

Table 2. Physical habitat characteristics of North Fork Kern River monitoring sites, Fall 2006.

Site Name	Barge Electrofishing Stations			Snorkeling Stations						
	Below Roads End	Goldledge	Hospital Flat	Roads End Lower	Roads End Middle	Roads End Upper	Goldledge	Hospital Flat	Above Fairview Dam	Above Johnsondale Bridge
Date Sampled	10/28/2006	10/29/2006	10/30/2006	10/27/2006	10/31/2006	10/27/2006	10/26/2006	10/26/2006	10/26/2006	11/1/2006
Sample Time	9:00	9:00	9:00	14:45	9:30	11:45	15:30	13:00	10:30	10:30
Sample Type	Electrofishing	Electrofishing	Electrofishing	Snorkel/Calibration	Snorkel/Calibration	Snorkel/Calibration	Snorkel	Snorkel	Snorkel	Snorkel
Reach Length (m)	100	60	90	33	40	61	50	30	50	30
Average Width (m)	17.6	27.8	29.1	17	18.7	10.5	30	25	30	25
Estimated surface area (m ²)	1760	1665.6	2619	561	748	640.5	1500	750	1500	750
Average Depth (m)	0.47	0.40	0.5	0.7	0.5	0.4	0.4	1	1	1.5
Maximum Depth (m)	0.9	1	1.7	1.6	1	0.7	1.2	2	2	2.5
Visibility (m)	NA	NA	NA	2	3	2	3	2	3	4
Water Temperature (C)	8.3	7.4	7.7	7.1	5.75	6.7	10.7	11.34	7.6	6.5
Specific Conductance (uS/cm)	71	85	85	87	67	66	81	80	75	93
Dissolved Oxygen (mg/L)	10.3	11.4	11.1	10.9	11.97	10.9	10.36	10.06	11.25	11.42
Habitat (%)										
Rifle	35	40	0	5	25	100	5	30	15	15
Run	65	35	75	87	70	100	90	70	65	65
Pool		25	25	8	5		5		20	20
Substrate (%)										
Silt	0	3	2	5	2	1	3	1	2	2
Sand	20	17	48	35	20	15	20	1	8	18
Gravel	5	15	5	5	8	4	2	8	12	10
Rubble	15	30	35	30	40	60	50	25	8	35
Boulder	60	35	10	15	30	20	25	65	60	30
Bedrock	0	0	0	10	0	0	0	0	10	5
Cover Type (%)										
Canopy	2	5	10	1	2	1	2	3	5	1
Surface Turbulence	50	40	1	5	20	5	2	5	35	20
Object Cover	35	35	20	15	15	5	10	15	<10	20
Undercut Bank	1	2	40	3	2	<1	2	5	2	2
Overhanging Vegetation	5	15	5	2	2	2	<1	2	2	0
Spawning Habitat	Poor	Fair	Poor	Poor	Poor	Poor	Poor	Poor	Fair/poor	Poor

Table 4. Fish abundance and biomass estimates for 2006 electrofishing monitoring sites, North Fork Kern River, Fall 2006.

Site	Site Length (m)	Species	Abundance per kilometer			Abundance per Hectare		
			Number of fish per km ¹	Biomass Estimate	95% CI	Number of fish per ha	Biomass Estimate	95% CI
<u>Roads End</u>	100	wild rainbow trout	215.0	13.0	5.5 - 731.0	122.2	7.4	3.2 - 19.3
		brown trout	20.0	1.9	NA	11.4	1.1	NA
		Sacramento pikeminnow	0.0	0.0		0.0	0.0	
		Sacramento sucker hatchery rainbow trout	773.8	229.5	120.8 - 37,874.9	439.6	130.4	73.6 - 298.3
		40.0	92.9	47.4 - 1,161.3	22.7	52.8	26.9 - 165.0	
		1,048.8	337.3		595.9	191.7		
<u>Goldledge</u>	60	wild rainbow trout	395.8	25.1	6.4 - 930.5	142.4	9.0	3.8 - 23.5
		Sacramento pikeminnow	16.7	0.002	NA	6.0	0.001	NA
		Sacramento sucker	3,464.3	671.0	200.8 - 183,934.3	1,246.1	241.4	120.4 - 530.5
		Total Abundance / Biomass	3,876.8	696.1		1,394.5	250.4	
<u>Hospital Flat</u>	90	wild rainbow trout	0.0	0	NA	0.0	0.0	NA
		Sacramento pikeminnow	488.9	15.9	NA	168.0	5.5	NA
		Sacramento sucker	5,822.2	43.9	18.7 - 47,909.0	2,000.8	15.1	7.1 - 34.9
		Total Abundance / Biomass	6,311.1	59.9		2,168.8	20.6	

¹Abundance estimates were calculated using the adjusted Petersen formula with Chapman's correction (Ricker, 1975)

Table 5. Direct observation data and abundance indices for North Fork Kern River snorkel survey sites.

	Number of Fish Observed					Number of Fish per Kilometer						
	Size Class					Size Class						
	75 mm <	76 - 175 mm	176 - 305 mm	306 - 460 mm	> 461 mm	Total	75 mm <	76 - 175 mm	176 - 305 mm	306 - 460 mm	> 461 mm	Total
Wild Rainbow Trout												
Above Johnsondale Bridge			1	4	2	7			33.3	133.3	66.7	233.3
Above Fairview Dam	1		1	5		7	20		20	100		140.0
Roads End ¹		1	1	7	1	10	0	7.5	7.5	52.2	7.5	74.6
Goldledge	11					11	220					220.0
Hospital Flat				1		1				33.3		33.3
Sacramento Sucker												
Above Johnsondale Bridge				5	2	7				166.7	66.7	233.3
Above Fairview Dam				3		3				60		60.0
Roads End ¹	19	1		2	1	23	141.8	7.5		14.9	7.5	171.6
Goldledge	50	3	5	5		63	1000	60	100	100		1260.0
Hospital Flat	4		23	2		29	133.3		766.7	66.7		966.7
Sacramento Pikeminnow												
Above Johnsondale Bridge						0						0.0
Above Fairview Dam						0						0.0
Roads End ¹	1					1	7.5					7.5
Goldledge	39					39	780.0					780.0
Hospital Flat	7					7	233.3					233.3

¹ The Roads End snorkel site consisted of three subsites.

	PE/site					Percent Composition				
	Above Johnsondale Bridge	Above Fairview Dam	Roads End ¹	Goldledge	Hospital Flat	Johnsondale Bridge	Fairview Dam	Roads End ¹	Goldledge	Hospital Flat
Wild Rainbow Trout	7	7	10	11	1	50.0	70.0	29.4	9.7	2.7
Sacramento Pikeminnow	0	0	1	39	7	0.0	0.0	2.9	34.5	18.9
Sacramento Sucker	7	3	23	63	29	50.0	30.0	67.6	55.8	78.4
Total	14	10	34	113	37	100	100	100	100	100

Table 6. Comparison of direct observation vs. electrofishing counts by species and size class at Roads End direct observation monitoring subsites, Fall 2006.

Subsites	Species	Number of Individuals Observed or Captured by Size Class											
		0-75 mm		76-175 mm		176 - 305 mm		306 - 460 mm		> 461 mm			
		Snorkel	Electrofishing	Snorkel	Electrofishing	Snorkel	Electrofishing	Snorkel	Electrofishing	Snorkel	Electrofishing		
Road's End Upper	Wild Rainbow Trout	0	0	0	1	0	0	0	0	0	0	0	0
	Sacramento Sucker	10	45	1	2	0	0	0	0	0	0	0	0
	Sacramento Pikeminnow	1	0	0	0	0	0	0	0	0	0	0	0
Roads End Middle	Wild Rainbow Trout	0	0	0	1	0	0	0	0	0	0	0	0
	Sacramento Sucker	9	14	0	3	0	1	2	3	1	0	0	0
	Sacramento Pikeminnow	0	1	0	0	0	0	0	0	0	0	0	0
Roads End Lower	Wild Rainbow Trout	0	2	1	3	0	1	7	0	1	0	0	0
	Sacramento Sucker	0	26	0	4	0	0	0	0	0	0	0	0
	Sacramento Pikeminnow	0	0	0	0	0	0	0	0	0	0	0	0

Table 7. Age class composition of wild rainbow trout at electrofishing monitoring sites, North Fork Kern River, Fall 2006.

Age Class	Average Length (mm)	Length Range (mm)	Estimated Abundance ¹ (fish/km)	Estimated % Abundance of Total Population ³	Estimated Biomass (kg/km)	Average Biomass (g/fish)	Range of Biomass (g/fish)	Average Condition Factor ²
Roads End								
0+	102	102	5	2	0.1	12.4	12.4	1.17
1+	146	92 - 215	170	79	7.2	42.2	9.7 - 112.0	1.14
2+	210	186 - 220	40	19	4.5	113.5	94 - 124.0	1.24
Goldledge								
0+	89	89	29	7	1.3	7.2	7.2	1.02
1+	141	113 - 178	317	80	14.6	35.8	16.0 - 68.1	1.18
2+	246	237 - 252	50	13	9.2	183.0	160.8 - 210.2	1.23
Hospital Flat								
No trout captured at this site								

¹ Age 0+ population estimate based upon total Population estimate - Base population (i.e., age class 1+ and older) estimate.

² Condition Factor = $WL^{-3} * 100,000$; W = weight (g), L = fork length (mm)

Table 8. Comparison of 1998 and 2006 physical habitat data for barge electrofishing sites, North Fork Kern River.

Site Name	Barge Electrofishing Stations		
	Below Roads End	Goldledge	Hospital Flat
Date Sampled	10/13/1998	10/29/06	10/30/06
Sample Time	10:00	9:00	9:00
Sample Type	Electrofishing	Electrofishing	Electrofishing
Reach Length (m)	70.4	60	90
Average Width (m)	14.4	27.8	29.1
Estimated surface area (m2)	1014	1665.6	2619
Average Depth (m)	0.9	0.4	0.5
Maximum Depth (m)	1.3	1	1.7
Visibility (ft)	NA	NA	NA
Water Temperature (C)	8	7.4	7.7
Specific Conductance (uS/cm)	70	85	85
Dissolved Oxygen (mg/L)	9.6	11.4	11.1
Habitat (%)			
Riffle	0	40	75
Run	100	40	25
Boulder Run	0	20	0
Pool	0	0	0
Substrate (%)			
Silt	0	2	0
Sand	10	15	15
Gravel	5	13	30
Rubble	25	20	40
Boulder	60	50	15
Bedrock	0	0	0

Table 9. Comparison of 1998 and 2006 physical habitat data for direct observation sites, North Fork Kern River.

Site Name	Snorkeling Stations					
	Roads End Lower	Roads End Upper	Goldledge	Hospital Flat	Above Fairview Dam	Above Johnsondale Bridge
Date Sampled	10/16/1998	10/27/06	10/15/98	10/14/98	10/18/06	10/17/98
Sample Time	10:15 - 10:35	10:45 - 10:55	11:45 - 12:10	11:45 - 12:05	10:15 - 10:30	12:20 - 12:35
Sample Type	Snorkel/ Calibration	Snorkel/ Calibration	Snorkel	Snorkel	Snorkel	Snorkel
Reach Length (m)	30	30	50	30	50	50
Average Width (m)	14	14	18	25	15	20
Estimated surface area (m ²)	450	450	900	750	750	1000
Average Depth (m)	0.6	0.8	1.8	1.4	1.5	2
Maximum Depth (m)	1.1	1.2	3.7	2	3	2.5
Visibility (ft)	3	3	2.4	3.7	3	3
Water Temperature (C)	NA	NA	NA	NA	NA	NA
Specific Conductance (uS/cm)	NA	NA	NA	NA	NA	NA
Dissolved Oxygen (mg/L)	NA	NA	NA	NA	NA	NA
Habitat (%)						
Riffle	5		5	30		15
Run	100	100	90	70	100	100
Boulder Run				75		65
Boulder Pocket Water				25		
Pool	8		5			20
Substrate (%)						
Silt	0	0	0	0	0	0
Sand	20	10	30	5	20	30
Gravel	0	0	0	5	10	10
Rubble	50	50	0	30	50	20
Boulder	30	40	10	60	10	40
Bedrock	0	0	60	0	10	0

Table 10. Comparison of 2006 population and biomass estimates of three electrofishing sites with previous monitoring data (1989-1991, 1998), North Fork Kern River.

	Abundance Estimates (fish/km)					Biomass Estimates (kg/km)				
	1989	1990	1991	1998	2006	1989	1990	1991	1998	2006
<u>Roads End</u>										
Wild rainbow trout	320	186	113	405	215	22.1	9.7	1.8	19.3	13.0
Hatchery rainbow trout	52	144	41	14	40	8.2	28.1	5.4	2.3	92.9
Brown trout	10	0	10	0	20	0.9	0.0	0.1	0.0	1.9
Sacramento pikeminnow	1351	1423	773	14	0	20.8	145.0	91.6	1.1	0.0
Sacramento sucker	5732	2691	3062	4286	774	708.5	549.2	404.7	712.4	229.5
Hardhead	10	10	0	0	0	0.1	0.6	0.0	0.0	0.0
Common Carp	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0
Total for Station	7475	4454	3999	4719	1049	760.6	732.6	503.6	735.1	337.3
<u>Goldledge</u>										
Wild rainbow trout	269	86	258	1496	396	10.7	5.7	9.5	51.2	25.1
Hatchery rainbow trout	75	65	108	93	0	9.0	9.8	23.6	31.5	0.0
Brown trout	0	0	0	13	0	0.0	0.0	0.0	0.1	0.0
Sacramento pikeminnow	2634	3935	1839	339	17	35.1	44.1	17.9	1.6	0.002
Sacramento sucker	3710	4065	3774	5159	3464	657.4	662.9	522.8	623.8	671.0
Hardhead	441	398	118	0	0	9.6	16.1	6.6	0.0	0.0
Common Carp	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0
Total for Station	7129	8549	6097	7100	3877	721.8	738.6	580.4	708.2	696
<u>Hospital Flat</u>										
Wild rainbow trout	10	0	0	1028	0	0.1	0.0	0.0	43.9	0.0
Hatchery rainbow trout	0	0	0	85	0	0.0	0.0	0.0	23.4	0.0
Brown trout	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0
Sacramento pikeminnow	2699	6117	3495	170	489	131.5	262.4	30.8	1.0	15.9
Sacramento sucker	1748	1476	2825	4700	5822	506.8	433.9	451.1	287.0	43.9
Hardhead	2194	1126	73	12	0	48.3	34.5	8.2	0.0	0.0
Common Carp	68	155	19	0	0	92.7	172.7	33.2	0.0	0.0
Total for Station	6719	8874	6412	5995	6311	779.4	903.5	523.3	355.3	59.9

Table 11. Comparison of 2006 and 1998 direct observation data for North Fork Kern River snorkel survey sites.

	1998 Number of Fish per Kilometer					2006 Number of Fish per Kilometer						
	75 mm <	Size Class				Total	75 mm <	Size Class				Total
		76 - 175 mm	176 - 305 mm	306 - 405 mm	> 406 mm			76 - 175 mm	176 - 305 mm	306 - 460 mm	> 461 mm	
<u>Wild Rainbow Trout</u>												
Above Johnsondale Bridge	80	340			420		33	133	67	233		
Above Fairview Dam	80	60			140	20	20	100		140		
Roads End	33				33		8	52	8	106		
Goldledge	80	180	80		340	220				220		
Hospital Flat	33	433	100		566		33			33		
	1998 Number of Fish per Kilometer					2006 Number of Fish per Kilometer						
75 mm <	Size Class				Total	75 mm <	Size Class				Total	
	76 - 175 mm	176 - 305 mm	306 - 405 mm	> 406 mm			76 - 175 mm	176 - 305 mm	306 - 460 mm	> 461 mm		
<u>Sacramento Sucker</u>												
Above Johnsondale Bridge		40	160	40	240		167	67		233		
Above Fairview Dam	20	160	140		320		60			60		
Roads End	67				67	142	8	15	8	117		
Goldledge	580	260	460	100	1480	1000	60	100		1260		
Hospital Flat	1633	200	67		1900	133	767	67		967		

Note: The Roads End snorkel site consisted of three subsites.

Table 12. Age class composition of wild rainbow trout during 1998 and 2006 population monitoring at electrofishing monitoring sites, North Fork Kern River.

Age Class	Average Length (mm)	Length Range (mm)	Estimated Abundance (fish/km)	Estimated % Abundance of Total Population ¹	Estimated Biomass (kg/km)	Average Biomass (g/fish)	Range of Biomass (g/fish)	Average Condition Factor ²
Roads End								
1998								
0+	94	91 - 95	93	23	0.9	9.2	8.7 - 9.4	1.11
1+	119	103 - 136	142	35	3	21.1	13.8 - 33.6	1.23
2+	183	156 - 201	93	23	6.7	72.4	43.3 - 96.9	1.16
3+	217	211 - 229	77	19	6.7	112.7	103.5 - 124.1	1.10
2006								
0+	102	102	5	2	0.1	12.4	12.4	1.17
1+	146	92 - 215	170	79	7.2	42.2	9.7 - 112.0	1.14
2+	210	186 - 220	40	19	4.5	113.5	94 - 124.0	1.24
Goldledge								
1998								
0+	92	81 - 101	419	28	3.8	9.2	5.9 - 11.6	1.16
1+	115	101 - 135	658	44	11.7	17.7	12.6 - 27.1	1.16
2+	192	156 - 232	374	25	30.2	80.7	42.6 - 144.7	1.11
3+	221	189 - 252	45	3	5.5	123.3	74 - 180.2	1.10
2006								
0+	89	89	29	7	1.3	7.2	7.2	1.02
1+	141	113 - 178	317	80	14.6	35.8	16.0 - 68.1	1.18
2+	246	237 - 252	50	13	9.2	183.0	160.8 - 210.2	1.23
Hospital Flat								
1998								
0+	87	77 - 98	108	11	0.9	8.1	5.3 - 11.6	1.20
1+	117	98 - 147	541	53	10.4	19.3	13 - 40	1.19
2+	195	162 - 222	298	29	23.1	77.6	60 - 100	1.05
3+	215	200 - 244	81	8	9.5	117.5	120 - 150	1.07
2006								
No trout captured at this site								

¹ Age 0+ population estimate based upon total Population estimate - Base population (i.e., age class 1+ and older) estimate.

² Condition Factor = $W/L^3 * 100,000$; W = weight (g), L = fork length (mm)