

State of California  
The Resources Agency  
DEPARTMENT OF FISH AND GAME

LOWER KLAMATH RIVER ANGLER CREEL CENSUS  
WITH EMPHASIS ON UPSTREAM MIGRATING  
FALL CHINOOK SALMON, COHO SALMON, AND STEELHEAD TROUT  
DURING JULY THROUGH OCTOBER, 1983 THROUGH 1987

by

James S. Hopelain  
Fisheries Programs Branch

Inland Fisheries  
Administrative Report No. 2001-1

2001

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ABSTRACT

During July through October, 1984 through 1987, a creel census was conducted in the lower 38.4 km (24 miles) of the Klamath River to determine numbers of upstream migrating fall chinook salmon, coho salmon, and steelhead trout harvested by anglers. Seasonal summaries and comparisons of angler effort and catch, catch timing, length frequencies, species composition, hatchery marks, and tag recoveries are presented.

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<sup>1</sup> Inland Fisheries Administrative Report No. 2000-02. Submitted March 2000. Edited by M. Ralph Carpenter, Sacramento Valley and Central Sierra Region, 1701 Nimbus Road, Suite A, Rancho Cordova, California 95670. This study was funded by the California Department of Fish and Game, National Marine Fisheries Service (Anadromous Fish Conservation Act Projects, California AFC-16, "Salmon and Steelhead Research, Management and Enhancement Project"), and the U. S. Fish and Wildlife Service (Anadromous Fish Conservation Act Project, California AFS-20, "Klamath River Project").

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## INTRODUCTION

The Klamath River system is the second largest river system in California (the Sacramento River system is the largest). It drains over 40,000 sq km in northern California and southern Oregon. The Trinity River is its largest tributary and joins the Klamath River at Weitchpec, river kilometer (rkm) 68.8 (river mile (rm) 43). Other major tributaries of the Klamath River are Salmon River (rkm 105.6, rm 66), Scott River (rkm 228.8, rm 143), and Shasta River (rkm, 283.2, rm 177).

The upper limit of anadromous fish migration in the main Klamath River is at Iron Gate Dam (rkm 306, rm 191). Iron Gate Hatchery (IGH), at the base of the dam, mitigates for salmon and Steelhead losses upstream of the dam. The upper limit of salmon and Steelhead migration in the Trinity River is at Lewiston Dam (rkm 177.6, rm 111). Trinity River Hatchery (TRH) is located at the base of Lewiston Dam and mitigates for salmon and Steelhead habitat losses upstream of the dam. Both hatcheries are operated by California Department of Fish and Game (CDFG).

The Klamath River system is one of the state's primary producers of chinook salmon (*Oncorhynchus tshawytscha*), and Steelhead trout (*O. mykiss*). These two species support popular sport fisheries throughout the Klamath River system with the most concentrated effort and catch occurring in the lower 15 miles of the main stem Klamath River.

Although sport angling has been popular throughout the Klamath River for many decades, angler harvest data of anadromous salmonids within the Klamath River system prior to 1978 is limited. The earliest report found that mentions angling in the Klamath River is by Snyder (1931) where he briefly describes angling methods, mean length and gender of fish during a two-day creel sample at the mouth of the Klamath River in August 1921. Coots (1952) reports on angler harvest of anadromous salmonids during a year-long creel census from the mouth of the Salmon River to Copco Dam during 1949 and 1950. Gibbs and Kimsey (1955) provide angler effort and harvest estimates for the boat fishery in the Klamath River estuary during 1951. Bailey (1952) reported on a creel census of the riffle fishery in the lower Klamath River upstream of the Highway 101 Bridge. The census was conducted during the fall adult Steelhead and chinook salmon immigration in 1951.

Other earlier creel census reports for the main stem Klamath River conducted upstream of the Salmon River described angler catches during the summer trout season. Some adult Steelhead and juvenile coho salmon are reported in the catches (Coots 1950, 1951, 1953, 1954; Wales 1948; Wales and Coots, 1949).

More recent angler harvest data was reported by Lanse (1970) in an area of the upper Klamath River, and by Miller (1971) working in an area of the middle Klamath River. Steelhead comprised the majority of the sampled catches.

The creel census studies prior to 1978 collected primarily angler effort, species composition, and catch-per-hour information. Some provided angler harvest and effort estimates within the

sampled area, however, not until 1978 was an attempt made to estimate chinook salmon harvest by anglers throughout the Klamath River basin (Boydston 1979).

The Fishery Conservation and Management Act of 1976 declared a fishery conservation zone in ocean waters surrounding the United States beginning 3 miles offshore and extending out to sea 200 miles. As a result the Pacific Fishery Management Council (PFMC) was established in 1976 to manage fisheries within the established zone. The PFMC soon recognized the need for salmon resource management and implemented the Fishery Management Plan (FMP) in 1977 for commercial and recreational salmon fisheries off the coasts of Washington, Oregon and California. The Klamath River is regarded as one of the more important producers of fall chinook salmon to California commercial and sport fisheries. PFMC management objectives included measures to rebuild and protect depressed Klamath River fall chinook salmon stocks (PFMC, 1983).

PFMC management practices focused on harvest restrictions for ocean troll and sport fisheries that were impacting Klamath River chinook salmon stocks. The State of California, with management jurisdiction of fisheries in coastal waters within 3 miles of shore and of in-river sport fisheries, implemented chinook salmon management practices and regulations supporting PFMC objectives. Thus, since 1978 the Klamath River adult fall chinook salmon run-size data have been a critical component for management of the fall chinook salmon resource and its fisheries in northern California and southern Oregon.

The numbers of fall chinook salmon entering the Klamath River (run size) is determined by accumulating the numbers harvested in-river, the numbers returning to the two hatcheries, and the numbers spawning naturally. Since 1978 the angler harvest of Klamath River fall chinook salmon has been monitored by CDFG to provide data for the fall chinook salmon run-size estimate. Annual reports summarizing these activities have been published through the 1982 season (Boydston 1979, 1980; Lee 1984a, 1984b, 1985).

This report covers the period from July 1, 1983 through June 30, 1988 (1983 - 1987 seasons). It provides data and a description of the CDFG fall chinook salmon angler harvest monitoring program in the main stem Klamath River from the mouth to Iron Gate Dam. Creel sampling took place in the lower 38.4 km (24 miles) of river from July 15 to October 15 each season. Trinity River fall chinook salmon angler harvest data during the corresponding time period are contained in a separate CDFG report. Hopelain (in progress) describes beach seining procedures and sampling/tagging results obtained during the creel census and related tagging for the period 1984 through 1987.

### Description of Fishery and Creel Sample Areas

The main stem Klamath River, from the mouth to Iron Gate Dam, was divided into three areas for the purpose of estimating catch and effort (Figure 1). In the lower two areas, anglers were

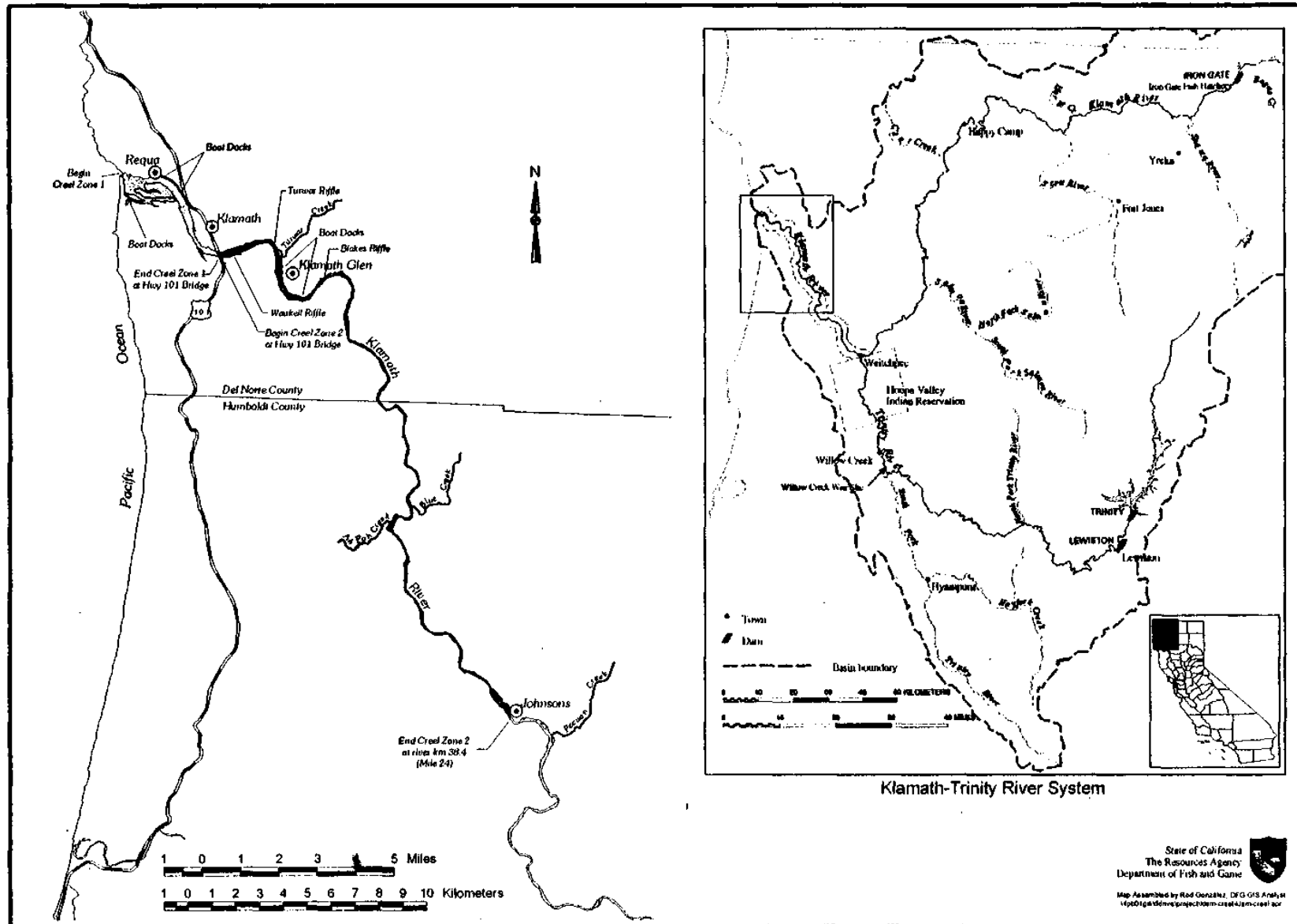


Figure 1. Klamath-Trinity river system showing creel census zones in the lower 38.4 km (24 miles).

were interviewed to sample effort and catch. In the third area, catches were determined from tag returns by anglers.

Area 1: This area consisted of 4.8 km (3 mi.) of river from the mouth to the Highway 101 Bridge, and is referred to as the estuary. Virtually all shore-angling effort took place at the river mouth on the south spit. A creel sample of shore anglers was conducted at this location each season from 1984 through 1987.

Most boat-angling effort in the estuary originated from ten resort boat docks in the estuary area. Two to four of these boat docks were sampled each season during 1984 through 1987 for angler effort and catch.

The majority of anglers were boat anglers in this very popular lower river fishery. The majority of fish caught were adult chinook salmon with relatively minor catches of Steelhead trout and coho salmon. Trolling was the most popular angling method. Fishing tackle used was relatively heavy, generally similar to ocean sport type. Terminal gear included anchovies, roe, spinners and spoons.

Area 2: This area extended from the Highway 101 Bridge (river kilometer (rkm) 4.8) upstream to about Pecwan Creek, rkm 38.4, near the community of Johnson's, and consisted primarily of riffle type fisheries. Shore angling effort was generally confined to Waukel, Turwar (also known as Terwer), and Blakes riffles located in the lower 5 km of this area. These areas were easily accessible to the shore angler. Two resort boat docks and a public launch ramp, also located in the lower 5 km, were the principal boat facilities for the area. Creel sampling occurred at all of these locations.

Shore angling access from the river reach upstream of Blakes Riffle to Johnson's was limited to about three areas: the mouth of Blue Creek (rkm 26.4), the mouth of Ah Pah Creek (rkm 27.7), and Bear Riffle (rkm 29.9). These were accessible by vehicle but accounted for an estimated less than one percent of angling effort in the entire sample area.

Virtually all boat angling effort that took place within Area 2 originated from the two boat docks or public launch ramp in the lower portion of this area, therefore, all boat angling effort was accounted for in the daily creel samples.

Angler access at Turwar and Blakes riffles was limited to specific, well defined routes, thus enabling a complete accounting of angler effort and catch during a sample day at these locations. Boat anglers were also confined to access at the launch ramp or resort boat docks enabling a complete sample of angler effort and catch for each sample day.

Waukel Riffle, located one-quarter mile upstream of the Highway 101 Bridge, had two principle access points, on either side of the river. Since we could sample only one side of the river each sample day, the daily sample procedure was to sample the side with the most anglers and account

for the angler effort on the opposite bank with four use-counts per day. Mean daily catch per angler hour was assumed to be the same for anglers sampled and anglers not sampled at this location.

Area 3: This area extended along the main stem Klamath River from Johnson's (rkm 38.4, rm 24) to Iron Gate Dam (rkm 306, rm 191). The portion of the river from Johnson's to Weitchpec (rkm 69, rm 43) was paralleled by Highway 169 and offered excellent river access to shore anglers.

The Klamath River from Weitchpec to Interstate 5 (I-5) (rkm 288, rm 180) was paralleled by Highway 96 and provided excellent angler access throughout this section. Popular shore fishing areas included the mouth of Bluff Creek (rkm 78, rm 48.6), and the mouths of the Scott and Shasta rivers. Numerous guides and anglers using "drift boats" were active throughout this section of river.

The upper most portion (18 km, 11 mi) of Area 3, from I-5 to Iron Gate Dam, was bordered mostly by private lands and had limited public access. This area was popular with anglers and guides using drift boats.

Area 3 was not creel sampled.

#### CREEL CENSUS METHODS

Half-pounders and grilse are referenced in this report. Half-pounders are sexually immature steelhead, 25 to 41 centimeters fork length, that return to freshwater 3 to 4 months after initial entry into salt water. They typically migrate upstream as far as 100 miles in the main stem Klamath River, and migrate approximately 30 miles upstream in the Trinity River. They do not spawn. It is believed half-pounders return to salt water during late fall to early spring months. Grilse are age-two precocious salmon. Virtually all are males. Adults are age-three and older. Grilse are sexually mature and can participate in spawning with adult females when they have the opportunity. Grilse are also referred to as "jacks" by many anglers. Like larger adults, grilse die at the end of their spawning cycle.

#### 1983.

As a result of a State hiring freeze and lack of manpower, we were unable to conduct creel census and seining/tagging activities to sample the lower Klamath River sport fishery during the fall of 1983. Monitoring was limited to occasional field observations and contacts with resort owners by a project fishery biologist. "Best-guess" estimates of the sport fishery harvest of fall chinook salmon from the mouth to Highway 101 Bridge were made for management purposes based on these observations and contacts. The estimate of the sport harvest of adult chinook salmon in the area from the Highway 101 Bridge to Blakes Riffle was based on regression

analysis ( $r = 0.98$ ,  $P \geq 0.80$ , 1 d.f.) of the 1980 through 1982 estimates of adult chinook salmon sport harvest downstream and upstream of the Highway 101 Bridge.

For the sport harvest estimate of grilse chinook salmon from the Highway 101 Bridge to Blakes Riffle, the 1980 through 1982 harvest estimates were averaged. The average represented 1.875 times the catch from the mouth to the Highway 101 Bridge and was applied to our "best-guess" estimates of grilse harvest below the Highway 101 Bridge.

The ratio of previous seasons volunteer tag returns of adult and grilse chinook salmon described by Lee (1985) was used to estimate the sport harvest of chinook salmon above the creel census area (excluding the Trinity River basin).

Fish heads from adipose (Ad)-marked chinook salmon and coho salmon suspected to contain a coded-wire tag (CWT) were recovered from several lower Klamath River resort owners. Heads and information on species and size were collected in a nonrandom manner by cooperating resort owners and anglers landing fish at their docks. Heads and associated data were collected from the resort owners by a project fishery biologist, and CWTs were removed from the heads and decoded at the project's laboratory in Arcata.

#### 1984 - 1987:

Creel census data collection and estimation procedures were the same for all four reporting years, 1984 through 1987. Creel census activities took place between July 15 and October 15 each year in Areas 1 and 2. Sampling began at each location as angler activity became apparent.

Creel sample locations were manned throughout the entire sample day to achieve a complete accounting of angler effort and catch for that day. Anglers were interviewed as they departed the area and the following information was recorded:

- 1) Completed fishing for this time period (recorded as complete or incomplete angler trip).
- 2) Hours spent fishing to nearest half hour.
- 3) First three numbers of their Zip Code (to determine general area of residence).
- 4) Any fish caught and kept were observed for species, fork length to nearest cm, fin clips, project tags, and unusual condition.
- 5) The head and scale samples were taken from salmon missing an adipose fin.

Weekly sampling schedules were designed to systematically sample four days per Julian week in 1984, 1985 and 1986, and three days per Julian week in 1987. A Julian week is defined as a grouping of seven consecutive days starting with January 1 through January 7, Julian week 1 running through the calendar year. For Areas 1 and 2, the census took place from Julian week 29 and continued through Julian week 41.



Daily data records were reviewed for completeness and correct coding, and then entered into a computer database file using dBase software.

Estimates of chinook salmon harvested by anglers in Area 3 were determined from \$10-reward spaghetti tags returned by anglers in Areas 2 and 3. External spaghetti tags were applied to upstream migrating chinook salmon at rkm 4.8 (rm 3.0) (Hopelain, in progress). A ratio of fish harvested per tag returned in Area 2, and number of tags returned from Area 3 was used to determine numbers of chinook salmon harvested in Area 3 (see following estimation procedure section).

### Estimation and Statistical Procedures.

Sampling for each census location was stratified by Julian week and angler effort and catch were estimated for each week.

**An estimate for each item (catch and effort) in the ith week ( $\hat{Y}_i$ ) was calculated by:**

$$\hat{Y}_i = \sum_{i=1}^n y_i (N/n)$$

where:  $y_i$  = daily total of each item in ith week.  
 $n$  = number of sampled days in ith week.  
 $N$  = number of fishing days in ith week.

**Variance [ $V(\hat{Y}_i)$ ] of each item estimated in the ith week was calculated by:**

$$V(\hat{Y}_i) = \sum_{i=1}^n y_i^2 - \frac{(\sum y_i)^2}{n} \times 1/n \times (N - n/N) \times N^2$$

**Total seasonal or sample period estimates  $T(\hat{Y})$  for each item was obtained by summing the weekly estimated values:**

$$T(\hat{Y}) = \sum_{i=1}^k (\hat{Y}_i)$$

where:  $k$  = number of weeks in sample Period.

Weekly sample variance values were summed to obtain variance of total seasonal estimate [VT( $\hat{Y}$ )]:

$$VT(\hat{Y}) = \sum_{i=1}^k V(\hat{Y}_i)$$

Confidence intervals (CI) for each weekly or seasonal estimate were calculated by:

$$CI = \hat{Y}_i \pm t \times \sqrt{V(\hat{Y}_i)}$$

where: t = value from t-distribution table at the 95% confidence level and the number of degrees of freedom equals n-1.

An estimate catch and effort for boat anglers using the estuary was done by a more elaborate procedure. Anglers were sampled at 2 to 4 of the 10 boat docks during the 1984-87 seasons. All anglers were sampled for the entire day at a selected dock. Thus catch and effort represented total catch and effort for a day. An average catch and effort was calculated for boats. To estimate total effort and catch for all boat anglers using the 10 boat docks, a weekly boat count of all boats at the 10 boat docks was made for each Julian week. Assuming the proportion of boats actively fishing was the same at all boat docks, a weekly boat sample ratio  $r_i$  was determined by

$$r_i = b_i / t_i$$

where:  $b_i$  = total of boats at docks where sampling occurred in ith week.  
 $t_i$  = total of boats at all estuary docks in the ith week.

Estuary boat angler estimates for each item ( $\hat{Y}_{b_i}$ ) during each week were then estimated by:

$$\hat{Y}_{b_i} = \hat{Y}_i / r_i$$

Total seasonal estimates ( $T\hat{Y}_{b_i}$ ) for estuary boat anglers were then determined by:

$$T\hat{Y}_{b_i} = \sum_{i=1}^k \hat{Y}_{b_i}$$

Because of our inability to interview anglers on both sides of the river at the Waukel Creek riffle area, total angler hours for each sample day ( $\hat{T}h_i$ ) were estimated by:

$$\hat{T}h_i = \frac{\sum_{j=1}^{a_i} h_{ji}}{\sum_{i=1} a_i} \times \left[ \sum_{i=1} a_i + \sum_{i=1} e_i \right]$$

where:  $h_{ji}$  = sampled angler hours of ith angler trip on the ith sample day.  
 $a_i$  = number of angler trips sampled on the ith day  
 $e_i$  = number of angler trips counted on opposite bank during ith day.

Total sample day catch ( $TC_{ki}$ ) of each species at Waukel Creek riffle was estimated by:

$$TC_{ki} = \sum_{i=1}^{a_i} C_{ki} \div \sum_{i=1}^{a_i} h_{ji} \times Th_i$$

where:  $C_{ki}$  = total fish of kth species sampled on ith day from all anglers interviewed.  
 $TC_{ki}$  = total estimated fish of kth species, caught on ith day.

Anglers were instructed to return recovered tags to the Department as indicated by the address on the tag. Only tags known to be recovered by anglers were used for total catch estimates. Tags recovered by all other methods including "unknown" and "found" were ignored when estimating catch in areas upstream of the creel sampled areas.

The following was used to calculate angler catch ( $C_u$ ) from Area 3, the area not creel sampled (Johnson's to Iron Gate Dam):

#### RESULTS

$$C_u = R_u \times (C_s \div R_s)$$

where:  $C_s$  = chinook salmon catch in sample Area 2 ( 101 Bridge to Johnson's)  
 $R_s$  = tags returned by anglers from Area 2  
 $R_u$  = tags returned by anglers from Area 3.

#### Creel Census 1983

A creel census was not conducted this year because a State hiring freeze prevented the Department from hiring necessary seasonal personnel. Chinook harvest of adults and grilse was based on "best-guess" estimates and on a regression developed from the 1980 through 1982 harvest data. In Area 1 the chinook harvest was estimated ("best-guess") at 60 grilse and 750 adults. In Areas 2 and 3 the chinook harvest was estimated (regression) at 175 grilse and 1,125 adults.

#### Creel Census 1984

The creel census was conducted from July 24 through September 7 in the estuary areas (Area 1), and from August 1 through October 15 in the sample areas upstream of the Highway 101 Bridge

(Area 2). Within these areas we interviewed a total of 11,833 anglers; 2651 in Area 1, and 9,182 in Area 2, who had caught 2,351 Steelhead, 323 chinook salmon, and 42 coho salmon (Table 1).

During the sample period, in the lower 38.4 km (24 mi) (Areas 1 and 2) anglers completed an estimated 41,593 trips, fished a total of 121,952 hours (h) and caught 1,383 salmon and 4,967 Steelhead (Table 2).

In Area 3, Johnson's to Iron Gate Dam, anglers returned eight spaghetti tags from chinook resulting in an estimated catch of 128 chinook salmon grilse and 1,799 chinook salmon adults (Tables 3 and 4).

Hatchery origin fin-clipped chinook salmon recovered in creel samples included 22 adults and 20 grilse (Table 5). An additional 9 adults and 6 grilse bearing Ad-CWT marks were voluntarily returned by anglers (Table 6).

Catches of chinook salmon peaked in Area 1 the week ending September 2, and they peaked in Area 2 the week ending September 2 (Figure 2.). Steelhead catches peaked in Area 2 the week ending September 2 (Figure 3).

Anglers interviewed at Blakes Riffle (rkm 11.3, mile 7.0) had the highest catch rates for half-pounders, while anglers interviewed at the Turwar (Roy Rook) Boat Ramp (rkm 7.2, rm 4.5) were the most successful at catching adult Steelhead (Table 7).

The highest catch rates for grilse chinook salmon were from anglers interviewed upstream of the Highway 101 Bridge at the Klamath Glen boat dock (rkm 3.0, rm 5.0), while the highest adult chinook salmon catch rates were from anglers interviewed downstream of the Highway 101 Bridge at Requa boat dock (rkm 0.8, rm 0.5) (Table 7).

A length-frequency distribution of 70 chinook salmon caught in Area 1 was bimodal with a major length mode at 66 cm FL and a minor length mode at 49 cm FL. Average fork length was 65 cm FL with a range of 43 to 91 cm FL (Figure 4).

A length frequency distribution of 248 chinook salmon caught in Area 2 was bimodal with a major peak at 46 cm FL and a smaller peak at 64 cm FL. A nadir, defined by smoothing with a moving average of five, indicated the smallest adult to be 54 cm FL. The average length of the sample was 55 cm FL, with a range of 34 to 102 cm FL (Figure 4).

Steelhead length frequency distribution revealed a strong peak in the half-pounder size range at 32 cm FL and a smaller peak in the adult range at about 48 cm FL. Mean length for 1,637 half-pounders was 34 cm FL, with a range of 25 to 43 cm FL. Mean length for 615 adult Steelhead was 53 cm FL, with a range of 44 to 73 cm FL (Figure 5).

**TABLE 1.** Summary of angler effort and catch sampled during the lower Klamath River creel census, fall 1984.

<u>Sample location</u>	<u>Angler trips</u>	<u>Angler hours</u>	<u>Steelhead<sup>a</sup></u>		<u>Chinook<sup>b</sup></u>		<u>Coho<sup>c</sup></u>	
			<u>Half-pounders</u>	<u>Adults</u>	<u>Grilse</u>	<u>Adults</u>	<u>Grilse</u>	<u>Adults</u>
<u>Mouth - Highway 101 Bridge</u>								
Mouth (Shore)	1,256	4,393	20	14	2	17	0	0
Requa (Boat)	1,395	3,606	16	3	11	36	3	0
<b>Totals</b>	<b>2,651</b>	<b>7,999</b>	<b>36</b>	<b>17</b>	<b>13</b>	<b>53</b>	<b>3</b>	<b>0</b>
<u>Highway 101 Bridge - Blakes Riffle</u>								
101 Bridge (Shore)	2,881	8,121	310	170	30	41	29	1
Turwar Riffle (Shore)	1,170	3,086	131	31	4	4	0	0
Turwar Ramp (Boat)	2,802	11,369	685	288	36	46	1	0
Klamath Glen (Boat)	1,651	5,800	360	88	59	37	6	1
Blakes Riffle (Shore)	678	1,797	215	20	0	0	0	0
<u>Subtotals</u>								
Shore	4,729	13,004	656	221	34	45	29	1
Boat	4,453	17,169	1,045	376	95	83	7	1
<b>TOTALS</b>	<b>9,182</b>	<b>30,173</b>	<b>1,701</b>	<b>597</b>	<b>129</b>	<b>128</b>	<b>36</b>	<b>2</b>
<u>All areas</u>								
<u>Subtotals</u>								
Shore	5,985	17,397	676	235	36	62	29	1
Boat	5,848	20,775	1,061	379	106	119	10	2
<b>GRAND TOTALS</b>	<b>11,833</b>	<b>38,172</b>	<b>1,737</b>	<b>614</b>	<b>142</b>	<b>181</b>	<b>39</b>	<b>3</b>

<sup>a</sup> Half-pounders  $\geq 25$  and  $< 44$  cm FL; adults  $\geq 44$  cm FL.

<sup>b</sup> Chinook  $\leq 54$  cm FL classified as grilse; chinook  $> 54$  cm FL classified as adults.

<sup>c</sup> Coho  $\leq 57$  cm FL classified as grilse; coho  $> 57$  cm FL classified as adults.

**Table 2.** Estimated total angler effort and harvest in the lower Klamath River (mouth to Johnson's, river kilometer 38.4), during Fall 1984 <sup>a</sup>

<u>Sampling location</u>	<u>Seven days per week</u>		<u>Steelhead</u>		<u>Salmon days only<sup>b</sup></u>		<u>Chinook</u>		<u>Coho</u>	
	<u>Angler trips</u>	<u>Angler hours</u>	<u>Half-pounders</u>	<u>adults</u>	<u>Angler trips</u>	<u>Angler hours</u>	<u>grilse</u>	<u>adults</u>	<u>grilse</u>	<u>adults</u>
<u>BELOW HIGHWAY 101 BRIDGE</u>										
Dad's Camp	1,707 <sup>c</sup>	5,925 <sup>c</sup>	31	43	1,707	5,925	3	21	0	0
Boat docks	21,137 <sup>c</sup>	54,686 <sup>c</sup>	229	45	21,137	54,689	172	527	57	0
Subtotals	22,844 <sup>c</sup>	60,614 <sup>c</sup>	260	88	22,844	60,614	175	548	57	0
<u>ABOVE HIGHWAY 101 BRIDGE</u>										
101 Bridge	5,717	15,995	558	391	4,544	13,001	58	81	71	2
Turwar Riffle	2,628	6,939	284	84	1,911	5,060	11	6	0	0
Turwar Ramp	5,596	22,600	1,225	703	4,407	18,288	67	98	2	0
Klamath Glen	3,446	12,169	695	217	3,002	10,661	120	72	15	2
Blakes Riffle	1,362	3,635	403	59	1,040	2,874	0	0	0	0
Subtotals	18,749	61,338	3,165	1,454	14,938	49,884	256	257	88	4
Grand Totals	41,593	121,952	3,425	1,542	37,782	110,498	431	805	145	4

<sup>a</sup> Estimates based on creel census conducted in the lower river. Figures do not consider shore anglers fishing between Blakes Riffle and Johnson's, which are estimated to be less than 1.0% of totals shown.

<sup>b</sup> During the 1984 season, fishing was closed below the Highway 101 bridge on Mondays and Tuesdays from August 1 through September 30, 1984. Fishing above the Highway 101 bridge was open seven days per week, except on Mondays and Tuesdays salmon could not be kept. Angler effort numbers reflect seven days per week for steelhead catches, and five days per week for salmon catches.

<sup>c</sup> These numbers represent five days of angler effort per week which was the total weekly effort for steelhead below the Highway 101 bridge.

**TABLE 3.** Summary of Klamath River angler harvest estimates for of chinook and coho salmon, and steelhead trout 1983 through 1987 Seasons

Harvest area	Angler trips	Angler hours	<u>Chinook</u>		<u>Coho</u>		<u>Steelhead</u>	
			<u>grilse</u>	<u>adults</u>	<u>grilse</u>	<u>adults</u>	<u>half-pounders</u>	<u>adults</u>
<u>1983</u> <sup>a</sup>								
Area 1 <sup>b</sup>			60	750				
Area 2-3			175	1,125				
Total			235	1,875				
<u>1984</u>								
Area 1	22,844	60,614	175	548	57	0	260	88
Area 2 <sup>c</sup>	14,938	49,884	256	257	88	4	3,165	1,454
Area 3 <sup>d</sup>	n/a	n/a	128	1,799	<sup>e</sup>			
Total	37,782	110,498	559	2,604	145	4	3,425	1,542
<u>1985</u>								
Area 1	21,399	68,070	1,479	2,427	12	41	135	107
Area 2	18,761	70,171	2,331	438	35	4	3,626	3,184
Area 3	n/a	n/a	1,943	563				
Total	40,160	138,241	5,753	3,428	47	45	3,761	3,291
<u>1986</u>								
Area 1	28,274	89,092	704	2,456	0	4	124	85
Area 2	18,156	71,564	2,257	2,661	50	15	2,073	2,905
Area 3	n/a	n/a	3,009	3,871				
Total	46,430	160,656	5,970	8,988	50	19	2,197	2,990
<u>1987</u>								
Area 1	26,292	79,534	146	2,455	1	0	98	43
Area 2	24,972	99,047	2,980	5,648	80	152	2,160	1,753
Area 3	n/a	n/a	1,490	3,655				
Total	51,264	178,581	4,616	11,758	81	152	2,258	1,796

<sup>a</sup> Creel census not conducted in 1983. Estimates based on previous season's harvest levels.

<sup>b</sup> Area 1= estuary, mouth (rkm 0, rm 0) to Highway 101 Bridge, (rkm 4.8, rm 3). Estimates based on creel data.

<sup>c</sup> Area 2 = Highway 101 Bridge (rkm 4.8, rm 3) to Johnson's, (rkm 38.4, rm 24). Estimates based on creel data.

<sup>d</sup> Area 3 = Johnson's, (rkm 38.4, rm 24) to Iron Gate Dam, (rkm 306, rm 191). Angler interviews were not conducted in this area. Estimates were based on tag returns.

<sup>e</sup> Harvest estimates for coho and steelhead were not determined for Area 3.

**TABLE 4.** Summary of reward tags returned by anglers from Klamath River fall chinook salmon. Included are estimates of angler harvest in creel Area 3 (Johnson's to Iron Gate Dam) computed from tag returns for the 1984 through 1987 seasons.

<u>Year</u>	<u>Area 2<sup>a</sup></u>		<u>Area 3<sup>b</sup></u>	
	<u>Grilse</u>	<u>Adults</u>	<u>Grilse</u>	<u>Adults</u>
<u>1984</u>				
Tags recovered	2	1	1	7
Number harvested	256 <sup>c</sup>	257	128 <sup>d</sup>	1,799
<u>1985</u>				
Tags recovered	18	7	15	9
Number harvested	2,331	438	1,943	563
<u>1986</u>				
Tags recovered	3	11	4	16
Number harvested	2,257	2,661	3,009	3,655
<u>1987</u>				
Tags recovered	2	17	1	11
Number harvested	2,980	5,648	1,490	3,655

<sup>a</sup> Area 2. Highway 101 Bridge (rkm 4.8, rm 3) to Johnson's (rkm 38.4, rm 24).

<sup>b</sup> Area 3. Johnson's (rkm 38.4, rm 24) to Iron Gate Dam (rkm 306, rm 191).

<sup>c</sup> Number harvested in Area 2 was estimated from creel census data.

<sup>d</sup> Number harvested in Area 3 was calculated based on tags returned in Areas 2 and 3.



**TABLE 5.** Summary of marks observed on chinook salmon in lower Klamath River creel samples during July through October, 1984-1987.

<u>Mark</u> <sup>a</sup>	<u>Season</u>	<u>Number observed</u>	<u>Percent of creel sample</u>	<u>Mean Range</u>	<u>(cm FL)</u>
<u>Adult chinook salmon</u>					
Ad	1984	20	11.0	69	(57-91)
	1985	81	10.3	73	(61-96)
	1986	202	11.9	70	(56-101)
	1987	325	11.9	70	(56-97)
LV <sup>b</sup>	1984	1	0.6	61	
	1985	13	1.6	75	(68-88)
	1986	6	0.4	79	(56-96)
	1987	0			
RV <sup>c</sup>	1984	1	0.6	66	
	1985	1	0.1	77	
	1986	1	0.0	61	
	1987	0			
<u>Grilse chinook salmon</u>					
Ad	1984	18	12.7	46	(42-52)
	1985	110	7.4	50	(37-60)
	1986	103	9.6	46	(35-55)
	1987	68	5.6	50	(40-55)
LV	1984	1	0.7	44	
	1985	0			
	1986	0			
	1987	0			
RV	1984	1	0.7	49	
	1985	0			
	1986	0			
	1987	0			

<sup>a</sup> Ad = adipose, LV = left ventral, RV = right ventral.

<sup>b</sup> Iron Gate Hatchery origin.

<sup>c</sup> Trinity River Hatchery origin.

**Table 6.** Release and recovery data for marked salmon obtained from lower Klamath River sport anglers, July through October 1984

		Release data						Recovery Data						
CWT	Brood								Number recovered			Mean		
Group	Strain <sup>a</sup>	Year	Number	Age <sup>b</sup>	Fish/kg	Date	Site <sup>c</sup>	Creel <sup>d</sup>	Volunteer <sup>e</sup>	Total	Age	FL	(cm)	Dates
<u>Adult chinook salmon</u>														
6-52-01		1981	34,000	f	140.9	10/82	TRH	1	0	1	3	57		9/1
6-59-04	Fall	1981	65,385	y	20.9	11/15-18/82	IGH	2	0	2	3	67	(62-72)	8/31-9/2
6-59-05	Fall	1980	185,857	f	163.0	6/8-9/81	IGH	1	2	3	4	83		9/1-8/31
6-59-06	Fall	1980	87,450	y	19.8	10/26-30/81	IGH	1	0	1	4	91		9/2
6-59-07	Fall	1981	159,092	f	238.1	6/23-24/82	IGH	5	3	8	3	63		8/4-9/1
6-59-14 <sup>f</sup>	Fall	1980	17,835-34,535	f	>21.0	sum.-fall'81	Red Cap Cr.	2	0	2	4	78		7/29-8/26
6-59-15 <sup>f</sup>	Fall	1980	35,803	f	220.0	5/26-27/81	Camp Cr.	1	1	2	4	n/a		8/22-8/30
6-59-18	Fall	1981	36,762	y	20.9	11/15-18/82	IGH	0	1	1	3	n/a		8/22
6-61-22	Fall	1981	103,161	y	36.7	10/12/82	TRH	1	1	2	3	67		9/6
6-61-37	Spring	1981	100,174	y	28.6	10/6-7/82	TRH	2	0	2	3	63	(62-64)	8/1-8/2
Subtotals								16	8	24				
Lost Tags <sup>g</sup>								3	0	3				
Subtotals								19	8	27				
No Tags <sup>h</sup>								0	1	1				
Totals								19	9	28				

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**Table 6.** Continued

		Release data						Recovery Data					
CWT	Brood							Number recovered			Mean		
Group	Strain <sup>a</sup>	Year	Number	Age <sup>b</sup>	Fish/kg	Date	Site <sup>c</sup>	Creel <sup>d</sup>	Volunteer <sup>e</sup>	Total	Age	FL (cm)	Dates
<u>Grilse chinook salmon</u>													
6-50-10	Fall	1982	39,127	y	16.5	11/7-9, 12/5/83	IGH	0	1	1	2	N/A	8/31
6-50-11	Fall	1982	36,997	y	16.5	11/7-9, 12/5/83	IGH	2	1	3	2	48.0 (46-50)	8/31-9/7
6-56-11	Fall	1982	21,223	y	24.2	11/15/83	TRH	1	0	1	2	43.0	9/1
6-59-9	Fall	1982	158,824	f	145.5	6/27-28/83	IGH	1	0	1	2	52.0	9/4
6-59-10	Fall	1982	83,023	f	165.4	6/23/83	Klamath Glen	0	1	1	2	N/A	8/31
6-59-11	Fall	1982	6,782	y	16.5	11/28-29/83	Klamath Glen	1	0	1	2	48.0	8/31
6-61-23	Fall	1982	90,242	f	296.1	6/83	TRH	1	0	1	2	N/A	8/30
6-61-29	Fall	1982	96,583	y	29.7	11/9/83	TRH	2	0	2	2	43.5 (43-44)	9/1
6-61-38	Spring	1982	96,461	y	27.1	11/3/83	TRH	1	2	3	2	N/A	7/11,8/3,8/19
Subtotals								9	5	14			
Lost Tags <sup>g</sup>								1	0	1			
Subtotals								10	5	15			
No Tags <sup>h</sup>								4	1	5			
TOTALS								14	6	20			

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**Table 6.** Continued

		Release data						Recovery Data					
CWT	Brood							Number recovered			Mean		
Group	Strain <sup>a</sup>	Year	Number	Age <sup>b</sup>	Fish/kg	Date	Site <sup>c</sup>	Creel <sup>d</sup>	Volunteer <sup>e</sup>	Total	Age	FL (cm)	Dates
<u>Adult coho salmon</u>													
6-59-55	Fall	1981	18,870	y+	22.0	4/13/83	IGH	1	1	2	3	N/A	10/4-10
TOTAL								1	1	2			
<u>Grilse coho salmon</u>													
6-56-46	Fall	1982	47,312	y+	27.9	3/12/84	TRH	1	0	1	2	42	10/4
6-59-58	Fall	1982	18,185	y+	24.3	4/16/84	IGH	1	0	1	2	N/A	
TOTAL								2	0	2			

<sup>a</sup> All 6-59-X groups were Klamath River strain; all 6-61-X groups were Trinity River strain.

<sup>b</sup> f = fingerling; y = yearling; y+ = yearling plus.

<sup>c</sup> IGH = Iron Gate Hatchery; TRH = Trinity River Hatchery.

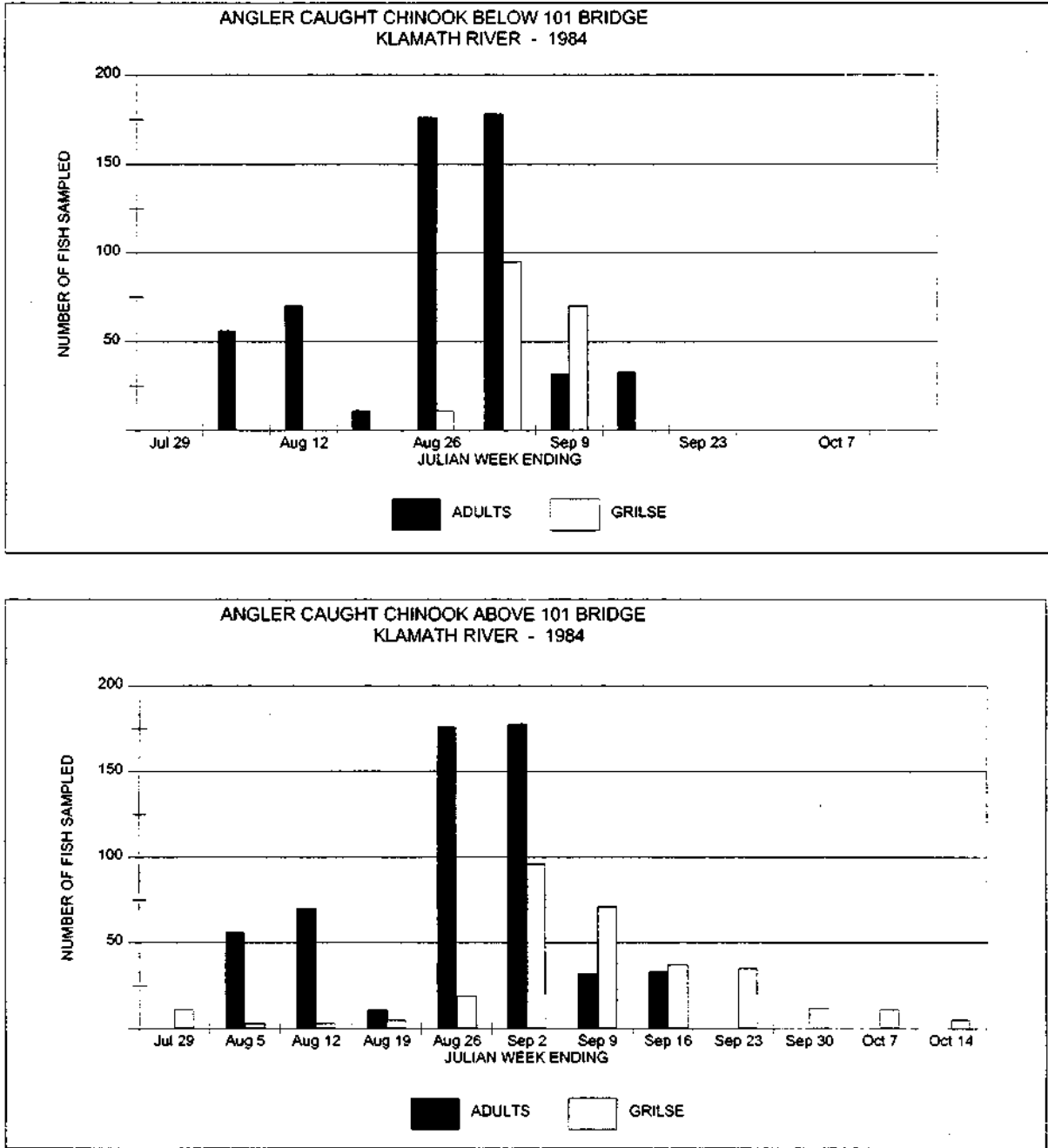
<sup>d</sup> Marked (Ad-CWT) salmon recovered during project creel census.

<sup>e</sup> Marked (Ad-CWT) salmon voluntarily provided at CDFG by Klamath River sport anglers.

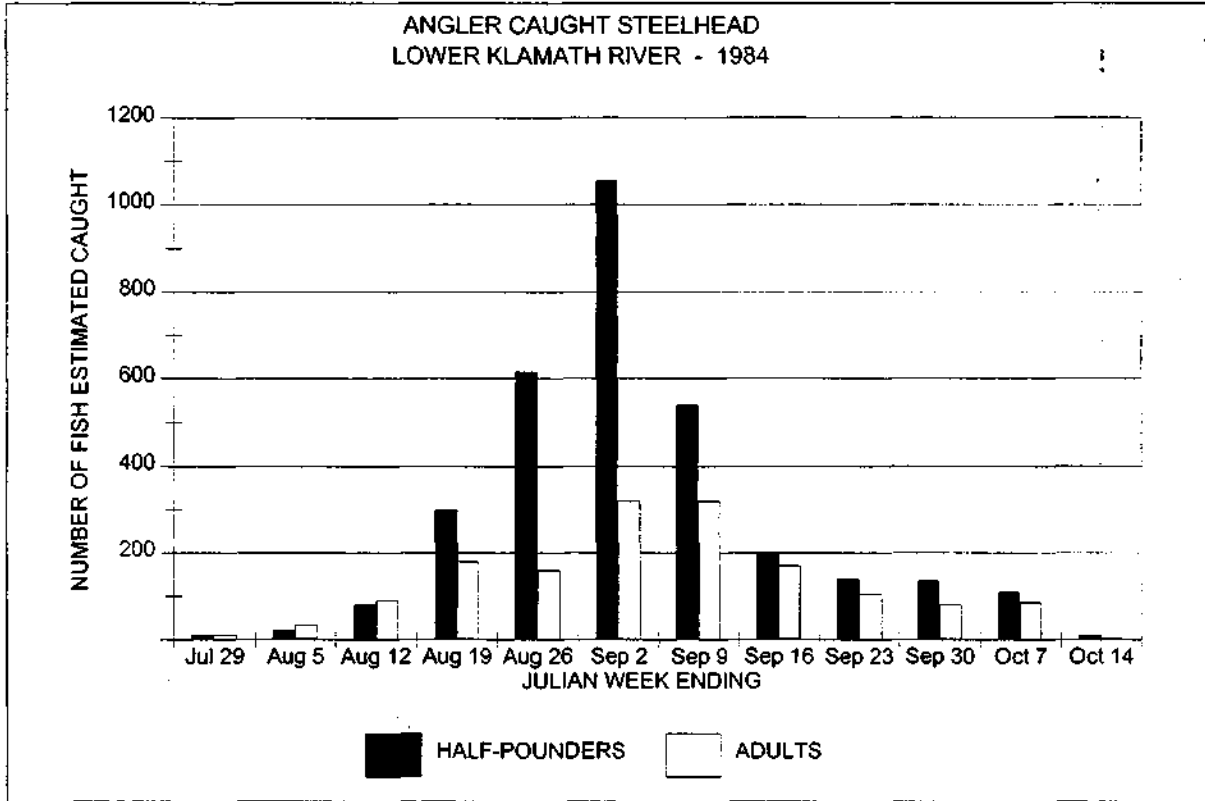
<sup>f</sup> Fish in that group were produced at IGH, transferred as fingerlings to a rearing pond located on the Klamath River tributary indicated under release site as part of the Cooperative Karok Indian Rearing Pond Program.

<sup>g</sup> Tags lost during processing.

<sup>h</sup> No tags recovered from adipose marked fish.



**Figure 2.** Angler-caught chinook salmon sampled in the lower 38.4 km (24 miles) of the Klamath River during July through October 1984. The reach downstream (below) of Highway 101 extends 4.8 km (3 miles) to the river's mouth. The reach upstream (above) of Highway 101 extends from the bridge upstream to river km 38.4 (river mile 24).



**Figure 3.** Estimated angler catch of steelhead in the lower 38.4 km (24 miles) of the Klamath River during July through October 1984. Half-pounders were 25 to 43 cm FL, adults were over 43 cm FL.

**Table 7.** Estimated catch per angler hour of steelhead and salmon in the lower Klamath River from the mouth upstream to Johnson's (38.4 km, 24 miles) during the 1984 fall season <sup>a</sup>

<u>Sampling location</u>	<u>Steelhead</u>		<u>Chinook salmon</u>		<u>Coho salmon</u>		<u>Weighted average</u>
	<u>Half-pounders</u>	<u>Adults</u>	<u>Grilse</u>	<u>Adults</u>	<u>Grilse</u>	<u>Adults</u>	
Mouth	0.005	0.004	0.001	0.004	0.000	0.000	0.012
Requa	0.004	0.001	0.003	0.010	0.001	0.000	0.019
Highway 101 Bridge	0.038	0.021	0.004	0.006	0.005	0.000	0.073
Turwar Riffle	0.043	0.010	0.002	0.001	0.000	0.000	0.055
Turwar Ramp	0.060	0.025	0.004	0.005	0.000	0.000	0.093
Klamath Glen	0.060	0.015	0.011	0.007	0.001	0.000	0.920
Blakes Riffle	0.116	0.011	0.000	0.000	0.000	0.000	0.127

<sup>a</sup> Creel census began July 28 and ended October 8, 1984.

<sup>b</sup> Total fish kept / total hours fished. Total hours represents effort for seven-day week.

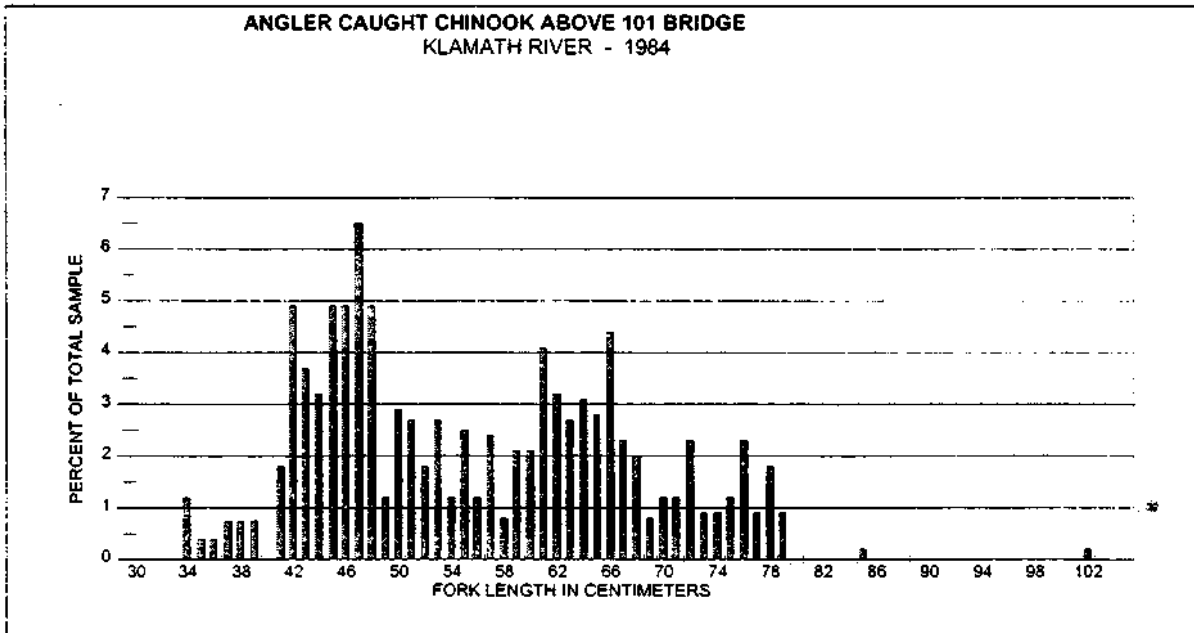
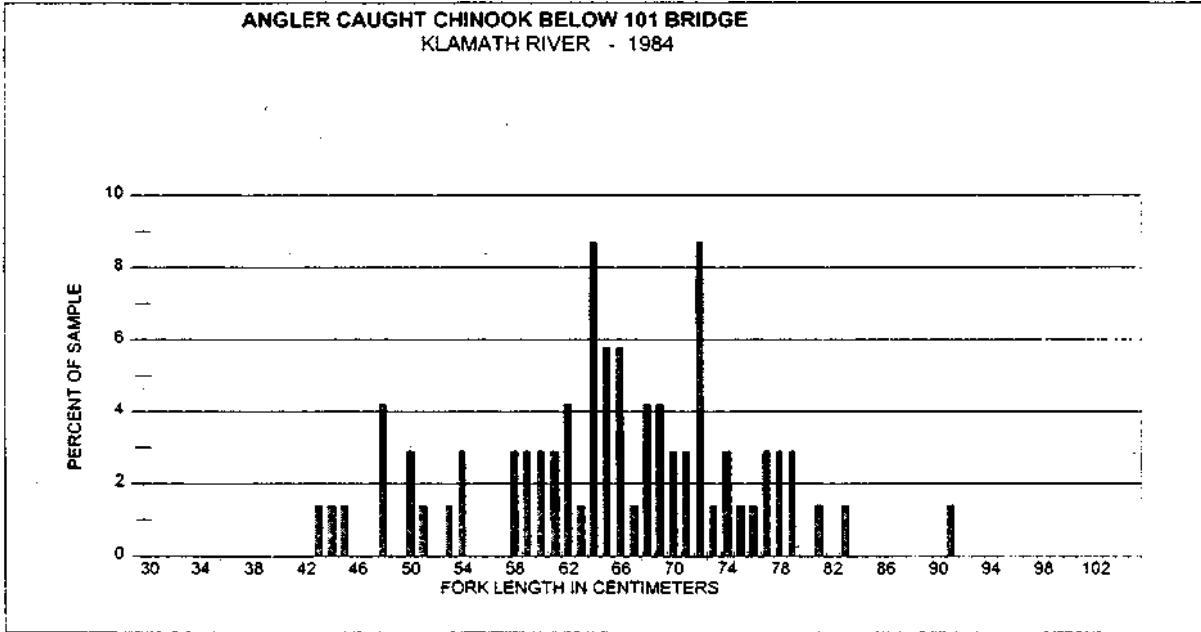
A length frequency distribution for coho salmon indicated the largest grilse was less than 55 cm FL (Figure 6). The mean length of 37 grilse was 46 cm FL, ranging from 37 to 54 cm FL. Mean length of 2 adults was 66 cm FL, ranging from 64 to 68 cm FL.

Fifty-two heads were recovered from Ad-marked salmon (36 random and nonrandom from creel census, and 16 recoveries volunteered by anglers) caught in the Areas 1 and 2 in the sport fishery this season. We received heads from July 11 through October 4, 1984. The total included 48 spring and fall chinook salmon, and 4 coho salmon (Table 6.)

Coded-wire tags were recovered from 38 (74.5% of 47) chinook salmon (24 adults and 14 grilse) and 4 (100%) of the coho salmon (Table 6).

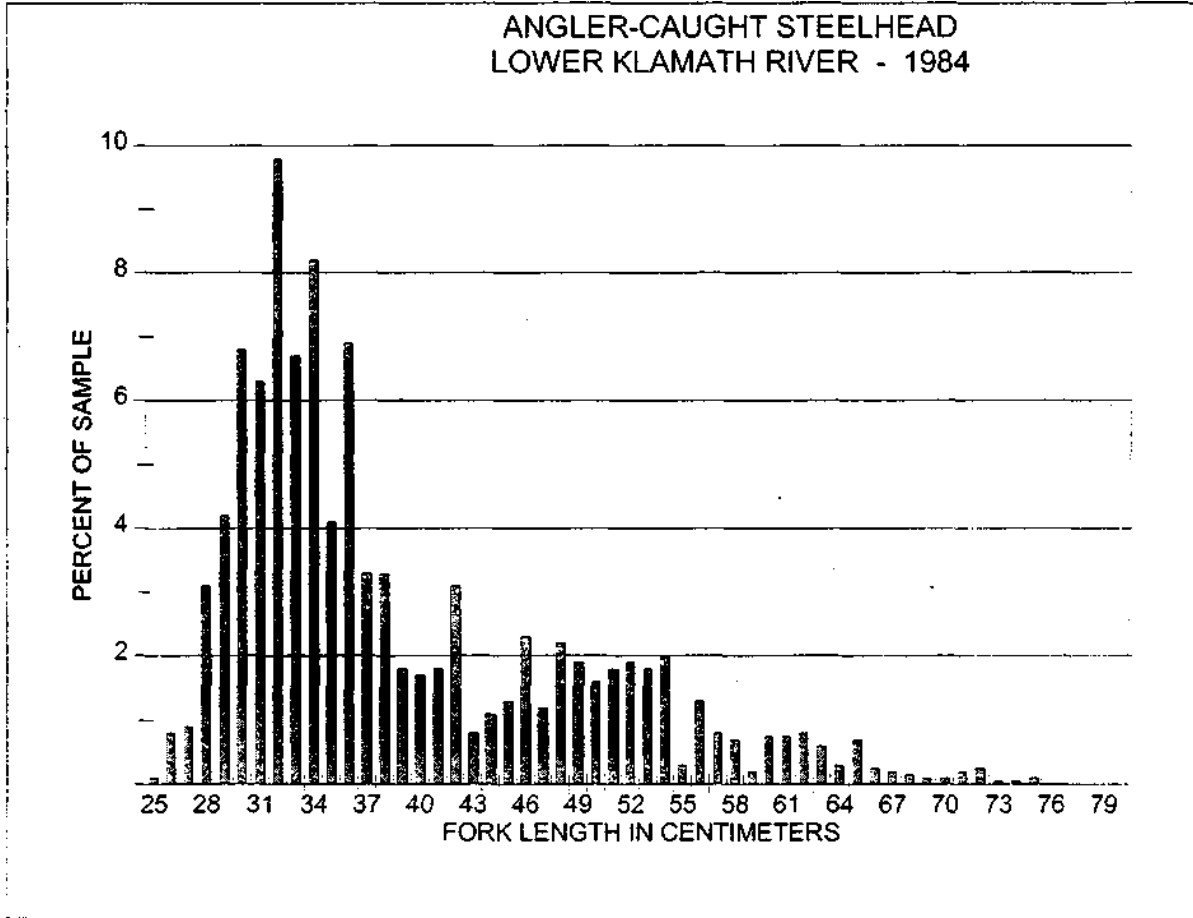
Nineteen mark groups were represented in the sample of recovered chinook salmon CWTs. The sample included 33 tags from fall chinook salmon released from two hatcheries and two Klamath River basin rearing ponds. We also recovered tags from five TRH spring chinook salmon, representing two different mark groups. All five spring chinook salmon were caught from July 11 through August 19, 1984. Fall chinook salmon bearing CWTs were recovered by anglers from July 29 through September 7, 1984 (Table 6).

Three mark groups were represented in the coho salmon tag sample. Both Klamath River basin hatcheries were represented in the sample. Coho salmon bearing CWTs were recovered from anglers in the lower Klamath River from October 4 through October 5, 1984 (Table 6).

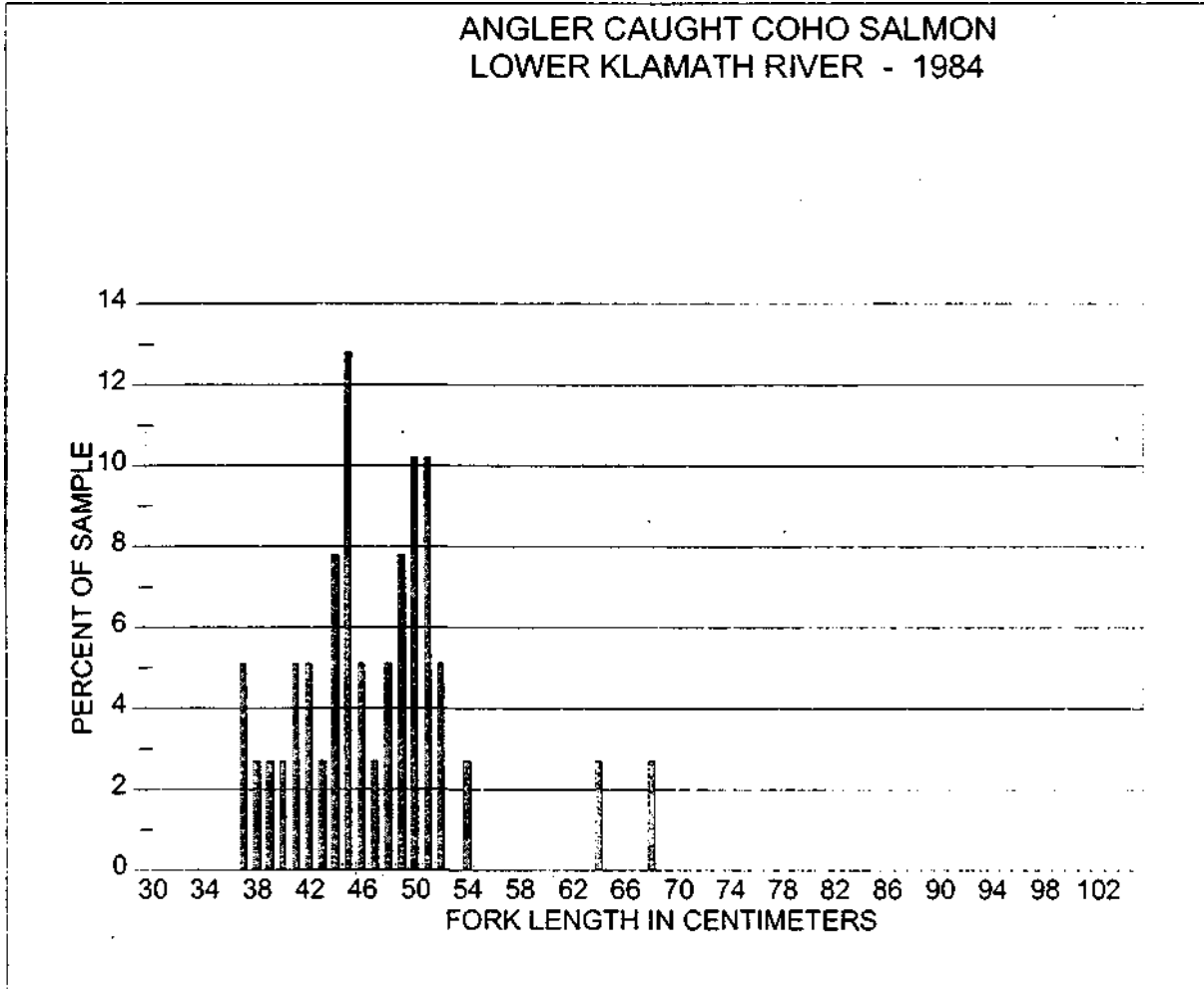


**Figure 4.** Length frequency of angler caught chinook salmon in two reaches of the lower Klamath River during July through October, 1984. The reach downstream (below) of Highway 101 extends 4.8 km (3 miles) to the river's mouth. The reach upstream (above) of Highway 101 extends from the bridge upstream to river km 38.4 (river mile 24).





**Figure 5.** Length frequency of angler-caught steelhead in the lower 38.4 km (24 miles) of the Klamath River during July through October, 1984.



**Figure 6.** Length frequency of angler-caught coho salmon in the lower 38.4 km (24 miles) of the Klamath River during July through October, 1984.

## Creel Census 1985

Creel censuses were conducted from July 23 through September 17 in the estuary (Area 1) and from August 1 through October 13 in the sample areas upstream of the Highway Bridge (Area 2). We interviewed a total of 16,272 anglers, 5,418 in Area 1 and 10,854 in Area 2, who had caught 3,294 Steelhead, 2,280 chinook salmon, and 40 coho salmon (Table 8).

In Areas 1 and 2 during the sample period, we estimated total of 41,593 angler trips and 121,952 angler hours, which resulted in a catch of 6,767 salmon and 7,052 Steelhead (Tables 3 and 9).

In Area 3, Johnson's to Iron Gate Dam, anglers returned 24 spaghetti tags from chinook salmon, resulting in an estimated catch of 1,943 chinook salmon grilse and 563 chinook salmon adults (Tables 3 and 4).

Catches of adult chinook salmon peaked in Area 1 the week ending August 19. Angler catches of chinook salmon grilse peaked in Area 1 the week ending September 2, and in Area 2 the week ending September 16 (Figure 7). Steelhead catches peaked in Area 2 the week ending August 26 (Figure 8).

Boat anglers interviewed at Turwar (Roy Rook) boat ramp and Klamath Glen boat dock had the highest catch rates for half-pounders, while anglers interviewed at the Turwar (Roy Rook) boat ramp were the most successful at catching adult Steelhead (Table 10).

The highest catch rates for grilse chinook salmon were for anglers interviewed in Area 2 at the Klamath Glen boat dock, while the highest adult chinook salmon catch rates were for anglers interviewed in Area 1 at resort boat docks near the estuary (Table 10).

Hatchery-origin, fin-clipped chinook salmon recovered in creel samples included 95 adults and 110 grilse (Table 5). An additional 70 adults and 48 grilse bearing Ad-CWT marks were returned voluntarily by anglers (Table 11).

A length frequency distribution of 1,474 chinook salmon caught in Area 1 indicated a bimodal population with major length modes centered around 56 cm FL and 70 cm FL. Average fork length was 67 cm FL with a range of 37 to 99 cm FL (Figure 9).

A length frequency of 1,336 chinook salmon caught in Area 2 exhibited a single mode with a peak at 50-51 cm FL. The average length of the sample was 53 cm FL, with a range of 27 to 98 cm FL (Figure 9).

A combined length frequency of all chinook salmon sampled, smoothed by a moving average of five, indicated a nadir between the grilse and adult modes at 62 to 63 cm FL.

**TABLE 8.** Summary of effort and catch sampled during the fall of 1985 in the lower Klamath River.

<u>Sample location</u>	<u>Angler trips</u>	<u>Angler hours</u>	<u>Steelhead</u> <sup>a</sup>		<u>Chinook</u> <sup>b</sup>		<u>Coho</u> <sup>c</sup>	
			<u>half-pounders</u>	<u>adult</u>	<u>grilse</u>	<u>adults</u>	<u>grilse</u>	<u>adults</u>
<u>Mouth - Highway 101 Bridge</u>								
Mouth (Shore)	2,166	6,113	11	8	66	181	1	3
Docks (Boat)	3,252	10,543	21	18	246	387	2	7
<b>Totals</b>	<b>5,418</b>	<b>16,656</b>	<b>32</b>	<b>26</b>	<b>312</b>	<b>568</b>	<b>3</b>	<b>10</b>
<u>Highway 101 Bridge - Blakes Riffle</u>								
101 Bridge (Shore)	3,673	11,584	274	312	437	115	4	4
Turwar Riffle (Shore)	1,573	4,601	259	168	19	5	2	1
Turwar Ramp (Boat)	3,932	18,692	865	853	458	68	6	3
Klamath Glen (Boat)	1,159	4,169	238	121	257	32	5	2
Blakes Riffle (Shore)	517	1,390	98	39	9	0	0	0
<u>Subtotals</u>								
Shore	5,763	17,575	631	528	465	120	6	5
Boat	5,091	22,861	1,103	974	715	100	11	5
<b>TOTALS</b>	<b>10,854</b>	<b>40,436</b>	<b>1,734</b>	<b>1,502</b>	<b>1,180</b>	<b>220</b>	<b>17</b>	<b>10</b>
<u>All Areas</u>								
<u>Subtotals</u>								
Shore	7,929	23,688	642	536	531	301	7	8
Boat	8,343	33,404	1,124	992	961	487	13	12
<b>Grand Totals</b>	<b>16,272</b>	<b>57,092</b>	<b>1,766</b>	<b>1,528</b>	<b>1,492</b>	<b>788</b>	<b>20</b>	<b>20</b>

<sup>a</sup> Half-pounders  $\geq 25$  and  $< 43$  cm FL; adult steelhead  $\geq 43$  cm FL.

<sup>b</sup> Chinook salmon  $\leq 60$  cm FL classified as grilse; chinook  $> 60$  cm FL classified as adults.

<sup>c</sup> Coho salmon  $\leq 58$  cm FL classified as grilse; coho  $> 58$  cm FL classified as adults.

**Table 9.** Estimated total angler effort and harvest in the lower Klamath River from the mouth to Johnson's, 38.4 km (24 miles) during Fall 1985 <sup>a</sup>

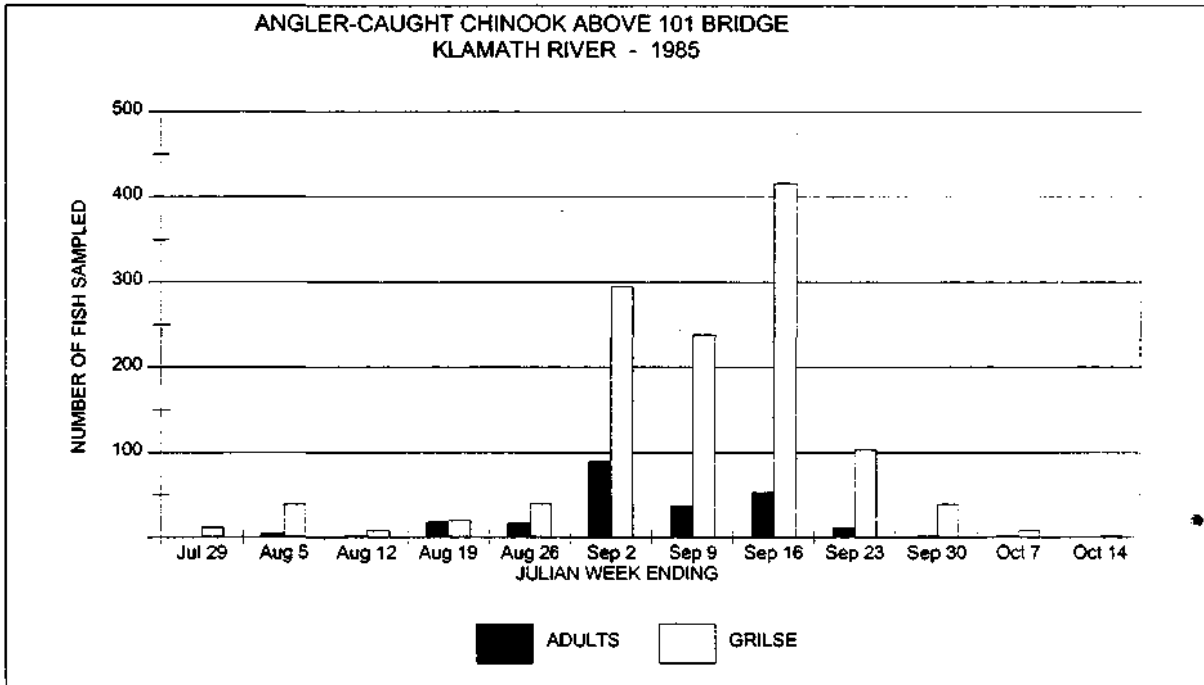
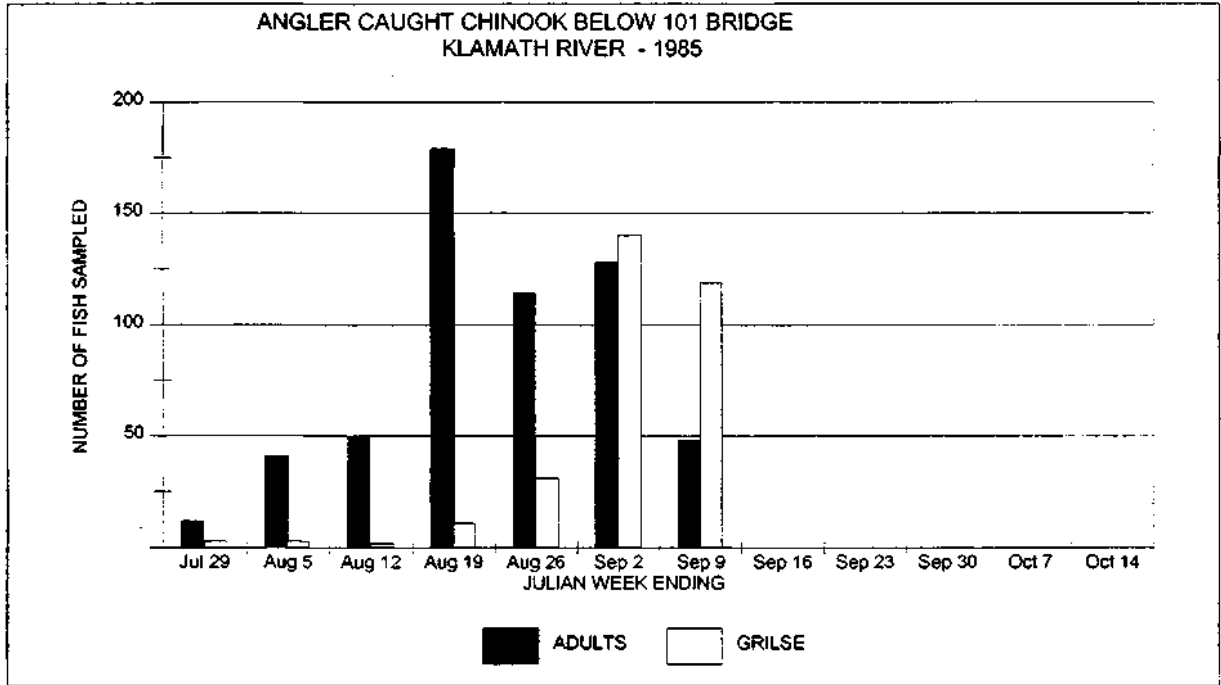
<u>Sampling location</u>	<u>Seven days per week</u>		<u>Steelhead</u>		<u>Salmon days only</u> <sup>b</sup>		<u>Chinook</u>		<u>Coho</u>	
	<u>Angler trips</u>	<u>Angler hours</u>	<u>Half-pounders</u>	<u>adults</u>	<u>Angler trips</u>	<u>Angler hours</u>	<u>grilse</u>	<u>adults</u>	<u>grilse</u>	<u>adults</u>
<u>Downstream of Highway 101 Bridge</u>										
Dad's Camp <sup>c</sup>	2,905 <sup>d</sup>	8,160 <sup>d</sup>	15	12	2,905	8,160	93	235	1	4
Boat docks	18,494 <sup>d</sup>	59,910 <sup>d</sup>	120	95	18,494	59,910	1,386	2,192	11	37
Subtotals	21,399 <sup>d</sup>	68,070 <sup>d</sup>	135	107	21,399	68,070	1,479	2,427	12	41
<u>Upstream of Highway 101 Bridge</u>										
101 Bridge	8,923	28,052	661	764	7,192	23,335	982	252	11	7
Turwar Riffle	3,522	10,314	553	370	2,592	7,665	42	8	3	3
Turwar Ramp	7,868	37,219	1,709	1,710	6,202	29,971	814	116	11	6
Klamath Glen	2,346	8,387	472	250	1,922	6,886	473	62	10	5
Blakes Riffle	1,236	3,253	231	90	853	2,314	20	0	0	0
Subtotals	23,895	87,225	3,626	3,184	18,761	70,171	2,331	438	35	21
Grand Totals	45,294	155,295	3,761	3,291	40,160	138,241	3,810	2,865	47	62

<sup>a</sup> Estimates based on creel census conducted in the lower river. Figures do not consider shore anglers fishing between Blakes Riffle and Johnson's, which are estimated to be <1.0% of totals shown.

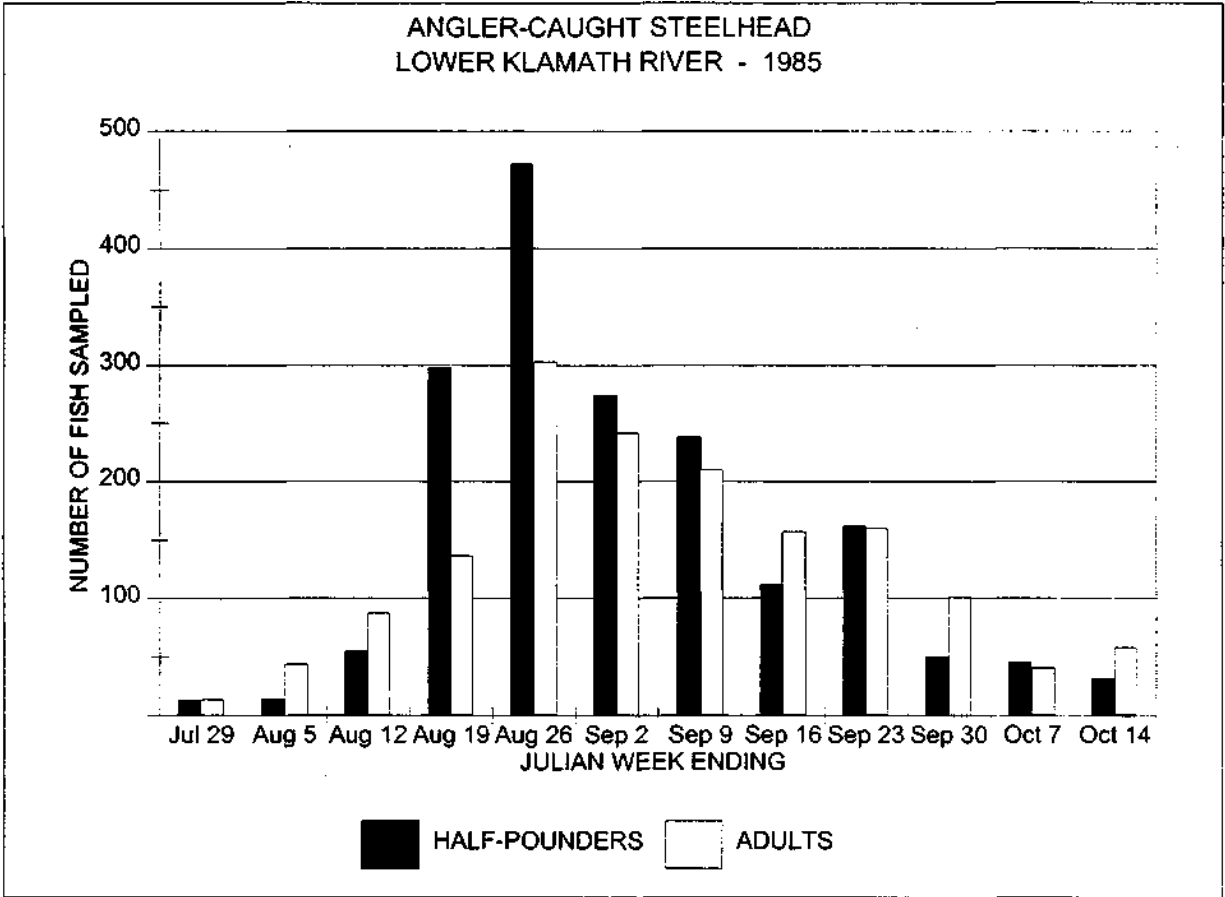
<sup>b</sup> During the 1985 season, fishing was closed below the Highway 101 bridge on Mondays and Tuesdays from August 1 through September 30, 1985. Fishing above the Highway 101 bridge was open seven days per week, except on Mondays and Tuesdays salmon could not be kept. Angler effort numbers reflect seven days per week for steelhead catches, and five days per week for salmon catches.

<sup>c</sup> Season closed September 9, 1985 to all fishing from Klamath River mouth to Highway 101 bridge.

<sup>d</sup> These numbers represent five days of angler effort per week which was the total weekly effort for steelhead below the Highway 101 bridge.



**Figure 7.** Angler-caught chinook salmon sampled in the lower 38.4 km (24 miles) of the Klamath River during July through October 1985. The reach downstream (below) of Highway 101 extends 4.8 km (3 miles) to the river's mouth. The reach upstream (above) of Highway 101 extends from the bridge upstream to river km 38.4 (river mile 24).



**Figure 8.** Angler-caught steelhead sampled in the lower 38.4 km (24 miles) of the Klamath River during July through October 1985.

**Table 10.** Estimated catches per angler hour of steelhead and salmon in the lower Klamath River (mouth to Johnson's, rkm 38.4, rm 24) during the 1985 fall season <sup>a</sup>

<u>Sampling location</u>	<u>Steelhead</u>		<u>Chinook</u>		<u>Coho</u>		<u>Weighted average</u>
	<u>Half-pounders</u>	<u>Adults</u>	<u>Grilse</u>	<u>Adults</u>	<u>Grilse</u>	<u>Adults</u>	
Mouth	0.001	0.001	0.011	0.030	0.000	0.000	0.044
Docks	0.002	0.002	0.023	0.037	0.000	0.001	0.065
101 Bridge	0.024	0.027	0.047	0.012	0.000	0.000	0.099
Turwar Riffle	0.056	0.037	0.005	0.001	0.001	0.000	0.099
Turwar Ramp	0.046	0.046	0.029	0.004	0.000	0.000	0.121
Klamath Glen	0.057	0.029	0.072	0.009	0.001	0.001	0.157
Blakes Riffle	0.071	0.028	0.008	0.000	0.000	0.000	0.105

<sup>a</sup> Creel census activities began July 24 and ended October 15, 1985.

<sup>b</sup> Total fish kept / total hours fished. Total hours represents effort for seven-day week.

A length frequency of sampled Steelhead revealed a bimodal distribution with modes at 33 cm FL and 51 cm FL, and a nadir separating half-pounders and adults at 42-43 cm FL. Mean length for 1,675 half-pounders was 34 cm FL with a range from 25 to 42 cm FL. Mean length for 1,476 Steelhead adults was 51 cm FL, ranging from 43 to 85 cm FL (Figure 10).

A length frequency of 28 coho salmon indicated the largest grilse was 53 cm FL and the smallest adult was 61 cm FL (Figure 11). Mean length of 19 grilse coho salmon was 66 cm FL, ranging from 37 to 53 cm FL. Mean length of nine adult coho salmon was 68 cm FL, ranging from 61 to 75 cm FL.

Four hundred forty-five heads from Ad-marked chinook salmon (327 sampled during creel census, 118 recoveries volunteered by anglers) were recovered from anglers in the lower Klamath River (Areas 1 and 2) sport fishery this season. We received heads from July 6 through September 29, 1985. The total included 8 spring chinook salmon and 348 fall chinook salmon (Table 11). The sample included 7 and 8 mark groups from IGH grilse and adults, respectively, and 9 and 10 mark groups from TRH grilse and adults, respectively. In addition, two mark groups were represented from Coleman National Hatchery (Sacramento River) and one mark group from Cole Rivers Hatchery (Rogue River, Oregon) (Table 11).

Dates of recovery of Ad-CWT spring chinook salmon ranged from July 6 to August 14. Dates of Ad-CWT fall chinook salmon recoveries ranged from July 27 to September 29, 1985 (Table 11).



**TABLE 11.** Release and recovery data for marked salmon obtained from lower Klamath River sport anglers, August - September 1985.

CWT Group	Release data							Recovery data						
	Strain <sup>a</sup>	Brood year	Number	Age <sup>b</sup>	Fish/kg	Date	Site <sup>c</sup>	Number recovered			Mean		Dates	
								Creel <sup>d</sup>	Volunteer <sup>e</sup>	Total	Age	cm FL (range)		
<u>Adult chinook salmon</u>														
6-50-10	Fall	1982	39,127	y	19.4	11/7-9,12/5/83	IGH	12	8	20	3	72	(66-79)	8/2-9/4
6-50-11	Fall	1982	36,997	y	19.4	11/7-9,12/5/8:	IGH	14	7	21	3	73	(61-81)	8/8-9/1
6-56-07	Fall	1982	88,854	f	32.1	6/83	TRH	3	1	4	3	70		8/28-9/1
6-56-09	Fall	1982	91,153	y	24.9	11/83	TRH	3	2	5	3	71	(70-74)	8/14-9/4
6-56-10	Fall	1982	20,902	y	29.5	11/83	TRH	3	2	5	3	69	(65-74)	8/8-9/4
6-56-11	Fall	1982	21,223	y	24.2	11/15/83	TRH	4	9	13	3	70	(60-75)	7/27-9/1
6-59-04	Fall	1981	65,385	y	20.9	11/15-18/82	IGH	3	0	3	4	83	(71-94)	7/31-8/8
6-59-06	Fall	1980	87,450	y	19.8	10/26-30/81	IGH	0	1	1	5	82		8/14
6-59-07	Fall	1981	159,092	f	238.1	6/23-24/82	IGH	4	5	9	4	87	(80-94)	7/31-8/29
6-59-08	Fall	1982	70,171	y	16.5	11/83-12/83	IGH	18	3	21	3	73	(66-83)	8/9-9/29
6-59-18	Fall	1981	36,762	y	20.9	11/15-18/82	IGH	1	0	1	4	87		8/28
6-59-19	Fall	1981	30,781	y	20.9	11/15-18/82	IGH	2	0	2	4	90	(88-91)	8/17-9/2
6-60-26	Fall	1981	42,964	f	173.8	5/82	Coleman	0	1	1	4	83		7/20
6-60-29	Fall	1981	43,817	f	160.6	5/82	Coleman	1	0	1	4	68		9/7
6-61-22	Fall	1981	103,161	y	36.7	10/12/82	TRH	1	0	1	4	82		9/2
6-61-23	Fall	1982	90,242	f	296.1	6/83	TRH	2	0	2	3	66	(64-69)	7/26
6-61-24	Fall	1982	138,801	f	248.6	6/83	TRH	0	1	1	3	71		8/15
6-61-25	Fall	1982	90,694	f	322.7	6/83	TRH	0	2	2	3	71		8/25-9/1
6-61-29	Fall	1982	96,583	y	29.7	11/9/83	TRH	21	9	30	3	70	(52-76)	7/21-9/1
6-61-38	Spring	1982	96,461	y	27.1	11/3/83	TRH	0	4	4	3	71	(66-78)	7/14-8/7
Subtotals								97	50	147				
Lost tags <sup>f</sup>								0	0	0				
Subtotals								97	50	147				
No. tags <sup>h</sup>								57	20	77				
Totals								154	70	224				

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TABLE 11. Continued.

CWT Group	Brood Strain <sup>a</sup> year	Release data						Recovery data						
		Number	Age <sup>b</sup>	Fish/kg	Date	Site <sup>c</sup>	Number recovered			Mean			Dates	
							Creel <sup>d</sup>	Volunteer <sup>e</sup>	Total	Age	cm FL	(range)		
<u>Grilse chinook salmon</u>														
6-56-08	Fall	1983	91,153	f	101.2	6/84	TRH	17	7	24	2	55	(48-68)	8/22-9/10
6-56-12	Fall	1983	97,311	f	107.8	6/84	TRH	22	13	35	2	55	(46-62)	8/23-9/14
6-56-13	Fall	1983	100,227	f	101.2	6/84	TRH	37	8	45	2	55	(49-68)	8/24-9/12
6-56-14	Fall	1983	25,547	y	26.6	10/84	TRH	6	3	9	2	49	(42-56)	9/2-9/22
6-56-15	Fall	1983	25,754	y	29.5	10/84	TRH	0	1	1	2	51		9/7
6-56-16	Fall	1983	26,171	y	31.0	10/84	TRH	1	1	2	2	45	(43-48)	9/1-9/4
6-59-23	Fall	1983	191,352	f	165.0	6/84	IGH	1	2	3	2	50	(43-55)	8/28-9/6
6-59-24	Fall	1983	97,566	f	198.0	6/84	IGH	1	0	1	2	45		8/23
6-59-26	Fall	1983	23,725	y	19.9	11/84	IGH	1	0	1	2	45		9/19
6-59-28	Fall	1983	93,710	f	49.1	6/84	IGH	1	0	1	2	52		9/19
6-59-32	Fall	1983	24,830	y	19.9	11/84	IGH	2	0	2	2	46	(40-51)	8/7-9/4
6-59-33	Fall	1983	23,766	y	19.9	11/84	IGH	1	0	1	2	51		9/2
6-61-13	Fall	1983	100,520	y	27.5	10/84	TRH	25	4	29	2	48	(41-58)	8/28-9/25
6-61-26	Fall	1983	191,094	f	129.8	6/84	TRH	17	3	20	2	54	(46-61)	7/31-9/8
6-61-40	Spring	1983	90,293	y	24.2	10/84	TRH	2	2	4	2	49	(45-55)	7/6-8/14
6-63-01	Fall	1983	92,965	y+	11.7	3/85	TRH	25	3	28	2	40	(37-44)	8/28-9/18
7-30-20	Fall	1983	24,295	y	14.3	9/84	CRH	0	1	1	2	41		8/24
Subtotals								161	48	209				
Lost tags <sup>f</sup>								2	0	2				
Subtotals								2	0	2				
No. tags <sup>h</sup>								165	48	213				
Totals								8	0	8				

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**TABLE 11.** Continued.

CWT Group	Brood Strain <sup>a</sup>	Brood year	Release data					Recovery data						
			Number	Age <sup>b</sup>	Fish/kg	Date	Site <sup>c</sup>	Number recovered			Mean		Dates	
								Creel <sup>d</sup>	Volunteer <sup>e</sup>	Total	Age	cm		FL(range)
<u>Adult coho salmon</u>														
6-56-45	Fall	1982	46,418	y+	29.3	2/84	TRH	1	0	1	3	52		9/12
6-56-46	Fall	1982	47,312	y+	27.9	3/12/84	TRH	5	0	5	3	65	(63-67)	8/28-9/21
6-56-47	Fall	1982	47,351	y+	24.2	4/84	TRH	5	2	7	3	62	(49-73)	8/22-9/19
6-56-48	Fall	1982	49,153	y+	24.2	4/84	TRH	3	1	4	3	63	(59-66)	9/1-9/4
6-56-49	Fall	1982	45,761	y+	20.5	4/84	TRH	3	1	4	3	65	(53-75)	9/4-9/18
6-59-59	Fall	1982	18,400	y+	22.0	4/84	IGH	1	0	1	3	72		9/21
Totals								18	4	22				
<u>Grilse coho salmon</u>														
6-59-30	Fall	1983	20,074	y+	15.4	3/85	IGH	2	0	2	2	45	(43-47)	9/14-9/25
Totals								2	0	2				

<sup>a</sup> All 6-59-X groups were Klamath River strain; all 6-61-X groups were Trinity River strain.

<sup>b</sup> f = fingerling; y = yearling; y+ = yearling plus.

<sup>c</sup> IGH = Iron Gate Hatchery; TRH - Trinity River Hatchery; CRH = Cole Rivers Hatchery, Oregon.

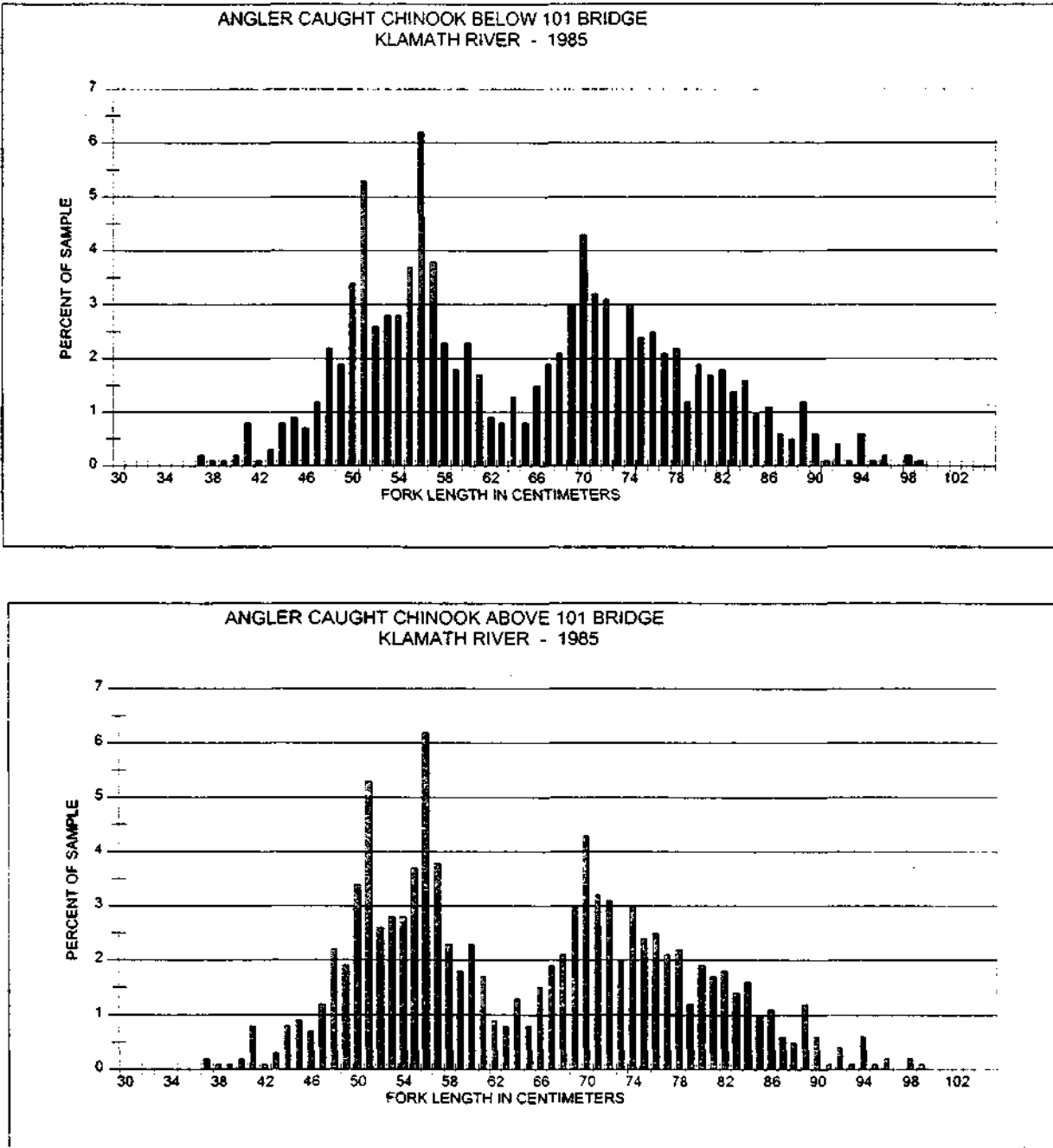
<sup>d</sup> Marked (Ad-CWT) salmon recovered during project creel census.

<sup>e</sup> Marked (Ad+CWT) salmon voluntarily provided to CDFG by Klamath River sport anglers.

<sup>f</sup> Tags lost during processing.

<sup>g</sup> Tags recovered but not legible.

<sup>h</sup> No tag recovered from adipose marked fish.



**Figure 9.** Length frequency of angler caught chinook salmon in two reaches of the lower Klamath River during July through October, 1985. The reach downstream (below) of Highway 101 extends 4.8 km (3 miles) to the river's mouth. The reach upstream (above) of Highway 101 extends from the bridge upstream to river km 38.4 (river mile 24).

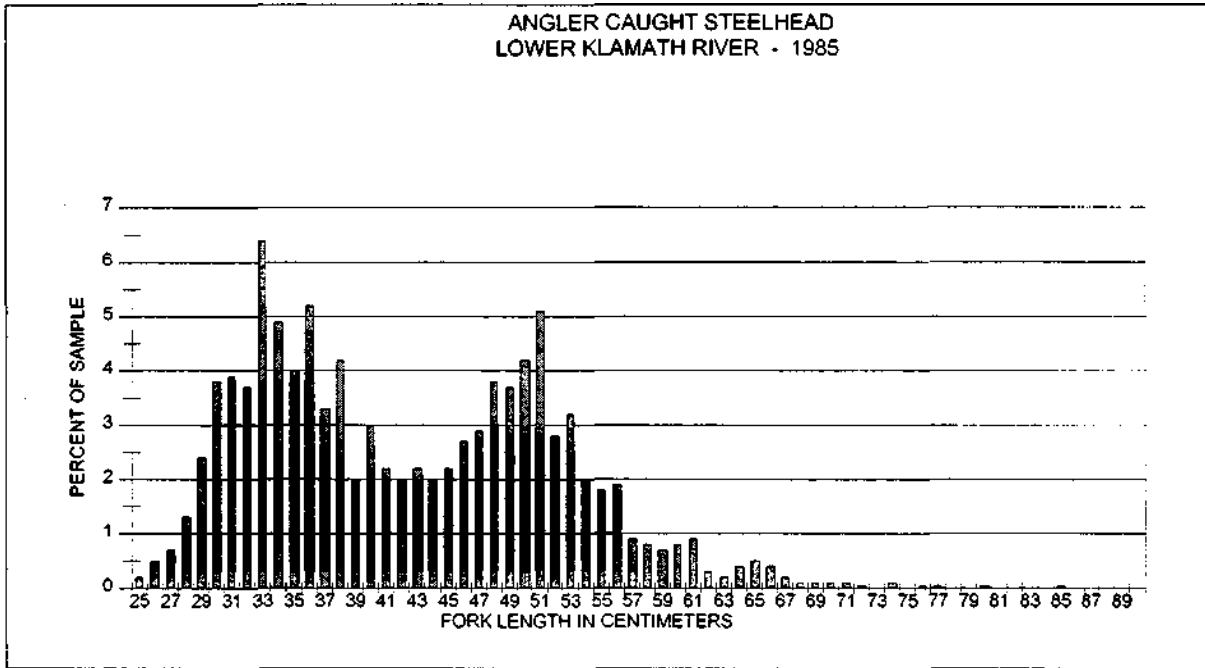


Figure 10. Length frequency of angler-caught steelhead in the lower 38.4 km (24 miles) of the Klamath River during July through October, 1985

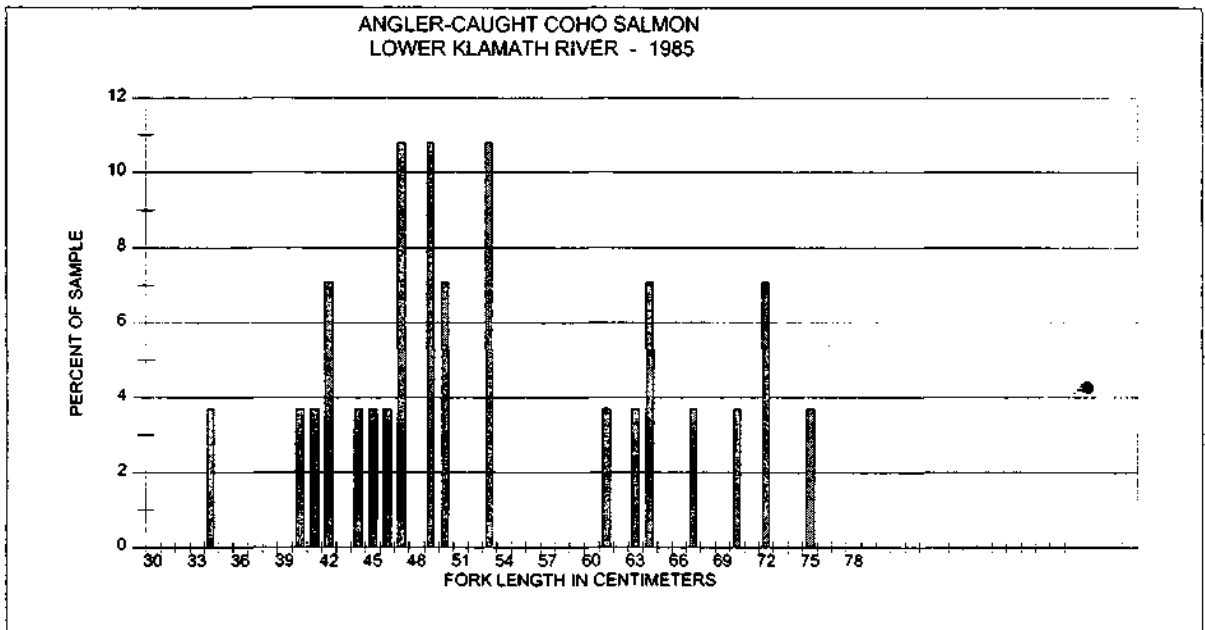


Figure 11. Length frequency of angler-caught coho salmon in the lower 38.4 km (24 miles) of the Klamath River during July through October, 1985.

Heads were recovered from 24 Ad-marked coho salmon representing seven mark groups from both Klamath River basin hatcheries. Coho salmon bearing CWTs were recovered from anglers in the lower Klamath River from August 22 through September 25, 1985 (Table 11).

#### Creel Census 1986

The creel census was conducted from July 23 through September 20 in the estuary area (Area 1) and from August 13 through October 13 in the sample areas upstream of the Highway 101 Bridge (Area 2). We interviewed a total of 15,204 anglers, 8,636 in Area 1 and 6,568 in Area 2, who had caught 1,907 Steelhead, 2,763 chinook salmon, and 25 coho salmon (Table 12).

In Areas 1 and 2 during the sample period, anglers completed an estimated 46,430 angler trips, fished 160,656 angler hours, and caught 8,138 salmon and 5,187 Steelhead (Table 13).

In Area 3, Johnson's to Iron Gate Dam, anglers returned 20 spaghetti tags from chinook salmon resulting in an estimated catch of 3,009 chinook salmon grilse and 3,871 chinook salmon adults (Tables 3 and 4).

Hatchery origin fin-clipped chinook salmon recovered in creel samples included 209 adults and 103 grilse (Table 5). An additional 50 adults and 13 grilse bearing Ad-CWT marks were voluntarily returned by anglers (Table 14).

Catches of chinook salmon adult and grilse peaked in Area 1 during the weeks ending August 19 and September 9, respectively. Angler catches of chinook salmon grilse and adults peaked in Area 2 the week ending September 9 (Figure 12). Half-pounder Steelhead catches peaked in Area 2 the week ending September 2, and adult Steelhead catches peaked the week ending September 23 (Figure 13).

Shore anglers interviewed at Turwar Riffle had the highest catch rates for half-pounders within Areas 1 and 2, while anglers interviewed at the Turwar (Roy Rook) boat ramp were the most successful at catching adult Steelhead within Areas 1 and 2 (Table 15).

The highest catch rates for chinook salmon grilse and adults within Areas 1 and 2 were from anglers interviewed in Area 2 at the Klamath Glen boat dock (Table 15).

A length frequency of 937 chinook salmon caught in Area 1 indicated a bimodal population, with a major length mode centered around 69 cm FL and a minor mode at 45 cm FL. Average fork length was 67 cm FL with a range of 26 to 103 cm FL (Figure 14).

A length frequency of 1,805 chinook salmon caught in Area 2 exhibited a bimodal curve with peaks at 48 and 61 cm FL. The average length of the sample was 56.9 cm FL, ranging from 29 to 102 cm FL (Figure 14).

A combined length frequency of all chinook salmon sampled, smoothed by a moving average of five, indicated a nadir between lengths represented by grilse and adult at 54 to 55 cm FL.

**TABLE 12.** Summary of angler effort and catch sampled during the fall 1986 lower Klamath River creel census, (numbers represent actual sample data).

<u>Sample location</u>	<u>Angler trips</u>	<u>Angler hours</u>	<u>Steelhead<sup>a</sup></u>		<u>Chinook<sup>b</sup></u>		<u>Coho<sup>c</sup></u>	
			<u>half-pounds</u>	<u>adults</u>	<u>grilse</u>	<u>adults</u>	<u>grilse</u>	<u>adults</u>
<u>Mouth - Highway 101 Bridge</u>								
Mouth (Shore)	2,363	8,071	0	7	46	200	0	0
<u>Boat docks</u>								
Requa	1,129	4,001	12	4	27	109	0	0
Panther Creek	2,013	6,468	2	1	59	184	0	1
Chinook	1,079	3,283	1	0	35	79	0	0
Riverside	2,052	5,908	19	14	43	168	0	1
Subtotal (Boat)	6,273	19,660	34	19	164	540	0	2
Totals	8,636	27,731	34	26	210	740	0	2
<u>Highway 101 Bridge - Blakes Riffle</u>								
<u>Shore</u>								
101 Bridge	1,477	5,067	134	183	95	210	0	0
Turwar Riffle	909	3,005	153	74	30	16	1	0
<u>Boat</u>								
Turwar Ramp	2,793	13,393	348	678	494	506	14	6
Klamath Glen	1,389	4,847	143	134	240	222	2	0
<u>Subtotals</u>								
Shore	2,386	8,072	287	257	125	226	1	0
Boat	4,182	18,240	491	812	734	728	16	6
TOTALS	6,568	26,312	778	1,069	859	954	17	6
<u>ALL AREAS</u>								
<u>Subtotals</u>								
Shore	4,749	16,143	287	264	171	426	1	0
Boat	10,455	45,972	525	831	898	1,268	16	8
GRAND TOTALS	15,204	62,115	812	1,095	1,069	1,694	17	8

<sup>a</sup> Half-poundsers  $\geq 25$  and  $< 42$  cm FL; adult steelhead  $\geq 42$  cm FL.

<sup>b</sup> Chinook salmon  $\leq 55$  cm FL classified as grilse; chinook salmon  $> 55$  cm FL classified as adults.

<sup>c</sup> Coho salmon  $\leq 55$  cm FL classified as grilse; coho salmon  $> 55$  cm FL classified as adults.

**TABLE 13.** Estimated total angler effort and harvest, lower Klamath River (mouth to Johnson's [rkm 38.4, rm 24] ), fall 1986 (numbers represent an expansion of sample data).

<u>Sample location</u>	<u>Angler trips</u>	<u>Angler hours</u>	<u>Steelhead</u> <sup>a</sup>		<u>Chinook</u> <sup>b</sup>		<u>Coho</u> <sup>c</sup>	
			<u>half-pounders</u>	<u>adults</u>	<u>grilse</u>	<u>adults</u>	<u>grilse</u>	<u>adults</u>
<u>Mouth - Highway 101 Bridge</u>								
Mouth (Shore)	4,581	15,470	0	15	94	414	0	0
Boat docks	23,693	73,622	124	70	610	2,042	0	4
Subtotal	28,274	89,092	124	85	704	2,456	0	4
<u>Highway 101 Bridge - Blakes Riffle</u>								
101 Bridge	5,148	17,491	458	653	340	770	0	0
Turwar Riffle	2,241	7,403	362	172	70	38	7	0
Turwar Ramp	6,661	31,945	820	1,629	1,179	1,208	37	14
Klamath Glen	3,241	11,317	334	313	560	518	4	0
Misc. <sup>d</sup>	865	3,408	99	138	108	127	2	1
Subtotal	18,156	71,564	2,073	2,905	2,257	2,661	50	15
<u>All Areas</u>								
TOTALS	46,430	160,656	2,197	2,990	2,961	5,117	50	19

<sup>a</sup> Half-pounders  $\geq 25$  and  $< 42$  cm FL; adults steelhead  $\geq 42$  cm FL.

<sup>b</sup> Chinook salmon  $\leq 55$  cm FL classified as grilse; chinook salmon  $> 55$  cm FL classified as adults.

<sup>c</sup> Coho salmon  $\leq 55$  cm FL classified as grilse; coho salmon  $> 55$  cm FL classified as adults.

<sup>d</sup> Includes an estimated 5% of anglers not sampled in the area above the Highway 101 bridge.



**TABLE 14.** Tagging and recovery data for marked (Ad+CWT) salmon obtained from lower Klamath River sport anglers, July-October 1986.

CWT Group	Release data							Recovery data						
	Strain <sup>a</sup>	Brood year	Number	Age <sup>b</sup>	Fish/kg	Date	Site <sup>c</sup>	Number recovered			Mean		Dates	
								Creel <sup>d</sup>	Volunteer <sup>e</sup>	Total	Age	cm FL (range)		
<u>Adult coho salmon</u>														
6-50-10	Fall	1982	39,127	y	19.4	11/7-9,12/5/83	IGH	4	0	4	4	86 (79-94)	8/16-8/25	
6-50-11	Fall	1982	36,997	y	19.4	11/7-9,12/5/83	IGH	5	1	6	4	91 (83-99)	8/16-9/7	
6-56-07	Fall	1982	88,854	f	32.1	6/83	TRH <sup>f</sup>	1	0	1	4	76	9/20	
6-56-08	Fall	1983	91,153	f	101.2	6/84	TRH <sup>g</sup>	12	0	12	3	68 (62-72)	7/28-9/12	
6-56-09	Fall	1982	91,153	y	24.9	11/83	TRH <sup>g</sup>	1	0	1	4	79	8/18	
6-56-12	Fall	1983	97,311	f	107.8	6/84	TRH <sup>h</sup>	6	0	6	3	69 (62-77)	9/3-9/14	
6-56-13	Fall	1983	100,227	f	101.2	6/84	TRH <sup>f</sup>	7	2	9	3	64 (54-71)	9/3-9/22	
6-56-14	Fall	1983	25,547	y	26.6	10/84	TRH <sup>g</sup>	5	1	6	3	68 (63-75)	9/7-9/24	
6-56-15	Fall	1983	25,754	y	29.5	10/84	TRH <sup>h</sup>	4	0	4	3	62 (57-71)	9/4-9/22	
6-56-16	Fall	1983	26,171	y	31.0	10/84	TRH <sup>f</sup>	10	0	10	3	64 (61-72)	9/3-9/24	
6-59-07	Fall	1981	159,092	f	238.1	6/23-24/82	IGH	1	0	1	5	74		
6-59-08	Fall	1982	70,171	y	16.5	11/83-12/83	IGH	3	4	7	4	82 (72-101)	7/21-9/10	
6-59-09	Fall	1982	158,824	f	145.0	6/83	IGH	2	2	4	4	79 (66-91)	8/18-9/3	
6-59-10	Fall	1982	83,023	f	165.0	6/83	IGH	2	0	2	4	80	9/1	
6-59-11	Fall	1982	13,880	y	16.5	11/83	IGH	1	0	1	4	92	8/19	
6-59-20	Fall	1982	47,040	f	114.0	6/83	IGH	1	0	1	4	76	8/24	
6-59-23	Fall	1983	191,352	f	165.0	6/84	IGH	3	3	6	3	68 (63-72)	9/4-9/10	
6-59-24	Fall	1983	97,566	f	198.0	6/84	IGH	5	1	6	3	70 (63-79)	8/23-9/17	
6-59-25	Fall	1983	94,738	y	43.7	11/84	IGH	8	2	10	3	67 (61-71)	8/31-9/12	
6-59-26	Fall	1983	23,725	y	43.7	11/84	IGH	1	2	3	3	66 (64-68)	9/10-9/22	
6-59-31	Fall	1983	22,599	y	43.1	11/84	IGH	1	0	1	3	62	9/6	
6-59-32	Fall	1983	24,830	y	43.7	11/84	IGH	4	0	4	3	73 (70-74)	9/3-9/15	
6-59-33	Fall	1983	23,766	y	43.7	11/84	IGH	1	0	1	3	64	9/3	

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**TABLE 14.** Continued.

CWT Group	Release data							Recovery data						
	Strain <sup>a</sup>	Brood year	Number	Age <sup>b</sup>	Fish/kg	Date	Site <sup>c</sup>	Number recovered			Mean		Dates	
								Creel <sup>d</sup>	Volunteer <sup>e</sup>	Total	Age	cm FL		(range)
<u>Adult coho salmon (continued)</u>														
6-61-13	Fall	1983	100,520	y	27.5	10/84	TRH	16	4	20	3	68	(58-79)	8/29-10/9
6-61-24	Fall	1982	138,801	f	248.6	6/83	TRH	1	0	1	4	92		8/25
6-61-26	Fall	1983	191,094	f	129.8	6/84	TRH	9	4	13	3	70	(52-82)	8/7-9/12
6-61-29	Fall	1982	96,583	y	29.7	11/9/83	TRH	1	1	2	4	81	(75-87)	8/1-8/12
6-61-38	Spring	1982	96,461	y	27.1	11/3/83	TRH	1	0	1	4	85		9/1
6-61-40	Spring	1983	90,293	y	24.2	10/84	TRH	15	4	19	3	69	(61-80)	7/2-9/17
6-63-01	Fall	1983	92,965	y+	11.7	3/85	TRH	41	9	50	3	61	(49-69)	8/21-9/24
62-17-58	Spring	1983	20,683	f	44.0	8/84	PVT <sup>i</sup>	1	0	1	3	73		8/2
Subtotals								173	40	213				
Lost Tags <sup>i</sup>								6	0	6				
Subtotals								179	40	219				
No Tags <sup>j</sup>								25	10	35				
Totals								204	50	254				

(continued on next page)

TABLE 14. Continued.

CWT Group	Strain <sup>a</sup>	Brood year	Release data					Recovery data						
			Number	Age <sup>b</sup>	Fish/kg	Date	Site <sup>c</sup>	Number recovered			Mean		Dates	
								Creel <sup>d</sup>	Volunteer <sup>e</sup>	Total	Age	cm FL (range)		
<u>Grilse chinook salmon</u>														
6-56-17	Fall	1984	98,906	f	121.0	6/85	TRH	8	0	8	2	51	(44-55)	8/22-9/10
6-56-18	Fall	1984	98,989	f	121.0	6/85	TRH	10	2	12	2	52	(45-57)	9/8-9/11
6-56-19	Fall	1984	94,100	f	119.0	6/85	TRH	7	6	13	2	49	(40-54)	8/21-9/17
6-56-20	Fall	1984	30,459	y	27.5	10/85	TRH	3	0	3	2	49	(43-57)	9/9-9/24
6-56-21	Fall	1984	24,541	y	26.4	10/85	TRH	4	0	4	2	49	(44-51)	9/12-9/29
6-56-22	Fall	1984	25,450	y	24.2	10/85	TRH	1	0	1	2	41		9/8
6-56-24	Fall	1984	102,512	y+	12.3	2/86	TRH	18	2	20	2	36	(36)	9/2-9/10
6-59-22	Fall	1984	98,500	y	19.8	11/85	IGH	4	0	4	2	42	(40-55)	9/1-9/13
6-61-27	Fall	1984	189,708	f	117.0	6/85	TRH	13	3	16	2	49	(45-56)	8/7-9/13
6-61-28	Fall	1984	97,070	y	24.2	10/85	TRH	9	0	9	2	44	(40-48)	9/3-9/24
6-61-43	Spring	1984	98,568	y	29.7	10/85	TRH	12	0	12	2	43	(35-52)	7/26-9/14
7-33-17	Fall	1984	50,346	y+	15.4	2/86	Bonneville (ODFW)	1	0	1	2	40		9/10
B6-08-03	Fall	1984	24,492	f	1,960.0	2/85	Shasta R. <sup>m</sup>	2	0	2	2	42	(38-45)	8/17-8/23
B6-08-04	Fall	1984	24,851	f	2,314.0	4/85	Bogus Cr. <sup>l</sup>	1	0	1	2	48		8/29
Subtotals								93	13	106				
Lost Tags <sup>i</sup>								2	0	2				
Subtotals								95	13	108				
No Tags <sup>j</sup>								6	0	6				
Totals								101	13	114				

(continued on next page)

**TABLE 14.** Continued.

CWT Group	Brood Strain <sup>a</sup>	Brood year	Release data					Recovery data					
			Number	Age <sup>b</sup>	Fish/kg	Date	Site <sup>c</sup>	Number recovered			Mean		Dates
							Creel <sup>d</sup>	Volunteer <sup>e</sup>	Total	Age	cm FL	(range)	
<u>Adult coho salmon</u>													
Total	None												
<u>Grilse coho salmon</u>													
6-59-30	Fall	1983	20,074	y+	15.4	3/85	IGH	1	0	1	2	46	9/29
Total								1	0	1			

<sup>a</sup> All 6-59-X groups were Klamath River strain; all 6-61-X groups were Trinity River strain.

<sup>b</sup> f = fingerling; y = yearling; y+ = yearling plus.

<sup>c</sup> IGH = Iron Gate Hatchery; TRH = Trinity River Hatchery; CRH = Cole Rivers Hatchery, Oregon; PVT = Private Hatchery.

<sup>d</sup> Marked (Ad-CWT) salmon recovered during project creel census.

<sup>e</sup> Marked (Ad-CWT) salmon voluntarily provided to CDFG by Klamath River sport anglers.

<sup>f</sup> Released downstream of TRH at Lime Point near Junction City.

<sup>g</sup> Released downstream of TRH at Steel Bridge near Douglas City.

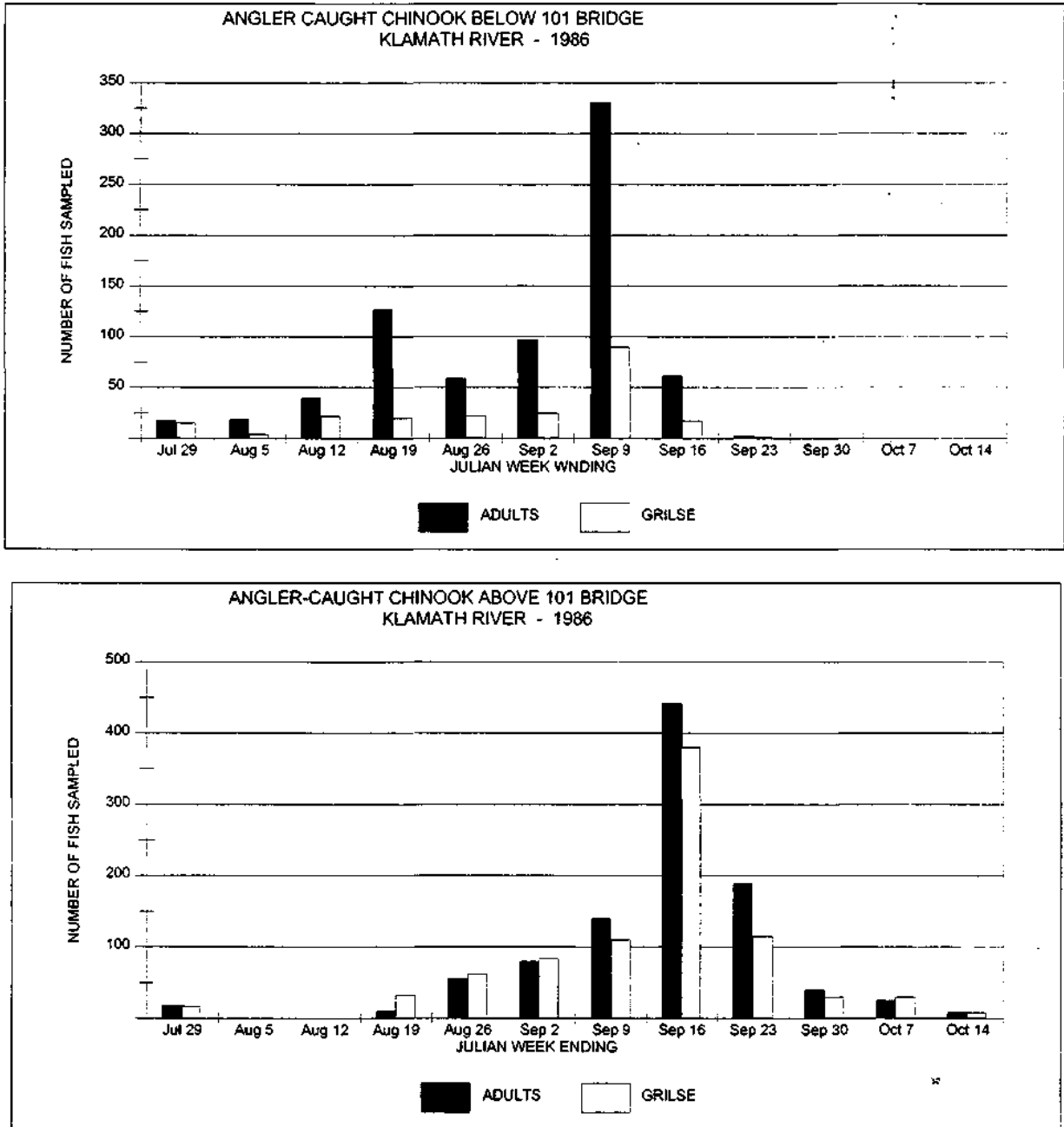
<sup>h</sup> Released downstream of TRH near Junction City.

<sup>i</sup> Tags lost during processing.

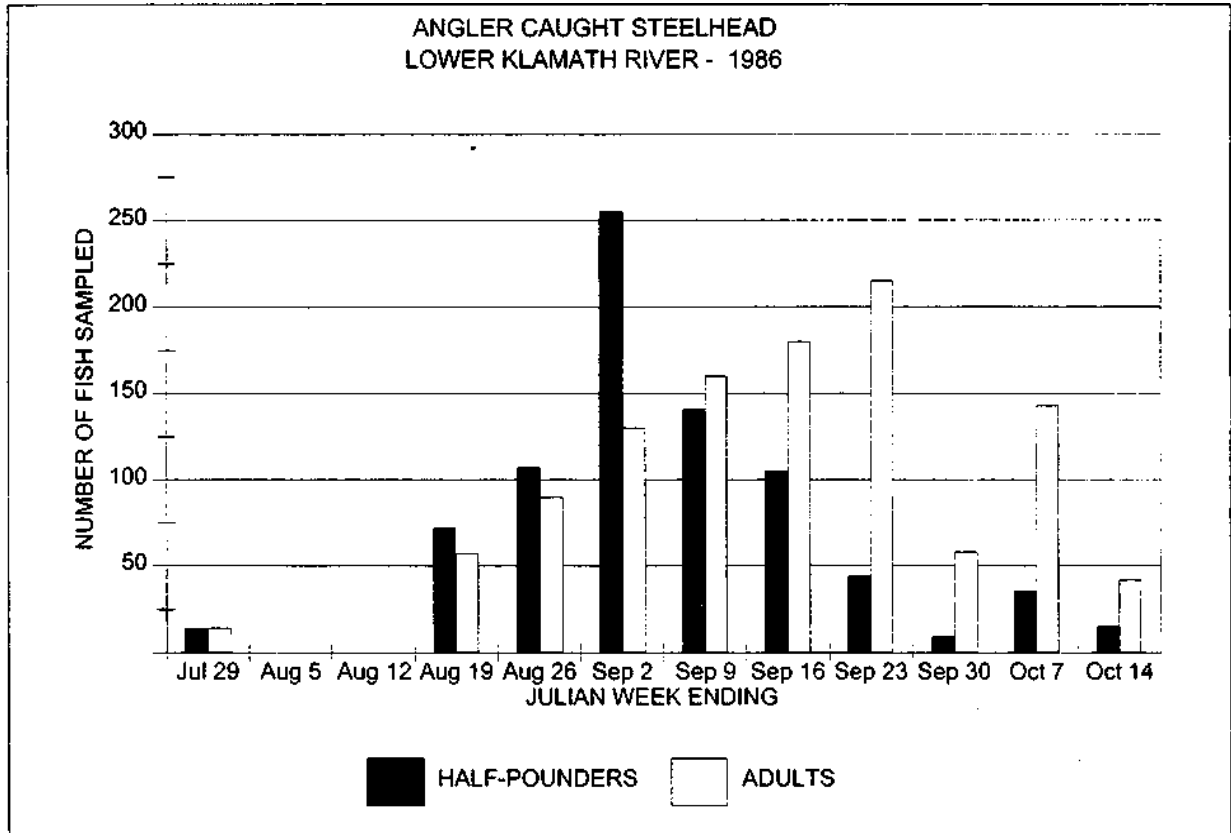
<sup>j</sup> No tag recovered from adipose marked fish.

<sup>k</sup> Tags recovered but not legible.

<sup>l</sup> Oregon-Pacific Salmon, Burnt Hill Creek, Oregon



**Figure 12.** Angler-caught chinook salmon sampled in the lower 38.4 km (24 miles) of the Klamath River during July through October 1986. The reach downstream (below) of Highway 101 extends 4.8 km (3 miles) to the river's mouth. The reach upstream (above) of Highway 101 extends from the bridge upstream to river km 38.4 (river mile 24).



**Figure 13.** Angler-caught steelhead sampled in the lower 38.4 km (24 miles) of the Klamath River during July through October 1986.

**Table 15.** Estimated catches per angler hour of steelhead and salmon in the lower Klamath River (mouth to Johnson's [rkm 38.4, rm 24 ]) during the 1986 fall season <sup>a</sup>

<u>Sampling location</u>	<u>Steelhead</u>		<u>Chinook salmon</u>		<u>Coho salmon</u>		<u>Weighted average</u>
	<u>Half-pounders</u>	<u>Adults</u>	<u>Grilse</u>	<u>Adults</u>	<u>Grilse</u>	<u>Adults</u>	
Mouth	0.000	0.001	0.006	0.027	0.000	0.000	0.034
Docks	0.002	0.001	0.008	0.028	0.000	0.000	0.039
101 Bridge	0.026	0.037	0.019	0.044	0.000	0.000	0.127
Turwar Riffle	0.049	0.023	0.009	0.005	0.001	0.000	0.088
Turwar Ramp	0.026	0.051	0.037	0.038	0.001	0.000	0.153
Klamath Glen	0.030	0.028	0.049	0.046	0.000	0.000	0.153

<sup>a</sup> The creel census began July 23 and ended October 13, 1986.

<sup>b</sup> Total fish kept / total hours fished.

A length frequency distribution of 1,895 steelhead was bimodal with mode peaks at 33 cm FL and 51 cm FL, and a nadir separating half-pounders and adults at 41 to 42 cm FL.

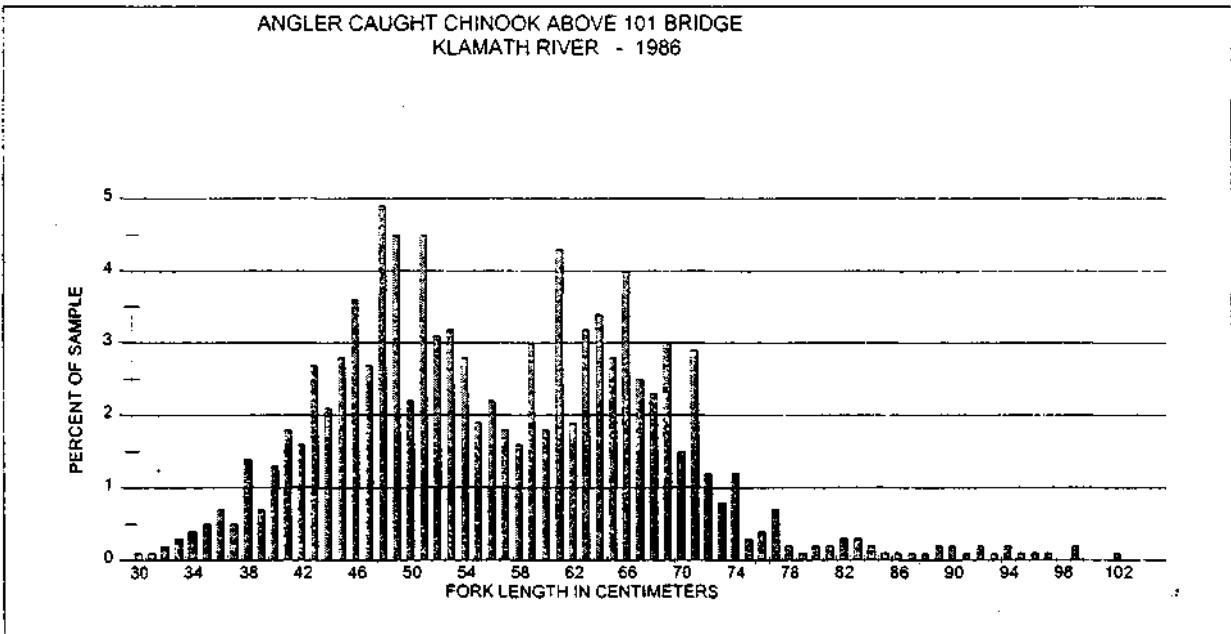
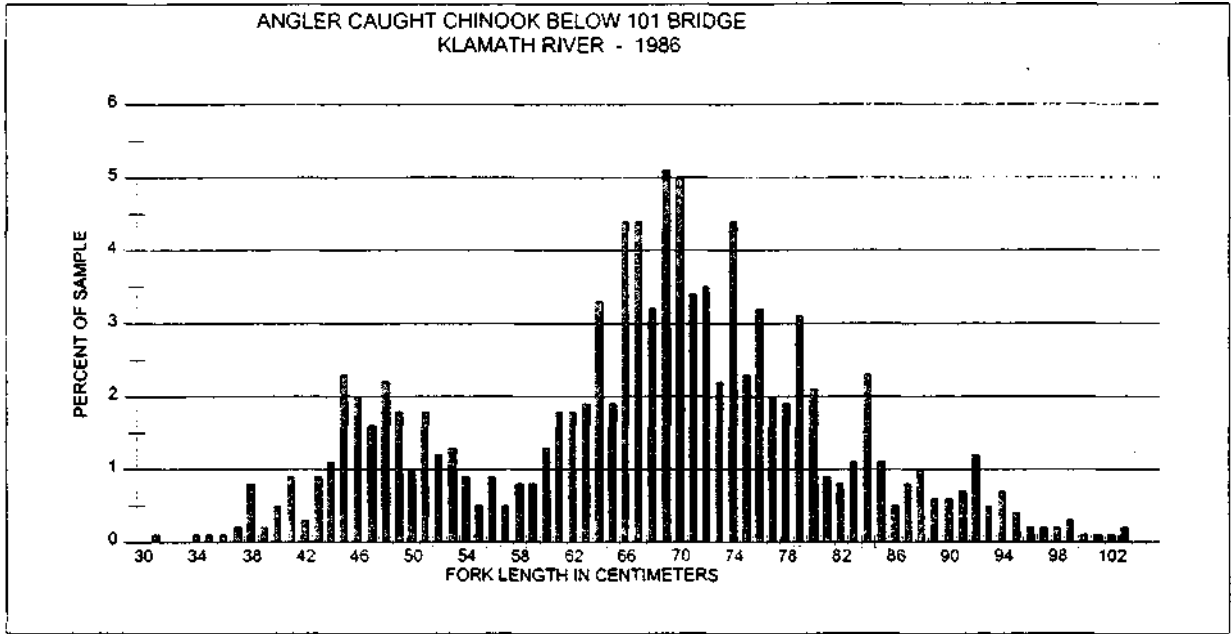
Mean length for 857 half-pounders ranging from 25 to 41 cm FL was 34 cm FL. Mean length for 1,038 steelhead adults ranging from 42 to 81 cm FL was 52 cm FL (Figure 15).

A length frequency of 25 coho salmon sampled in the creel indicated the largest grilse was 56 cm FL and the smallest adult was 66 cm FL (Figure 16). Mean length of 20 coho salmon grilse was 46 cm FL, ranging from 34 to 56 cm FL. Mean length of five adult coho salmon was 69 cm FL, ranging from 66 to 72 cm FL.

Three hundred sixty-eight heads were recovered from Ad-marked chinook salmon (305 sampled during creel census and 63 volunteer angler recoveries) caught in the lower Klamath River (Areas 1 and 2) sport fishery. We received heads from July 2 through October 9, 1986. The total included 33 spring chinook salmon and 237 fall chinook salmon (Table 14). The sample included 1 and 15 mark groups from IGH grilse and adults, respectively, and 10 and 8 mark groups from TRH grilse and adults, respectively. In addition, two mark groups of naturally spawned chinook salmon grilse from Bogus Creek and Shasta River were represented (Table 14).

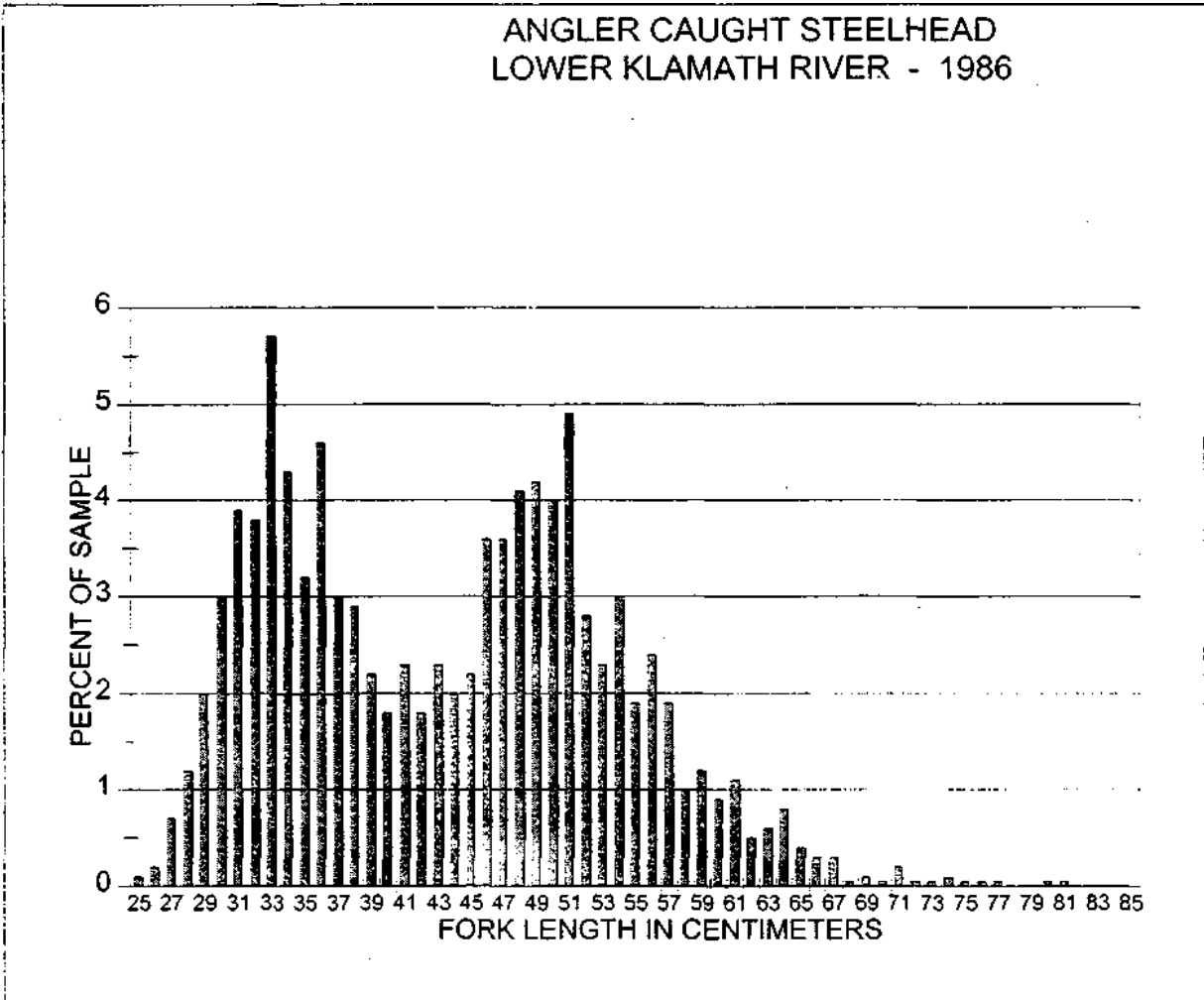
Dates of recovery of Ad-CWT spring chinook salmon ranged from July 2 to September 14. Dates of Ad-CWT fall chinook salmon recoveries ranged from July 27 to September 17, 1986 (Table 14).

A head was recovered from one Ad-marked coho salmon grilse from IGH (Table 14).



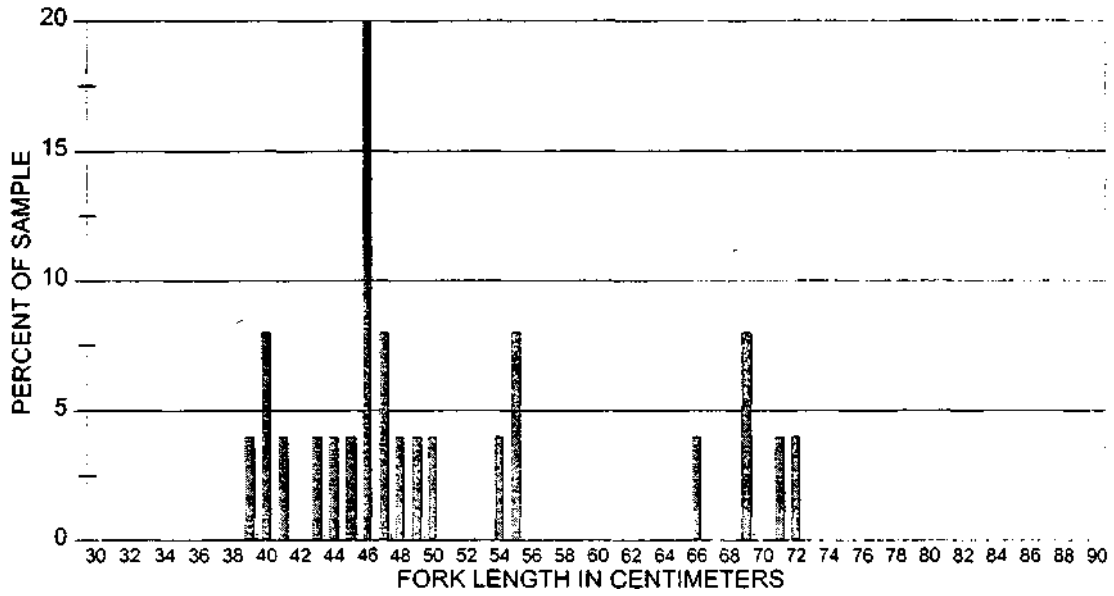
**Figure 14.** Length frequency of angler caught chinook salmon in two reaches of the lower Klamath River during July through October, 1986. The reach downstream (below) of Highway 101 extends 4.8 km (3 miles) to the river's mouth. The reach upstream (above) of Highway 101 extends from the bridge upstream to river km 38.4 (river mile 24).





**Figure 15.** Length frequency of angler-caught steelhead in the lower 38.4 km (24 miles) of the Klamath River during July through October, 1986.

ANGLER CAUGHT COHO SALMON  
LOWER KLAMATH RIVER - 1986



**Figure 16.** Length frequency of angler-caught coho salmon in the lower 38.4 km (24 miles) of the Klamath River during July through October, 1986.

## Creel Census 1987

The creel census was conducted from July 28 through September 17 in the estuary area (Area 1) and from July 30 through October 13 in the sample areas upstream of the Highway 101 Bridge (Area 2). We interviewed a total of 14,344 anglers, 5,822 in Area 1 and 8,522 in Area 2, who had caught 1,449 Steelhead, 3,937 chinook salmon, and 79 coho salmon (Table 16).

In Areas 1 and 2 during the sample period, anglers completed an estimated 51,246 angler trips, fished 178,581 angler hours, and caught 11,229 chinook salmon, 233 coho salmon, and 4,011 Steelhead (Table 17).

In Area 3, Johnson's to Iron Gate Dam, anglers returned 14 spaghetti tags from chinook salmon, resulted in an estimated catch of 1,490 chinook salmon grilse and 3,655 chinook salmon adults (Tables 3 and 4).

Hatchery origin fin-clipped chinook salmon observed in creel samples included 324 adults and 68 grilse (Table 5).

Catches of chinook salmon adult and grilse peaked in Area 1 the week ending September 2. Angler catches of chinook salmon grilse and adults peaked in Area 2 the week ending September 9 (Figure 17).

Angler catches of half-pounder Steelhead peaked in Area 2 the week ending August 26 and adult Steelhead catches remained at a relatively constant level from the weeks ending August 26 through October 14, 1987 (Figure 18).

Shore anglers interviewed at Turwar Riffle had the highest catch rates for half-pounders and adult Steelhead within the Areas 1 and 2 (Table 18).

Boat anglers interviewed in Area 2 at the Klamath Glen dock and Turwar (Roy Rook) boat ramp areas had the highest catch rates for chinook salmon grilse and adults (Table 18).

A length frequency of 575 chinook salmon caught in Area 1 indicated a major length mode centered around 79 cm FL. Average fork length was 79 cm FL with a range of 43 to 99 cm FL (Figure 19).

A length frequency of 3,348 chinook salmon caught in Area 2 exhibited a bimodal curve with peaks at 50 and 66 cm FL. The average length of the sample was 61 cm FL, ranging from 29 to 99 cm FL (Figure 19).

A combined length frequency of all chinook salmon sampled, smoothed by a moving average of five, indicated a nadir between the grilse and adult modes at 56 to 57 cm FL.

A length frequency of 1,272 sampled Steelhead revealed a bimodal population with mode peaks at 33 cm FL and 48 cm FL, and nadir separating half-pounders and adults at 41 to 42 cm FL (Figure 20).

**TABLE 16.** Summary of angler effort and catch sampled during the fall 1987 Lower Klamath River Creel Census, (numbers represent actual sample data).

<u>Sample location</u>	<u>Angler trips</u>	<u>Angler hours</u>	<u>Steelhead</u> <sup>a</sup>		<u>Chinook</u> <sup>b</sup>		<u>Coho</u> <sup>c</sup>	
			<u>half-pounders</u>	<u>adults</u>	<u>grilse</u>	<u>adults</u>	<u>grilse</u>	<u>adults</u>
<u>MOUTH- HIGHWAY 101</u>								
Mouth (Shore)	2,064	6,651	2	3	4	195	1	0
<u>Boat docks</u>								
Panther Creek	1,681	5,312	7	6	12	150	0	0
Chinook	601	1,851	0	0	1	60	0	0
Riverside	1,476	4,519	6	2	12	144	0	0
Subtotal (Boat)	3,758	11,682	13	8	25	354	0	0
Totals	5,822	18,333	15	11	29	549	1	0
<u>HIGHWAY 101 BRIDGE - BLAKES RIFFLE</u>								
<u>Shore</u>								
101 Bridge	2,208	8,354	112	87	158	413	5	9
Turwar Riffle	769	1,947	94	45	8	12	0	0
<u>Boat</u>								
Turwar Ramp	4,274	19,601	451	437	812	1,455	22	39
Klamath Glen	1,271	4,726	138	59	207	294	1	2
<u>Subtotals</u>								
Shore	2,977	10,301	206	132	166	425	5	9
Boat	5,545	24,327	589	496	1,019	1,749	23	41
TOTALS	8,522	34,628	795	628	1,185	2,174	28	50
<u>ALL AREAS</u>								
<u>Subtotals</u>								
Shore	5,041	16,952	208	135	170	620	6	9
Boat	9,303	36,009	602	504	1,044	2,103	23	41
GRAND TOTALS	14,344	52,961	810	639	1,214	2,723	29	50

<sup>a</sup> Half-pounders  $\geq 25$  and  $< 42$  cm FL; adults  $\geq 42$  cm FL.

<sup>b</sup> Chinook  $\leq 55$  cm FL classed as grilse; chinook  $> 55$  cm FL classed as adults.

<sup>c</sup> Coho  $\leq 55$  cm FL classed as grilse; coho  $> 55$  cm FL classed as adults.

**TABLE 17.** Estimated total angler effort and harvest, lower Klamath River (mouth to Johnson's [rkm 38.4, rm 24]), fall 1987 (numbers represent an expansion of sample data).

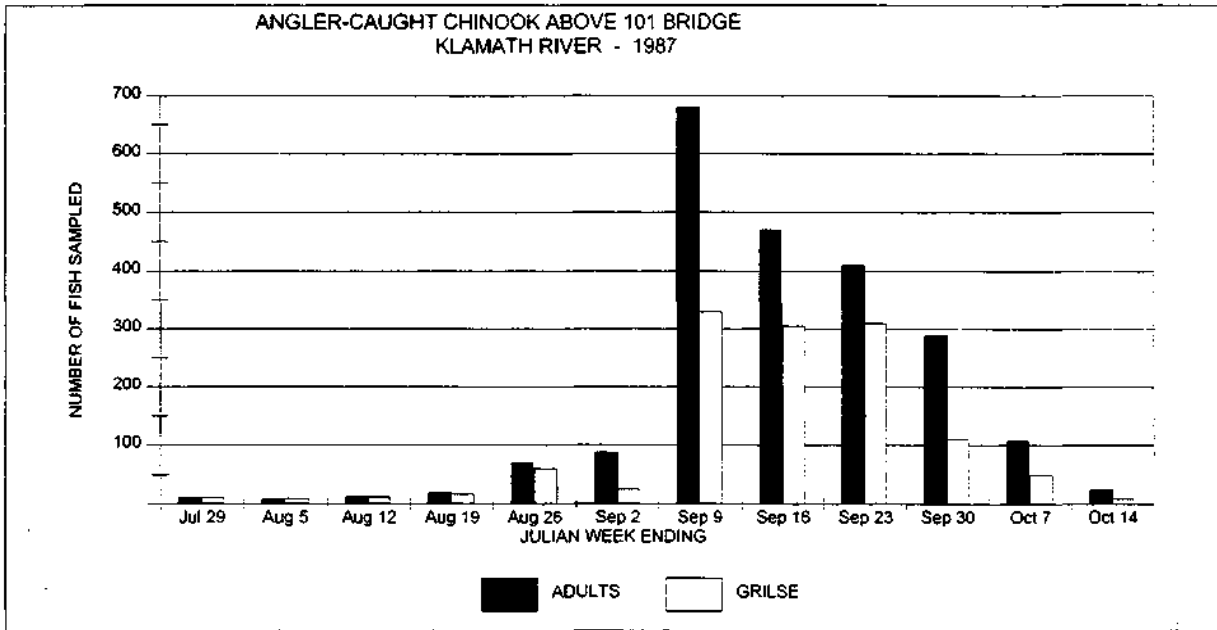
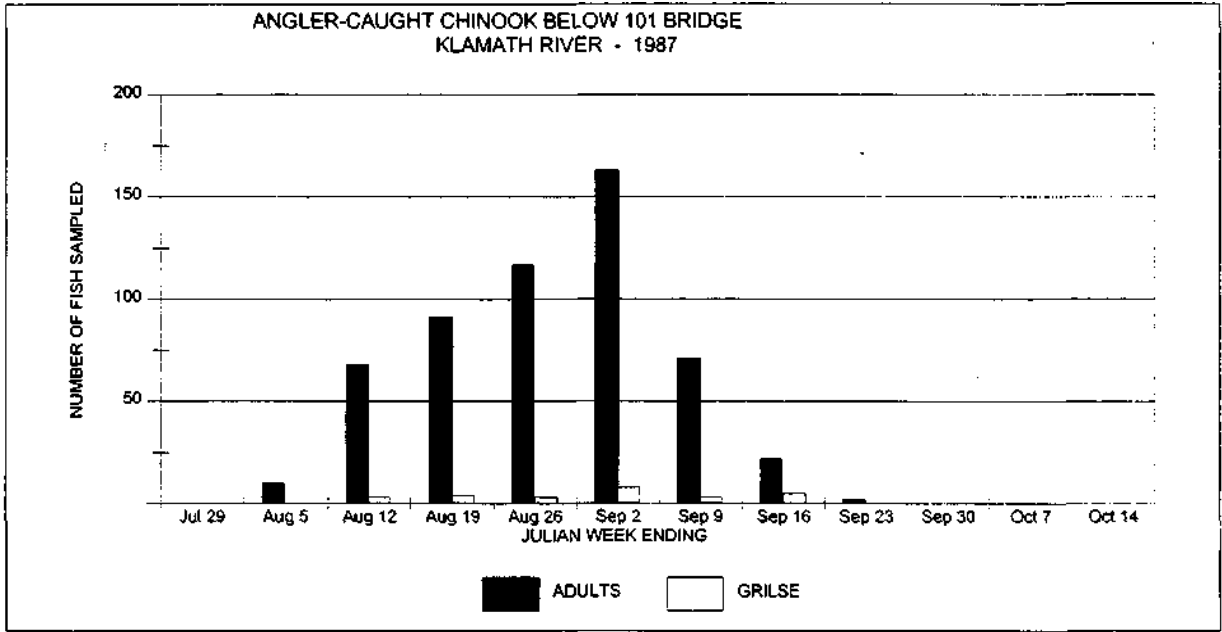
<u>Sample location</u>	<u>Angler trips</u>	<u>Angler hours</u>	<u>Steelhead</u> <sup>a</sup>		<u>Chinook</u> <sup>b</sup>		<u>Coho</u> <sup>c</sup>	
			<u>half-pounders</u>	<u>adults</u>	<u>grilse</u>	<u>adults</u>	<u>grilse</u>	<u>adults</u>
<u>Mouth - Highway 101</u>								
Mouth (Shore)	3,343	10,741	3	4	5	302	1	0
Boat docks	22,949	68,793	95	39	141	2,153	0	0
Subtotal	26,292	79,534	98	43	146	2,455	1	0
<u>Highway 101 Bridge - Blakes Riffle</u>								
101 Bridge	9,673	36,296	524	408	679	1,686	23	42
Turwar Riffle	1,645	4,177	188	106	15	21	0	0
Turwar Ramp	8,745	39,968	956	965	1,542	2,787	51	91
Klamath Glen	3,720	13,889	389	150	602	885	2	12
Misc. <sup>d</sup>	1,189	4,717	103	81	142	269	4	7
Subtotal	24,972	99,047	2,160	1,710	2,980	5,648	80	152
<u>All Areas</u>								
TOTALS	51,264	178,581	2,258	1,753	3,126	8,103	81	152

<sup>a</sup> Half-pounders  $\geq 25$  and  $< 42$  cm FL; adult steelhead  $\geq 42$  cm FL.

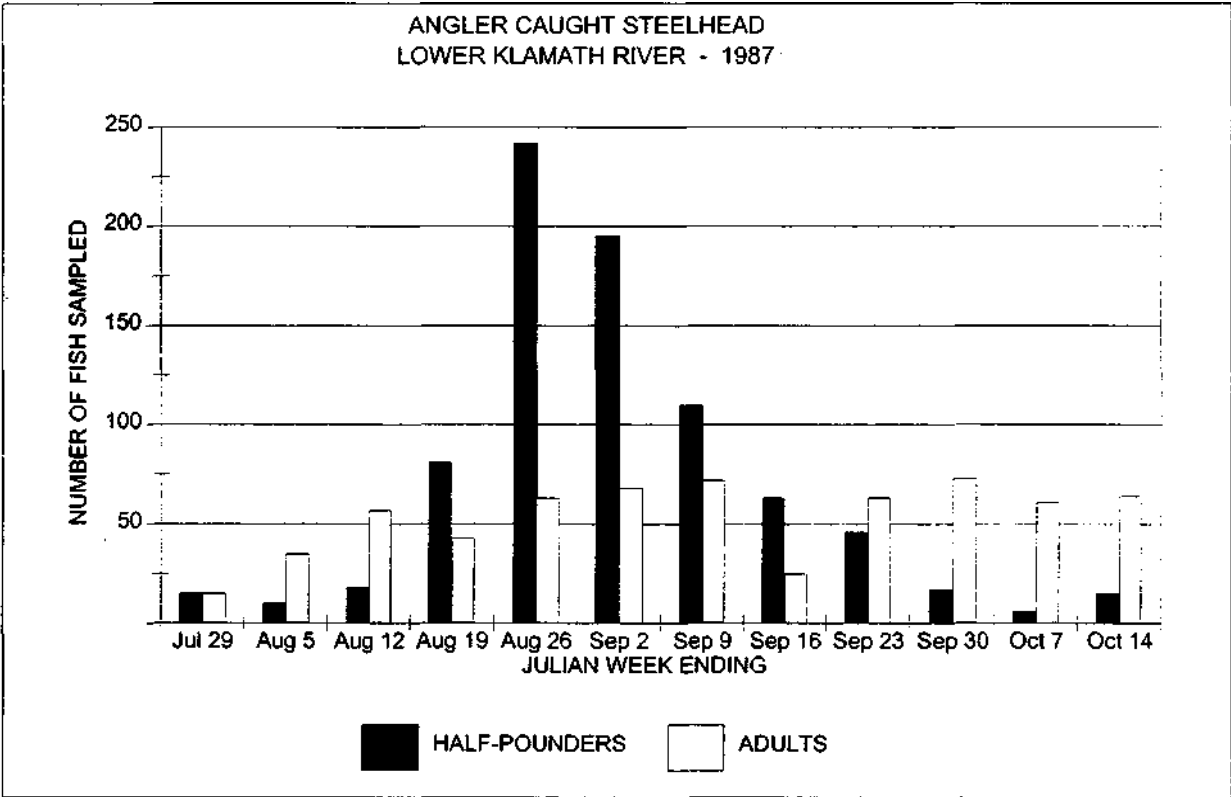
<sup>b</sup> Chinook salmon  $\leq 55$  cm FL classified as grilse; chinook salmon  $> 55$  cm FL classified as adults.

<sup>c</sup> Coho salmon  $\leq 52$  cm FL classified as grilse; coho salmon  $> 52$  cm FL classified as adults.

<sup>d</sup> Includes an estimated 5% of anglers not sampled in the area upstream of the Highway 101 bridge.



**Figure 17.** Angler-caught chinook salmon sampled in the lower 38.4 km (24 miles) of the Klamath River during July through October 1987. The reach downstream (below) of Highway 101 extends 4.8 km (3 miles) to the river's mouth. The reach upstream (above) of Highway 101 extends from the bridge upstream to river km 38.4 (river mile 24).



**Figure 18.** Angler-caught steelhead sampled in the lower 38.4 km (24 miles) of the Klamath River during July through October 1987.

**Table 18.** Estimated catches per angler hour of steelhead and salmon in the lower Klamath River (mouth to Johnson's [rkm 38.4, rm 24] during the 1987 fall season <sup>a</sup>

<u>Sampling location</u>	<u>Steelhead</u>		<u>Chinook salmon</u>		<u>Coho salmon</u>		<u>Weighted average</u>
	<u>Half-pounders</u>	<u>Adults</u>	<u>Grilse</u>	<u>Adults</u>	<u>Grilse</u>	<u>Adults</u>	
Mouth	0.000	0.000	0.000	0.028	0.000	0.000	0.029
Docks	0.001	0.001	0.002	0.031	0.000	0.000	0.035
101 Bridge	0.014	0.011	0.019	0.046	0.001	0.001	0.093
Turwar Riffle	0.045	0.025	0.004	0.005	0.001	0.000	0.079
Turwar Ramp	0.024	0.024	0.039	0.070	0.001	0.002	0.160
Klamath Glen	0.028	0.011	0.043	0.064	0.000	0.001	0.147

<sup>a</sup> The creel census began July 28 and ended October 13, 1987.

<sup>b</sup> Total fish kept / total hours fished.

Mean length for 734 half-pounders was 33.2 cm FL, ranging from 25 to 41 cm FL. Mean length for 538 steelhead adults was 53 cm FL, ranging from 42 to 96 cm FL (Figure 20).

A length frequency of 60 sampled coho salmon indicated the largest grilse was 51 cm FL and the smallest adult was 54 cm FL (Figure 21). Mean length of 20 grilse coho salmon was 44 cm FL, ranging from 37 to 51 cm FL. Mean length of 40 adult coho salmon was 64 cm FL, ranging from 54 to 76 cm FL.

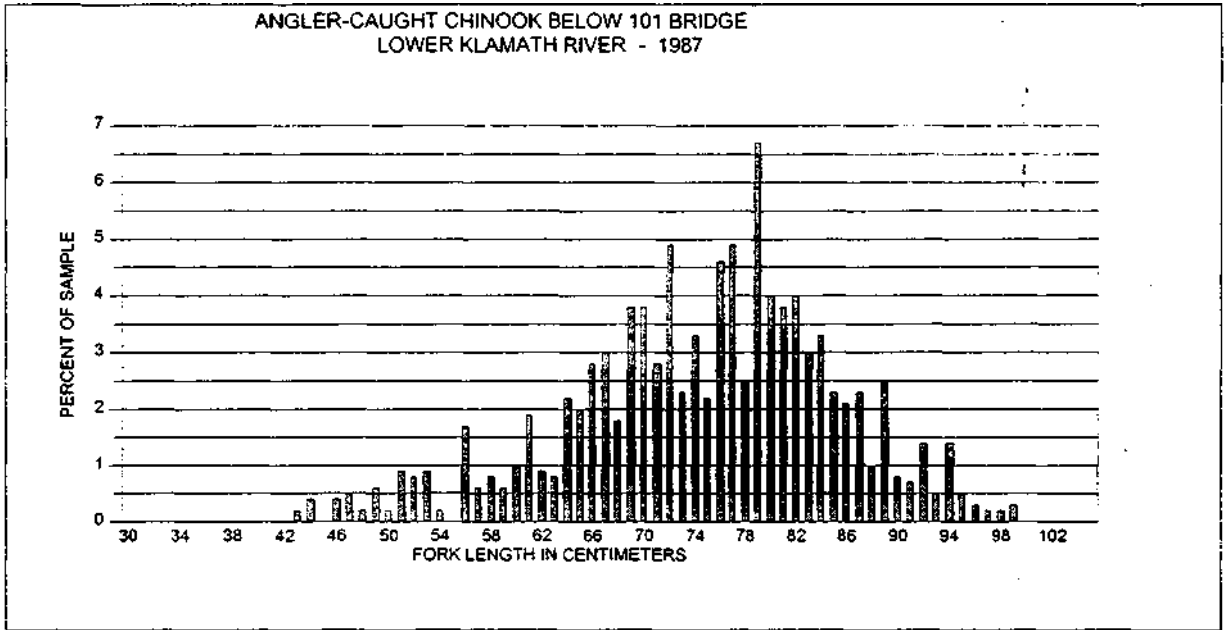
Four hundred thirty-two heads were recovered this season from Ad-marked chinook salmon (380 sampled during creel census, 52 recoveries volunteered by anglers) caught in the lower Klamath River (Areas 1 and 2) sport fishery. We received heads from Ad-marked salmon from July 9 through October 13, 1987. The total included 33 spring chinook salmon and 399 fall chinook salmon (Table 19).

Recovered CWTs included 3 and 11 mark groups from IGH grilse and adult chinook salmon, respectively, and 4 and 16 mark groups from TRH grilse and adult chinook salmon, respectively. In addition, two mark groups of naturally spawned chinook salmon adults from Bogus Creek and Shasta River, and two mark groups of naturally spawned chinook salmon grilse from the Shasta River were represented. Two mark groups of chinook salmon grilse from the Hoopa Valley Tribe chinook salmon rearing program were also represented (Table 19).

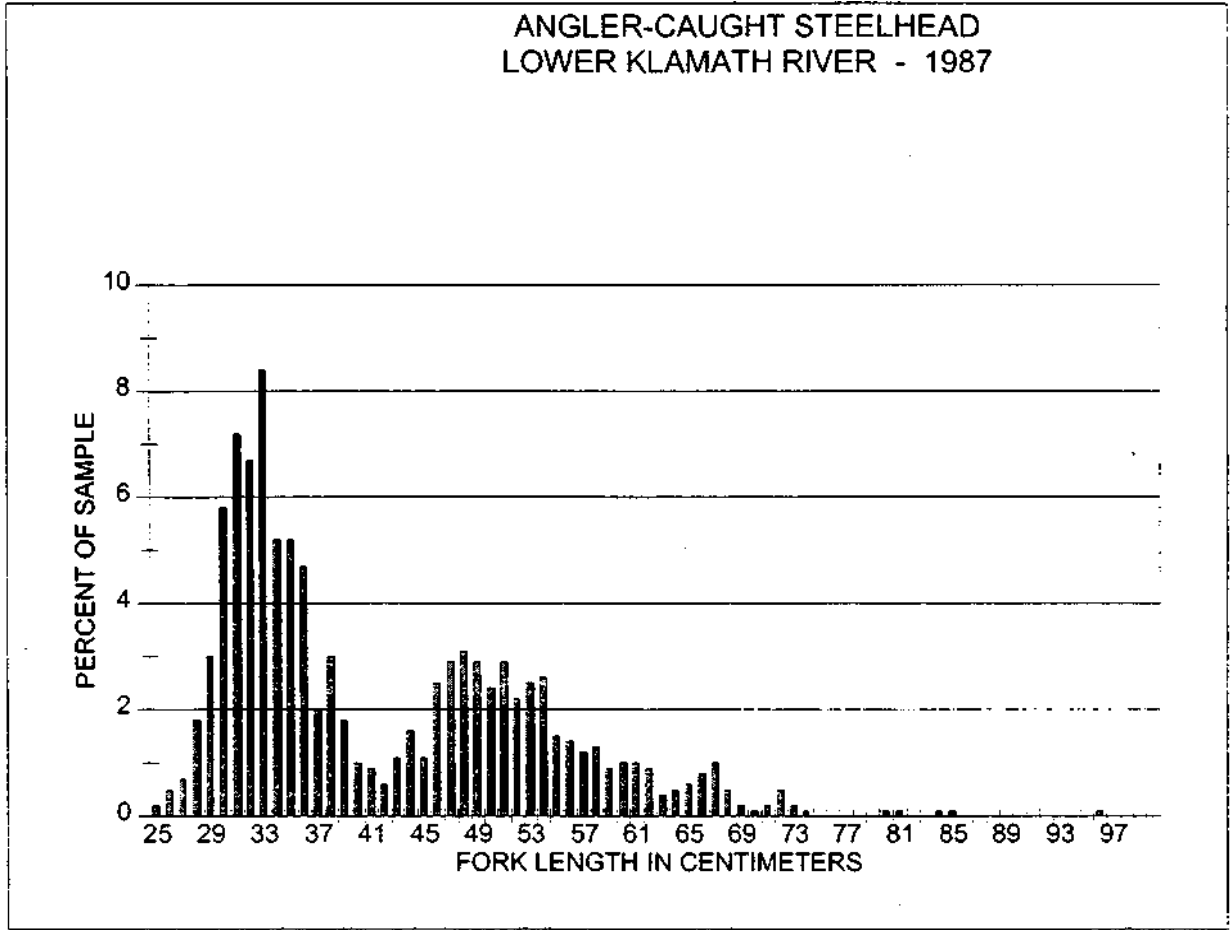
Dates of recovery of Ad-CWT spring chinook salmon ranged from July 9 to September 5. Ad-CWT fall chinook salmon were recovered from July 16 to October 13, 1987 (Table 19).

Two Ad-marked coho salmon were also observed in creel samples this season.

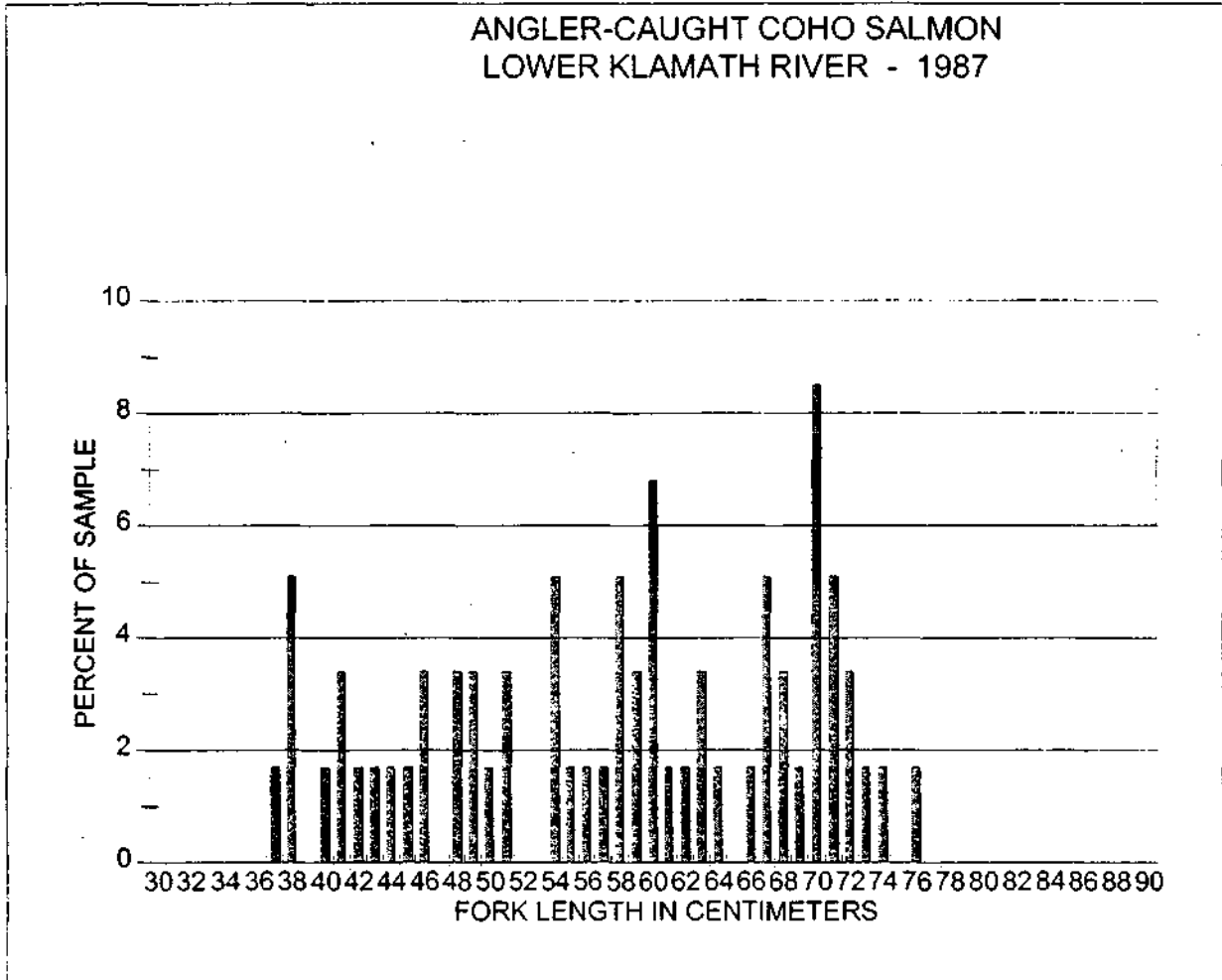




**Figure 19.** Length frequency of angler caught chinook salmon in two reaches of the lower Klamath River during July through October, 1987. The reach downstream (below) of Highway 101 extends 4.8 km (3 miles) to the river's mouth. The reach upstream (above) of Highway 101 extends from the bridge upstream to river km 38.4 (river mile 24).



**Figure 20.** Length frequency of angler-caught steelhead in the lower 38.4 km (24 miles) of the Klamath River during July through October, 1987.



**Figure 21.** Length frequency of angler-caught coho salmon in the lower 38.4 km (24 miles) of the Klamath River during July through October, 1987.

**TABLE 19.** Tagging and recovery data for marked (Ad+CWT) salmon obtained from lower Klamath River sport anglers July-October 1987

CWT Group	Release data							Recovery data					
	Strain <sup>a</sup>	Brood year	Number	Age <sup>b</sup>	Fish/kg	Date	Site <sup>c</sup>	Number recovered			Mean		Dates
								Creel <sup>d</sup>	Volunteer <sup>e</sup>	Total	Age	cm FL (range)	
<u>Adult chinook salmon</u>													
6-56-13	Fall	1983	100,227	f	101.2	6/84	TRH <sup>f</sup>	3	0	3	4	61	9/12-13
6-56-14	Fall	1983	25,547	y	26.6	10/84	TRH <sup>g</sup>	3	1	4	4	78	8/15-9/12
6-56-16	Fall	1983	26,171	y	31.0	10/84	TRH <sup>f</sup>	1	0	1	4	90	8/15
6-56-17	Fall	1984	98,906	f	121.0	6/85	TRH <sup>g</sup>	6	1	7	3	68	8/8-9/13
6-56-18	Fall	1984	98,989	f	121.0	6/85	TRH <sup>h</sup>	10	3	13	3	65	8/11-9/27
6-56-19	Fall	1984	94,100	f	119.0	6/85	TRH <sup>f</sup>	7	1	8	3	67	8/27-9/25
6-56-20	Fall	1984	30,459	y	27.5	10/85	TRH <sup>g</sup>	13	1	14	3	58	9/1-25
6-56-21	Fall	1984	24,541	y	26.4	10/85	TRH <sup>h</sup>	8	0	8	3	59	9/9-10/3
6-56-22	Fall	1984	25,450	y	24.2	10/85	TRH <sup>f</sup>	4	1	5	3	63	8/29-9/21
6-56-24	Fall	1984	102,512	y+	12.3	2/86	TRH	101	13	114	3	60	8/5-10/13
6-59-22	Fall	1984	98,500	y	19.8	11/85	IGH	14	6	20	3	68	8/28-9/19
6-59-23	Fall	1983	191,352	f	165.0	6/84	IGH	6	3	9	4	79	8/6-9/5
6-59-24	Fall	1983	97,566	f	198.0	6/84	IGH	1	2	3	4	78	8/18-9/9
6-59-25	Fall	1983	94,738	y	43.7	11/84	IGH	13	7	20	4	82	8/7-9/5
6-59-26	Fall	1983	23,725	y	43.7	11/84	IGH	2	0	2	4	81	8/19-9/19
6-59-27	Fall	1984	187,500	f	117.0	6/85	IGH	2	0	2	3	72	8/23-9/5
6-59-28	Fall	1984	93,710	f	108.0	6/85	IGH	9	3	12	3	69	8/21-10/6
6-59-31	Fall	1983	22,599	y	43.7	11/84	IGH	2	0	2	4	80	8/15-9/1
6-59-32	Fall	1983	24,830	y	43.7	11/84	IGH	2	0	2	4	76	9/17
6-59-33	Fall	1983	23,766	y	43.7	11/84	IGH	7	0	7	4	78	8/21-9/13
6-59-35	Fall	1983					IGH	4	0	4	3	66	8/27-9/13

(continued on next page)

**TABLE 19.** Continued.

CWT Group	Release data							Recovery data						
	Strain <sup>a</sup>	Brood year	Number	Age <sup>b</sup>	Fish/kg	Date	Site <sup>c</sup>	Number recovered			Mean		Dates	
								Creel <sup>d</sup>	Volunteer <sup>e</sup>	Total	Age	cm FL		(range)
<u>Adult chinook salmon (continued)</u>														
6-61-13	Fall	1983	100,520	y	27.5	10/84	TRH	5	0	5	4	80		8/29-9/27
6-61-26	Fall	1983	191,094	f	129.8	6/84	TRH	2	0	2	4	--		9/15
6-61-27	Fall	1984	189,708	f	117.0	6/85	TRH	11	2	13	3	68		7/16-10/6
6-61-28	Fall	1984	97,070	y	24.2	10/85	TRH	27	3	30	3	62		9/3-10/6
6-61-43	Spring	1984	98,568	y	29.7	10/85	TRH	21	7	28	3	65		7/10-9/5
6-63-01	Fall	1983	92,965	y+	11.7	3/85	TRH	16	4	20	4	78		8/23-10/3
B6-08-03	Fall	1984	24,492	wild	891.0	2/85-3/85	Shasta R	1	0	1	3	--		8/13
B6-09-02	Fall	1984	24,360	wild	1,052.0	4/85	Bogus Cr	1	0	1	3	65		9/6
Subtotals								302	41	343				
Lost tags <sup>i</sup>								1	0	1				
No Tags <sup>j</sup>								21	8	29				
Totals								324	49	373				

(continued on next page)

**TABLE 19.** Continued.

CWT Group	Strain <sup>a</sup>	Brood year	Release data					Recovery data					
			Number	Age <sup>b</sup>	Fish/kg	Date	Site <sup>c</sup>	Number recovered			Mean		Dates
								Creel <sup>d</sup>	Volunteer <sup>e</sup>	Total	Age	cm FL (range)	
<u>Grilse chinook salmon</u>													
6-52-04	Fall	1985	3,706	y(wild)	18.3	10/86	Mill Cr. (Trinity R.)	3	0	3	2	49	9/15-10/8
6-52-05	Fall	1985	26,505	y(wild)	14.3	10/86	Tish Tang Cr. (Trinity R.)	11	0	11	2	53	9/5-15
6-56-23	Fall	1985	196,249	f	156.2	6/86	TRH	19	0	19	2	53	9/3-29
6-56-25	Fall	1985	97,368	y	29.8	10/86	TRH	11	1	12	2	48	9/3-21
6-59-29	Fall	1985	95,296	f	16.1	6/86	IGH	1	0	1	2	46	9/17
6-59-34	Fall	1985	147,356	f	--	6/86	IGH	2	0	2	2	52	8/3-9/6
6-61-42	Spring	1985	192,487	f	153.8	6/86	TRH	2	2	4	2	50	7/9-8/13
6-61-44	Spring	1985	101,091	y	27.8	10/86	TRH	1	0	1	2	44	8/9
6-63-04	Fall	1985	16,038	y	15.9	11/86	IGH	1	0	1	2	41	9/5
B6-08-05	Fall	1985	23,568	f(wild)	1,250.0	3/86	Shasta R.	1	0	1	2	41	8/18
B6-08-06	Fall	1985	26,857	f(wild)	714.3	4/86	Shasta R.	2	0	2	2	55	8/26-9/6
Subtotals								54	3	57			
No Tags <sup>j</sup>								2	0	2			
Totals								56	3	59			

<sup>a</sup> All 6-59-X groups were Klamath River strain; all 6-56-X and 6-61-X groups were Trinity River strain.

<sup>b</sup> f = fingerling; y = yearling; y+ = yearling plus.

<sup>c</sup> IGH = Iron Gate Hatchery; TRH = Trinity River Hatchery.

<sup>d</sup> Marked (Ad-CWT) salmon recovered during project creel census.

<sup>e</sup> Marked (Ad-CWT) salmon voluntarily provided to CDFG by Klamath River sport anglers.

<sup>f</sup> Released downstream of TRH at Line Point near Junction city.

<sup>g</sup> Released downstream of TRH at Steel Bridge near Douglas City.

<sup>h</sup> Released downstream of TRH near Junction City.

<sup>i</sup> Tags lost during processing.

<sup>j</sup> No tag recovered from adipose marked fish.

## DISCUSSION

### Angler Catch Timing.

Area 1: During 1984 through 1987, anglers generally began catching adult chinook salmon in Area 1 the week ending July 29. Catches of combined grilse and adult chinook salmon generally peaked the week ending September 2. Chinook salmon catches usually dropped sharply after September 2, and the fishery in Area 1 was essentially finished by the week ending September 23 (Figures 2, 7, 12 and 17).

Incidental steelhead catches occurred throughout the sample period.

Incidental numbers of coho salmon generally began appearing in angler catches the week ending September 2.

Chinook salmon dominated the catches in Area 1. The proportion of adult chinook salmon caught increased each year from 1984 to 1987, ranging from 48.5 to 89.6 percent (Figure 22).

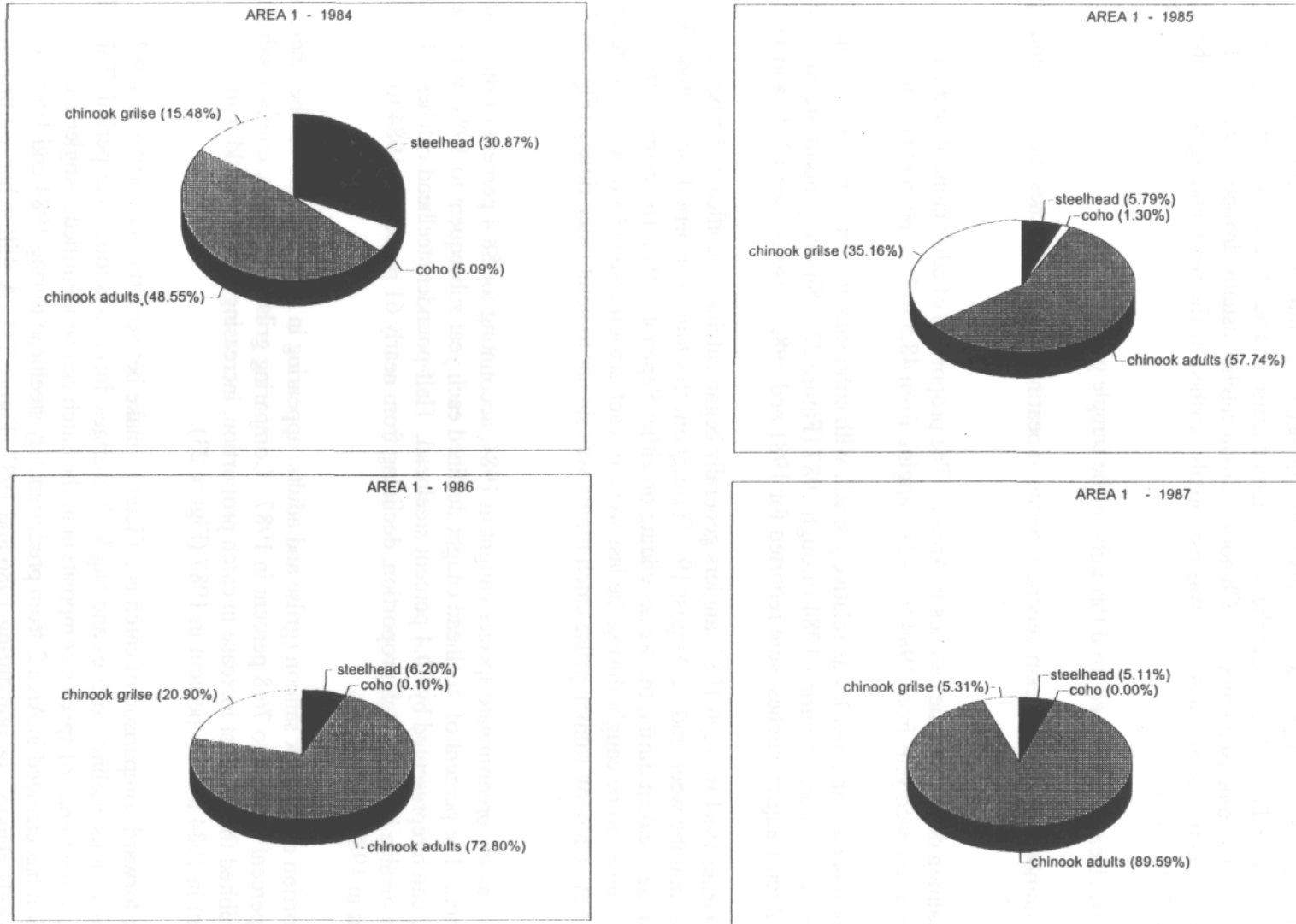
Coho salmon harvest in Area 1 was relatively small, with coho salmon represented in the total catch by 0.0 to 5.0 percent during 1984 through 1987 (Figure 22). Similar proportions of coho salmon in Area 1 angler catches were reported for 1981 and 1982 seasons (Lee 1984b and 1985).

Area 2: During 1984 through 1987, anglers generally began catching significant numbers of chinook salmon the week ending August 19. Throughout this four-year period, adult chinook salmon catches peaked during the weeks ending on either September 9 or 16. Some chinook salmon continued to be caught during the last week of each season ending October 14 (Figures 2, 7, 12 and 17). Chinook salmon grilse catch timing was similar to adult catch timing (Figures 2, 7, 12 and 17).

Steelhead was the predominate species caught in 1984, accounting for 88.4 percent of the total Area 2 catch. The percent of steelhead caught declined each year subsequent to 1984, with the 1987 total catch represented by 30.4 percent steelhead. Half-pounder steelhead catches exhibited the largest decline in total catch proportion, declining from nearly 61 percent in 1984 to 17 percent in 1987 (Figure 23).

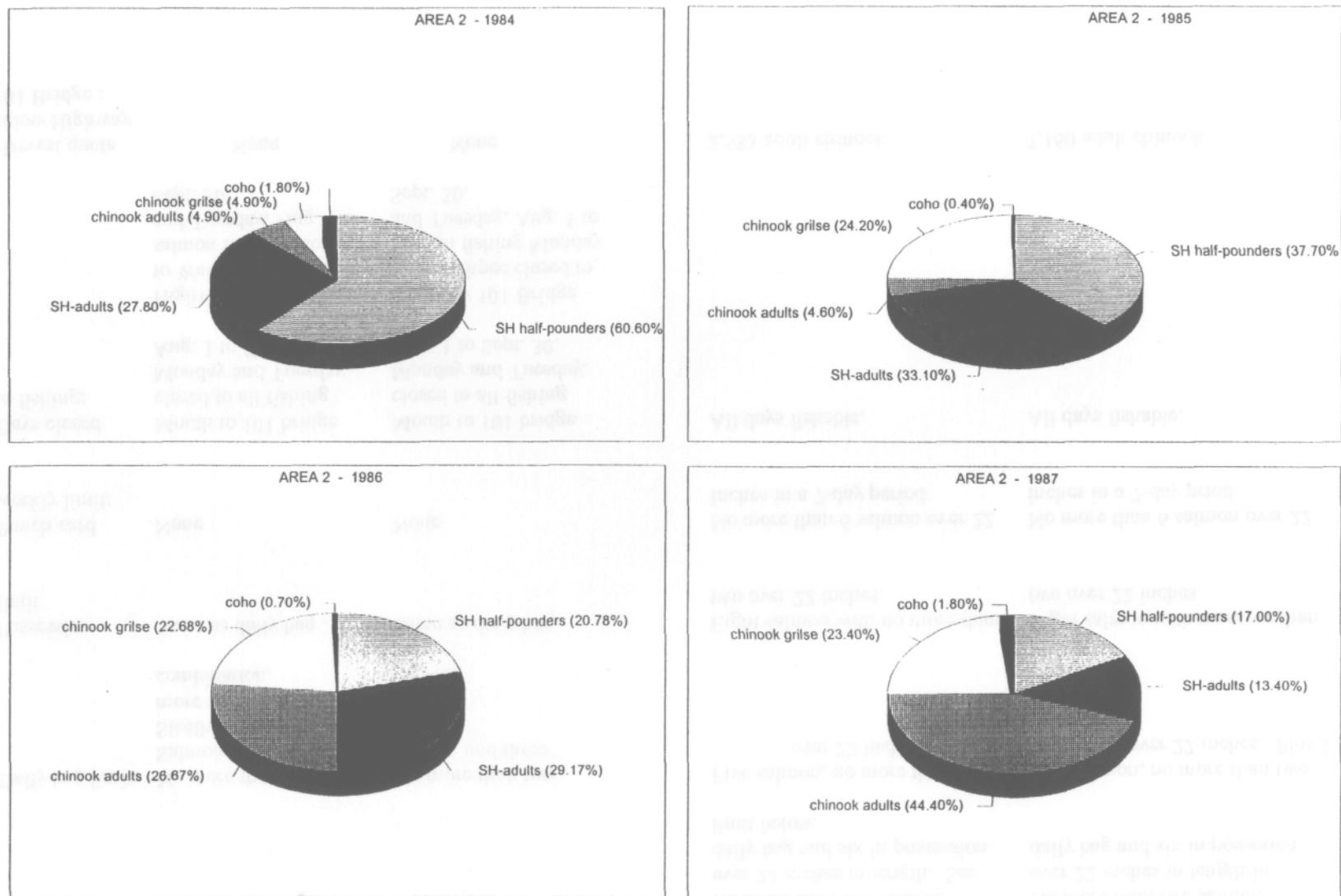
The proportion of chinook salmon (grilse and adults) appearing in Area 2 angler catches increased from 9.8 percent in 1984 to 76.8 percent in 1987. Comparing grilse and adults, chinook salmon adults exhibited the greatest increase in catch proportion, increasing nearly tenfold from 4.9 percent in 1984 to 44.4 percent in 1987 (Figure 23).

A straight forward comparison of catch is difficult to make between the years 1984 to 1987, because of various angling closures and bag limit changes during this four- year period (Table 20). However, some trends of species composition in the catch can be identified. Angler-catch composition has changed in Area 2 from predominately steelhead during 1984 and 1985, to predominately chinook salmon during 1986 and 1987 (Figure 23). A shift in harvest proportion was also noted between Areas 1 and 2. During 1986 and 1987, numbers of adult chinook salmon



**Figure 22.** Angler catch composition as observed in creel census samples in the lower Klamath River downstream of the Highway 101 Bridge 4.8 km (3 miles) to the river's mouth (Area 1), during July through October, 1984 through 1987.

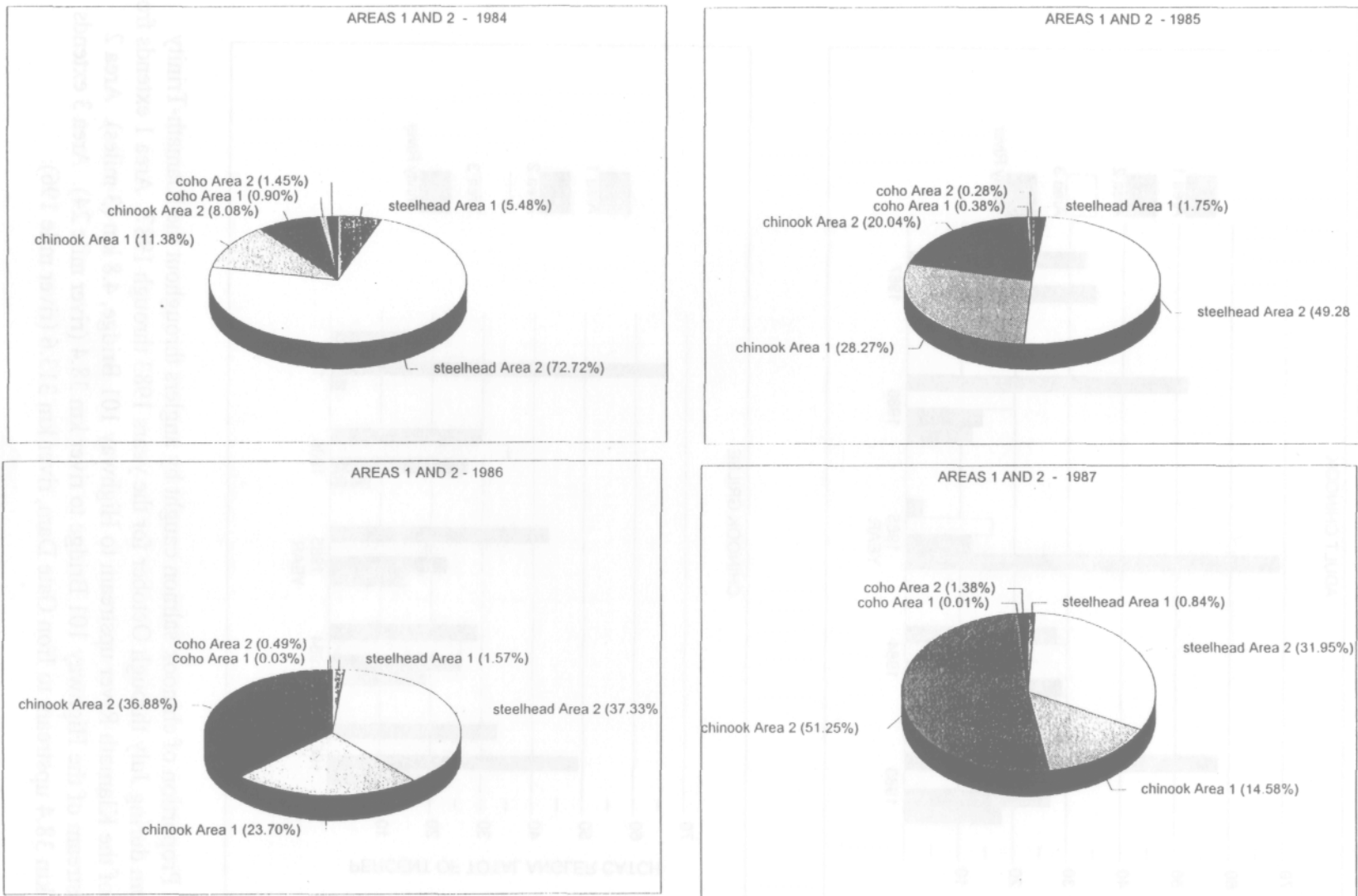




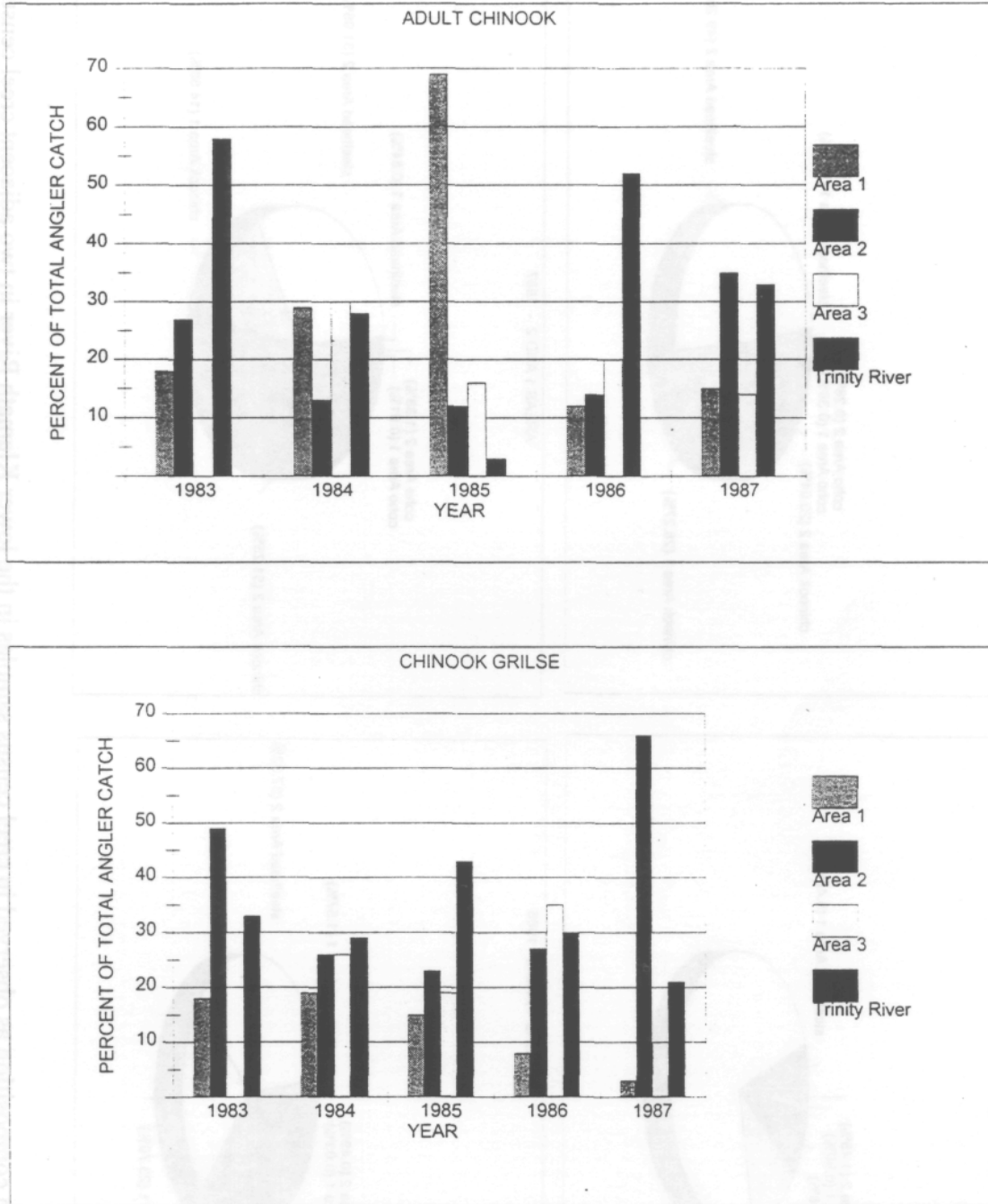
**Figure 23.** Angler catch composition as observed in creel census samples in the lower Klamath River from the Highway 101 Bridge upstream to river km 38.4 (river mile 24) (Area 2), during July through October, 1984 through 1987.

**Table 20.** Summary of angling regulations pertaining to Klamath River anglers, 1984 through 1987 seasons.

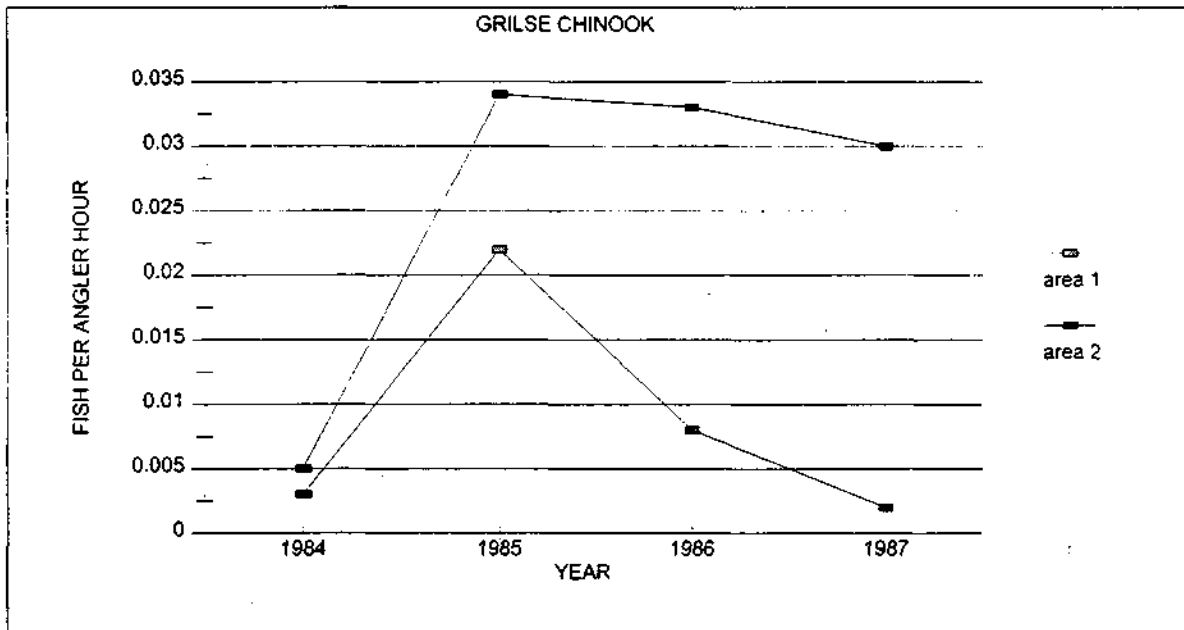
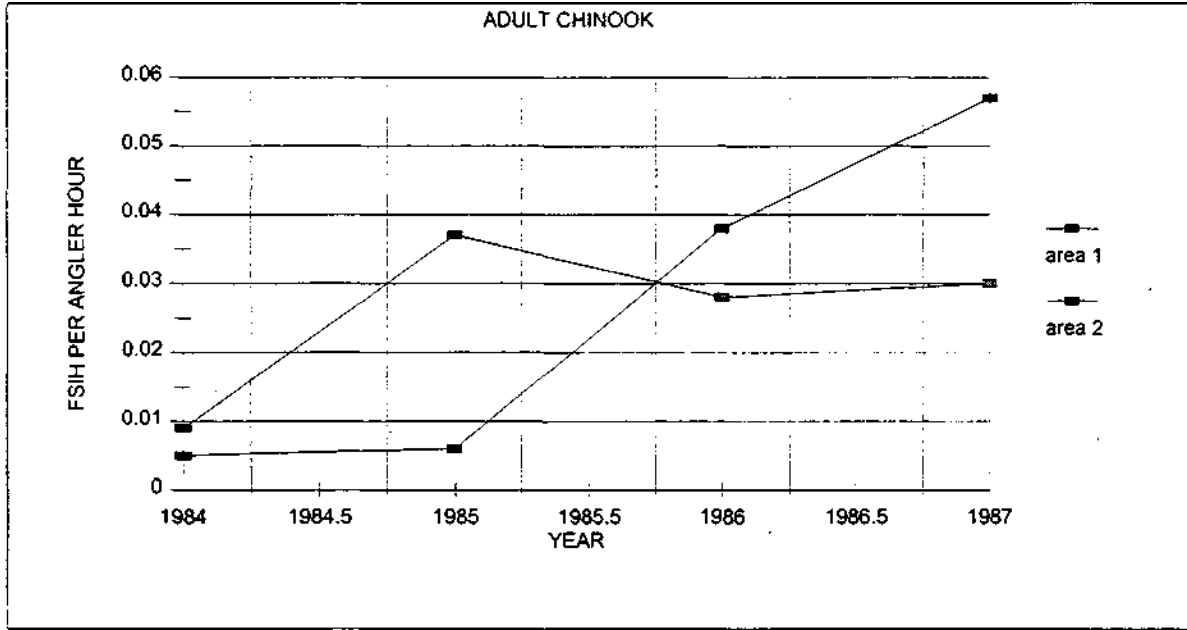
Category	1984	1985	1986	1987
Size limits:	none	none	No more than two salmon over 22 inches in length. See daily bag and six in possession limit below.	No more than two salmon over 22 inches in length in daily bag and six in possession.
Daily bag limit:	No more than two Salmon and three Steelhead, and no more than 3 in combination.	No more than two salmon and three	Five salmon, no more than two over 22 inches. Plus 3 steelhead.	Five salmon, no more than two over 22 inches. Plus 3 steelhead.
Possession limit	Same as daily bag.	Same as daily bag.	Eight salmon with no more than two over 22 inches.	Eight salmon with no more than two over 22 inches.
Punch card weekly limit:	None	None	No more than 6 salmon over 22 Inches in a 7-day period	No more than 6 salmon over 22 inches in a 7-day period.
Days closed to fishing:	Mouth to 101 bridge closed to all fishing Monday and Tuesday, Aug. 1 to Sept. 30.	Mouth to 101 bridge closed to all fishing Monday and Tuesday, Aug. 1 to Sept. 30.	All days fishable.	All days fishable.
	Highway 101 Bridge to Weitchpec closed to salmon fishing Monday and Tuesday, Aug. 1 to Sept. 30.	Highway 101 Bridge to Weitchpec closed to salmon fishing Monday and Tuesday, Aug. 1 to Sept. 30.		
Harvest quota below Highway 101 Bridge:	None	None	2,583 adult chinook	7,160 adult chinook



**Figure 24.** Angler catch composition as observed in creel census samples in the lower Klamath River in two adjacent creel census areas from the mouth upstream 38.4 km (24 miles) ( Areas 1 and 2), during July through October, 1984 through 1987.



**Figure 25.** Proportion of chinook salmon caught by anglers throughout the Klamath-Trinity River system during July through October for the years 1983 through 1987. Area 1 extends from the mouth of the Klamath River upstream to Highway 101 Bridge, 4.8 km (3 miles). Area 2 extends upstream of the Highway 101 Bridge to river km 38.4 (river mile 24). Area 3 extends from river km 38.4 upstream to Iron Gate Dam, river km 313.6 (river mile 196).



**Figure 26.** Comparison of angler catch per hour in creel Area 1 (mouth to Highway 101 bridge) and creel Area 2 (Highway 101 bridge upstream to river km 38.4 km, [river mile 24]) for chinook salmon adults and grilse during the months July through October, 1984 through 1987.

The catch of adult chinook salmon in Area 2 appears to be related to the adult chinook salmon run size, however, chinook salmon catches in Area 1 do not appear to be related to the size of the adult chinook salmon run. A regression of catch-per-angler-hour of adult chinook salmon in Area 2 and total adult chinook salmon run size during six seasons from 1980 through 1987 indicates a positive relationship ( $r^2 = 0.82$ ) (Figure 27). No relationship ( $r^2 = 0.19$ ) was found for a similar regression for Area 1 adult chinook salmon per angler hour and total adult chinook salmon run size.

Grilse chinook salmon: In general, anglers in Area 2 were more successful at catching chinook salmon grilse than Area 1 anglers. The chinook salmon grilse catch-per-angler-hour in Area 1 generally decreased from 1984 through 1987 compared with a general increase of catch per angler hour in Area 2 (Figure 26).

No correlation was found for chinook salmon grilse run size in the Klamath River system and grilse chinook salmon caught per angler hour in Area 1 or in Area 2.

Steelhead: Steelhead half-pounder catch rates decreased each year from 1984 through 1987, ranging downward from 0.052 to 0.022 fish per angler hour (Figure 28). During the 1980-82 seasons, the catch rate of half-pounders ranged from 0.038 to 0.081 fish per angler hour (Lee 1984a, 1984b and 1985).

The catch rate of Steelhead adults peaked in 1986 at 0.041 fish per angler hour and dropped to a low of 0.017 fish per angler hour in 1987. During 1980 and 1982 adult Steelhead catch rates remained constant at 0.042 fish per angler hour (Lee 1984a, 1984b and 1985).

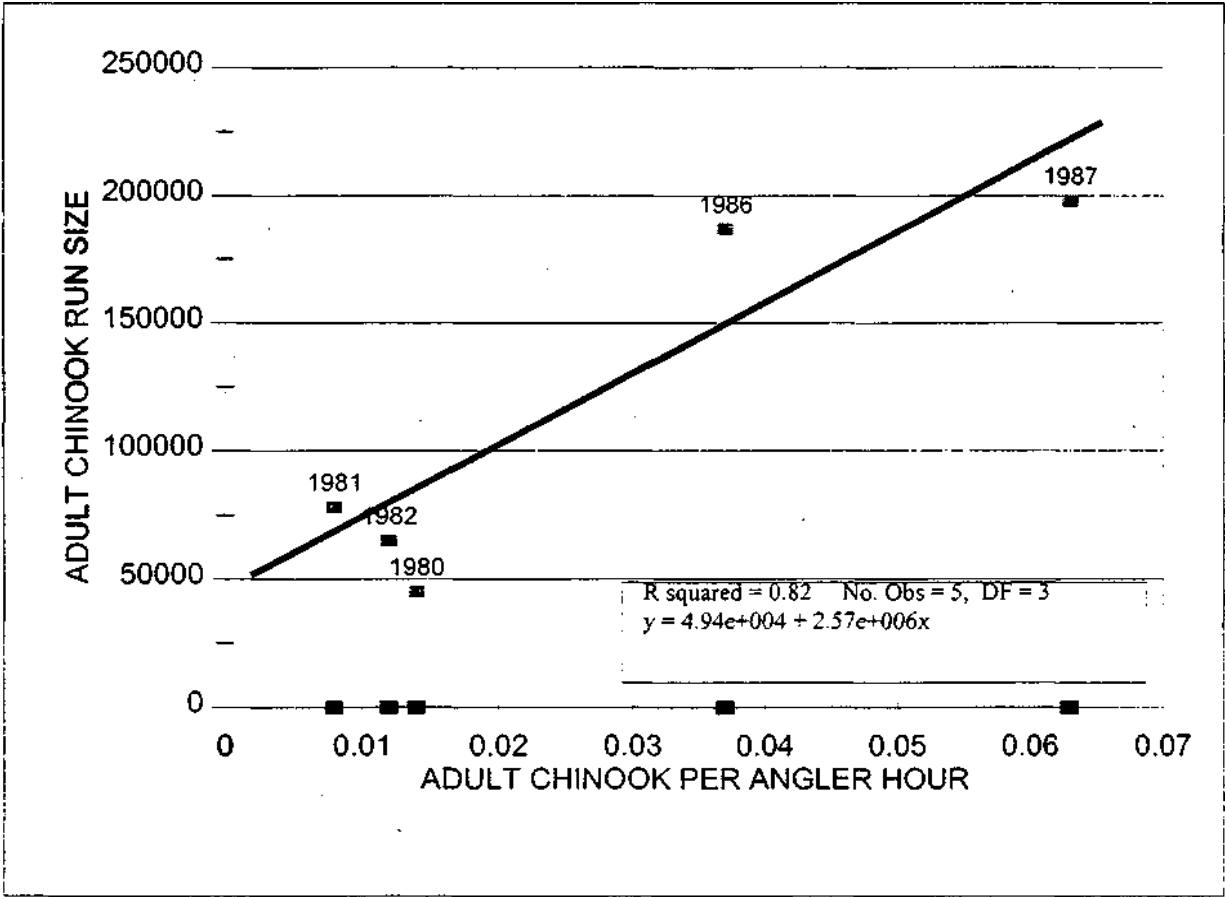
Specific causes for the general decline in Steelhead catch rates during the 1984-87 fishing seasons compared with the 1980-82 seasons have not been determined. The decrease in catch rates may be reflecting actual population decreases of Klamath River system Steelhead, however, a relationship with fall Steelhead run size and angler catch rates in Area 2 has not been established.

### Angler Effort

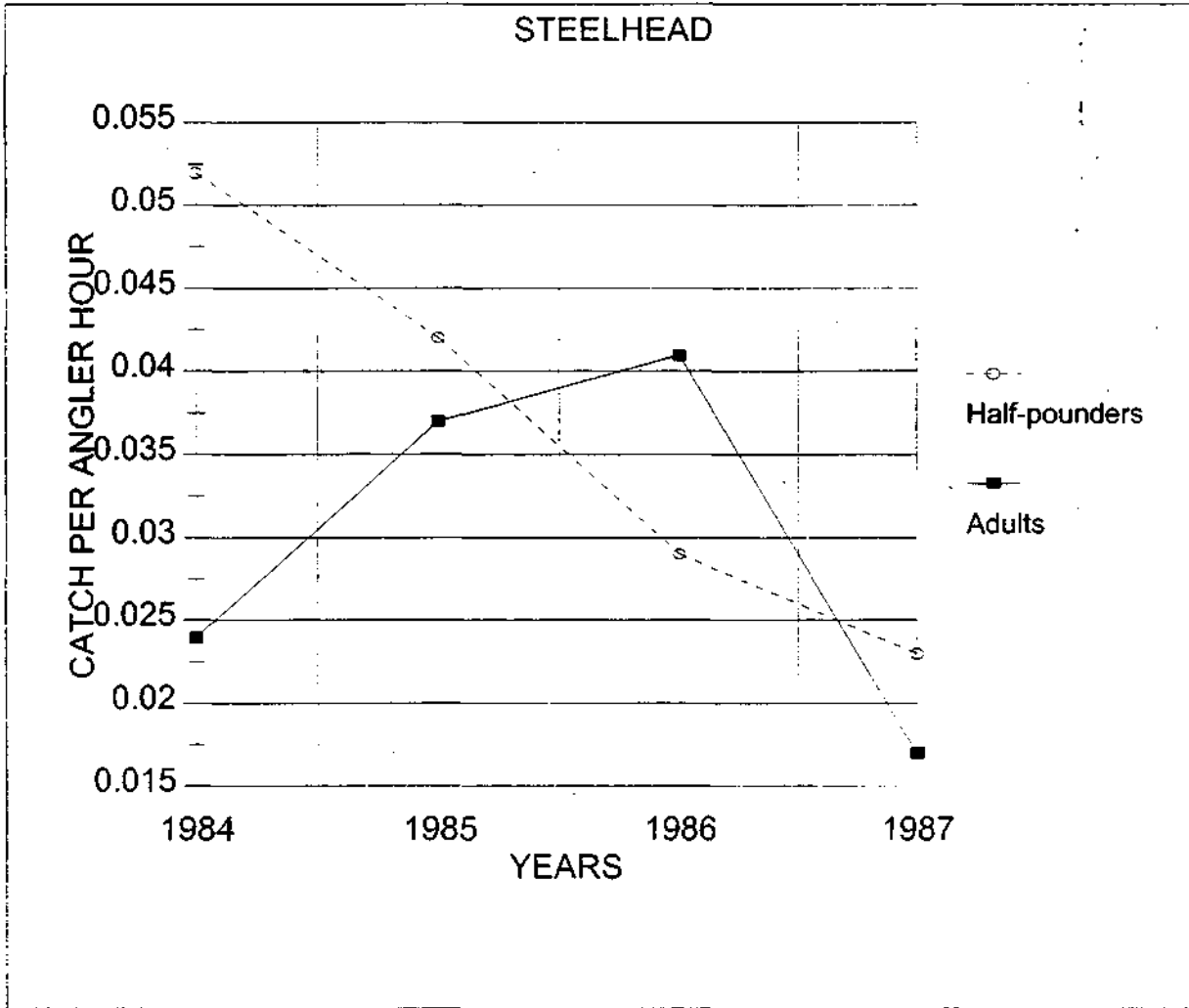
Total angler effort in Areas 1 and 2 increased 46 percent from 1984 through 1987, from about 122,000 to 178,580 angler hours, respectively. A dynamic inverse relationship appears to exist with angler effort between Areas 1 and 2. For example, when annual angler effort decreased in Area 1, annual angler effort increased in Area 2 during the same season (Figure 29).

### Tag Returns From Anglers

During this reporting period, the annual proportion of tags returned from the total estimated harvest of chinook salmon adults in Area 2 ranged from 0.30 to 1.60 percent, and from 0.07 to 0.78 percent of the grilse chinook salmon estimated harvested in Area 2 (Table 4). The tags were applied to salmon seined immediately downstream of the boundary of Area 2 (Highway 101 bridge).

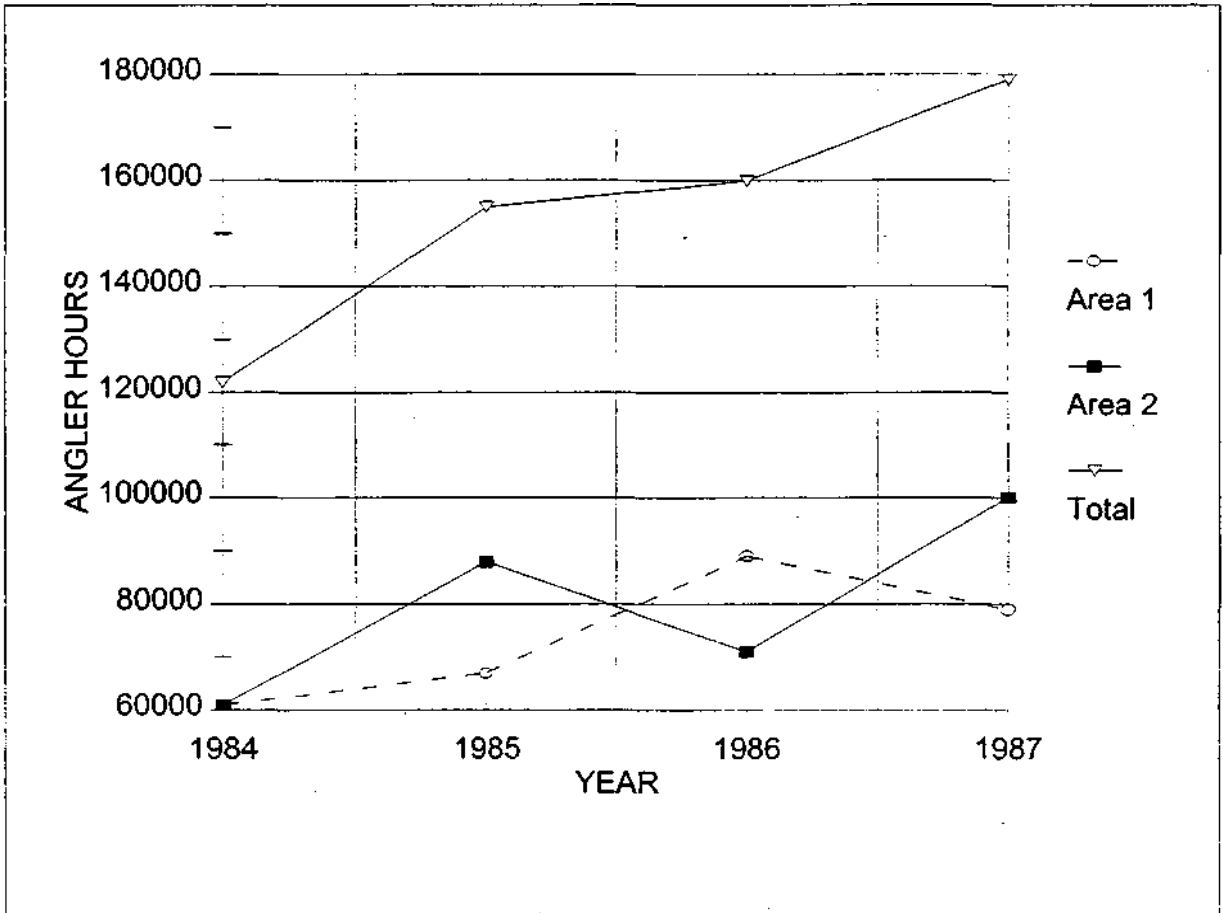


**Figure 27.** Regression of adult chinook catch-per-angler-hour in the lower 38.3 km (24 miles) of the Klamath River on adult chinook run size for five years during 1980 through 1987.



**Figure 28.** Angler catch per hour of steelhead half-pounders and steelhead adults observed in creel samples taken in the lower 38.4 km (24 miles) of the Klamath River during the months of July through October, 1984 through 1987.





**Figure 29.** Angler effort estimated from creel samples in the lower 38.4 km (24 miles) of the Klamath River during the months July through October, 1984 through 1987. Area 1 includes the Klamath River mouth upstream to Highway 101 bridge, and Area 2 includes the reach upstream of Highway 101 Bridge to river km 38.4 (river mile 24).

### Coded-Wire Tag Recoveries

Based on Ad-CWT recovered chinook salmon, peak catches of fall chinook salmon originating from IGH occur one to two weeks prior to fall chinook salmon originating from TRH (Figure 30). Occurrence of peak catches from each hatchery varied from season to season, but IGH fall chinook salmon always peaked before TRH fall chinook salmon. This phenomenon could have management implications if selective harvest of specific fall chinook salmon stocks becomes a management goal.

Analysis of specific code groups recovered in the Klamath River basin during 1984 through 1987 is presented by Paulsen (1988).

### Comparison of Mean Lengths

Adult chinook salmon catch in Area 1 were generally larger than those caught in Area 2 (Table 21). Grilse chinook salmon caught in Area 1 tended to be slightly larger than those caught in Area 2, but these differences were not significant (Table 21). The mean lengths of steelhead half-pounders and adults were comparable for years 1984 through 1987 in Area 2 (Table 22).

### Angler Origin.

Anglers from central California counties had the highest representation among Area 1 and 2 anglers during 1984 through 1987. Anglers from southern California and northern California counties were about equally represented. Anglers from other states and countries represented 6.2 percent of all anglers sampled during 1984 through 1987 (Table 23).

Anglers with residences less than 150 miles from the lower Klamath River accounted for 20.7 percent of the anglers sampled. Nearly 80 percent of the anglers that fished the lower Klamath River during July through October in 1984 through 1987 resided more than 150 miles away.

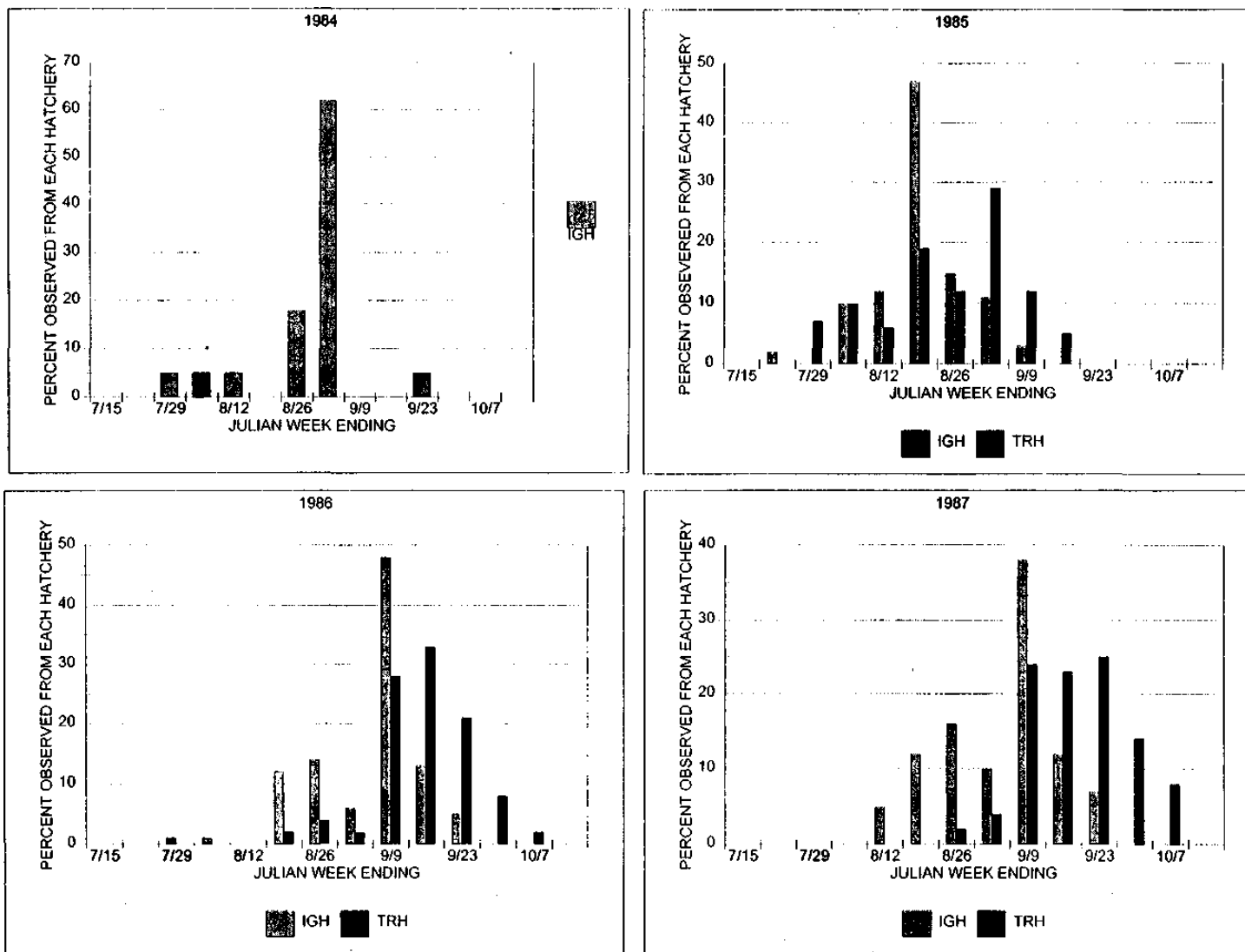
## RECOMMENDATIONS

Fall chinook salmon run size, angler harvest, and angler effort have increased during this reporting period. Fall chinook salmon angler harvest throughout the Klamath River is an important element in fall chinook salmon management and should continue. Additional angler harvest information should be collected in Area 3 to more accurately determine catch per effort and hatchery mark ratios.

Steelhead catches have declined in Area 2 during the last two years of this reporting period, 1986 and 1987. Fall steelhead levels should be carefully monitored in future seasons to assess the status of the fall steelhead. A long term declining trend in steelhead levels must be detected and sound management practices implemented to reverse any downward trend.

**Table 21.** Comparison of mean lengths of fall chinook salmon observed in Klamath River angler creel samples from Area 1 (estuary) and Area 2 (Highway 101 bridge to Johnson's) during July through October 1984 - 1987.

Area 1						Area 2					
Year	Mean FL (cm)	(range)	n	sum X <sup>2</sup>	variance	Year	Mean FL (cm)	(range)	n	sum X <sup>2</sup>	variance
<u>Adult Chinook</u>											
1984	68	(54-91)	59	27,816	53.8	1984	65	(54-86)	126	546,435	46.9
1985	76	(63 -99)	762	4,397,213	55.4	1985	73	(63-93)	181	974,389	56.3
1986	73	(56-101)	730	3,957,572	84.0	1986	66	(56-102)	913	4,086,752	61.6
1987	72	(56-99)	774	(4,130,987)	101.3	1987	6	(56-99)	2,162	9,798,337	56.8
<u>Grilse Chinook</u>											
1984	48	(43-53)	11	25,248	9.6	1984	45	(34-53)	122	255,341	18.4
1985	53	(24-62)	713	2,033,197	26.0	1985	50	(27-62)	1,155	2,923,577	38.8
1986	47	(26-55)	207	456,658	28.4	1986	47	(24-55)	893	2,002,754	28.0
1987	50	(24-55)	253	640,986	17.0	1987	49	(29-55)	1,186	2,897,548	16.5



**Figure 30.** Timing of hatchery-marked chinook salmon in lower Klamath River angler creel samples during 1984 through 1987. IGH represents Iron Gate Hatchery, and TRH represents Trinity River Hatchery. Hatchery origin was determined from coded-wire-tags (CWTs).

**Table 22.** Summary of steelhead mean lengths observed in lower Klamath River angler creel census July through October, 1984 through 1987 seasons.

Year	Mean FL (cm)	(range)	Sample size	Sum X <sup>2</sup>	Variance
<u>Half-pounders</u>					
1984	33	(25-42)	1,660	1,873,426	15.1
1985	34	(25-42)	1,675	2,023,454	15.0
1986	34	(25-41)	857	1,014,329	13.0
1987	33	(25-41)	734	812,573	10.0
<u>Adults</u>					
1984	53	(43-75)	633	1,792,915	47.1
1985	51	(43-85)	1,477	3,957,748	34.8
1986	51	(42-81)	1,038	2,792,264	39.7
1987	53	(42-96)	538	1,552,531	57.7

**Table 23.** Zip code summary for anglers sampled in the lower Klamath River (mouth to Johnson's, km 384. rm 24) during July through October, 1984 through 1987.

County	1984	1986	1987	Total 1984-87	Percent of total
<u>Southern California Counties</u>					
Kern	651	145	514	1,310	
Los Angeles	1,761	382	1,090	3,233	
Orange	437	57	409	903	
Riverside	105	41	239	385	
San Bernardino	314	76	426	816	
San Diego	492	92	307	891	
Santa Barbara	161	36	162	359	
Ventura	274	57	211	542	
Subtotal	4,195	886	3,358	8,439	30.8
<u>Central California Counties</u>					
Alameda	1,220	389	1,229	2,838	
Contra Costa	107	21	79	207	
Fresno	316	94	475	885	
Marin/Sonoma	166	64	232	462	
Monterey	69	37	79	185	
Sacramento	265	99	373	737	
San Joaquin	522	201	858	1,581	
San Mateo	771	119	620	1,510	
Santa Clara	735	157	555	1,447	
Subtotal	4,171	1,181	4,500	9,852	35.9
<u>Northern California Counties</u>					
Glenn/Colusa	423	139	432	994	
Humboldt	1,188	373	1,381	2,942	
Trinity/Mendocino/ Southern Humboldt	587	333	1,087	2,007	
Trinity/Siskiyou/ Shasta	289	78	352	719	
Yolo	284	99	384	767	
Subtotal	2,771	1,022	3,636	7,429	27.1
<u>Other states and countries</u>					
Subtotal				1,695	6.2
Totals				27,415	

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