Page

Table 2-1.	Streams survey locations on San Antonio Creek (SAC) and its tributaries, Ventura River, North Fork Matilija Creek (NFMC), and Bear Creek	1
Table 2-2.	Habitat Summary for North Fork Matilija Creek	2
Table 2-3.	Habitat Summary for Bear Creek	2
Table 2-4.	Habitat Summary for San Antonio Creek	2
Table 2-5.	Data Summary for Pools, Riffles (Turbulent) and Runs and Glides (Non-Turbulent) per Reach on North Fork Matilija Creek and Bear Creek	3
Table 2-6.	Data Summary for Pools, Riffles (Turbulent) and Runs and Glides (Non-Turbulent) per Reach on San Antonio Creek	4
Table 3-1.	Known Steelhead Migration Barriers in the Ventura River Watershed on the Mainstem and Key Tributaries [*]	5
Table 3-2.	Summary of Recommended Enhancement Projects within Priority Geographic Areas	9

Table 2-1.Streams survey locations on San Antonio Creek (SAC) and its tributaries,
Ventura River, North Fork Matilija Creek (NFMC), and Bear Creek.

Stream	Location	Description
SAC	Reach A	From Old Cr. Rd. crossing to 3000 ft. upstream
SAC	Reach B	Crown Hill Ranch crossing Fraser Rd. to 4044 ft. upstream
SAC	Reach C	Below Ranch Cielo to Lion Creek confluence 3799 ft. upstream
SAC	Reach D	Below camp Comfort to Bridge 2392 ft. upstream
SAC	Reach E	From Ten-Mile Curve to 1689 ft. upstream
SAC	Spot Checks	Soule Park Golf Course, Hwy 150, Grand Ave.
Senior Cr.	Spot Checks	Ladera Ranch Rd.
Ventura River	Spot Checks	Gravel survey below confluence with San Antonio Creek
Thacher Cr.	Spot Checks	Boardman Rd., Ave. de la Verda, Ave. de la Recreo, Grand Ave., and McAndrew Rd.
Lion Cr.	Spot Checks	Hwy 150 (3 locations)
Reeves Cr.	Spot Checks	Reeves Rd., McNell Rd., and McAndrew Rd.
NFMC	Reach A	Lowest bridge to next bridge upstream 3288 ft.
NFMC	Reach B	Below Wheeler Springs to next bridge upstream 1262 ft.
NFMC	Reach C	Lowest tunnel to next tunnel upstream 3551 ft.
Bear Cr.	Reach D	Hwy 33 bridge to 2594 ft upstream
NFMC	Reach E	Above wheeler campground barrier to 2079 ft. upstream
NFMC	Reach F	Hwy 33 bridge to 1007 ft upstream

Habitat Type	Number of Units	Total Feet of Type	% that Type	Avg. Width	Avg. Depth	Avg. Maximum Depth
Run	12	619	5.5	9.21	0.40	0.75
Riffle	88	5,713	50.7	8.12	0.59	1.18
Pool	73	4,929	43.8	15.23	1.18	2.02
Total	173	11,216	100.0	10.85	0.69	1.32

 Table 2-2.
 Habitat Summary for North Fork Matilija Creek

Table 2-3.Habitat Summary for Bear Creek

Habitat Type	Number of Units	Total Feet of Type	% that Type	Avg. Width	Avg. Depth	Avg. Maximum Depth
Run	6	173	12.0	3.08	0.33	0.50
Riffle	24	3,059	48.0	2.89	0.34	0.62
Pool	20	668	40.0	5.08	0.74	1.20
Total	50	3,900	100	3.68	0.47	0.77

Table 2-4.Habitat Summary for San Antonio Creek

Habitat Type	Number of Units	Total Feet of Type	% that Type	Avg. Width	Avg. Depth	Avg. Maximum Depth
Run	31	3,718	24.9	8.59	0.39	0.71
Riffle	56	7,801	52.1	6.69	0.41	0.65
Pool	44	3,442	23.0	11.12	1.03	1.51
Total	131	14,961	100	8.80	0.61	0.96

Table 2-5.Data Summary for Pools, Riffles (Turbulent) and Runs and Glides (Non-
Turbulent) per Reach on North Fork Matilija Creek and Bear Creek

NON-TURBULENT										
Date	Reach	Habitat Unit	Units/Reach	Total Length (ft)	Unit Proportion (%)	Mean Width (ft.)	Mean Depth (ft.)	Max Depth (ft.)		
2-May-02	А	Runs/Glides	6	343	12.0	13.17	0.48	0.82		
2-May-02	В	Runs/Glides	0	0	0.0	0.00	0.00	0.00		
1-May-02	С	Runs/Glides	3	119	4.7	8.67	0.33	0.63		
30-Apr-02	Bear Cr.	Runs/Glides	6	173	12.0	3.08	0.33	0.50		
29-Apr-02	Е	Runs/Glides	2	129	7.5	9.00	0.50	0.95		
29-Apr-02	F	Runs/Glides	1	28.0	4.0	6.00	0.30	0.60		
				Average	6.70	6.65	0.32	0.58		

TURBULI	ENT							
Date	Reach	Habitat Unit	Units/Reach	Total Length (ft)	Unit Proportion (%)	Mean Width (ft.)	Mean Depth (ft.)	Max Depth (ft.)
2-May-02	А	Riffles	25	1603	48.0	11.46	0.49	1.01
2-May-02	В	Riffles	10	690	56.0	12.40	1.04	2.20
1-May-02	С	Riffles	27	1553	43.7	6.61	0.38	0.71
30-Apr-02	Bear Cr.	Riffles	24	3059	48.0	2.89	0.34	0.62
29-Apr-02	E	Riffles	13	1402	48.1	5.92	0.58	1.14
29-Apr-02	F	Riffles	13	465	52.0	4.19	0.46	0.82
				Average	49.31	7.25	0.55	1.08

SCOUR P	OOL							
Date	Reach	Habitat Unit	Units/Reach	Total Length (ft)	Unit Proportion (%)	Mean Width (ft.)	Mean Depth (ft.)	Max Depth (ft.)
2-May-02	А	Pools	19	1342	40.0	21.61	1.40	2.34
2-May-02	В	Pools	8	572	44.0	16.13	1.40	2.45
1-May-02	С	Pools	33	1953	51.6	15.52	1.16	1.92
30-Apr-02	Bear Cr.	Pools	20	668	40.0	5.08	0.74	1.20
29-Apr-02	Е	Pools	12	548	44.4	13.33	0.97	1.69
29-Apr-02	F	Pools	11	514	44.0	9.55	0.96	1.68
				Average	43.99	13.54	1.11	1.88

Habitat Type Summaries (Entire Creek)						
Habitat Types	Total Feet	Proportion				
Non-Turbulent	792	5.2%				
Turbulent	8772	57.9%				
Scour Pools	5597	36.9%				
Total	15161	100.0%				

	er and Instream Mean &	Mean &
Reach No.	(Range)	(Range)
	Canopy (%)	Cover (%)
А	21.8 (0-70)	32.5 (0-80)
В	6.7 (0-20)	45.6 (10-80)
С	28.6 (0-90)	37.2 (0-80)
Bear Cr.	46.9 (5-80)	27.7 (0-80)
Е	43.0 (10-75)	24.8 (5-40)
F	50.0 (10-90)	25.2 (5-60)

Table 2-6.Data Summary for Pools, Riffles (Turbulent) and Runs and Glides (Non-
Turbulent) per Reach on San Antonio Creek

NON-TURE	NON-TURBULENT										
Date	Reach	Habitat Unit	Units/Reach	Total Length (ft)	Unit Proportion (%)	Mean Width (ft.)	Mean Depth (ft.)	Max Depth (ft.)			
15-May-02	А	Runs/Glides	7	499	18.5	6.50	0.43	0.74			
16-May-02	В	Runs/Glides	12	1740	33.0	7.42	0.40	0.72			
14-May-02	С	Runs/Glides	5	781	19.0	14.20	0.58	0.96			
13-May-02	D	Runs/Glides	6	643	25.0	6.83	0.32	0.72			
14-May-02	Е	Runs/Glides	1	55	11.0	8.00	0.20	0.40			
				Average	21.30	8.59	0.39	0.71			

TURBULE	NT							
Date	Reach	Habitat Unit	Units/Reach	Total Length (ft)	Unit Proportion (%)	Mean Width (ft.)	Mean Depth (ft.)	Max Depth (ft.)
15-May-02	А	Riffles	14	1328	37.0	7.57	0.36	0.61
16-May-02	В	Riffles	15	1484	42.0	8.33	0.32	0.57
14-May-02	С	Riffles	12	2144	46.0	6.25	0.45	0.89
13-May-02	D	Riffles	10	1348	42.0	6.50	0.72	0.79
14-May-02	Е	Riffles	5	1497	56.0	4.80	0.20	0.40
				Average	44.60	6.69	0.41	0.65

SCOUR POOL7								
Date	Reach	Habitat Unit	Units/Reach	Total Length (ft)	Unit Proportion (%)	Mean Width (ft.)	Mean Depth (ft.)	Max Depth (ft.)
15-May-02	А	Pools	15	1190	44.5	9.17	0.83	0.85
16-May-02	В	Pools	9	840	25.0	15.56	1.30	2.07
14-May-02	С	Pools	9	874	35.0	8.44	0.92	1.48
13-May-02	D	Pools	8	401	33.0	10.75	1.05	1.76
14-May-02	Е	Pools	3	137	33.0	11.67	1.03	1.40
				Average	34.10	11.12	1.03	1.51

Habitat Type Summaries (Entire Creek)						
Habitat Types	Total Feet	Proportion				
Non-Turbulent	3718	24.9%				
Turbulent	7801	52.1%				
Scour Pools	3442	23.0%				
Total	14961	100.0%				

Canopy Cover and Instream Cover							
Reach	Mean & (Range) Canopy (%)	Mean & (Range) Cover (%)					
А	35.8 (0-90)	23.1 (0-65)					
В	10 (0-70)	14 (0-60)					
С	1.9 (0-20)	9.2 (0-50)					
D	25 (0-90)	18.8 (0-60)					
Е	20 (0-70)	22.2 (10-50)					

Map No. ¹	Tributary/ River	Barrier	Severity	Priority ²	Comments	Photo	Source
1	Rattlesnake Creek	Matilija Road; 0.8 mi. west of SR 33	Partial?	None	Low flow crossing; revisit priority once Matilija Dam removed		ENTRIX & WCC 1997
2	Tributary to Matilija Creek	Matilija Road; 3.3 mi. west of SR 33	Partial?	None	Low flow crossing; revisit priority once Matilija Dam removed		ENTRIX & WCC 1997
3	Tributary to Matilija Creek	Matilija Road; 4.2 mi. west of SR 33	Partial?	None	Low flow crossing; revisit priority once Matilija Dam removed		ENTRIX & WCC 1997
4	Matilija Creek	Matilija Dam	Complete	High	Removal being studied		ENTRIX & WCC 1997
5	Matilija Creek	USGS Gage Weir	Partial	Low	Low to moderate flow barrier; habitat available upstream currently limited; revisit priority once Matilija Dam removed	27, 28	Pers. comm. S. Howard, 2003
6	North Fork Matilija Creek	Lower Wheeler Creek Campground Crossing	Complete	High	Blocks passage to upper North Fork Matilija Creek	23, 24	Current study
7	North Fork Matilija Creek	Upper Wheeler Creek Campground Crossing	Partial	Med	Low flow crossing		Current study
8	Bear Creek	Lower Wheeler Creek Campground Crossing	Partial	Med	Low flow crossing		Current study
9	Bear Creek	Upper Wheeler Creek Campground Crossing	Partial	Med	Low flow crossing	25	Current study
10	Ventura River	Robles Dam & Downstream Weir	Complete	High	Fish passage project in process; construction anticipated in 2003-2004		ENTRIX & WCC 1997
11	Ventura River	OVSD Pipeline at Hwy 150	Partial	Med	Low flow impediment; conditions may change after high runoff event		Pers. comm. K. Loomis, 2003
12	Ventura River	Subsurface Dam at Foster Park	Partial	Med	Potential low flow impediment for part of the channel		Pers. comm. K. Loomis, 2003
13	San Antonio Creek	Debris Basin	Complete?	None	Boulder dam; needs to be surveyed to determine degree of barrier; suitability of upstream habitat unknown - revisit priority once headwaters habitat assessed		Pers. comm. P. Lindsey, 2003 & J. Ruch, 2003; NMFS 2003

Table 3-1. Known Steelhead Migration Barriers in the Ventura River Watershed on the Mainstem and Key Tributaries^{*}

14	San Antonio Creek	Grand Avenue	Partial?	Low	Concrete apron; low flow barrier; habitat may be available in Gridley Creek	35	Current study
15	San Antonio Creek	Soule Golf Course Crossing	Complete?	Med	Low flow crossing with substantial downstream drop; would provide access to Gridley Creek; revisit priority once headwaters habitat assessed	33, 34	Current study
16	San Antonio Creek	Crossing Above 10 mile Curve	Partial	Med	Private low flow crossing	32	Current study
17	San Antonio Creek	Private Crossing	Partial	Med	Private crossing; culverts appear functional	31	Current study
18	San Antonio Creek	Fraser Street	Partial	Med	Low flow crossing; more substantial drop than others	30	Current study
19	San Antonio Creek	Old Creek Road	Partial	Med	Low flow crossing	29	Current study
20	San Antonio Creek	Bike Trail Crossing	Partial	Med	Low flow crossing		ENTRIX 2001
21	Lion Creek	Irrigation Reservoir Dam	Complete	None	Access to site likely blocked at barrier no. 22; feasibility of passage unknown; suitability of upstream habitat unknown - revisit priority once headwaters habitat assessed		ENTRIX & WCC 1997
22	Lion Creek	Low-falls, bedrock sheet	Complete?	High	Forms 6 ft vertical barrier; natural barrier		ENTRIX 2001
23	Lion Creek	Low-falls, bedrock sheet	Partial	Low	Natural barrier (located upstream of barrier No. 22); may be other barriers between here and no. 21		ENTRIX 2001
24	Thacher Creek	Grand Avenue	Complete?	None	Low flow crossing with major downstream scour; suitability of upstream habitat unknown - revisit priority once headwaters habitat assessed	37, 38	Current study
25	Thacher Creek	McNell Road	Partial?	None	Low flow crossing; suitability of upstream habitat unknown - revisit priority once headwaters habitat assessed		Current study
26	Thacher Creek	Boardman Road	Complete?	None	2 box culverts with concrete apron; suitability of upstream habitat unknown - revisit priority once headwaters habitat assessed	36	Current study
27	Thacher Creek	McAndrew Road	Partial?	None	2 box culverts with concrete apron; suitability of upstream habitat unknown - revisit priority once headwaters habitat assessed	39	Current study

28	Reeves Creek	McAndrew Road	Partial	None	2 box culverts with concrete apron; suitability of upstream habitat unknown - revisit priority once headwaters habitat assessed	40	Current study
29	McNell Creek	Thacher Road	Partial?	None	Box culvert with concrete apron; suitability of upstream habitat unknown - revisit priority once headwaters habitat assessed	41	Current Study
30	Coyote Creek	Casitas Dam	Complete	None	Technically infeasible to ladder; not slated for removal		ENTRIX & WCC 1997
31	Coyote Creek	Camp Chafee Road	Partial?	None	Low flow crossing; no biological benefit upstream		ENTRIX & WCC 1997
The su	itability of the fol	llowing crossings/barriers	is unknown				
32	San Antonio Creek	Diversion Dam	Unknown	None	Type of structure unknown; suitability of upstream habitat unknown - revisit priority once headwaters habitat assessed		Pers. comm. J. Ruch, 2003
33	Thacher Creek	Ave. de la Verda	Unknown	None	Box culvert; suitability of upstream habitat unknown - revisit priority once headwaters habitat assessed		ENTRIX & WCC 1997
34	Thacher Creek	Ave. de la Recreo	Unknown	None	Box culvert; suitability of upstream habitat unknown - revisit priority once headwaters habitat assessed		ENTRIX & WCC 1997
35	McNell Creek	McNell Road	Unknown	None	Box culvert; suitability of upstream habitat unknown - revisit priority once headwaters habitat assessed		ENTRIX & WCC 1997
36	McNell Creek	Carne Road	Unknown	None	Box culvert; suitability of upstream habitat unknown - revisit priority once headwaters habitat assessed		ENTRIX & WCC 1997
37	McNell Creek	Gorham Road	Unknown	None	Box culvert; suitability of upstream habitat unknown - revisit priority once headwaters habitat assessed		ENTRIX & WCC 1997
38	Ventura River	Temporary Agricultural Diversion Dams	Unknown	Unknown	Private structures; structure type/locations unknown		NMFS 2003
39	Ventura River	Temporary Surface Diversion	Unknown	Unknown	Private structures; located approximately 1 mile upstream of ocean		NMFS 2003
40	Ventura River	Southern California Gas Line	Unknown	Unknown	Located approximately 1.5 miles upstream of ocean		NMFS 2003

^{*}Defined as tributaries known to historically or currently provide steelhead habitat: Coyote, Santa Ana, San Antonio (and tributaries), North Fork Matilija Creek, and Matilija Creek; assumes fish passage at Robles Diversion Dam (construction scheduled for 2003-2004) but not Matilija Dam since this project is still in the feasibility study phase.

¹See Figure 3-1

² High = currently blocks or severely limits passage to substantial (i.e. more than ~ 1 mile) of suitable habitat upstream

- Med = low flow barrier but substantial suitable habitat upstream; or currently blocks or severely limits passage to marginal quality or quantity (i.e. < ~1 mile) of habitat upstream
- Low = low flow barrier and marginal quality; or quantity (i.e. < -1 mile) of habitat available upstream
- None = no known steelhead habitat upstream; or project not feasible (e.g. Casitas Dam)

Unknown = available information too limited

Table 3-2.Summary of Recommended Enhancement Projects within Priority
Geographic Areas1

Restoration Type	Enhancement Action	Priority Tier
First Priority	v – Upper Ventura River Tributaries	
Access		
	Passage at Robles Diversion (in progress) (No. 10)	1st
	Passage at Matilija Dam (No. 4)	1st
	Passage at Wheeler Gorge Campground over N.F. Matilija	1st
	Creek (lower crossing) (No. 6)	
	Migration flow in the mainstem	1st
	Passage at Wheeler Gorge Campground over N.F. Matilija Creek (upper crossing) (No. 7)	2nd
	Passage at Wheeler Gorge Campground over Bear Creek (2 crossings) (Nos. 8, 9)	2nd
	Passage at USGS weir (No. 5)	3rd
	Remove OVSD pipeline (No. 11)	2nd
	Notch subsurface dam at Foster Park (No. 12)	2nd
Habitat		
	Bank stabilization in the lower reaches of NFMC	3rd
	Riparian revegetation in lower reaches of NFMC	3rd
Second Prior Access	ity – San Antonio Creek Watershed	
Access	Soule Park Golf Course (No. 15)	2nd
	Grand Ave crossing over SAC (No. 14)	2nd 2nd
	Crossing above 10 mile curve (No. 16)	2nd 2nd
	Private Crossing (No. 17)	2nd 2nd
	Fraser Street (No. 18)	2nd 2nd
	Old Creek Road (No. 19)	2nd 2nd
	Bike Trail Crossing (No. 20)	2nd 2nd
Habitat	· · · · · · · · · · · · · · · · · · ·	
	Manage sources of nutrient loading & pollutants	1st
	(e.g. establish grazing buffers, landowner education)	
	Manage sources of sediment loading	1st
	(e.g. education, bank stabilization, riparian restoration)	
	Install instream habitat structures & improvements	3rd

¹ See Section 3.4.2 for an explanation of ratings

Third Priori	ty – Mainstem Ventura River	
Access ²		
Habitat		
	Manage water extractions to maintain baseflow in the live	1st
	reach	
	Reduce in-channel maintenance activities	1st
	Riparian revegetation	2nd
	Install instream habitat structures and improvements	2nd
Watershed-	Wide Projects ³	
Habitat		
	Outreach to landowners (e.g. nutrient loading,	1st
	sedimentation, livestock fencing, access)	
	Purchase conservation easements	1st
	Flood plain management	2nd
	Develop opportunities for volunteering in creeks	2nd
	Public education regarding steelhead/habitat presence	2nd
	Non-native vegetation removal	3rd
	Non-native wildlife removal	3rd
	Conservation hatchery	3rd

² Addressed under "Upper Ventura River Tributaries" as access issues in the mainstem would limit the ability to access the first priority geographic area.
³ In determining the relative priority of watershed-wide projects to geographic-area-specific projects,

³ In determining the relative priority of watershed-wide projects to geographic-area-specific projects, watershed-wide projects are considered of equivalent priority to the "second priority" geographic area, San Antonio Creek (see Section 3.4.2.4 for further explanation).