach during the October–November 2005 fish sampling.**

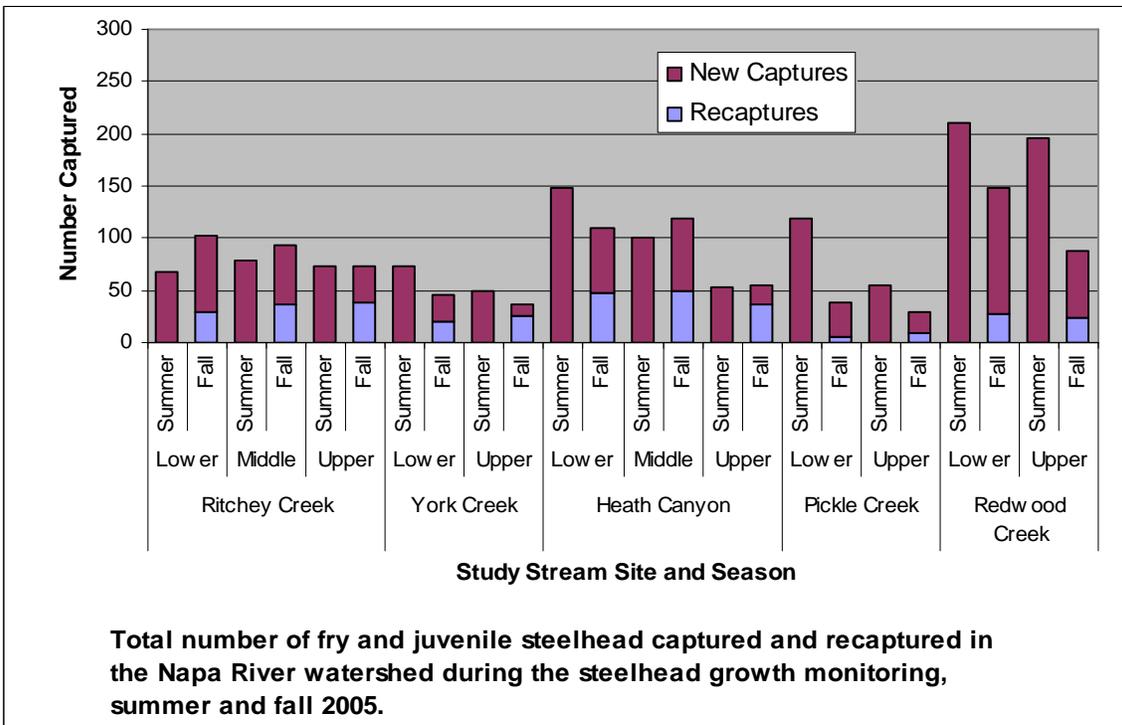
		Species							
		Bluegill	Mosquitofish	California Roach	Sculpin	Steelhead			Total
Stream	Reach					<i>new</i>	<i>recapture</i>	<i>total</i>	
Heath Canyon	Lower	2				40	46	86	88
	Middle	6				17	48	65	71
	Upper					9	36	45	45
Heath Canyon Total		8				66	130	196	204
Pickle Creek	Lower		1			1	6	7	8
	Upper					8	9	17	17
Pickle Creek Total			1			9	15	24	25
Redwood Creek	Lower			8		57	25	82	90
	Upper			8	2	27	24	51	61
Redwood Creek Total				16	2	84	49	133	151
Ritchey Creek	Lower				4	24	30	54	58
	Middle				3	15	37	52	55
	Upper					13	38	51	51
Ritchey Creek Total					7	52	105	157	164
York Creek	Lower			6	24	16	20	37	67
	Upper				5	4	21	25	30
York Creek Total				6	29	20	41	61	96
Total		8	1	22	38	231	340	571	640

*Note: data are preliminary and subject to revision.*



**Figure 1. Number of steelhead marked using each marking technique.**

*Note: data are preliminary and subject to revision.*



**Figure 2. Number of steelhead captured and recaptured during summer and fall 2005 sampling.**

*Note: data are preliminary and subject to review and change.*