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SPORT FISHERIES OF THE EEL RIVER, 1972-73

Memorandum Report

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State of California
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DEPARTMENT OF FISH AND GAME

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FOREWORD

This report was prepared from field studies by the Contract Services Section to fulfill a contractual commitment to the Department of Water Resources under Work Authority 1257-0184, the Middle Fork Eel River Investigation.

The primary purpose of this report is to describe the fishing use and sport catch within the major parts of the Eel River system (Middle Fork, South Fork, and main Eel Rivers).

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by

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ABSTRACT

A creel and angler use survey was conducted from September 1972 through August 1973 on the Middle Fork Eel, South Fork Eel and main Eel rivers. Approximately 53,600 angler days (202,500 hours) of use were expended during the year and about 27,100 fish were caught. The catch was made up of approximately 900 American shad (Alosa sapidissima), 600 silver salmon (Oncorhynchus kisutch), 2,400 fall run king salmon (Oncorhynchus tshawytscha), 14,200 juvenile steelhead (Salmo gairdneri), 2,500 half-pounder steelhead (Salmo gairdneri), 400 spring run steelhead (Salmo gairdneri), 4,300 winter run steelhead (Salmo gairdneri), and 1,800 redtail surfperch (Amphisticus rhodoterus). No fish was observed in an angler's catch at turbidities that exceeded 30 Jackson Turbidity Units.

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INTRODUCTION

The Eel River has supported both sport and commercial fisheries for well over a century (Burns et al, 1972). Eel River salmon contribute to the ocean sport and commercial fisheries, and along with steelhead, they support significant river sport fisheries (U. S. Fish and Wildlife Service, 1960). River sport fishing, which is mostly for these anadromous species, is seasonal and it is dependent upon angler access, streamflow and turbidity.

The Department of Water Resources, the U. S. Bureau of Reclamation, and the U. S. Corps of Engineers have studied the Eel River system for possible water project development. If a project is built within the Eel River system, it would affect fishing by blocking fish passage and changing the streamflow regime. Some projects would prolong river turbidity (Burns et al, 1972). In order to evaluate the potential impact of the water projects, it was necessary to gather data on current angler use and sport fish yield. These data indicate the present status of the Eel River sport fisheries and they provide a base for projecting and comparing changes in the fisheries which may result in the event of water project development.

In the past, estimates of angler use and catch in the Eel River have been derived from studies designed to describe fisheries in short reaches of the river for specific fishing seasons (Murphy and DeWitt, 1951; Day, 1968), or the estimates of angler use and catch for the entire river have been based upon very limited data (U. S. Fish and Wildlife Service, 1960; California Department Fish and Game, 1966; Anderson, 1972; and Burns et al, 1972). In my study, the fisheries statistics are derived from data collected from most of the Eel River system for a full year.

Like the previous studies, however, my data are somewhat limited and they preclude the establishment of confidence intervals for my estimates. Nevertheless, my estimates provide information useful for planning and evaluating potential water development projects. My survey was carried out in the Middle Fork Eel, the South Fork Eel and the main Eel Rivers. Although the Van Duzen River is an important and productive tributary to the Eel River, great distances of travel precluded including it in the overall survey. However, some aerial counts of anglers were made on the Van Duzen River and an estimate of angler use in the Van Duzen River is included in this report.

The objectives of my study were: (1) to estimate the existing level and seasonal trends of angler use, (2) to estimate the catch of various fish species, and (3) to determine the relationship between angler use and success, and water turbidity.

METHODS

I surveyed the Eel River sport fisheries from September 1, 1972 through August 31, 1973. Since anglers are distributed seasonally throughout 300 miles of river, I divided the main Eel, the South Fork and the Middle Fork Eel Rivers into nine census areas (Figure 1). Both aerial flights and ground surveys were used to record angler use, while a roving, ground census was used to sample angler success.

Angler Use

Aerial Flights

Angler use was observed on 38 days of low-level aerial flights along the main Eel, the South Fork and the Middle Fork Eel Rivers. In addition, 23 days of flights were made along the Van Duzen River. The flights along

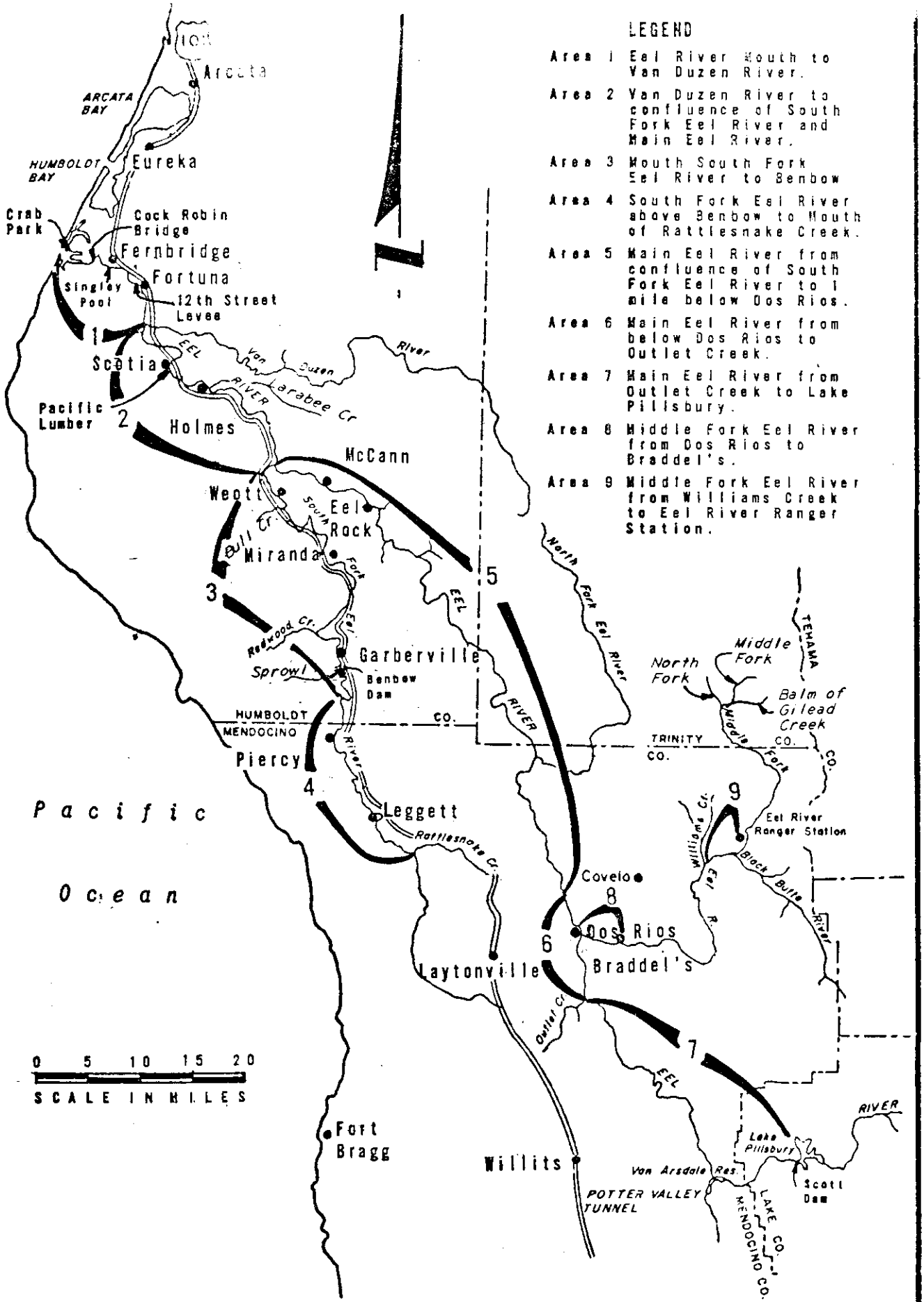

Figure 1. Eel River Creel Census Areas, 1972-73.

the Van Duzen River were made as part of a Department of Water Resources' survey of recreational use of the Eel River system (Smith et al, 1974). Two flights were made each survey day and each flight took about 2 hours. Generally, the first flight began at 0900 and the second at 1400. Both flights began either at Lake Pillsbury, at the Eel River Ranger Station, or at the mouth of the main Eel River. The starting point was alternated each day. The flights along the main Eel, South Fork and Middle Fork Eel rivers complemented surveys on the ground, making it possible to: (1) verify no fishing use in areas of remote access, (2) detect shifts in the distribution of anglers which were related to changes in stream conditions or fish movement, and (3) estimate boat angler use in the lower river where poor access made it impossible for ground personnel to see all boats.

Ground Surveys

Use counts and angler interviews were made concurrently in each area. The number of days each area was surveyed ranged from 84 days in Area 1 to 10 days in Area 5 (Table 1). No ground survey was made in the Van Duzen River. The number of days each area was surveyed was based on previous creel census data and on observations of angler distribution during aerial flights. Initially, I planned to use the aerial counts of anglers to estimate angler use; however, several plane flights had to be cancelled because of bad weather and not enough data were collected for reliable estimates. Consequently, I had to rely heavily on the ground counts to estimate angler hours.

Four angler counts, which took about 1 hour each, were made each survey day. In the fall, these counts were at 0700, 0930, 1300 and 1630 hours. The hour of the day of each count was adjusted seasonally to compensate for changes in day length. The counts within a day began at one

TABLE 1

Eel River Areas and Number of Days of Ground and Aerial Surveys, 1972-73

Area Number	Location	Number of Days of Counts																			
		Sep		Oct		Nov		Dec		Jan		Feb		Mar		Apr		May		Jun		Jul		Aug		Total	
		G	A	G	A	G	A	G	A	G	A	G	A	G	A	G	A	G	A	G	A	G	A	G	A	G	A
1	Eel River mouth to Van Duzen River	15	3	18	5	7	3	1	1	0	1	0	1	3	1	2	3	2	2	12	5	11	6	13	4	84	35
2	Eel River from Van Duzen River to confluence of South Fork Eel River and main Eel River	0	3	7	5	3	4	4	1	2	1	2	1	4	1	0	2	3	4	5	5	4	6	2	4	36	37
3	Mouth of South Fork Eel River to Benbow	1	3	0	5	2	4	1	0	3	1	1	1	3	1	4	3	5	4	2	5	5	6	1	5	[illegible]	
4	South Fork Eel River above Benbow to mouth of Rattlesnake Creek 1/	0	3	0	5	0	4	0	0	1	1	3	1	0	1	4	3	4	4	3	5	2	6	0	5	[illegible]	
5	Main Eel River from confluence of South Fork Eel River to one mile below Dos Rios	0	2	0	5	0	4	1	1	1	1	0	1	0	0	0	3	3	3	4	5	1	5	0	4	[illegible]	
6	Main Eel River from below Dos Rios to Outlet Creek	4	3	2	5	5	4	10	1	1	1	3	1	4	1	5	3	2	4	0	4	0	4	0	4	36	[illegible]
7	Main Eel River from Outlet Creek to Lake Pillsbury	2	3	2	5	0	4	0	0	0	1	0	1	0	0	0	0	1	3	4	4	6	4	1	4	18	[illegible]
8	Middle Fork Eel River from Dos Rios to Braddels	3	3	2	5	5	4	10	1	1	1	3	1	4	1	5	3	2	4	0	3	0	3	0	1	34	[illegible]
9	Middle Fork Eel River from Williams Creek to Eel River Ranger Station 2/	4	3	2	5	4	4	6	1	1	1	3	1	4	1	5	3	10	4	[illegible]		0	3	0	4	43	[illegible]
10	Van Duzen River from mouth to Bridgeville	0	1	0	1	0	2	0	1	0	1	0	1	0	0	0	3	0	3	0	3	0	3	0	4	[illegible]	

G = Ground survey; A = Aerial survey.

1/ Access is remote on South Fork Eel above Rattlesnake Creek; consequently, no angler use was assumed above Rattlesnake Creek.

2/ No access is available between Braddels and Williams Creek; consequently, no angler use was assumed in this area.

end or the other of the area to be surveyed. The beginning point was alternated on the next survey day. Areas 1, 2, 3, 4, 5 and 7 were surveyed on separate days; whereas, areas 6, 8 and 9 were surveyed simultaneously within the same day. Within these three areas the count began either at the Eel River Ranger Station or at the confluence of Outlet Creek and the main Eel River. The starting point was also alternated each day. Counts of anglers from each area were recorded separately. Vehicles of fishermen were counted when the fishermen were not in view. The number of fishermen per vehicle was determined later through angler interviews.

I estimated daily use by multiplying the average of the four counts by the number of hours of daylight (10 to 14 hours, depending on the season). Total hours of use for the year were calculated by stratifying river area (Table 1) and season (Table 2). Streamflow and turbidity were also considered in determining the number of days that fishing occurred within a stratum. Since my data showed that there was no difference in weekday, holiday or weekend use in Areas 1 through 8 (Ralph Carpenter, Department of Fish and Game; Ralph Hinton, Department of Water Resources, personal communications), I did not separate these days into separate strata.

TABLE 2

Seasonal Strata Used for Determining
Angler Use and Catch in the Eel River, 1972-73

Area	Strata
1	Sep.; Oct.-Nov. 3; Nov. 4-Dec.; Jan.-Mar.; Apr.-May; June; July; and Aug.
2	Sep.; Oct.; Nov.-Dec.; Jan.-Feb.; Mar.-May; June; and July-Aug.
3	Sep.-Oct.; Nov.-Dec.; Jan.-Feb.; Mar.; Apr.; May; and June-Aug.
4	Sep.-Oct.; Nov.-Dec.; Jan.-Mar.; Apr.-May; and June-Aug.
5	Sep.-Oct.; Nov.-Dec.; Jan.-Mar.; Apr.-May; and June-Aug.
6	Sep.-Oct. 15; Oct. 16-Nov.; Dec.-Jan.; Feb.-Mar.; Apr.-May; and June-Aug.
7	Sep.-Nov. 16; Nov. 17-Dec.; Jan.-May 25; May 26-June; and July-Aug.
8	Sep.-Oct.; Nov.; Dec.-Jan.; Feb.-Mar.; Apr.-May; and June-Aug.
9	Sep.-Oct.; Nov.-Dec.; Jan.-Feb.; Mar.-Apr. 13; Apr. 14-June 15; and June 16-Aug.

Creel Census

Fishermen were interviewed in a roving census. Areas 1, 2, 3, 4, 5 and 7 were surveyed on separate days, whereas Areas 6, 8 and 9 were all surveyed within 1 day. Anglers were contacted in each part of the area only once during the day. Interview time was divided evenly so that one-third of the area was surveyed between the first and second use counts, one-third was surveyed between the second and third counts, and one-third was surveyed between the third and fourth counts. On days when fishing pressure was heavy, it was necessary to interview every other angler or sometimes fewer. Information obtained from each angler included:

1. Elapsed fishing time
2. Complete (finished fishing for the day) or incomplete fishing effort
3. Boat or shore angler
4. Fish caught separated in the following categories:
    a. juvenile steelhead (less than 230 mm - 9 inches) in Areas 1, 2 and 3
    b. half-pounder steelhead (from 230 to 430 mm - 9 to 17 inches)1/ in Areas 1, 2 and 3
    c. juvenile steelhead (less than 380 mm - 15 inches) in Areas 4 through 9
    d. adult steelhead
    e. silver salmon
    f. king salmon
    g. shad
    h. other species
5. Fish fork length and weight
6. Marked fish

1/ Murphy and DeWitt (1951) describe an Eel River half-pounder as a sea run rainbow trout that is from 9 to 17 inches fork length.

7. Number of anglers per vehicle1/

8. County of residence

Estimates of catches of American shad, juvenile steelhead, spring-run steelhead and redtail surfperch were determined by multiplying the catch per hour of each species by the estimate of angler hours of use in each river area for a given seasonal stratum (Table 2). It was not possible to separate hours fished for silver salmon from hours fished for king salmon, winter steelhead or half-pounder steelhead because of similar fishing methods and fishing seasons; therefore, the catch estimates for these species were determined by the formula: catch of a given species = $\frac{S}{T}$ EC. S is the number of fish of a given species observed in the creel census; T is the total of all salmon, half-pounder and winter steelhead observed in the creel census; and EC is the estimated catch of all salmon, half-pounder and winter steelhead (derived by multiplying catch per hour for these fishes by angler hours).

Turbidity and Number of Fishable Days

A water sample was collected each time an area was surveyed so that the relationship between angler use and success and water turbidity could be examined. Water samples were taken to the Department of Water Resources facility in Red Bluff where turbidity (JTU) was determined using a Hach colorimeter.

The number of days a given river area was fishable was determined by examining the relationship between turbidity, streamflow and angler use within that river area. The number of fishable days in a given area at a

1/ To obtain accurate information, the interviewer asked each angler to identify other members of his party. This information was used to calculate an estimate of use when only vehicles belonging to anglers were visible in Areas 1, 6, 8 and 9.

given period was used in computing the angler use estimate. However, adjustments were made to these numbers because of seasonal closures described in the 1973 California Sport Fishing Regulations and known periods of no angler use.

RESULTS

Angler Use

Anglers spent about 202,500 hours fishing in the main Eel, Middle Fork Eel and South Fork Eel rivers from September 1, 1972, through August 31, 1973 (Table 3). A rough estimate of angler use in the Van Duzen River, which was based on aerial counts of anglers, is about 20,000 angler hours. Use in Areas 1 through 9 includes 171,800 hours of shore fishing and 30,700 hours of boat fishing. Anglers were observed fishing from boats only in the lower main Eel River (Areas 1, 2 and 5) and in the lower South Fork Eel River (Area 3). An average angler day for shore fishermen was 3.7 hours, while boat fishermen put in a longer day, 4.3 hours. In terms of angler days, shore fishermen expended about 46,400 in the main Eel, South Fork Eel and Middle Fork Eel rivers and about 5,400 in the Van Duzen River. Boat fishermen expended about 7,100 angler days.

Area 1 (main Eel River from the mouth upstream to the Van Duzen River) received more fishing pressure than any of the other eight areas. Fishing effort was greatest in Area 1 from September through the first week of November and during the last week of August, when fishermen sought half-pounder steelhead, fall-run king salmon, winter-run steelhead and silver salmon (Table 4). Fishing for these species from December through March was hampered by high flows and turbid water. Fishermen fished in

TABLE 3

Total Angler Hours Expended by
Shore and Boat Fishermen in the
Eel River, 1972-73

River Area	Shore Fishermen (Angler Hours)	Boat Fishermen (Angler Hours)	Total Use	Percent of Total Use
1	67,080	23,510	90,590	41
2	9,830	3,810	13,640	6
3	30,410	1,670	32,080	14
4	10,000	0	10,000	5
5	3,950	1,660	5,610	2
6	10,340	0	10,340	5
7	31,390	0	31,390	14
8	1,090	0	1,090	1
9	7,720	0	7,720	3
Subtotal Areas 1-9	171,810	30,650	202,460	91
Van Duzen River	20,000	0	20,000	9
Total	191,810	30,650	222,460	100

TABLE 4

Angler Use and Catch by Season in
Area 1 and Area 2 of the Eel River,
1972-73

Seasonal Strata	Angler Hours	Estimated Catch					
		Redtail Surfperch	American Shad	Silver Salmon	King Salmon	Steelhead Half-Pounder	Steelhead Winter Run
			Area 1				
Sep.	19,846				54	1,063	54
Oct.-Nov. 3	47,906			237	1,589	857	184
Nov. 4-Dec.	6,091						
Jan.-Mar.	0						
Apr.-May	4,004	180					
June	4,738	1,516	853				
July	2,610	107					
Aug.	5,392	44				34	11
	Total	1,847	853	237	1,643	1,954	249
			Area 2				
Sep.	699						
Oct.	5,261			106		141	
Nov.-Dec.	5,531			128	26		333
Jan.-Feb.	0						
Mar.-May	479					24	
June	222						
July-Aug.	1,444						
	Total	0	0	234	26	165	333

the estuary primarily for redtail surfperch from April through August. A fishery for American shad developed during a 2-week period in June on a riffle which was immediately downstream from the Van Duzen River. No shad was observed in any other reach of the river.

Area 2 (main Eel River from the Van Duzen River upstream to the South Fork Eel River) received moderate fishing use in comparison with the other river areas. Fishing for anadromous salmonids in Area 2 increased in October and continued into December as the fish moved upstream from the lower river (Table 4). Winter storms and turbid water limited fishing here as it did in Area 1.

Area 3 (South Fork Eel River from the mouth of South Fork Eel upstream to Benbow Dam) ranked second in angler use. The fishery from November through April was primarily for adult salmon and steelhead, while the fishery for the remainder of the year was primarily for half-pounder and juvenile steelhead (Table 5). The amount of fishing for juvenile steelhead was surprisingly low.

Area 4 (South Fork Eel River from Benbow Dam upstream to the mouth of Rattlesnake Creek) received only moderate use. Although no juvenile steelhead were observed in the catch, anglers fished here for both juvenile and adult salmonids. Most of the fishing for winter steelhead occurred here from January through March (Table 5).

Area 5 (main Eel River from the confluence of the South Fork Eel River to 1 mile below Dos Rios) received low use and Area 6 (main Eel River 1 mile below Dos Rios upstream to Outlet Creek) received moderate use. Most of the fishing in Areas 5 and 6 was for adult salmon and steelhead. The winter steelhead fishery developed in Area 5 from November through December (Table 5). From mid-October through January, the fishery in Area 6 was for king salmon and winter steelhead.

TABLE 5

Angler Use and Catch by Season in
Area 3, Area 4, Area 5 and Area 6,
of the Eel River, 1972-73

Seasonal Strata	Angler Hours	Estimated Catch				
		Silver Salmon	King Salmon	Steelhead		
				Juvenile	Half-Pounder	Winter Run
Area 3						
Sep.-Oct.	1,057				135	
Nov.-Dec.	16,963	133	530			66
Jan.-Feb.	9,262					2,316
Mar.	1,987					121
Apr.	788			34		34
May	428					
June-Aug.	1,595				204	
	Total	133	530	34	339	2,537
Area 4						
Sep.-Oct.	854					
Nov.-Dec.	2,534					
Jan.-Mar.	4,340					373
Apr.-May	984					
June-Aug.	1,288					
Area 5						
Sep.-Oct.	430					
Nov.-Dec.	4,515		59			
Jan.-Mar.	0					
Apr.-May	608					
June-Aug.	55					
Area 6						
Sep.-Oct. 15	110					
Oct. 16-Nov.	5,781		119			476
Dec.-Jan.	3,582		16			112
Feb.-Mar.	168					
Apr.-May	697					
June-Aug.	0					
	Total	0	135	0	0	588

Area 7 (main Eel River from Outlet Creek upstream to Lake Pillsbury) received the third highest use. Fishing here was primarily for juvenile steelhead. Most of the use occurred from May 26 through June during the opening months of the trout season. The fishery continued into mid-November (Table 6). Poor access limited angling in this area to a 11.5-mile reach just below Lake Pillsbury.

Area 8 (Middle Fork Eel River from Dos Rios upstream to Braddel's) had the lowest fishing use. Most of the fishing here was for king salmon and winter-run steelhead during December and January (Table 6).

Area 9 (Middle Fork Eel River near the Eel River Ranger Station) received moderate use. The fishery here was primarily for spring-run steelhead, and it was concentrated in April, May and June (Table 6). There was a winter steelhead fishery from January to mid-April.

Several key fishing areas were noted from the angler use counts, and these areas drew the heaviest use during good fishing. The key areas were:

Area 1. Eel River Mouth to Van Duzen River

- a. Crab Park (boat and shore)
- b. Cock Robin Bridge (boat and shore)
- c. Singley Pool (boat and shore)
- d. Fernbridge (boat and shore)
- e. Twelfth Street levee near Fortuna (boat and shore)
- f. Riffle below mouth of Van Duzen River (shore)

Area 2. Main Eel River from the Van Duzen River to the Confluence of South Fork Eel

- a. Scotia bluffs near Scotia (boat and shore)
- b. Pacific Lumber Company access road (boat and shore)
- c. Holmes (boat and shore)
- d. Near mouth of Larabee Creek (boat and shore)
- e. Near mouth of South Fork Eel River (boat and shore)

TABLE 6

Angler Use and Catch by Season in
Area 7, Area 8 and Area 9 of the Eel River,
1972-73

Seasonal Strata	Angler Hours	Estimated Catch				
		King Salmon	Steelhead			
			Juvenile	Half-Pounder	Winter Run	Spring Run
			Area 7			
Sep.-Nov. 16	8,223		8,551			
Nov. 17-Dec.	0					
Jan.-May 25	0					
May 26-June	14,600		4,351			
July-Aug.	8,565		1,276			
	Total	0	14,178	0	0	0
			Area 8			
Sep.-Oct.	24					
Nov.	374					
Dec.-Jan.	690	21			21	
Feb.-Mar.	0					
Apr.-May	0					
June-Aug.	0					
			Area 9			
Sep.-Oct.	0					
Nov.-Dec.	96					
Jan.-Feb.	842				104	
Mar.-Apr. 12	1,812				63	
Apr. 14-June 15	4,966					394
June 16-Aug.	0					
	Total	0	0	0	167	394

Catch

General Fishery Characteristics

Of 38 species of fish identified from the Eel River system, 7 were caught during the census (Table 7). About 27,100 fish were caught during the year. Most of the fish (14,200) were juvenile steelhead (Table 8). Approximately 4,300 winter-run steelhead; 2,400 fall-run king salmon; 2,500 half-pounder steelhead; 1,800 redtail surfperch; 900 American shad; 600 silver salmon; and 400 spring-run steelhead were landed. A California roach was caught incidentally with small trout below Lake Pillsbury and a brown bullhead was caught incidentally near Fortuna. Although these two fish appeared in the creel census, I did not consider it valid to estimate the total catch of these two species for the river system.

Only two marked fish were observed during the study, and these were winter-run steelhead caught on the South Fork Eel River. One fish had a left pectoral fin clipped and was probably a stray from a 1970 fish plant from Coleman Hatchery made at Clarksburg on the lower Sacramento River. The other fish had a right ventral fin clipped and was probably a stray fish planted earlier in the Klamath River system.

Distribution and Seasonal Trends in the Catch

All redtail surfperch observed were caught in the Eel River Estuary (Area 1) from April through August (Tables 4 and 8) while all American shad observed were caught in June in Area 1 (Tables 4 and 8).

Silver salmon were observed in Areas 1, 2 and 3 (Table 8). In Area 1, they were landed from October through the first week of November (Table 4); in Area 2, they were landed from October through December; and in Area 3, they were landed from November through December (Table 5).

TABLE 7

The Fishes of the Eel River Basin 1/

Common	Scientific	Species Caught in 1972-73 Creel Census
	Anadromous Species	
Pacific lamprey	Entosphenus tridentatus	
River lamprey	Lampetra ayresi	
Green sturgeon	Acipenser medirostris	
American shad	Alosa sapidissima	X
Silver salmon	Oncorhyncus kisutch	X
King salmon	Oncorhyncus tshawytscha	X
Coast cutthroat trout	Salmo clarki	
Steelhead rainbow trout	Salmo gairdneri	X
	Freshwater Species	
Kokanee 2/	Oncorhyncus nerka	
Rainbow trout	Salmo gairdneri	
Sacramento sucker	Catostomus occidentalis	
Golden shiner 3/	Notemigonus crysoleucas	
California roach	Hesperoleucus symmetricus	X
Brown bullhead	Ictalurus nebulosus	X
Green sunfish	Lepomis cyanellus	
Bluegill	Lepomis macrochirus	
Coast range sculpin	Cottus aleuticus	
Prickly sculpin	Cottus asper	
Three-spined stickleback	Gasterosteus aculeatus	
	Estuarine Species	
Pacific herring	Clupea harengus	
Pacific sardine	Sardinops sagax	
Northern anchovy	Engraulis mordax	
Surf smelt	Hypomesus pretiosus	
Longfin smelt	Spirinchus Thaleichthys	
Eulachon	Thaleichthys pacificus	
Pacific tomcod	Microgadus proximus	
Topsmelt	Atherinops affinis	
Bay pipefish	Syngnathus griseolineatus	
Redtail surfperch	Amphisticus rhodoterus	X
Shiner surfperch	Cymatogaster aggregata	
Walleye surfperch	Hyperprosopon argenteum	
Pile surfperch	Rhacochilus vacca	
Saddleback gunnel	Pholis ornata	
Kelp greenling	Hexagrammos decagrammus	
Staghorn sculpin	Leptocottus armatus	
Cabezon	Scorpaenichthys marmoratus	
Speckled sanddab	Citharichthys stigmaeus	
English sole	Parophrys vetulus	
Starry flounder	Platichthys stellatus	

1/ Species in addition to those caught by anglers were either reported by Burns, et al (1972) or captured by me during netting surveys in the estuary (Smith, et al, 1974).

2/ Kokanee were planted as fingerlings in Lake Pillsbury in 1961; however, they have not established themselves and may be absent.

3/ Golden shiner are common in Lake Pillsbury, but they are uncommon elsewhere in the Eel River.

TABLE 8

Estimated Sport Catch in the Eel River, 1972-73

River Area	Redtail Surfperch	American Shad	Silver Salmon	King Salmon	Steelhead			
					Juvenile	Half-Pounder	Winter Run	Summer
1	1847	853	237	1643	-	1954	249	-
2	-	-	234	26	-	165	333	-
3	-	-	133	530	34	339	2537	-
4	-	-	-	-	-	-	373	-
5	-	-	-	59	-	-	-	-
6	-	-	-	135	-	-	588	-
7	-	-	-	-	14178	-	-	-
8	-	-	-	21	-	-	21	-
9	-	-	-	-	-	-	167	394
Total	1847	853	604	2414	14212	2458	4268	394

King salmon were observed in the catch in all areas except Areas 4, 7 and 9 (Table 8). Most of the king salmon were landed in Area 1 from October through the first week of November (Table 4). Most of the remainder were landed in the other river areas from November through December (Tables 5 and 6).

Nearly all juvenile steelhead were landed below Lake Pillsbury in Area 7 (Table 6) during the trout season (May 26 through November 16). Only a few were caught in Area 3 (Table 5).

Half-pounder steelhead were caught in Areas 1, 2 and 3 (Table 8). Most were caught in Area 1 in September, although many were also taken from October through the first week in November.

Winter-run steelhead were caught in all areas except Areas 5 and 7 (Table 8). Most of these fish were taken in Area 3 from January through February (Table 5). Winter-run were also landed from August through April in this and other areas of the Eel River.

Spring-run steelhead were observed only in Area 9 (Table 8). These fish were taken from mid-April through mid-June (Table 6).

Size of Fish Caught

Census clerks measured 455 fish from the sport catch (Table 9). Adult winter steelhead and adult spring-run steelhead had the greatest mean fork lengths of those fish measured. They averaged 680 mm (26.8 inches). Silver salmon averaged 595 mm (23.5 inches); king salmon, 560 mm (22.0 inches); American shad, 450 mm (17.6 inches); half-pounder steelhead, 330 mm (13.0 inches); redtail surfperch, 285 mm (11.3 inches); juvenile steelhead caught in the lower river, 210 mm (8.3 inches); and juvenile steelhead caught in the upper river, 195 mm (7.3 inches). Silver salmon grilse had lengths which ranged from 420 to 470 mm (16.6 to 18.7 inches)

- TABLE 9

Length-Frequency and Weight of Angler Caught Fish, Eel River, 1972-73

Length (mm)	Juvenile Steelhead Areas 1-3	Juvenile Steelhead Areas 4-8	Half Pounder Steelhead	Adult Steelhead Winter Run	Adult Steelhead Spring Run	Silver Salmon	King Salmon	American Shad	Redtail Surfperch
100-119		2							
120-139		21							
140-159		15							
160-179		10							2
180-199	3	8							2
200-219	1	18							5
220-239	3	22							3
240-259		10	3						10
260-279		4	2						14
280-299		1	5						28
300-319		3	8				1		26
320-339		1	4						13
340-359			5						4
360-379			3						
380-399			2				1	3	
400-419			4				4	12	
420-439						2	5	12	
440-459				3		4	3	18	
460-479						1	7	8	
480-499				1			4	9	
500-519				2			2	3	
520-539				3	2			1	
540-559				1					
560-579				3					
580-599				1	2				
600-619				2	2	1			
620-639				2	1				
640-659				4	1				
660-679				5	2				
680-699				2	1		1		
700-719				8		1	2		
720-739				8	1	1			
740-759				4	1	2			
760-779				3		1			
780-799				2	1				
800-819				3	3		2		
820-839				1					
840-859									
860-879				2	1		1		
880-899				2		1			
900-919									
920-939							1		
940-959									
960-979							1		
980-999									
1000-1019							1		
1020-1039							1		
Total Sample	7	113	38	58	18	14	37	87	105
Average Length (mm)	218	185	330	860	880	595	560	450	285
(inches)	(8.3)	(7.8)	(13.0)	(26.8)	(26.8)	(23.5)	(22.0)	(17.6)	(11.3)
Average Weight (g)	125	81	330	3685	3685	2780	2660	1204	490
(lb)	(0.27)	(0.18)	(0.73)	(8.12)	(8.51)	(6.12)	(5.86)	(2.65)	(1.08)
Range of Weight (g)	75-230	15-380	175-875	9.50-8080	1600-6300	800-7300	275-14500	750-1650	125-900
(lb)	(0.16-0.51)	(0.03-0.79)	(0.38-1.48)	(2.10-17.80)	(4.00-13.88)	(1.76-16.08)	(0.61-31.94)	(1.65-4.07)	(0.28-1.98)

and they had an average length of 450 mm (17.7 inches). King salmon grilse had lengths which ranged from 310 to 500 mm (12.2 to 19.7 inches) and they had an average length of 450 mm (17.7 inches). Adult spring-run steelhead had the heaviest average weight, 3.9 kg (8.5 lb). Adult winter-run steelhead averaged 3.7 kg (8.1 lb), silver salmon, 2.8 kg (6.1 lb); king salmon, 2.7 kg (5.9 lb); American shad, 1.2 kg (2.6 lb); redtail surf-perch, 0.5 kg (1.1 lb); half-pounder steelhead 0.3 kg (0.7 lb); juvenile steelhead caught in the lower river, 0.1 kg (0.3 lb) and juvenile steelhead caught in the upper river, .08 kg (0.2 lb).

Relationship Between Fishing Use and Success and Turbidity

Turbidity was determined for 175 water samples collected from October 1972 through April 1973 from streamflows that ranged from 337.0 m^3/sec (119,000 cfs) on the main Eel River at Scotia in January to 1.1 m^3/sec (38 cfs) on the South Fork Eel River near Miranda in May. Turbidity of the samples ranged from 1,100 to 1 JTU. Inspection of graphs of streamflows versus turbidity showed that there was no precise relationship between streamflow and turbidity; however, streamflows in excess of 2,000 cfs generally made the water too turbid to fish. All of the fishing use observed in the Eel River system occurred when water turbidity was less than 100 JTU (Table 10). More than 98 percent of the fishing observed took place when turbidities were 30 JTU or less; whereas, turbidities of 30 JTU or less occurred during 76 percent of the days surveyed. Consequently, the differences in angler use and the occurrence of a given turbidity were statistically significant at the 5 percent significance level, indicating that the difference was not because of change and that angler use was significantly greater in turbidities of 30 JTU or less.

TABLE 10

Comparison of Angler Hours Fished, Observed Fish Catch, and Turbidity in the Main Eel, South Fork Eel and Middle Fork Eel Rivers From October 1972 through April 1973

Turbidity (JTU)	Hours Fished	Cumulative Percent of Hours Fished	Percent of Observed Fish Caught	Cumulative Percent of Observed Fish
0-5	18,740	84.5	92.0	92.0
6-10	1,975	93.4	6.0	98.0
11-15	660	96.4	1.0	99.0
16-20	495	98.6	0	99.0
21-25	15	98.7	0	99.0
26-30	15	98.8	1	100.0
31-35	0	-		
36-40	0	-		
41-45	0	-		
46-50	70	99.1		
51-55	5	99.1		
56-60	10	99.1		
61-65	0	-		
66-70	25	99.3		
71-75	0	-		
76-80	0	-		
81-85	0	-		
86-90	0	-		
91-95	0	-		
96-100	165	100.0	100.0	100.0
Over 100	0	-		

Most of the small amount of fishing pressure that occurred at turbidities greater than 30 JTU was by anglers who fished regardless of water conditions because they had travelled a long distance. No fish was observed in an angler's catch when turbidities exceeded 30 JTU.

DISCUSSION

The roving census and periodic plane flights were unsatisfactory methods for accomplishing the goals set for the Eel River study. The plane flights were not satisfactory for providing estimates of angler use year around because visibility was hampered by fog. In addition, several flights were cancelled in the winter and spring because of inclement weather. The accuracy of angler use and catch estimates could be increased greatly in future creel censuses on the Eel River by using more manpower or by concentrating on fewer river areas. The number of sample days required to get better estimates of angler use and catch can be determined by the optimum use allocation method using my data for 1972-73. The number of fishable days within each stratum could be more accurately determined by taking more turbidity samples.

About 33,000 catchable-sized trout were planted in Lake Pillsbury in 1972 and 1973. Some of these fish probably escaped to the Eel River when the lake spilled in the winter and spring; consequently, part of the estimated catch of juvenile steelhead in the upper Eel River was probably catchable trout.

The estimated sport catch of 900 American shad is probably conservative because several anglers said that they released their fish. Eel River American shad appear to be somewhat will-o-the-wisp by nature. These fish were observed caught only at one riffle in 1973 and they were not seen at

that riffle in 1974. Earlier investigations indicate that shad spawn as far downstream as near the Twelfth Street levee in the lower Eel (Murphy and DeWitt, 1951). Adults have been observed as far upstream as Dos Rios. An adult shad was observed in an angler's catch at Dos Rios in October 1975 (Charles J. Brown, Jr., DFG, personal communication). Apparently, the pattern of stream runoff from year to year has a good deal to do with where the fish spawn and, consequently, where they can be caught.

Trends in the Sport Fishery

The sport fishery of the lower Eel River (Area 1) was examined from June through November 1950 (Murphy and DeWitt, 1951), and the sport fishery of the Middle Fork and the upper Eel Rivers (Areas 6, 8 and 9) was examined from November 1967 through April 1968 (Contract Services Section, unpublished data). Although I used sport catch to describe the results of my study, catch rate (catch per hour) was the only statistic available for comparing my study with the earlier studies.

Murphy and DeWitt (op cit) interviewed 1,580 anglers on 55 census days. These anglers fished 2,373 hours and their observed catch was 61 half-pounders, 6 adult steelhead, 1 silver salmon, and 100 king salmon. The catch per hour of each species was: half-pounder steelhead, 0.026; adult steelhead, 0.003; silver salmon, <0.001; and king salmon, 0.042. In the same river area in a comparable time period in 1972-73, my data show that 901 anglers were interviewed on 77 sample days. These anglers fished 2,259 hours and their catch was 38 half-pounder steelhead, 5 adult steelhead, 3 silver salmon, and 24 king salmon. The catch per hour of each species was: half-pounder steelhead, 0.017; adult steelhead, 0.002; silver salmon, 0.001; and king salmon, 0.011. The sport fishery of the upper Eel River from Outlet Creek to just below Dos Rios (Area 6) was

examined from November 1967 through April 1968 (Contract Services Section, unpublished data). Six hundred and ninety-eight anglers were interviewed on 101 sample days. These anglers fished 2,391 hours and their observed catch was 47 adult steelhead and 17 king salmon. The catch per hour of steelhead was 0.020 and that for king salmon was 0.007. My studies showed that during a comparable period in 1972 and 1973, 98 anglers were interviewed on 26 days. These anglers fished 290 hours and their observed catch was 12 steelhead, 1 silver salmon, and 3 king salmon. The catch per hour was: steelhead, 0.041; silver salmon, 0.003; and king salmon, 0.010.

In the lower river, the overall catch of 0.071 salmonids per angler hour in 1950 was a little more than twice the catch rate I observed there in 1972-73 (0.031 salmonids per angler hour), and the overall catch of 0.055 salmonids per angler hour in the upper river in 1972-73 was twice that observed there in 1967-68 (0.027 salmonids per angler hour). I don't believe that data from these censuses in Areas 1 and in 6, 8 and 9 are particularly useful for demonstrating trends in fishing success. Likewise, the U. S. Fish and Wildlife Service's (1960) estimates of 80,600 angler days per year in 1956-57 and an annual catch of 68,400 trout, 3,500 salmon and 13,700 steelhead must also be compared to my data with caution. The 1956-57 values were very rough estimates based on data from several north coastal streams. Because of limited data, all streams were pooled to estimate angler use and catch per angler hour, and the relationships between the various streams were used to derive use and catch values for the Eel River (U. S. Fish and Wildlife, unpublished data report). Numbers of fish counted yearly at Benbow vary considerably from year to year (Burns, et al), and streamflow and turbidity, which regulate the number of fishing days, vary from year to year depending upon rainfall and

watershed conditions. Consequently, angler use and fishing success may vary considerably from year to year and from decade to decade. There is no doubt, however, that the Eel River watershed is presently in poor condition and that excessive erosion and turbidity accompany fall and winter storms (Brown and Haley, 1974). Not only does the erosion limit fishable days, but it also decreases the river's production of steelhead and salmon. Consequently, I conclude that the decrease in catch rate from 1950 to 1972-73 in Area 1 suggests a decline in the Eel River sport catch.

The relationship between turbidity and fishing success indicates that in the event a dam is built within the Eel River system, multiple intakes to the outlet structure would be required to provide selection of the clearest water possible for release from the reservoir. Any water project that would provide prolonged releases of turbid water (in excess of 30 JTU) would limit fishing opportunity downstream from the project.

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