PERFORMANCE REPORT

STATE: California_____ PROJECT NUMBER: ATS-16-4_____

PROJECT TYPE: Anadromous Fish Research

PROJECT TITLE: Coastal Steelhead Study

PERIOD COVERED: July 1, 1975-June 30, 1976

PROJECT OBJECTIVES: 1) Evaluate stocking hatchery-reared steelhead smolts in California's north coast streams.

2) Locate suitable rearing pond sites and water supplies in north coast river drainages.

3) Evaluate use of cages for rearing steelhead smolts.

JOB 1. Evaluation of hatchery contribution to winter-run steelhead sport fisheries and spawning escapements.

Job Objectives: (1) To determine the river sport catch and escapement of hatchery origin winter-run steelhead in selected north coastal rivers.

(2) To determine the cost of artificially generating a sport-caught adult winter-run steelhead.

(a) Activity: Creel census—Gualala, Garcia and Mad Rivers' winter steelhead fisheries.

A creel census was conducted on the above three study streams for hatchery-origin, winter steelhead fin-clipped by the project and released in the springs of 1973 and 1974 in the Gualala and Mad Rivers, and in all three study streams in spring 1975. This was the fourth consecutive season of censusing the Gualala and Garcia Rivers and the third consecutive season of censusing Mad River.

The Mad River was censused from December 1 through March 31: the Gualala and Garcia Rivers were censused from December 1 through February 29. The periods sampled effectively covered the respective winter steelhead fisheries. On the Gualala and Garcia Rivers, anglers were canvassed at creel check stations; on Mad River, a combination creel check station-roving creel census was employed.

Angler-caught steelhead encountered in the census were sampled for sex, fork length, weight, marks, and scales. On all three streams, water turbidity samples were taken every census-day morning.

(b) Target date for achievement: June 30, 1978.

(c) Pate of accomplishment: In progress.

(d) Significant deviations: None.

(e) Remarks: Synopses of the respective fisheries follow. Census data for all salmonids encountered are given in Table 1.

Table 1

Creel Census Summary: 1975-76 Winter Steelhead Fisheries; Mad, Gualala and Garcia Rivers

Parameter estimated	Item	Steelhead Fishery Mad River (Dec.-Mar.)	Gualala River (Dec.-Feb.)	Garcia River (Dec.-Feb.)
Effort	Angler-hours	25,018	27,899	5,778
	Angler- days	11,191	5,936	1,926
	Average angler-day (hours)	2.24	4.70	3.00
Catch	Steelhead 1\	1,200(9.3)2\	1,418(17.0)	242(3.0)
	King salmon	22(15.9)	0	0
	Silver salmon	7	10	3
	Trout 3\	381(76.9)	-incomplete-	85
Success	Steelhead catch-per-angler-hour	0.048	0.051	0.042 \sic

1\ Rainbow trout >=\ 33 cm (13 inches) FL.
2\ Percent estimated released in parentheses.
3\ Salmonids < 33 cm (13 inches) FL.

Mad River: From December 1, 1975 through March 31, 1976, estimated total angler effort on Mad River was 25,018 angler-hours. Effort last year for the comparable period was 15,503 angler-hours. An exceptionally mild winter, with accompanying low rainfall, provided the opportunity for the increased effort this year. We considered the river "fishable" (i.e., measured turbidity 30 JTU or less) on 64 (53%) of the 122-day season.

The estimated winter steelhead catch was 1,200 fish for an estimated angler success rate of 0.048 steelhead/hour (20.8 hours/ steelhead). Last season, anglers averaged 0.062 steelhead/hour (16.1 hours/steelhead).

We sampled 419 sport-caught steelhead this season. They averaged 59.0 cm FL and about 2.1 kg, round weight. The largest steelhead sampled was 96 cm FL and weighed 10 kg.

Anglers creeled an estimated 101 project fin-clipped steelhead, bringing" to 174 the estimated number of project fin-clipped steelhead taken in Mad River winter steelhead fisheries over the last three seasons (Table 2).

Table 2

Hatchery Steelhead Returns to Mad, Gualala, and Garcia River Winter Steelhead Fisheries through March, 1976
(x = returns forthcoming)

Mark	Brood year	Date released	Number release	Size	Number creeled Age 2	Age 3	Age 4	Cumm. percent
Gualala River								
RP	1972	4/23/73	20,405	15.2/kg	18	2	14	0.17
RV	1973	4/17 to 5/16/74	8,532	20.7/kg	15 *1	20 *3	X	0.41
LV	1973	4/17 to 5/16/74	7,102	20.7/kg	10 *2	14 *4	X	0.34
LP	1974	4/16/7S	10,036	19/kg	0 *5	X	X	0.00
RP	1974	4/17 to 23/75	14,600	16/kg	3 *6	X	X	0.02
Garcia River								
RV	1974	4/3/75	9,900	22/kg	9	X	X	0.09
LV	1974	4/4/75	14,875	19/kg	18	X	X	0.12
Mad River								
LP	1972	5/7/73	30,484	22/kg	0	55	23	0.26
RP	1972	5/7/73	30,277	42/kg	0	18	5	0.08
Ad	1973	3/30 & 31/74	20.391	37.5/kg	0	8	X	0.04
RP	1974	3/25/75	20.310	25Ag	18	X	X	0.09
LP	1974	3/25/75	10,090	20/kg	18	X	X	0.18
Ad-LP	1974	3/25/75	10,055	15Ag	29	X	X	0.29

*1 An additional 17 fish were caught in the Garcia River.
*2 An additional 6 fish were caught in the Garcia River.
*3 An additional 2 fish were caught in the Garcia River.
*4 An additional 8 fish were caught in the Garcia River.
*5 An additional 5 fish were caught in the Garcia River.
*6 An additional 11 fish were caught in the Garcia River.

Additional returns of marked fish are anticipated over the next two seasons.

Mad River Hatchery received 37 project fin-clipped steelhead during the winter of 1975-76 (Table 3).

Table 3

Project-marked Steelhead Recovered at Mad River Hatchery, Winter 1975-76

Brood year	Mark	Number recovered	Size range (cm FL)
1972	LP	9	66.0-87.0
	RP	1	87.0
1973	Ad	3	54.5-67.0
1974	LP	12	19.0-48.5
	RP	3	33.0-39.0
	Ad-LP	9	33.5-43.0

Gualala River: Gualala River effort (27,899 angler-hours) was up from last season an estimated 91%. Low rainfall and low clear flows most of the winter provided the opportunity for the increased pressure. We considered the river "fishable" all but three days of the 91-day steelhead season (considered to be December 1 through February 28).

For the season, anglers averaged 0.051 steelhead/angler-hour (19.6 hours/steelhead). Last season, anglers averaged 18.5 hours of effort/steelhead. The estimated steelhead catch this season was 1,418 fish, of which 17% was estimated released. The catch last season was an estimated 793 fish, of which 23% was estimated released.

Unusually low clear flows most of the winter rendered the fish highly visible to the anglers; the fish, however, were highly wary of the anglers. We observed no spectacular catches this season like those observed in 1974-75, when in two days 244 anglers sampled had creeled 135 steelhead.

Sport-caught steelhead sampled on the Gualala this season averaged 67.2 cm FL (about 3.2 kg, round weight). This was up about 4 cm from the season before. Male steelhead outnumbered females 1.00 to 0.92.

We estimated 51 project fin-clipped steelhead were taken by Gualala anglers this season (Table 2). An additional 26 project:-marked steelhead, planted in the Gualala River, were estimated in the Garcia River catch. Additional mark returns are anticipated in the Gualala for two more seasons.

Garcia River: hours) was about double last season's effort (5,778 hours vs. 2,385 hours) due to low, clear river flows much of the season. The estimated steelhead catch (242 fish) was up 84 fish (53%) from last season. The 1975-76 steelhead angler success rate was 0.042 steelhead/angler-hour (23.8 hours/steelhead). Last year, Garcia anglers fished an average of 18.2 hours/steelhead. The average length of steelhead sampled in the creel on the Garcia this season was 62.1 cm FL (about 2.5 kg, round weight).

We estimated 27 Garcia-released, project-marked steelhead were harvested in the Garcia River this season (Table 2). No marked fish released in the Garcia were seen in the Gualala in 1975-76.

(f) Recommendations: Job 1 should be continued through June 1978 to permit completion of sampling for the 1974 brood releases, and preparation of the Job Final Report.

(g) Cost: $50,000.

(a) Activity: Adult Tagging—Gualala and Garcia Rivers

Garcia River: Beginning November 1, we placed one wire fyke trap in each of three holes (Piling, Lower Bend and Upper Bend) in the lower Garcia River to capture upstream-migrating

steelhead adults for tagging. The Piling Hole trap was a circular trap, 3 m in diameter and 6 m long, equipped with two 3.7 m-long skids made of metal highway guard-railing. A wire-cable pulley, stretched across the river, was used to drag the trap in and out of the hole during servicing operations. In Lower Bend Hole, we placed a 4.6 m-long, 1.8 m-diameter circular trap that could be rolled out of the water with a hand winch. In Upper Bend Hole, we put another 4.6 m-long, 1.8 m-diameter circular trap. The mouth of this trap was modified to form a l.8 m x 6.l m rectangular opening. It was lifted from the water with a special boom arrangement and hand winches.

The traps were checked every Monday, Wednesday and Friday morning.

In early January, all three traps were removed from the Garcia due to poor trapping success which we believe was due to the low, clear water conditions that persisted most of the winter. During two months of trapping only three steelhead were captured and tagged in the Garcia.

Gualala River: Between December 1 and 4, we placed three 6.1 m-long, 3 m-diameter circular wire fyke traps in the lower Gualala River to catch upstream migrating adult steelhead. The traps were checked every Monday, Wednesday, and Friday morning by rolling them from the water with a bumper-mounted electric winch. The traps were fished through April.

We used a gill net for the first time this season on the Gualala River to capture adult steelhead for tagging. The gill net used was 27.4 m long x 3.7 m deep, and fitted with a total of four alternating, equal-length panels of 8.3 and 8.9 cm bar-mesh netting. The net was fished stationary.

We began netting December 17, soon after the first major school of steelhead had moved into the river, as indicated from angler catches. Netting operations were terminated April 28 after 196.5 hours of gill netting effort.

We tried both day and night sets. Night sets were far more successful, due, we believe, to the low, clear water conditions that persisted most of this winter and spring.

Back-pack electrofishing was not done this year in order to devote more time to gillnetting.

Each steelhead captured this year was tagged with a $5 reward, Floy FD-68B anchor tag, double marked by punching a small hole in the upper lobe of the tail fin (to assess tag loss), sexed, measured in cm FL, and examined for marks.

(b) Target date for achievement: May 1, 1977.

(c) Date of achievement: In progress.

(d) Significant deviations: Original plans called for development of population estimates for adult steelhead in both the Gualala and Garcia Rivers using fish captured and tagged from wire fyke traps. Persistent low, clear water conditions in both rivers made the traps ineffective. Trapping in both rivers was halted, and available resources concentrated on the Gualala, where enough steelhead were captured with gill nets to provide data for a good population estimate. Inadequate numbers of steelhead were tagged in the Garcia to permit development of an estimate of the Garcia population.

(e) Remarks: A total of 518 steelhead was captured this season in the Gualala River: 505 by gill net and 13 by fyke traps. Three hundred and twenty-three fish were in fresh (unspent) condition, and were suitable for tagging; 28 fish were in fresh condition but were unsuitable for tagging (weak or bleeding); and 167 fish were spent and were not acceptable for tagging (Table 4).

Table 4

Monthly Steelhead Tagging Data,
Gualala River, December 17, 1975-April 28, 1976

Month	No. fresh steelhead		Number spent (not tagged)	Total	Tagging effort (gill-net hours)	Fresh steelhead catch/hour (gill-net only)
	Not tagged	Tagged				
December	1	62	0	63	21.50	2.93
January	16	72	0	88	48.25	1.82
February	9(1)	*136(3)	7(1)	152(5)	51.25	2.83
March	1	44(4)	109(2)	154(6)	56.75	0.79
April	1	9	51(2)	61(2)	18.75	0.53
TOTALS	28(11)	323(7)	167(5)	518(13)	196.50	1.79

* ( ) indicates steelhead captured in fyke traps; number to left is total of fyke trap and gill net catches.

Monthly gill-net catch rate data indicates the latter half of December and the month of February were the peak periods of fresh steelhead abundance near the mouth of the river this season. For the season, the fresh steelhead gill-net catch/hour was 1.79 fish.

Thirty-six, Project fin-clipped steelhead were netted in the Gualala this season (Table 5).

Table 5

Summary of Project-marked Steelhead
Netted in the Gualala River During 1975-76 Season

Brood year	Mark	Month					Total
		Dec.	Jan.	Feb.	Mar.	Apr.	
1972	RP	0	0	3(1)*	7(3)	2(4)	12(8)
1973	LV	0	5(1)	1	0(2)	0(1)	6(4)
	RV	0	1	2	1(2)	0	4(2)
TOTALS							22(14)

* Number spent steelhead in parentheses.

It is noteworthy that so many RP-marked 1972 brood year steelhead were gill-netted (20 fish) and taken in the sport fishery (14 fish—see Table 2) this year as 4-year-olds. Only two fish from this mark group were estimated taken in the fishery last season as three-year-olds. Typically, yearling hatchery steelhead releases make their greatest fishery and spawning escapement contributions as three-year-olds.

Scales from four of the gill-netted fish caught this season were examined and all four had one spawning check situated near the scale margin, indicating they had spawned last year as three-year-olds.

Indications now are that a probably greater number of these fish entered the river last season but evaded the fishery to a much greater degree than they did this season. We believe this was due to the time of year they entered the river to spawn. The netting data show the majority entered this season during March. This was probably similar to the time when they entered as three-year-olds. During the 1974-75 season the fishery was all but rained out after the month of January, and it legally closed to angling the last day of February.

The parents of these fish were also "late" (March-April) spawners. The parents were seined from the San Lorenzo River in early April 1972, in an effort to rescue a large number of adult steelhead that had been stranded by low flows in the lower river near the town of Santa Cruz. They were near-rice when seined and were spawned April 1C and 11, 1972.

Data from gill-netted fish indicates there was a general decrease in average fork length of fresh steelhead entering the Gualala as the season progressed (Table 6).

Table 6

Mean Fork Lengths of Fresh Gualala River Gill-netted Steelhead by Half-month Period, December 17, 1975-April 15, 1976

Period	Mean fork length (cm)	Sample size
December 17-31	70.1	1
January 1-15	68.4	44
January 16-31	68.5	27
February 1-15	66.1	97
February 16-29	67.9	35
March 1-15	61.8	10
March 16-31	62.4	34
April 1-15	62.3	10

The gill-net catches of unspawned fish showed no trend in abundance of one sex over the other as the season progressed. However, females dominated the spent-fish catches (Table 7).

Table 7

Percent of Total Spent Steelhead Gill Netted That Were Females

Month	Total numbers of spent steelhead netted	Percent that were females
February	7	100
March	109	92
April	51	84

Anglers returned a total of 60 tags this season: 56 from this season's tagging and 4 from fish tagged in 1974-75.

Anglers responding to a follow-up questionnaire reported keeping 46 (82%) and releasing 10 (18%) of this year's fish. In this same questionnaire, anglers reported the kind of lure on which 45 of the tagged fish were caught. Roe took 26 fish (58%); flies, 15 fish (33%); and spinners or spoons, 4 fish (9%).

All tag recoveries came from the Gualala River system except one fish tagged January 5. 1976, which was caught by an angler March 17, 1976, in the Russian River.

We used the Petersen Model *1 to compute a population estimate for the 1975-76 Gualala River steelhead run. The formula is as follows:

$$N = \frac{(M+1)\ (C+1)}{R}$$

where N = population,
M = number tagged,
C = catch or sample
R = number of tags recovered.

We tagged 323 fresh steelhead. However, four were found dead below the tagging site, and some of the others lost their tags. Tag loss, based on 25 creel-sampled, double-marked steelhead was estimated at 4%. Hence the corrected number of tagged fish is 306.

The sample size (C) includes the estimated angler catch (1,418 fish) plus the number of spent steelhead taken in the gill net (167).

Anglers returned a total of 56 tags. However, based on our creel census data, we estimated a 9% nonresponse— 2 of 22 tags observed in our creel census were not received (in the census we left it up to the anglers to send in tags). Thus, the corrected number of angler-recovered tags is 62. Two tags were recovered from gill-netted spent fish, bringing to 64 the number of tag recoveries this season.

We estimate the 1975-76 Gualala River steelhead population was 7,608 fish (95% C.I. = 6,126 to 10,379).

(f) Recommendations: 1) Fyke trapping be discontinued on both the Gualala and Garcia Rivers.

2) Tagging effort be concentrated on the Gualala River in 1976-77. Use gill nets only to catch fish for tagging.

(g) Cost: $50,000.

*1 From: Ricker, W. E. 1975. Computation and Interpretation of Biological Statistics of Fish Populations. Canada Dep. of Environment, Fisheries and Marine Service, Bulletin 191, 382 p.

(a) Activity: Steelhead Scales Analyses.

All sea-run steelhead encountered by creel census crews during the 1975-76 season were sampled for scales. Samples were then impressed on cellulose acetate slides and filed for later analysis.

As time permitted, remaining juvenile scale samples collected in past years were projected, analyzed and measured. Scale sample data were recorded in a form suitable for computer key-punching.

(b) Target date for achievement; June 1978.

(c) Date of accomplishment: In progress.

(d) Significant deviations: None.

(e) Remarks: None.

(f) Recommendations: Future scale sampling be restricted to project fin-clipped fish only.

(g) Cost: $6,000.

Prepared by: L. B. Boydstun

L. B. Boydstun

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