

Table AQ 6-1. Tributaries Surveyed at Their Confluence with the Project Mainstem Rivers.

River and River Mile on Mainstem River	Surveyed Tributary
Middle Fork American River	
RM 6.4	American Canyon Creek
RM 9.3	Gas Canyon Creek
	Todd Valley Creek
RM 11.0	Canyon Creek
RM 14.1	Otter Creek
RM 17.0	Jesse Creek
RM 18.1	Pond Creek
RM 18.5	Dardanelles Creek
RM 19.5	Snyder Canyon Creek
RM 21.0	Volcano Canyon Creek
RM 24.1	North Fork of the Middle Fork American River
RM 30.4	Brushy Canyon Creek
RM 39.7	Duncan Creek
Rubicon River	
RM 3.5	Long Canyon Creek
RM 5.2	Pilot Creek
RM 22.6	South Fork Rubicon River
Long Canyon Creek	
RM 5.6	Wallace Creek

FINAL

Table AQ 6-2. Summary of Fish Species Observed¹ during the 2007–2008 Fish Population Sampling (●).

Study Site	Fish Species ²														
	RBT	BNT	HH	SPM	MXD	SS	SCULP	SD	CAR	SMB	GSUN	KOK	TCB	LKT	WCF
Middle Fork American River Downstream of Ralston Afterbay															
Fish MF4.8	●	●			●	●	●								
MFAR at RM 4.8				●		●	●								
Fish MF14.1	●	●				●	●								
Otter Creek at MF14.1	●		●	●	●	●	●		●						
Gas Canyon	●	●					●								
Fish MF23.5	●	●			●										
MFAR at RM 23.5	●	●	●	●		●	●								
Middle Fork American River from Middle Fork Interbay to Ralston Afterbay															
Fish MF26.2	●	●	●	●	●	●	●	●	●						
MFAR at RM26.2	●	●	●	●	●	●	●	●	●						
MFAR at RM26.6	●	●													
MFAR at RM29.4	●	●													
Middle Fork American River Upstream of Middle Fork Interbay															
Fish MF36.2	●	●													
Fish MF44.7	●	●													
Fish MF51.8	●	●													
Rubicon River															
Rubicon River RM 0.0–0.5	●		●	●	●	●	●	●	●						
Rubicon at RM 3.5	●	●	●	●	●				●						
Fish R 3.5	●	●		●	●	●	●	●	●						
Rubicon River at RM 5.2	●	●	●	●	●				●						
Rubicon River at RM 6.2	●	●	●	●					●						
Rubicon River at RM 8.0	●	●		●					●						
Rubicon River at RM 9.9	●	●							●						
Rubicon River at RM 14.3	●	●							●						
Fish R20.9	●	●				●									
Fish R25.7	●	●													
Fish R36.2	●	●						●							
Long Canyon Creek															
LC at RM 0.2	●	●	●	●					●						
Fish LC9.0	●														
North Fork Long Canyon Creek															
Fish NFLC1.9	●														
Fish NFLC3.8	●														
NFLC RM 3.6–5.0	●														

FINAL

**Table AQ 6-2. Summary of Fish Species Observed¹ during the 2007 2008 Fish Population Sampling (●)
(continued).**

Study Site	Fish Species ²														
	RBT	BNT	HH	SPM	MXD	SS	SCULP	SD	CAR	SMB	GSUN	KOK	TCB	LKT	WCF
South Fork Long Canyon Creek															
Fish SFLC2.3	●														
Fish SFLC4.2	●														
SFLC RM 5.7– 9.4	●														
Duncan Creek															
Fish D6.3	●	●													
Fish D8.3	●	●													
Fish D9.0	●	●													
Fish D10.0	●	●													
Duncan Creek RM9.0 - 13.6	●	●													
North Fork of the Middle Fork American River															
NFMF at RM 0.2	●	●	●	●					●						
Fish NFMF2.3	●			●		●	●	●	●						
North Fork American River															
Fish NF18.4	●	●				●	●								
Fish NF31.3	●			●	●	●	●			●	●				
NF at RM 31.3	●		●	●		●	●			●	●				●
Fish NF53.7	●			●	●	●	●	●	●						
Diversion Pools															
NFLC	dry														
SFLC	●														
Duncan	●	●													
Reservoirs															
Ralston	●	●	●	●		●									
Interbay	●	●													
French Meadows	●	●										●	●		
Hell Hole	●	●				●						●	●	●	

¹Refer to PCWA (2008) for details on the site locations, sampling methods, and additional results of the 2007AQ 2 - Fish Population studies.

²Species: RBT = Rainbow Trout; BNT = Brown Trout; HH = Hardhead; SPM = Sacramento Pike Minnow; MXD = Mixed Minnow; SS = Sacramento Sucker; SCULP = Sculpin; SD = Speckled Dace; CAR = California Roach; SMB = Smallmouth Bass; GSUN = Green Sunfish; KOK = Kokanee; TCB = Tui Chub; LKT = Lake Trout; WCF = White Catfish

³RM = River Mile

Table AQ 6-3. Instream Channel Features that Present Potential Fish Passage Barriers.

Barrier ID	River Mile	Barrier Assessment ¹	Barrier Class	Physical Characteristics at Low Flows				Passable at Low Flows		Barrier Limitation ⁷	Passable at Higher Flows	Comments
				Height ² (ft)	Horizontal Distance or Length (ft) (Measured or Calculated) ³	Depth ⁴ (ft)	Water Velocity ⁵ (ft/s)	Trout	Minnows ⁶			
Middle Fork American River Downstream of Ralston Afterbay												
Ruck-a-Chucky Falls - MF10.7a	MF10.7	2007 Survey	Falls	18.0	1.0	4.0	-	NO	NO	FH	NO	Complex falls system.
Ruck-a-Chucky Falls - MF10.7b	MF10.7	2007 Survey	Falls	3.0	1.0	3.0	-	NO	NO	FH	NO	Complex falls system.
Ruck-a-Chucky Falls - MF10.7c	MF10.7	2007 Survey	Falls	8.0	1.0	1.0	-	NO	NO	FH	NO	Complex falls system.
Ruck-a-Chucky Falls - MF10.7d	MF10.7	2007 Survey	Falls	4.0	1.0	1.0	-	NO	NO	FH	NO	Complex falls system.
Ruck-a-Chucky Falls - MF10.7e	MF10.7	2007 Survey	Falls	6.0	1.0	1.0	-	NO	NO	FH	NO	Complex falls system.
Ruck-a-Chucky Falls - MF10.7f	MF10.7	2007 Survey	Falls	3.0	1.0	2.0	-	NO	NO	FH	NO	Complex falls system.
Ruck-a-Chucky Falls - MF10.7g	MF10.7	2007 Survey	Falls	3.0	1.0	3.0	-	NO	NO	FH	NO	Complex falls system.
Tunnel Chute - MF22.9b	MF22.9	2007 Survey	Falls	2.0	3.5	1.5	3.5	NO	NO	FH	NO	
Tunnel Chute - MF22.9e	MF22.9	2007 Survey	Falls	2.3	5.1	1.9	4.0	NO	NO	FH	NO	
Middle Fork American River from Ralston Afterbay to Middle Fork Interbay												
Plunge Pool above Ralston Afterbay - MF26.4	MF26.4	2007 Survey	Falls	8.5	8.8	4.5	4.1	NO	NO	FH	NO	
Instream Barrier Qual - MF26.6a	MF26.6	Aerial Survey	Falls	-	-	-	-	NO	NO	FH	NO	Evaluated from helicopter and photos.
Instream Barrier Qual - MF26.6b	MF26.6	Aerial Survey	Falls	-	-	-	-	NO	NA	FH	NO	Evaluated from helicopter and photos.
Instream Barrier Qual - MF26.6c	MF26.6	Aerial Survey	Falls	-	-	-	-	NO	NA	FH	NO	Evaluated from helicopter and photos.
Instream Barrier Qual - MF26.6d	MF26.6	Aerial Survey	Falls	-	-	-	-	Potential	NA	FH	Potential	Evaluated from helicopter and photos.
Instream Barrier Qual - MF26.6e	MF26.6	Aerial Survey	Falls	-	-	-	-	Potential	NA	FH	Potential	Evaluated from helicopter and photos.
Middle Fork American River Upstream of Middle Fork Interbay												
Plunge Pool above Middle Fork Interbay - MF36.3	MF36.3	2007 Survey	Falls	4.0	3.0	-	-	NO	NA	FH	NO	
Instream Barrier - MF44.6	MF44.6	2006 Survey	Falls	3.5	1.0	1.8	-	NO	NA	FH	Potential	
Instream Barrier - MF44.7	MF44.7	2006 Survey	Falls	3.5	1.0	1.3	-	NO	NA	FH	Potential	
Instream Barrier - MF44.8	MF44.8	2006 Survey	Falls	2.2	1.0	3.6	-	NO	NA	FH	Potential	
Instream Barrier - MF44.9a	MF44.9	2006 Survey	Falls	4.0	1.0	6.0	-	NO	NA	FH	Potential	
Instream Barrier - MF44.9b	MF44.9	2006 Survey	Falls	6.0	1.0	3.0	-	NO	NA	FH	Potential	
Instream Barrier - MF45.2a	MF45.2	2006 Survey	Falls	3.0	1.0	3.8	-	NO	NA	FH	Potential	
Instream Barrier - MF45.2b	MF45.2	2006 Survey	Falls	6.0	1.0	3.3	-	NO	NA	FH	Potential	
Instream Barrier - MF45.3	MF45.3	2006 Survey	Falls	7.0	1.0	2.0	-	NO	NA	FH	Potential	
Instream Barrier - MF45.4	MF45.4	2006 Survey	Falls	3.0	1.0	2.5	-	NO	NA	FH	Potential	
Instream Barrier - MF57.9	MF57.9	2008 Survey	Falls	9.4	2.5	1.4	-	NO	NA	FH LD	NO	8 miles upstream of French Meadows Reservoir.
Rubicon River												
Cascade below Long Canyon Confluence - R3.4a	R3.4	2007 Survey	Falls	2.2	2.4	3.6	1.9	NO	NO	FH	Potential	
Cascade below Long Canyon Confluence - R3.4b	R3.4	2007 Survey	Falls	2.1	0.9	1.3	3.1	Potential	NO	FH	Potential	
Instream Barrier Qual - R3.9	R3.9	Aerial Survey	Falls	-	-	-	-	Potential	Potential	FH	Potential	Evaluated from helicopter and photos.
Instream Barrier Qual - R4.2	R4.2	Aerial Survey	Falls	-	-	-	-	Potential	Potential	FH	Potential	Evaluated from helicopter and photos.
Instream Barrier Qual - R4.5	R4.5	Aerial Survey	Falls	-	-	-	-	Potential	Potential	FH	Potential	Evaluated from helicopter and photos.
Instream Barrier Qual - R4.6	R4.6	Aerial Survey	Falls	-	-	-	-	Potential	Potential	FH	Potential	Evaluated from helicopter and photos.
Instream Barrier Qual - R4.7	R4.7	Aerial Survey	Falls	-	-	-	-	Potential	Potential	FH	Potential	Evaluated from helicopter and photos.
Instream Barrier Qual - R5.1	R5.1	Aerial Survey	Falls	-	-	-	-	Potential	Potential	FH	Potential	Evaluated from helicopter and photos.
Instream Barrier Qual - R6.0	R6.0	Aerial Survey	Falls	5.0	-	-	-	NO	NO	FH	Potential	Evaluated from helicopter and photos.
Instream Barrier Qual - R6.1	R6.1	Aerial Survey	Falls	-	-	-	-	Potential	Potential	FH	Potential	Evaluated from helicopter and photos.
Instream Barrier Qual - R7.7b	R7.7	Aerial Survey	Falls	-	-	-	-	Potential	Potential	FH	Potential	Evaluated from helicopter and photos.
Instream Barrier Qual - R7.8	R7.8	Aerial Survey	Falls	-	-	-	-	Potential	Potential	FH	Potential	Evaluated from helicopter and photos.
Instream Barrier Qual - R7.9	R7.9	Aerial Survey	Chute	-	-	-	-	Potential	Potential	CV	Potential	Evaluated from helicopter and photos.
Instream Barrier Qual - R8.0	R8.0	Aerial Survey	Falls	-	-	-	-	Potential	Potential	FH	Potential	Evaluated from helicopter and photos.

Table AQ 6-3. Instream Channel Features that Present Potential Fish Passage Barriers (continued).

Barrier ID	River Mile	Barrier Assessment ¹	Barrier Class	Physical Characteristics at Low Flows				Passable at Low Flows		Barrier Limitation ⁷	Passable at Higher Flows	Comments
				Height ² (ft)	Horizontal Distance or Length (ft) (Measured or Calculated) ³	Depth ⁴ (ft)	Water Velocity ⁵ (ft/s)	Trout	Minnows ⁶			
Rubicon River												
Instream Barrier Qual - R8.2	R8.2	Aerial Survey	Falls	8.0	-	-	-	NO	NO	FH	Potential	Evaluated from helicopter and photos.
Instream Barrier Qual - R8.7	R8.7	Aerial Survey	Falls	-	-	-	-	Potential	NA	FH	Potential	Evaluated from helicopter and photos.
Instream Barrier Qual - R8.8	R8.8	Aerial Survey	Falls	-	-	-	-	Potential	NA	FH	Potential	Evaluated from helicopter and photos.
Instream Barrier Qual - R8.9	R8.9	Aerial Survey	Falls	-	-	-	-	Potential	NA	FH	Potential	Evaluated from helicopter and photos.
Instream Barrier Qual - R9.7	R9.7	Aerial Survey	Falls	-	-	-	-	Potential	NA	FH	Potential	Evaluated from helicopter and photos.
Instream Barrier Qual - R9.8	R9.8	Aerial Survey	Falls	-	-	-	-	Potential	NA	FH	Potential	Evaluated from helicopter and photos.
Instream Barrier Qual - R10.2	R10.2	Aerial Survey	Falls	-	-	-	-	Potential	NA	FH	Potential	Evaluated from helicopter and photos.
Instream Barrier Qual - R10.7	R10.7	Aerial Survey	Falls	-	-	-	-	Potential	NA	FH	Potential	Evaluated from helicopter and photos.
Instream Barrier Qual - R10.8	R10.8	Aerial Survey	Falls	-	-	-	-	Potential	NA	FH	Potential	Evaluated from helicopter and photos.
Instream Barrier Qual - R11.2a	R11.2	Aerial Survey	Falls	-	-	-	-	Potential	NA	FH	Potential	Evaluated from helicopter and photos.
Instream Barrier Qual - R11.2b	R11.2	Aerial Survey	Falls	-	-	-	-	Potential	NA	FH	Potential	Evaluated from helicopter and photos.
Instream Barrier Qual - R11.8	R11.8	Aerial Survey	Falls	-	-	-	-	Potential	NA	FH	Potential	Evaluated from helicopter and photos.
Instream Barrier Qual - R12.2	R12.2	Aerial Survey	Falls	-	-	-	-	Potential	NA	FH	Potential	Evaluated from helicopter and photos.
Instream Barrier Qual - R12.6	R12.6	Aerial Survey	Falls	-	-	-	-	Potential	NA	FH	Potential	Evaluated from helicopter and photos.
Instream Barrier Qual - R13.0	R13.0	Aerial Survey	Falls	-	-	-	-	Potential	NA	FH	Potential	Evaluated from helicopter and photos.
Instream Barrier Qual - R13.2	R13.2	Aerial Survey	Falls	-	-	-	-	Potential	NA	FH	Potential	Evaluated from helicopter and photos.
Instream Barrier - R14.2	R14.2	2006 Survey	Falls	6.0	1.0	2.9	-	NO	NA	FH	Potential	
Instream Barrier Qual - R14.6	R14.6	Aerial Survey	Falls	-	-	-	-	Potential	NA	FH	Potential	Evaluated from helicopter and photos.
Instream Barrier Qual - R14.9	R14.9	Aerial Survey	Falls	-	-	-	-	Potential	NA	FH	Potential	Evaluated from helicopter and photos.
Instream Barrier - R15.0a	R15.0	2006 Survey	Chute	-	5.0	0.3	-	Potential	NA	CV	Potential	Bedrock sheet.
Instream Barrier - R15.0b	R15.0	2006 Survey	Falls	4.0	1.0	7.0	-	NO	NA	FH	Potential	
Instream Barrier Qual - R15.3	R15.3	Aerial Survey	Falls	-	-	-	-	NO	NA	FH	NO	Evaluated from helicopter and photos. Large falls and bedrock sheet.
Sedimentation from Dam Failure Event - R28.9	R28.9	Aerial Survey	Dry	-	-	-	-	NO	NA	RD	Potential	
Instream Barrier - R35.8c	R35.8	2007 Survey	Falls	8.0	-	0.0	-	NO	NA	FH PD	No	Above Hell Hole Reservoir high water mark.
Instream Barrier - R35.8d	R35.8	2007 Survey	Chute	-	8.0	1.0	-	NO	NA	PD	No	Above Hell Hole Reservoir high water mark.
Instream Barrier - R35.8e	R35.8	2007 Survey	Falls	10.0	-	8.0	-	NO	NA	FH	No	Above Hell Hole Reservoir high water mark.
Long Canyon Creek												
Instream Barrier - LC0.2b	LC0.2	2006 Survey	Falls	3.0	1.0	6.6	-	NO	NO	FH	Potential	
Instream Barrier - LC0.2c	LC0.2	2006 Survey	Falls	4.5	1.0	0.5	-	NO	NA	FH PD	Potential	
Instream Barrier - LC6.0	LC6.0	2006 Survey	Falls	7.0	1.0	3.5	-	NO	NA	FH	Potential	
Instream Barrier - LC6.2	LC6.2	2006 Survey	Falls	3.0	1.0	0.4	-	NO	NA	FH PD	Potential	
Instream Barrier - LC6.4	LC6.4	2006 Survey	Falls	5.0	1.0	0.5	-	NO	NA	FH PD	Potential	
Instream Barrier - LC6.5	LC6.5	2006 Survey	Falls	4.0	1.0	2.0	-	NO	NA	FH	Potential	
Instream Barrier - LC6.7	LC6.7	2006 Survey	Falls	3.0	1.0	0.5	-	NO	NA	FH PD	Potential	
Instream Barrier - LC6.8	LC6.8	2006 Survey	Falls	3.5	1.0	0.1	-	NO	NA	FH PD	Potential	
Instream Barrier - LC6.9a	LC6.9	2006 Survey	Falls	4.0	1.0	2.0	-	NO	NA	FH FH	Potential	
Instream Barrier - LC6.9b	LC6.9	2006 Survey	Falls	4.5	1.0	1.5	-	NO	NA	FH PD	Potential	
Instream Barrier - LC8.2a	LC8.2	2006 Survey	Falls	3.0	1.0	0.7	-	NO	NA	FH	Potential	
Instream Barrier - LC8.2b	LC8.2	2006 Survey	Falls	4.0	1.0	4.0	-	NO	NA	FH	Potential	
Instream Barrier - LC9.1a	LC9.1	2006 Survey	Falls	4.0	1.0	4.0	-	NO	NA	FH	Potential	
Instream Barrier - LC9.1b	LC9.1	2006 Survey	Falls	5.0	1.0	3.0	-	NO	NA	FH	Potential	
Instream Barrier - LC9.8	LC9.8	2006 Survey	Falls	4.0	1.0	2.2	-	NO	NA	FH	Potential	
Instream Barrier - LC11.0	LC11.0	2006 Survey	Falls	9.0	1.0	6.5	-	NO	NA	FH	Potential	
Instream Barrier - LC11.2a	LC11.2	2006 Survey	Chute	-	-	-	-	NO	NA	CD CV	Potential	
Instream Barrier - LC11.2b	LC11.2	2006 Survey	Falls	2.2	1.0	1.0	-	NO	NA	FH	Potential	
Instream Barrier - LC11.4	LC11.4	2006 Survey	Falls	3.0	1.0	0.3	-	NO	NA	FH PD	Potential	

Table AQ 6-3. Instream Channel Features that Present Potential Fish Passage Barriers (continued).

Barrier ID	River Mile	Barrier Assessment ¹	Barrier Class	Physical Characteristics at Low Flows				Passable at Low Flows		Barrier Limitation ⁷	Passable at Higher Flows	Comments
				Height ² (ft)	Horizontal Distance or Length (ft) (Measured or Calculated) ³	Depth ⁴ (ft)	Water Velocity ⁵ (ft/s)	Trout	Minnows ⁶			
North Fork Long Canyon Creek												
Instream Barrier - NFLC0.1	NFLC0.1	2006 Survey	Falls	6.0	1.0	2.2	-	NO	NA	FH	Potential	
Instream Barrier - NFLC0.7	NFLC0.7	2006 Survey	Falls	2.4	1.0	0.1	-	NO	NA	FH PD	Potential	
Instream Barrier - NFLC0.9	NFLC0.9	2006 Survey	Falls	2.5	1.0	0.8	-	NO	NA	FH PD	Potential	
Instream Barrier - NFLC1.6	NFLC1.6	2006 Survey	Falls	3.0	1.0	0.7	-	NO	NA	FH PD	Potential	
Instream Barrier - NFLC1.7	NFLC1.7	2006 Survey	Falls	2.0	1.0	1.4	-	Potential	NA	FH	Potential	Total barrier at low flows.
Instream Barrier - NFLC4.0	NFLC4.0	2006 Survey	Falls	2.9	1.0	1.4	-	NO	NA	FH	Potential	
South Fork Long Canyon Creek												
Instream Barrier - SFLC0.7	SFLC0.7	2006 Survey	Falls	6.5	1.0	4.5	-	NO	NA	FH	Potential	10' drop over 22' feet of cascades.
Instream Barrier - SFLC0.8	SFLC0.8	2006 Survey	Chute	-	13.0	-	-	NO	NA	CD CV	Potential	Bedrock sheet. Evaluated from photos.
Instream Barrier - SFLC1.4a	SFLC1.4	2006 Survey	Falls	2.0	1.0	-	-	Potential	NA	FH	Potential	Total barrier at low flow.
Instream Barrier - SFLC1.4b	SFLC1.4	2006 Survey	Falls	2.0	1.0	-	-	Potential	NA	FH	Potential	Total barrier at low flow.
Plunge Pool below South Fork Long Canyon Diversion Dam - SFLC3.2a	SFLC3.2	2007 Survey	Chute	-	25.0	0.1	6.8	NO	NA	CD CV	NO	Downstream start of large barrier sequence.
Plunge Pool below South Fork Long Canyon Diversion Dam - SFLC3.2b	SFLC3.2	2007 Survey	Falls	3.3	1.6	2.1	6.8	NO	NA	FH LD	NO	
Plunge Pool below South Fork Long Canyon Diversion Dam - SFLC3.2c	SFLC3.2	2007 Survey	Chute	-	18.0	0.1	6.8	NO	NA	CD CV	NO	Chute flows directly into lower falls - no plunge pool.
Plunge Pool below South Fork Long Canyon Diversion Dam - SFLC3.2d	SFLC3.2	2007 Survey	Falls	1.4	0.8	1.4	1.5	Potential	NA	FH LD	NO	Upstream-most measured barrier in sequence - smaller chutes and falls continue upstream.
Natural dewatered section above South Fork Long Canyon Diversion Dam	SFLC3.6-4.0	2006 Survey	Dry	-	-	-	-	NO	NA	RD	Yes	Recent landslide event has created subterranean flow
Duncan Creek												
Instream Barrier - D4.4	D4.4	2006 Survey	Falls	2.7	1.0	1.7	-	NO	NA	FH	Potential	
Instream Barrier - D6.3	D6.3	2006 Survey	Falls	2.5	1.0	2.4	-	NO	NA	FH	Potential	
Instream Barrier - D6.4	D6.4	2006 Survey	Falls	2.0	1.0	3.0	-	Potential	NA	FH	Potential	
Instream Barrier - D6.8	D6.8	2006 Survey	Falls	1.5	1.0	1.6	-	Potential	NA	FH	Potential	
Instream Barrier - D7.2	D7.2	2006 Survey	Falls	1.7	1.0	0.9	-	Potential	NA	FH PD	Potential	
Instream Barrier - D8.2	D8.2	2006 Survey	Falls	-	-	-	-	Potential	NA	FH	Potential	
Instream Barrier - D8.4a	D8.4	2006 Survey	Falls	2.0	1.0	1.0	-	Potential	NA	FH	Potential	
Instream Barrier - D8.4b	D8.4	2006 Survey	Falls	2.0	1.0	1.1	-	Potential	NA	FH	Potential	
Instream Barrier - D9.0a	D9.0	2006 Survey	Falls	2.5	1.0	1.2	-	NO	NA	FH	Potential	
Bedrock section above Duncan Diversion Dam - D9.0b	D9.0	2007 Survey	Chute	-	8.0	0.2	4.0	Potential	NA	CD	Potential	Measurement taken at bottom chute in a series of 3 similar chutes.
Bedrock section above Duncan Diversion Dam - D9.1a	D9.1	2007 Survey	Chute	-	4.7	0.2	5.0	Potential	NA	CD	Potential	
Bedrock section above Duncan Diversion Dam - D9.1b	D9.1	2007 Survey	Falls	3.6	3.9	0.1	1.9	NO	NA	FH	Potential	Falls spill onto bedrock. Falls are split, measurements are from the channel with the most flow.

¹Barriers visited during 2007 barrier surveys were assessed following the methods of Powers and Orsborn (1985) and Thompson (1972). Barriers visited in 2006 were assessed following the 2006 Aquatic Mesohabitat Mapping Technical Study Plan (PCWA 2006).

²Height of vertical barrier for falls.

³Horizontal leap distance required to clear falls or swimming length of chutes. The horizontal distance of falls was not assessed during the 2006 Aquatic Mapping. In these cases, the fish length applied to the leaping equation was used for the horizontal distance.

⁴Plunge pool depth for falls, depth of water in chutes, or average depth within critical riffles.

⁵Velocity at crest of falls, water velocity in chutes, or average velocity within critical riffles.

⁶"Minnows" include hardhead, Sacramento pikeminnow, and Sacramento sucker. Distribution was assumed to be limited to the Middle Fork American River downstream of the impassable barrier at river mile 26.6 and the Rubicon River downstream of the impassable barrier at river mile 8.2.

⁷RD = riffle depth; RV = riffle velocity; PD = plunge pool depth; LD = landing depth; LV = landing velocity; FH = falls height; CV = chute velocity and length; CD = chute depth; Turb = turbidity.

Table AQ 6-4. Infrastructure Facilities that Present Potential Fish Passage Barriers.

Barrier ID	River Mile	Barrier Class	Barrier Assessment ¹	Physical Characteristics at Low Flows				Passable at Low Flows		Barrier Limitation ⁷	Passable at Higher Flow	Comments
				Height ² (ft)	Horizontal Distance or Length (ft) (Measured or Calculated) ³	Depth ⁴ (ft)	Water Velocity ⁵ (ft/s)	Trout	Minnows ⁶			
Middle Fork American River Downstream of Ralston Afterbay												
Ralston Afterbay Dam	MF24.7	Falls	2007 Survey	89.0	-	-	-	NO	NO	FH	NO	
Middle Fork American River from Ralston Afterbay to Middle Fork Interbay												
Abandoned Weir below Middle Fork Interbay	MF35.5	Falls	2007 Survey	6.7	7.3	1.6	2.2	NO	NA	FH Turb	NO	Deterioration of the weir allows some water to flow through.
Middle Fork Interbay Dam	MF35.6	Falls	2007 Survey	70.5	0.1	6.0	0.5	NO	NA	FH LD	NO	Measurements taken at skirt along the base of the dam.
Middle Fork American River Upstream of Middle Fork Interbay												
Weir with Gage below French Meadows Dam	MF46.6	Falls	2007 Survey	0.1	4.8	2.8	-	Potential	NA	FH	YES	Observed at high flows, weir inundated.
French Meadows Dam	MF47.2	Falls	2007 Survey	231.0	-	-	-	NO	NA	FH	NO	
Rubicon River												
Hell Hole Dam	R30.5	Falls	2007 Survey	410.0	-	-	-	NO	NA	FH	NO	
North Fork Long Canyon Creek												
River Crossing of Hell Hole - Middle Fork Tunnel	NFLC0.6	Falls	2007 Survey	9.3	0.1	1.0	0.4	NO	NA	FH LD	NO	Minimal water spilling over top of barrier.
Cascade below weir below Diversion Dam - NFLC3.1	NFLC3.1	Falls	2007 Survey	3.8	1.3	0.6	1.3	NO	NA	FH PD LD	Potential	Cascade covered by cement from weir. Measurements made on accessible features.
North Fork Long Canyon Diversion Dam	NFLC3.1	Falls	2007 Survey	10.0	-	-	-	NO	NA	FH	NO	
South Fork Long Canyon Creek												
South Fork Long Canyon Diversion Dam	SFLC3.3	Falls	2007 Survey	27.0	-	-	-	NO	NA	FH	NO	
Road Crossing to Campground above Diversion Dam	SFLC3.5	Chute	2006 Survey	-	15.0	0.1	-	NO	NA	CD	NO	
Duncan Creek												
Duncan Diversion Dam	D8.6	Falls	2007 Survey	32.0	-	-	-	NO	NA	FH	NO	
Weir at Gage above Duncan Diversion Dam	D8.8	Falls	2007 Survey	0.7	1.2	1.3	1.0	Potential	NA	FH	YES	

¹Barriers visited during 2007 barrier surveys were assessed following the methods of Powers and Orsborn (1985) and Thompson (1972). Barriers visited in 2006 were assessed following the 2006 Aquatic Mesohabitat Mapping Technical Study Plan (PCWA 2006).

²Height of vertical barrier for falls.

³Horizontal leap distance required to clear falls or swimming length of chutes. The horizontal distance of falls was not assessed during the 2005-2006 Aquatic Mapping. In these cases, the fish length applied to the leaping equation was used for the horizontal distance.

⁴Plunge pool depth for falls, depth of water in chutes, or average depth within critical riffles.

⁵Velocity at crest of falls, water velocity in chutes, or average velocity within critical riffles.

⁶Minnows* include hardhead, Sacramento pikeminnow, and Sacramento sucker. Distribution was assumed to be limited to the Middle Fork American River downstream of the impassable barrier at river mile 26.6 and the Rubicon River downstream of the impassable barrier at river mile 8.2.

⁷RD = riffle depth; RV = riffle velocity; PD = plunge pool depth; LD = landing depth; LV = landing velocity; FH = falls height; CV = chute velocity and length; CD = chute depth; Turb = turbidity.

Table AQ 6-5. Tributary Confluences that Present Potential Fish Passage Barriers.

Barrier ID	River Mile	Barrier Assessment ¹	Barrier Class	Physical Characteristics at Low Flows					Passable at Low Flows		Barrier Limitation ⁸	Passable at Higher Flows
				Height ² (ft)	Horizontal Distance or Length (ft) (Measured or Calculated) ³	Depth ⁴ (ft)	Water Velocity ⁵ (ft/s)	Elevation Below High Water (ft) ⁶	Trout	Minnows ⁷		
Middle Fork American River Downstream of Ralston Afterbay												
American Canyon Creek - MF6.4	MF6.4	Qualitative Visit	Falls	-	-	-	-	Above High Water	NO	NO	FH	Potential
Gas Canyon Creek - MF9.0a	MF9.0	2007 Survey	Falls	2.2	0.2	0.2	0.8	Above High Water	NO	NO	FH PD	NO
Gas Canyon Creek - MF9.0b	MF9.0	2007 Survey	Falls	1.1	0.8	0.5	1.3	Above High Water	Potential	NO	FH PD LD	Potential
Gas Canyon Creek - MF9.0c	MF9.0	2007 Survey	Falls	1.4	1.4	0.0	1.9	Above High Water	Potential	NO	FH PD LD	Potential
Todd Creek - MF9.6	MF9.6	2007 Survey	Falls	4.8	1.0	1.2	0.0	Above High Water	NO	NO	FH LD	Potential
Canyon Creek - MF11.0a	MF11.0	2007 Survey	Falls	6.0	2.4	0.4	1.8	Above High Water	NO	NO	FH PD	NO
Canyon Creek - MF11.0b	MF11.0	2007 Survey	Chute	-	2.0	0.4	5.4	Above High Water	Potential	Potential	PD	NO
Canyon Creek - MF11.0c	MF11.0	2007 Survey	Falls	0.9	0.7	0.3	5.2	Above High Water	NO	NO	FH PD	NO
Canyon Creek - MF11.0d	MF11.0	2007 Survey	Chute	-	2.3	0.4	3.5	Above High Water	Potential	Potential	LD	Potential
Otter Creek - MF14.1b	MF14.1	2008 Survey	Chute	-	4.5	0.1	6.9	Above High Water	NO	NO	CD PD	Potential
Jesse Canyon Creek - MF17.0a	MF17.0	2007 Survey	Chute	-	5.0	0.1	6.0	Above High Water	NO	NO	LD CD	NO
Jesse Canyon Creek - MF17.0b	MF17.0	2007 Survey	Falls	4.0	1.0	2.0	-	Above High Water	NO	NO	FH	Potential
Jesse Canyon Creek - MF17.0c	MF17.0	2007 Survey	Chute	-	10.0	-	-	Above High Water	NO	NO	CV CD	Potential
Jesse Canyon Creek - MF17.0d	MF17.0	2007 Survey	Chute	-	10.0	-	-	Above High Water	NO	NO	CV CD	Potential
Jesse Canyon Creek - MF17.0e	MF17.0	2007 Survey	Falls	3.0	1.0	-	-	Above High Water	NO	NO	FH	Potential
Pond Creek - MF18.1	MF18.1	Qualitative Visit	Falls	-	-	-	-	Above High Water	NO	NO	FH	NO
Dardanelles Creek - MF18.5	MF18.5	Qualitative Visit	Falls	-	-	-	-	Above High Water	NO	NO	FH	NO
Snyder Canyon Creek - MF19.5	MF19.5	Qualitative Visit	Falls	-	-	-	-	Above High Water	NO	NO	FH	NO
Volcano Canyon Creek - MF20.9a	MF20.9	2007 Survey	Falls	1.0	2.4	0.3	0.8	Above High Water	NO	NO	FH PD	Potential
Volcano Canyon Creek - MF20.9b	MF20.9	2007 Survey	Falls	0.8	2.4	0.8	1.5	Above High Water	Potential	NO	FH PD	Potential
Volcano Canyon Creek - MF20.9d	MF20.9	2007 Survey	Falls	2.3	3.9	0.7	0.5	Above High Water	NO	NO	FH PD	Potential
Volcano Canyon Creek - MF20.9e	MF20.9	2007 Survey	Chute	-	3.5	0.3	3.3	Above High Water	Potential	Potential	PD	Potential
Volcano Canyon Creek - MF20.9f	MF20.9	2007 Survey	Falls	1.4	1.2	0.7	3.1	Above High Water	Potential	NO	FH PD	Potential
Middle Fork American River from Ralston Afterbay to Middle Fork Interbay												
Brushy Canyon Creek - MF30.4	MF30.4	Qualitative Visit	Falls	-	-	-	-	Above High Water	NO	NA	FH	NO
Middle Fork American River Upstream of Middle Fork Interbay												
Duncan Creek - MF39.7a	MF39.7	2007 Survey	Chute	-	5.5	0.2	3.2	Above High Water	Potential	NA	CD	Potential
Duncan Creek - MF39.7b	MF39.7	2007 Survey	Falls	6.4	1.0	2.0	-	Above High Water	NO	NA	FH	NO
Rubicon River												
Long Canyon Creek - R3.6	LC0.2	2007 Survey	Falls	5.0	1.0	3.0	-	Above High Water	NO	NO	FH	NO
Pilot Creek - R5.2b	R5.2	2007 Survey	Falls	1.1	1.8	1.3	3.1	Above High Water	Potential	NO	FH	Potential
Pilot Creek - R5.2c	R5.2	2007 Survey	Falls	1.7	1.0	0.2	3.5	Above High Water	NO	NO	FH PD	Potential
Pilot Creek - R5.2d	R5.2	2007 Survey	Falls	3.9	5.9	2.2	8.0	Above High Water	NO	NO	FH LV	NO
Pilot Creek - R5.2e	R5.2	2008 Survey	Chute	-	6.3	0.3	7.0	Above High Water	Potential	Potential	LD	NO
Pilot Creek - R5.2f	R5.2	2007 Survey	Falls	2.5	4.1	2.1	5.0	Above High Water	NO	NO	FH Turb	NO
South Fork Rubicon River - R22.6	R22.6	Aerial Survey	Falls	-	-	-	-	Above High Water	NO	NA	FH	NO

Table AQ 6-5. Tributary Confluences that Present Potential Fish Passage Barriers (continued).

Barrier ID	River Mile	Barrier Assessment ¹	Barrier Class	Physical Characteristics at Low Flows					Passable at Low Flows		Barrier Limitation ⁸	Passable at Higher Flows
				Height ² (ft)	Horizontal Distance or Length (ft) (Measured or Calculated) ³	Depth ⁴ (ft)	Water Velocity ⁵ (ft/s)	Elevation Below High Water (ft) ⁶	Trout	Minnows ⁷		
Long Canyon Creek												
Wallace Canyon	LC5.6	Qualitative Visit	Falls	-	-	-	-	-	NO	NA	FH FD	NO
North Fork Long Canyon Creek												
No Tributary Barriers		2007 Survey										
South Fork Long Canyon Creek												
No Tributary Barriers		2007 Survey										
Duncan Creek												
No Tributary Barriers		2007 Survey										

¹Barriers visited during 2007 barrier surveys were assessed following the methods of Powers and Orsborn (1985) and Thompson (1972). Barriers visited in 2006 were assessed following the 2006 Aquatic Mesohabitat Mapping Technical Study Plan (PCWA 2006).

²Height of vertical barrier for falls.

³Horizontal leap distance required to clear falls or swimming length of chutes. The horizontal distance of falls was not assessed during the 2006 Aquatic Mapping. In these cases, the fish length applied to the leaping equation was used for the horizontal distance.

⁴Plunge pool depth for falls, depth of water in chutes, or average depth within critical riffles.

⁵Velocity at crest of falls, water velocity in chutes, or average velocity within critical riffles

⁶Elevation is referenced to the high water mark of the mainstem for tributary streams and the full pool elevation for reservoir inlets

⁷"Minnows" include hardhead, Sacramento pikeminnow, and Sacramento sucker. Distribution was assumed to be limited to the Middle Fork American River downstream of the impassable barrier at river mile 26.6 and the Rubicon River downstream of the impassable barrier at river mile 8.2.

⁸RD = riffle depth; RV = riffle velocity; PD = plunge pool depth; LD = landing depth; LV = landing velocity; FH = falls height; CV = chute velocity and length; CD = chute depth; Turb = turbidity.

Comments
Impassable cascade/chute 150' upstream from confluence.
Driver's Flat Road Crossing (non-Project general access road)- 250' from confluence.
Driver's Flat Road Crossing (non-Project general access road)- 250' from confluence.
60' upstream from Driver's Flat Road Crossing.
Falls at Driver's Flat Road Crossing, no water in tributary at time of survey.
80' upstream from confluence with MFAR.
54' upstream from confluence with MFAR.
54' upstream from confluence with MFAR.
54' upstream from confluence with MFAR.
1.5 miles upstream of confluence.
Cascades, no habitat upstream of confluence.
Cascades, no habitat upstream of confluence.
Cascades, no habitat upstream of confluence.
Partially inundated by peaking stage elevation.
30.4' upstream of confluence.
30.4' upstream of confluence.
30.4' upstream of confluence.
30.4' upstream of confluence.
Very high gradient channel with large, narrow falls/cascades within the first 1000'.
Impassable cascade and falls 240' upstream from confluence.
Falls 240' up from MFAR confluence.
Barrier 0.2 miles upstream from confluence.
Barrier 84' upstream from Rubicon confluence.
No standing wave and resting pool provides no location to jump upper falls.
Barrier 222' upstream from Rubicon confluence.
Barrier 222' upstream from Rubicon confluence.
Barrier 222' upstream from Rubicon confluence.
Surveyed from helicopter. Impassable barriers immediately upstream of confluence.

Comments
Falls and cascades upstream of confluence, no habitat available.

Table AQ 6-6. Reservoir Pool Inlets that Present Potential Fish Passage Barriers.

Barrier ID	River Mile	Barrier Assessment ¹	Barrier Class	Physical Characteristics at Low Flows					Passable at Low Flows		Barrier Limitation ⁸	Passable at Higher Flow	Comments
				Height ² (ft)	Horizontal Distance or Length (ft) (Measured or Calculated) ³	Depth ⁴ (ft)	Water Velocity ⁵ (ft/s)	Elevation Below High Water (ft) ⁶	Trout	Minnows ⁷			
Middle Fork American River Downstream of Ralston Afterbay													
No Reservoir Inlet Barriers		2007 Survey											
Middle Fork American River from Ralston Afterbay to Middle Fork Interbay													
No Reservoir Inlet Barriers		2007 Survey											
Middle Fork American River Upstream of Middle Fork Interbay													
No Reservoir Inlet Barriers		2007 Survey											
Middle Fork American River Upstream of French Meadows Reservoir													
No Reservoir Inlet Barriers		2007 Survey											
Rubicon River Upstream of Ralston Afterbay													
No Reservoir Inlet Barriers		2007 Survey											
Rubicon River Upstream of Hell Hole Reservoir													
Hell Hole Reservoir Inlet - R34.5c	R34.5	2007 Survey	Falls	3.0	4.2	2.4	4.9	47.0	NO	NA	FH	No	
Hell Hole Reservoir Inlet - R35.2a	R35.2	2007 Survey	Chute	-	17.5	0.6	7.6	45.0	NO	NA	CV	Potential	
Hell Hole Reservoir Inlet - R35.2b	R35.2	2007 Survey	Chute	-	17.5	1.3	7.0	45.0	NO	NA	CV	Potential	
Hell Hole Reservoir Inlet - R35.8a	R35.8	2007 Survey	Falls	35.0	-	8.0	-	19.0	NO	NA	FH	No	
Hell Hole Reservoir Inlet - R35.8b	R35.8	2007 Survey	Falls	15.0	-	-	-	4.0	NO	NA	FH	No	
Five Lakes Creek - 5L0.2a	5L0.2	2007 Survey	Chute	-	5.5	0.2	4.2	13.0	Potential	NA	CD	Potential	
North Fork Long Canyon Creek													
No Reservoir Inlet Barriers		2007 Survey											
South Fork Long Canyon Creek													
South Fork Long Canyon Diversion Pool Inlet	SFLC3.3	2007 Survey	Critical Riffle	-	-	0.2	1.0	5.1	Potential	NA	RD	Potential	Critical riffle absorbed by diversion pool high water level.
Duncan Creek													
No Reservoir Inlet Barriers		2007 Survey											

¹Barriers visited during 2007 barrier surveys were assessed following the methods of Powers and Orsborn (1985) and Thompson (1972). Barriers visited in 2006 were assessed following the 2006 Aquatic Mesohabitat Mapping Technical Study Plan (PCWA 2006).

²Height of vertical barrier for falls.

³Horizontal leap distance required to clear falls or swimming length of chutes. The horizontal distance of falls was not assessed during the 2006 Aquatic Mapping. In these cases, the fish length applied to the leaping equation was used for the horizontal distance.

⁴Plunge pool depth for falls, depth of water in chutes, or average depth within critical riffles.

⁵Velocity at crest of falls, water velocity in chutes, or average velocity within critical riffles.

⁶Elevation is referenced to the high water mark of the mainstem for tributary streams and the full pool elevation for reservoir inlets.

⁷"Minnows" include hardhead, Sacramento pikeminnow, and Sacramento sucker. Distribution was assumed to be limited to the Middle Fork American River downstream of the impassable barrier at river mile 26.6 and the Rubicon River downstream of the impassable barrier at river mile 8.2.

⁸RD = riffle depth; RV = riffle velocity; PD = plunge pool depth; LD = landing depth; LV = landing velocity; FH = falls height; CV = chute velocity and length; CD = chute depth; Turb = turbidity.