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A Synthesis Report of 25 Salmonid Creel Censuses Spanning 60 Years from 1955 through 2014 in the Smith River, Del Norte County, California

Including a comparison between creel census and
Steelhead Report and Restoration Card results

Prepared by

Mark Zuspan

Edited by

Michelle Gilroy and Justin Garwood

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TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

FOREWORD

This report is a synthesis of prior published and unpublished reports, memos and field notes detailing angler-caught salmonids in the Smith River. The synthesis includes work beginning in 1955 and continues intermittently through 2014. Objectives over the years varied widely, ranging from simply providing an official presence on the river to generating statistically valid salmon and steelhead trout harvest estimates. Most of the information was generated from creel censuses conducted by the California Department of Fish and Game (CDFG) (now California Department of Fish and Wildlife (CDFW[1])). The single exception was the 1956/57 census which was conducted by U.S. Department of Interior Fish and Wildlife Service (USFWS).

ABSTRACT

This review provides a unique perspective into an important California fishery. The Smith River is the largest un-dammed anadromous river in California that runs into the ocean, and supports valuable steelhead trout (*Oncorhynchus mykiss*), Chinook Salmon (*Oncorhynchus tshawytscha*), and to a lesser extent Coastal Cutthroat Trout (*Oncorhynchus clarkii clarkii*) fisheries. There has been an enduring interest in this fishery as evidenced by the 25 known creel censuses performed during the last 60 years. During the 16 censuses that reported total catch, it was estimated that over 1.2 million hours (411 person-years at 8 hours per day) were spent catching 60,769 steelhead trout, 26,299 Chinook Salmon and 2,925 Coastal Cutthroat Trout. Noteworthy, this represents only a fraction of the hours actually expended because most of the censuses were not designed to sample the entire adult salmon/steelhead runs. The overall catch rate (combined adult fish) does not appear to have decreased through time. This rate which was first reported in 1965, was essentially identical to the last reported in 2006-07 at 0.066 and 0.067 fish per hour, respectively. The highest overall catch rate of 0.114 was reported in the 2004-05 creel census. Comparisons are made between catch statistics derived from the creel censuses and the Steelhead Report and Restoration Card Program (SHRRC). For the six years of concurrent data collection, SHRRC estimated the rate of hatchery-contribution at about 32% while the creel census clerk observations put the estimate

[1] On January 1, 2012, the "California Department of Fish and Game (CDFG)" became the "California Department of Fish and Wildlife (CDFW)". Hereafter, with exception of Table 1, all references to "CDFG" will be made as "CDFW".

at about 40%. Catch-and-release rates were estimated at about 69% and 64% by SHRRC and the creel census, respectively. SHRRC total steelhead trout catch estimates were significantly less than that those reported during creel censuses. Averaged over the six years of concurrent data collection, SHRRC estimates were only about 23% of creel-census derived estimates. Fishing regulations have changed and hatchery production has decreased substantially since the last robust creel census in 2006-07 making it difficult to apply previously documented exploitation rates to those of the current fisheries.

SPECIES NAMING CONVENTION

For species referred to in this report, the proper presentation, according the AFS publication 34 [36] includes: "Chinook Salmon", "Coho Salmon", "steelhead trout" and "Coastal Cutthroat Trout". Hereafter, for the proposes of this report, Chinook Salmon will be referred to as "Chinook or sometimes within tables as "Chin"; Coho Salmon will be referred to as "Coho"; steelhead trout will be referred to as Steelhead or within tables as "SH"; and Coastal Cutthroat Trout will be referred to as "Cutthroat" or sometimes as "CCT" within tables.

DATA DISCREPANCIES

It should be noted that some of the numbers presented in this synthesis are different than those presented in the original report tables. The differences are minimal, relegated to small differences in a few caught fish or hours fished over the course of the season. The original tables in question were spreadsheets whose underlying formulas estimated monthly catch and hours fished based on expanded numbers which produced fractional fish or hours. However, the monthly figures were presented as whole numbers and when summed across the season didn't always add up to the totals presented. For this report, I have assumed the whole numbers presented by the month in the original table were the correct and adjusted the season totals to match the monthly totals.

CENSUS SURVEY VERSUS SAMPLE SURVEY

Throughout this document the word "census", as in "creel census" or "census year", is used to present information related to Smith River angling collected over the years by CDFW and others. Technically, in a "census survey", information is collected from all participants in a population whereas in a "sample survey", only a representative subsample of the population is used [34]. Without exception[2], results presented in this report were derived using sample-survey methods rather than census-survey methods. I have chosen to use the word "census" instead of the more appropriate "sample-survey" as that is the term generally used by the original authors and is commonly used by fishery workers when referring to angler surveys. The reader should be aware that results presented in the synthesis report are derived from sample surveys.

SPECIAL NOTE: 1980-81 CREEL CENSUS

The 1980-81 census appears to be a robust effort with catch estimates produced for the same river sections adopted in later censuses (*see* "Creel Census Locations" page 22). Unfortunately, no report or narrative was found describing this study. The only documentation found was a group of creel census

[2] Methods are not available for all creel censuses covered in the report.

summary tables, length frequency charts and hand-drawn maps detailing river zones sampled [8]. Further complicating the issue, about one half of the tables were marked "Preliminary" and there appeared to be discrepancies within the various tables. For example, the two tables describing Chinook (referred to as King Salmon) catch and angling effort clearly indicates there was no sampling in September while another table describing Steelhead results (rainbow trout) provides an estimate for September's effort and catch (*see* Appendix 9, Appendix 10, and Appendix 11). Noteworthy, in contrast to all the other months listed, the effort and catch estimates identified with September are both rounded to the nearest 1,000 (Appendix 11). It seems likely the 1980-81 census began May 24, 1980 (as indicated on one of the figures) and continued, excluding September, through May of 1981. Unfortunately, the results related to the December 1980 through May 1981 period were confined to a single table describing rainbow trout (Steelhead) catch and effort (Appendix 11). Due to the lack of results related to the December 1980 through May of 1981 census, for this synthesis report, only the May 24, 1980 through November (excluding September) results are presented in this report. Additionally, because of the September break in the census, results are generally presented as two censuses: 1980a (May 24 through August) and 1980b (October 1 through November).

LITERATURE CITED

This report, as a synthesis, is derived almost exclusively from previously generated reports. When this report references sources, the reader will be presented with a bracketed-reference number (i.e. [9]) referring to Table 1 which provides the Author, Title and publishing date (if available).

CREEL CENSUS SOURCE DOCUMENTS

This synthesis report covers 25[3] different creel censuses of vastly varying efforts, objectives and documentation (Table 9, Table 5 and Table 1). Only 16 of the 25 censuses were designed for, and of sufficient duration and intensity, for the author(s) to provide expanded catch/use estimates for adult runs of Chinook salmon and/or Steelhead (Table 9). Most (11 of 16) of these censuses also had comprehensive published reports detailing methods and results. However, for five of the 16 (1955, 1956, 1977, 1980 and 1986-87), formal reports were unavailable and other sources of information were used (Table 1). Clearly, census results based on fragmentary information (e.g. the 1977 census) should not be given the same consideration as results from a comprehensive, well-documented published report (e.g. 1997-98). The table below (Table 1) is provided to give the reader a sense of the quality of the underlying documents used in the generation of this synthesis report as well as a means to provide citations within this document.

[3] Although it is listed as a single reference in some tables, the 1980 creel census is, for this report, considered as two censuses (1980a and 1980b).

Table 1 Creel census reports and other documents used as references in this report.

Citation #	Creel Census Year(s)	Source Document(s)	Note(s) - Author(s), Online source
1	1955	Progress Report of Salmon Sport Fishery Survey in Tidewater of Smith River during 1955. Prepared for publication August 10, 1956. Data was obtained by personnel of Federal Aid Project F-12-R. 1 pp.	Robert Menchen, Aquatic Biologist of CDFG.
2	1956-57	Natural Resources of Northwester California, A Preliminary Survey of Fish and Wildlife Resources, Report Appendix, United States Department of the Interior, Pacific Southwest Field Committee, by Fish and Wildlife Service, 1960, 104 pp. plus plates and attachments	See page 26 and figures 3, 4 and 5 for reference to the 1956-57 creel census.
3	1964	File Report: Report on the Planting of Silver Salmon in Middle Fork of the Smith River, Del Norte County, California, 3 pp.	CDFG: Author(s) and Dates unknown
4	1965	Lower Smith River Estuary Creel Census, 1965, John S. Day, Region 1, Inland Fisheries, Marine Resources Administrative Report No. 68-3, 1968, 6 pp. This report was stamped "Complete report available upon request". Search for "Complete" report was unsucessful.	CDFG document
5	1970	FIELD NOTE - Location: Smith River, Del Norte Co., Jedediah Smith State Park to Patricks Creek, Subject: Creel Census for recently stocked silver salmon, Date: July 21 through 26, 1970, 3 pp.	Don LaFaunce, CDFG, 6/10/80
6	1973	FIELD NOTE - Location: Smith River (from Patricks Creek downstream to Hiouchi Bridge), Subject: Creel Census (planted steelhead trout), Date: June 27 to June 29, 1973, 1 pp.	L.L. Rudder, CDFG, 8/28/73
7	1977	Documents include a study proposal including Purpose, Study Area and Methods, 3 tables summarizing the census results and a map of the study area, 3 pp.	CDFG, Author(s) and Dates unknown
8	1980 a/b	Documents include 6 Tables of catch and use results 2 of which are stamped "Preliminary", 5 charts of catch/use and length-frequency results and 2 river maps, 12 pp. No narative found for this document.	Steve Taylor and Pat Figuli, CDFG authored two of the tables.
9	1984	Recreational Angler Use and Catch in the Mainstem Smith River, California August - December, 1984, by Steven N. Taylor and James Lytle, Inland Fisheries Division, Inland Fisheries Administrative Report No. 96-1, 1996, 16 pp.	CDFG Document
10	1986-87	Summary of 1986-87 Smith River Creel Census Data; 1 pp. Summary states creel ran from 11/1/1986 through 1/31/87 but field data sheets indicate census extended beyond 1/31/87.	CDFG, Author and date unknown.
11	1997-98	Recreational Angler Use and Catch in the Smith River, Del Norte County, California, September 1997 - March 1998, by David A. McLeod, Northern California - North Coast Region, Inland Fisheries, April 23, 1999, 15 pp.	CDFG Documents
12	1998-99	Recreational Angler Use and Catch in the Smith River, Del Norte County, California, November 1998 - March 1999, by David A. McLeod, Northern California - North Coast Region, Inland Fisheries, January 12, 2000, 11 pp.	
13	1999-2000	Recreational Angler Use and Catch in the Smith River, Del Norte County, California, October 1999 - March 2000, by Michael D. Sparkman, Steelhead Research and Monitoring Program, Northern California North Coast Region, November 7, 2000, 20 pp.	
14	2000-01	Annual Report, Recreational Angler Use, Catch and Harvest in the Smith River, Del Norte County, California, 2000-2001, Project 1g1, by Seth Ricker, Northern California, North Coast Region, Steelhead Research and Monitoring Program, January 2002, 18 pp.	
15	2001-02	2001-2001 Annual Report, Recreational Angler Use, Catch and Harvest in the Smith River, Del Norte County, California, 2001-2002, Project 1g1, by Rebecca Dutra and Seth Ricker, Northern California, North Coast Region, Steelhead Research and Monitoring Program, January 2003, 16 pp.	
16	2002-03	2002-2003 Annual Report, Recreational Angler Use, Catch and Harvest in the Smith River, Del Norte County, California, 2002-2003, Project 1g1, by Seth Ricker and Rebecca Dutra, Northern California, North Coast Region, Steelhead Research and Monitoring Program, January 2003, 20 pp.	
17	2004-05	Annual Report, Recreational Angler Use, Catch and Harvest in the Smith River, Del Norte County, California, 2004-2005, Project 1g1, by Patrick Garrison, Northern California, North Coast Region, Anadromous Fisheries Research and Monitoring Program, December 2005, 18 pp.	
18	2005-06	2005-2006 Annual Report, Recreational Angler Use, Catch and Harvest in the Smith River, Del Norte County, California, 2005-2006 by Rebecca Dutra, September 2006, 16 pp.	
19	2006-07	2006-2007 Annual Report, Recreational Angler Use, Catch and Harvest in the Smith River, Del Norte County, California, 2006-2007 by Rebecca Dutra, September 2007, 17 pp.	
20	2008-09	File Report: Estimated 2008 Angler Use and Catch at the Sand Hole, Smith River, 1 pp.; Copies of field data sheets 9 pp.	Undated file report by Larry Preston, CDFG
21	2010	Recreational Angler Use, Catch and Harvest in the Smith River, Del Norte County, California, October-November 2010, Prepared By Brian Crouch, May 2011, 6 pp.	CDFG Document
22	2012 2013 2014	Recreational Angler Use, Catch and Harvest in the Smith River, Del Norte County, California, October-November, 2012, 2013 and 2014, by Guy Smith, Sherry Mason, John Grondalski, Michelle Gilroy, and Mark Zuspan, May 9, 2017, 14 pp.	
Other non-creel census documents			
23	N/A	Rowdy Creek Fish Hatchery 2015/2016 through 2020/2021 5-Year Management Plan	Contact Person: Andrew Van Scoyk, Hatchery Manager
24	N/A	Length conversion equations for Sockeye, Chinook, and Coho Salmon in Southeast Alaska, by Keith Pahlke, Regional Information report No. IJ88-03, February 1988	Alaska Department of Fish and Game Division of Commercial Fisheries.
25	N/A	Steelhead Report and Restoration Card Program database, 1997 through 2007.	Provided by Farhat Bajjaliya, CDFW 2016
26	N/A	File Report: 2014 and 2015 Rowdy Creek Fish Hatchery Smith River salmonid marking program assessment, 9/29/15 Justin Garwood, 4 pp.	CDFG Documents
27	N/A	A Report on Chinook Salmon Straying Into the Smith River, California in 1983, Jim Waldvogel, Sea Grant Marine Advisor, University of California Cooperative Extension, February 1984, 11 pp.	
28	N/A	Final Rule: Endangered and Threatened Species: Threatened status for two ESU's of steelhead in Washington, Oregon, and California. Federal Register, Vol. 63, No. 53, March 1998, 25 pp.	National Marine Fisheries Service, 1998
29	N/A	Final Rule: Endangered and Threatened Species: Threatened status for two Chinook salmon Evolutionarily Significant Units (ESU's) in California. Federal Register, Vol. 64, No. 179, September 16, 1999, 22 pp.	National Marine Fisheries Service, 1999
30	N/A	Endangered and Threatened Species: Threatened Status for One Steelhead Evolutionarily Significant Unit (ESU) in California. 21 pp.	National Marine Fisheries Service, 2000
31	N/A	Final Rule: Endangered and Threatened Species; Threatened status for Southern Oregon/Northern California Coast Evolutionarily Significant Unit (ESU) of coho salmon. Federal Register, Vol. 62, No. 87, May 6, 1997. 24,588 pps	National Marine Fisheries Service, 1997
32	N/A	Status Review of Coastal Cutthroat Trout from Washington, Oregon and California. NOAA Technical Memorandum NMFS-NWFSC-37, January 1999, 320 pp.	National Oceanic and Atmospheric Administration. 1999
33	N/A	Fish Species of Special Concern in California, Third Edition, Center for Watershed Sciences and Department of Wildlife, Fish and Conservation Biology, University of California Davis and California Department of fish and Wildlife, July, 2015, 842 pp.	https://www.wildlife.ca.gov/Conservation/SSC/Fishes
34	N/A	NOAA Office of Science and Technology, National Marine Fisheries Service, Recreational Fisheries, Understanding Estimation, Census vs. Sampling	http://www.st.nmfs.noaa.gov/recreational-fisheries/Understanding-Estimation/census-vs-sampling
35	N/A	California Department of Water Resources, California Data Exchange Center, Monthly Precipitation	http://cdec.water.ca.gov/cgi-progs/reports/PRECIPOUT.BSN.2016
36	N/A	Common and Scientific Names of Fishes from the United States, Canada, and Mexico, 7th edition, American Fisheries Society Special Publication 34, April, 2013, 243 pp.	American Fisheries Society
37	N/A	National Wild and Scenic River Systems	https://www.rivers.gov/california.php
38	N/A	California Wild and Scenic Rivers Systems (Public Resources Code Section 5093.50 et seq)	http://www.dot.ca.gov/ser/vol1/sec3/special/ch19wsrivers/chap19.htm#CWSRS
39	N/A	2011-2016 Salmonid Redd Abundance and Juvenile Salmonid Spatial Structure in the Smith River Basin, California and Oregon, February, 2017, 88 pp.	Prepared by: Jolyon Walkley and Justin M. Garwood
40	N/A	Source consisted of two spreadsheets titled "Run Timing Rogue R below Marial.xls" and "Run Timing Chetco.R.xls" both created on 11/10/2003. Spreadsheets indicate Input to this data was contributed by Jerry Vogt, Russ Stauf, and Todd Confer of the ODFW and Randy Frick (USFS).	Spreadsheets provided by Todd Confer, District Fish Biologist, ODFW
41	N/A	Life Stage Periodicities of Anadromous Salmonids in the Klamath River Basin, Northwestern California, by Robert A. Leidy and George R. Leidy U.S. Fish and Wildlife Service, Division of Ecological Services, Sacramento, California April 1984, 39 pp.	
42	N/A	Operation of Dual Frequency Identification Sonar (Didson) to Monitor Adult Anadromous Fish Migrations in the Smith River, California: 2-Year Pilot Study, Prepared for the County of Del Norte by Zachary S. Larson, March 2013, 43 pp.	Study monitored Smith River adult Chinook and Steelhead migration during the 2010-2011 and 2011-2012 runs
43	N/A	Use of Dual Frequency Identification Sonar to Monitor Steelhead Escapement in the Smith River, California, 2012-2013, Prepared for the County of Del Norte by Zachary S. Larson, June 2013, 28 pp.	Study monitored Smith River adult Steelhead migration during the 2012-2013 run

Included in the above documents, is a raw database [25] from the Steelhead Report and Restoration Card Program (SHRRC). This database contains Smith River Steelhead catch statistics from 1999 through 2007, which when modified, allowed direct comparisons between creel-census derived and SHRRC derived catch statistics (*see* "Steelhead Report and Restoration Card Program and Creel Census Comparisons", page 57).

SMITH RIVER DESCRIPTION[4]

The Smith River (Figure 1) is California's fourth largest coastal river, with a watershed of approximately 1,580 km^2 (610 mi^2) in California and 298 km^2 (115 mi^2) in Oregon. Its precipitous upper canyons are forested in fir, spruce, cedar and pine with groves of tall redwoods in Redwood National and State Parks. At its terminus, it flows through an agriculturally developed coastal plain and enters the Pacific Ocean four miles south of the Oregon border. The Smith River drainage receives an average of over 90 inches of precipitation annually [35], occurring mainly as rain. Because of its steep gradients, rocky soils and narrow canyons, flow in the Smith River responds rapidly to storm precipitation. The river is part of both the National [37] and California [38] Wild and Scenic Rivers systems and a National Recreation Area in Six Rivers National Forest.

In 2008, the Wild Salmon Center (WSC) recognized the Smith River as the first of California's six wild salmon strongholds. WSC's web page (https://www.wildsalmoncenter.org/2013/02/01/smith-river/) described the Smith River as: "…A crown jewel in the Stronghold network, the emerald waters of the Smith are home to strong populations of Chinook and coho salmon (relative to other populations in the eco-region), as well as steelhead and cutthroat trout."

[4] With slight modification, the first paragraph comes directly from the 1997-98 creel census report [12].

Figure 1 Smith River drainage showing creel census reaches used during the 1980 and later creel censuses as well as the three "Regulation Zones" described in the "Smith River Fishing Regulation", page 15.

SMITH RIVER FISHERIES

The Smith River has two general sport fisheries with gear and bag limit regulations applied separately to each fishery and fish species. The current fall/winter fishery generally extends from September 1 to April 30 and largely targets adult anadromous forms including Chinook salmon, Steelhead, and coastal cutthroat trout. In addition to the winter fishery dates, fishing is also regulated dynamically through low-flow restrictions from October 1 through January 31 (see "Low-Flow Angling Regulations", page 17). If discharge drops below 600 cubic feet per second the lower river closes to fishing until the flow rises to sufficient levels. The summer fishery generally extends from the last Saturday in May through August 31 and targets resident trout *spp*. including coastal cutthroat trout and resident rainbow trout. Some headwater reaches of the Smith River have subtle differences in season lengths, gear restrictions, and bag limits from the general regulations. Specific angling regulations and their history are described in detail in the Smith River Angling Regulations section of this report (*see* page 15).

ROWDY CREEK FISH HATCHERY

BACKGROUND

In response to perceived declining fisheries after the 1964 flood, the Smith River Kiwanis Club requested and received authorization from the California State Legislature in 1970 to build an anadromous fish hatchery on Rowdy Creek at the confluence of Dominie Creek, tributary to the lower Smith River (*see* Figure 1). In 1973, Rowdy Creek Fish Hatchery (RCH) began its Salmon-Rearing Program followed in 1982 by the Steelhead-Rearing Program. The goal of both programs was to increase the quality of fishing and boost the local economy [23].

ANNUAL PRODUCTION AND PLANTING

All RCH production numbers and planting locations presented in the section were provided by Andy Van Scoyk, RCH manager, personal communication, 2016.

Chinook: Prior to 2010, RCH raised and released both fingerlings, or sub-yearlings, and yearling Chinook salmon. Fingerlings are raised to about 50-120 fish/lb. and released between May 15 and June 15 while yearlings are raised to about 10-15 fish/lb. and released between October 1 and December 15. All Chinook were released at the hatchery. In years when flows at the hatchery were not sufficient to safely release fish, the release site was moved to the County Boat ramp on the mainstem Smith River about 2.2 km upstream (*see* Figure 1). Only fish with 100% intact adipose fin (presumably fish of natural origin) returning to RCH are used to supply eggs for subsequent Brood Years (BY) (*see* "Marking Programs" page 13). RCH stopped yearling Chinook salmon production in 2010 and thereafter released only fingerlings. The reasons for discontinuing yearling production were: 1) there was insufficient water in Rowdy Creek/ Dominie Creek to pump into the hatchery for supporting both Chinook and Steelhead yearling programs and 2), early tag returns indicated that yearling Chinook returns were actually lower than fingerling releases and therefore the extra costs associated with longer rearing were not justified. Based on the current CDFW trapping and rearing permit and five-year management plan, RCH can release up to 100,000 Chinook per year [23].

From the 1994 through 2016 BYs, RCH release-numbers of Chinook salmon fingerlings and yearlings has ranged from 0 to 485,012 and 0 to 159,023 respectively (Table 2). The average fingerling release from 1994 to 2009 was 245,918 fish (range: 79,676 to 485,012). From 2010 to 2016 the average fingerling

release was much less equaling 72,923 fish (range: 8,425 to 110, 144) or 29% of the previous period average (Table 2).

Steelhead: RCH Steelhead are reared to about 5-10/lb. and released between March 15 and April 15. Prior to the 2010 BY, nearly all of the Steelhead production was released at the Forks at river kilometer (RKM) 33.1. As of the 2010 BY, due to concerns regarding straying, competition, and predation on ESA/ CESA listed Coho, Steelhead and Chinook (California Species of Special Concern), all hatchery Steelhead have been released at the County Boat Ramp at RKM 9.0, about 2.2 km upstream of the hatchery. The average fingerling release from 1994 to 2009 was 101,451 fish (range: 52,113 to 151,328). From 2010 to 2016 the average fingerling release was much less equaling 52,825 fish (range: 18,589 to 86,953) or 52% of the previous period average (Table 2). Based on the current CDFW trapping and rearing permit and five-year management plan, RCH can release up to 80,000 steelhead per year [23]. As with Steelhead, only presumable natural-origin fish (100% intact adipose fin) returning the RCH are used to supply eggs.

Coho: Rowdy Creek Fish Hatchery raised Coho (*Oncorhynchus kisutch*) through the 1998 BY and discontinued production at the request of CDFW and National Marine Fisheries Service (NMFS) [23] due to the federal listing of Coho as Threatened in 1997. Numbers released through the 1998 BY are presented in Table 2.

MARKING PROGRAMS

Beginning in 1994, a program, in compliance with their CDFW trapping and rearing permit and five-year management plan, was instituted at RCH designed to distinguish Smith River hatchery-produced Steelhead from natural-origin Steelhead by removing the Adipose Fin (Ad-clip) from all production prior to release. In addition to the Ad-clip, in some early years, other external parts (fins/maxillary) were removed to identify the individual BY [23].

In 2006, a similar marking program, also required by their current CDFW trapping and rearing permit and five-year management plan, for RCH-produced Chinook salmon was instituted. Due to funding constraints all RCH-produced Chinook salmon received left ventral fin clips in 2006 and 2009. In 2007 and 2008 as well as from 2010 to present, all Chinook salmon have received Ad-clips and coded-wire tags (CWT) prior to release [23].

Table 2 Rowdy Creek Fish Hatchery salmon and Steelhead released into the Smith River, brood years 1994 through 2016.

BY	Chinook [1/]			Steelhead [2/]	Coho
	Fingerlings	Yearlings	Total		
1994	0	78,446	78,446	121,680	11,862
1995	294,162	159,023	453,185	58,560	32,895
1996	246,294	77,728	324,022	102,475	11,880
1997	484,864	66,100	550,964	101,629	14,625
1998	485,012	67,165	552,177	123,923	4,292
1999	320,832	55,030	375,862	151,328	Ended production [3/]
2000	235,084	52,608	287,692	117,011	
2001	275,533	27,207	302,740	87,883	
2002	319,798	33,900	353,698	90,789	
2003	182,600	49,545	232,145	103,910	
2004	229,456	29,320	258,776	132,838	
2005	191,350	50,700	242,050	122,089	
2006	116,743	49,450	166,193	97,316	
2007	125133	42,230	167,363	78,709	
2008	79,676	2,362	82,038	52,113	
2009	102,238	3,167	105,405	80,959	
2010	110,144	Ended production [4/]	110,144	56,569	
2011	104,013		104,013	50,988	
2012	97,945		97,945	71,433	
2013	8,425		8,425	86,953	
2014	70,275		70,275	49,285	
2015	85,193		85,193	18,589	
2016	34,468		34,468	35,955	

[1/] All chinook salmon are released in the lower river within about 2.2 km of the hatchery

[2/] Nearly all steelhead trout prior to the 2010 BY were released at the "Forks" about 26 km upstream of the hatchery. Beginning with the 2010 BY all steelhead are released at the County Boat Ramp about 2.2 km upstream of the hatchery.

[3/] Coho BY 1998 was the last year of coho production at RCH. See "Annual Production and Planting" section.

[4/] Chinook BY 2009 was the last year of chinook yearling production at RCH. See "Annual Production and Planting" section.

Although the goal of both marking programs at RCH was to mark all fish prior to release, the actual percentage of fish that were effectively marked was lower. In the Smith River, CDFW considers juvenile fish with at least 50% of its fin removed to be effectively marked and likely to be recognized as a marked fish when observed as an adult.

CDFW [26] performed quality assessments of Steelhead and Chinook salmon at RCH for ten BYs of Chinook and eight BYs of Steelhead beginning with the 2004 BY (Table 3). Results of the assessments indicate that on average, 91.2% of the Steelhead and 93.4% of the Chinook salmon were properly marked prior to release (Table 3). CDFW continues to perform these assessments.

Table 3 Rowdy Creek Fish Hatchery salmon and Steelhead fin-clipping (Ad-clip) quality, brood years (BY) 2004 – 2015

Brood Year	Steelhead				Chinook [1/]			
	No. [2/]	Good [3/]	Poor [4/]	% Good	No.	Good	Poor	% Good
2004	256	190	66	74.2%	256	190	66	74.2%
2006	No Assesment				668	632	36	94.6%
2007					975	904	71	92.7%
2009	971	896	75	92.3%	656	655	1	99.8%
2010	748	661	87	88.4%	1327	1082	245	81.5%
2011	563	542	21	96.3%	1074	1061	13	98.8%
2012	751	740	11	98.5%	529	525	4	99.2%
2013	918	827	91	90.1%	121	119	2	98.3%
2014	501	475	26	94.8%	753	733	20	97.3%
2015	216	206	10	95.4%	920	899	21	97.7%
Overall Average [5/]				91.2%	Overall Average			93.4%

[1/] Quality of coded-wire tagging not assessed for this table

[2/] Number of individual fish checked for fin-clip quality

[3/] Good defined as >= 50% of fin removed.

[4/] Poor definded as <50% of fin removed.

[5/] Calculated as the average of the percentages.

It is important to recognize that releasing essentially unmarked hatchery fish will, if not corrected for, result in under-estimating the contribution rates of hatchery-produced fish in the fishery (see "Hatchery Steelhead Contribution Rates", page 55 for details on correction methods).

SMITH RIVER ANGLING REGULATIONS

Laws governing the take of fish in the Smith River are promulgated by the State of California Fish and Game Commission under the advisement of CDFW. The laws are published annually and widely distributed through Freshwater Sport Fishing Regulation Booklets. Regulations may vary year-to-year in response to environmental changes, new information related to population dynamics or changes in Federal and/or State classifications under the Federal and/or State Endangered Species Acts (ESA). Changes in regulations (e.g. the federal listing and subsequent cessation of Coho harvest in 1998) can complicate inter-year comparisons. In an attempt to identify inter-year catch/harvest changes related to regulation changes, Table 4 below details annual regulations related to the years and river sections in which creel censuses took place.

Smith River regulations are specific to individual sections of the river. However, those sections of river have not been consistent through time. For example, in 1977 under special regulations, only two sections of the Smith River were identified while in 2014 there were eight. For this report, the Smith River is divided into three "Zones" which are, for the most part, managed for anadromous fish including Steelhead, Chinook, Coho and Coastal Cutthroat Trout (*see* Figure 1).

Zone 1 is defined for this report as the section of mainstem Smith River extending from its mouth to the confluence of Rowdy Creek. Zone 2 is the mainstem upstream of Zone 1 to the confluence of the Middle and South Forks. Zone 3 includes: the Middle Fork from its mouth to the confluence of Patrick Creek; the North Fork from its mouth to the confluence of Stony Creek; and two sections of the South Fork Smith, the first from its mouth to the George Tyron Bridge, and second from Craigs Creek to Jones Creek. Beginning with the 1977 census and continuing to present, the section of the South Fork Smith River between the George Tyron Bridge and Craigs Creek has been closed to fishing (*see* Figure 1).

Table 4 Fishing regulations, Smith River Zones [1/] 1, 2 and 3: 1955 through 2014. Regulations apply to all zones unless noted.

<table>
<tr><th rowspan="2">Creel Census Year(s) [2/]</th><th rowspan="2">Season</th><th rowspan="2">Species/Bag Limit</th><th colspan="3">Restrictions [3/]</th><th rowspan="2">Creel Census Year(s)</th></tr>
<tr><th>Gear</th><th>Low-flow</th><th>Report Card(s)</th></tr>
<tr><td>1955</td><td rowspan="2">Nov 1 through last day in Feb.</td><td rowspan="4">3 trout/salmon combo</td><td rowspan="3">None</td><td rowspan="4">None</td><td rowspan="5">None</td><td>1955</td></tr>
<tr><td>1956-57</td><td>1956-57</td></tr>
<tr><td>1965</td><td>Zone 1 plus lower 4.6 km of Zone 2 open all year; remainder of Zone 2 plus Zone 3 open Nov 1 through last day in Feb.</td><td>1965</td></tr>
<tr><td>1977</td><td rowspan="5">All year</td><td>9/1 through Dec. no hook with more than 1 point or size >1</td><td>1977</td></tr>
<tr><td>1980 a/b</td><td>Same as 1977 except 8/15 through Dec.</td><td rowspan="3">Starting 11/1 all Zones closed to fishing if flows at Hy 101 gauging station < 400cfs.</td><td>1980 a/b</td></tr>
<tr><td>1984</td><td>3 trout/salmon combo but <= 2 salmon</td><td rowspan="2"></td><td>1984</td></tr>
<tr><td>1986-87</td><td rowspan="2">Steelhead Trout Catch Report-Restoration Card required</td><td>1986-87</td></tr>
<tr><td>1997-98</td><td>2 fish limit, 1 trout or salmon >22"/ day</td><td>10/1 through 4/1 , upper 2km of Zone 1 plus Zones 2 and 3 closed when flows at Jedidiah Smith Gauging station < 400 cfs.</td><td>1997-98</td></tr>
<tr><td>1998-99</td><td rowspan="8">4th Saturday in May through 3/31</td><td rowspan="2">1 wild trout/SH > 22" TL [4/] or 1 hatchery trout/SH, 1 Chin. No more than 5 wild trout/SH > 22" per year. 0 Coho [5/]</td><td rowspan="3">Artificial lures with barbless hooks only - 4th Saturday in May through Oct. 31. Barbless hooks only Nov. 1 through Mar. 31.</td><td>1998-99</td></tr>
<tr><td>1999-2000</td><td>10/1 through 4/1 , Zones 2 and 3 closed when flows at Jedediah Smith Gauging station < 400 cfs.</td><td>1999-2000</td></tr>
<tr><td>2000-01</td><td rowspan="7">1 wild trout/SH > 16" TL or 1 hatchery trout/SH; 1 Chin, 2 cutthroat >= 10" TL; no more than 5 wild trout/SH over 16" per year, 0 Coho</td><td rowspan="7">10/1 through 1/31 , Zones 2 and 3 closed when flows at Jedediah Smith Gauging station < 400 cfs.</td><td>2000-01</td></tr>
<tr><td>2001-02</td><td>2001-02</td></tr>
<tr><td>2002-03</td><td>2002-03</td></tr>
<tr><td>2004-05</td><td>2004-05</td></tr>
<tr><td>2005-06</td><td>2005-06</td></tr>
<tr><td>2006-07</td><td rowspan="2">Artificial lures with barbless hooks only - 4th Saturday in May through 8/31.</td><td>2006-07</td></tr>
<tr><td>2008</td><td rowspan="2">4th Saturday in May through 3/31 for Zones 1 and 3, and through 4/30 for Zone 2</td><td>2008</td></tr>
<tr><td>2010</td><td>0 wild trout/SH, 2 hatchery trout/SH, 4 hatchery trout/SH possession, 1 Chin, 2 CCT >=10" TL, and <= 5 wild Chin/year, 0 Coho</td><td>Artificial lures with barbless hooks only - 4th Saturday in May through 8/31. Barbless hooks only - 9/1 through 3/31 (Zones 1,3) and 4/30 (Zone 2).</td><td rowspan="3">North Coast Salmon Report Card and Steelhead Report and Restoration Card required</td><td>2010</td></tr>
<tr><td>2012</td><td rowspan="2">4th Saturday in May through 4/30.</td><td rowspan="2">0 wild trout/SH, 2 hatchery trout/SH, 4 hatchery trout/SH possession, 1 Chin, 2 CCT >=10" TL, and <= 5 wild Chin> 22" TL/year, 0 Coho</td><td>2012</td></tr>
<tr><td>2013</td><td rowspan="2">Artificial lures with barbless hooks only - 4th Saturday in May through 8/31. Barbless hooks only - 9/1 through 4/30.</td><td rowspan="2">10/1 through 1/31 , Zones 2 and 3 closed when flows at Jedediah Smith Gauging station < 600 cfs.</td><td>2013</td></tr>
<tr><td>2014</td><td>2014</td></tr>
</table>

[1/] See Smith River Angling Regulations section above for description of Zones.

[2/] 1964, 1970 and 1973 regulations not presented because these censuses were directed at non-anadromous or juvenile salmonids.

[3/] In addition to or in place of general-statewide or district-wide regulations.

[4/] "TL" = Total Length

[5/] Coho Salmon listed as Threatened under the ESA - no harvest allowed throughout the state.

Minor changes in regulations have likely affected angler effort and harvest through the years. More severe regulations, including low-flow angling regulations (see below), the ban on Coho harvest in 1998, and on non-hatchery Steelhead in 2010, likely had a larger impact on effort and harvest. Coho harvest was banned because they were classified as "Threatened" in 1997 under the Federal Endangered Species Act [31]. Wild (or naturally produced) Steelhead harvest was banned in the Smith River in 2010 due to CDFW recommendation to the Fish and Game Commission (FGC) to reduce wild Steelhead harvest from five to either one or zero based primarily on Steelhead Report and Restoration Card Program (SHRRC) data analysis. The FGC ultimately made the decision to limit Steelhead harvest to hatchery Steelhead only.

LOW-FLOW ANGLING REGULATIONS

Beginning in late 1979, CDFW implemented regulations designed to protect Northern California migrating adult salmon and Steelhead during periods of high vulnerability due to low river flow. For the Smith River, specific areas of closure, inclusive dates and river-flow thresholds, varied somewhat (*see* Table 4) and always involved closing sections of the river to salmon and Steelhead fishing when river flows dropped below a certain level (normally 400 cubic feet per second prior to 2013). River flows were provided by the United States Geological Survey (USGS) from their Highway 101 Bridge gauging station in 1980 and their Jedediah Smith State Park gauging station for all subsequent years. In 2013, based on newly available migration behavior data of adult salmonids during low discharge, the minimum discharge cutoff was raised to 600 cubic feet per second to provide more protection to staging adult Chinook salmon and Steelhead.

CDFW CARD PROGRAMS

Beginning in 1993, CDFW instituted the Steelhead Report and Restoration Card Program (SHRRC) whereby all anglers fishing for Steelhead in California anadromous waters were required to purchase a Report Card and record their fishing information (*see* Table 4). This information includes: the date and location where they fished; any adult [5] Steelhead caught and kept or caught and released; and the number of hours fished. In 1997, CDFW began a universal Steelhead marking program for all hatchery-produced Steelhead requiring that all hatchery origin Steelhead be marked with a clipped adipose fin. In response to the universal marking program, the Steelhead Report Card was modified in 1999 to include both wild- and hatchery-produced adult Steelhead caught and kept or caught and released.

In addition to the SHRRC card, Smith River anglers were required to purchase the North Coast Salmon Report Card (NCSRC) beginning in 2010. Both cards are required to be filled out by the angler and returned to CDFW by January 31 of the following year.

SPECIES STATUS (FEDERAL AND STATE)[6]

Smith River Chinook (or king) salmon (*Oncorhynchus tshawytscha*) are included in the Southern Oregon and Northern California Coastal (SONCC) Evolutionarily Significant Unit (ESU), and Smith River Steelhead (*Oncorhynchus mykiss*) are within the Klamath Mountains Province ESU [29, 28]. The SONCC Chinook ESU was considered "not warranted" for Federal Endangered Species Act (ESA) listing [29], and hence, angler

[5] For purposes of the Steelhead Report and Restoration Card Program, only steelhead > 16 inches in length are considered adults and reportable.

[6] With slight modification, this section is taken directly from 2012-2014 creel census report [22].

catches are allowed. Smith River Chinook salmon are however, a California Species of Special Concern [33].

The Klamath Mountains Province Steelhead ESU was found "not warranted" for federal ESA listing [30], and limited harvest of wild Steelhead in the Smith River was allowed through February 2010. As with Chinook salmon, Smith River Steelhead are a California Species of Special Concern [33]. Effective March 1, 2010, all Smith River wild Steelhead are required to be released. Only hatchery Steelhead may now be harvested (CDFW Regulations).

Smith River Coho (*Oncorhynchus kisutch*) belong to the SONCC ESU, and are classified federally as "Threatened" [31] therefore, no harvest is allowed (CDFW Regulations). SONCC Coho are also listed as threatened from Punta Gorda to the Oregon border under California ESA (CDFW Regulations).

Smith River coastal cutthroat trout (*Oncorhynchus clarkii clarkii*) are part of the SONCC ESU of coastal cutthroat trout, and were classified as "not warranted" for listing [32], and harvest is allowed. Coastal cutthroat trout are also a California Species of Special Concern [33].

CREEL CENSUS OBJECTIVES

Creel censuses objectives over the years have varied widely and have included: determining the efficacy of hatchery planting programs; generating statistically valid salmon and Steelhead harvest estimates; and simply providing an official presence on the river (Table 5). Reflecting the variety of objectives, the timing and locations of Smith River creel censuses as well as the effort (days censused) have also varied through the years (Table 9, and *see* Figure 2). Objectives were not always stated clearly on the source documents. For some years, the creel census' objectives were deduced based on the results presented.

1955 AND 1956

Based on the very limited documentation found for these censuses, the 1955 census, conducted by CDFW, was directed at estimating angler use and harvest of salmon while the 1956 census, conducted by the USFWS appears to have expanded the effort to also include Steelhead estimates [1, 2].

1964, 1970 AND 1973

During the mid-'60s and into the early- '70s CDFW attempted to establish a summer fishery in the Smith River using hatchery-reared "catchable" Coho and Steelhead [3, 5 and 6]. Catchable fish varied in size but were generally reported as weighing about 3.2 oz. (.09 kg) each at release. As part of this effort, all hatchery-produced fish received identifying fin-clips prior to release. Complete planting records are not available but planting appears to have taken place in various locations throughout the years in the mainstem and Middle Fork Smith River. Short-term focused creel surveys were conducted in 1964, 1970 and 1973 to evaluate the efficacy of the summer catchable planting program (Table 5). The surveys were generally timed and located to coincide with hatchery releases.

1980A

As stated above (*see* "Special note: 1980-81 creel census" page 7) no narrative was found related to this census. However, based on the timing (May 24 through August) and fork lengths of Steelhead caught (< 32 cm) this survey was clearly timed to sample non-anadromous Steelhead and Cutthroat.

1965, 1977, 1980B, 1984, 1986-87, AND 1997-98 THROUGH 2006-07

All these censuses were directed at estimating total adult salmon and/or Steelhead catch and angler use specifically for the location(s) censused and for the duration of the census. The 1965 census [4] had the additional objective of determining if hatchery catchable Coho planted in the prior summer had survived and returned as adults. The 1984 [9] census, directed at adult Chinook salmon, had the additional objective of determining if the high straying rate of out-of-basin hatchery Chinook salmon observed in the prior year [27] was a continuing issue (Table 5).

2008, 2012, 2013, 2014

These short-term, limited-location censuses [22] were primarily directed at providing a CDFW presence on the river during times of perceived illegal harvest. Additional objectives included angler education and collecting angling use and catch information for the period and location censused (Table 5).

2010

The 2010 census [21] had similar objectives to the 1965, 1977 etc. censuses but because of the limited funds for staffing did not produce expanded use or catch statistics (Table 5).

Table 5 Smith River Creel censuses primary objective(s), 1955-2014

Creel census year(s)	Primary Objective(s)
1955	Estimate fishing pressure, angling success and total catch of salmon in the Smith River Tidewater.
1956	Estimate angler use and catch of adult salmon and steelhead in Smith River. [1/]
1964	Evaluate the effectiveness of a summer fishery for hatchery-planted catchable Coho salmon.
1965	Estimate angler use and catch of salmon during the survey period; Determine if catchable Coho planted during the summer migrated to the sea and returned as adults.
1970	Evaluate the effectiveness of a summer fishery for hatchery-planted catchable Coho salmon.
1973	Evaluate the effectiveness of a summer fishery for hatchery-planted catchable steelhead trout.
1977	Estimate angler use, harvest and catch statistics for Chinook Salmon in the lower 28.2 km (17.5 miles) of the main stem Smith River.
1980 a/b	(a) May through August - estimate angler use and harvest of juvenile steelhead and cutthroat; (b) October and November - estimate angler use and harvest of adult chinook, steelhead and cutthroat.
1984	Estimate angler use, harvest and catch statistics for Chinook Salmon in the lower 28.2 km (17.5 miles) of the main stem Smith River; Determine if the high Chinook salmon straying rate reported the previous year [27]was a continuing event; Estimate harvest of other salmonids during the study period.
1986-87	Estimate angler use, harvest and catch statistics for chinook salmon, steelhead trout and cutthroat trout during the study period.
1997-98	Estimate adult and sub-adult salmonid catch and harvest by species, month and river reach; compare hatchery and wild steelhead harvest; determine: distribution of salmonid catch, extent of swallowed hooks by gear type and angler demographics.
1998-99	
1999-2000	
2000-01	
2001-02	
2002-03	
2004-05	
2005-06	
2006-07	
2008	Provide CDFW persence in response to perceived illegal chinook harvest at "Sand Hole" [2/]
2010	Provide CDFW presence on the river; collect angler use and catch statistics during the eight days of censusing from 10/4/10 through 11/2/10.
2012	Provide CDFW presence during the early-season's low flows in an attempt to lessen snagging and other illegal fishing activities; alert anglers of the risk to future angling opportunities that illegal activities could impose; Educate anglers regarding current fishing regulations and the importance of accurate report-card reporting; Collect angler-use and harvest data to assist in evaluating current fishing regulations.
2013	
2014	

[1/] Original creel census report is unavailable. Objectives presented here were extrapolated based on summary results of the creel census presented in a much broader report of Northern California natural resource assessment compiled by the USFWS in 1960 (see Source Document section).

[2/] A popular fishing hole locally know as "Sand Hole" located 3.8 km upstream from the mouth of the Smith River.

CREEL CENSUS METHODS

Not surprisingly, methods during the 25 creel censuses have varied considerably, primarily based on objectives, personnel availability and funding. Because of incomplete documentation, methods for many of the censuses presented in this review are partially or completely unknown (*see* "Creel Census Source Documents", page 8 and Table 1).

Presenting detailed methods for all of the censuses covered in this synthesis is beyond the scope of this report. The reader is encouraged to obtain the individual creel census report of interest (if available) for the specific methods employed that year.

The following is presented as a "generic creel census model" which can be considered the foundation upon which most creel censuses covered in the report were built.

CREEL CENSUS TYPE

Creel censuses, in which effort and catch expansions were presented, generally used both "Roving Creel" and "Access Point" methodology.

Roving Census

In a Roving census, census clerks travel by vehicle on a predetermined route locating anglers to interview. The Roving census is used to estimate fishing effort, catch rate, and other parameters when access to a fishery occurs at too many points to ensure all anglers are encountered. Important features of a Roving census include: censuses are not limited by the type of angler access, anglers are actively sought out and interviewed before they complete their trips, and other indicators of angling activity such as empty boat trailers can be monitored to account for anglers that are not interviewed.

Access-Point Census

In an Access-Point census, census clerks are stationary, generally located at a site of high angler use such as a boat launch. In contrast to a Roving census, the Access-Point census includes all anglers who leave the fishery at an access site during defined monitoring periods with equal probability of being counted, regardless of how long they fished. The anglers are interviewed at the fishery, reducing recall (memory) issues and providing site-specific information[7].

CENSUS STRATA

Angling Type

Various angling methods are likely to have different success rates and were often stratified for expansion purposes. For example, in most of the later censuses, catch and effort for estuary-boat anglers, upriver-boat anglers and shore anglers were independently estimated and expanded.

River Reach

As with the angling-type strata, river-reaches can be expected to have different angling success rates and were often considered separate stratum for expansion purposes. Nearly all the censuses that described methods use some version of the six river reaches shown in Table 6 and Figure 1 (also *see* Appendices 1-8) to record the locations of effort and catch.

Census Frequency and Day Type

Normally, all weekend days and holidays through the duration of the census were sampled while weekdays were chosen at random without replacement. Generally a sample rate of about 50% of

[7] With minor modification, the above sections descriptions of "Roving Creel" and "Access Point" censuses were taken directly from the 2012-2014 census report [22].

available days was obtained. Most censuses stratified weekdays, weekend days and holidays for expansion purposes.

CENSUS INFORMATION OBTAINED

Information obtained during angler interviews varied but generally included: 1) County of residence; 2) length of time fished (nearest 0.5 hour); 3) type of terminal fishing gear used (fly, lure, bait) - if bait was used with a lure it was considered bait; 4) fishing method (shore, drift boat, pram, estuary boat; 5) species and total length (nearest cm) of fish kept, and hatchery marking if any; 6) whether or not the kept fish had swallowed the hook; and 7) species released and whether hatchery marks were noticed. In addition to angler interviews, clerks obtained other angler-use information such as the number of boat trailers observed at launch sites. This type of angler-use information is referred to as a "Use Count".

EXPANSION CALCULATIONS

For an Access Point census, effort and catch for each stratum is estimated by multiplying the observed catch or use for that stratum times the total days in the stratum divided by the number of sampled days. As a hypothetical example: There are 21 weekdays in October and creel clerks censused 10 of those, contacting 150 anglers who fished a total of 1,000 hours and caught 50 Chinook salmon. The expansion for that strata (weekdays in October) would be: (1,000 x 21) / 10 equaling 2,100 hours fished and (50 x 21) / 10 equaling 105 Chinook caught. Total effort and catch is simply the sum of all stratum for the time or area of interest.

During a Roving Creel census, not all anglers are interviewed so use counts are made to estimate total effort by stratum. Shore angler effort is estimated by systematically counting anglers within the study area to determine the average number of anglers fishing at any one time and multiplying that by the number of possible sample days in the stratum times the average number of fishable hours in a day. Again a hypothetical example: if use counts within an area of interest indicated the average number of anglers fishing at any one time on a weekday in October was 50, the total estimated effort for October would be 50 (anglers) times 21 (days) times 13 hours (fishable hours/day) giving a total month's effort of 13,650 hours. Estimated catch would be the average catch per hour times 13,650. Drift boat effort and catch was determined essentially the same way except rather than counting anglers, empty trailers were counted and multiplied by the average number of anglers per boat as determined by interviews.

CREEL CENSUS LOCATIONS

Creel census locations have varied between years, dependent on the objectives of the study for that year (*see* Table 5, Figure 1, and Appendices 1-8). For this report, locations can either be a point on the river or a continuous section (reach) of river. Censuses designed to generate complete catch and use statistics, for adult salmon or Steelhead runs, generally covered the entire river where catch was likely to occur. Censuses that had special objectives (e.g. to monitor illegal harvest in a particularly vulnerable site as in 2008, 2012-2014) were confined to a specific area of interest.

During some years, census locations and timing were also dictated by low-flow angling regulations (*see* "Low-Flow Angling Regulations", page 17). When low-flow closures were in effect, creel censuses were generally confined to the lower river, below the confluence of Rowdy Creek (Reach 1).

Main Stem and Middle Fork Smith River

The naming convention for the mainstem and Middle Fork Smith River is somewhat unconventional and counterintuitive. On most maps, the mainstem ends at the confluence of the South Fork and is renamed the Middle Fork.

River areas and reaches

Prior to the 1980 census, the river reaches censused were either not described, as in 1956-57, or variously described as dictated by the needs of the individual census. While a detailed report describing the 1980 censuses was not found, there is a hand-drawn map with river reaches labeled A through E that, with one exception, duplicate reaches 1 through 5 described in the 1997-98 census [11]. The exception was that Reach D ended at Siskiyou Fork while Reach 4 ended at Patrick Creek (*see* Figure 1).

The five reaches described in the 1997-98 census were later modified and described in the 1999-2000 census [13]. The 1999-2000 modification subdivided the 1997-98 Reach 1 into two reaches to better describe the estuary fishery. For the purposes of this report, the six reaches first described in the 1999-2000 report will be adopted.

With one minor difference, all but eight of the 25 creel censuses used the above described river reaches (but sometimes merged) to report use and catch. The minor difference was for the 1977 census that ended at the Forks, about 1 KM below the end of Reach 4 (*see* Figure 1).

As stated in the 1997-98 creel census report [11], the six reaches described in Table 6 covered virtually all water open to fishing by the public.

Beginning with the 2000 census [14], river reaches were considered subsection of two “Areas”, generally described as “down river”, which included Reaches 1, 2, 3 and “up river” which included Reaches 4,5,6 (Table 6).

Table 6 Creel census river area and reach descriptions, lengths and starting and ending river kilometers.

		River Kilometer (RKM) [1/]				
Area	Reach	Start	End	Length	Fork [2/]	Description
1	1	0.0	6.4	6.4	Mainstem	Mouth to confluence of Rowdy Creek
	2	6.4	11.0	4.6	Mainstem	Rowdy Creek mouth to Highway 101 Bridge
	3	11.0	22.9	11.9	Main stem	Highway 101 Bridge to Hiouchi Bridge
2	4	22.9	29.4	6.5	Mainstem	Hiouchi Bridge to Christensen Bridge (includes lower 1 km of the Middle Fork Smith River)
	5	0.0	24.1	24.1	S. Fork	South Fork Smith River from South Fork Bridge to Hurdygurdy Creek
	6	22.9	55.3	32.4	M. Fork [3/]	Middle Fork Smith River from Christensen Bridge to Patrick Creek

[1/] Kilometers from Smith River mouth as measured from Google Earth imagery dated 7/14/2015.

[2/] The Smith River Fork descriptions are somewhat confusing as they do not follow "normal" naming convention. What would normally be considered the main stem terminates at the confluence of the South Fork and is renamed the "Middle Fork"

[3/] Middle Fork kilometers are shown as a continuation of mainstem kilometers.

See Appendix 1 through Appendix 8 for detailed maps of creel census Areas, Reaches and Sites referred to throughout this report.

CENSUS LOCATIONS BY YEAR(S)

1955, 1956-57

As stated in the "Source Document" section (page 8), little was found in the way of documentation for the 1955 and 1956-57 creel censuses. The single-page summary of the 1955 creel census was titled as a "Tidewater" census but did not supply a specific location. Clearly, the census included the estuary but it is unknown how far up the river the census continued. Tidal influence during the summer months extends up to the Bailey Riffle during large tides with the saltwater wedge extending up to Rowdy Creek (J. Garwood, personal communication). There is no reference, other than simply the "Smith River", for the location where the 1956-57 census took place.

1964

During the course of this census, the entire mainstem from the mouth to Siskiyou Fork (RKM 0.0-60.6) were included. However, this was not an extensive census and each river reach was only censused for a few days (Figure 3 and Table 9).

1965

This census was limited to lower 0.8 km of Reach 1.

1970

This seven-day census included two reaches of the mainstem Smith River: from Jedediah Smith State Park to the Idlewild Highway Maintenance Station (RKM 24.3 to 65.8) and from Jedediah Smith State Park to Patrick Creek (RKM 24.3-55.3).

1973

The 1973 census was short-term (3 days) and covered the mainstem from the Hiouchi Bridge to Patrick Creek (RKM 22.9 to 55.3).

1980a/b, 1997-98 through 2006-07

These full-season censuses covered the mainstem Smith River from the mouth to Patrick Creek (RKM 0.0 to 55.3) and the South Fork Smith River from its mouth to Hurdygurdy Creek (RKM 0.0 to 24.1). Reaches 1 and 2 were combined in the 1980 a/b, 1997-98 and 1998-99 censuses.

1984

The 1984 census [9] included two sections of the mainstem Smith River: the "Estuary" section, from the mouth to the Ship Ashore Restaurant (RKM 0.0 to 0.7) and the "Upriver" section from Ship Ashore Restaurant to the confluence of the South Fork Smith River (RKM 0.7 to 28.5).

1986-87

This census [10], in the single-page summary that was found, indicated five sections were censused, labeled A through E, but failed to specify where those sections were. It is likely the five sections (A-E) are the same five sections shown on a map for the 1980 census [8] but without confirmation, results for the 1986-87 census will not be given by individual river reaches.

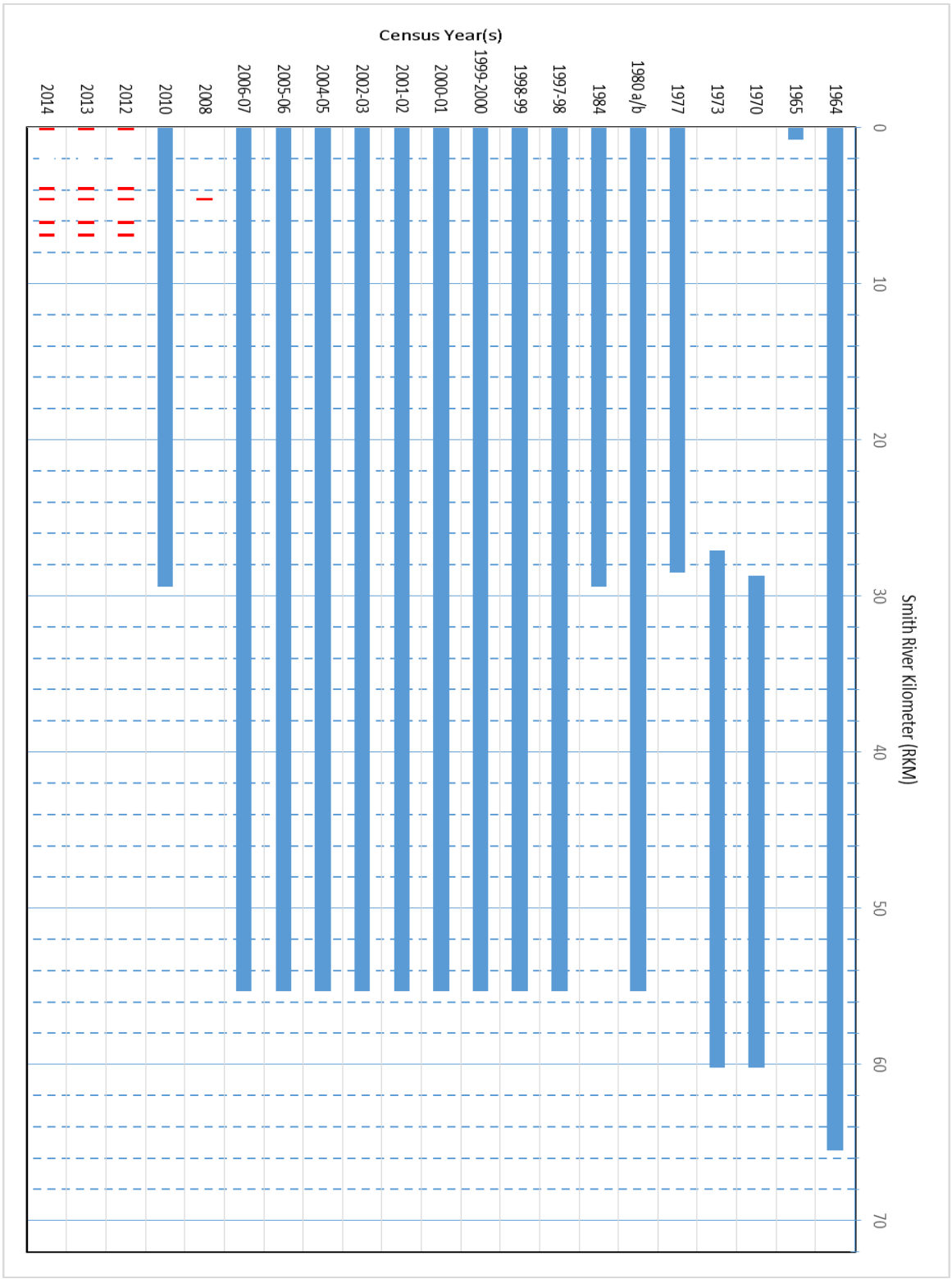
2010

Due to low-flow fishing closures, most of the effort in 2010 occurred in Reach 1, from the mouth to the confluence of Rowdy Creek [21] (*see* Figure 1). Reaches 2 through 4, from Rowdy Creek confluence to the Christensen Bridge, were also censused intermittently during this short-term census (Table 6).

2008, 2012, 2013 and 2014

These censuses [22] were limited to specific sites or points on the lower mainstem Smith River. The 2008 census was limited to a single point locally known as "Sand Hole" at RKM 3.8. The 2012, 2013 and 2014 censuses included Sand Hole plus four other points: the mouth (RKM 0.0), Sand Hole at Pala Road (RKM 4.5), Rowdy Creek Launch (RKM 6.0) and Rowdy Creek mouth (RKM 6.4).

Figure 2 Mainstem Smith River (includes Middle Fork) kilometers included in the 1964 through 2014 creel censuses. Red lines indicate "Point" surveys.



RUN TIMING, CREEL CENSUS TIMING AND SAMPLING RATES

Run Timing

For this report, the majority of Smith River Chinook salmon are considered to be in the river and subject to angler catch between September 1 and December 31 (Table 11, Figure 6). The Coho run is between November 1 and January 31 while the Steelhead run is between November 1 and April 30 (Table 11, Figure 3). Annual variation has occurred, likely based on river temperatures but the above run-timing clearly contains the bulk of the individual runs (Figure 3). All three species occur in the river longer than these general periods but are generally spawning and not available to anglers.

For comparison, run timing for the three closest major salmon and steelhead producing rivers; the Chetco and Rogue Rivers in Oregon and the Klamath River in California are presented in Table 7.

Table 7 Fall Chinook, Coho and Winter Steelhead run-timing for the Rogue and Chetco Rivers in Oregon [40] and the Klamath River in California [41].

Species/ Race	River	Month																							
		Jan		Feb		Mar		Apr		May		Jun		Jul		Aug		Sep		Oct		Nov		Dec	
Fall Run Chinook	Rogue [1/]																								
	Chetco																								
	Klamath [2/]																								
Winter Steelhead	Rogue																								
	Chetco																								
	Klamath																								
Coho	Rogue																								
	Chetco																								
	Klamath [3/]																								

Represents periods of peak use based on professional opinion.
Represents lesser level of use based on professional opinion.
Represents periods of presence, either with no level of use OR uniformly distributed level of use indicated
Represents periods of presence, without indication of level of presence

[1/] Lower and Mid-Rogue River below Marial.
[2/] Lower and mid-Klamath River below Scott River confluence.
[3/] Tributaries of the Klamath and Trinity rivers.

It is important to understand that the run-timings presented in Table 7 above, were not the result of systematic studies but consisted of the best "professional opinions" at the time. Indeed, authors of the Klamath run-time report [41] specifically mentioned that the data was a "first attempt" and would likely require modification as more information became available.

Creel Census Timing

Creel censuses are timed to coincide with the run-timing of the species of interest. The summer censuses were designed to investigate catch statistics of Smith River resident and pre-smolt Steelhead and hatchery-planted catchable Coho. Early-fall censuses were timed to sample the bulk of the Chinook run and late-fall through winter censuses are timed to sample both Coho and Steelhead.

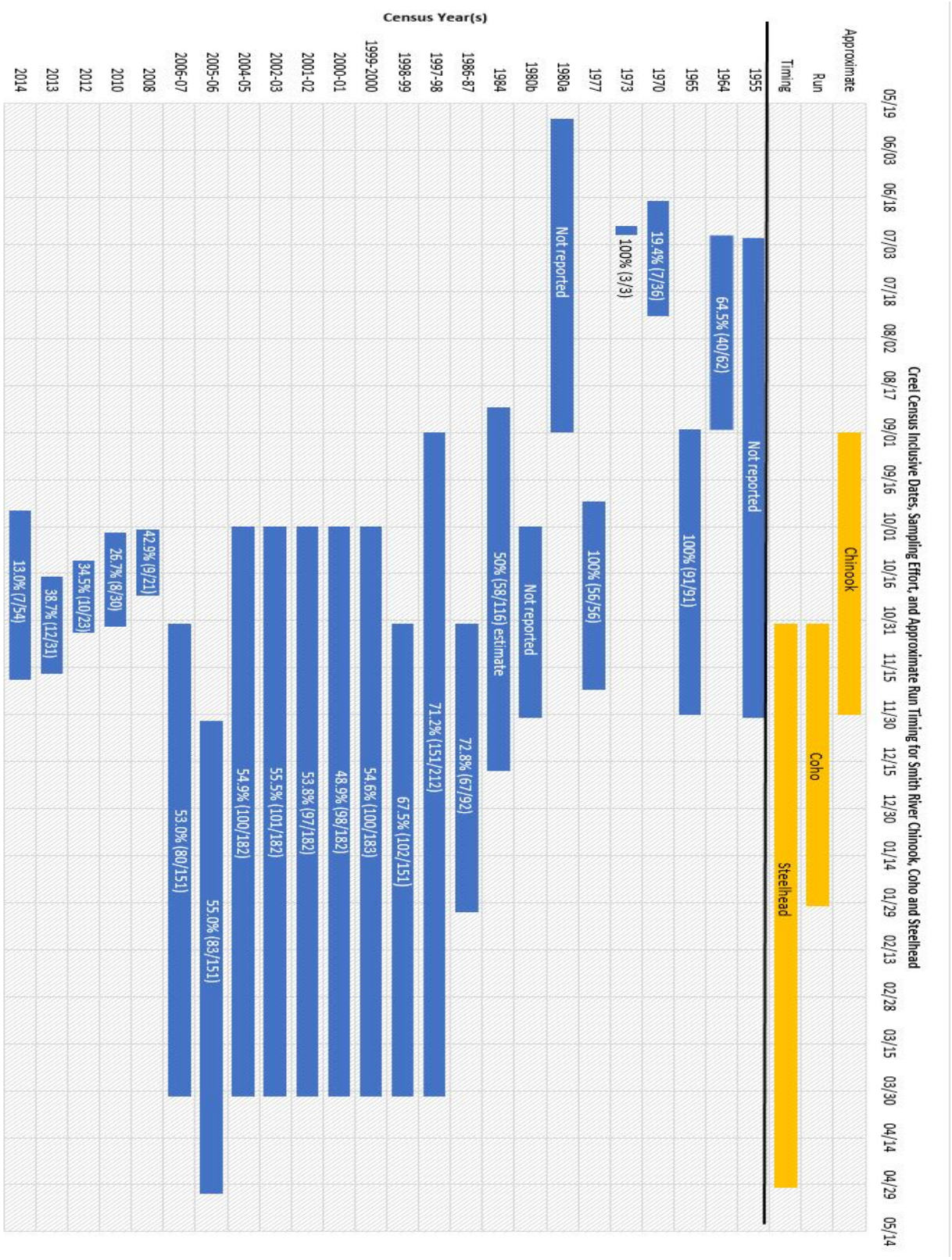
Creel census inclusive dates and sampling rates (i.e. the number of days sampled during the census) are known for all but four of the 25 censuses (*see* Table 9). While for the 1956-57 census, neither the census dates nor sampling rates are known, the fact that expanded catches were reported for Steelhead and salmon[8] would imply it was appropriately timed for these fish. Inclusive dates for the 1955, 1980a and 1980b censuses are known but not the sampling rates. All known creel census dates, sampling rates and target adult runs for all censuses are shown in Figure 3 and Table 9 below.

[8] The report gave expanded catch statistics for "Salmon" with no distinction between species.

Creel Census Sampling Rates

Creel censuses that were designed to estimate total catch of the various adult runs had sampling rates of between 50% and 100% (Table 9, Figure 3). Beginning with the 1984 census and ending with the 2006-07 census, sampling rates were generally around 50% (Table 9, Figure 3) and considered high enough to accurately estimate catch through the various adult runs. The summer creel censuses (1964, 1970, 1973 and 1980a) were designed to evaluate the catch of resident trout and hatchery-planted catchable Coho and did not take place during the anadromous adult runs (Table 9, Figure 3). The 2008 and beyond censuses were designed to provide a CDFW presence on the river during times of perceived high illegal harvest of adult Chinook salmon. Although these censuses occurred during the adult runs (Table 9, Figure 3) they were too short of duration and of too low of intensity to provide comprehensive harvest information.

Figure 3 Smith River Creel Census timing, 1955-2014. Numbers on graph indicates days censused versus days available for censusing. For example: "55.5% (101/182)" indicates 55.5% of the days between the start and end of the 2002-03 census were censused. Also shown is the approximate Smith River run-timing for adult Chinook, Coho and Steelhead.



LOW-FLOW CLOSURES

Low-flow angling regulations precluded angling for varying durations and locations during 10 of the 15 creel censuses that took place after those regulations were established in late 1979 (*see* "Low-Flow Angling Regulations" page 17 and Table 4). During those periods and areas of closures, creel censuses were normally confined to the lower river, generally below the confluence of Rowdy Creek. During some years, the fishery was closed and reopened several times during the early season based on changing rivers flows (Table 8).

Table 8 Low-flow fishing closures that took place during Smith River creel censuses, 1980 through 2014.

Creel census year(s)	Fishery closure and opening date(s)						Inclusive dates subject to low-flow closure		Minimum Flow (cfs) [1/]	Zones [2/] closed
	Closed	Open	Closed	Open	Closed	Open	Start	End		
1980 [3/]	11/01/80	11/02/80					1-Nov	[4/]	400	1,2,3
1984	Flows remained above 400 cfs all season so no low-flow closures took place.						1-Nov	[4/]	400	1,2,3
97-98							1-Oct	1-Apr	400	2[5/], 3
98-99	10/01/98	10/07/98	10/20/98	10/26/98			1-Oct	1-Apr	400	2[5/], 3
99-00	10/01/99	10/28/99	11/05/99	11/08/99	11/09/99	11/10/99	1-Oct	1-Apr	400	2,3
00-01	10/01/00	10/28/00					1-Oct	31-Jan	400	2,3
01-02	10/01/01	10/30/01					1-Oct	31-Jan	400	2,3
02-03	10/01/02	11/08/02	12/02/02	12/10/02			1-Oct	31-Jan	400	2,3
2004	10/01/04	10/18/04	11/22/04	11/26/04			1-Oct	31-Jan	400	2,3
05-06	10/01/05	10/26/05					1-Oct	31-Jan	400	2,3
06-07	10/01/06	11/03/06					1-Oct	31-Jan	400	2,3
2010	10/01/10	10/26/10					1-Oct	31-Jan	400	2,3
2012	Censuses were conducted downstream of the low-flow closures zones.						1-Oct	31-Jan	400	2,3
2013							1-Oct	31-Jan	600	2,3
2014							1-Oct	31-Jan	600	2,3

[1/] For 1980 only, flow data related to the low-flow closure was measured at the USGS gauging station located at the Highway 101 Bridge. Flows for all subsequent years were measured at the USGS gauging station at Jedediah Smith State Park.

[2/] See "Smith River Angling Regulations" for zone descriptions.

[3/] Low-flow regulation became effective beginning in 1980.

[4/] Regulations did not specify an end date.

[5/] For 1997-98 and 1988-1989 only, the 2.0 km section downstream of the confluence of Rowdy Creek was include in Zone 2.

CREEL CENSUS RESULTS

CENSUS EFFORT AND CATCH SUMMARY

Table 9 below briefly summarizes census timing, effort and catch results of the 25[9] creel censuses covered in the report. Data presented in Table 9, particularly the expanded catch and hours fished, must be considered with the following caveat: The expanded numbers only apply to the location(s) surveyed for the duration of the census. For example, for the 2008 census, the expanded catch and hours fished figures presented only apply to the single location during the 21 days in which censusing took place (*see* Table 9, Figure 2 and Figure 3).

[9] The 1980 census is considered as two censuses for this report. The first (1980a) was directed at resident trout and hatchery-planted catchables while the second (1980b) was directed at returning adult Chinook salmon.

Table 9 Summarized effort and catch results of 25 Smith River creel censuses, 1955 through 2014.

Creel Census Year(s)	Census Dates		Angling Days		Angler Contacts	Census timed to sample majority of adult run			Catch and effort observed or reported during census					Expanded catch					
	Start	End	Available	Censused		SH	Chin	Coho	SH	Chin	Coho	CCT	Hrs Fished	Hrs. Fished	SH	Chin	Coho	CCT	Other
1955	7/1/1955	11/30/1955	153	Not Reported (N/R)			✓			1,415	15		[1]	[2]	0	4,030	60	0	0
1956	Not Reported [3]					✓	✓	✓	Not Reported					[4]	4,400	3,400 [5]		0	0
1964	6/30/1964	8/30/1964	62	40	N/R				1,070 [6]	0	695	10	2,118	Not Applicable					
1965	9/1/1965	11/30/1965	91	91	4,225		✓		0	1,054	57	0	17,393	47,536	0	2,971	157	0	0
1970	6/20/1970	7/26/1970	36	7	81				23	0	43	0	86	Not Applicable					
1973	6/27/1973	6/29/1973	3	3	48				21	0	0	0	72						
1977	9/24/1977	11/22/1977	56	56	2,779		✓		0	472	0	0	5,036	45,130	0	4,303	0	0	0
1980 a	5/24/1980	8/31/1980	Not Reported						Not Reported					27,027	5,526	0	0	1,133	1,342 [7]
1980 b	10/1/1980	11/30/1980					✓							56,240	3,121	1,528	0	75	214 [7]
1984	8/25/1984	12/18/1984	116	58 [8]	N/R		✓							48,693	369	718	98	124	0
1986-87	11/1/1986	1/31/1987	92	67	5,018				467	85	0	4	15,368	33,793	1,045	190	0	9	0
1997-98	9/1/1997	3/31/1998	212	151	7,090	✓	✓	✓	Not Reported					136,011	3,970	1,522	2	189	4 [9]
1998-99	11/1/1998	3/31/1999	151	102	5,201		✓	[11]						122,334	5,448	800	4	35	0
1999-2000	10/1/1999	3/31/2000	183	100	3,621	✓	✓							101,224	3,724	825	0	98	0
2000-01	10/1/2000	3/31/2001	182	98	3,621 [10]	✓	✓							103,900	5,499	3,678	15	131	0
2001-02	10/1/2001	3/31/2002	182	97	6,031	✓	✓							116,670	8,027	1,997	0	387	0
2002-03	10/1/2002	3/31/2003	182	101	6,229	✓	✓							101,744	6,507	2,348	0	276	0
2004-05	10/1/2004	3/31/2005	182	100	4,316	✓	✓							83,152	4,531	4,718	0	243	0
2005-06	12/1/2005	4/30/2006	151	83	3,790	✓								98,737	7,576	43	0	134	0
2006-07	11/1/2006	3/31/2007	151	80	4,059	✓								91,902	5,426	598	14	91	0
2008	10/2/2008	10/22/2008	21	9	32				0	3	0	0	61	1,204	0	60	0	0	0
2010	10/4/2010	11/2/2010	30	8	261				2	101	1		1,078	Not Applicable					
2012	10/12/2012	11/3/2012	23	10	153				0	8	0	0	369						
2013	10/17/2013	11/16/2013	31	12	126				0	4	0	0	289						
2014	9/26/2014	11/18/2014	54	7	73				0	6	0	0	155						

[1] Fishing effort reported as 1,715 "skiff days" and 3,803 "man-days".

[2] Expanded fishing effort reported as 5,600 "skiff days" and 12,800 "man-days".

[3] Based on fish number reported, the inclusive dates for the 1956 census are assumed to have encompassed the entire Chinook, Coho and Steelhead runs.

[4] Expanded fishing effort reported as 44,100 days; 22,900 for trout; 8,700 for salmon; and 12,500 for steelhead.

[5] Reported as 3,400 "salmon"; no differentiation between species.

[6] Numbers in shaded cells are likely juvenile/ non-anadromous fish.

[7] Reported as "Other Fish"; species not identified.

[8] 58 days is an estimate: report indicates approximately "one-half" of available days were sampled.

[9] Chum salmon.

[10] 3,621 may be a "copy-paste" error [14] as it is identical to the prior year. If incorrect, actual number is unknown.

[11] Coho harvest prohibited beginning with the 1998-99 census.

Summer Creel Censuses

1964, 1970 and 1973

These censuses were low intensity, short duration surveys (*see* Table 9) conducted during summer months to determine if CDFW's planting of catchable hatchery Coho and Steelhead could generate a viable summer fishery on the Smith River [3, 5, and 6] (*see* "Creel Census Objectives", page 18). The planting program, which began in 1964, ended sometime after 1973. Based on the low returns documented in the 1964 census (2.0%) and again in the 1970 census, CDFW biologist, Don LaFaunce, recommended discontinuing the planting program. For public relations reasons, the planting program continued, apparently using hatchery Steelhead instead of Coho. Records are unclear as to when the summer planting program ended but the 1973 three-day census [6] indicates 48 anglers fishing 72 hours caught 21 planted Steelhead. Basic effort and catch results for the three censuses are shown in Table 9.

1980a

This summer census [8] ran from late-May through August and was clearly timed to target non-anadromous salmonids. Unfortunately, no narrative was found for this census so its purpose is unknown. Basic catch and effort results for this census are shown in Table 9 and Table 11.

Fall/Winter Creel Censuses

Catch by River Reach

Estimated catch by species and river reach was reported for 10 of the 25 censuses including the 1984 and the 1997-98 through 2006-07 census years (Table 10). Not all reaches were censused during all years and not all censuses were timed to include the entire run of the individual species (see Table 9, Figure 2, and Figure 3). To generate the average catch per hour (CPH) shown in Figure 4, census years which reported catch in identical river reaches were combined. For example, CPH for Reach 2 was a combination of the seven census years 1999-00 through 2006-07 (Table 10).

In general, CPH for combined Chinook, Steelhead and Cutthroat was highest in Reaches 5 and 6 where, over a nine-year period, it averaged 0.090 and 0.092, respectively. Reaches 3 and 4 over the same nine years had an average CPH of 0.037 and 0.067, respectively. Reach 1 CPH over an eight-year period averaged 0.024 while Reach 2 over a seven-year period averaged 0.050 (Figure 4).

It should be noted that CPH, especially in the lower river reaches is probably under reported. This is the result of combining census years, most of which were timed to miss the early portion of the Chinook run (*see* Table 9 and Figure 3).

Noteworthy, CPH in Reach 1 appears to be influenced by late-fall river flows where extreme low flows tend to correspond to higher catch rates (*see* "Low River Flow Correlates on Catch Rates and Pinniped-Bite Mark Rates", page 61).

Figure 4 Average catch per hour by river reach of combined Chinook, Steelhead and Cutthroat observed during Smith River creel censuses, 1984 through 2006-07. Error bars depict positive standard error of the means.

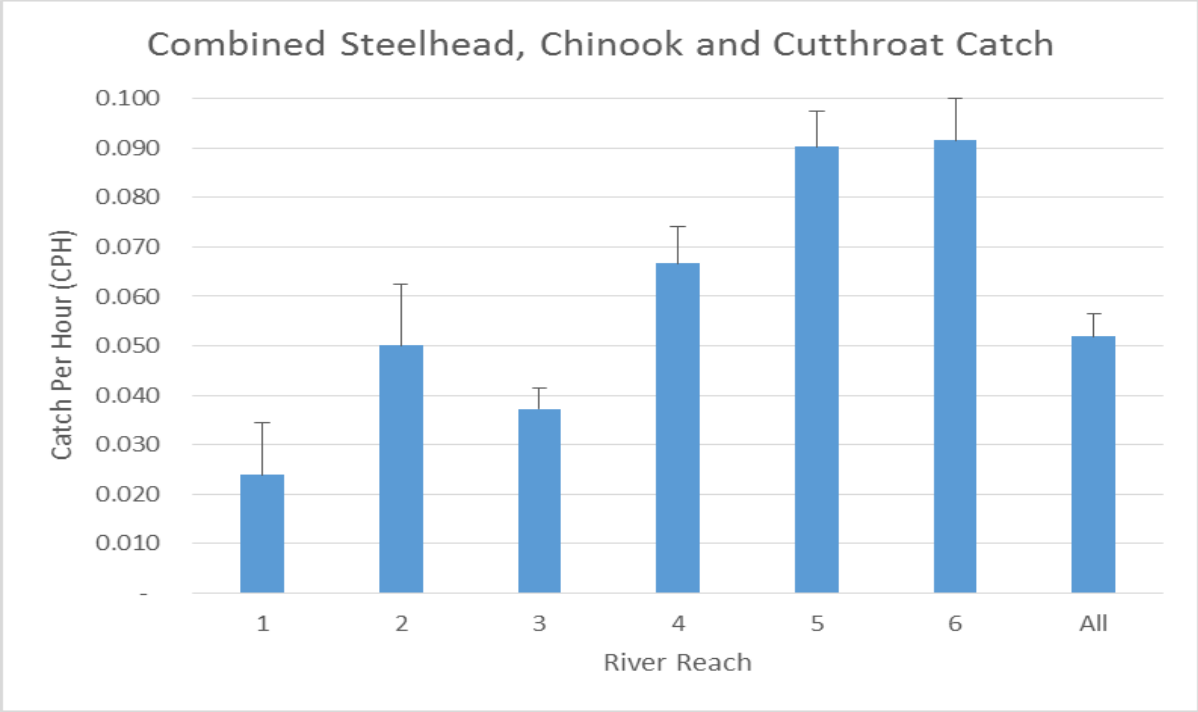


Table 10 Estimated fish caught and catch per hour (CPH) by bank anglers by River Reach, Smith River creel censuses, 1984 through 2006-07.

Creel Census Year(s)	Species	River Reach 1	2	3	4	5	6	Totals
1984	Steelhead [1/]	10			359	Not censused		369
	Chinook	210			506			716
	Cutthroat	1			123			124
	Total Catch	222			988			1,210
	Angler Hrs	17,806			30,887			48,693
	CPH	0.012			0.032			0.025
1997-98	Steelhead		181	847	212	334	280	1,854
	Chinook		71	380	35	282	14	782
	Cutthroat		29	58	5	19	25	136
	Total Catch		281	1,285	252	635	319	2,772
	Angler Hrs		13,348	39,353	7,759	7,513	3,197	71,170
	CPH		0.021	0.033	0.032	0.085	0.100	0.039
1998-99	Steelhead		92	926	479	558	555	2,610
	Chinook		135	104	26	24	0	289
	Cutthroat		0	7	0	0	16	23
	Total Catch		227	1,037	505	582	571	2,922
	Angler Hrs		8,621	38,069	7,198	7,494	7,561	68,943
	CPH		0.027	0.027	0.070	0.078	0.076	0.042
1999-00	Steelhead	0	1	437	253	618	284	1,593
	Chinook	54	62	113	18	0	75	322
	Cutthroat	0	0	26	22	8	0	56
	Total Catch	54	63	576	293	626	359	1,971
	Angler Hrs	2,691	5,787	24,845	5,930	6,605	5,913	51,771
	CPH	0.020	0.011	0.023	0.049	0.095	0.061	0.038
2000-01	Steelhead	39	59	622	623	281	416	2,039
	Chinook	117	556	503	11	10	66	1,263
	Cutthroat	0	8	18	41	3	2	72
	Total Catch	156	623	1,143	675	293	484	3,374
	Angler Hrs	4,355	6,598	19,423	6,369	4,858	8,196	49,799
	CPH	0.036	0.094	0.059	0.106	0.060	0.059	0.068
2001-02	Steelhead	0	146	900	556	802	650	3,054
	Chinook	61	20	82	93	10	64	330
	Cutthroat	26	0	91	117	16	53	303
	Total Catch	87	166	1,073	766	828	767	3,687
	Angler Hrs	3,267	7,952	25,240	8,809	6,343	8,169	59,779
	CPH	0.027	0.021	0.043	0.087	0.131	0.094	0.062
2002-03	Steelhead	3	161	646	575	643	662	2,690
	Chinook	232	9	144	95	22	44	546
	Cutthroat	131	4	16	24	5	77	257
	Total Catch	366	174	806	694	670	783	3,493
	Angler Hrs	4,053	6,263	23,085	8,913	6,630	5,848	54,792
	CPH	0.090	0.028	0.035	0.078	0.101	0.134	0.064
2004-05	Steelhead	0	93	118	347	442	589	1,589
	Chinook	28	292	210	3	60	43	636
	Cutthroat	0	17	0	0	0	0	17
	Total Catch	28	402	328	350	502	632	2,242
	Angler Hrs	4,576	4,574	9,057	5,511	4,568	5,276	33,562
	CPH	0.006	0.088	0.036	0.064	0.110	0.120	0.067
2005-06	Steelhead	0	450	1,179	413	387	718	3,147
	Chinook	0	0	11	0	0	0	11
	Cutthroat	0	0	54	0	7	0	61
	Total Catch	0	450	1,244	413	394	718	3,219
	Angler Hrs	339	8,198	22,725	9,045	6,004	6,901	53,212
	CPH	0.000	0.055	0.055	0.046	0.066	0.104	0.060
2006-07	Steelhead	0	323	345	472	490	617	2,247
	Chinook	0	0	46	115	10	6	177
	Cutthroat	0	17	6	2	2	38	65
	Total Catch	0	340	397	589	502	661	2,489
	Angler Hrs	300	6,275	16,243	8,611	5,708	8,488	45,625
	CPH	0.000	0.054	0.024	0.068	0.088	0.078	0.055

[1/] The 1984 census "Steelhead" included resident Rainbow Trout and juvenile Steelhead.

Monthly Estimated Catch, Effort and Catch per Hour

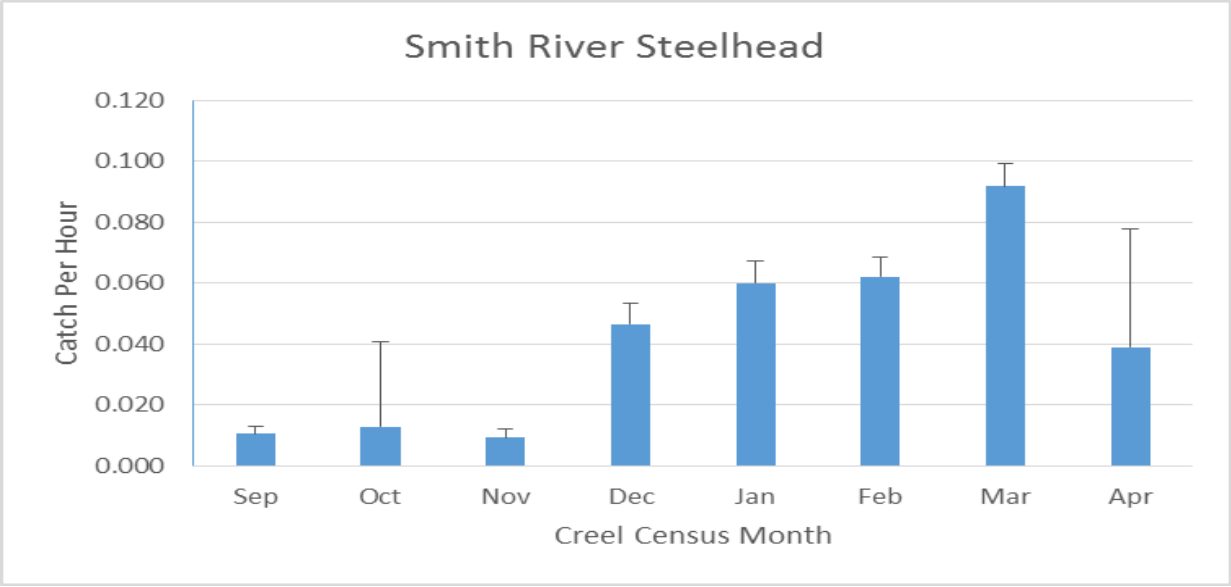
Steelhead: When the 11 censuses that reported Steelhead catch by month were combined, Steelhead were reported caught in essentially all months censused (Table 11 and Figure 5). It should be noted the 1980 and 1984 censuses [8, 9] included resident rainbow trout and juvenile Steelhead in their catch statistics. It is likely the Steelhead catches reported in the August through October timeframe were composed primarily of juvenile Steelhead or rainbow trout which had not reared in the ocean. The 1997-98 census [11] which started in September (Table 9) reported non-juvenile Steelhead caught as early as September (Table 11). Averaged over the 11 censuses, the monthly adult Steelhead catch per hour (CPH) peaked in March at 0.092 (Table 11 and Figure 5). The relatively high CPH seen in August (0.148) was likely composed of juvenile and resident forms of Steelhead.

Table 11 Estimated monthly Steelhead catch, hours fished (Effort) and catch per hour (CPH) in the Smith River reported in the 1980 through 2006-07 creel censuses. Captures in August and September are likely predominantly juvenile and resident forms.

Creel Census Month		Creel Census Year(s)											Average CPH [1/]
		1980 a/b	1984	1997-98	1998-99	1999-00	2000-01	2001-02	2002-03	2004-05	2005-06	2006-07	
Aug	Catch	3,125	0	Not censused									
	Effort	10,580	1,041										
	CPH	0.295	0.000										0.148
Sep	Catch	Not censused	111	84	Not censused								
	Effort		13,849	6,475									
	CPH		0.008	0.013									0.010
Oct	Catch	2,422	175	10	Not censused	0	0	0	0	160	Not censused		
	Effort	29,788	18,959	7,792		2,190	2,892	2,443	4,696	15,226			
	CPH	0.081	0.009	0.001		0.000	0.000	0.000	0.000	0.011			0.013
Nov	Catch	699	57	160	109	33	104	386	193	47	Not censused	141	
	Effort	26,452	10,460	26,930	14,583	17,313	23,229	20,033	18,373	15,238		18,166	
	CPH	0.026	0.005	0.006	0.007	0.002	0.004	0.019	0.011	0.003		0.008	0.009
Dec	Catch	844	26	180	1,077	254	571	1,338	956	729	821	675	
	Effort	22,813	4,384	10,211	18,909	5,569	19,775	18,978	13,319	9,869	15,251	13,441	
	CPH	0.037	0.006	0.018	0.057	0.046	0.029	0.071	0.072	0.074	0.054	0.050	0.048
Jan	Catch	839	Not censused	615	1,708	1,013	1,382	2,527	1,623	1,790	2,960	2,133	
	Effort	18,848		31,788	37,182	27,830	22,421	34,009	26,626	19,478	36,175	25,741	
	CHP	0.045		0.019	0.046	0.036	0.062	0.074	0.061	0.092	0.082	0.083	0.060
Feb	Catch	549	Not censused	1,461	1,516	1,502	1,846	2,256	2,462	922	2,477	1,502	
	Effort	15,442		32,898	34,317	35,582	23,645	28,232	26,148	15,470	31,152	23,678	
	CPUE	0.036		0.044	0.044	0.042	0.078	0.080	0.094	0.060	0.080	0.063	0.062
Mar	Catch	417	Not censused	1,460	1,038	922	1,595	1,519	1,273	884	1,304	975	
	Effort	6,131		19,917	17,343	12,922	11,939	12,972	12,582	7,871	14,267	10,875	
	CPUE	0.068		0.073	0.060	0.071	0.134	0.117	0.101	0.112	0.091	0.090	0.092
Apr	Catch	289	Not censused								0	Not censused	
	Effort	3,719									1,892		
	CPUE	0.078									0.000		0.039
Total	Catch	6,059	312	3,970	5,448	3,724	5,498	8,026	6,507	4,532	7,562	5,426	
	Effort	123,193	37,192	136,011	122,334	101,406	103,901	116,667	101,744	83,152	98,737	91,901	
	CPH	0.049	0.008	0.029	0.045	0.037	0.053	0.069	0.064	0.055	0.077	0.059	0.049

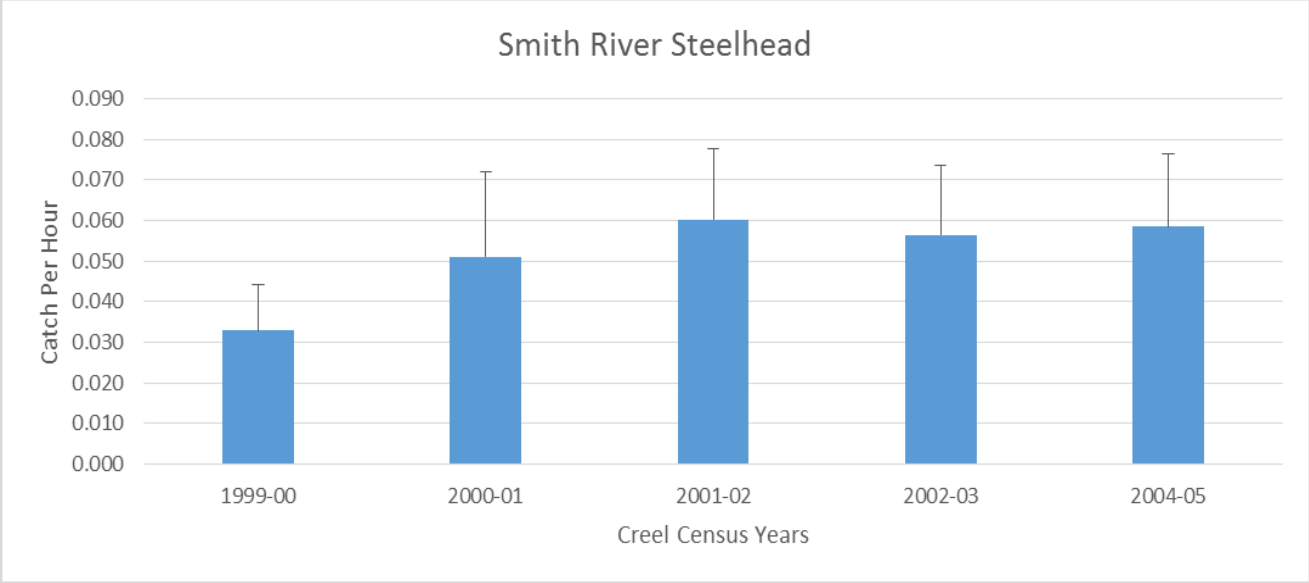
[1/] Calculated as the average of the percentages.

Figure 5 Smith River average monthly catch per hour of Steelhead for the combined 1980 through 2006-07 creel censuses. August catches are excluded as they were almost certainly non-anadromous. Error bars depict positive standard error of the means.



Inter-annual comparisons of CPH can only be made for censuses with identical durations. For example, the 1998-99 census season total CPH can't be compared to the 1997-98 census because October was not censused in 1998/99 (*see* Table 11). For the five censuses of comparable durations, the annual CPH for Steelhead varied from 0.037 in 1999-00 to 0.069 in 2001-02 (*see* Table 11 and Figure 6).

Figure 6 Smith River average annual catch per hour of Steelhead for 5 years of comparable creel censuses. Error bars depict positive standard error of the means.



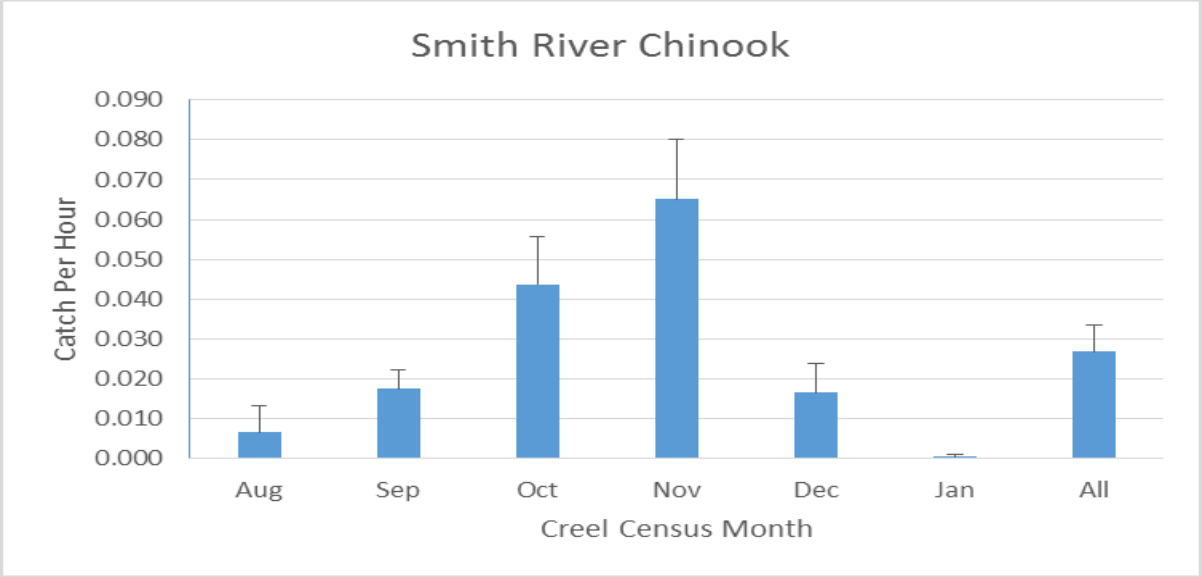
Chinook: Most of the 11 censuses that reported catch by month began after the Chinook run was already in progress (Table 12 and see Figure 3). However, the 1980, 1984 and 1997-98 censuses began early enough to provide information on the beginning of the Chinook run. While a few Chinook were caught in August of 1984 the overall catch per hour (CPH) was only 0.007 indicating few Chinook were available to the fishery at that time. The overall CPH increased to 0.018 in September, peaking at .065 in November then decreasing to only 0.001 in January (Table 12 and Figure 7). Based solely on monthly CPH observed during the 11 creel census, the Smith River Chinook run begins in earnest in September and continues through December (Figure 7).

Table 12 Estimated monthly Chinook catch, hours fished (Effort) and catch per hour (CPH) in the Smith River reported in the 1980 through 2006-07 creel censuses.

Creel Census Month		Creel Census Year											Average CPH [1/]
		1980 a/b	1984	1997-98	1998-99	1999-00	2000-01	2001-02	2002-03	2004-05	2005-06	2006-07	
Aug	Catch	0	14	Not censused									
	Effort	10,580	1,041										
	CPH	0.000	0.013										0.007
Sep	Catch	Not censused	176	145	Not censused								
	Effort		13,849	6,475									
	CPH		0.013	0.022									0.018
Oct	Catch	670	363	388	Not censused	49	56	60	395	1,636	Not censused		
	Effort	29,788	18,959	7,792		2,190	2,892	2,443	4,696	15,226			
	CPH	0.022	0.019	0.050		0.022	0.019	0.025	0.084	0.107			0.044
Nov	Catch	858	146	922	652	733	2,304	1,867	1,824	2,517	Not censused	494	
	Effort	26,452	10,460	26,930	14,583	17,313	23,229	20,033	18,373	15,238		18,166	
	CPH	0.032	0.014	0.034	0.045	0.042	0.099	0.093	0.099	0.165		0.027	0.065
Dec	Catch	Not Reported	19	53	135	43	1,232	65	127	564	38	99	
	Effort		4,384	10,211	18,909	5,569	19,775	18,978	13,319	9,869	15,251	13,441	
	CPH		0.004	0.005	0.007	0.008	0.062	0.003	0.010	0.057	0.002	0.007	0.017
Jan	Catch		Not censused	7	13	0	86	0	2	2	4	5	
	Effort			31,788	37,182	27,830	22,421	34,009	26,626	19,478	36,175	25,741	
	CHP			0.000	0.000	0.000	0.004	0.000	0.000	0.000	0.000	0.000	0.001
Total	Catch	1,528	572	1,515	800	825	3,678	1,992	2,348	4,719	42	598	
	Effort	56,240	38,233	83,196	70,674	52,902	68,317	75,463	63,014	59,811	51,426	57,348	
	CPH	0.027	0.015	0.018	0.011	0.016	0.054	0.026	0.037	0.079	0.001	0.010	0.027

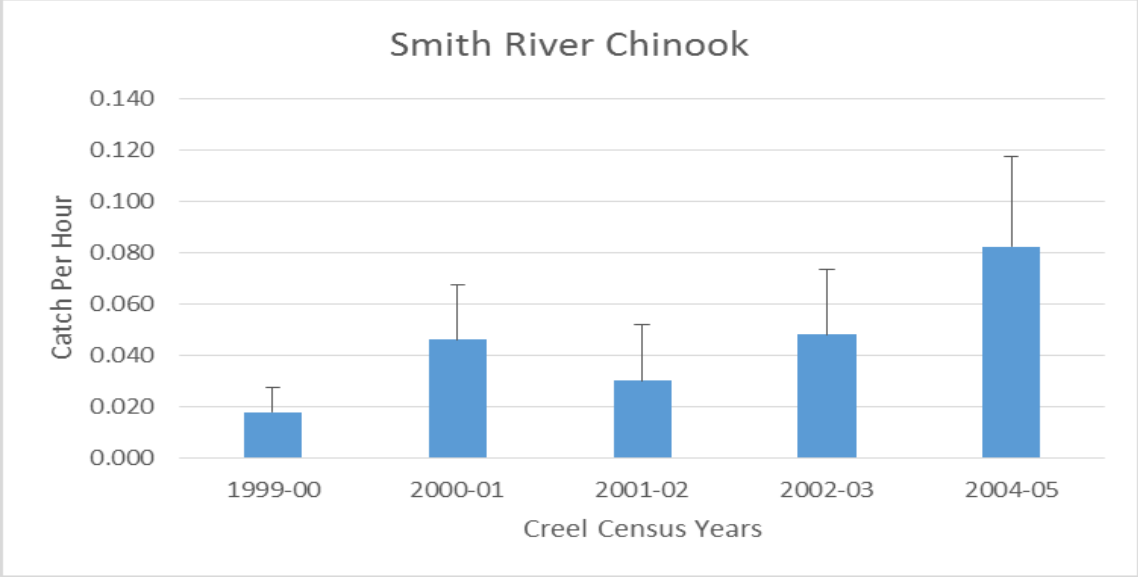
[1/] Calculated as the average of the percentages.

Figure 7 Smith River average monthly catch per hour of Chinook for the combined 1980 through 2006-07 censuses. Error bars depict positive standard error of the means.



Like Steelhead (see above) CPH Inter-annual comparisons for Chinook can only be made between the five censuses that were of comparable durations. For these, the annual CPH varied from 0.016 in 1999-00 to 0.079 in 2004-05 (Table 12, Figure 8).

Figure 8 Smith River average annual catch per hour of Chinook for the 5 years of comparable creel censuses. Error bars depict positive standard error of the means.



Coho: Prior to their federal listing in 1997 [31], Coho were occasionally reported caught in low numbers during the creel censuses (*see* Table 9). In the five pre-listing censuses that reported expanded coho catch, CPH peaked at just 0.0033 (157 fish/47,536 hrs.) in 1965, followed by 0.002 (98 fish/48,693 hrs.) in 1984, and 0.0000 in 1977, 1980 and 1986 (*see* Table 9). Only one (1984) of the pre-listing censuses reported coho catch by month [9]. During that census, coho CPH peaked in September at 0.0031 (43 fish/13,849 hrs.) followed by October at 0.0021 (22 fish/10,460 hrs.) and December at 0.0005 (2 fish/4384 hrs.).

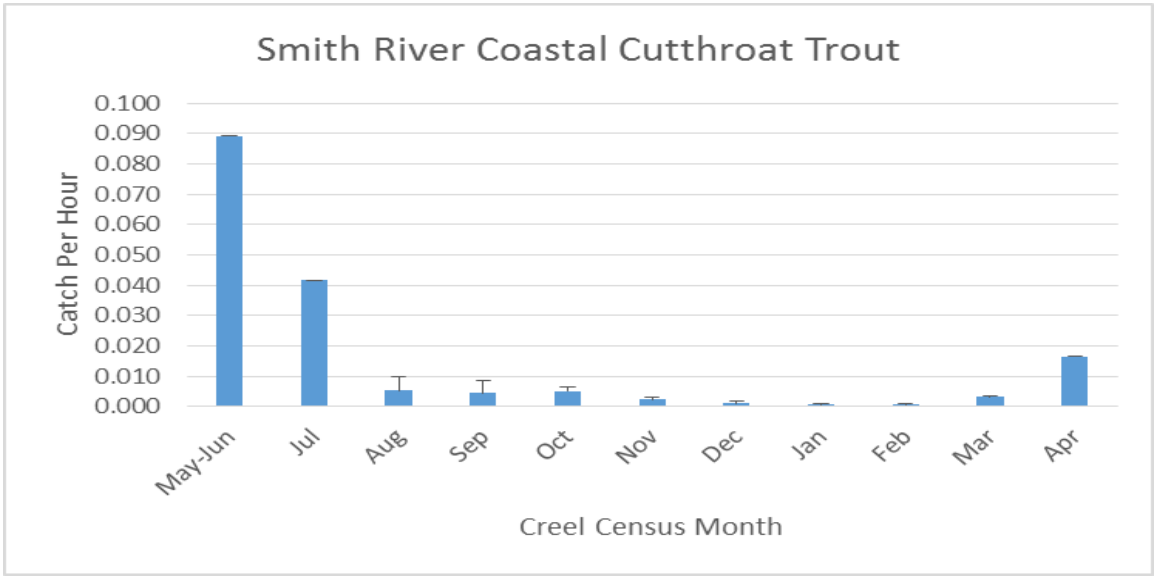
Cutthroat: Like Steelhead, when the 11 censuses that reported Cutthroat were combined, Cutthroat were reported caught in all months censused (Table 13 and Figure 9). The highest catch rates occurred in the late-spring to early-summer time frame, peaking at about .09 fish per hour in June (Table 13 and Figure 9).

Table 13 Estimated monthly Cutthroat catch, hours fished (Effort) and catch per hour (CPH) in the Smith River reported in the 1980 through 2006-07 creel censuses.

Creel Census Year(s)	Creel Census Month																																							
	May 24 - Jun			Jul			Aug			Sep			Oct			Nov			Dec			Jan			Feb			Mar			Apr			Total		
	Catch	Effort	CPH	Catch	Effort	CPH	Catch	Effort	CPH	Catch	Effort	CPH	Catch	Effort	CPH	Catch	Effort	CPH	Catch	Effort	CPH	Catch	Effort	CPH	Catch	Effort	CPH	Catch	Effort	CPH	Catch	Effort	CPH	Catch	Effort	CPH
1980 a/b	648	7,265	0.089	383	9,182	0.042	102	10,580	0.010	Not censused			75	29,788	0.003	0	26,452	0.000	Not reported															1,208	83,267	0.015
1984	Not censused			Not censused			1	1,041	0.001	0	13,849	0.000	107	18,959	0.006	14	10,460	0.001	2	4,384	0.000	Not censused			Not censused			Not censused			Not censused			124	37,192	0.003
1997-98							Not censused			56	6,475	0.009	56	7,792	0.007	38	26,930	0.001	8	10,211	0.001	0	31,788	0.000	7	32,898	0.000	24	19,917	0.001				189	136,011	0.001
1998-99										Not censused			Not censused			0	14,583	0.000	0	18,909	0.000	5	37,182	0.000	0	34,317	0.000	30	17,343	0.002				35	122,334	0.000
1999-00													0	2,190	0.000	22	17,313	0.001	0	5,569	0.000	0	27,830	0.000	39	35,582	0.001	37	12,922	0.003	Not censused			98	101,406	0.001
2000-01													0	2,892	0.000	31	23,229	0.001	36	19,775	0.002	2	22,421	0.000	11	23,645	0.000	51	11,939	0.004				131	103,901	0.001
2001-02													26	2,443	0.011	106	20,033	0.005	99	18,978	0.005	61	34,009	0.002	48	28,232	0.002	46	12,972	0.004				386	116,667	0.003
2002-03													21	4,696	0.004	116	18,373	0.006	0	13,319	0.000	30	26,626	0.001	31	26,148	0.001	78	12,582	0.006				276	101,744	0.003
2004-05													160	15,226	0.011	59	15,238	0.004	13	9,869	0.001	0	19,478	0.000	2	15,470	0.000	10	7,871	0.001				244	83,152	0.003
2005-06													Not censused			Not censused			0	15,251	0.000	50	36,175	0.001	20	31,152	0.001	33	14,267	0.002	31	1,892	0.016	134	98,737	0.001
2006-07																25	18,166	0.001	17	13,441	0.001	0	25,741	0.000	0	23,678	0.000	49	10,875	0.005	Not censused			91	91,901	0.001
Totals	648	7,265	0.089	383	9,182	0.042	103	11,621	0.009	56	20,324	0.003	445	83,986	0.005	411	190,777	0.002	175	129,706	0.001	148	261,250	0.001	158	251,122	0.001	358	120,688	0.003	31	1,892	0.016	2,916	1,076,312	0.003
Average CPH 1/			0.089			0.042			0.005			0.004			0.005			0.002			0.001			0.001			0.001			0.003			0.016			0.003

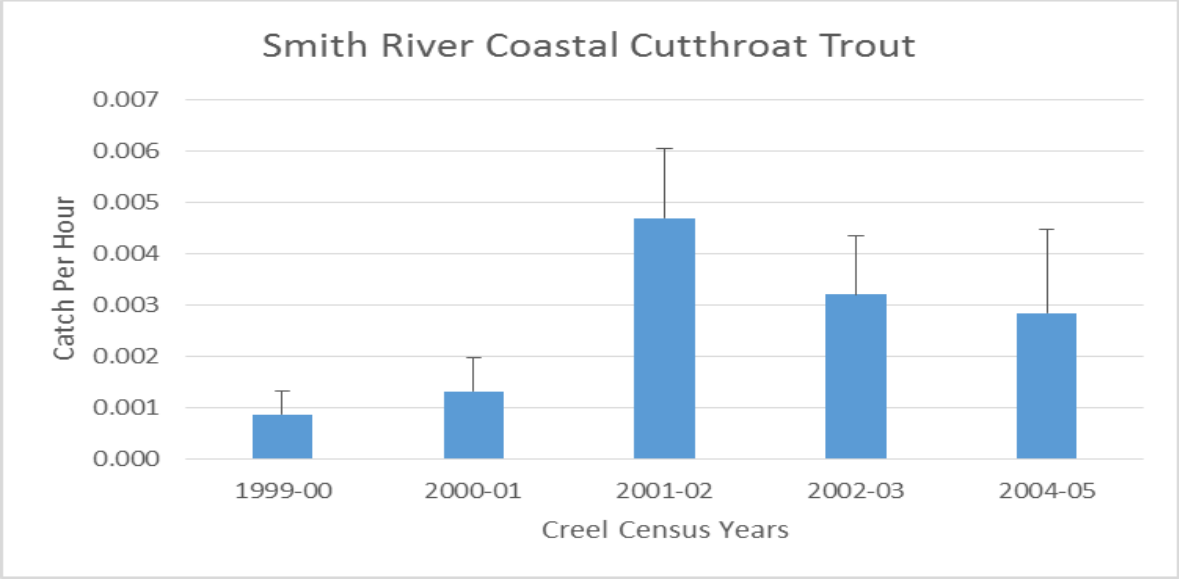
1/ Calculated as the average of the percentages.

Figure 9 Smith River average monthly catch per hour of Cutthroat for the combined 1980 through 2006-07 censuses. Error bars depict positive standard error of the means. Note: errors bars not available for May-June, July, and April as only one creel census took place during those months.



Catch per hour comparisons for Cutthroat were made for the five years in which the censuses were of comparable durations. For these, CPH varied from about 0.001 in 1999-00 to about 0.004 in 2001-02 (*see* Table 13, Figure 10).

Figure 10 Smith River average annual catch per hour of Cutthroat for the 5 years of comparable creel censuses. Error bars depict positive standard error of the means.



Effort, catch, harvest and incidence of hook swallowing by Gear Type

During nine of the censuses covered in the report, anglers were asked what type of terminal gear they used and, if they caught fish, were they released and whether the fish had swallowed the hook. Gear was limited to "Bait", "Lure" and "Fly" with baited lures grouped with "Bait". Results were not separated into species but presented as combined species.

Effort, Catch and Harvest: Anglers clearly preferred bait as terminal gear while fishing for salmon and Steelhead on the Smith River. The percentage of anglers using bait ranged from 73.3% to 82.8% averaging 77.5% during the nine censuses (Table 14). Lures accounted for between 22.0% and 16.4% averaging 19.6% followed by flies ranging between 0.9% and 6.8% averaging 2.9% (Table 14).

Consistently, during the eight years where it was reported, bait anglers harvested the vast majority of Smith River fish ranging from 82.0% and 86.9% averaging 83.9% (Table 14). Anglers using lures during the same years harvested between 12.1% and 16.3% of the fish averaging 15.0% while fly anglers harvested between 0.0% and 2.5%, averaging 1.1% (Table 14). Notably, when averaged over the nine censuses, bait anglers accounted for 77.5% of the hours fished but harvested 83.9% of the fish (Table 14). Unfortunately,

catch-and-release rates by terminal gear was not reported so it unknown if bait angling is more productive or fly/lure anglers are simply more likely to release their catch.

Table 14 Hours fished, fish kept and percentage of swallowed hooks by terminal gear type during nine Smith River creel censuses 1997-1998 through 2006-07.

	Gear Type	Creel Census Year(s)									All years combined
		97-98	98-99	99-00	00-01	01-02	02-03	04-05	05-06	06-07	
Hours Fished	Bait	16,115	14,449	10,357	13,406	16,505	15,306	10,728	12,620	12,822	122,308
	Lure [1/]	4,631	3,501	2,880	2,701	4,656	3,927	3,240	2,495	2,931	30,962
	Fly	339	349	232	1,171	722	757	675	133	211	4,589
% of Hours Fished	Bait	76.4%	79.0%	76.9%	77.6%	75.4%	76.6%	73.3%	82.8%	80.3%	77.5%
	Lure	22.0%	19.1%	21.4%	15.6%	21.3%	19.6%	22.1%	16.4%	18.4%	19.6%
	Fly	1.6%	1.9%	1.7%	6.8%	3.3%	3.8%	4.6%	0.9%	1.3%	2.9%
Number of Fish Kept	Bait	506	342	210	380	544	446	Not reported	453	396	3,277
	Lure	98	67	41	54	91	90		68	76	585
	Fly	9	6	1	11	7	8		0	2	44
% of Fish Kept	Bait	82.5%	82.4%	83.3%	85.4%	84.7%	82.0%	Not reported	86.9%	83.5%	83.9%
	Lure	16.0%	16.1%	16.3%	12.1%	14.2%	16.5%		13.1%	16.0%	15.0%
	Fly	1.5%	1.4%	0.4%	2.5%	1.1%	1.5%		0.0%	0.4%	1.1%
% Swallowed Hook	Bait	26.0%	10.0%	24.0%	15.0%	21.0%	8.3%	Not reported	10.0%	18.0%	16.5%
	Lure	12.0%	7.0%	7.0%	4.0%	13.0%	1.1%		3.0%	7.0%	6.8%
	Fly	0.0%	17.0%	0.0%	9.0%	14.0%	0.0%		0.0%	0.0%	5.0%

[1/] A baited lure is considered bait.

Incidence of Swallowed Hooks: During the eight censuses where it was reported, the incidence of swallowed hooks ranged from 10.0% to 26.0%, averaging 16.5% for bait-caught fish, 3.0% to 13.0%, averaging 6.8% for lure-caught fish, and 0.0% to 17.0%, averaging 5.0% for fly-caught fish (*see* Table 14). Authors from two of the reports recommended using caution when interpreting hook-swallowing rates. In the case of fly-caught fish, low sample size was sited while for bait-caught fish, it was speculated the relatively low hook-swallowing rate noted in the 1998-99 census may have been the result of anglers misreporting due to an anticipated regulation banning the use of bait if swallowed-hook rates were too high [12 and 13].

Incidence of pinniped bite marks and/or net scars

During seven of the censuses, creel clerks, while measuring fish, also checked for injuries including pinniped (seal) bites and net scars (presumably from gill nets). For all but two of the years, pinniped bite marks and net scars were not reported separately. During those two years, only one net scar was reported so it's assumed the "bite + net" numbers shown in Table 15 are predominately pinniped bite injuries.

The percentage of fish bearing pinniped bite marks varied profoundly through the seven years of censuses ranging from 2.6% to 75.1% with an overall average of 19.3% (Table 15). The reason for troublingly high bite-mark rate in 02-03 was not addressed in the report [16] but appears to be related to the extreme low flows incurred during November and December of 2002, a time period associated with Steelhead moving

into the lower river (*see* "Low River Flow Correlates on Catch Rates and Pinniped-Bite Mark Rates", page 61).

Table 15 Fish displaying pinniped bite marks and/or net scars observed during seven Smith River creel censuses.

Creel census year(s)	Number of Fish observed 1/	Injury type					
		Pinniped bite		Net scar		bite + net	
						No.	%
98-99	471	17		1		18	3.8%
99-00	250					26	10.4%
00-01	446					94	21.1%
01-02	660					44	6.7%
02-03	514					386	75.1%
05-06	399					25	6.3%
06-07	381	10		0		10	2.6%
Totals	3,121	27		1		603	19.3%

1/ Only fish measured during the censuses were checked for injuries. All species combined.

The significance of pinniped bite marks is unknown but as noted in the 1998-99 census [12], "fish displaying these injuries do not represent the number of fish attacked or netted, only those that escaped the encounter."

Catch by Method

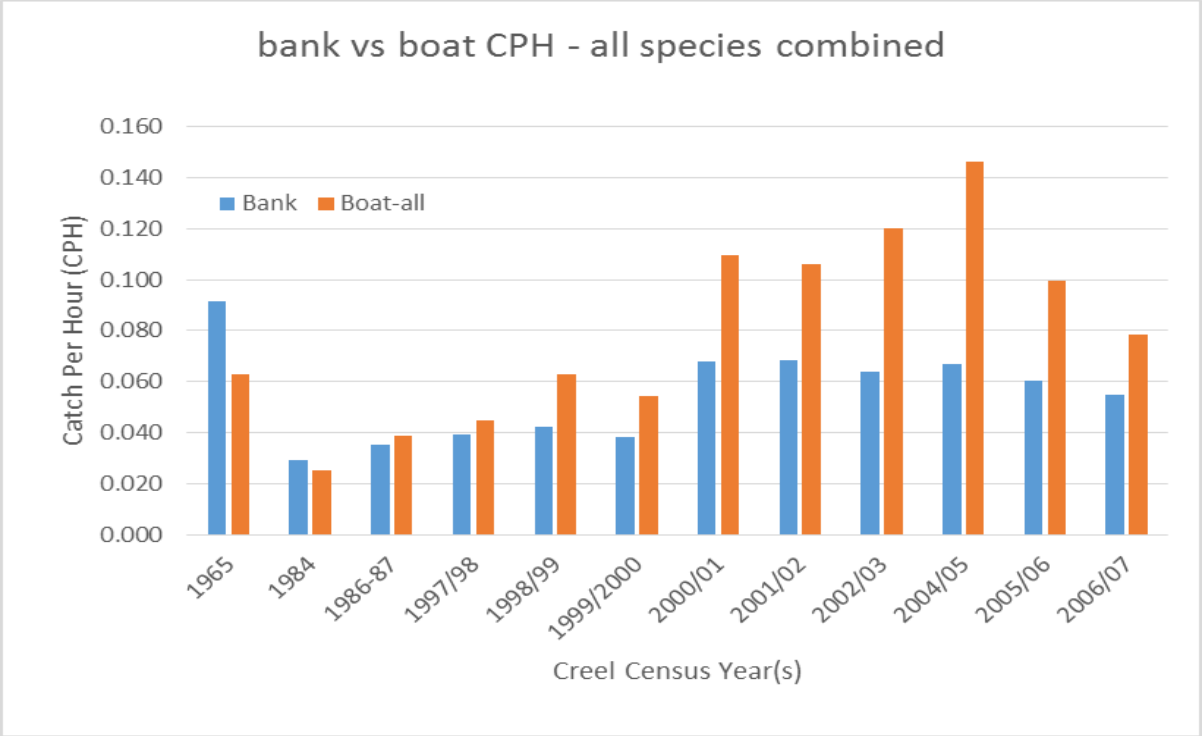
For 12 of the 25 censuses covered in the report, estimated catch, effort (hours fished) and catch per hour (CPH) were stratified by methods including bank- and boat-anglers. Boat angling was sometimes further separated into estuary- versus up-river boat. Up-river boat angling was sometimes further separated into pram versus drift boats. For inter-year consistency, this report will include only the following methods: Bank angling; boat angling; and, if presented in the original census, up-river boat and estuary-boat angling.

CPH – Bank versus Boat Anglers: With two exceptions (1965 and 1984) boat anglers have had greater success than bank anglers. Boat angling CPH through the 12 years has ranged from 0.025 to 0.146 averaging 0.079 fish caught per hour. During the same period, bank anglers CPH has ranged from 0.029 to 0.092 averaging 0.055 fish caught per hour (Table 16 and Figure 11).

Table 16 Hours fished, total fish caught and catch per hour (CPH) for bank, boat, up-river boat and estuary boat angling. Smith River creel censuses 1965 through 2006-07.

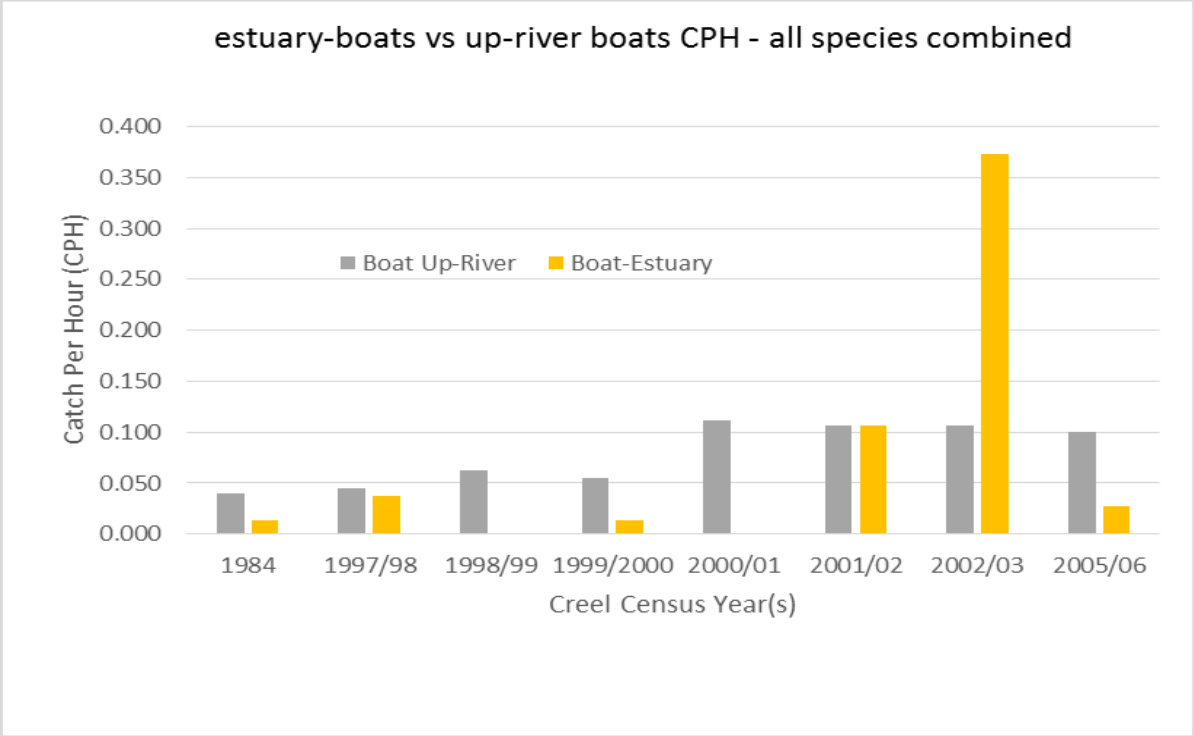
Creel census year(s)	Method	Angler Hrs	Catch - all species	Catch per hour
1965	Bank	4829	442	0.092
	Boat	42707	2686	0.063
1984	Bank	22954	664	0.029
	Boat	25739	645	0.025
	Up-river Boat	10864	438	0.040
	Estuary Boat	14875	207	0.014
1986-87	Bank	17979	629	0.035
	Boat	15814	615	0.039
1997/98	Bank	71170	2778	0.039
	Boat	64841	2909	0.045
	Up-river Boat	61832	2795	0.045
	Estuary Boat	3009	114	0.038
1998/99	Bank	68943	2926	0.042
	Boat	53391	3361	0.063
	Up-river Boat	53365	3361	0.063
	Estuary Boat	26	0	0.000
1999/2000	Bank	51771	1971	0.038
	Boat	49453	2676	0.054
	Up-river Boat	49091	2671	0.054
	Estuary Boat	362	5	0.014
2000/01	Bank	49799	3388.6	0.068
	Boat	54101	5933.5	0.110
	Up-river Boat	53478	5933.5	0.111
	Estuary Boat	623	0	0.000
2001/02	Bank	54071	3686.48	0.068
	Boat	63280	6724.9	0.106
	Up-river Boat	60144	6388.9	0.106
	Estuary Boat	3136	336	0.107
2002/03	Bank	54792	3491	0.064
	Boat	46952	5639	0.120
	Up-river boat	44617	4768	0.107
	Estuary Boat	2335	871	0.373
2004/05	Bank	33562	2241	0.067
	Boat	49590	7250	0.146
2005/06	Bank	53212	3220	0.061
	Boat	45525	4534	0.100
	Up-river Boat	44952	4518	0.101
	Estuary Boat	573	16	0.028
2006/07	Bank	45625	2493	0.055
	Boat	46277	3635	0.079

Figure 11 Bank-angling versus boat-angling catch per hour of all species combined. Smith River creel censuses, 1965 through 2006-07.



CPH – Estuary versus up-river boat anglers: Catch success between estuary boat and up-river boat anglers has varied widely through the eight years of reported catch. The catch rates of all fish combined for up-river boat anglers ranged from 0.040 to 0.111 averaging 0.078. During the same eight-year period, estuary boat anglers caught between 0.000 and 0.373 averaging 0.072 fish per hour (*see* Table 16, Figure 12). It should be noted that one of the two lowest estuary boat CPH (0.000) was reported during the 1998-99 census which did not begin until November, essentially a month later than other censuses in this analysis. Because of the delay, the Chinook run in the estuary was essentially over before the census began. Indeed, the 1998-99 census [12] reported only 26 hours spent fishing by estuary boat anglers, less than 1.0% of the eight-year average of 3,117 hours. The reason for the poor estuary-boat catch reported in the 2001-02 census [15] is unknown (*see* Table 16, Figure 12). It is also unknown why estuary-boat angling during the 2002-03 census [16] was so successful, reporting over three times the next highest CPH rate (0.373 versus 0.111) reported during the 2000-01 census [14] for up-river boat anglers (*see* Table 16, Figure 12).

Figure 12 Estuary boat versus up-river boat catch per hour of all species combined. Smith River creel censuses, 1984 through 2005-06.



Fish size and age at capture

Lengths of captured fish were measured by creel clerks during most of the censuses; the results of which are summarized in Table 17, Figure 13 and Figure 15. Census years that are not included on the tables and figures did not have accompanying length data available. With the exception of 1984, fish were measured to the nearest cm in total length (TL) while in 1984 they were measured in fork lengths (FL). For 1984 only, FL was converted to TL using the formula TL (mm) = 1.015 (FL) + 39.02 [24]. Additionally, in 1984, individual fish measurements were not provided but for this report were interpolated from published graphs in which lengths were presented in 5cm groupings. Because of the coarse (5cm) groupings, average lengths for both Chinook and Steelhead are not presented.

Steelhead size at capture: For the 10 census years that Steelhead were measured, the minimum TL ranged from 20 to 50 cm, maximum TL ranged from 94 to 99 cm and the average TL ranged from 68.9 to 75.4 cm (Table 17). It is worth noting the average TL of Steelhead increased after the 97-98 census due to harvest regulations restricting the catch of natural origin Steelhead to fish > 40.5 cm TL (16 in) (Table 17, Figure 13 and *see* Table 4). When lengths <40.5 cm were deleted from the calculations, the average for the 97-98 census was 70.5 cm.

Table 17 Numbers, minimum, maximum and average [1/] lengths (TL, cm) of fish measured in Smith River creel censuses 1984 through 2014.

Creel Census	Steelhead				Chinook				Cutthroat			Coho		
Year(s)	N	Min	Max	Avg	N	Min	Max	Avg	N	Min	Max	N	Min	Max
1984 [2/]	65	20	95	[3/]	226	40	105	n/a	17	16	45	29	26	75
1997-98	420	24	94	68.9	110	30	125	76.2	None Reported			None Reported		
1998-99	414	43	99	75.4	56	48	108	87.4						
1999-2000	199	30	97	70.2	51	46	112	75.9						
2000-01	319	33	97	70.44	126	53	108	79.9						
2001-02	553	46	97	72.4	107	26	130	88.5						
2002-03	399	48	99	70.9	115	63	120	97.3						
2004-05	357	45	98	71.2	185	46	122	93.2						
2005-06	396	46	97	71.2	3	70	97	n/a						
2006-07	353	50	94	72.5	28	76	109	95.8						
2008	None Reported				4	61	97	n/a						
2010					37	63	109	90.5				1	77	77
2012					5	69	96	n/a				None Reported		
2013					3	82	95	n/a						
2014					3	68	95	n/a						

[1/] Averages not presented when fewer than 25 fish were measured.

[2/] Originally measured in Fork Length, converted to Total Length using TL (mm)=1.015(FL)+39.02 (see [11])

[3/] Not available. See "Fish Size at Capture" section above.

Steelhead age at capture**:** Based on the moving-average-of-three lines depicted in Figure 13, a single strong mode can be seen at around 72 cm with weaker modes at around 56 cm and 92 cm TL. Of interest, those modes hold generally true for all but the 1998-99 census whose modes were about 4 cm larger; probably related to better-than-average ocean growth. The modes likely correspond to the average TL-at-age with 56 cm representing 2-yr olds, 72 cm 3-yr olds and 92 cm 4-yr olds. Based on the length-at-age analysis, it is clear the great majority of the Steelhead catch were 3-year olds. Some confirmation for size-at-age can be found in the 1997-98 census which, due to a marking program at the hatchery, was able to distinguish 1995 BY hatchery-produced fish. Essentially all hatchery Steelhead were fin-clipped prior to release but for the 1995 BY only, they received an additional mark. During the 1997-98 census those uniquely marked fish were 3-year olds. As seen in Figure 14, those 3-year olds ranged from about 60 to 84 cm averaging about 70 cm.

Figure 13 Smith River Steelhead measured (TL cm) in the 1997-98 through 2006-07 creel censuses. Line depicts moving average of 3.

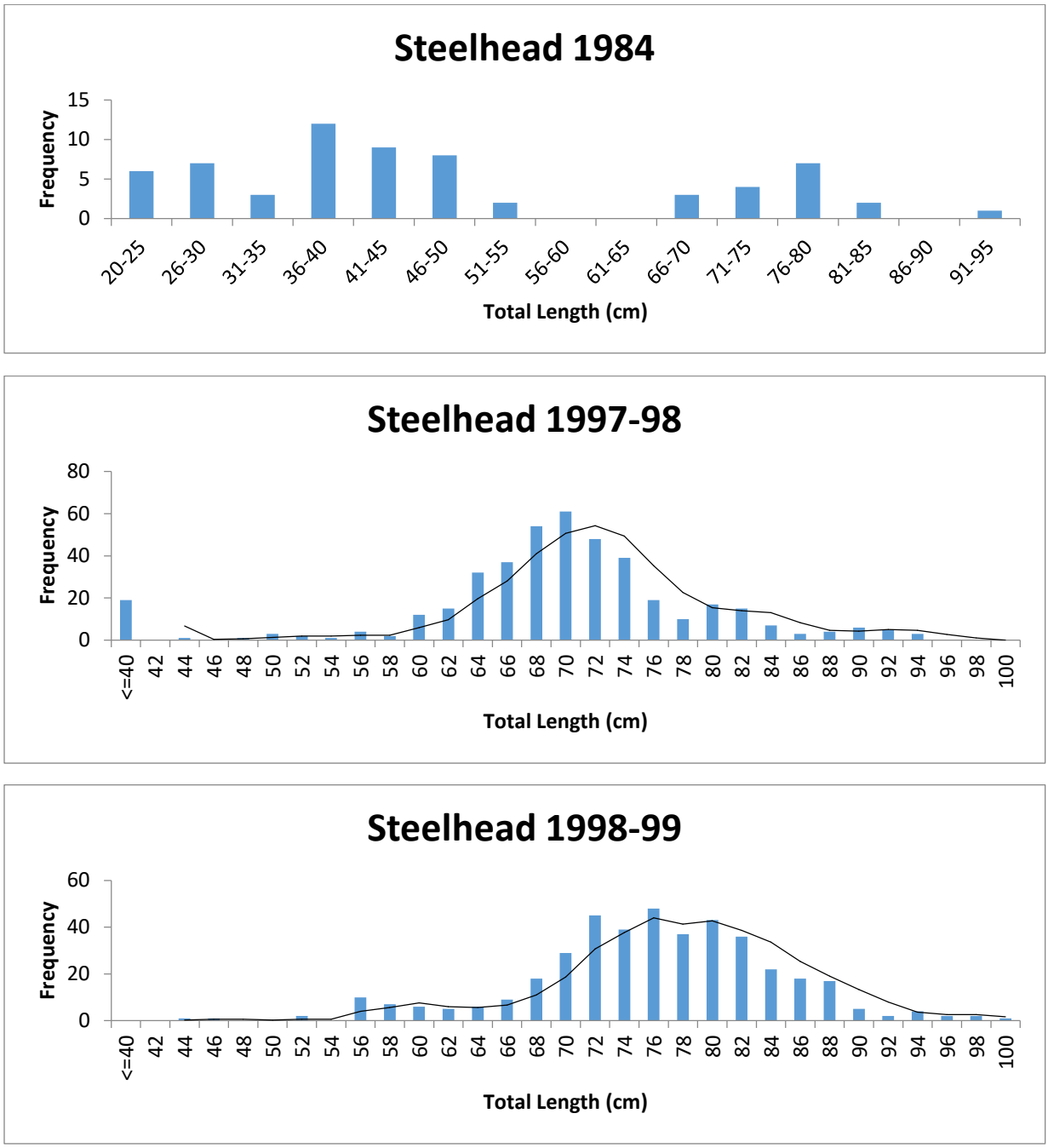


Figure 13 continued: Smith River Steelhead measured (TL cm) in the 1997-98 through 2006-07 creel censuses. Line depicts moving average of 3.

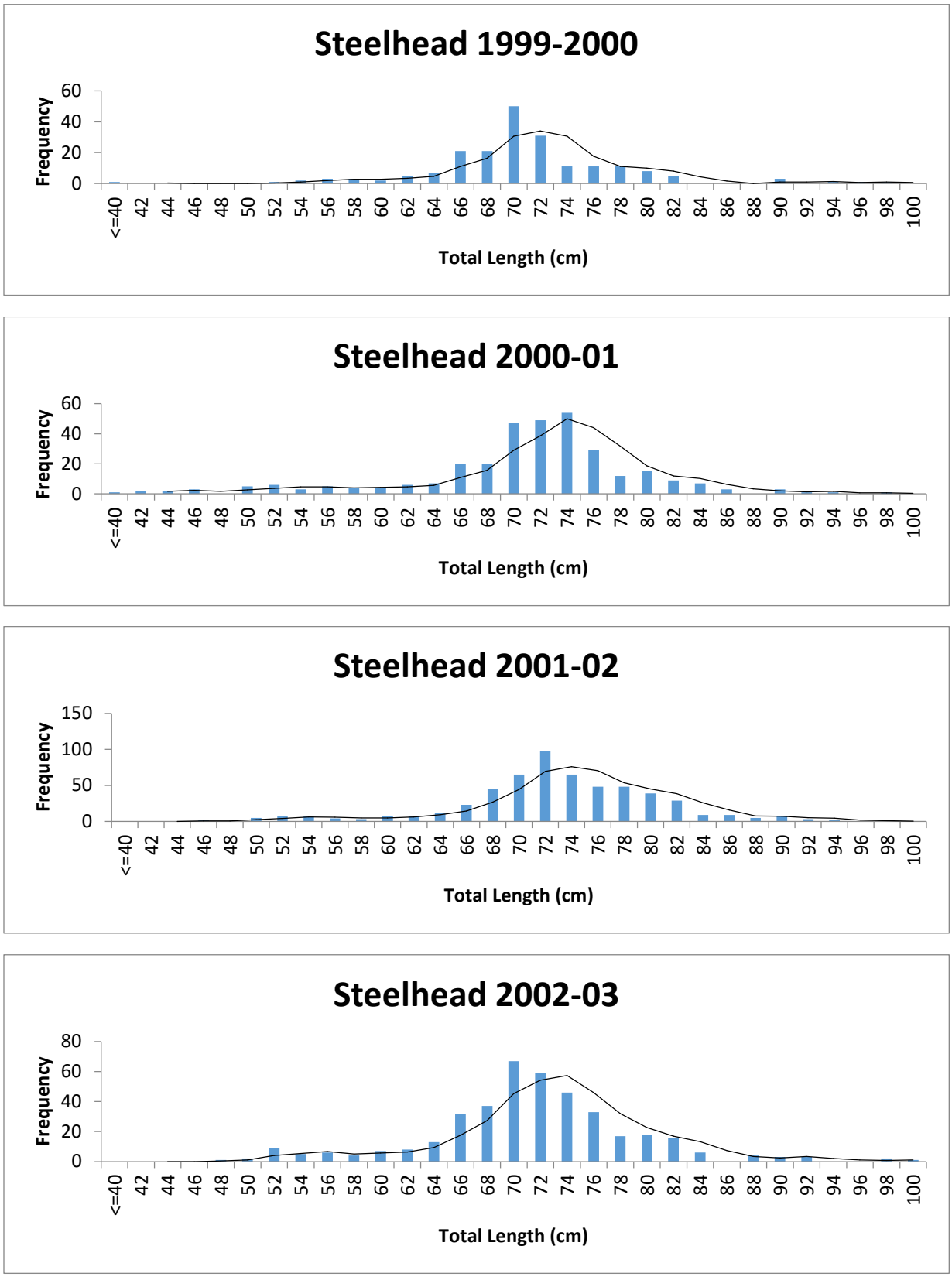
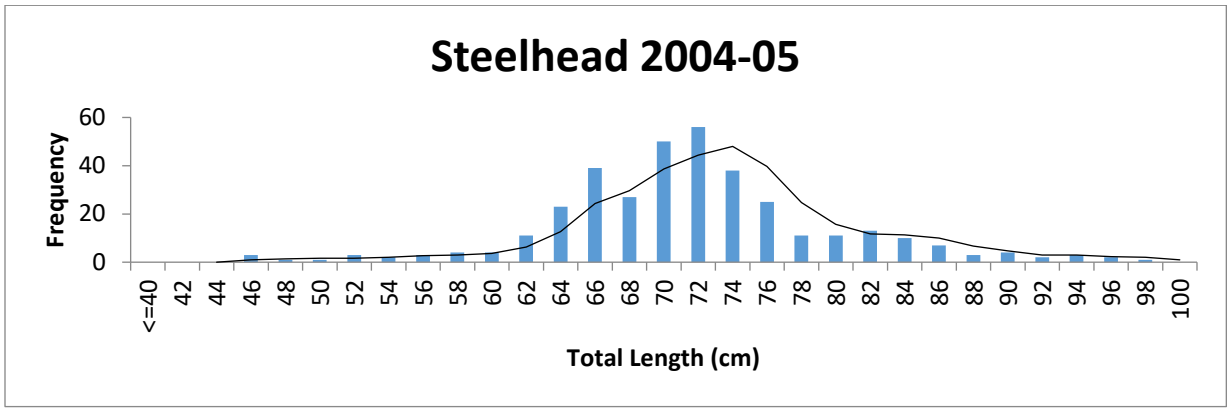
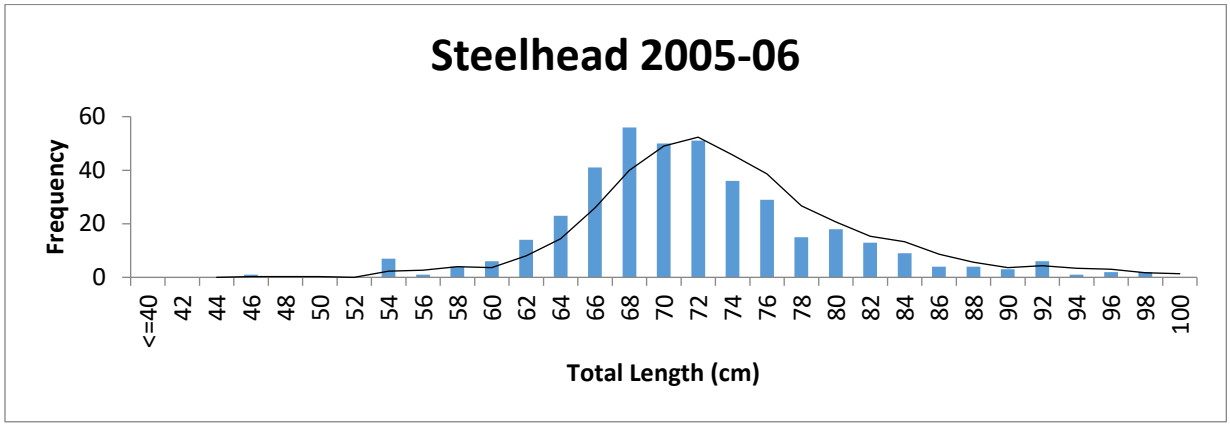


Figure 13 continued: Smith River Steelhead measured (TL cm) in the 1997-98 through 2006-07 creel censuses. Line depicts moving average of 3.





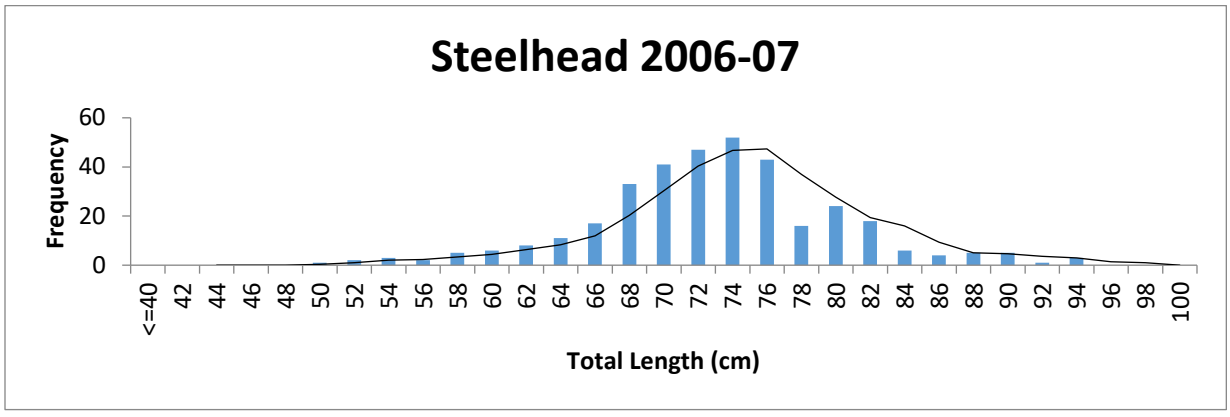
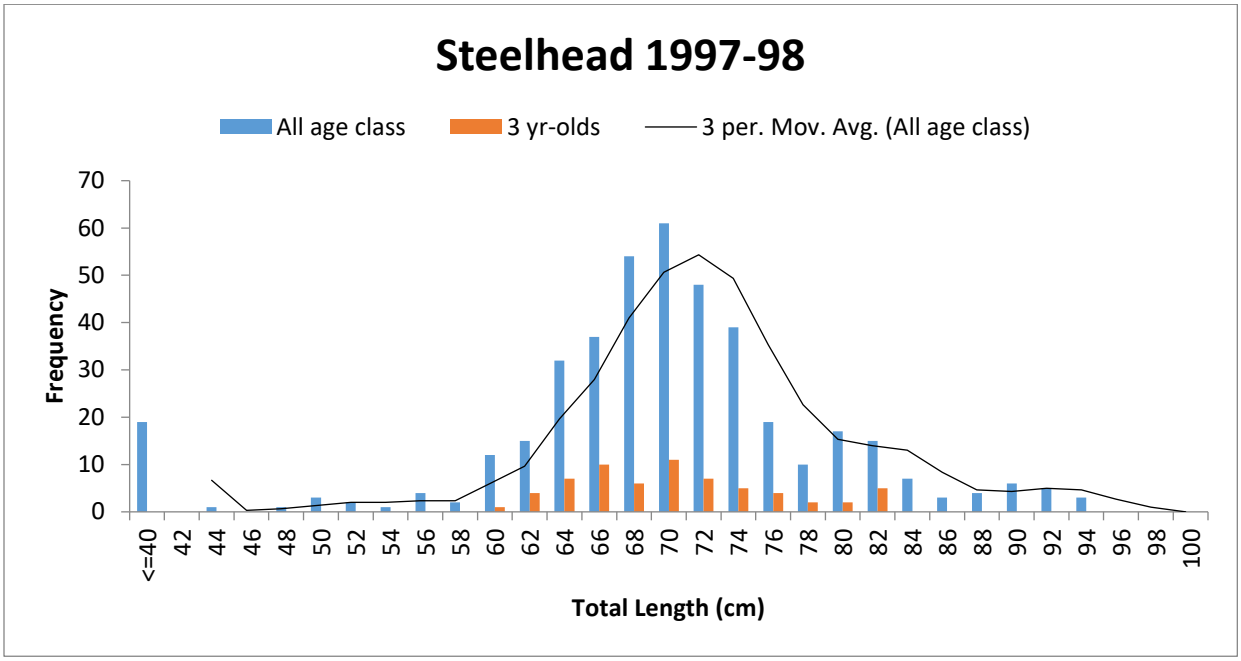


Figure 14 Smith River Steelhead Lengths (TL cm) measured during creel census, 1997-98. Three-year olds are hatchery-produced fish from the 1995 BY which had received unique fin-clips. Line depicts moving average of 3.



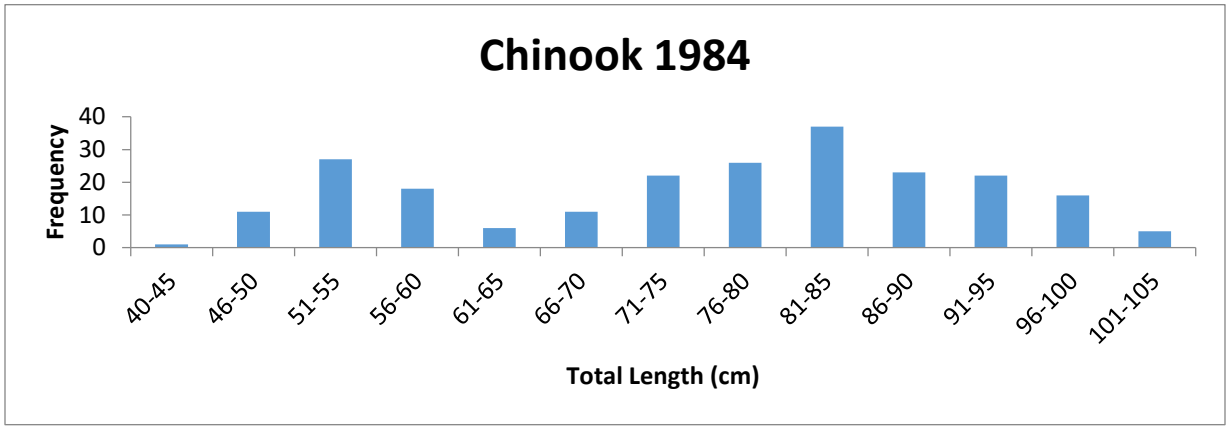
Chinook Size at Capture: For the 10 censuses that measured more than 25 fish[10], minimum size ranged from 26 to 76 cm TL, and maximum size ranged from 105 to 130 TL, and average size ranged from 75.9 to 97.3 cm TL (*see* Table 17).

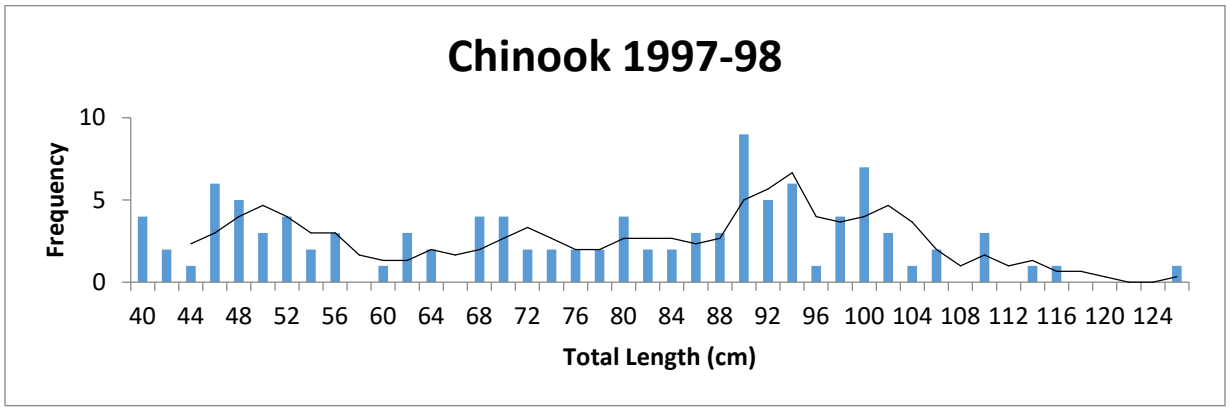
Chinook lengths are graphically presented in Figure 15 for years in which more than 25 individual fish were measured. Individual measurements were not available for the 1984 census so for that year only, lengths are presented in 5 cm groupings; all others are presented in 2 cm groupings (Figure 15). Additionally, for 1984 only, reported fork lengths were converted to total lengths as described above (*see* "Fish Size at Capture", page 45). In an attempt to smooth the data and discern age classes by lengths, a line representing a moving average of 3 cm was added to the charts for all but the 1984 census year (Figure 15). That year was excluded because reported lengths were already combined into 5 cm groupings.

Chinook Age at Capture: Unlike Steelhead, Chinook salmon did not show clear modes representing age classes (Figure 15). That is likely due in part to the low sample size as compared to Steelhead (*see* Table 17). The fact that RCH released both sub-yearlings and yearlings probably further masks the length frequency distribution as cohorts from the same brood year are likely to return at different sizes. The 1984 census [9] had the highest sample size (226) and reported the mean size (TL) for 2-year olds at 51.6 cm and 82.1 cm for 3-yr olds. The size separating 2-yr olds from adults was reported to be 61.8 cm [9].

[10] To minimize sampling error, only censuses reporting 25 or more Chinook measured will be included when analyzing catch statistics related to fish lengths.

Figure 15 Smith River Chinook salmon measured (TL cm) in the 1984 through 2010 creel censuses. Line depicts moving average of 3 cm.





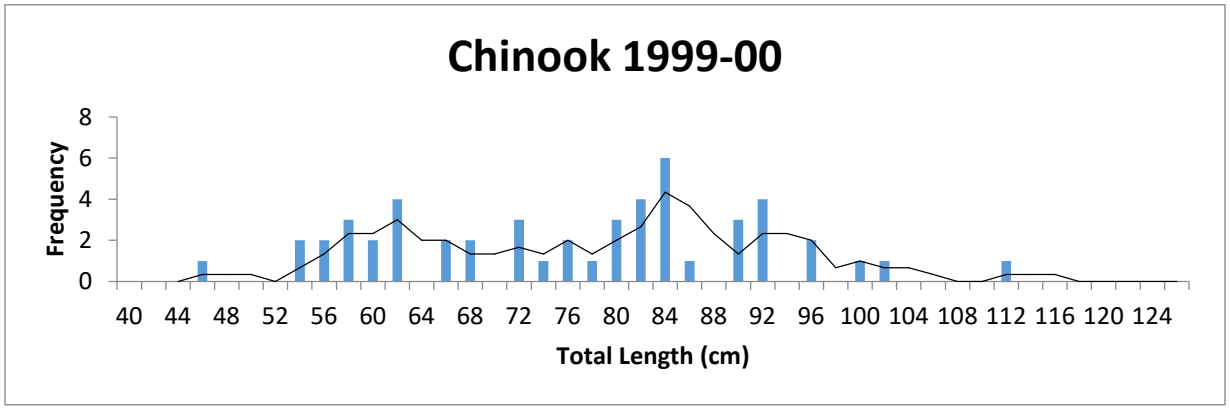


Figure 15 continued: Smith River Chinook salmon measured (TL cm) in the 1984 through 2010 creel censuses. Line depicts moving average of 3 cm.

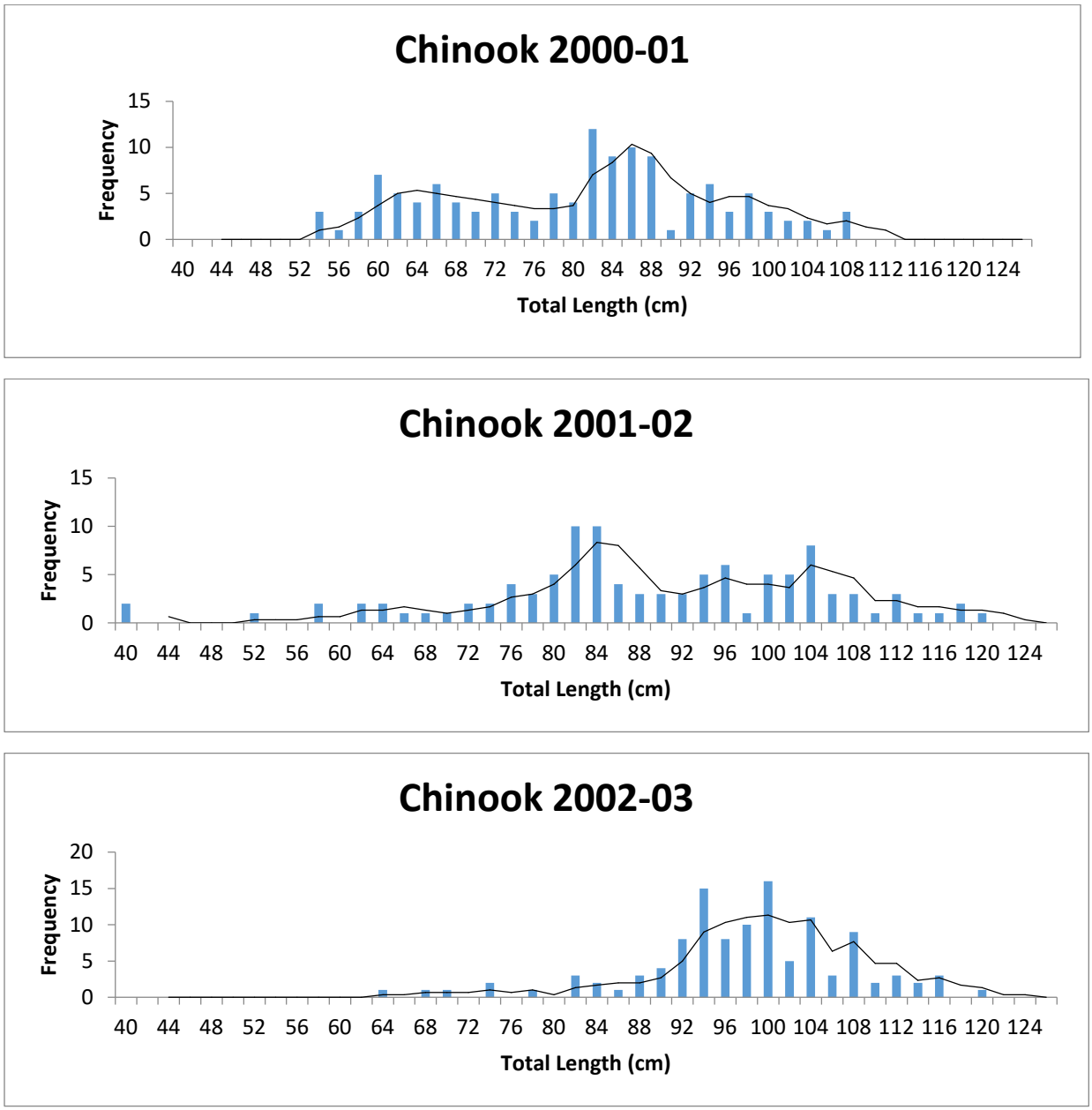
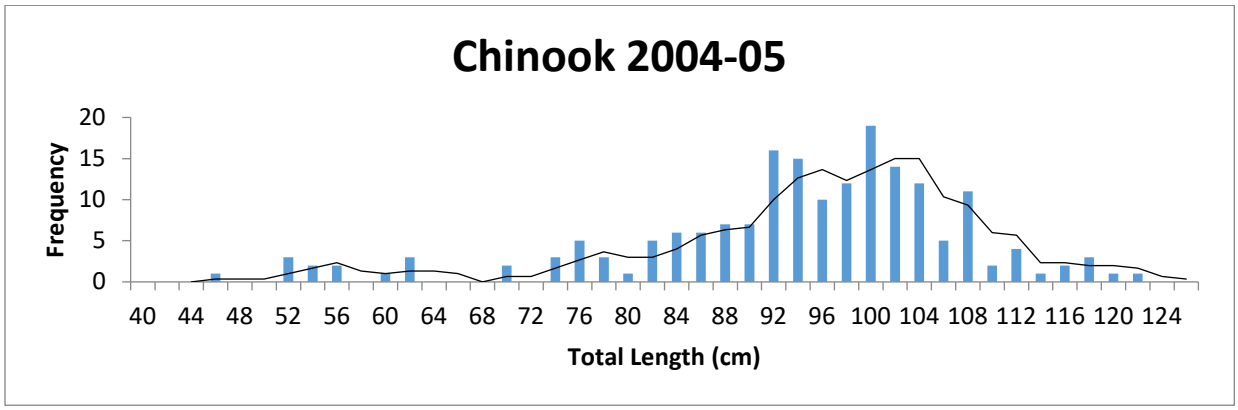
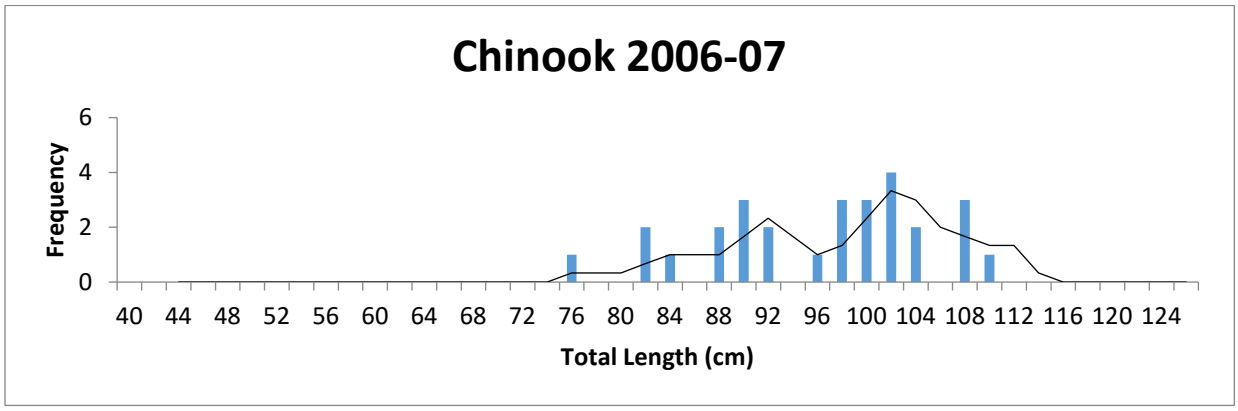
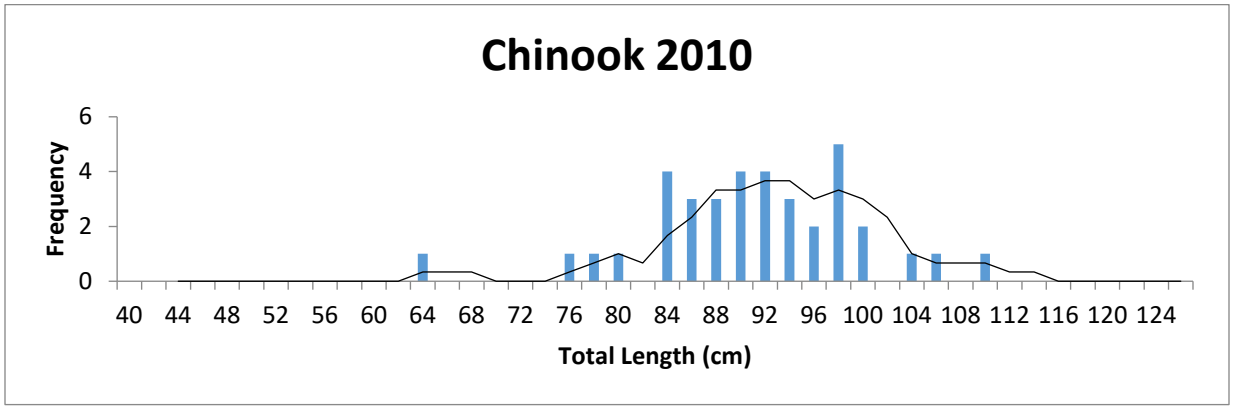


Figure 15 continued: Smith River Chinook salmon measured (TL cm) in the 1984 through 2010 creel censuses. Line depicts moving average of 3 cm.







Other Species size and age at capture: A few Cutthroat and Coho were reported measured during the 1984 census [9] (*see* Table 17 for results).

Hatchery contribution rates to the fishery

Census Clerk-Observed Versus Angler-Reported Rates of Adipose fin-Clipped (Ad-clips) Steelhead*:* Beginning with the 1997-98 creel census [11] CDFW began reporting the contribution of RCH-produced Steelhead to the catch[11]. The ability to distinguish hatchery from wild fish was the result of the marking program initiated through CDFW policy at RCH in 1994 in which all hatchery-produced Steelhead received Ad-clips[12]. During the nine creel censuses conducted from 1997-98 through 2006-07 the estimates of hatchery-produced[13] Steelhead were presented stratified by location (above and below the Forks) and whether the fish was observed by a creel census clerk or reported by the angler from memory. The overall percentage of clerk-observed hatchery-produced Steelhead averaged 34.3% (range: 25.4% to 43.0%) while angler -reported Steelhead averaged 18.6% (range: 4.7% to 31.9%). The below- and above-forks estimates for clerk-observed Steelhead averaged 35.0% (range: 25.4% to 44.5%) and 22.1% (range: 8.7% to 32.3%), respectively. The angler-reported below- and above-forks Ad-clip rates averaged 20.8% (range: 5.3% to 31.2%) and 5.4% (range: 2.0% to 9.1%), respectively (Table 18).

Table 18 Smith River creel census numbers and percentages of Adipose-fin clipped Steelhead observed by census clerks versus reported by anglers, 1997 through 2007.

Creel Census Year	All Locations								Below Forks [1]								Above Forks							
	Clerk Observed				Angler Reported				Clerk Observed				Angler Reported				Clerk Observed				Angler Reported			
	No	Yes	Total	% clip	No	Yes	Total	% clip	No	Yes	Total	% clip	No	Yes	Total	% clip	No	Yes	Total	% clip	No	Yes	Total	% clip
1997 [3]	No CDFW census				194	76	270	28.1%																
1997-98	313	114	427	26.7%	266	13	279	4.7%	292	104	396	26.3%	216	12	228	5.3%	21	10	31	32.3%	50	1	51	2.0%
1998-99	290	125	415	30.1%	329	61	390	15.6%	262	123	385	31.9%	269	56	325	17.2%	21	2	23	8.7%	60	5	65	7.7%
1999-2000	128	74	202	36.6%	200	36	236	15.3%	117	71	188	37.8%	142	33	175	18.9%	11	3	14	21.4%	58	3	61	4.9%
2000-01	176	133	309	43.0%	419	196	615	31.9%	161	129	290	44.5%	369	191	560	34.1%	15	4	19	21.1%	50	5	55	9.1%
2001-02	335	196	531	36.9%	766	143	909	15.7%	307	185	492	37.6%	618	134	752	17.8%	28	11	39	28.2%	148	9	157	5.7%
2002-03	382	130	512	25.4%	870	159	1029	15.5%	375	128	503	25.4%	822	157	979	16.0%	7	2	9	22.2%	48	2	50	4.0%
2004-05	268	113	381	29.7%	433	93	526	17.7%	246	106	352	30.1%	352	89	441	20.2%	22	7	29	24.1%	81	4	85	4.7%
2005-06	300	214	514	41.6%	528	205	733	28.0%	286	212	498	42.6%	441	200	641	31.2%	14	2	16	12.5%	87	5	92	5.4%
2006-07	270	168	438	38.4%	483	148	631	23.5%	255	162	417	38.8%	390	143	533	26.8%	15	6	21	28.6%	93	5	98	5.1%
Average [4]				34.3%				18.6%				35.0%				20.8%				22.1%				5.4%

[1] Mainstem Smith River downstream of the junction of the Middle and North Forks.

[2] Adipose-fin clipped

[3] Jan and Feb of 1997 survey conducted by volunteers not under the supervision of CDFW.

[4] Calculated as the average of the percentages. Jan and Feb 1997 survey not included in average.

It is noteworthy that compared to clerk-observed estimates of ad-clipped Steelhead, angler reported estimates are consistently lower. In fact, during the nine years of censuses, anglers reported only about one-half of the percentage of ad-clipped Steelhead of that observed by creel census clerks (18.6% versus 34.3%) (*see* Table 18). Most of this disparity is likely the result of anglers tending to prefer harvesting hatchery Steelhead over wild Steelhead. This differential harvest results in lowering the ad-clip rate of released Steelhead (or angler-reported) while increasing the ad-clip rate of harvested (or clerk-observed) Steelhead. Other potential sources of the disparity may include: creel census clerks are trained to identify fin-clips and have the fish in hand while anglers are untrained and are relying on memory as to whether

[11] The reported contribution rates failed to correct for poorly marked hatchery-produced steelhead. Corrected values are presented at the end of this section.

[12] Not all hatchery-produced steelhead were effectively marked. See "Marking Programs", page 13.

[13] For the purposes of the report, "hatchery-produced Steelhead" and "Ad-clipped Steelhead" are synonymous.

or not the fish they caught and released was marked; and there may also be a bias against catching hatchery fish and therefore anglers may tend to under-report their catch. For the purposes of this report, only creel-clerk observed data will be used to determine hatchery-contribution rates to the fishery.

Hatchery Steelhead Contribution Rates: As noted earlier, the objective of marking 100% of hatchery-produced Steelhead at RCH prior to release was not attained (*see* "Marking Program", page 13). Quality checks by CDFW during the 2004-2014 time frame indicate the marking program achieved an average effective-marking rate of 91.2% (Table 3). For the purpose of estimating hatchery-contribution rates, it was assumed that each hatchery-marked Steelhead observed represents 91.2% of what was actually caught. The calculated unmarked-but-hatchery-produced fish were then subtracted from the observed unmarked fish as a correction. For example: during the 1997-98 census, creel clerks observed 313 unmarked fish and 114 ad-clipped fish. Since the 114 ad-clipped fish represented only 91.2% of the ad-clipped population, that number was divided by 0.912 to calculate the actual number of hatchery fish in the sample; in this case 125 fish. The 11 (125-114) unmarked-but-hatchery-produced fish were then subtracted from the 313 unmarked fish giving a corrected unmarked/marked rate of 302/125 (Table 19). Corrected hatchery Steelhead contribution rates averaged 37.6% (range: 27.8% to 47.2%) for all locations, 38.4% (range: 27.9 to 48.8%) for below the Forks and 24.3% (range: 9.5% to 35.4%) for above the Forks (Table 19).

It should be noted that the poor RCH fin-clip rates used for corrections do not necessarily represent the individual brood years of returning adults. This is the result of the aggregating poor fin-clip rates from brood years 2004 through 2015 and applying that to returning adults from the 1997 through 2006/2007 creel censuses. This likely resulted in underestimating hatchery contribution rates because in general, poor fin-clip rates have decreased through time (*see* Table 3).

Table 19 Creel-Clerk observed Rowdy Creek Fish Hatchery Steelhead contribution rates to the Smith River fishery, 1997 through 2007 corrected for poor fin-clipping rates.

Creel Census Year	All Locations					Below Forks [1/]					Above Forks				
	Observed		Corrected [2/]			Observed		Corrected			Observed		Corrected		
	Ad-Clips		Ad-Clips			Ad-Clips		Ad-Clips			Ad-Clips		Ad-Clips		
	No	Yes	No	Yes	% Clips	No	Yes	No	Yes	% Clips	No	Yes	No	Yes	% Clips
1997-98	313	114	302	125	29.3%	292	104	282	114	28.8%	21	10	20	11	35.4%
1998-99	290	125	278	137	33.0%	262	123	250	135	35.0%	21	2	21	2	9.5%
1999-2000	128	74	121	81	40.2%	117	71	110	78	41.4%	11	3	11	3	23.5%
2000-01	176	133	163	146	47.2%	161	129	149	141	48.8%	15	4	15	4	23.1%
2001-02	335	196	316	215	40.5%	307	185	289	203	41.2%	28	11	27	12	30.9%
2002-03	382	130	369	143	27.8%	375	128	363	140	27.9%	7	2	7	2	24.4%
2004-05	268	113	257	124	32.5%	246	106	236	116	33.0%	22	7	21	8	26.5%
2005-06	300	214	279	235	45.7%	286	212	266	232	46.7%	14	2	14	2	13.7%
2006-07	270	168	254	184	42.1%	255	162	239	178	42.6%	15	6	14	7	31.3%
Average [3/]					37.6%					38.4%					24.3%

[1/] Mainstem Smith River downstream of the junction of the Middle and North Forks.

[2/] Ad-clipped numbers adjusted upward to account for the average poor-fin clip rate of 8.8%.

[3/] Calculated as the average of the percentages.

The above and below Forks rate of hatchery-produced Steelhead is of importance because it is an indication of hatchery fish straying well upstream of their origin.

Hatchery policy, prior to 2011, was to release their Steelhead production as yearlings primary at the boat ramp located at the confluence of the Middle- and South-Forks of the Smith River (the "Forks"). Beginning in 2011, due to CDFW concerns regarding straying, competition, and predation, the hatchery was required to release all Steelhead at the county boat ramp about 2.2 km upstream of the mouth of Rowdy Creek and 23.6 km downstream of the Forks [23]. The success of this change in release strategy is unknown as there has not been a comprehensive creel census since its inception and average annual hatchery Steelhead production has decreased by approximately 50% since 2010.

Hatchery Chinook Contribution Rates*:* Beginning in 2006, CDFW required that Rowdy Creek Fish Hatchery mark 100% of its Chinook salmon production with identifying fin-clips (*see* "Marking Programs", page 13). Since then, only one creel census (2010) has been conducted in which enough Chinook were observed by creel clerks to assess hatchery contribution rates. During the 2010 census, creel clerks observed 38 Chinook of which 8 (21.0%) were fin-clipped indicating RCH origin. Correcting for 6.6% poor fin clip rate for Chinook at the hatchery (*see* Table 3), 23.7% (9/38) of the creel-clerk observed Chinook catch in 2010 was of hatchery origin. It should be noted however, the 2010 census was confined to the lower river where hatchery fish were expected to be more abundant near the hatchery (*see* Figure 2 and "Census locations by year(s)" page 24).

Assessing contribution- and straying-rates of hatchery-produced Chinook and Steelhead within the Smith River basin is of vital importance in managing both hatchery and wild-stocks. Future creel censuses, in concert with universal hatchery marking, Salmon Card data, and spawner surveys, would provide this much-needed assessment.

Walkley and Garwood [37] conducted spawning surveys for five winters (2011 to 2016) throughout tributaries of the Smith River and found the average stray rate of hatchery produced Chinook carcasses was 8.8 percent in tributaries below the Smith River forks (excluding Rowdy Creek drainage) and zero in tributaries above the forks. However, they did observe three live hatchery Chinook out of 461 observations (0.6%) above the forks. In addition, Walkley and Garwood [37] found the average stray rate of live hatchery produced Steelhead was 5.3 percent in tributaries below the Smith River forks (excluding Rowdy Creek drainage) and zero percent in tributaries above the forks. The survey methods, spatial focus, and timeframe for the creel surveys were quite different than the spawner surveys. For example, the creel surveys were focused on the mainstem channels of the Smith River and the spawning surveys focused on tributaries. These data indicate that during spawner surveys much fewer hatchery salmonids were observed relative to natural-origin salmonids than reported by creel clerks. Production of Chinook and Steelhead at RCH has substantially declined since 2006 suggesting far fewer hatchery fish contribute to the catchable populations. Furthermore, the hatchery stocking location was moved in 2011 potentially altering the stray rates of Chinook and Steelhead from previous years (*see* "Annual Production and Planting", page 12).

Catch-and-Release Rates

Smith River anglers commonly practice catch-and-release fishing, generally releasing over 50% of their catches (Table 20). The table below summarizes catch-and-release rates for Steelhead, Chinook salmon and Cutthroat for the 10 censuses taking place from 1997-98 to 2010 in which 50 or more fish were reported caught. Release rates ranged from 44.3% to 69.3%, averaging 60.8% for Steelhead, 32.0% to 79.2%, averaging 52.1% for Chinook and 80.1% to 100%, averaging 89.0% for cutthroat (Table 20).

Table 20 Catch-and-release rates for Smith River Steelhead, Chinook and cutthroat trout as reported during 10 creel censuses from 1997-98 to 2010.

Creel Census Year(s)	Steelhead				Chinook				Cutthroat			
	Kept	Released	Total	% Released	Kept	Released	Total	% Released	Kept	Released	Total	% Released
1997-98	2,210	1,760	3,970	44.3%	880	642	1,522	42.2%	None reported			
1998-99	2,300	3,148	5,448	57.8%	467	333	800	41.6%				
1999-2000	1,590	2,134	3,724	57.3%	497	328	825	39.8%	0	98	98	100.0%
2000-01	1,691	3,808	5,499	69.2%	1,078	2,600	3,678	70.7%	None reported			
2001-02	2,632	5,395	8,027	67.2%	741	1,256	1,997	62.9%				
2002-03	2,000	4,507	6,507	69.3%	758	1,591	2,349	67.7%	55	221	276	80.1%
2004-05	1,590	2,943	4,533	64.9%	891	3,384	4,275	79.2%	39	205	244	84.0%
2005-06	3,224	4,353	7,577	57.5%	None reported				11	124	135	91.9%
2006-07	2,164	3,260	5,424	60.1%	406	191	597	32.0%	10	81	91	89.0%
2010	None reported				55	27	82	32.9%	None reported			
Average [1/]				60.8%	Average			52.1%	Average			89.0%

[1/] Calculated as the average of the percentages.

Steelhead Report and Restoration Card Program and Creel Census Comparisons

With some adjustments, direct comparisons of Steelhead-catch-and release of both hatchery and wild fish can be made between creel census data and data generated from the Steelhead Report and Restoration Card Program (SHRRC) [25]. From 1999 to 2007 seven creel censuses were conducted which resulted in catch and release statistics for Smith River hatchery and wild Steelhead (Table 21). To make the two data-sets comparable, SHRRC data outside of the time frame of the census was ignored. For example, the 2004-05 census was conducted from 10/9/04 through 3/31/05 and although that time frame coincides with the vast majority of the Steelhead run, it probably misses the early and late portions of the run. The SHRRC however, is designed to capture year-round catch information. For the 2004-05 Steelhead run, the 82 Steelhead reported caught by the SHRRC before and after the active census dates were not included for comparison. Additionally, specific locations of catch are not available from the SHRRC so only basin-wide comparisons can be made.

Table 21 Numbers [1/] and percentages of hatchery and natural-origin Steelhead observed by creel clerks versus reported by the SHRRC, 1999-2000 through 2006-2007 seasons.

Creel Census Year [3/]	Data Source						% Under Reported [4/]
	Creel Census			SHRRC [2/]			
	Wild	Hatchery	% Hat	Wild	Hatchery	% Hat	
1999-2000	121	81	40.1%	330	111	25.1%	37.4%
2000-01	163	146	47.2%	309	130	29.6%	37.3%
2001-02	316	215	40.5%	433	244	36.1%	11.0%
2002-03	369	143	28.0%	1,055	695	39.7%	-41.9%
2004-05	257	124	32.5%	1,977	928	31.9%	1.9%
2005-06	279	235	45.7%	2,734	1,243	31.3%	31.6%
2006-07	254	184	42.0%	2,774	1,122	28.8%	31.5%
Average [5/]			39.4%	Average		31.8%	19.4%

[1/] Reported hatchery numbers adjusted upward and wild numbers lowered to account for the average poor fin-clip rate of 8.8%.

[2/] Steelhead Report and Restoration Card Program.

[3/] SHRRC data not included when outside of the creel census time frame.

[4/] Percentage under reported as compared to Creel Census.

[5/] Calculated as the average of the percentages.

Hatchery Steelhead Contribution Rate Comparisons: During the seven years of concurrent data collection, the percent of hatchery contribution in the Steelhead fishery ranged from 28.0% to 47.2% for creel-clerk observed fish while SHRRC-generated data ranged from 25.1% to 39.7% (*see* Table 21).

For all but the 2002-03 season, SHRRC under reported hatchery-contribution rates as compared to creel census rates. Assuming the creel-clerk observed hatchery contribution rates are correct (*see* "Hatchery Contribution to the Fishery", page 54), the overall under-reporting rate averaged over the six years was 19.4% (Table 21). The reason for the disparity in hatchery Steelhead contribution rates between the two reporting methods is unknown.

Steelhead Catch-and-Release Estimates During the seven years of concurrent creel census and SHRRC Smith River Steelhead catch statistics, the average release rate equaled 63.9% (range: 57.3% to 69.3%) for creel census data while for SHRRC data averaged 68.6% (range: 65.2% to 70.8%) (Table 22). Overall, the two methods appeared to produce reasonably comparable results related to Steelhead release rates. While the creel census did not report separate release rates for hatchery versus wild Steelhead, the SHRRC data indicated anglers consistently released a higher percentage of wild Steelhead versus hatchery Steelhead. The higher release rate for natural-origin Steelhead may be influenced by the minimum size limit aimed at reducing harvest of smaller natural-origin Steelhead (see Table 4). The SHRRC release rates for hatchery Steelhead averaged 52.7% (range: 47.0% to 59.8%) and for wild Steelhead it averaged 75.6% (range 68.8% to 79.2%) (Table 22).

Table 22 Smith River Steelhead catch and release rates as reported during six creel census versus reported by the SHRRC.

Creel Census Year [4/]	Data Source															
	Creel Census				SHRRC [1/]											
	Hatchery and Wild [2/]				Hatchery [3/]				Wild				Hatchery and Wild			
	Kept	Rel [5/]	Total	% Rel	Kept	Rel	Total	% Rel	Kept	Rel	Total	% Rel	Kept	Rel	Total	% Rel
1999-2000	1,590	2,134	3,724	57.3%	54	57	111	51.5%	75	255	330	77.2%	129	312	441	70.7%
2000-01	1,691	3,808	5,499	69.2%	67	63	130	48.8%	64	245	309	79.2%	131	308	439	70.2%
2001-02	2,632	5,395	8,027	67.2%	101	143	244	58.6%	103	330	433	76.2%	204	473	677	69.9%
2002-03	2,000	4,507	6,507	69.3%	280	415	695	59.8%	329	726	1,055	68.8%	609	1,141	1,750	65.2%
2004-05	1,590	2,942	4,532	64.9%	449	478	928	51.6%	480	1,498	1,977	75.7%	929	1,976	2,905	68.0%
2005-06	3,224	4,353	7,577	57.5%	659	584	1,243	47.0%	721	2,013	2,734	73.6%	1,380	2,597	3,977	65.3%
2006-07	2,164	3,260	5,424	60.1%	540	582	1,122	51.9%	597	2,177	2,774	78.5%	1,137	2,759	3,896	70.8%
Average [6/]				63.6%	Average			52.7%	Average			75.6%	Average			68.6%

[1/] Steelhead Report and Restoration Card Program.

[2/] Hatchery versus wild steelhead release rates not reported.

[3/] Reported hatchery numbers adjusted upward and wild numbers lowered to account for the average poor-fin clip rate of 9.3%.

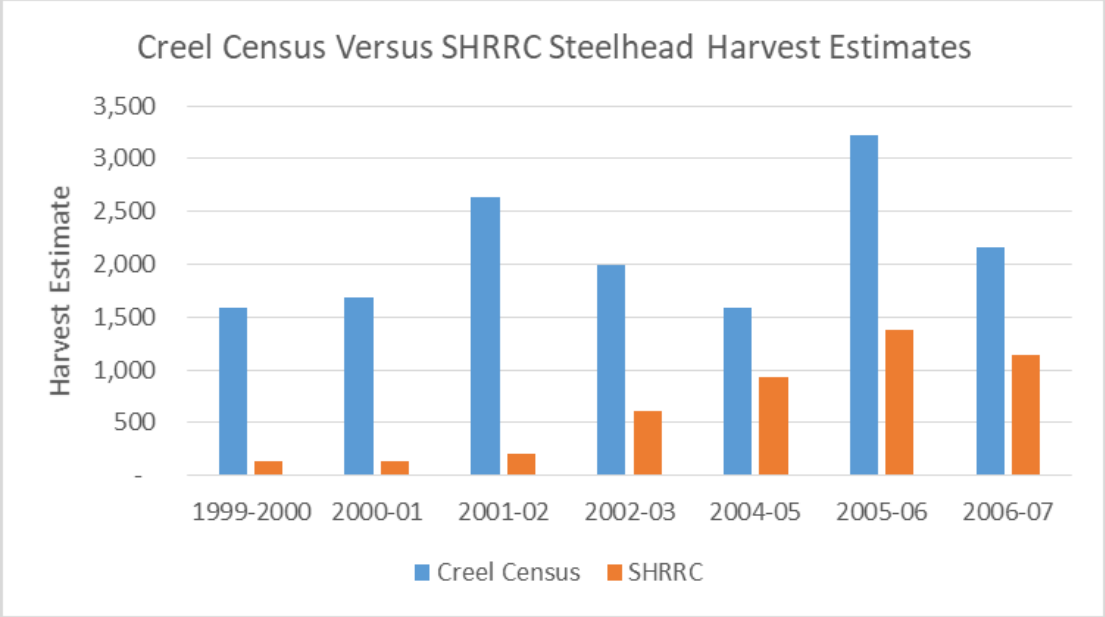
[4/] SHRRC data not included when outside of the creel census time frame.

[5/] Released

[6/] Calculated as the average of the percentages.

Steelhead Harvest Rates: Table 22 above and Figure 16 show seven years of Steelhead harvest rates for Smith River Steelhead as estimated concurrently by the creel census and SHRRC. As noted in Table 22 under the "Kept" columns, harvest estimates for hatchery plus wild Steelhead ranged from 1,590 to 3,224 for the creel census and 129 to 1,380 for the SHRRC. As shown graphically in Figure 16, creel census estimates consistently and significantly estimated higher Steelhead harvests than SHRRC. In fact, for the first three-years of comparisons, creel census estimates are over ten times the SHRRC estimates (*see* Table 22, Figure 16).

Figure 16 Creel census versus SHRRC Smith River Steelhead harvest estimates, 1999-2000 to 2006-07.



Noteworthy, during the first four years of comparisons, SHRRC regulation did not require anglers to return their report cards to CDFW. Instead, a percentage of anglers were randomly interviewed by phone and their catch statistics were compiled to represent all anglers. In 2004, regulations were changed to require all anglers to return their report card to CDFW no later than January 31 of the following year. This change in regulations is probably reflected in the better consistency between creel census and SHRRC estimates for later years but does not explain why the 2002-03 SHRRC estimate, which was still under the old regulations, more closely approximated the creel estimate. Even with the better consistency however, creel-census estimates are still about twice that as estimated by the SHRRC (Figure 16).

It is unclear which of the two methods produce the most accurate catch and harvest estimates. On the one hand, the SHRRC figures are theoretically actual counts and not dependent on data expansion but conversely, SHRRC relies on anglers correctly and honestly filling out and returning the report cards[14]. It is possible some anglers would feel it is in their best interest to under-report their catch. Creel census estimates are performed by paid professional staff and use established methods designed to produce consistent statistical results. However, creel censuses are highly dependent on anglers correctly reporting the number of hours they fish and the number of fish they caught and released.

If Steelhead harvest estimates are going to be used as an effective management tool, a better understanding of which estimating method returns a more accurate number is needed.

[14] According to the CDFW administrator for the SHRRC Program, only about 30% of the SHRRCs sold are returned by anglers.

Low River Flow Correlates on Catch Rates and Pinniped-Bite Mark Rates

Low-flow days are defined here as the number of days within the November through December time period that have average daily flows of less than 600 CFS as measured at the USGS Jedediah Smith gauging station near Hiouchi. The number of low-flow days varied greatly during the seven years of creel censuses between 1998 and 2006 inclusive. During the 61-day period of November 1 through December 31, the number of low-flow days ranged from one in 2005 to twenty-three in 2002 (Table 23). Both the incidence of pinniped bite marks and Reach 1 CPH correlated with extreme low flows incurred in the late-fall of 2002. Specifically, with the low flows, both the incidence of pinniped bite marks and CPH (in Reach 1) were elevated (Table 23).

Table 23 Incidence of pinniped bite marks and catch per hour versus number of low-flow days (<600 CFS) as measured at the USGS gauging station near Hiouchi.

	Year [1/]						
	1998	1999	2000	2001	2002	2005	2006
Incidence of bite marks [2/]	3.8%	10.4%	21.1%	6.7%	75.1%	6.3%	2.6%
Reach 1 catch per hour [3/]	0.027	0.020	0.036	0.027	0.090	0.000	0.000
Low-flows days [4/]	3	7	11	11	23	1	2

1/ November through December only

2/ Precent of fish observed displaying pinniped bite marks. All species combined

3/ Catch per hour fished for all species combined

4/ Daily flows less than 600 CFS as measured at the USGS gauging station near Crescent City.

Regression analysis indicates a high correlation, (R^2=0.899 and R^2=0.826) between the number of low-flow days and both the incidence of pinniped bite marks and the catch per hour in Reach 1, respectively (Figure 17 and Figure 18). However, this is a small 7-year data series and could be substantially weighted by the 2002 sampling year (Figure 18).

It is likely that the low flows observed in 2002 restricted upstream migration in the lower river, thereby concentrating the run making them more vulnerable to both pinniped predation and angling success.

Figure 17 Smith River, Reach 1 catch per hour versus the number of low-flow days observed during the 1998 through 2006 creel censuses (see "Low River Flow Correlates on Catch Rates and Pinniped Bite Mark Rates" page 61 for definition of "low-flow days").

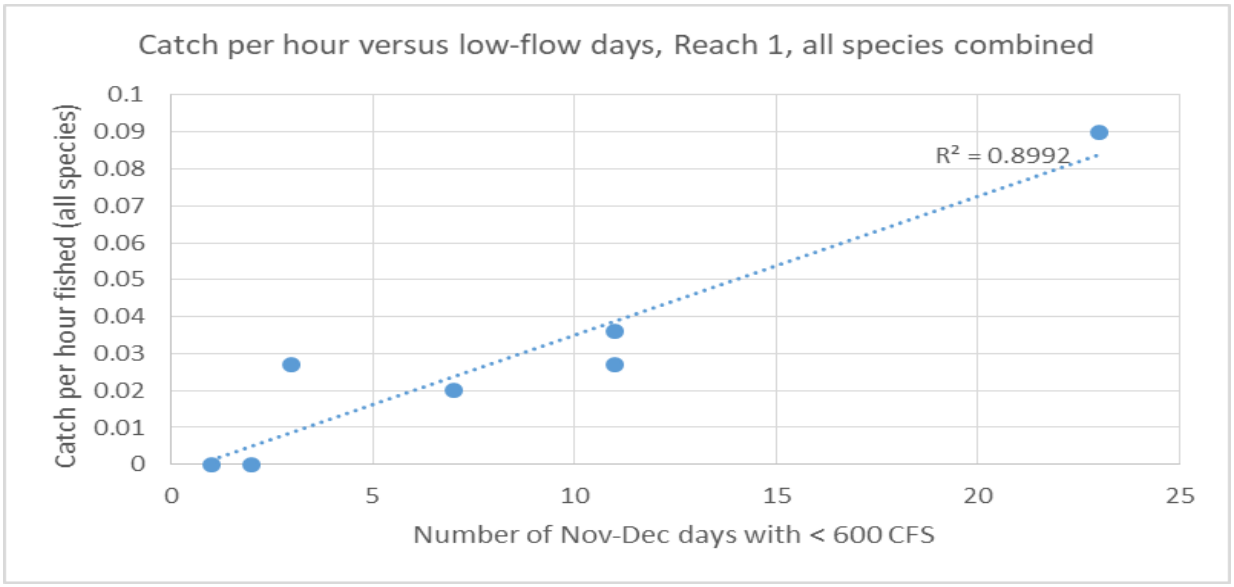
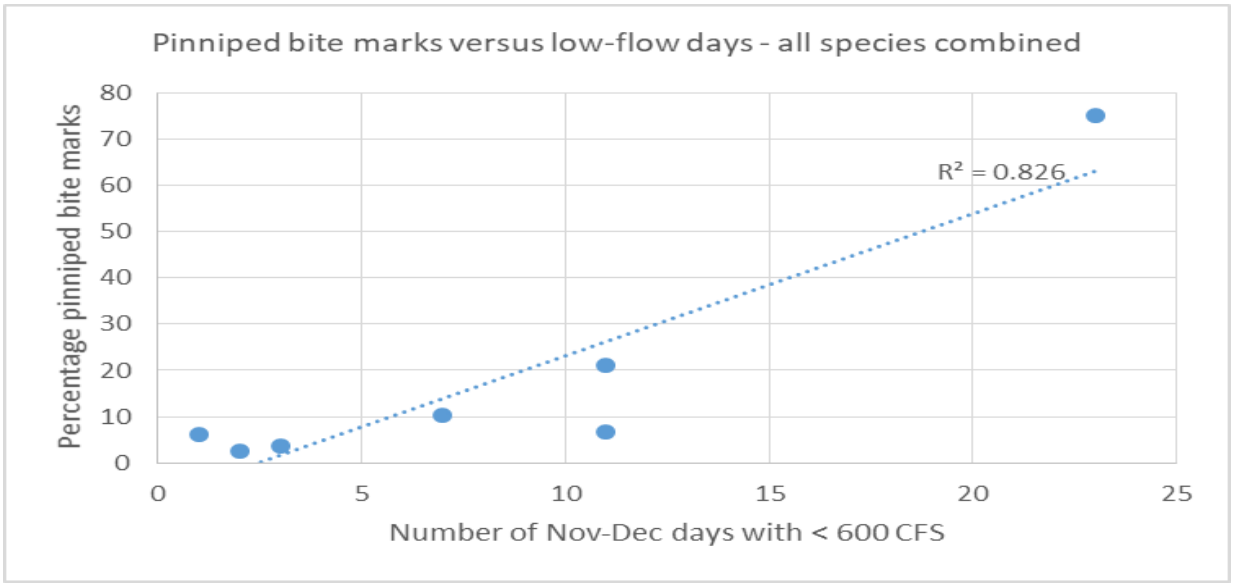


Figure 18 Smith River, pinniped bite mark rates versus the number of low-flow days observed during the 1998 through 2006 creel censuses (see "Low River Flow Correlates on Catch Rates and Pinniped Bite Mark Rates" page 61 for definition of "low-flow days)".



Exploitation Rates

The Smith River is one of the most important salmonid fisheries in California. Unlike other important fisheries such as the Klamath and Sacramento rivers, the Smith River lacks consistent long-term monitoring programs for estimating annual run size and harvest of adult salmonids. Understanding adult run size versus harvest (exploitation rate) during spawning migrations is a critical element for managing populations.

There are no concurrent run-size and harvest estimates for Smith River adult salmonids. However, in 2010-2011, 2011-2012, and 2012-2013 Smith River adult salmonid runs were estimated for the basin upstream on Rowdy Creek using Dual Frequency Identification Sonar (DIDSON) technology [42 and 43], (Table 24).

Table 24 Smith River adult Steelhead and Chinook run-size estimates 2010-11, 2011-12 and 2012-13 upstream of Rowdy Creek.

Didson Operating Period		Run-size Estimates	
Start	End	Chinook	Steelhead [a/]
10/25/2010	04/04/2011	22,500	16,000
10/01/2011	03/29/2012	20,000	15,000
12/14/2012	03/31/2013	-- [b/]	9,562
Average Run Size		21,250	13,521

[a/] Upstream migrating Steelhead only.

[b/] Operating period did not include Chinook run.

While there are no corresponding harvest estimates for these years it may be worthwhile to compare previously generated harvest estimates within the same section of river: above Rowdy Creek. Creel Censuses conducted in 1999-2000, 2000-2001 and 2001-2002 provided both Chinook and Steelhead harvest estimates for the Smith River above Rowdy Creek (Table 25). Applying the average harvest rates for the three censuses to the average run size noted above (*see* Table 24) results in an exploitation rate of 9.3% (1,976/21,250) for Chinook and 42.4% (5,737/13,521) for Steelhead. It must be noted that the exploitation rates given above are at best, a "ball park figure" considering the harvest estimates were from a period a decade prior to the run-size estimates and wild steelhead could no longer be harvested after 2009.

Table 25 Smith River upstream of Rowdy Creek harvest estimates for Chinook and Steelhead during the 1999-2000, 2000-2001 and 2001-2002 creel censuses.

Creel Census Year(s)	Harvest Estimates [a/]	
	Chinook	Steelhead
1999-2000	766	3,724
2000-2001	3,560	5,460
2001-2002	1,601	8,026
Average Harvest	1,976	5,737

[a/] Harvest exclusive of Estuary

DISCUSSION

The purpose of this report is to provide fisheries managers a synthesis of all available creel data from the Smith River presented in a single format. Although intermittent, these data represent the most comprehensive assessment of contemporary Smith River angular catch data. Creel censuses provide valuable information to fishery managers, difficult or impossible to obtain in any other manner including:

- Monitoring interactions between hatchery- and naturally-produced fish
- Determining the need for protective angling regulations
- Monitoring effects of regulation changes
- Monitoring inter-annual changes in the fishery including
    - possible changes in species composition
    - possible changes in the size/age of fish
- Monitoring relative health of the fishery in terms of angler effort and catch
- Monitoring incidence of pinniped encounters with adult salmonids
- Comparing and contrasting bias in angling effort and catch statistics with the "Report Card Programs"
- Providing increased CDFW presence to deter illegal fishing activity
- Providing educational opportunities for anglers
- Reinforcing positive public opinion regarding CDFW's commitment to the resource
- Aiding in determining the economic value of the fishery to interested parties

The last comprehensive creel census for Smith River Chinook was done in 1997-98 [11]; 20 years ago. Robust creel censuses targeting Smith River Steelhead have occurred more recently, but even the most recent (2006-07) was over 10 years ago.

Since the last comprehensive creel censuses, many changes in angling regulations and hatchery practices related to Smith River salmonids have occurred. While these changes were put in place to both increase angling opportunities and protect naturally produced salmonids, their effectiveness is unknown. A creel census timed and located to monitor angling effort and catch of Smith River Chinook and Steelhead is vital in answering the above questions. Furthermore, a robust estimate of the total Smith River adult population size of Chinook and Steelhead is vital to understanding the exploitation rate of wild and hatchery populations derived from creel censuses.

While the Report Card Programs (*see* "CDFW Card Programs", page 17) are designed, in part, to answer some of the above questions, comparisons to date (*see* Figure 16) have shown significant disparity between creel-census- and report-card derived results. A creel census fine-tuned to investigate the source of the disparities could have state-wide significance.

RECOMMENDATIONS

Priority should be given to Identifying long-term funding sources for annual Smith River creel censuses. The censuses should follow standard methods and objectives (except as noted below) established in the 1996-97 census and be of duration to fully sample the Steelhead and Chinook runs – September through March. Strong consideration should be given to hiring local creel clerks to save on travel time as well as

fuel and other vehicle related costs. Furthermore, creel censuses should be coupled with an adult counting station so annual exploitation rates can be compared to total annual adult population estimates. Additional objectives should be included in the censuses to specifically:

- Evaluate current RCH downstream release policy for Steelhead to determine straying and contribution to the fishery of hatchery-produced Steelhead.
- Evaluate RCH Chinook releases to determine straying and contribution to the fishery of hatchery-produced Chinook.
- Compare and contrast Smith River Chinook fishery information derived from the creel census versus the North Coast Salmon Report Card.
- Investigate the disparity of Steelhead fishery information observed between SHRRC and creel census-derived methods.
- If time permits, consider having creel clerks check SHRRC report cards to ensure they are being properly filled out.

Regardless of whether or not creel censuses take place, CDFW should continue to perform quality control on the effectiveness of the marking programs at RCH.

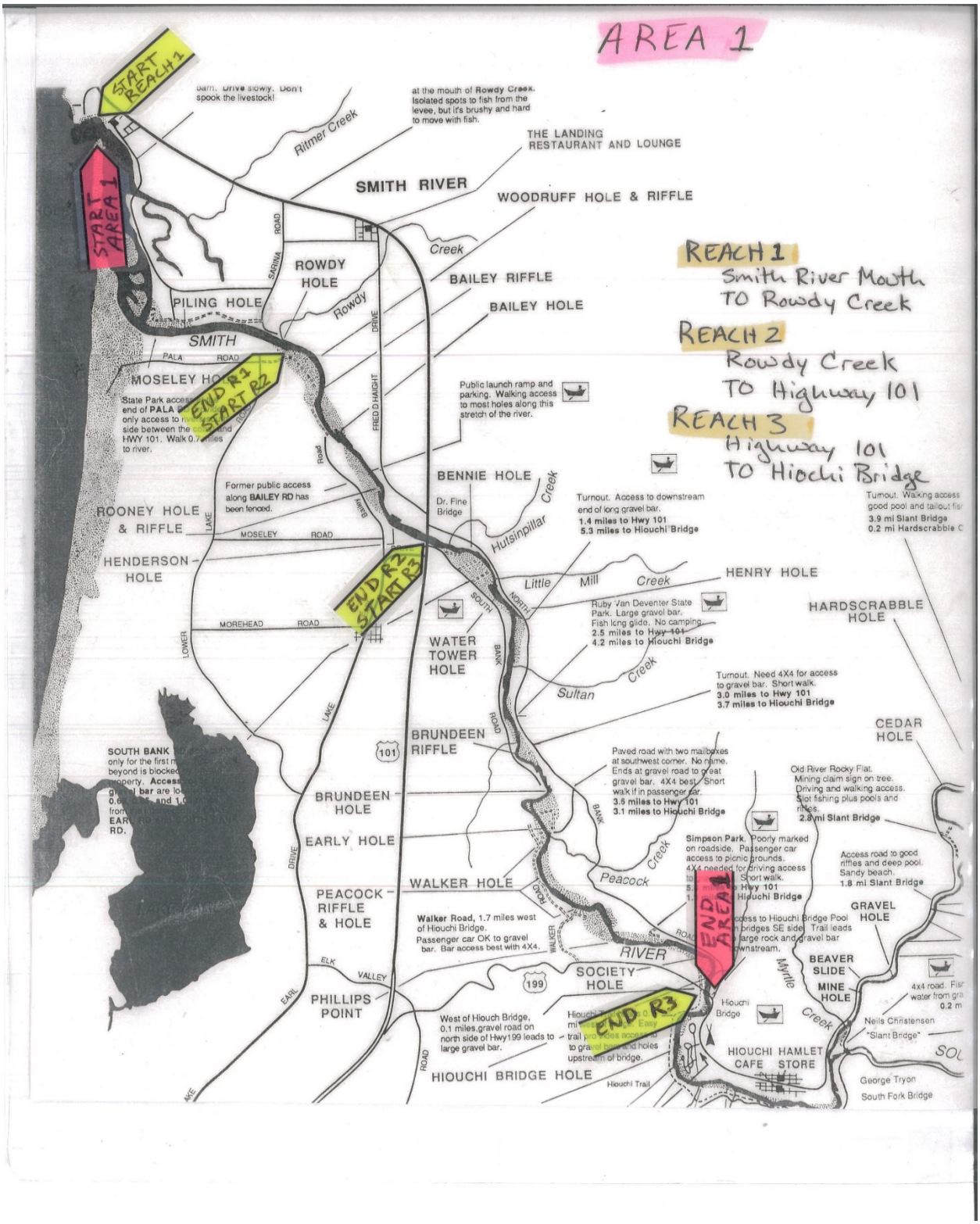
ACKNOWLEDGEMENTS

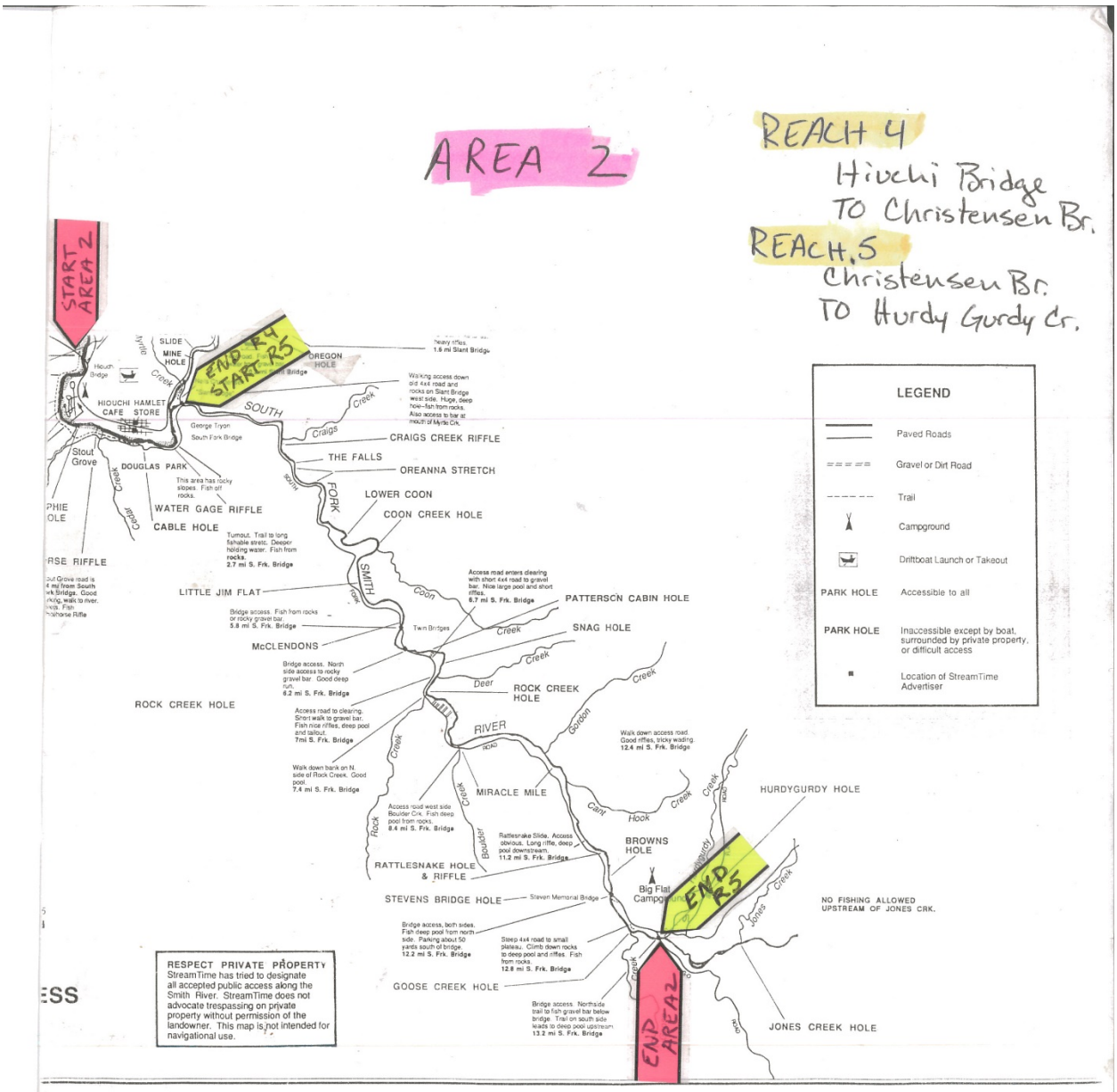
This synthesis report would not be possible without the many years of creel censuses carried out by dozens of field personnel as well as the in-depth analysis and publications produced by fishery scientists/authors through the years. I express my gratitude to the following for their thoughtful and insightful comments which greatly benefited this report: Sherry Mason, Michael Sparkman, Farhat Bajjaliya, Philip Bairrington and Mike McCain.

Beyond that, I would like to specifically thank and acknowledge Michelle Gilroy and Justin Garwood for their efforts towards this report which went far beyond their valuable editing contributions. Without Michelle Gilroy's persistence in obtaining funding, this report would literally never have been started, much less been completed. Additionally, Michelle spent untold hours on the phone and digging through dusty old cardboard boxes to locate and make available nearly-forgotten creel reports and other documents used in the completion of this report. Justin Garwood authored the main map (Figure 1) as well as many of the paragraphs in this report.

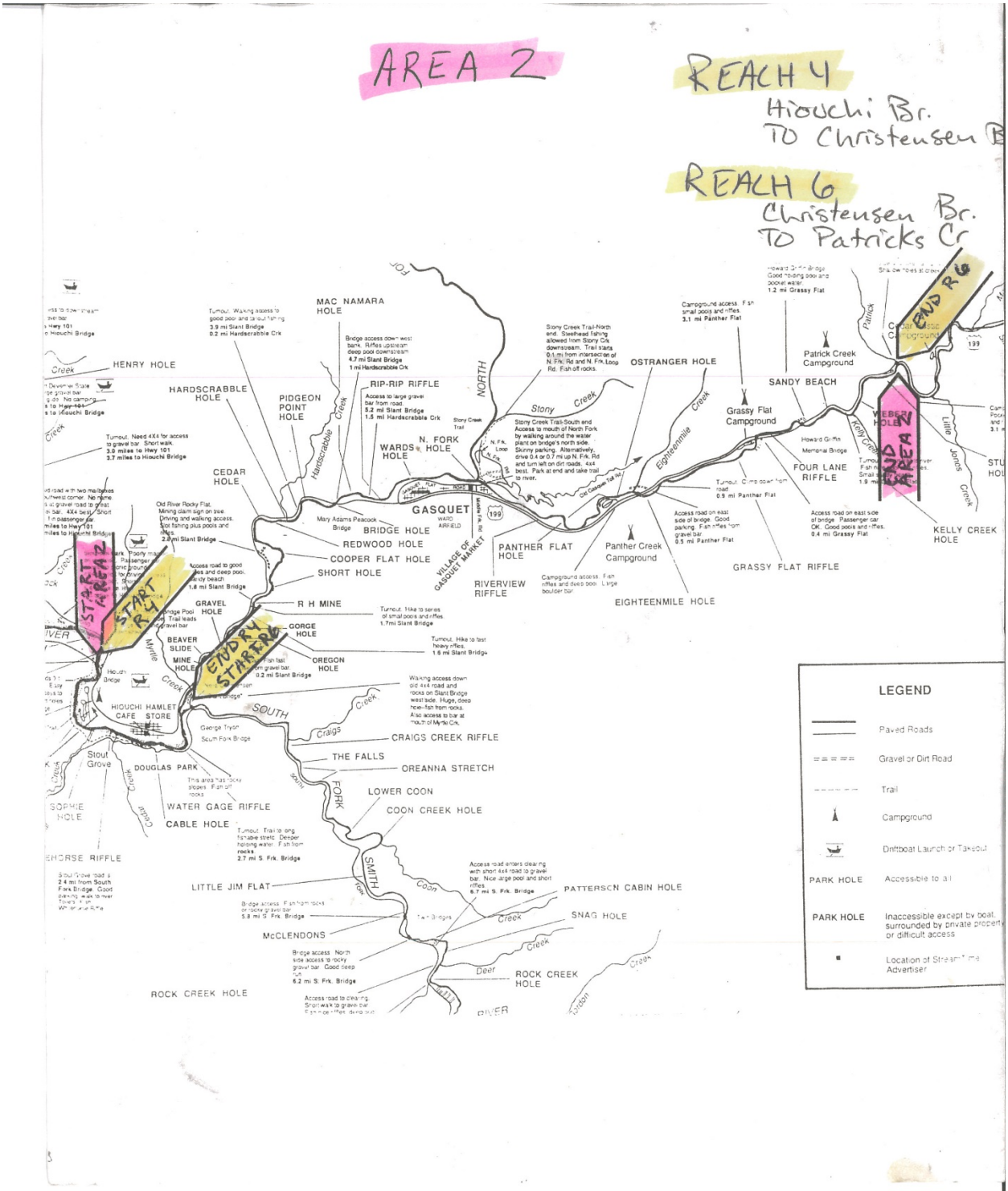
APPENDICES

Appendix 1 Smith River creel censuses, Area 1, Reaches 1, 2 and 3.

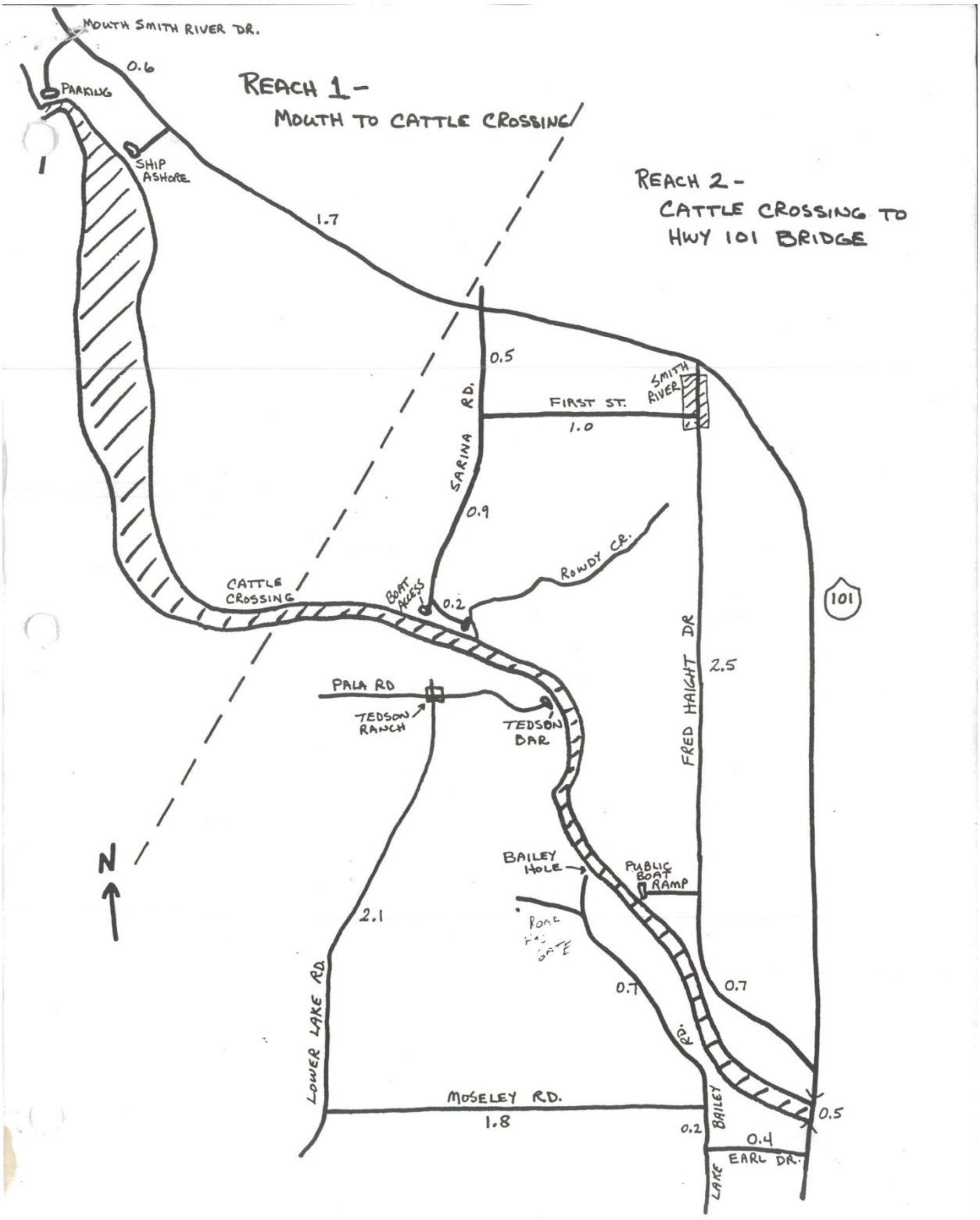



AREA 2
REACH 4
Hiouchi Bridge
TO Christensen Br.
REACH 5
Christensen Br.
TO Hurdy Gurdy Cr.
START AREA 2
END R4 START R5
END R5
END AREA 2
LEGEND
Paved Roads
Gravel or Dirt Road
Trail
Campground
Driftboat Launch or Takeout
PARK HOLE
Accessible to all
PARK HOLE
Inaccessible except by boat, surrounded by private property, or difficult access
Location of StreamTime Advertiser
HIOUCHI HAMLET
CAFE STORE
Hiouchi Bridge
SLIDE
MINE HOLE
OREGON HOLE
Slant Bridge
Myrtle Creek
SOUTH FORK
Craigs Creek
CRAIGS CREEK RIFFLE
THE FALLS
OREANNA STRETCH
LOWER COON
COON CREEK HOLE
George Tryon South Fork Bridge
Stout Grove
DOUGLAS PARK
This area has rocky slopes. Fish off rocks.
WATER GAGE RIFFLE
CABLE HOLE
Turnout. Trail to long fishable stretc. Deeper holding water. Fish from rocks. 2.7 mi S. Frk. Bridge
LITTLE JIM FLAT
Bridge access. Fish from rocks or rocky gravel bar. 5.8 mi S. Frk. Bridge
McCLENDONS
Bridge access. North side access to rocky gravel bar. Good deep run. 6.2 mi S. Frk. Bridge
ROCK CREEK HOLE
Access road to clearing. Short walk to gravel bar. Fish nice riffles, deep pool and tailout. 7mi S. Frk. Bridge
Walk down bank on N. side of Rock Creek. Good pool. 7.4 mi S. Frk. Bridge
SMITH RIVER
Access road enters clearing with short 4x4 road to gravel bar. Nice large pool and short riffles. 6.7 mi S. Frk. Bridge
PATTERSON CABIN HOLE
Twin Bridges
SNAG HOLE
Deer Creek
ROCK CREEK HOLE
Gordon Creek
Walk down access road. Good riffles, tricky wading. 12.4 mi S. Frk. Bridge
MIRACLE MILE
Rock Creek
Access road west side Boulder Crk. Fish deep pool from rocks. 8.4 mi S. Frk. Bridge
Boulder Creek
Rattlesnake Slide. Access obvious. Long riffle, deep pool downstream. 11.2 mi S. Frk. Bridge
RATTLESNAKE HOLE & RIFFLE
Cant Hook Creek
HURDYGURDY HOLE
BROWNS HOLE
Big Flat Campground
STEVENS BRIDGE HOLE
Steven Memorial Bridge
Bridge access, both sides. Fish deep pool from north side. Parking about 50 yards south of bridge. 12.2 mi S. Frk. Bridge
Steep 4x4 road to small plateau. Climb down rocks to deep pool and riffles. Fish from rocks. 12.8 mi S. Frk. Bridge
GOOSE CREEK HOLE
Bridge access. Northside trail to fish gravel bar below bridge. Trail on south side leads to deep pool upstream. 13.2 mi S. Frk. Bridge
Jones Creek
NO FISHING ALLOWED UPSTREAM OF JONES CRK.
JONES CREEK HOLE
RESPECT PRIVATE PROPERTY
StreamTime has tried to designate all accepted public access along the Smith River. StreamTime does not advocate trespassing on private property without permission of the landowner. This map is not intended for navigational use.

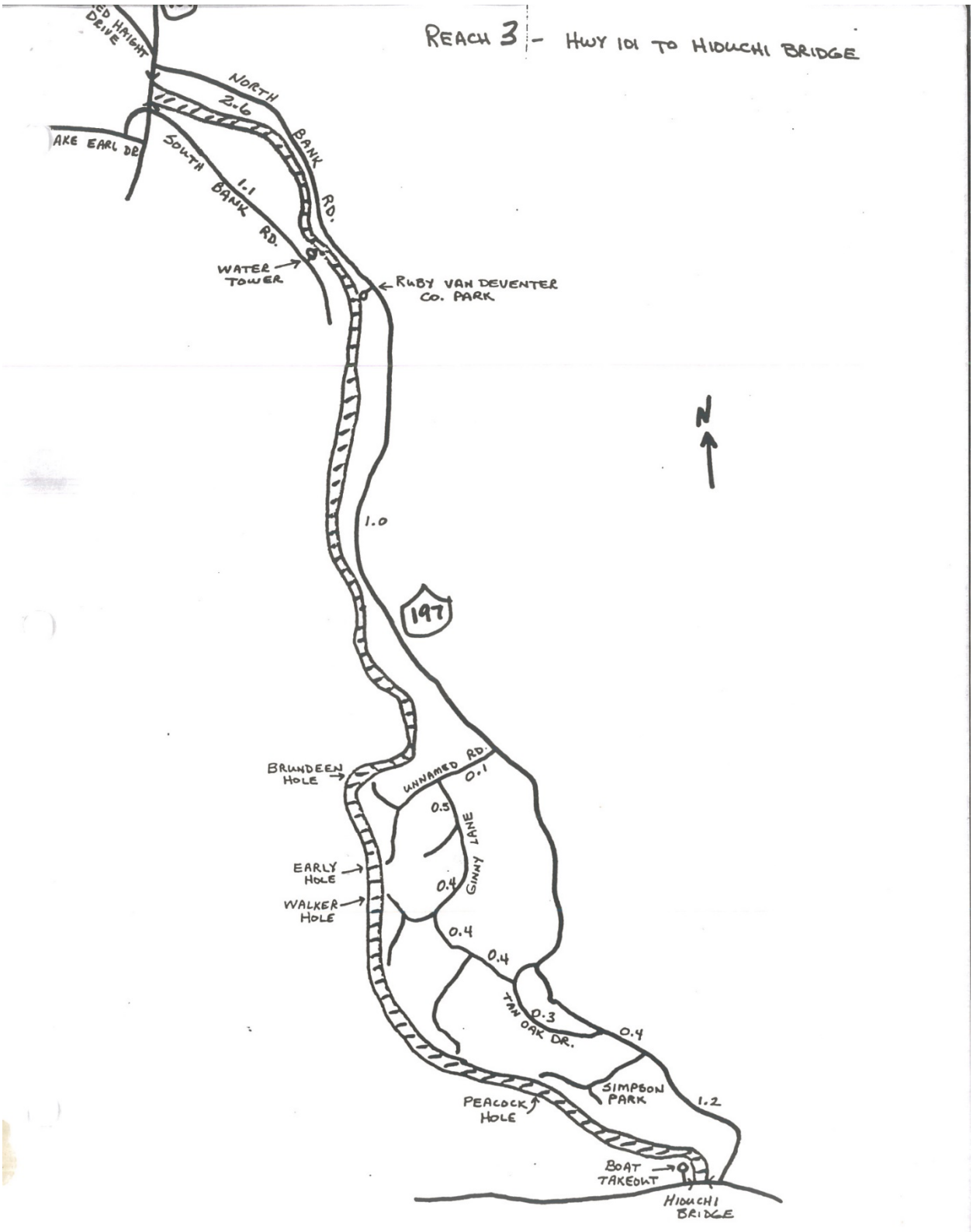
Appendix 3 Smith River creel censuses, Area 2, Reaches 4 and 6.

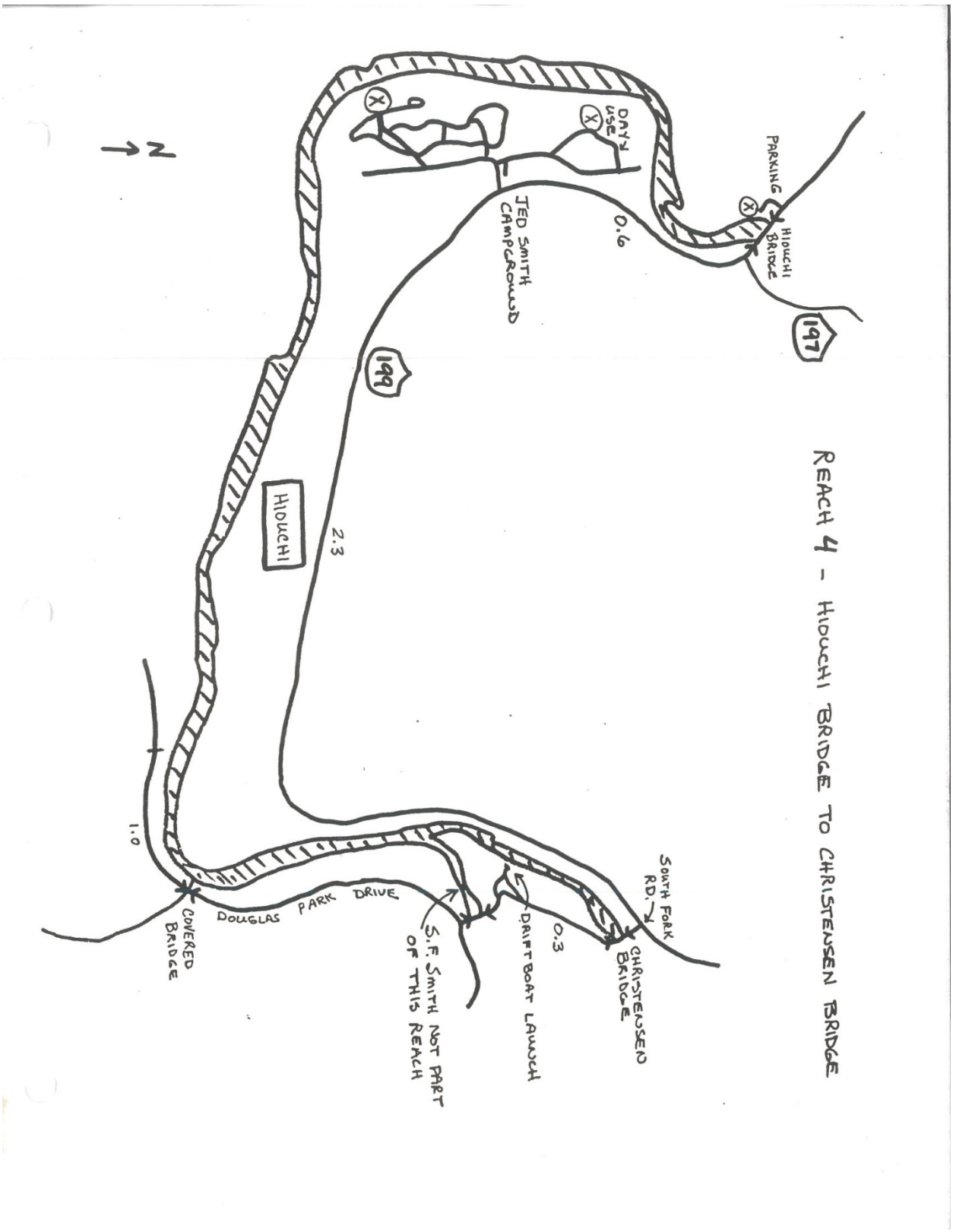


Appendix 4 Smith River creel censuses Reaches 1 and 2 detail.

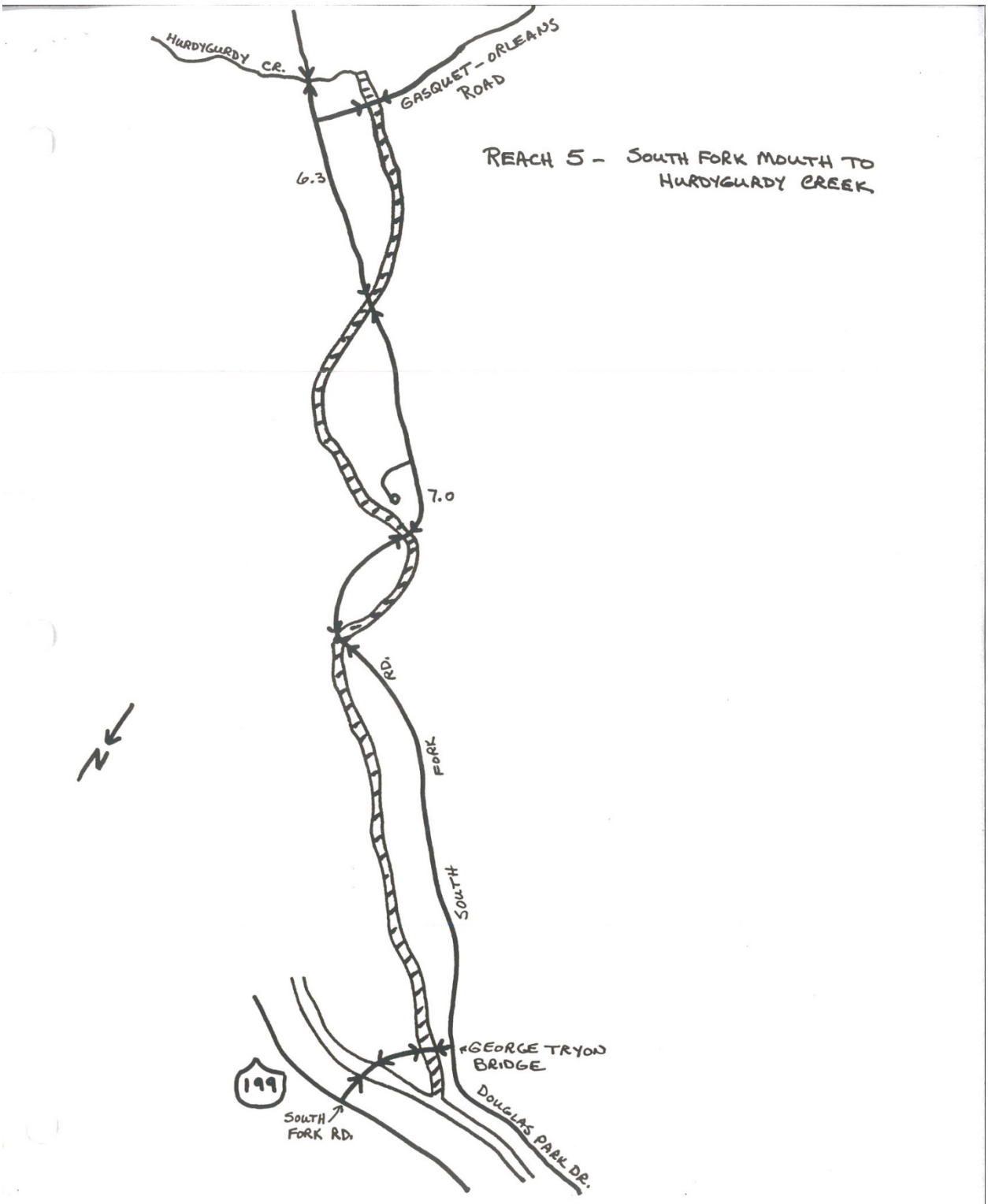


Appendix 5 Smith River creel censuses Reach 3 detail.

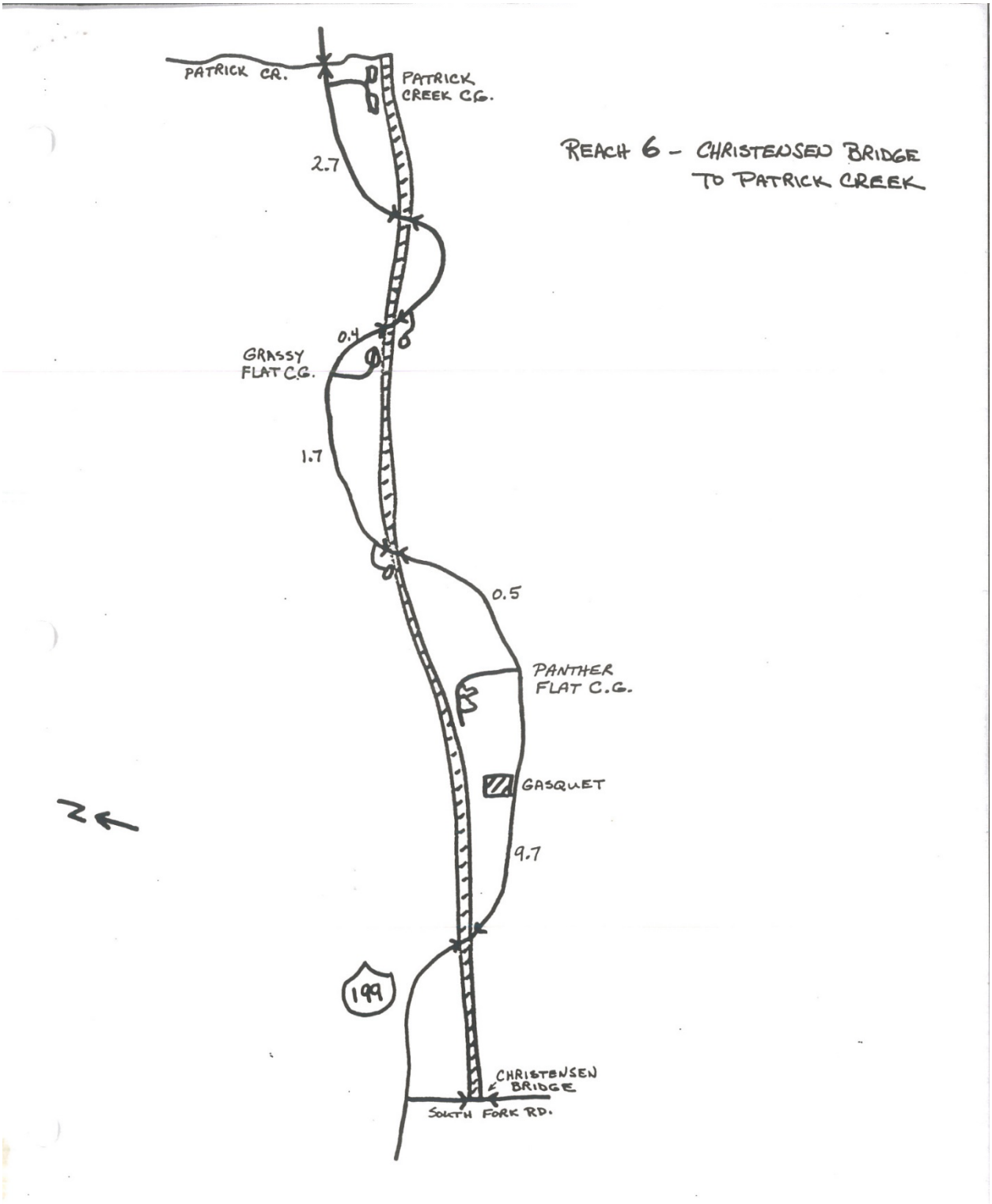



REACH 4 - HIOUCHI BRIDGE TO CHRISTENSEN BRIDGE
N
HIOUCHI BRIDGE
PARKING
DAY USE
JED SMITH CAMPGROUND
0.6
197
199
HIOUCHI
2.3
1.0
COVERED BRIDGE
DOUGLAS PARK DRIVE
S.F. SMITH NOT PART OF THIS REACH
DRIFT BOAT LAUNCH
0.3
SOUTH FORK RD.
CHRISTENSEN BRIDGE

Appendix 7 Smith River creel census Reach 5 detail.



Appendix 8 Smith River creel census Reach 6 detail.



PRELIMINARY

Estimated Yield By Species In Sampled Portion of Smith River, 1980

		A Yield	%	B Yield	%	C Yield	%	D Yield	%	E Yield	%	F Yield	%	Total
May - June	King Salmon	0	0	0	0	0	0	0	0	0	0	0	0	0
	Rainbow	0	0	369	64.3	90	100.0	424	58.3	249	48.8	0		1132
	Cutthroat	0	0	205	35.7	0	0	182	25.0	261	51.2	0		648
	Other	79	100.0	0	0	0	0	121	16.7	0	0	0		200
	Total	79	100.0	574	100.0	90	100.0	727	100.0	510	100.0	0		1980
Jul	King Salmon	0	0	0	0	0	0	0	0	0	0	0	0	0
	Rainbow	57	50.0	326	62.5	76	100.0	459	45.5	351	63.7			1269
	Cutthroat	9	8.3	131	25.0	0	0	92	9.1	151	27.3			383
	Other	47	41.7	65	12.5	0	0	459	45.5	50	9.1			621
	Total	113	100.0	522	100.0	76	100.0	1010	100.0	552	100.0	0		2273
Aug	King Salmon	0		0	0	0	0	0	0	0	0	0	0	0
	Rainbow	0		183	55.6	387	63.6	1674	89.8	881	93.1	0		3125
	Cutthroat	0		37	11.1	0	0.0	0	10.2	65	6.9	0		102
	Other	0		110	33.3	221	36.4	190	0	0	0	0		521
	Total	0		330	100.0	608	100.0	1864	100.0	946	100.0	0		3748
Sept.	No Sampling in September													
Oct.	King Salmon	485	84.4	75	4.8	85	15.0	25	4.8					670
	Rainbow	36	6.3	1422	90.5	483	85.0	481	90.5					2422
	Cutthroat	0	0	50	3.2	0	0	25	4.8					75
	Other	54	9.4	25	1.6	0	0	0	0					79
	Total	575	100.0	1572	100.0	568	100.0	531	100.0					3246
Nov.	King Salmon	561	59.2	210	50.0	69	66.7	18	8.3					858
	Rainbow	251	26.5	210	50.0	34	33.3	204	91.7					699
	Cutthroat	0	0	0	0	0	0	0	0					0
	Other	135	14.3	0	0	0	0	0	0					135
	Total	947	100.0	420	100.0	103	100.0	222	100.0					1692

Appendix 9 Original results table for the 1980a Smith River creel census. Note table marked "Preliminary".

Appendix 10 Original results table for the 1980a Smith River creel census. Note table marked "Preliminary".

Estimated use (in Angler-Hrs.) Sampled Portion
Smith River, 1980
Prepared by Steven N. Taylor

November 30, 1980

	A	B	C	D	E	F	TOTAL
May 24 - June 30	1,128	1,699	1,097	1,483	1,579	279	7,265
Jul.	1,446	1,858	1,573	2,136	2,009	160	9,182
Aug.	1,509	1,571	3,418	2,270	1,074	738	10,580
Sept.	-	-	-	-	-	-	
Oct.	15,963	9,528	3,740	567	0	--	29,788
Nov.	12,628	8,226	3,974	1,140	484	-	26,452

- = No sampling.

PRELIMINARY

Appendix 11 Original results table for the 1980-81 Smith River creel census. Note: due to the paucity of data, the December through May results presented in this table are not included in the synthesis report.

SMITH RIVER FISHERIES STATISTICS
1980-81

Month	Estimated Use (Angler-Hours)		Estimated Catch (Rainbow Trout)	
June	7,265	67,815	1,132	10,948
July	9,182		1,269	
Aug.	10,580		3,125	
Sept.	11,000		3,000	
Oct.	29,788		2,422	
Nov.	26,452	94,287	699	3,637
Dec.	22,813		844	
Jan.	18,848		839	
Feb.	15,442		549	
Mar.	6,131		417	
Apr.	3,719		289	
May	882		-0-	
Total	162,102		14,585	