

Article #2	Ecology of Fishes in Sierra Nevada <i>Sub-study of Article #1</i>	Article #4	Fishes of the SJR Drainage	Article #1	Decline of Natives in Sierra Nevada
7/27/70 - 9/4/70		9/1985 - 9/1986		1969 - 1971 (this study)	Baseline: 1898, 1934, 1940-41
<u>Waterbodies:</u>	130 sampling sites (see Article #1)	<u>Waterbodies:</u>		<u>Waterbodies:</u>	167 sampled sites: (130 b/w 7/27 - 9/4/1970), and 37 during summer & autumn of 1969, 1970, and 1971.
	Stanislaus, Tuolumne, Merced, Chowchilla, Fresno, SJ, Kings, Kaweah, & Tule Rivers		Stanislaus, Tuolumne, Merced, Chowchilla, Fresno, SJ, Kings, Kaweah, & Tule Rivers		186 sampling sites, 156 sites used in statistical analyses.

KEY

23.00%	Same % as adjacent study	Decrease
Brown Trout	Native Species	Increase
Bigscale Logperch	Non-native Species	

Species	Native or Non-Native?	% of sites collected in (Article #2). 130 Sites July 27-Sept. 4, 1970. This study was a subset of the main study (#1)	% of sites collected in (Article #1). 167 sites (130 b/w 7/27-9/4/1970, and 37 during summer & autumn of 1969, 70, and 71.	% of sites collected in (Article #4). 156 sites used, Main survey was July-Sept. 1986.	# of sites collected in (Article #4)	Increase / Decrease since the 1970 study to the 1986 study?
Bigscale Logperch	NN			<1		Increase
Black Bullhead	NN			4.00%		Increase
Black Crappie	NN			<1		Increase
Bluegill	NN	23.00%	23.00%	12.00%	18	Decrease
Brown Bullhead	NN	7.00%	7.00%	0.00%		Decrease
Brown Trout	NN	1.00%	1.00%	9.00%		Increase
CA Roach	N	32.00%	32.00%	30.00%	47	Decrease
Carp	NN	2.00%	3.00%	2.00%		~same
Chinook Salmon	N		1.00%	0.00%		Decrease
Delta Smelt	N			0.00%		N/A
Fathead Minnow	NN			<1		Increase
Golden Shiner	NN	8.00%	8.00%	3.00%		Decrease
Goldfish	NN	1.00%	1.00%	<1%		~same
Green Sunfish	NN	46.00%	46.00%	25.00%	43	Decrease
Hardhead	N	9.00%	9.00%	6.00%	10	Decrease

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Hitch	N	10.00%	10.00%	5.00%	8	Decrease
Kernbrook Lamprey	N			5.00%		Increase
Largemouth Bass	NN	31.00%	31.00%	19.00%	28	Decrease
Mosquitofish	NN	26.00%	26.00%	23.00%	30	Decrease
Pacific Lamprey	N		1.00%	6.00%		Increase
Pacific Brook Lamprey	N		1.00%			~same
Prickly Sculpin	N	2.00%	4.00%	7.00%		Increase
Rainbow Trout	N	20.00%	20.00%	38.00%	59	Increase
Redear Sunfish	NN	1.00%	2.00%	4.00%		Increase
Redeye Bass	NN			1.00%		Increase
Riffle Sculpin	N	2.00%	2.00%	4.00%		Increase
Sacramento Blackfish	N			0.00%		N/A
Sacramento Perch	N			0.00%		N/A
Sacramento Squawfish	N	38.00%	38.00%	29.00%	46	Decrease
Sacramento Sucker	N	42.00%	42.00%	48.00%		Increase
Smallmouth Bass	NN	7.00%	7.00%	7.00%		~same
Splittail	N			0.00%		N/A
Thicktail Chub	N			0.00%		N/A
Threadfin Shad	NN			<1		Increase
Threespine Stickleback	N	1.00%	2.00%	3.00%		Increase
Tule Perch	N			0.00%		N/A
White Catfish	NN	9.00%	9.00%	3.00%		Decrease
White Crappie	NN			2.00%		Increase
White Sturgeon	N			0.00%		N/A
# of Native Species Collected		9	12	11	#2 is a subset of #1. All studies sampled in the same geographic areas. #1 and #2 can be used as baseline data for #4. All 3 studies are not a strong argument for a decrease in native species/time, with non-native species as the cause. Although non-natives have increased/time, the natives have also increased/time. Native abundance displacement from lower elevation warmer waters is not attributed to non-native species. At least not based on this data.	
# of Non-Native Species Collected:		12	12	18		
% of Native Species		42%	50%	37%		
% of Non-Native Species		57%	50%	62%		
# of natives increased to 1986:		8				
#of natives decreased to 1986:		5				
# of non-natives increased to 1986		9				
# of non-natives decreased to 1986:		7				

Comparison of Articles #1 and #2 (they the same study).

Species	Native or Non-Native?	% of sites collected in (Article #1)	# of sites collected in (Article #1)	% of sites collected in (Article #2)	# of sites collected in (Article #2)
Largemouth Bass	NN	31.00%		31.00%	
Green Sunfish	NN	46.00%		46.00%	
Smallmouth Bass	NN	7.00%		Did not specify	
Bluegill	NN	23.00%		23.00%	
Mosquitofish	NN	28.00%		Did not specify	
Hitch	N	10.00%		10.00%	
Sacramento Squawfish	N	38.00%		38.00%	
Hardhead	N	9.00%		9.00%	
CA Roach	N	32.00%		32.00%	
Sacramento Sucker	N	42.00%		42.00%	
Rainbow Trout	N	20.00%		Did not specify	
Brown Trout	NN	1.00%		Did not specify	

Increase / Decrease (b/w articles #1 & #2)?	Note:
Same	Both Sierra Nevada studies (#1 & #2) used the same data for species in these watersheds. Both studies were conducted at the same time, in same areas, with apparent overlapping sample sites. Article #1 uses baseline data from older studies. Both articles #1 and #2 provide the baseline data for Article #4.
Same	
N/A	
Same	
N/A	
Same	
Same	
Same	
Same	
Same	
N/A	
N/A	

**Article #1 -
Decline of Native
Fishes in Sierra
Nevadas**

Species	Native or Non-Native?	Rutter Study (1898)	Needham & Hanson Study (1934)	Dill Study (1940-41)	This study (1970)
Bluegill	NN	None	Present	Present	Present
Brown Bullhead	NN	None	None	Present	Present
Brown Trout	NN	None	Present	Present	Present
California Roach	N	Present	Present	Present	None
Carp	NN	None	Present	Present	Present
Chinook Salmon	N	Present	Present	Present	None
Green Sunfish	NN	None	None	Present	Present
Hardhead	N	Present	Present	Present	None
Hitch	N	Present	Present	Present	None
Largemouth Bass	NN	None	None	Present	Present
Mosquitofish	NN	None	None	Present	Present
Pacific Brook Lamprey	N	?	?	Present	Present
Pacific Lamprey	N	?	?	Present	Present
Prickly Sculpin	N	?	?	Present	Present
Rainbow Trout	N	?	Present	Present	Present
Sacramento Blackfish	N	?	Present	Present	None
Sacramento Squawfish	N	Present	Present	Present	None
Sacramento Sucker	N	Present	Present	Present	Present
Smallmouth Bass	NN	None	Present	Present	None
Splittail	N	Present	None	None	None
Threespine Stickleback	N	Present	Present	Present	Present
Tule Perch	N	Present	Present	Present	None
% Native Species Present		100%	77%	62%	40%
# of Native Species Present		9	10	13	6
# of Non-Native Species Present		0	4	8	7

The trend at Friant Dam is that native fish species populations have declined since 1898, while non-native fish species have increased since 1898.