

Table AQ 3-1. Descriptions of Aquatic Mollusk Study Sites.

Study Sites	Reach Type					Downstream Starting Location (UTM) ¹		Approximate Survey Length (m)	Elevation (ft)	Survey Times (person-hours)	Study Site Description
	Peaking Reach	Bypass Reach	Comparison Reach	Tributary Streams	Reservoir Inflow	Easting	Northing				
Middle Fork American River Downstream of Ralston Afterbay (Peaking Reach)											
MF4.8	•					675249	4310850	480	640	2.5	Middle Fork American River at Buckeye Bar
MF9.1	•					679057	4314666	400	690	4	Middle Fork American River at Driver's Flat (Ruck-a-Chucky Rapids), near Gas Canyon Creek
MF14.1	•					685681	4314189	400	820	2.5	Middle Fork American River at Otter Creek
Otter Creek				•		685765	4314137	325	825	4	Small tributary flowing into site MF 14.1 beginning upstream of Middle Fork American River high water mark
MF19.1	•					689242	4318581	650	920	4	Middle Fork American River at Volcano Creek
MF24.1	•					694893	4320305	480	1075	4	Middle Fork American River at the North Fork of the Middle Fork American River confluence
Middle Fork American River from Middle Fork Interbay to Ralston Afterbay											
MF26.2		•				696433	4320038	240	1180	2.7	Middle Fork American River from Middle Fork Interbay to Ralston Afterbay
Middle Fork American River Upstream of Middle Fork Interbay											
MF36.2		•				708273	4322431	160	2560	2	Middle Fork American River upstream of Middle Fork Interbay
MF44.7		•				716569	4329703	330	4400	4	Middle Fork American River below French Meadows Dam
MF51.8					•	724193	4334956	330	5280	4	Middle Fork American River upstream of French Meadows Reservoir at the high water mark
Rubicon River											
R3.5		•				700277	4319361	350	1390	4	Rubicon River at the Long Canyon Creek confluence
R20.9		•				717725	4314621	480	3320	4	Rubicon River from Deer Creek to Long Canyon Creek confluence
R25.7		•				720854	4320556	325	4320	2.3	Rubicon River from Hell Hole Dam to Deer Creek
R36.2					•	729446	4328848	245	4640	3.4	Rubicon River upstream of Hell Hole Reservoir at the high water mark
Five Lakes Creek											
FLC					•	729538	4329076	200	4600	3.4	Five Lakes Creek upstream of the Hell Hole Reservoir high water mark
Long Canyon Creek											
LC0.0	•					700277	4319361	160	1395	2	Long Canyon Creek about 10 meters upstream from the Rubicon River confluence
LC9.0	•					712163	4319386	326	3720	4	Long Canyon Creek downstream from confluence of North and South Forks
South Fork Long Canyon Creek											
SFLC2.3	•					717898	4324290	200	4520	3.7	South Fork Long Canyon Creek from Diversion to confluence with Long Canyon Creek
SFLC4.2			•			720074	4326270	200	4760	3.7	South Fork Long Canyon Creek upstream of Diversion
North Fork Long Canyon Creek											
NFLC1.9	•					716538	4324418	160	4480	3.7	North Fork Long Canyon Creek from Diversion to confluence with Long Canyon Creek
NFLC3.8			•			718466	4326174	200	4960	3.7	North Fork Long Canyon Creek upstream of Diversion
Duncan Creek											
D6.3	•					715470	4332015	250	4780	3	Duncan Creek from Diversion to confluence with the Middle Fork American River
D9.0			•			718074	4334908	225	5280	3	Duncan Creek upstream of Diversion
North Fork of the Middle Fork American River											
NFMF0.0			•	•		695221	4320358	160	1070	2	North Fork of the Middle Fork American River about 10 meters upstream from the Middle Fork American River confluence
NFMF2.3			•	•		697269	4321654	245	1240	2	North Fork of the Middle Fork American River near Circle Bridge
North Fork American River											
NF31.3			•	•		676912	4317879	400	760	2.5	North Fork American River above Lake Clementine

¹Universal Transverse Mercator Zone 10 North, North American Datum 1983

Table AQ 3-2. Summary of Aquatic Mollusks Found in the Study Area.

Scientific Name	Common Name	Family	Typical Habitat	Habitat Where Found	Special-Status
Bivalves (Mussels and Clams)					
<i>Margaritifera falcata</i>	Western pearlshell mussel	Margaritiferidae		Burrowed in sand and gravel substrate near the top of pools or in lower velocity portions of runs	No
<i>Pisidium casertanum</i>	Ubiquitous peaclam	Sphaeriidae	Has a nearly cosmopolitan distribution and is widely adaptable to a broad range of habitats (Burch 1975a).	Burrowed in sand/silt in edgewater and eddies	No
<i>Pisidium walkeri</i>	Walker peaclam	Sphaeriidae	Typically found in creeks and rivers with slow currents and small lakes with soft mud bottoms (Burch 1975a).	Burrowed in sand/silt in edgewater and eddies	No
<i>Pisidium</i> species ¹		Sphaeriidae		Burrowed in flocculent silt/organic matter permeated by spring/seep inflow along the stream margins	No
Gastropods (Aquatic Snails)					
<i>Ferrissia rivularis</i>	Creeping ancyloid	Lymnaeidae	Aquatic pulmonate (i.e., air breathing) snails that acquire oxygen through their mantles and can thus occupy calm, warm, and often stagnant water where dissolved oxygen concentrations are low (Sturm et al. 2006).	Attached to gravels and cobbles in shallow edgewater	No
<i>Fossaria obrussa</i>	Golden fossaria	Lymnaeidae		Attached to rocks or woody debris in shallow, warm edgewater	No
<i>Menetus opercularis</i> (also known as <i>Menetus callioglyptus</i>)	Button sprite	Planorbidae		Attached to cobbles and boulders in shallow spring and tributary inflow areas	No
<i>Physella gyrina</i> (also known as <i>Physa gyrina</i>)	Tadpole physa	Physidae		Attached to rocks or woody debris in warm, low-velocity areas	No
<i>Juga</i> (<i>Oreobasis</i>) <i>nigrina</i>	Black juga or smooth river juga	Pleuroceridae		A prosobranch snail that has retained the ancestral gilled oxygen uptake and thus requires clean, well oxygenated waters (Sturm et al. 2006).	Attached to rocks or woody debris in flowing water or edgewater receiving spring inflow

¹Some shells of this species keyed out to *Pisidium adamsi*, but there was considerable variation in shell diagnostic characteristics that limited the efficacy of traditional morphology-based identification.

Table AQ 3-3. Mollusk Abundance by Study Site in the Bypass, Peaking, and Comparison Reaches.

Species		Aquatic Mollusks									
		Bivalves (Mussels and Clams)				Total Number of Live Bivalves	Gastropods (Aquatic Snails)				
		<i>Margaritifera falcata</i>	<i>Pisidium casertanum</i>	<i>Pisidium walkeri</i>	<i>Pisidium</i> species		<i>Ferrissia rivularis</i>	<i>Fossaria obrussa</i>	<i>Juga (Oreobasis) nigrina</i>	<i>Menetus opercularis</i>	<i>Physella gyrina</i>
Middle Fork American River											
Peaking Reach	MF4.8		1 shell			0					
	MF 9.1	1 live				1					
	MF14.1	2 live ¹				2					6 live
	MF19.1		2 shells			0					
	MF24.1					0				5 live	2 live
Tributary	Otter Creek	shell fragments				0				1 live	> 500 live
Bypass Reach	MF26.2			3 live	1 shell	3	4 live, 3 shells				15 - 30 live
	MF36.2					0			> 500 live	1 live	
	MF44.7				5 live, 2 shells	5					
Reservoir Inlet	MF51.8				1 shell	0					
Number of Live Specimens		1	0	3	5		4	0	> 500	7	> 500
Rubicon River											
Rubicon River Bypass Reach	R3.5	shell fragments ²				0	2 live			3 live	> 500 live
	R20.9					0			20 - 30 live	5 live	
	R25.7				2 live	2				3 live	
Reservoir Inlet	R36.2					0					
	FLC					0					
Number of Live Specimens		0	0	0	2		2	0	20 - 30	11	> 500
Long Canyon Creek											
Downstream of Diversions (Div)	LC0.0	1 live ³				1	1 live			1 live	> 500 live
	LC9.0				10 live, 10 shells	10				20 - 30 live	
	NFLC1.9				1 live	1				3 live, 6 shells	
	SFLC2.3				5 live, 2 shells	5				2 live, 3 shells	
Upstream of Div	NFLC3.8					0					
	SFLC4.2				1 live	1				4 live	
Number of Live Specimens		1	0	0	16		0	0	0	30 - 40	0

Table AQ 3-3. Mollusk Abundance by Study Site in the Bypass, Peaking, and Comparison Reaches.

Species		Aquatic Mollusks									
		Bivalves (Mussels and Clams)				Total Number of Live Bivalves	Gastropods (Aquatic Snails)				
		<i>Margaritifera falcata</i>	<i>Pisidium casertanum</i>	<i>Pisidium walkeri</i>	<i>Pisidium</i> species		<i>Ferrissia rivularis</i>	<i>Fossaria obrussa</i>	<i>Juga (Oreobasis) nigrina</i>	<i>Menetus opercularis</i>	<i>Physella gyrina</i>
Duncan Creek											
Downstream of Div	D6.3					0					
Upstream of Div	D9.0					0					
Number of Live Specimens		0	0	0	0		0	0	0	0	0
Comparison Rivers											
North Fork of Middle Fork American River	NFMF0.0	shell fragments ⁴				0	6 live				> 1000 live
	NFMF2.3					0	5 live		30 - 40 live		> 1000 live
North Fork of American River	NF31.3	5 live				5		30 - 40 live			20 - 30 live
Number of Live Specimens		5	0	0	0		11	30 - 40	30 - 40	0	> 2000

¹Incidental sightings near Otter Creek confluence in 2007.

²Incidental sighting of shells downstream of the Long Canyon Creek confluence in 2007.

³Incidental sighting of one live specimen in 2007.

⁴Incidental sighting upstream of the Middle Fork American River confluence in 2007.

Total Number of Live Gastropods
0
0
6
0
7
> 500
19 - 34
> 500
0
0
> 500
25 - 35
3
0
0
> 500
20 - 30
3
2
0
4

Total Number of Live Gastropods
0
0
> 1000
> 1000
50 - 70

Table AQ 3-4. Aquatic Mollusk Diversity by Study Site in the Bypass, Peaking, and Comparison Reaches.

Species	Aquatic Mollusks													
	Bivalves (Mussels and Clams)				Number of Bivalve Species per Site	Gastropods (Aquatic Snails)					Number of Gastropod Species per Site	Total Number of Species per Site	Total Number of Species per Reach	
	<i>Margaritifera falcata</i>	<i>Pisidium casertanum</i>	<i>Pisidium walkeri</i>	<i>Pisidium</i> species		<i>Ferrissia rivularis</i>	<i>Fossaria obrussa</i>	<i>Juga (Oreobasis) nigrina</i>	<i>Menetus opercularis</i>	<i>Physella gyrina</i>				
Middle Fork American River														
Peaking Reach	MF4.8		O		1						0	1	4	
	MF 9.1	X			1						0	1		
	MF14.1	X			1					X	1	2		
	MF19.1		O		1						0	1		
	MF24.1				0				X	X	2	2		
Tributary	Otter Creek	O			1				X	X	2	3	3	
Bypass Reach	MF26.2			X	O	2	X			X	2	4	6	
	MF36.2					0		X	X	X	2	2		
	MF44.7				X	1					0	1		
Reservoir Inlet	MF51.8				O	1					0	1	1	
Number of Sites		3	2	1	3		1	0	1	3	4			
Rubicon River														
Rubicon River	R3.5	O				1	X			X	X	3	4	6
	R20.9					0			X	X		2	2	
Bypass Reach	R25.7			X		1			X		1	2		
Reservoir Inlet	R36.2					0					0	0	0	
	FLC					0					0	0	0	
Number of Sites		1	0	0	1		1	0	1	3	1			
Long Canyon Creek														
Downstream of Diversions (Div)	LC0.0	X				1	X			X	X	3	4	5
	LC9.0				X	1				X		1	2	
	NFLC1.9				X	1				X		1	2	
	SFLC2.3				X	1				X		1	2	
Upstream of Div	NFLC3.8					0						0	0	0
	SFLC4.2				X	1				X		1	2	2
Number of Sites		1	0	0	4		1	0	0	5	1			
Duncan Creek														
Downstream of Div	D6.3					0						0	0	0
Upstream of Div	D9.0					0						0	0	0
Number of Sites		0	0	0	0		0	0	0	0	0			
Comparison Rivers														
North Fork of Middle Fork American River	NFMF0.0	O				1	X				X	2	3	4
	NFMF2.3					0	X		X		X	3	3	
North Fork of American River	NF31.3	X				1		X			X	2	3	3
Number of Sites		2	0	0	0		2	1	1	0	3			
Total in Study Area		7	2	1	8		5	1	3	11	9			

Notes:

X – Indicates sites where live specimens were found

O – Indicates sites where only shells were found

Bolded O or X indicates incidental sightings by other researchers during the 2007 aquatic studies