STATUS OF STEELHEAD TROUT, (Oncorhynchus mykiss), IN THE CENTRAL VALLEY OF CALIFORNIA

INTRODUCTION

This report summarizes the best available counts and estimates of adult steelhead trout abundance and angler catch in the Central Valley of California (Figure 1). The period covered is 1953-89. Except for the Mokelumne River, the San Joaquin system is not included. Since construction of dams on all the rivers steelhead are virtually absent from the San Joaquin drainage.

Steelhead counts for individual years are given in Appendix Tables 1-3). Some steelhead counts are the result of enumeration over fishways or at fish hatcheries. Other population estimates are the result of tagging and tag recovery with angler census. Some estimates were made using assumptions concerning the hatchery escapement/angler catch ratios. Due to the varied intensity of creel census effort, any population and angler catch estimates should be considered minimum estimates.

HISTORIC STEELHEAD RANGE

The original range of steelhead was from central Alaska to the Mexican border. In the Central Valley of California steelhead probably flourished in every stream with a year round supply of cool water. Unfortunately, the freshwater habitat of the steelhead has undergone alteration because of man's activities. Most

of these changes have adversely affected the production of steelhead in various phases of their life history. On many streams construction of dams denied steelhead access to historic spawning and rearing areas. In other streams water diversions have lowered stream flows affecting upstream passage of adults and downstream migration of smolts and yearlings.

With the exception of a small population in the Mokelumne River that is hatchery maintained, there are no steelhead populations left in the san Joaquin River system. Likewise in the Sacramento River watershed, only streams with hatchery support, i.e., Battle Creek, Feather and American Rivers have even modest sized runs. The main stem Sacramento River, Mill and Deer Creeks have runs that are at critically low levels. Remnant populations are believed to exist in Clear, Cottonwood, and Chico and Butte Creeks.

CENTRAL VALLEY ADULT STEELHEAD POPULATION TRENDS

Sacramento River System Above the Feather River

Population Estimates from Tagging Studies

Programs to determine adult population levels for steelhead, using tagging methods, were conducted between 1953 and 1958, and from 1971 through 1974. These programs were designed to estimate run size in the entire upper Sacramento River above the mouth of the Feather River. The runs in the 1950's series averaged 20,500

fish. In the early 1970's the average was nearly identical at 21,600 steelhead.

Counts at Red Bluff Diversion Dam (RBDD)

Steelhead counts past RBDD are available since 1967. These counts demonstrate a downward trend since the late 1960's (Figure 2). The means for the 60's, 70's and 80's are 13,300, 5,900 and 2,500, respectively (Table 1).

Calculated Runs

For years when no tagging or creel census was conducted the total run size was estimated by regressing total run counts against total catch and then catch against RBDD counts. Combined calculated runs with runs estimated by tagging/creel census also show a downward trend by decade since the 1960's. Mean population sizes for the 50's, 60's, 70's and 80's are 20,500, 30,300, 20,700 and 13,000, respectively (Table 1).

Coleman National Fish Hatchery (CNFH)

The CNFH has been trapping, spawning, rearing steelhead since 1943 as mitigation for Shasta Dam. Coleman trapped about 1,000 fish per year in the 1950's, 2,700 steelhead on average in the 1960's, 1,800 in the 1970's and 1,200 in the 1980's (Table 1). Like their wild counterpart, hatchery trapping at CNFH exhibits a downward trend since the 1960's (Figure 3).

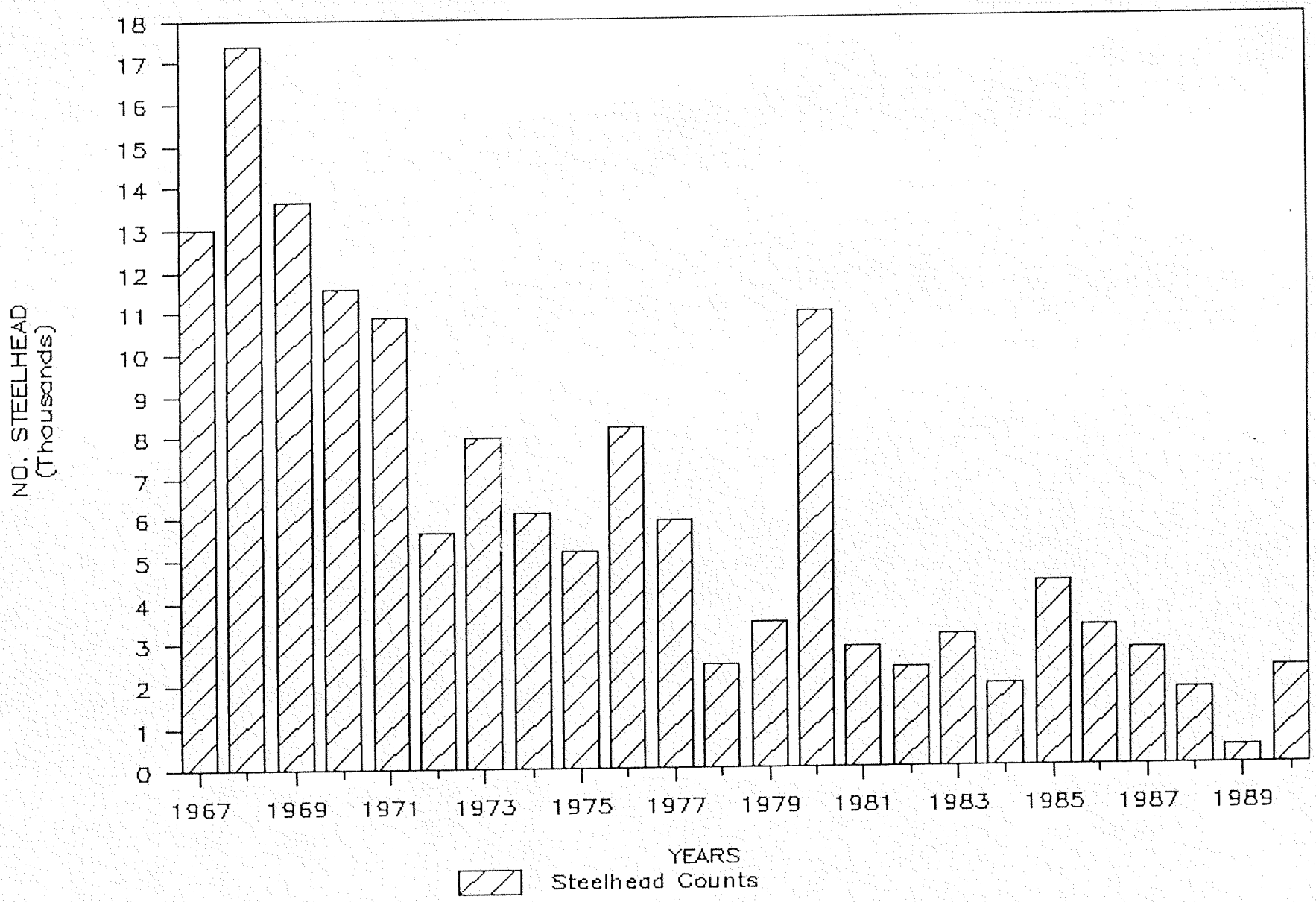
'ABLE 1 . Adult Steelhead Run Summary by Decade 1950's - 1980's (nearest 100 fish).

Decade	System a* Above Feather R.	Coleman Fish Hatchery	Red Bluff Diversion Dam	Mill Creek	Deer Creek	Feather River	Feather River Hatchery	Yuba River	American River	Nimbus Fish Hatchery	Mokelumne River Hatchery
1950's	20,500	1,000	NA	1,000	b*	b*	NA	b*	<1,000	200	NA
1960's	30,300	2,700	13,300	1,500	c*	1,000	500	b*	5,000 d*	1,200	100
1970's	20,700	1,800	5,900	280 e*	b*	2,100	400	b*	16,000 f*	2,000	<50
1980's	13,000	1,200	2,500	b*	b*	9,500 d*	1,200	2,000 d*	17,500 d*	1,500	<10

a* Data is unavoidably inflated. Missing year estimates were developed by combining results of two regression equations.
b* No counts made.
c* Only two counts made; 1963 = 53, 1964 = 1,006.
d* Preliminary estimate from Fred Meyer.
e* 1979 was the only count in the decade.
f* Only two estimates made; 1972 = 19,583, 1974 = 12,274.

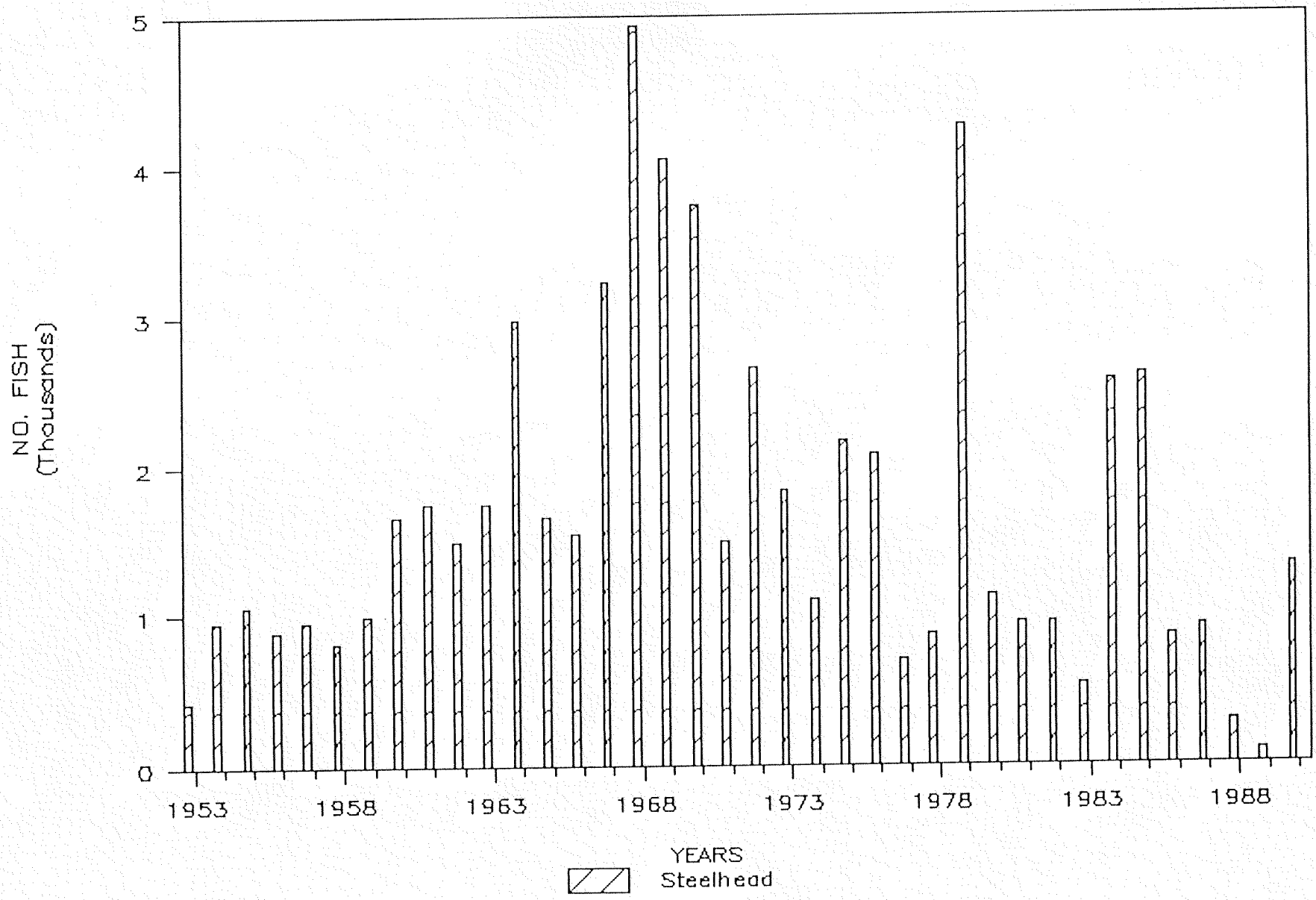
RED BLUFF DIVERSION DAM

Steelhead Counts



COLEMAN NATIONAL FISH HATCHERY

Steelhead Counts



Mill Creek - Deer Creek

Steelhead populations are thought to be at low levels in these streams. Since 1953, twelve counts have been made of fish migrating over Clough Dam, and two on Deer Creek at Vina Dam. Mean run size in Mill Creek was 1,087, with a range from 280 to 2,269. Very little is known about Deer Creek steelhead. Counts in 1963 and 1964 were 53 and 1,006, respectively.

Both these streams have excellent water supplies and good rearing habitat. Water diversions, however, are a particular problem for downstream migrants. Although all diversions are screened, some years the creeks go dry in late spring/early summer below the lowest diversion dams. Even when the creeks don't dry up they may be dewatered. Such stream flow reduction helps elevate water temperatures beyond tolerance limits and concentrates fish in small volumes of water making young steelhead extremely susceptible to predation.

Feather River

Prior to construction of Oroville Dam, most Feather River steelhead spawned in areas upstream from Oroville. The river system above Oroville was also important as natural steelhead rearing habitat. The Oroville Project is a complete barrier to upstream migrating adult steelhead, and Feather River Hatchery has been operating since Project construction to mitigate for the losses

of steelhead spawning and rearing habitat. Over 90% of the steelhead production in the Feather River is now of hatchery origin. A very limited reach of year round rearing habitat precludes significant wild production.

Pre-Oroville Dam steelhead counts are estimated to be near 1,000 fish annually. During four years of Interim Fish Facility, before Feather River Hatchery came on-line, steelhead trapping averaged 600 fish. Subsequent hatchery operations have yielded runs between 78 and 1,721 (Figure 4). Trapping at the hatchery averaged 500 in the 1960's, 400 in the 1970's and 1,200 in the 1980' (Table 1). Total population estimates are 1,000, 2,100 and 9,500 for the 1960's, 1970's and 1980's, respectively (Table 1).

Yuba River

About 25 miles of riverine habitat, from the confluence with the Feather River to Englebright Dam, is available to salmonids. Major diversions occur at Daguerre Point Dam located about mid-point of the river reach. Releases for these diversions keep good flows of cool water available in the upper half of the river creating habitat for rearing of steelhead.

Except for stray fish of probable Feather River Hatchery origin, Yuba steelhead are all from natural reproduction. Region 2 personnel estimate the steelhead run in recent years is near 2,000 fish (Table 1).

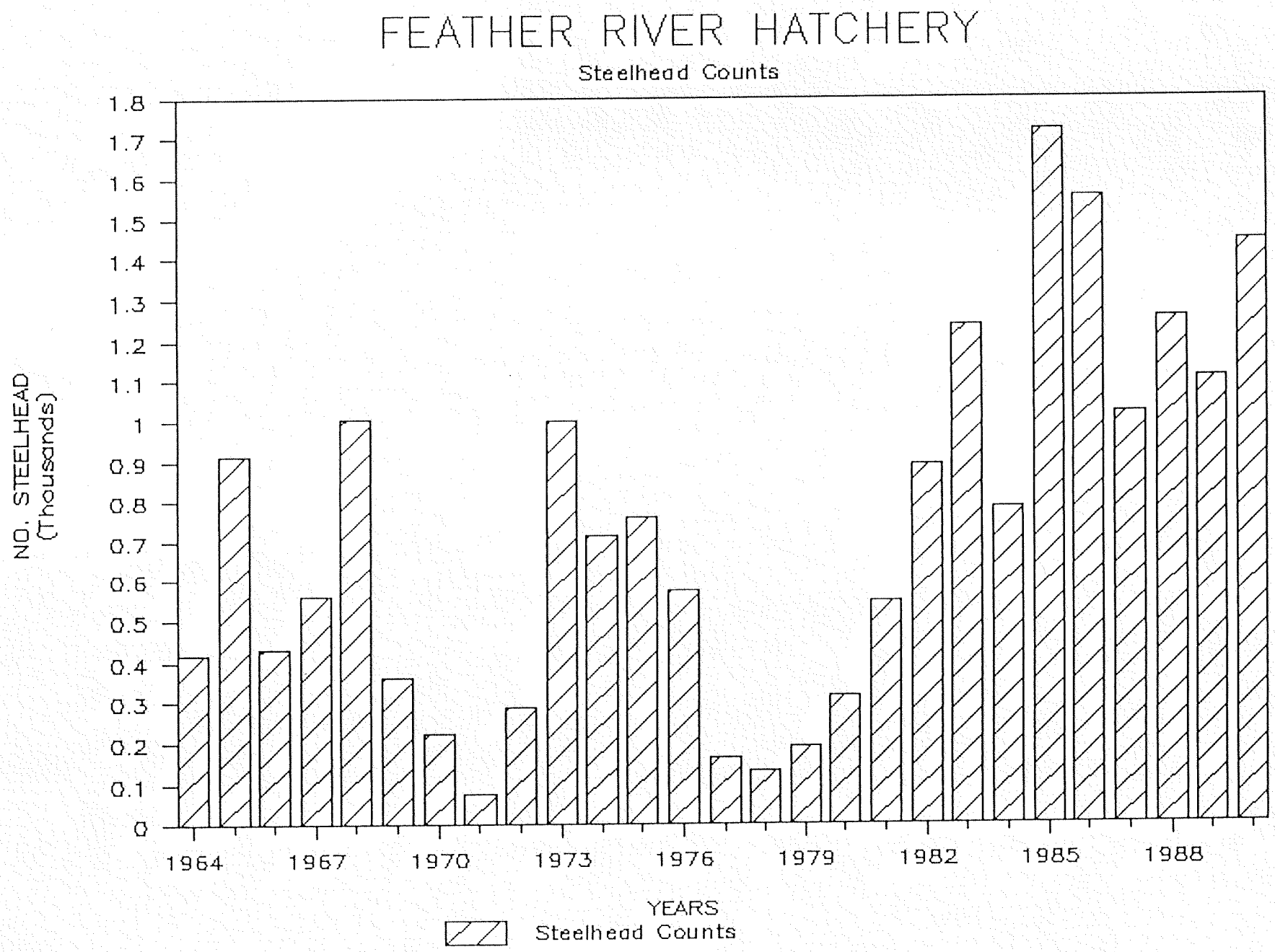

FEATHER RIVER HATCHERY
Steelhead Counts
NO. STEELHEAD (Thousands)
1.8
1.7
1.6
1.5
1.4
1.3
1.2
1.1
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
1964
1967
1970
1973
1976
1979
1982
1985
1988
YEARS
Steelhead Counts

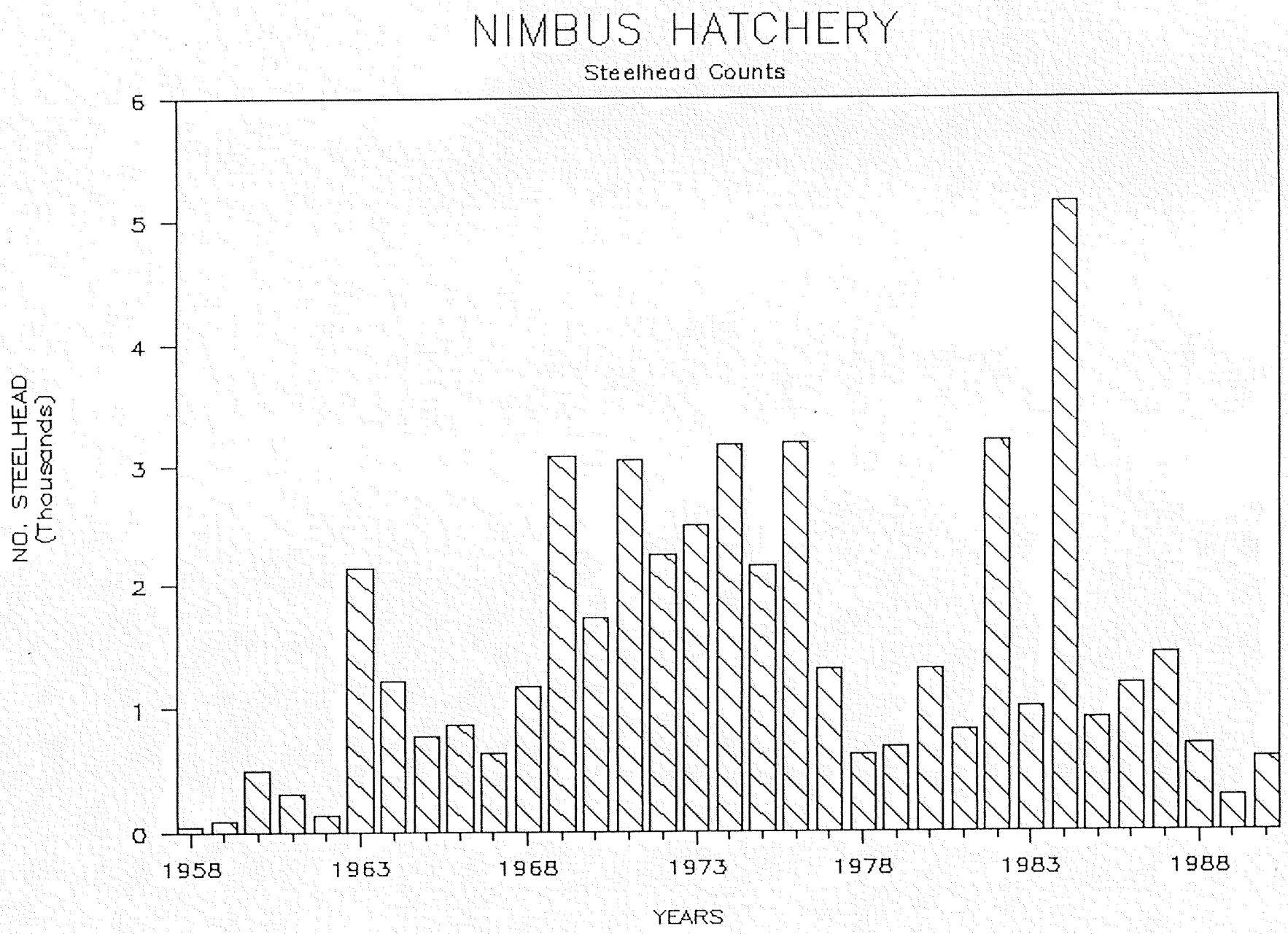
Figure 4.

American River

Steelhead have access to only the 23 miles of American River below Nimbus Dam. This dam is a diversion structure, built to deliver water stored in Folsom Lake into Folsom South Canal. The Bureau of Reclamation controls flows below Nimbus Dam. They also own Nimbus Fish Hatchery below Nimbus Dam but contract with the California Department of Fish and Game to operate the hatchery. Historic records of steelhead runs prior to construction of the Folsom Project are limited to counts at the old Folsom Dam fish ladder. From 1943-1947 counts ranged from 88 to 1,287, with a mean of 516 fish (USFWS and CFG, 1953).

In the 1970's Staley (1976), reported results of two population estimates based upon tagging and recovery with angler census. He reported a population of 19,583 in 1972 and 12,274 in 1974.

Steelhead abundance has increased dramatically due primarily to propagation at Nimbus Fish Hatchery (Figure 5). Total runs averaged less than 1,000 in the 1950's, 5,000 in the 1960's, 16,000 in 1970's and 17,500 in the 1980's (Table 1). Nimbus Fish Hatchery shows parallel increases in totals of trapped fish; 200, 1,200, 2,000 and 1,800 for the 1950's, 1960's 1970's and 1980's, respectively.


NIMBUS HATCHERY
Steelhead Counts
NO. STEELHEAD
(Thousands)
0
1
2
3
4
5
6
1958
1963
1968
1973
1978
1983
1988
YEARS

Mokelumne River

Mokelumne River is a tributary to the San Joaquin River. Prior to completion of Comanche Dam in the early 1960's there was a popular fishery for "steelhead". The Mokelumne River Fish Installation produces 30,00 to 50,000 yearling or older steelhead each year that has maintained the trout fishery and realized a modest but declining steelhead run.

Counts are not available for the 1950's. Mokelumne River Fish Installation trapped an average 100 fish per year in the 1960's, less than 50 in the 1970's and less than 10 per year in the 1980's (Table 1).

RECREATIONAL HARVEST

Introduction

The importance of steelhead as a sport fish continues to grow as California's population increases. Anglers' like to catch steelhead and demand for good angling experience continues.

Documented studies of angler catch are limited. The studies made are confined to the Sacramento, Feather and American Rivers. All three rivers have runs supported almost entirely by hatcheries.

Sacramento River

Angler census in the Sacramento River during the 1950's and late-60's early 1970's were used to extrapolate and calculate catch for other years. When assembled as mean catch per decade, these data show a decline in catch since the 1960's (Table 2). Average catch is estimated at 7,600, 13,500, 7,600 and 3,100 for the 1950's, 1960's, 1970's and 1980's, respectively.

Feather River

An angler census for steelhead was conducted from 1972 through 1974 to estimate the success rates in the steelhead fishery (Painter,et.al., 1977). Angler catch ranged from 1,184 to 2,858. Additional angler surveys, by Region 2 personnel, were conducted in the 1980's. An estimated 8,000 steelhead a year are now harvested in the Feather River by about 30,000 angler days of effort.

The trend in steelhead catch has risen steadily over the past 30 years. When expressed as a mean catch per year by decade, steelhead averaged 500 in the 1960's, 1,500 in the 1970's and 8,000 in the 1980's (Table 2).

American River

Staley (1976) estimated that anglers took over 5,000 fish from

TABLE 2. Summary of Angler Catch of Steelhead. Data are means by Decade 1950's - 1980's (nearest 100 fish).

Decade	Sacramento System above Feather River	Feather River	Yuba River	American River
1950's	7,600	- -	a*	a*
1960's	13,500	500 b*	a*	a*
1970's	7,600	1,500 b*	a*	4,300 c*
1980's	3,100	8,000 d*	2,000 d*	6,500 d*

a* No data available.
b* Draft report by Painter and Wixom, 1977.
c* Staley (1976); 1972 = 5,369, 1974 = 3,265.
d* Preliminary estimate by Fred Meyer.

the American River in 1972 and over 3,000 in 1974. Region 2 continues to monitor the American closely. They now estimate over 20,000 angler days are expended annually to harvest 5,000 to 8,000 steelhead.

The trend in angler catch appears to be rising. Average catch per decade was 4,300 in the 1970's and 6,500 for the 1980's (Table 2).

APPENDIX TABLE 1. Estimated and Calculated Steelhead Populations and Catch from the Sacramento River Above the Feather River.

Year	RBDD Counts	Estimated Population 1* 2*	Calculated Population	Estimated Catch 3* 4* 5*	Calculated Catch
1953		14,400		3,619	
1954		28,400		11,431	
1955		28,320		9,769	
1956		18,380		7,994	
1957		19,410		6,263	
1958		14,340		6,544	
1959					
1960					
1961					
1962			18,172	6,410	
1963			25,938	10,720	
1964			34,497	15,470	
1965			33,290	14,800	
1966	13,011		36,955		16,834
1967	17,416		46,480	22,120	
1968	13,648		31,565	13,843	
1969	11,590		44,600	21,077	
1970	10,876		31,643	13,886	
1971	5,641	25,510		11,460	
1972	7,978	24,444		10,561	
1973	6,101	17,334		4,247	
1974	5,205	19,136		4,953	
1975	8,196		25,957		10,731
1976	5,928		20,775		7,855
1977	2,467		12,870		3,468
1978	3,487		15,200		4,761
1979	10,994		32,347		14,277
1980	2,898		13,854		4,014
1981	2,394		12,703		3,375
1982	3,150		14,611		4,334
1983	1,969		11,733		2,837
1984	4,404		17,296		5,924
1985	3,358		14,903		4,595
1986	2,809		13,648		3,899
1987	1,796		11,336		2,616
1988	432		8,222		818
1989					

1* 1953-58 from Fish. Bull. 114.
2* 1971-74 preliminary office data.
3* 1953-58 from Fish. Bull. 114.
4* 1962-65 from Dralle & Van Woert Admin. Rept.
5* 1967-74 from Rowell, AFB Office Rept.

APPENDIX TABLE 2. Adult Steelhead Counts At Selected Locations.

Year	Coleman Fish Hatchery	RBDD	Mill Creek	Deer Creek	FEATHER RIVER River		FEATHER RIVER Hatchery	AMERICAN RIVER River a*, b*	AMERICAN RIVER Nimbus Hatchery	Mokelumne River Hatchery
1953	424		715							
1954	960		1,492							
1955	1,063		1,213							
1956	889		1,443							
1957	962		1,301							
1958	816		790				NA		51	NA
1959	992		417				NA		102	NA
1960	1,653		742				NA		491	NA
1961	1,739		1,222				NA		316	NA
1962	1,486		2,269				NA		137	NA
1963	1,737		1,158	53			NA		2,141	NA
1964	2,965			1,006	832		416		1,216	NA
1965	1,643				1,828	c*	914		778	15
1966	1,532				868	c*	434		874	30
1967	3,229	13,011			1,126	c*	563		642	17
1968	4,939	17,416			2,010	c*	1,005		1,183	103
1969	4,046	13,648			968		361		3,066	24
1970	3,742	11,590			422		224		1,734	134
1971	1,486	10,876			156		78		3,033	215
1972	2,645	5,641			576		288	19,583	2,256	4
1973	1,834	7,978			2,184		1,000		2,506	11
1974	1,099	6,101			2,186		715	12,274	3,157	18
1975	2,162	5,205			3,605		758		2,164	2
1976	2,069	8,196					573		3,181	0
1977	697	5,928					163		1,307	0
1978	865	2,467					131		619	0
1979	4,264	3,487	280				189		680	0
1980	1,118	10,994					314		1,310	0
1981	945	2,898					547		821	0
1982	938	2,394					891		3,190	0
1983	529	3,150					1,238		1,003	0
1984	2,565	1,969					783		5,155	0
1985	2,604	4,404					1,721		910	0
1986	850	3,358					1,554		1,193	0
1987	915	2,809					1,018		1,431	48
1988	286	1,796					1,254		705	0
1989	99	432					1,106		289	
1990	1,319	2,322	d*				1,445		594	

a* Staley (1976).
b* Preliminary field estimates from Fred Meyer.
c* Interim Facility fish counts.
d* Preliminary estimate from Dick Painter.

APPENDIX TABLE 3. Angler Catch Estimates for Steelhead from Tributaries of the Sacramento River 1963 - 1988.

Year	Feather River	American River
1963	416	
1964	914	
1965	434	
1966	563	
1967	1,005	
1968	484	
1969	211	
1970	78	
1971	288	
1972	1,184	5,369
1973	1,474	
1974	2,858	3,265
1975		
1976		
1977		
1978		
1979		
1980		
1981		
1982		
1983		
1984		
1985		
1986		
1987		
1988		