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REF 90385

State of California  
The Resources Agency  
Department of Fish and Game

AN ESTIMATE OF ANGLER PRESSURE AND SPORT FISH HARVEST FROM THE  
KLAMATH RIVER BETWEEN IRON GATE DAM AND SALMON RIVER,  
INCLUDING DATA DESCRIBING THE SIZE OF ANADROMOUS FISH SPAWNING MIGRATIONS<sup>1/</sup>

by

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SUMMARY

This study was conducted to obtain estimates of angler pressure, sport fish harvest and the percent of adult steelhead (Salmo gairdneri) and adult king salmon (Oncorhynchus tshawytscha) harvested by anglers. This study will be used to evaluate water projects proposed for the Klamath River system and to evaluate current management of the Klamath River aquatic resources.

The study area included approximately 124 miles of the Klamath River in northwestern California from Iron Gate Dam downstream to its confluence with the Salmon River. The study period extended from September 1, 1968, through August 31, 1969.

A total of 158,832 angler hours were estimated to have been spent harvesting an estimated 5,091 adult steelhead, 8,998 half-pounder steelhead, 19,911 juvenile steelhead, 1,532 adult king salmon, 57 juvenile king salmon, 10 adult silver salmon (O. kisutch), and 40 juvenile silver salmon. Also harvested were an estimated 2,360 nonsalmonids.

Anglers harvested approximately 19% of the adult steelhead entering the upper three sections of the study area during the fall of 1968 and spring of 1969 (estimated 2,984 of 15,373), and about 6% of the adult king salmon entering the entire study area in the fall of 1968 (estimated 1,532 of 26,839). Results indicated the number of adult salmonids harvested may be positively correlated with the number of adult salmonids in the spawning migration. Adult female steelhead and king salmon were caught in greater proportion than the males of these species.

Of several groups of marked juvenile steelhead released from Iron Gate Hatchery into the study area, less than 5% of any group was harvested by anglers during the study period.

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<sup>1/</sup> Anadromous Fisheries Branch Administrative Report No. 72-8.  
Submitted June 1971.

## INTRODUCTION

Over the past few years, the Klamath River system has been the focus of considerable attention and concern. In 1967, the Klamath River was listed as a "degraded" stream under the Federal Water Pollution Control Act. The river is one of the largest of the Pacific Northwest, and also one of the most heavily angling for trout and salmon.

Nation-wide and regional agencies have announced a variety of projects and reservoirs for the Klamath River system which would severely affect if not completely eliminate anadromous fish passage and spawning habitat throughout the entire system from the mouth of the river, Klamath Falls, to the most downstream anadromous populations within the estuary, and a diligent examination of the effects of these proposed projects on the Klamath River system and on existing and potential anadromous fish populations is imperative.

## OBJECTIVE

The primary objectives of this study were to determine angler use and sport fish harvest in the study area, and to estimate the number of adult anadromous fish of each species migrating into the study area.

## ACKNOWLEDGMENTS

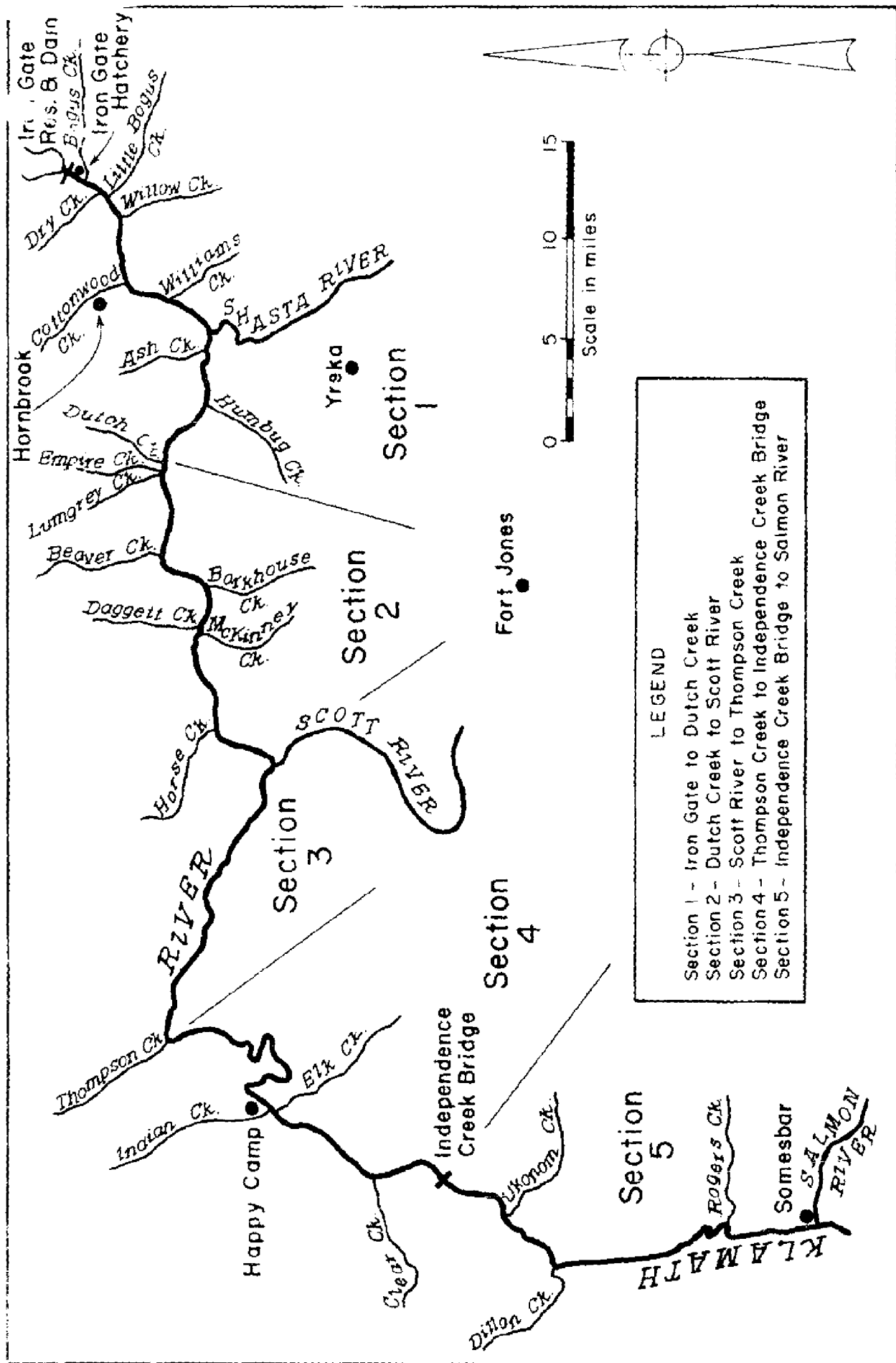
Tom Bonner and Don Davison, Fish and Game Wardens Aids, conducted almost all of the angler interviews and some of the angler counts. W. Donald Weidlein, Associate Fishery Biologist, and Donald H. Fry, Jr., Senior Marine Biologist, contributed valuable suggestions during the report drafting stage. Rob Cole, Bob Powers, and Leo Singer, Fish and Game Warden-Pilots, each piloted the Department airplane at various times throughout the study. My thanks are extended to all.

## DESCRIPTION OF THE STUDY AREA

The Klamath River originates in Lake Uvuna near Klamath Falls, Oregon. Soon after entering northern California, the river flows through Copco and Iron Gate reservoirs, and then continues through Siskiyou, Humboldt, and Del Norte counties for about 188 miles to the Pacific Ocean.

The study area extended from Iron Gate Dam down river approximately 100 river miles to the mouth of the Salmon River (Figure 1).

The mean width of the Klamath in the study area is approximately 178 feet. The elevation of the river and watershed from sea level is about 2,700 feet and at the same elevation the drainage basin is about 1,000 square miles (Figure 1).



LEGEND

Section 1 - Iron Gate to Dutch Creek  
 Section 2 - Dutch Creek to Scott River  
 Section 3 - Scott River to Thompson Creek  
 Section 4 - Thompson Creek to Independence Creek Bridge  
 Section 5 - Independence Creek Bridge to Salmon River

Figure 1. Map of study area.

during the study period, increases from 16.0°C on March 1, 1968, to 21.0°C on July 1, 1968, to 8.7°C on April 4, 1969, and 11.0°C on August 22, 1969. 8 miles below the mouth of the Salmon River, ranged from 1,170 ft on August 28 and September 1, 1968, to 1,200 ft on January 21, 1969. The temperature of the Klamath River just below Iron Gate Dam ranged from 34.7°C in February, 1969, to 23.1°C in April, 1969. Air temperature were not available for the Klamath River at the mouth of the Salmon River, but they were probably similar to those recorded at Iron Gate Hatchery. Air temperatures recorded at Iron Gate Hatchery ranged from 1 F in January, 1969, to 100 F in September, 1968. Those recorded at Somesbar, just above the mouth of the Salmon River, ranged from 22 F in December, 1968, to 110 F in July, 1969. Precipitation or rain only totaled about 18 inches at Iron Gate Hatchery and approximately 28 inches at Somesbar for the 12 month study period. (Air temperatures and precipitation data were recorded by U. S. Forest Service personnel at Ukono Ranger Station near Somesbar.)

The 124-mile study area was divided into five geographical sections as follows (Figure 1):

<u>Section</u>	<u>Description</u>	<u>River miles</u>
1	Iron Gate Dam to Dutch Creek	24
2	Dutch Creek to Scott River	23
3	Scott River to Thompson Creek	20
4	Thompson Creek to Independence Creek Bridge	28
5	Independence Creek Bridge to Salmon River	29

Each of these sections was further divided into subsections for the purpose of data collection; however, the data were summarized by major section only.

Access to the Klamath River for fishing was generally excellent within the study area, however, all riparian lands in the upper one fifth of Section 1 were posted against trespass only in 1969. The importance of this closure is discussed later in this report. Much of the river, particularly in the lower half of the study area, flowed through public land administered by the U. S. Forest Service; access to these lands was excellent. Angling access to the river, where bordered on both sides by private lands, was generally unrestricted except for the upper fifth of Section 1, as just mentioned.

County, state, or federal roads paralleled the entire length of the study area.

#### ANGLING REGULATIONS IN THE STUDY AREA

The 124-mile reach of the Klamath River was open to public angling with the following two exceptions: (1) from Iron Gate Dam to Dutch Creek, the stream was closed to all angling, and (2) from a point 1.5 miles upstream to a point 1.50 ft downstream from the mouth of the Salmon River, the river was closed to all angling from September 1 through October 31.

The study area was open all year to angling for salmon and trout. Bag limits for trout or salmon in combination were: During general trout season (April 27 - November 15, 1968; May 3 - November 15 in 1969) either (i) 10 fish, but not more than 10 lb and one fish, or (ii) three fish, irrespective of size; during remainder of year, three fish, irrespective of size.

Other pertinent angling regulations regarding trout and salmon were: (i) Snagging was unlawful. (Fish must voluntarily take hook in its mouth.) Unintentionally snagged fish were to be returned unharmed to the river. (ii) The use of any multiple hook with shortest distance between hook points greater than  $1\frac{1}{4}$  inches or shank longer than 2 inches was unlawful. (iii) Night fishing was legal for all species except trout and salmon. The lawful fishing time for salmonids was one hour before sunrise to one hour past sunset. (iv) No minimum size limits were in effect for salmon or trout or any other species of fish, except there was a 40-inch total length minimum size limit for sturgeon (Acipenser spp).

#### DESCRIPTION OF ANGLING METHODS

Boat angling in the study area consisted of one to three anglers plus an oarsman per boat. The boats were usually double ended, wooden, and about 15 ft long. The boat was usually held over favorite holes or pools for a time while the anglers cast with lures. Only infrequently would anglers be encountered in other types of boats. Most fishing boats observed during the study were under the control of a professional guide, extremely familiar with the study area. Shore angling included both bank fishing and wading.

The more common baits for adult, half-pounder and juvenile steelhead included metal or plastic spinning lures, single salmon eggs, dry flies, and night crawlers. Artificial roe clusters, fresh roe and cured roe were also used to take adult steelhead. The most popular method of angling for adult king salmon was also with fresh or cured roe, but large heavy metal lures were also used. Juvenile king salmon and juvenile silver salmon were taken incidentally while angling for juvenile steelhead; adult silver salmon were taken incidentally while angling for adult king salmon or adult steelhead.

#### METHODS

The use count and creel survey portion of this study was conducted on the main stem of the Klamath River and did not include any tributaries. The estimates of numbers of adult fish migrating into the study area included runs of fish into the various tributaries.

This study was designed to include all legal trout fishing time from sunset to sunset. Although lawful fishing time for salmonids began via law before sunrise and ended one hour after sunset, angler activity during these 1 1/2 one-hour periods was assumed to be insignificant. Therefore, no attempt was made to estimate the night catches of species such as the salmonids.

sample days were on a monthly basis and were divided into (i) weekdays and (ii) weekend days. The following holidays were classed as weekend days but were not sampled: Labor Day (Sept. 2, 1968), Thanksgiving week plus the Friday following (Nov. 28 and 29, 1968), Christmas Day (Dec. 25, 1968), New Year's Day (Jan. 1, 1969), Lincoln's Birthday (Feb. 12, 1969), Memorial Day (May 30, 1969), Independence Day (July 4, 1969). In 1969, the opening weekend of general trout season, May 2 and 3, was classed as a separate stratum. Sample days were divided into 3 or 4 time periods each of which was sampled independantly in each section. The length of these time periods varied with the length of the day in each month (Table 1).

### ANGLER COUNTS

An angler was defined as any person actively engaged in angling or a related activity such as baiting a hook, changing a lure, or walking along the riverbank carrying fishing gear. Persons walking to or from their vehicles or along the road carrying fishing gear, were not counted.

Anglers were classified as boat or shore anglers.

Angler counts were conducted by low altitude airplane flights during September, October, November, July, and August. During December, January, February, and March, foul weather and canyon fog rendered airplane flights impossible. In April, May, and June, turbid water conditions precluded virtually all angling except for the upper half of Section 1. Airplane flights using the Sacramento based Cessna for the purpose of enumerating anglers in this short reach of river would have been impractical and uneconomical.

When angler counts could not be conducted by airplane, they were accomplished by automobile from the various public roads paralleling the study area. Many times, the anglers were not visible from the road but their parked cars were. At these times, it was necessary for the counter to leave the road and walk the shoreline to count anglers. The number of days on which angler counts were conducted in each section, together with the number of days in monthly strata are shown in Table 2.

Although neither method of counting anglers (by car or plane) was particularly accurate, airplane counts of anglers were believed to yield the most accurate results. The counts of anglers in Section 1 were probably as accurate as angler counts from the plane, as public roads closely paralleled this reach of the Klamath River.

Table I

Time periods\* in Sample Day for each Month of Study

Month	Approximate Time of Sunrise †	Time period 1	Time period 2	Time period 3	Time period 4
<u>1963</u>					
September	0600 & 1800	0600-0900	0900-1200	1200-1500	1500-1800
October	0630 & 1730	0600-0900	0900-1200	1200-1500	1500-1800
November	0700 & 1700	0700-1000	0900-1200	1300-1700	
December	0730 & 1700	0700-1000	1000-1300	1300-1700	
<u>1969</u>					
January	0730 & 1700	0700-1000	1000-1300	1300-1700	
February	0700 & 1730	0730-1000	1000-1300	1300-1700	
March	0630 & 1800	0700-1000	1000-1300	1300-1830	
April	0530 & 1900	0700-1000	1000-1300	1300-1830	
May 3 & 4**	0500 & 1900	0600-1200	1200-1900		
Balance of May	0500 & 1930	0700-0900	0900-1500	1500-1900	
June	0430 & 2000	0500-0900	0900-1500	1500-2000	
July	0500 & 1930	0500-0900	0900-1500	1500-2000	
August	0500 & 1900	0500-0900	0900-1500	1500-2000	

\* All times are Pacific Standard Time.

\*\* Opening weekend of general trout season.

Table 2

Angler Counts  
Number of Days Sampled, by Section

Month	Weekend days sampled Section					Total weekend available	Weekdays sampled Section					Total weekdays available
	1	2	3	4	5		1	2	3	4	5	
<u>1968</u>												
September	3	3	2	3	3	10	3	3	3	3	3	15
October	3	2	1	3	3	8	3	3	2	2	1	11
November	2	2	2	0	0	11	2	2	2	2	2	11
December	3	3	2	2	1	10	5	2	2	2	2	11
<u>1969</u>												
January	3	4	4	3	2	9	5	5	5	4	2	21
February	7	5	2	2	1	9	8	6	3	3	2	19
March	6	6	3	4	0	10	5	2	3	2	0	11
April	1	0	2	0	2	3	14	2	2	1	2	11
May 1 & 4*	2	2	2	2	2	2	-	-	-	-	-	-
Balance of May	3	2	3	2	3	8	8	6	5	5	3	21
June	6	5	4	3	2	9	5	5	5	6	2	21
July	5	6	5	4	4	9	4	3	3	3	1	14
August	4	6	5	3	3	10	7	7	7	5	3	21
TOTALS	51	47	41	31	26	113	69	46	42	38	24	252

\* Opening weekend of general trout season.

Table 3

Angler Interviews  
Number of Days Sampled, by Section

Month	Weekend days sampled Section					Total weekend available	Weekdays sampled Section					Total weekdays available
	1	2	3	4	5		1	2	3	4	5	
<u>1968</u>												
September	6	5	5	4	3	10	7	5	6	5	4	20
October	1	1	1	3	4	8	9	7	10	6	7	23
November	5	5	6	5	5	11	7	10	10	7	5	19
December	6	6	7	4	3	10	9	8	4	4	2	21
<u>1969</u>												
January	8	6	4	2	0	9	13	6	4	2	0	22
February	6	1	1	3	0	9	11	11	3	5	2	31
March	8	1	3	6	0	10	7	4	3	2	0	11
April	1	2	1	1	0	3	15	3	1	2	1	11
May 1 & 4*	2	1	2	2	2	2	-	-	-	-	-	-
Balance of May	2	2	3	2	2	8	19	2	1	1	2	21
June	3	1	3	3	3	9	11	6	1	0	1	11
July	4	2	7	7	5	9	4	1	5	5	2	12
August	1	7	7	7	4	10	7	5	8	9	4	21
TOTALS	68	63	48	51	31	113	113	81	55	58	34	240

\* Opening weekend of general trout season.



In sections 1, 2, 4, and 7, angler counts by car were probably less accurate than the airplane counts as public roads were occasionally some distance from the river.

#### ANGLER INTERVIEWS

Angler interviews were accomplished by automobile from the various roads paralleling the study area. Because of time limitations, not every angler counted was interviewed. Interviews were conducted concurrently with angler counts during months when angler counts were accomplished by automobile but not by airplane. The number of days on which angler interviews were conducted in each section, together with the number of days in monthly strata are shown in Table 1.

The following data were obtained through angler interviews: (i) boat or shore angler, (ii) county of residence, (iii) hours fished that day, (iv) fishing day complete or incomplete, (v) fork length and weight of each fish caught, (vi) sex of each mature salmonid caught, (vii) tag number or mark on each fish caught, and (viii) lure or bait used.

Steelhead-rainbow trout less than 10 inches TL were classed as juveniles, those between 10.0 and 13.9 inches TL were classed as half-pounder steelhead, and those 14 inches or longer were classed as adult steelhead. All lengths were recorded to the nearest 0.1 inch.

#### FISH POPULATION SURVEYS

Numbers of king salmon spawners utilizing or migrating through the entire study area and numbers of steelhead spawners utilizing or migrating through Sections 3, 2, and 1 were estimated by several methods including counts at hatcheries or counting stations, redd and live spawner counts, and knowledge of similar streams or counts made in previous years. Also used were California Fish and Wildlife Plan estimates. Main stem Klamath River spawning estimates were not based on any empirical data.

#### RESULTS

##### Angler Effort

Total angler effort for the 12-month study period was estimated to be 153,830 hr. Seventy-nine percent of the angler pressure occurred during September, October, and November, 1968 (Figure 2 and Table 4). Boat anglers contributed 7% or 11,227 hr while shore anglers contributed 93% or 147,605 hr. Completed fishing days data of shore anglers averaged 2.9 hr and a boat angler day averaged 5.2 hr. Angling pressure, primarily for adult salmonids

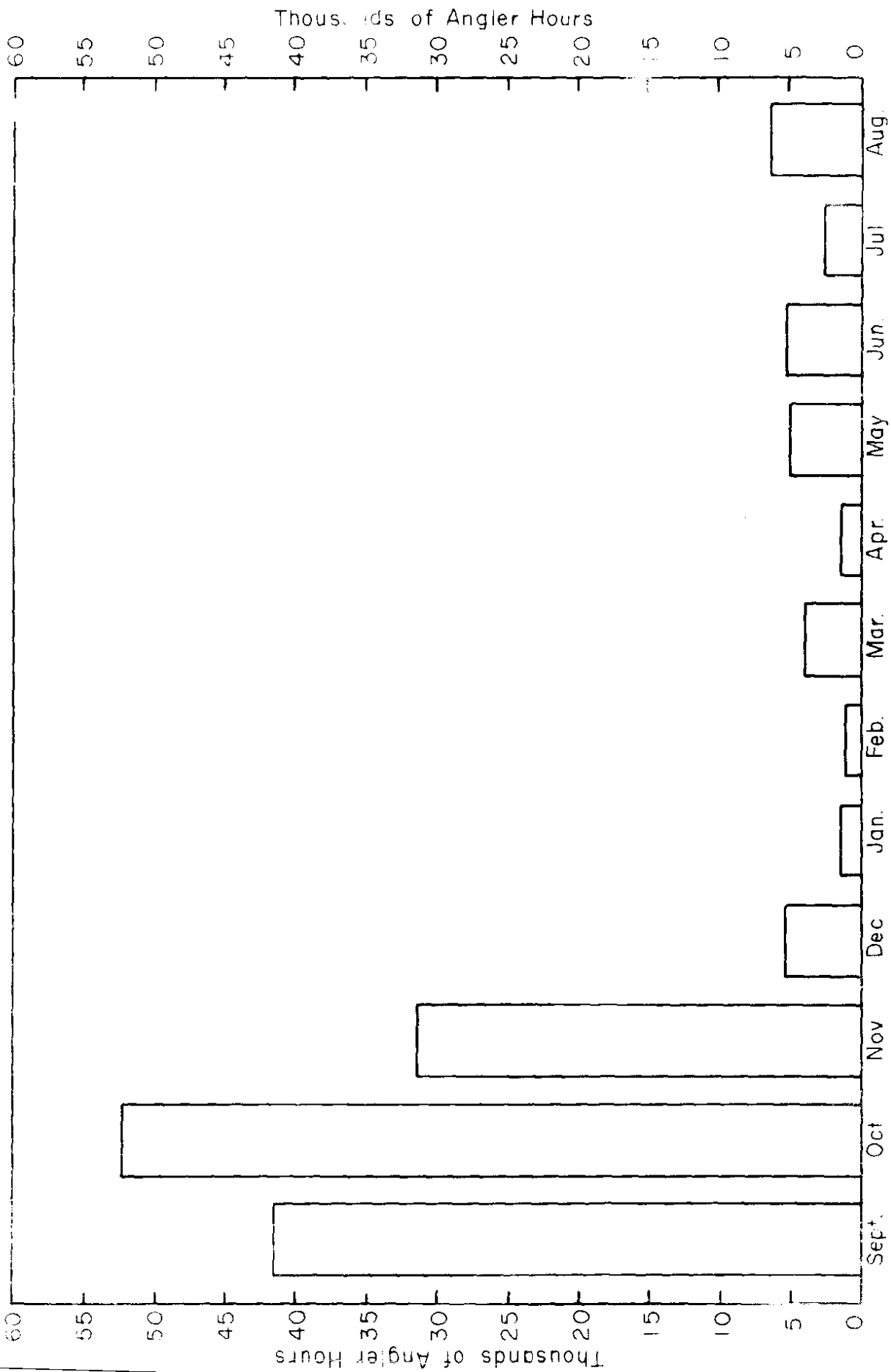


Figure 2. Angler use by month, in study area, 1968 - 1969.

Table 4

Estimated Angler Hours in Study Area by Section  
 Boat and Shore Anglers Combined

Month	Section 1	Section 2	Section 3	Section 4	Section 5	Total
<u>1968</u>						
September	9,078	2,473	5,314	7,448	17,426	41,739
October	9,649	4,677	9,762	10,317	18,043	52,448
November	9,117	3,133	6,359	6,526	6,302	31,437
December	2,518	626	781	992	340	5,257
<u>1969</u>						
January	1,174	125	162	225	0	1,686
February	1,032	79	0	54	0	1,165
March	3,405	319	0	291	0	4,015
April	1,253	0	0	363	0	1,616
May 3 & 4*	1,068	14	14	28	4	1,128
Balance of May	3,132	384	120	300	0	3,936
June	2,998	458	445	507	696	5,104
July	1,094	718	235	106	636	2,789
August	1,723	386	421	299	3,683	6,512
TOTALS	47,241	13,392	23,613	27,456	47,130	158,832

\* Opening weekend of general trout season.

and half-pounder steelhead, was high in all study sections during September, October, and November. Angling effort from December through May was directed almost entirely toward adult steelhead. This use occurred principally in Section 1 as water emanating from Iron Gate Reservoir was relatively clear compared to the very turbid condition of the other four study sections. During June and July, angling effort was directed almost entirely toward juvenile steelhead, but was still concentrated in Section 1. However, low, silt-free water conditions attracted significant numbers of juvenile steelhead anglers to the rest of the study area as well. In August, anglers anticipating the first appearance of upstream migrating adult salmonids and half-pounder steelhead increased angling pressure considerably in Section 5.

Thirty-nine percent (62,468 angler hr) of the estimated total angler effort occurred on weekends and holidays, and 61% (96,364 angler hr) occurred on weekdays.

It was estimated that 70% of the total angler hours was directed toward the capture of half-pounder and adult steelhead, 10% toward the capture of juvenile steelhead and 20% toward the harvest of adult king salmon. Less than 1% was directed toward the harvest of other species. Lanse (1970) discusses the difficulty of assigning angler hours to species categories.

This creel survey sampled 7.1% of the total estimated boat angler hr and 5.3% of the total estimated shore angler hr, as shown below:

	<u>Estimated total angler hours</u>	<u>Hours sampled during creel survey</u>	<u>Percent of total estimated angler hours sampled</u>
Boat	11,227	800	7.1
Shore	<u>147,605</u>	<u>7,808</u>	<u>5.3</u>
Combined	158,832	8,608	5.4

Angler Harvest

Entire study area

Salmonids. An estimated 35,639 salmonids weighing 40,686 lb were harvested during the study period with shore anglers taking 93% of the catch in numbers of fish and 90% by weight (Table 5).

Total boat or shore angler catch per hour ranged from a high of 1.38 juvenile steelhead per boat angler hour to .012 adult king salmon per shore angler hour (Table 6). These catch-per-hour data do not include fish captured and released.

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Table 1  
 Monthly catch rates of red snappers, Pacific sand lance

Month	General trawl		Jumbo trawl		Small scale		Total		Miles		Total	
	No.	Lbs.	No.	Lbs.	No.	Lbs.	No.	Lbs.	No.	Lbs.	No.	Lbs.
<b>GENERAL TRAWLS</b>												
September, 1968	0	0	66	46	0	0	101	1,221	0	0	170	1,221
October	28	0	87	58	120	412	176	170	0	0	274	582
November	578	201	25	15	48	164	674	375	0	0	1,048	540
December	1	1	5	3	215	761	217	765	0	0	218	768
January, 1969	5	0	6	0	24	87	29	87	0	0	29	87
February	0	0	4	3	78	92	82	95	0	0	82	95
March	26	14	40	28	173	434	239	472	0	0	248	476
April	168	38	0	0	0	0	168	38	0	0	168	38
May 3 & 4*	40	15	5	2	0	14	40	17	0	0	60	31
Balance of May	14	4	14	16	0	0	28	16	0	0	28	16
June	482	87	0	0	0	0	482	87	0	0	482	87
July	0	0	0	0	0	0	0	0	0	0	0	0
August	0	0	0	0	0	0	0	0	0	0	0	0
<b>TOTALS</b>	<b>1,349</b>	<b>304</b>	<b>255</b>	<b>164</b>	<b>624</b>	<b>1,912</b>	<b>120</b>	<b>1,397</b>	<b>0</b>	<b>0</b>	<b>2,051</b>	<b>3,369</b>
<b>SHORT CATCHES</b>												
September, 1968	1,979	270	3,143	1,973	679	1,161	638	5,125	0	0	5,820	11,509
October	3,692	458	3,238	2,259	1,866	5,175	749	7,828	10	15	8,952	15,738
November	1,217	379	1,282	858	682	1,301	43**	156	0	0	3,174	3,304
December	68	27	141	72	768	2,379	0	0	0	0	922	2,471
January, 1969	70	29	19	14	60	144	0	0	0	0	149	187
February	147	66	42	32	80	112	0	0	0	0	226	237
March	595	229	125	61	140	264	0	0	0	0	861	554
April	1,282	195	129	79	13	16	0	0	13***	2	1,997	292
May 3 & 4*	566	152	120	48	33	90	13***	1	27***	3	1,344	295
Balance of May	3,121	410	104	70	0	0	0	0	0	0	3,225	480
June	4,388	604	255	170	81	86	17***	-	0	0	4,718	860
July	1,896	225	268	145	0	0	0	0	0	0	2,104	370
August	389	87	0	0	138	319	16	76	0	0	543	482
<b>TOTALS</b>	<b>18,502</b>	<b>3,081</b>	<b>8,743</b>	<b>5,803</b>	<b>4,467</b>	<b>11,647</b>	<b>1,466</b>	<b>16,266</b>	<b>30</b>	<b>20</b>	<b>33,288</b>	<b>36,917</b>
<b>COMBINED CATCHES</b>												
September, 1968	1,379	270	3,209	2,018	679	1,161	732	5,416	0	0	5,999	12,806
October	3,117	464	3,328	2,317	2,005	5,587	768	7,004	10	15	8,222	16,387
November	1,795	610	1,287	878	725	2,955	43****	166	0	0	3,920	3,701
December	68	29	140	72	901	2,149	0	0	0	0	1,200	2,243
January, 1969	75	31	19	14	84	220	0	0	0	0	178	274
February	147	66	42	32	80	161	0	0	0	0	226	237
March	622	243	174	80	515	608	0	0	0	0	1,109	1,030
April	1,400	220	129	79	13	16	0	0	13***	2	1,788	317
May 3 & 4*	1,321	167	108	51	47	104	13***	1	27***	3	1,504	326
Balance of May	3,121	410	118	70	0	0	0	0	0	0	3,239	484
June	4,871	604	255	170	81	86	17***	-	0	0	5,201	877
July	1,896	225	268	145	0	0	0	0	0	0	2,104	370
August	389	87	0	0	138	319	16	76	0	0	543	482
<b>TOTALS</b>	<b>19,331</b>	<b>3,477</b>	<b>11,688</b>	<b>7,607</b>	<b>5,091</b>	<b>18,686</b>	<b>1,488</b>	<b>17,609</b>	<b>50</b>	<b>20</b>	<b>39,138</b>	<b>49,684</b>

\* opening weekend of general trawl season.  
 \*\* 27 of these were juveniles.  
 \*\*\* All juveniles.  
 \*\*\*\* 27 of these were juveniles.

Table 6

Salmonid Catch Per Hour for Boat and Shore Anglers  
Entire Study Area

Month	Angler hours		Catch		Catch/hr	
	Boat	Shore	Boat	Shore	Boat	Shore
<u>Juvenile steelhead</u>						
April, 1969	53	1,565	168	1,232	3.17	.788
May 3 & 4*	46	1,082	46	966	1.00	.893
Balance of May	237	3,699	14	3,121	0.059	.844
June	151	4,953	482	4,389	3.19	.886
July	27	2,762	6	1,896	0.000	.686
TOTALS	514	14,059	710	11,601	1.38	.821
<u>Half-pounder steelhead</u>						
September, 1968	2,631	39,108	66	3,143	.025	.080
October	2,970	49,478	87	3,238	.029	.065
November	2,917	28,520	25	1,232	.009	.043
TOTALS	8,518	117,106	178	7,613	.021	.065
<u>Adult steelhead</u>						
September, 1968	2,631	39,108	0	679	.000	.017
October	2,970	49,478	139	1,866	.047	.038
November	2,917	28,520	43	682	.015	.024
December	948	4,309	218	763	.230	.177
January, 1969	209	1,477	24	60	.115	.041
February	265	900	18	30	.068	.033
March	761	3,254	173	140	.227	.043
April	53	1,563	0	13	.000	.008
May 3 & 4*	46	1,032	9	38	.196	.035
Balance of May	237	3,699	0	0	.000	.000
August	12	6,500	0	138	.000	.021
TOTALS	11,045	139,890	624	4,409	.056	.032
<u>Adult king salmon</u>						
September 1968	2,631	39,108	104	628	.040	.016
October	2,970	49,478	19	749	.006	.015
November	2,917	28,520	0	43	.000	.002
August, 1969	12	6,500	0	16	.000	.002
TOTALS	8,530	123,606	123	1,436	.014	.012

\* Opening weekend of general trout season.

The total catch per hour for each of the various categories of salmonids is best represented by including only those months in which a significant number of salmonids in a particular category were present in the study area. Adult king salmon were present in significant numbers during September, October, and November, 1968, and August, 1969. Adult steelhead appeared to be present in significant numbers from September, 1968, through May, 1969, and in August, 1969. Half-pounder steelhead were present in the study area during September, October, and November, 1968. Although juvenile steelhead were present in significant numbers throughout the study period, anglers did not actively seek them until the period April through July, 1969.

Harvest of anadromous salmonids from tributaries to the study area was generally restricted to an unknown but presumed significant number of juvenile steelhead during the general trout season, with two major exceptions: (1) the unknown number of adult steelhead harvested from the Scott River, and (2) the unknown number of adult steelhead taken from the Shasta River. The study area extended to the mouth of the Salmon River, but the Salmon River was not included in the study area. An insignificant number of adult steelhead were taken from other smaller tributaries to the study area because adult steelhead enter and spawn in these tributaries almost entirely during the times these streams are closed to angling. The harvest of adult king salmon from tributaries to the study area is insignificant because of special angling closures on primary king salmon spawning streams.

The 206 adult steelhead measured during the study averaged 2.7 lb and ranged from 14.0 inches FL and 1.0 lb to 26.2 inches FL and 8.4 lb. The 72 adult king salmon measured averaged 11.9 lb and ranged from 14.3 inches FL and 0.7 lb to 42.0 inches FL and 24.1 lb.

Data from Trinity River Hatchery, Iron Gate Hatchery, Shasta River Counting Station, and the Bogus Creek salmon carcass inventory indicate females comprised 61% of the 1968-69 adult steelhead population and 51% of the 1968 adult king salmon population in the study area. However, of 172 adult steelhead and 79 adult king salmon sexed during this study, 74% and 58%, respectively, were females (Table 7).

Marked Juvenile Steelhead. Several groups of marked juvenile steelhead were released from Iron Gate Hatchery into the study area during the study period. The percent of these fish harvested as juveniles during the study varied, but did not exceed 5% for any one group (Table 8). None of the marked juveniles we observed were captured in any section other than the one into which they were released.

Nonsalmonids. In addition to salmonids, shore anglers caught an estimated 2,360 nonsalmonids weighing 598 lb (Table 9). Nonsalmonids were not observed in the catches of boat anglers.

Table 7

Sex Composition of Adult Steelhead and Adult King Salmon  
Sport Caught in Study Area

Month:	Adult steelhead		Adult king salmon	
	Male	Female	Male	Female
September, 1968	1	0	11	17
October	13	22	20	29
November	10	30	2	0
December	11	28	-	-
January, 1969	3	10	-	-
February	2	8	-	-
March	3	15	-	-
April	0	2	-	-
May	1	2	-	-
June	-	-	-	-
July	-	-	-	-
August	0	1	-	-
TOTALS	44	172	33	79
	26%	74%	42%	58%



Table 8

Estimated Percent Harvest of Marked Juvenile Steelhead  
Released into the Klamath River During this Study

Fin clip:	An-1M	Ar-RM	Ad-RM	Ad-1M	Ad-RV	Ad-LV
Brood year:	1967	1967	1968	1968	1968	1968
Release date:	11-6-68	11-7&8-68	5-12-69	5-13&14-69	5-12-69	6-30-69
Release site:	I.G.H.*	H. C.**	I.G.H.	H. C.	I.G.H.	I.G.H.
No. released:	49,935	49,350	37,575	35,954	36,524	73,330
Size of fish:	3.8/lb	2.9-3.8/lb	9.0/lb	9.1/lb	9.8/lb	12-15/lb
CATCH:						
Sept., 1968	-	-	-	-	-	-
Oct.	-	-	-	-	-	-
Nov.	1,008	334	-	-	-	-
Dec.	44	0	-	-	-	-
Jan., 1969	24	51	-	-	-	-
Feb.	54	0	-	-	-	-
Mar.	476	41	-	-	-	-
Apr.	247	0	-	-	-	-
May	130	0	303	111	381	-
June	0	0	544	0	906	0
July	0	0	27	0	0	0
Aug.	0	0	0	0	0	0
TOTALS	1,983	426	874	111	1,287	0
% HARVEST	4.0	0.9	2.3	0.3	3.5	0.0

\* I.G.H. - Iron Gate Hatchery.

\*\* H. C. - Happy Camp.

Table 9

## Estimated Sport Catch of Nonsalmonids, Entire Study Area

Month	Yellow perch ( <i>Perca flavescens</i> )		Klamath smallscale sucker ( <i>Catostomus rimiculus</i> )		Largemouth bass ( <i>Micropterus salmoides</i> )		Speckled dace ( <i>Rhinichthys osculans</i> )		Total Nonsalmonids	
	No.	Lbs.	No.	Lbs.	No.	Lbs.	No.	Lbs.	No.	Lbs.
September, 1968	0	0	0	0	0	0	0	0	0	0
October	0	0	0	0	0	0	0	0	0	0
November	0	0	0	0	0	0	0	0	0	0
December	0	0	0	0	0	0	0	0	0	0
January, 1969	123	31	0	0	0	0	0	0	123	31
February	0	0	0	0	0	0	0	0	0	0
March	5	3	0	0	0	0	0	0	5	3
April	167	74	0	0	0	0	0	0	167	74
May 3 & 4*	52	6	0	0	0	0	0	0	52	6
Balance of May	1,724	401	0	0	0	0	0	0	1,724	401
June	134	28	60	30	9	6	0	0	203	64
July	0	0	0	0	0	0	0	0	0	0
August	81	19	0	0	0	0	9	0	81	19
TOTALS	2,286	562	60	30	9	6	5	-	2,300	598

\* Opening weekend of general trout season.

Green sturgeon (Acipenser medirostris) and American shad (Alosa sapidissima) are known to occur in the lower 3.4 mile of the study area. It is believed that most are stopped from further upstream migration in the Klamath River by Ishi Pishi Falls, a series of cascades a short distance above the mouth of the Salmon River. Although some of these two species of fish are occasionally caught in the study area below Ishi Pishi Falls, neither were observed in anglers' catches.

### Individual Study Sections

Section 1. Approximately 90% of the length of the Klamath River in Section 1 was bordered on both sides by private lands. At the beginning of this study, and for many years prior, anglers were allowed virtually unrestricted access across these private lands for the purpose of fishing the Klamath River. However, early in 1969, almost all private lands bordering the Klamath River above, and immediately below the confluence of Willow Creek were posted against trespass.

An estimated 47,241 angler hr were spent in Section 1 (Table 4), harvesting 16,364 salmonids weighing 19,650 lb (Table 10). It was estimated boat anglers contributed 13% of the angler hr (6,272) while harvesting 13% of the salmonids by number (2,153), and 16% by weight (3,185 lb).

Section 2. Approximately two-thirds of the Klamath River in Section 2 was bordered on both sides by private lands, and another sixth was bordered by private lands on one side only. However, much of the river bordered by private land was accessible to anglers. An estimated 13,392 angler hr were spent in Section 2 (Table 4), harvesting 1,360 salmonids weighing 2,280 lb (Table 11). It was estimated boat anglers contributed 4% of the angler hr (517) and harvested no salmonids.

Section 3. A little over 1/3 of the length of the Klamath River within Section 3 flowed through private land. Access over these private lands to the Klamath River for the purpose of fishing was virtually unrestricted.

An estimated 23,613 angler hr were spent in Section 3 (Table 4), harvesting 2,640 salmonids weighing 6,539 lb (Table 12). It was estimated boat anglers contributed 1% (275) of the angler hr while harvesting 2% (40) of the salmonids caught and 2% (143 lb) of their weight.

All king salmon observed in Section 3 were caught from a 1/2-mile section of Klamath River immediately below the mouth of the Scott River.

Section 4. Approximately 90% of the length of the Klamath River in Section 4 was bordered on both sides by public lands. With the abundance of public lands bordering the river in Section 4, access to the Klamath River was excellent. An estimated 27,456 angler hr were spent in Section 4 (Table 4), harvesting 5,223 salmonids weighing 2,799 lb (Table 13). It was estimated boat anglers contributed 10% (2,436) of the angler hr and harvested 3% (140) of the salmonids caught and 8% (216 lb) of the total landed weight.

Table 10

Estimated Angler Harvest, Section 1

Month	Number					Total salmonids	
	Juvenile steelhead	Half-pounder steelhead	Adult steelhead	King salmon	Silver salmon	Number	Weight
September, 1968	0	117	0	580	0	706	7,649
October	666	31	506	389	0	1,592	5,864
November	1,139	96	346	0	0	1,581	1,427
December	73	128	325	0	0	526	2,128
January, 1969	24	19	54	0	0	97	184
February	66	53	48	0	0	167	254
March	526	174	310	0	0	1,010	988
April	645	129	13	0	13*	800	226
May	3,925	223	47	13*	27*	4,235	799
June	3,746	135	58	0	0	3,939	770
July	1,171	208	0	0	0	1,379	328
August	332	0	0	0	0	332	33
TOTALS	12,313	1,313	1,707	991	40	16,364	19,650

\* Juveniles.

Table 11

Estimated Angler Harvest, Section 2

Month	Number					Total salmonids	
	Juvenile steelhead	Half-pounder steelhead	Adult steelhead	King salmon	Silver salmon	Number	Weight
September, 1968	155	159	11	0	0	325	151
October	126	0	39	15	0	180	222
November	8	9	19	0	0	36	61
December	0	0	577	0	0	577	1,745
January, 1969	0	0	30	0	0	30	70
February	0	0	0	0	0	0	0
March	0	0	3	0	0	3	16
April	0	0	0	0	0	0	0
May	19	0	0	0	0	19	1
June	51	0	0	0	0	51	4
July	111	0	0	0	0	111	8
August	28	0	0	0	0	28	1
TOTALS	498	168	679	15	0	1,360	2,280

Table 12

Estimated Angler Harvest, Section 3

Month	Number					Total salmonids	
	Juvenile steelhead	Half-pounder steelhead	Adult steelhead	King salmon	Silver salmon	Number	Weight
September, 1968	265	437	168	70	0	940	1,571
October	390	51	165	345	10	961	3,903
November	47	102	186	9	0	344	670
December	0	18	70	0	0	97	369
January, 1969	0	0	0	0	0	0	0
February	0	0	0	0	0	0	0
March	0	0	0	0	0	0	0
April	0	0	0	0	0	0	0
May	6	0	0	0	0	6	1
June	246	0	0	17*	0	263	13
July	0	0	0	0	0	0	0
August	29	0	0	0	0	29	3
TOTALS	983	608	598	441	10	2,640	6,539

\* Juveniles.

Table 13

Estimated Angler Harvest, Section 4

Month	Number					Total salmonids	
	Juvenile steelhead	Half-pounder steelhead	Adult steelhead	King salmon	Silver salmon	Number	Weight
September, 1968	801	638	153	0	0	1,592	816
October	511	574	116	19	0	1,220	850
November	449	329	94	27*	0	899	834
December	0	0	0	0	0	0	0
January, 1969	51	0	0	0	0	51	20
February	81	0	0	0	0	81	32
March	96	0	0	0	0	96	26
April	755	0	0	0	0	755	91
May	197	0	0	0	0	197	19
June	198	120	0	0	0	318	107
July	14	0	0	0	0	14	4
August	0	0	0	0	0	0	0
TOTALS	3,153	1,661	363	46	0	5,223	2,799

\* Juveniles.

Section 7. Approximately 90% of the Klamath River in section 5 was bordered on both sides by public land. Access to the river for angling was unrestricted. An estimated 47,130 angler hr were spent in Section 5 (Table 4), harvesting 10,052 salmonids weighing 9,418 lb (Table 14). It was estimated boat anglers contributed 47% (1,727) of the angler hr while harvesting less than 1% (18) of the salmonids caught and 3% (325 lb) of their weight.

#### Estimate of Total Adult Steelhead and King Salmon Harvested in Study Area

An estimated 26,539 king salmon spawners entered the study area in the fall of 1968, and an estimated 15,873 steelhead spawners entered Sections 3, 2, and 1 during the fall of 1968, and the spring of 1969 (Tables 15 and 16). These estimates are comprised of those spawners entering tributaries, those spawning in the Klamath River, those trapped at Iron Gate Hatchery, and those caught by anglers from the study area. No estimates were made of the number of steelhead spawners entering Sections 5 and 4.

It was estimated anglers in the study area harvested 5.8% of the king salmon spawners entering the study area in the fall of 1968 and 18.8% of the steelhead spawners entering Sections 3, 2, and 1 during the fall of 1968, and the spring of 1969 (Table 17).

#### Angler Origin

During this study, 4,212 anglers were interviewed. Of this total, 27.3%, or 1,148, were residents of Siskiyou County (Table 18). Monthly tabulations showed Siskiyou County residents comprised from 11 to 73% of the total number of anglers interviewed each month (Table 19).

## DISCUSSION AND CONCLUSION

### Steelhead

#### Adults

Lanse (1970) reported an estimated 20,841 adult steelhead migrated into Section 1 during the 1967-68 season and that approximately 6,710, or 32%, were harvested by anglers from the study area. During this study, 9,029 adult steelhead were estimated to have entered Section 1, and of this total, 1,707, or 19%, were harvested by anglers. These two sets of data indicate there may be a positive correlation between the size of an adult steelhead population and the numbers of fish harvested from that population by anglers. However, the correlation, if any, must be affected by such variables as angler pressure (which may be dependent on the size of an adult steelhead population) and river conditions affecting angler success.



Table 14

Estimated Angler Harvest, Section 5

Month	Number					Total salmonids	
	Juvenile steelhead	Half-pounder steelhead	Adult steelhead	King salmon	Silver salmon	Number	Weight
September, 1968	158	1,858	347	73	0	2,436	2,679
October	1,424	2,669	1,179	0	0	5,272	5,548
November	152	721	80	7	0	960	703
December	0	0	0	0	0	0	0
January, 1969	0	0	0	0	0	0	0
February	0	0	0	0	0	0	0
March	0	0	0	0	0	0	0
April	0	0	0	0	0	0	0
May	0	0	0	0	0	0	0
June	630	0	0	0	0	630	63
July	600	0	0	0	0	600	30
August	0	0	138	16	0	154	395
TOTALS	2,964	5,248	1,744	96	0	10,052	9,418

Table 15

Estimated Number of King Salmon Spawners  
Fall, 1968--Entire Study Area

<u>Stream</u>	<u>Estimation method*</u>	<u>Estimated number of king salmon spawners</u>
Bogus Creek	2	3,500
Shasta River	1	14,042
Beaver Creek	2	120
Horse Creek	2	12
Scott River	3	3,750
Grider Creek	2	125
Thompson Creek	2	175
Indian Creek	2	100
Elk Creek	4	125
Clear Creek	4	100
Dillon Creek	4	50
Klamath River	3	200
Iron Gate Hatchery	1	2,708
Angler harvest	-	<u>1,532</u>
TOTAL		26,539

- \*(1) Actual counts of fish at hatcheries or fish counting stations.  
 (2) Completing a one time count of salmon (live and dead) and their redds at the end of the salmon spawning season by walking in and along stream.  
 (3) Counts of redds by airplane.  
 (4) No counts made, estimate based on knowledge of similar streams or counts made in that stream in past years.

Could not add  
 (no data)  
 Cedar Gulch  
 Blue Gulch  
 Sharps Gulch  
 Bankhouse

Table 16

Estimated Number of Steelhead Spawns  
 through August, 1969, Sect

Stream	Estimation method*	Estimated number of steelhead spawners		Estimated number of steelhead spawners
<u>SECTION 1</u>				
Brush Creek	3	40	Ves	0
Bogus Creek	3	400	Beav	60
Dry Creek	2	60	Bark	10
Little Bogus Creek	2	30	McKinley Creek	2
Cedar Gulch	2	6	Doggott Creek	2
Willow Creek	2	125	Kohl Creek	2
Cape Horn Creek	2	2	Horse Creek	2
Cottonwood Creek	3	50	Dona Creek	2
Blue Gulch	2	0	Klamath River (Section 2)	5
Williams Creek	2	15	Angler harvest (Section 2)	-
Sharps Gulch	2	0	TOTAL SECTION 2	931
Shasta River	4	6,000	<u>SECTION 3</u>	
Ash Creek	3	4	Scott River	4
Humbug Creek	2	50	Walker Creek	3
Klamath River (Section 1)	5	200	Seiad Creek	3
Iron Gate Hatchery	1	370	Grider Creek	3
Angler harvest (Section 1)	-	1,707	West Grider Creek	3
TOTAL SECTION 1		9,059	Portuguese Creek	3
<u>SECTION 2</u>				
Dutch Creek	2	10	Fort Goff Creek	3
Empire Creek	2	10	Klamath River (Section 3)	5
Langroy Creek	2	15	Angler harvest (Section 3)	-
Little Humbug Creek	2	0	TOTAL SECTION 3	5,883
			GRAND TOTAL	<u>15,873</u>

- (1) Actual counts of fish at hatcheries or fish counting stations.
- (2) Walking in and along stream, counting redds and live spawners.
- (3) No counts made, estimate based on knowledge of similar streams or counts made in that stream in past years.
- (4) Estimate based on California Fish and Wildlife Plan.
- (5) No counts made, estimate not based on any empirical data.

Table 17

Percent of King Salmon and Steelhead Spawners Harvested by Anglers

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	<u>TOTAL</u>
Number king salmon spawners entering study area	26,539
Angler harvest of king salmon spawners	1,532
Percent of king salmon run harvested by anglers	5.8%
Number steelhead spawners entering Sections 1, 2, and 3	15,873
Angler harvest of steelhead spawners (Sections 1, 2, and 3)	2,984
Percent of steelhead run harvested by anglers (Sections 1, 2, and 3)	18.8%

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Table 18

Angler Residence Data

California			California		
by county			by county (continued)		
	Number	Percent of total		Number	Percent of total
Alameda	200	4.7	Siskiyou	1,148	27.3
Amador	1	< 0.1	Solano	26	0.6
Butte	74	1.8	Sonoma	87	2.1
Calaveras	6	0.1	Stanislaus	41	1.0
Contra Costa	223	5.3	Sutter	11	0.3
Del Norte	2	0.1	Tehama	15	0.4
El Dorado	6	0.1	Trinity	11	0.3
Fresno	53	1.3	Tulare	7	0.2
Glenn	13	0.3	Tuolumne	3	0.1
Humboldt	82	1.9	Ventura	19	0.5
Imperial	7	0.2	Yolo	28	0.7
Inyo	1	< 0.1	Yuba	3	0.1
Kern	62	1.5			
Kings	5	0.1	<u>Sub Total</u>	<u>3,980</u>	<u>94.8</u>
Lake	8	0.2			
Lassen	8	0.2	<u>Other States</u>		
Los Angeles	442	10.5	Arizona	6	0.1
Madera	6	0.1	Colorado	6	0.1
Marin	58	1.4	Florida	1	< 0.1
Mendocino	24	0.6	Michigan	5	0.1
Merced	27	0.6	Montana	4	0.1
Modoc	4	0.1	Nevada	7	0.2
Monterey	46	1.1	Ohio	4	0.1
Napa	32	0.8	Oklahoma	4	0.1
Nevada	32	0.8	Oregon	173	4.1
Orange	64	1.5	Texas	2	< 0.1
Placer	11	0.3	Washington	17	0.4
Plumas	13	0.3	Wisconsin	2	< 0.1
Riverside	13	0.3			
Sacramento	181	4.3	<u>Sub Total</u>	<u>231</u>	<u>5.3</u>
San Benito	10	0.2			
San Bernardino	33	0.8	<u>Country</u>		
San Diego	56	1.3	British Columbia,		
San Francisco	163	4.0	Canada	1	< 0.1
San Joaquin	82	1.9			
San Luis Obispo	4	0.1	<u>Sub Total</u>	<u>1</u>	<u>&lt; 0.1</u>
San Mateo	121	2.9			
Santa Barbara	29	0.7			
Santa Clara	210	5.0	<u>GRAND TOTAL</u>	<u>4,212</u>	<u>100.1</u>
Santa Cruz	34	0.8			
Shasta	130	3.1			

Table 19

Percent Siskiyou County Residents of Total Number of Anglers Interviewed

Month	Number Siskiyou County residents interviewed	Total anglers interviewed	Percent of total
September, 1968	87	568	15.3
October	207	1,397	14.8
November	165	771	21.4
December	97	197	49.2
January, 1969	58	117	49.6
February	52	128	40.6
March	134	267	50.2
April	93	127	73.2
May 3 & 4	69	97	71.1
Balance of May	67	118	56.8
June	85	209	40.7
July	17	64	26.6
August	17	152	11.2
TOTALS	1,148	4,212	27.3

Possibly the single most important factor used in determining the approximate percent harvest of steelhead in Section 1 in each study (1967-68 and 1968-69) was the estimate of the number of adult steelhead spawning in the Shasta River. In each study the number of steelhead spawning in the Shasta River was estimated to be 6,000, the estimate which appears in the California Fish and Wildlife Plan. This estimate of 6,000 is an average annual estimate. The 1967-68 steelhead run was generally agreed to be one of the largest in recent years and the 1968-69 run one of the smallest, therefore the actual number of steelhead spawning in the Shasta River may have been more than average in 1967-68 and less than average in 1968-69.

Under this assumption, the sport harvest of steelhead spawners entering Section 1 during each study may have been relatively constant, possibly 25-30% of the total population in each instance.

The sport harvest of an estimated 13.8% of the number of adult steelhead entering Sections 1, 2, and 3 during this study does not at this time appear great enough to warrant additional protection through more restrictive angling regulations.

Adult females of both steelhead and king salmon were harvested in greater numbers than one would expect knowing the proportion of females in the spawning population as measured at Iron Gate Hatchery, Trinity River Hatchery, Shasta River Counting Station, and the Bogus Creek King Salmon Survey. Females comprised 74% of the adult steelhead catch and 58% of the adult king salmon catch, while females comprised 61% of the adult steelhead population and 51% of the adult king salmon population at the above four sites, combined.

Withler (1966) found almost twice as many females as male steelhead were taken from the Cheakamus River in British Columbia by sport anglers, suggesting the sport fishery there selects for females of adult steelhead populations.

#### Half-pounders

Half-pounder steelhead, as defined and observed in this study, appeared to have a definite upstream migration schedule, reaching the study area by the first week in September and remaining available to anglers through October and November. We know virtually nothing about their freshwater activities, their downstream migration patterns or the purpose for their entering fresh water.

Half-pounders appeared to have spent some time in the ocean, judging from their light, bright coloration. Autopsied half-pounders were sexually undeveloped. Kesner and Barnhart's (1972) work indicates most half-pounders (defined as steelhead 250-349 mm in fork length) are immature, and from the scale pattern analysis are primarily two- and three-year-old fish. Two-year-old fish spent one year in the stream, while three year olds spent

two years in the stream. Both spend only a few months in the ocean before beginning their first upstream migration. A single Ad fin-clipped half-pounder (released at Iron Gate Hatchery as a juvenile in May, 1968) was observed in September, 1968, during this study, and an AdRM fin-clipped half-pounder caught in the Klamath River near its mouth in September, 1969, after the completion of this study support the view that half-pounder steelhead spend only a few months in the ocean before migrating into fresh water for the first time. Further study in this area is necessary, particularly to discover what amount of recruitment occurs, if any, from the half-pounder ranks to the adult steelhead population and whether the size of adult steelhead populations could be expected to increase if the sport harvest of half-pounders was reduced

The rainbow trout-steelhead classed as half-pounders, taken in Section 1, appear to be primarily large juvenile rainbow trout-steelhead whose innate urge to migrate downstream had been delayed or even lost. These fish differed from this study's concept of true half-pounders for three reasons: (1) they lacked the characteristic light, bright coloration, suggesting recent marine residence of half-pounders taken in Sections 4 and 5; (2) using data for months of September, October, and November, the angler catch per hour for true half-pounders decreased upstream from Section 5 (Table 20) indicating very few true half-pounders entered Section 1; and (3) the great majority (72%) of all half-pounders sized trout taken in Section 1 were not taken in September, October, and November, their recognized period of upstream migration, but were captured principally in March through June when much of the angling pressure was directed toward juvenile steelhead.

Table 20

Number of Half-pounders and Half-pounder Catch Per Hour for the Months of September, October, and November, Combined, 1968, by Section

<u>Section</u>	<u>Est. no. harvested/est. ang. hrs.</u>	<u>Est. catch/hour</u>
1	244 / 27,844	.009
2	168 / 10,283	.016
3	590 / 21,435	.028
4	1,541 / 24,291	.063
5	5,248 / 41,771	.126

Juveniles

Lanse (1970) reported an 11% angling harvest of marked juvenile steelhead in Section 1 during a four-month period (April through July, 1968). These 25,688 Ad fin-clipped juveniles were released into the Klamath River on May 6, 1968 from Iron Gate Hatchery. This high angling mortality in Section 1 was not noted during a like period in 1969 from a similar plant of 37,087 AdRM fin-clipped juvenile steelhead released on May 12, 1969 (Table 21).



Table 21

Juvenile Steelhead Harvest  
Section 1

	<u>1968</u>			<u>1969</u>		
	Angler hours	Total juvenile steelhead harvest	Marked Ad juvenile steelhead harvest	Angler hours	Total juvenile steelhead harvest	Marked AdRM juvenile steelhead harvest
April	5,444	2,146	-	1,253	645	-
May	10,278	13,978	2,665	4,200	3,925	303
June	1,950	744	112	2,998	3,746	544
July	1,726	123	35	1,094	1,171	27
August	3,187	1,703	67	1,723	332	0
TOTALS	22,652	18,764	2,879	11,268	9,819	874

The primary reasons for the lowered harvest of both wild and hatchery-reared juvenile steelhead for this five month period in 1969 were: (i) the river did not become relatively low and silt-free until mid-June while in 1968, it was relatively low and silt-free by early May, and (ii) the posting against trespass of the upper one fifth of Section 1 in 1969.

From Table 8 it appears juvenile steelhead released in November, 1968, at Iron Gate Hatchery, began their seaward migration at the time we suspect most wild juveniles begin their's, in April and May, since no AnJM juvenile steelhead were observed in anglers' catches after May 4, 1969, but were observed every month prior to May back to the time of their release.

It appears the AnRM juvenile steelhead released in November, 1968, at Happy Camp, some 82 miles below Iron Gate Dam, may also have begun their seaward migration in the spring of 1969, however the data are not conclusive.

Those juvenile steelhead released in May, 1969, at Iron Gate Hatchery were observed in anglers' catches through May and June and occasionally in July, indicating these groups of marked juveniles may have delayed their downstream migration somewhat past the period we suspect most wild juvenile steelhead migrate downstream.

It is obvious more study is needed to reach reasonable conclusions regarding the effect of release date on the initiation of downstream migration by hatchery-reared juvenile steelhead.

King Salmon

Adults

Lanse (1970) estimated 16,900 king salmon spawners entered Section 1 and that 278 (1.6%) were harvested from the study area by anglers. During this study, 11,278 king salmon spawners were estimated to have entered Section 1. Of these, 978 (4.6%) were taken from the study area by anglers. Again, as with the adult steelhead harvest data, it appears a positive correlation may exist between the number of adult spawners (in this instance king salmon) and the numbers of these fish harvested by anglers. Again, the correlation must be affected by the variables mentioned earlier under Steelhead - Adults.

During this study, the sport harvest from the study area of an estimated 5.8% of the king salmon spawners entering the study area, was not considered great enough for concern, at present.

Juveniles

Juvenile king salmon formed an insignificant part of the total catch during this study. Of an estimated 35,639 salmonids taken (40,686 lb) 57 juvenile king salmon weighing about two pounds were caught.

Silver Salmon

Adults

Only ten adult silver salmon were estimated to have been taken from the study area. Silver salmon did not appear to be numerous in the study area, however, the total run of silver salmon, including grilse, returning to Iron Gate Hatchery has been increasing each year (Table 22).

Table 22

<u>Year</u>	<u>Silver salmon grilse returning to Iron Gate Hatchery</u>	<u>Silver salmon adults returning to Iron Gate Hatchery</u>	<u>Total silver salmon returning to Iron Gate Hatchery</u>
1964	0	0	0
1965	0	2	2
1966	0	4	4
1967	28	51	79
1968	333	24	357
1969	749	202	951
1970	335	1,397	1,632

If this trend continues, silver salmon may become an important gamefish in the Klamath River.

Juveniles

Juvenile silver salmon formed an insignificant part of the total catch during this study. Of an estimated 35,639 salmonids weighing 40,686 pounds, 40 juvenile silver salmon weighing five pounds were caught.

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