

Mid-Klamath River Chinook Spawner Escapement Surveys

Klamath National Forest
FWS Agreement # 813335H014

Final Report

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ABSTRACT

Cooperative spawning ground surveys, between the United States Forest Service, California Department of Fish and Game, Yurok Tribe, Karuk Tribe and local volunteers, have occurred on the Klamath National Forest since 1992. In 2004, two more cooperators, the Scott Valley Resource Conservation District and the Quartz Valley Reservation, joined in on our efforts. These surveys are used to estimate the total in-river spawner escapement of fall Chinook salmon (*Oncorhynchus tshawytscha*) by the Klamath Fisheries Management Council and the Pacific Fisheries Management Council in the determination of harvest allocations for the subsequent year.

The Salmon River, Scott River, and mid-Klamath River tributaries are surveyed on an annual basis using both carcass mark-recapture and redd count techniques. In 2004, redd surveys were used in the mid-Klamath tributaries, Wooley Creek, and the lower Salmon River. Carcass mark-recapture was used in conjunction with redd surveys on the Salmon River, above Nordheimer Creek, including portions of the North and South Forks. Redds were not enumerated during surveys in the Salmon River, instead redds were flagged and mapped using high resolution GPS. This method was used during the 2003 surveys to map redds in the Scott River. Redd mapping allows the Forest Service to continue documentation of spawning ground distribution while using the crew field time more effectively. Judicious use of crew time, reflected as salaries, has become a necessity due to budget constraints. Because redds were mapped on the Scott River in 2003, redds were not mapped there this year. We plan on alternating mapping of redds in the Scott and Salmon Rivers from one year to the next. Carcass mark-recapture was the only method used on the Scott River in 2004. The 2004 cooperative survey began October 18 and ended a week earlier than planned on November 23 due to low fish numbers (< 100 carcasses in either the Scott or Salmon River).

Approximately 626 fish returned to the Salmon River, 467 fish returned to the Scott River, 4750 fish returned to the Shasta River basin and Bogus Creek, and 557 fish returned to miscellaneous mid-Klamath River tributaries in 2004. The Salmon River spawning was concentrated in those reaches that have historically had heavy spawning, the lower 6 miles of the North Fork and South Fork and in the mainstem. The Scott River spawning distribution is flow dependent with the valley having the highest concentration of spawning in years of high flows, and the canyon having the highest concentration of spawning during years of low flow. The Scott River 2004 surveys found that spawning was most concentrated in the canyon probably due to low flows (20-120 cfs) throughout the survey period.

INTRODUCTION

Prior to cooperative surveys, weirs and racks were used in the Salmon River and Scott River to estimate fall Chinook salmon spawner escapement. These methods were controversial because of the potential effect of the racks on fish survival, distribution, and migration. Also, the public became concerned about the potential for harassment and poaching in areas where fish congregated below the racks. The ability to gather escapement information, without the effects stated above, was a driving factor in developing the current survey techniques.

Over the past twenty-six years, the California Department of Fish and Game (CDFG) has determined fall Chinook salmon spawner escapement in the Klamath River watershed, using a combination of weirs, mark-recapture surveys, redd surveys, and hatchery returns information. This data is used in the determination of stock size projections and harvest allocations in the management of Klamath River fall Chinook salmon stocks by the Klamath Fisheries Management Council (KFMC) and the Pacific Fisheries Management Council (PFMC).

CDFG, Six Rivers National Forest (SRNF), and the Klamath National Forest (KNF) (SRNF and KNF are hereafter referred to as the USFS) have conducted Chinook spawner surveys for many years. Since missions differ among agencies, the objectives for these surveys were always slightly different. The USFS traditionally counted redds and live fish in order to estimate the number and distribution of spawning Chinook salmon. Beginning in 1992, the CDFG and the USFS joined forces to accomplish spawner escapement surveys partially due to shrinking budgets in both State and Federal programs and the desire to increase cooperative operations between agencies. These surveys now include collaboration with the Karuk Tribal Government, Yurok Tribal Government, local volunteers, Salmon River Restoration Council, Scott Valley Watershed Council, and public schools. In 2004, the Scott Valley Resource Conservation District and Quartz Valley Reservation became new cooperators. The cooperative effort has improved the accuracy of CDFG estimates by enabling surveys that are more extensive and occur more frequently.

For Fiscal Year 2005 (field season beginning in October 2004), a combination of redd and mark-recapture counts were completed in the Scott River and Salmon River in order to determine fall Chinook spawner escapement and distribution. This report will summarize the methods and findings for surveys conducted in from October 18 to November 23 of 2004 in the Klamath National Forest (Table 1). A separate report (Mega-Table, Appendix A) is being prepared by CDFG biologists for the escapement estimates to be used by the KFMC and PFMC. Budget allocations and estimated matching funds are summarized in Appendix F.

Table 1. 2004 Survey Schedule for Salmon River, Scott River, and Tributaries.

Survey Week	Salmon River Monday	Scott River Tuesday	Tributaries Wednesday	Salmon River Thursday	Scott River Friday
Training			10/13	10/14	
1	10/18	10/19	10/20	10/20	10/22
2	10/25	10/26	10/27	10/28	10/29
3	11/1	11/2	11/3	11/4	11/5
4	11/8	11/9	11/10	11/11	11/12
5	11/15	11/16	11/17	11/18	11/19

6	11/22	11/23	off	off	off
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Tributaries surveyed on Wednesdays included Wooley Creek, Grider Creek, Clear Creek, Horse Creek, Beaver Creek, Nordheimer Creek, Methodist Creek, and Knownothing Creek (Appendix D).

REDD SURVEYS

Study Area:

In 2004, redd surveys were conducted on the Salmon River and several major tributaries to the middle Klamath River. Redd surveys on the Scott River were conducted from Fay Lane to the confluence of the Klamath River (Appendix B). Redd surveys on the Salmon River were conducted from mile marker 12 on the North Fork to the confluence with the South Fork, and from Mathews creek campground to the confluence with the North Fork on the South Fork. The mainstem of the Salmon River was surveyed from the confluence of the North and South Forks to the confluence with the Klamath River (Appendix C). Mid Klamath tributaries (Appendix D) surveyed for Chinook redds were Beaver Creek, Horse Creek, Clear Creek, Dillon Creek, Elk Creek, Grider Creek, Camp Creek, Red Cap Creek, and Bluff Creek. For reach descriptions of mid Klamath tributaries surveyed see Table 2.

Methods:

The USFS and CDFG held two training sessions for agency employees, Tribal employees, and volunteers. On October 13th and 14th, the redd survey/carcass mark-recapture training was held at Indian Scotty Group campground on the Scott River. Other topics discussed at the training included safety procedures, salmonid life cycle, and the use of Petersen mark-recapture estimates.

On the Salmon River, crews conducted two concurrent surveys on survey reaches, using redd counts and carcass counts. Where redd surveys were conducted, each redd was marked by tying pink or orange flagging to adjacent vegetation on the riverbank. The location of each redd was documented using GPS during the last week of surveys. In the Scott River basin, crews conducted mark-recapture surveys on cooperative reaches, and redd surveys in several tributaries to the mid-Klamath River (Table 3). A typical crew consisted of two people. Each crew walked two to five miles of river each survey day unless health and safety concerns limited the crew's ability to survey. Mark-recapture surveys were also conducted in the Shasta River and Bogus Creek.

The number of times a reach was surveyed was directly related to the number of people available on the survey dates. When a lack of available surveyors was a concern on the Salmon River, the reaches to be surveyed were determined by the level of activity observed on the prior survey date. For the Scott River, the amount of prior activity, the number of reaches not surveyed to date, and access to private land influenced where the surveys would occur. An attempt was made to have people survey different reaches throughout the week, to reduce estimator bias.

The number of reaches surveyed in a particular year on the Scott River are flow dependent. In low flow years, surveys are focused in the canyon reaches (1-6). In higher flow years, surveys are concentrated in the valley reaches (7-15). During higher flows, the majority of the spawning occurs in the valley reaches. However, this area also contains the majority of private lands. Consequently, landowner permission is an important part of the survey process on the Scott River.

Table 2. Reach and survey descriptions at Base effort level for Mid-Klamath River Chinook salmon surveys.

STREAM REACH	SURVEY TYPE	BASE COVERAGE
SALMON RIVER		
North Fork		
8 – 4	Carcass mark-recapture	2 times /wk
4- Forks	Carcass mark-recapture	2 times /wk
South Fork		
Matthews - Indian ¹	Carcass mark-recapture	2 times /wk
Indian - O'Farrill ¹	Carcass mark-recapture	2 times /wk
O'Farrill - Henry Bell ¹	Carcass mark-recapture	2 times /wk
Henry Bell – Forks ¹	Carcass mark-recapture	2 times /wk
Mainstem Salmon		
Forks – Nordheimer ⁵	Carcass mark-recapture	2 times /wk
Nordheimer – Grants	Redd Count	1 per season
Grants – Wooley	Redd Count	1 per season
Wooley – Mouth	Redd Count	1 per season
Wooley Creek		
Bridge Ck - Gates Ck	Redd Count	1 per season
Gates Ck – Mouth	Redd Count	1 per season
NF Wooley - Bridge Ck	Redd Count	1 per season
SCOTT RIVER		
Fay Lane - Mouth ^{2,4} (15 reaches)	Carcass mark-recapture	2 /wk for 6 reaches

Table 2. Reach and survey descriptions for Base effort level for mid- Klamath River Chinook salmon surveys (continued)

MID-KLAMATH TRIBUTARIES		
Beaver Creek		
Campground - Mouth ⁴	Redd Count	2 per season
Clear Creek		
Slippery Ck - Mouth	Redd Count	1 every 2 weeks
Dillon Creek		
Mile 3 - Mouth	Redd Count	1 every 2 weeks
Elk Creek		
Bear Ck - Doolittle Ck	Redd Count	1 every 2 weeks
Doolittle Ck - Twins Ck	Redd Count	1 every 2 weeks
Twins Ck - 5 mile bridge	Redd Count	1 every 2 weeks
5 mile bridge - Mouth	Redd Count	1 every 2 weeks
Grider Creek		
Bark Shanty – Campground	Redd Count	1 every 2 weeks
Camp Creek		
	Redd Count	1 every 2 weeks
Ti Creek		
	Redd Count	2 per season
Irvine Creek		
	Redd Count	2 per season
Independence Creek		
	Redd Count	2 per season
Horse Creek		
	Redd Count	2 per season
Thompson Creek		
	Redd Count	2 per season
Red Cap Creek		
	Redd Count	1 every 2 weeks
Bluff Creek		
	Redd Count	1 every 2 weeks
SHASTA RIVER ³		
Yreka Ck - Pioneer Bridge	Carcass mark-recapture	1 every week
Pioneer Bridge - Mouth		
	Carcass mark-recapture	1 every week
¹ These two reaches have been split (Matthews - O'Farrill and O'Farrill - Forks). Due to heavy use by fish, many times the full reaches cannot be done in one day.		
² Reach selection is influenced by water year.		
³ The Shasta River is surveyed by California Department of Fish and Game.		
⁴ Some private land - access is dependent on landowner permission.		
⁵ Reach split to accommodate school volunteers		

CARCASS MARK-RECAPTURE SURVEYS

Carcass surveys were conducted twice a week, using mark-recapture techniques outlined in the Klamath Basin Cooperative Spawning Ground Surveys Training manual (CDFG 2004). On the first survey date, carcasses were only marked. Therefore, recapture of carcasses did not begin until the second survey date. Recaptured/old carcasses were chopped in half to prevent double counting of individual carcasses. The spawning population was estimated by CDFG biologists based on the expansion of recovery information using the Peterson and Schaefer models. The Peterson Mark-Recapture Estimate and the Schaefer Method for Stratified Populations are used to estimate a population's size when the population is too large to count or is not all visible at once.

The Peterson model is expressed as:

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

Where N = the population size
M = number of salmon marked (tagged)
C = number of carcasses in the sample
R = number of marked carcasses recovered

The Schaefer model is expressed as:

$$N = \sum N_{ij} = \sum \left(R_{ij} \cdot \frac{M_i}{R_i} \cdot \frac{C_j}{R_j} \right)$$

Where N = the population size
 M_i = number of fish marked in the i th period of marking
 $M = \sum M_i$, total number marked
 C_j = number of fish caught and examined in the j th period of recovery
 $C = \sum C_j$, total number examined
 R_{ij} = number of fish marked in the i th marking period which are recaptured in the j th recovery period
 R_i = total recaptures of fish tagged in the i th period
 R_j = total recaptures during the j th period

The process in the field is as follows:

- 1) Take a sample of the population (carcasses)
- 2) Mark the sample (tag the carcass)
- 3) Return and mix the marked sample back into the population (throw the marked carcass into fast moving water so it distributes randomly)
- 4) Re-sample the population (subsequent surveys, recaptured carcasses) to determine the ratio of marked to unmarked carcasses.

For streams where only redd counts occurred, or where the mark-recapture technique recovered less than 25 tags, redd counts were used to supplement the population estimate derived from the above models by adding two individuals for each redd counted. To estimate the population from redd counts, the number of redds was multiplied by two. In addition, the live fish counts per reach on the last survey date were added to the redd-derived population estimate.

In addition to tagging, salmon carcasses were sampled for fork length, sex, and scales. Scale samples were collected and sent to the Yurok Tribe to be analyzed for age class distribution. The heads from all adipose clipped fish were collected and delivered to the CDFG for coded wire tag recovery.

RESULTS

CDFG reports Klamath River Basin Fall Chinook salmon spawner escapement estimates developed from these surveys in the Mega-Table (Appendix A). According to these estimates, only 4750, 467, 626, and 557 individual fish returned to the Shasta River and Bogus Creek combined, Scott River, Salmon River and miscellaneous Klamath River tributaries, respectively. In the 26 years (1978-2004) that CDFG has reported these numbers, approximately ten years (1979, 1980, 1983, 1984, 1990, 1991, 1992, 1993, 1994, 1999) had lower Chinook run-size estimates than those calculated for 2004. Since 1978, Klamath River run-size has been estimated as high as 245,542 (1995) and as low as 11,273 (1992). The total run-size for natural spawners in 2004 was estimated to be 88,777.

The number and distribution of redds surveyed in 2004 will be reported once the data is made available to the USFS. This information will be given to US Fish and Wildlife Service as a supplement to this report.

DISCUSSION

Several hypotheses have been proposed to explain why Chinook numbers were low in 2004. One hypothesis is that effects from disease, poor ocean conditions and increased ocean harvest in international waters may be adversely affecting Pacific salmon run sizes. CDFG is currently writing a detailed report analyzing the 2004 Klamath Basin Fall Chinook Salmon Escapement (Mark Hampton, CDFG, pers. comm., 4 May 2005; to be written by S. Borok, CDFG). The report will discuss population trends in the Basin as well as make conclusions regarding the depressed numbers seen by surveyors in 2004. As such, the CDFG report should be considered in combination with this report. CDFG has also analyzed age-specific escapement for the 2004 run. The report "Klamath River Fall Chinook Age-Specific Escapement, 2004 run," produced by the KFMC's Technical Advisory Team (KRTAT), is attached as Appendix E.

The cooperative survey efforts described in this report are valuable because they provide managers with a continuous data set on which decisions can be made. By working cooperatively, agencies and other interest groups can more effectively and extensively survey a target resource. In our case, we were able to conduct surveys over a wider area in a standardized manner, resulting in better understanding of fall Chinook spawner population trends over time. Collecting data at the intensity in which we did has resulted in "Mega-Table" estimates that more accurately reflect actual in-river run sizes (Appendix A) on which stock size projections and harvest allocations are based. Without USDI-Fish and Wildlife Service funding, this effort would not have happened at the same level.

Literature Cited

- CDFG (California Department of Fish and Game). 2005. Klamath River basin fall chinook salmon spawner escapement, in-river harvest and run-size estimates, 1978-2003. Available from W. Sinnen, CDFG, 5341 Ericson Way, Arcata, CA 95521.
- Cook, R.C. and G.E. Lord. 1978. Identification of stocks of Bristol Bay sockeye salmon, *Oncorhynchus nerka*, by evaluating scale patterns with polynomial discriminant method. Fishery Bulletin 76:415-423.
- Cook, R.C. 1983. Simulation and application of stock composition estimators. Canadian Journal of Fisheries and Aquatic Sciences 40:2113-2118.
- Goldwasser, L., M.S. Mohr, A.M. Grover, and M.L. Palmer-Zwahlen. 2001. The supporting databases and biological analyses for the revision of the Klamath Ocean Harvest Model. Available from M.S. Mohr, NOAA Fisheries, 110 Shafer Road, Santa Cruz, CA 95060.
- Kimura, D.K. and Chikuni, S. 1987. Mixtures of empirical distributions: an interactive application of the age-length key. Biometrics 43:23-35.
- KRTAT (Klamath River Technical Advisory Team). 2005. Ocean abundance projections and prospective harvest levels for Klamath River fall chinook, 2005 season. Available from U.S. Fish and Wildlife Service, 1829 South Oregon Street, Yreka, CA 96097.
- Mohr, M.S., A.M. Grover, M.L. Palmer-Zwahlen, and M. Burner. 2001 Klamath Ocean Harvest Model Revision Documentation Outline. Available from M.S. Mohr, NOAA Fisheries, 110 Shaffer Road, Santa Cruz, CA 95060.

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Appendix A
Klamath River Basin Fall Chinook Salmon Spawner Escapement,
In-river Harvest and Run-size Estimates 1978-2004

(California Department of Fish and Game Mega-Table)

**Klamath River Basin Fall Chinook Salmon Spawner Escapement, In-river Harvest and Run-size Estimates
1978-2004 a/**

SPAWNER ESCAPEMENT

	1978			1979			1980		
	Grilse	Adults	Totals	Grilse	Adults	Totals	Grilse	Adults	Totals
Hatchery Spawners									
Iron Gate Hatchery (IGH)	925	6,945	7,870	257	2,301	2,558	451	2,412	2,863
Trinity River Hatchery (TRH)	1,325	6,034	7,359	964	1,335	2,299	2,256	4,099	6,355
Subtotals	2,250	12,979	15,229	1,221	3,636	4,857	2,707	6,511	9,218
Natural Spawners									
Trinity River basin									
(above Willow Creek, excluding TRH)	4,712	31,052	35,764	3,936	8,028	11,964	16,837	7,700	24,537
Salmon River basin	1,400	2,600	4,000	150	1,000	1,150	200	800	1,000
Scott River basin	1,909	3,423	5,332	428	3,396	3,824	2,245	2,032	4,277
Shasta River basin	6,707	12,024	18,731	1,040	7,111	8,151	4,334	3,762	8,096
Bogus Creek basin	651	4,928	5,579	494	5,444	5,938	1,749	3,321	5,070
Main Stem Klamath River (excluding IGH)	300	1,700	2,000	466	4,190	4,656	867	2,468	3,335
Misc. Klamath tributaries (above Hoopa and Yurok Reservations)	735	2,765	3,500	147	1,068	1,215	500	1,000	1,500
Hoopa and Yurok Reservation tribs.	-- b/	-- b/	-- b/	100 c/	400 c/	500 c/	250 c/	400 c/	650 c/
Subtotals	16,414	58,492	74,906	6,761	30,637	37,398	26,982	21,483	48,465
Total Spawner Escapement	18,664	71,471	90,135	7,982	34,273	42,255	29,689	27,994	57,683

IN-RIVER HARVEST

	1978			1979			1980		
	Grilse	Adults	Totals	Grilse	Adults	Totals	Grilse	Adults	Totals
Angler Harvest									
Klamath River (below Hwy 101 bridge)	122	854	976	216	484	700	835	727	1,562
Trinity River basin (above Willow Creek)	-- d/	-- d/	-- d/	765	1,157	1,922	2,456	998	3,454
Balance of Klamath system	1,960	840	2,800	1,200	500	1,700	2,600	2,771	5,371
Subtotals	2,082	1,694	3,776	2,181	2,141	4,322	5,891	4,496	10,387
Indian Net Harvest e/									
Klamath River (below Hwy 101 bridge)	--	--	--	--	--	--	495	9,605	10,100
Klamath River (Hwy 101 to Trinity mouth)	--	--	--	--	--	--	272	1,528	1,800
Trinity River (Hoopa Reservation)	--	--	--	--	--	--	220	880	1,100
Subtotals	1,800	18,200	20,000	1,350	13,650	15,000	987	12,013	13,000
Total In-river Harvest	3,882	19,894	23,776	3,531	15,791	19,322	6,878	16,509	23,387

IN-RIVER RUN

	1978			1979			1980		
	Grilse	Adults	Totals	Grilse	Adults	Totals	Grilse	Adults	Totals
Totals									
In-river Harvest and Escapement	22,546	91,365	113,911	11,513	50,064	61,577	36,567	44,503	81,070
Angling Mortality (2.04% of harvest) f/	42	35	77	45	44	88	120	92	212
Net Mortality (8.70% of harvest) f/	157	1,583	1,739	117	1,187	1,304	86	1,045	1,130
Total In-river Run	22,745	92,983	115,728	11,675	51,295	62,970	36,773	45,640	82,413

(continued next page)

**Klamath River Basin Fall Chinook Salmon Spawner Escapement, In-river Harvest and Run-size Estimates
1978-2004 a/**

SPAWNER ESCAPEMENT

	1981			1982			1983		
	Grilse	Adults	Totals	Grilse	Adults	Totals	Grilse	Adults	Totals
Hatchery Spawners									
Iron Gate Hatchery (IGH)	540	2,055	2,595	1,833	8,353	10,186	514	8,371	8,885
Trinity River Hatchery (TRH)	1,004	2,370	3,374	4,235	2,058	6,293	271	5,494	5,765
Subtotals	1,544	4,425	5,969	6,068	10,411	16,479	785	13,865	14,650
Natural Spawners									
Trinity River basin									
(above Willow Creek, excluding TRH)	5,906	15,340	21,246	8,149	9,274	17,423	853	17,284	18,137
Salmon River basin	450	750	1,200	300	1,000	1,300	75	1,200	1,275
Scott River basin	3,409	3,147	6,556	4,350	5,826	10,176	170	3,398	3,568
Shasta River basin	4,330	7,890	12,220	1,922	6,533	8,455	753	3,119	3,872
Bogus Creek basin	912	2,730	3,642	2,325	4,818	7,143	335	2,713	3,048
Main Stem Klamath River									
(excluding IGH)	1,000	3,000	4,000	1,000	3,000	4,000	200	1,800	2,000
Misc. Klamath tributaries									
(above Hoopa and Yurok Reservations)	500	1,000	1,500	600	1,500	2,100	140	1,270	1,410
Hoopa and Yurok Reservation tribs.	-- b/								
Subtotals	16,507	33,857	50,364	18,646	31,951	50,597	2,526	30,784	33,310
Total Spawner Escapement	18,051	38,282	56,333	24,714	42,362	67,076	3,311	44,649	47,960

IN-RIVER HARVEST

	1981			1982			1983		
	Grilse	Adults	Totals	Grilse	Adults	Totals	Grilse	Adults	Totals
Angler Harvest									
Klamath River (below Hwy 101 bridge)	536	1,714	2,250	1,252	3,539	4,791	60	750	810
Trinity River basin (above Willow Creek)	1,456	3,174	4,630	2,554	2,321	4,875	116	2,360	2,476
Balance of Klamath system	5,260	1,095	6,355	8,678	2,479	11,157	175	1,125	1,300
Subtotals	7,252	5,983	13,235	12,484	8,339	20,823	351	4,235	4,586
Indian Net Harvest e/									
Klamath River (below Hwy 101 bridge)	912	23,097	24,009	290	4,547	4,837	12	800	812
Klamath River (Hwy 101 to Trinity mouth)	1,104	8,405	9,509	1,195	8,424	9,619	121	5,700	5,821
Trinity River (Hoopa Reservation)	449	1,531	1,980	314	1,511	1,825	30	1,390	1,420
Subtotals	2,465	33,033	35,498	1,799	14,482	16,281	163	7,890	8,053
Total In-river Harvest	9,717	39,016	48,733	14,283	22,821	37,104	514	12,125	12,639

IN-RIVER RUN

	1981			1982			1983		
	Grilse	Adults	Totals	Grilse	Adults	Totals	Grilse	Adults	Totals
Totals									
In-river Harvest and Escapement	27,768	77,298	105,066	38,997	65,183	104,180	3,825	56,774	60,599
Angling Mortality (2.04% of harvest) f/	148	122	270	255	170	425	7	86	94
Net Mortality (8.70% of harvest) f/	214	2,872	3,087	156	1,259	1,416	14	686	700
Total In-river Run	28,130	80,292	108,422	39,408	66,612	106,020	3,846	57,546	61,392

(continued next page)

**Klamath River Basin Fall Chinook Salmon Spawner Escapement, In-river Harvest and Run-size Estimates
1978-2004 a/**

SPAWNER ESCAPEMENT

	1984			1985			1986		
	Grilse	Adults	Totals	Grilse	Adults	Totals	Grilse	Adults	Totals
Hatchery Spawners									
Iron Gate Hatchery (IGH)	764	5,330	6,094	2,159	19,951	22,110	1,461	17,096	18,557
Trinity River Hatchery (TRH)	766	2,166	2,932	18,166	2,583	20,749	3,609	15,795	19,404
Subtotals	1,530	7,496	9,026	20,325	22,534	42,859	5,070	32,891	37,961
Natural Spawners									
Trinity River basin (above Willow Creek, excluding TRH)	3,416	5,654	9,070	29,454	9,217	38,671	20,459	92,548	113,007
Salmon River basin	216 ^{g/}	1,226 ^{g/}	1,442 ^{g/}	905	2,259	3,164	949	2,716	3,665
Scott River basin	358	1,443	1,801	1,357	3,051	4,408	4,865	3,176	8,041
Shasta River basin	480	2,362	2,842	2,227	2,897	5,124	683	3,274	3,957
Bogus Creek basin	465	3,039	3,504	1,156	3,491	4,647	1,184	6,124	7,308
Main Stem Klamath River (excluding IGH)	200	1,350	1,550	156	468	624	196	603	799
Misc. Klamath tributaries (above Hoopa and Yurok Reservations)	150	990	1,140	646	4,214	4,860	606	4,919	5,525
Hoopa and Yurok Reservation tribs.	-- ^{b/}	-- ^{b/}	-- ^{b/}	50 ^{h/}	80 ^{h/}	130 ^{h/}	-- ^{b/}	-- ^{b/}	-- ^{b/}
Subtotals	5,285	16,064	21,349	35,951	25,677	61,628	28,942	113,360	142,302
Total Spawner Escapement	6,815	23,560	30,375	56,276	48,211	104,487	34,012	146,251	180,263

IN-RIVER HARVEST

	1984			1985			1986		
	Grilse	Adults	Totals	Grilse	Adults	Totals	Grilse	Adults	Totals
Angler Harvest									
Klamath River (below Hwy 101 bridge)	175	548	723	1,479	2,427 ^{v/}	3,906	704	2,456	3,160
Trinity River basin (above Willow Creek)	393	736	1,129	5,442	154 ^{v/}	5,596	3,438	12,039	15,477
Balance of Klamath system	384	2,056	2,440	4,274	1,001 ^{v/}	5,275	5,266	6,532	11,798
Subtotals	952	3,340	4,292	11,195	3,582 ^{v/}	14,777	9,408	21,027	30,435
Indian Net Harvest ^{e/}									
Klamath River (below Hwy 101 bridge)	132	11,878	12,010	132	5,700	5,832	191	15,286	15,477
Klamath River (Hwy 101 to Trinity mouth)	183	5,622	5,805	476	3,925	4,401	377	5,033	5,410
Trinity River (Hoopa Reservation)	140	1,170	1,310	947 ^{y/}	1,941 ^{y/}	2,888 ^{y/}	286	4,808	5,094
Subtotals	455	18,670	19,125	1,555	11,566	13,121	854	25,127	25,981
Total In-river Harvest	1,407	22,010	23,417	12,750	15,148	27,898	10,262	46,154	56,416

IN-RIVER RUN

	1984			1985			1986		
	Grilse	Adults	Totals	Grilse	Adults	Totals	Grilse	Adults	Totals
Totals									
In-river Harvest and Escapement	8,222	45,570	53,792	69,026	63,359	132,385	44,274	192,405	236,679
Angling Mortality (2.04% of harvest) ^{f/}	19	68	88	228	73	302	192	429	621
Net Mortality (8.70% of harvest) ^{f/}	40	1,623	1,663	135	1,006	1,141	74	2,185	2,259
Total In-river Run	8,281	47,261	55,542	69,389	64,438	133,827	44,540	195,019	239,559

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**Klamath River Basin Fall Chinook Salmon Spawner Escapement, In-river Harvest and Run-size Estimates
1978-2004 a/**

SPAWNER ESCAPEMENT

	1987			1988			1989		
	Grilse	Adults	Totals	Grilse	Adults	Totals	Grilse	Adults	Totals
Hatchery Spawners									
Iron Gate Hatchery (IGH)	1,825	15,189	17,014	609	16,106	16,715	831	10,859	11,690
Trinity River Hatchery (TRH)	2,453	13,934	16,387	4,752	17,352	22,104	239	11,132	11,371
Subtotals	4,278	29,123	33,401	5,361	33,458	38,819	1,070	21,991	23,061
Natural Spawners									
Trinity River basin									
(above Willow Creek, excluding TRH)	5,949	71,920	77,869	10,626	44,616	55,242	2,543	29,445	31,988
Salmon River basin	118	3,832	3,950	327	3,273	3,600	695	2,915	3,610
Scott River basin	797	7,769	8,566	473	4,727	5,200	1,188	3,000	4,188
Shasta River basin	398	4,299	4,697	256	2,586	2,842	137	1,440	1,577
Bogus Creek basin	1,208	9,748	10,956	225	16,215	16,440	444	2,218	2,662
Main Stem Klamath River									
(excluding IGH)	65	863	928	164	2,982	3,146	214	1,011	1,225
Misc. Klamath tributaries									
(above Hoopa and Yurok Reservations)	237	3,286	3,523	418	4,167	4,585	248	3,239	3,487
Hoopa and Yurok Reservation tribs.	-- b/	-- b/	-- b/	55 w/	820 w/	875 w/	40 w/	600 w/	640 w/
Subtotals	8,772	101,717	110,489	12,544	79,386	91,930	5,509	43,868	49,377
Total Spawner Escapement	13,050	130,840	143,890	17,905	112,844	130,749	6,579	65,859	72,438

IN-RIVER HARVEST

	1987			1988			1989		
	Grilse	Adults	Totals	Grilse	Adults	Totals	Grilse	Adults	Totals
Angler Harvest									
Klamath River (below Hwy 101 bridge)	146	2,455	2,601	124	3,367	3,491	137	1,328	1,465
Trinity River basin (above Willow Creek)	923	9,433	10,356	2,735	9,341	12,076	209	3,054	3,263
Balance of Klamath system	4,367	8,281	12,648	2,552	9,495	12,047	1,921	4,393	6,314
Subtotals	5,436	20,169	25,605	5,411	22,203	27,614	2,267	8,775	11,042
Indian Net Harvest e/									
Klamath River (below Hwy 101 bridge)	36	39,978	40,014	138	36,914	37,052	0	37,130	37,130
Klamath River (Hwy 101 to Trinity mouth)	117	8,136	8,253	173	9,667	9,840	120	4,961	5,081
Trinity River (Hoopa Reservation)	262	4,982	5,244	267	5,070	5,337	71	3,474	3,545
Subtotals	415	53,096	53,511	578	51,651	52,229	191	45,565	45,756
Total In-river Harvest	5,851	73,265	79,116	5,989	73,854	79,843	2,458	54,340	56,798

IN-RIVER RUN

	1987			1988			1989		
	Grilse	Adults	Totals	Grilse	Adults	Totals	Grilse	Adults	Totals
Totals									
In-river Harvest and Escapement	18,901	204,105	223,006	23,894	186,698	210,592	9,037	120,199	129,236
Angling Mortality (2.04% of harvest) f/	111	412	523	110	453	564	46	179	225
Net Mortality (8.70% of harvest) f/	36	4,617	4,653	50	4,491	4,542	17	3,962	3,979
Total In-river Run	19,048	209,134	228,182	24,054	191,642	215,696	9,100	124,340	133,440

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**Klamath River Basin Fall Chinook Salmon Spawner Escapement, In-river Harvest and Run-size Estimates
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SPAWNER ESCAPEMENT

	1990			1991			1992		
	Grilse	Adults	Totals	Grilse	Adults	Totals	Grilse	Adults	Totals
Hatchery Spawners									
Iron Gate Hatchery (IGH)	321	6,719	7,040	65	4,002	4,067	3,737	3,581	7,318
Trinity River Hatchery (TRH)	371	1,348	1,719	205	2,482	2,687	211	3,779	3,990
Subtotals	692	8,067	8,759	270	6,484	6,754	3,948	7,360	11,308
Natural Spawners									
Trinity River basin									
(above Willow Creek, excluding TRH)	241	7,682	7,923	382	4,867	5,249	2,563	7,139	9,702
Salmon River basin	596 <i>v</i>	4,071 <i>v</i>	4,667 <i>v</i>	143	1,337	1,480	547	778	1,325
Scott River basin	236	1,379	1,615	146	2,019	2,165	965	1,873	2,838
Shasta River basin	118	415	533	10	716	726	66	520	586
Bogus Creek basin	53	732	785	20	1,261	1,281	556	598	1,154
Main Stem Klamath River									
(excluding IGH)	59	505	564	8	572	580	234	366	600
Misc. Klamath tributaries									
(above Hoopa and Yurok Reservations)	30	694	724	9	495	504	153	280	433
Hoopa and Yurok Reservation tribs.	17 <i>w</i>	118 <i>w</i>	135 <i>w</i>	0 <i>w</i>	382 <i>w</i>	382 <i>w</i>	59 <i>w</i>	474 <i>w</i>	533 <i>w</i>
Subtotals	1,350	15,596	16,946	718	11,649	12,367	5,143	12,028	17,171
Total Spawner Escapement	2,042	23,663	25,705	988	18,133	19,121	9,091	19,388	28,479

IN-RIVER HARVEST

	1990			1991			1992		
	Grilse	Adults	Totals	Grilse	Adults	Totals	Grilse	Adults	Totals
Angler Harvest									
Klamath River (below Hwy 101 bridge)	58	291	349	19	314	333	13	20	33
Trinity River basin (above Willow Creek)	22	328	350	94	1,177	1,271	158	314	472
Balance of Klamath system	2,020	2,934	4,954	573	1,892	2,465	3,949	668	4,617
Subtotals	2,100	3,553	5,653	686	3,383	4,069	4,120	1,002	5,122
Indian Net Harvest e/									
Klamath River (below Hwy 101 bridge)	13	3,648	3,661	7	3,902	3,909	124	1,152	1,276
Klamath River (Hwy 101 to Trinity mouth)	141	3,447	3,588	25	5,016	5,041	200	3,687	3,887
Trinity River (Hoopa Reservation)	36	811	847	30	1,280	1,310	42	946	988
Subtotals	190	7,906	8,096	62	10,198	10,260	366	5,785	6,151
Total In-river Harvest	2,290	11,459	13,749	748	13,581	14,329	4,486	6,787	11,273

IN-RIVER RUN

	1990			1991			1992		
	Grilse	Adults	Totals	Grilse	Adults	Totals	Grilse	Adults	Totals
Totals									
In-river Harvest and Escapement	4,332	35,122	39,454	1,736	31,714	33,450	13,577	26,175	39,752
Angling Mortality (2.04% of harvest) <i>f/</i>	43	73	115	14	69	83	84	20	105
Net Mortality (8.70% of harvest) <i>f/</i>	17	687	704	5	887	892	32	503	535
Total In-river Run	4,392	35,882	40,274	1,755	32,670	34,425	13,693	26,698	40,391

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**Klamath River Basin Fall Chinook Salmon Spawner Escapement, In-river Harvest and Run-size Estimates
1978-2004 a/**

SPAWNER ESCAPEMENT

	1993			1994			1995		
	Grilse	Adults	Totals	Grilse	Adults	Totals	Grilse	Adults	Totals
Hatchery Spawners									
Iron Gate Hatchery (IGH)	883	20,828	21,711	758	13,808 ^{m/}	14,566	259	22,681 ^{m/}	22,940
Trinity River Hatchery (TRH)	736	815	1,551	4,442	3,264	7,706	76	15,178	15,254
Subtotals	1,619	21,643	23,262	5,200	17,072	22,272	335	37,859	38,194
Natural Spawners									
Trinity River basin									
(above Willow Creek, excluding TRH)	2,465	5,905	8,370	2,505	10,906	13,411	9,262	77,876	87,138
Salmon River basin	456	3,077	3,533	277	3,216	3,493	1,335	4,140	5,475
Scott River basin	265	5,035	5,300	505	2,358	2,863	3,279	11,198	14,477
Shasta River basin	85	1,341	1,426	1,840	3,363	5,203	695	12,816	13,511
Bogus Creek basin	431	3,285	3,716	443	7,817	8,260	1,207	45,225	46,432
Main Stem Klamath River									
(excluding IGH)	31 ^{nv}	647 ^{nv}	678 ^{nv}	625 ^{nv}	3,249 ^{nv}	3,874 ^{nv}	768 ^{nv}	6,472 ^{nv}	7,240 ^{nv}
Misc. Klamath tributaries									
(above Hoopa and Yurok Reservations)	92	2,470	2,562	50	1,202	1,252	744 ^{ov}	3,654 ^{ov}	4,398 ^{ov}
Hoopa and Yurok Reservation tribs.	0 ^{nv}	98 ^{nv}	98 ^{nv}	0 ^{nv}	222 ^{nv}	222 ^{nv}	34 ^{pv}	413 ^{pv}	447 ^{pv}
Subtotals	3,825	21,858	25,683	6,245	32,333	38,578	17,324	161,794	179,118
Total Spawner Escapement	5,444	43,501	48,945	11,445	49,405	60,850	17,659	199,653	217,312

IN-RIVER HARVEST

	1993			1994			1995		
	Grilse	Adults	Totals	Grilse	Adults	Totals	Grilse	Adults	Totals
Angler Harvest									
Klamath River (below Hwy 101 bridge)	23	669	692	246	662	908	323	956	1,279
Trinity River basin (above Willow Creek)	172	391	563	547	260	807	554	2,779	3,333
Balance of Klamath system	1,730	2,112	3,842	1,763	910	2,673	3,543	2,346 ^{qv}	5,889
Subtotals	1,925	3,172	5,097	2,556	1,832	4,388	4,420	6,081	10,501
Indian Net Harvest e/									
Klamath River (below Hwy 101 bridge)	62	3,017	3,079	81	4,362	4,443	137	5,119	5,256
Klamath River (Hwy 101 to Trinity mouth)	80	5,127	5,207	118	5,064	5,182	152	7,055	7,207
Trinity River (Hoopa Reservation)	33	1,492	1,525	94	2,266	2,360	268	3,383	3,651
Subtotals	175	9,636	9,811	293	11,692	11,985	557	15,557	16,114
Total In-river Harvest	2,100	12,808	14,908	2,849	13,524	16,373	4,977	21,638	26,615

IN-RIVER RUN

	1993			1994			1995		
	Grilse	Adults	Totals	Grilse	Adults	Totals	Grilse	Adults	Totals
Totals									
In-river Harvest and Escapement	7,544	56,309	63,853	14,294	62,929	77,223	22,636	221,291	243,927
Angling Mortality (2.04% of harvest) ^{f/}	39	65	104	52	37	90	90	124	214
Net Mortality (8.70% of harvest) ^{f/}	15	838	853	25	1,017	1,042	48	1,353	1,401
Total In-river Run	7,598	57,212	64,810	14,371	63,983	78,354	22,774	222,768	245,542

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**Klamath River Basin Fall Chinook Salmon Spawner Escapement, In-river Harvest and Run-size Estimates
1978-2004 a/**

SPAWNER ESCAPEMENT

	1996			1997			1998		
	Grilse	Adults	Totals	Grilse	Adults	Totals	Grilse	Adults	Totals
Hatchery Spawners									
Iron Gate Hatchery (IGH)	543	13,622	14,165	452	13,275	13,727	403	14,923	15,326
Trinity River Hatchery (TRH)	249	6,411	6,660	820	5,387	6,207	192	14,296	14,488
Subtotals	792	20,033	20,825	1,272	18,662	19,934	595	29,219	29,814
Natural Spawners									
Trinity River basin	4,478	42,646	47,124	2,845	11,507	14,352	1,974	24,460	26,434
(above Willow Creek, excluding TRH)	274	5,189	5,463	217	5,783	6,000	116	1,337	1,453
Salmon River basin	145	11,952	12,097	277	8,284	8,561	266	3,061	3,327
Scott River basin	46	1,404	1,450	334	1,667	2,001	76	2,466	2,542
Shasta River basin	377	10,420	10,797	221	9,809	10,030	205	6,630	6,835
Bogus Creek basin									
Main Stem Klamath River	218 <i>ni</i>	2,790 <i>ni</i>	3,008 <i>ni</i>	104 <i>ni</i>	3,472 <i>ni</i>	3,576 <i>ni</i>	109 <i>ni</i>	2,913 <i>ni</i>	3,022 <i>ni</i>
(excluding IGH)									
Misc. Klamath-Trinity tributaries	581 <i>oi</i>	5,804 <i>oi</i>	6,385 <i>oi</i>	174 <i>oi</i>	5,174 <i>oi</i>	5,348 <i>oi</i>	83 <i>oi</i>	1,232 <i>oi</i>	1,315 <i>oi</i>
(above Hoopa and Yurok Reservations)	55 <i>pi</i>	1,121 <i>pi</i>	1,176 <i>pi</i>	53 <i>pi</i>	448 <i>pi</i>	501 <i>pi</i>	26 <i>pi</i>	389 <i>pi</i>	415 <i>pi</i>
Hoopa and Yurok Reservation tribs.									
Subtotals	6,174	81,326	87,500	4,225	46,144	50,369	2,855	42,488	45,343
Total Spawner Escapement	6,966	101,359	108,325	5,497	64,806	70,303	3,450	71,707	75,157

IN-RIVER HARVEST

	1996			1997			1998		
	Grilse	Adults	Totals	Grilse	Adults	Totals	Grilse	Adults	Totals
Angler Harvest									
Klamath River (below Hwy 101 bridge)	100	3,110	3,210	49	2,182	2,231	124	1,603	1,727
Klamath River (Hwy 101 to Coon Cr Falls)	1,128	4,052	5,180	1,226	512	1,738	406	1,270	1,676
Trinity River basin (above Willow Creek)	331	1,214	1,545 <i>ni</i>	353	1,331	1,684 <i>ni</i>	275	3,262	3,537 <i>ni</i>
Balance of Klamath system	753	4,390	5,143	781	1,651	2,432 <i>ni</i>	303	1,575	1,878 <i>ni</i>
Subtotals	2,312	12,766	15,078	2,409	5,676	8,085	1,108	7,710 <i>ni</i>	8,818
Indian Net Harvest e/									
Klamath River (below Hwy 101 bridge)	163	49,113	49,276	21	5,574	5,595	16	3,454	3,470
Klamath River (Hwy 101 to Trinity mouth)	19	4,593	4,612	8	5,275	5,283	32	5,198	5,230
Trinity River (Hoopa Reservation)	8	2,770	2,778	6	1,238	1,244	5	1,535	1,540
Subtotals	190	56,476	56,666	35	12,087	12,122	53	10,187	10,240
Total In-river Harvest	2,502	69,242	71,744	2,444	17,763	20,207	1,161	17,897	19,058

IN-RIVER RUN

	1996			1997			1998		
	Grilse	Adults	Totals	Grilse	Adults	Totals	Grilse	Adults	Totals
Totals									
In-river Harvest and Escapement	9,468	170,601	180,069	7,941	82,569	90,510	4,611	89,604	94,215
Angling Mortality (2.04% of harvest) <i>fi</i>	47	261	308	49	116	165	23	157	180
Net Mortality (8.70% of harvest) <i>fi</i>	17	4,911	4,927	3	1,051	1,054	5	886	890
Total In-river Run	9,532	175,773	185,305	7,993	83,736	91,729	4,639	90,647	95,286

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**Klamath River Basin Fall Chinook Salmon Spawner Escapement, In-river Harvest and Run-size Estimates
1978-2004 a/**

SPAWNER ESCAPEMENT

	1999			2000			2001		
	Grilse	Adults	Totals	Grilse	Adults	Totals	Grilse	Adults	Totals
Hatchery Spawners									
Iron Gate Hatchery (IGH)	4,830	9,290	14,120	839	71,635	72,474	1,364	37,204	38,568
Trinity River Hatchery (TRH)	2,027	5,037	7,064	1,070	25,976	27,046	267	17,908	18,175
Subtotals	6,857	14,327	21,184	1,909	97,611	99,520	1,631	55,112	56,743
Natural Spawners									
Trinity River basin									
(above Willow Creek, excluding TRH)	4,154	6,753	10,907	3,376	23,468	26,844	1,336	35,991	37,327 ^{ca}
Salmon River basin	110	670	780	228	1,544	1,772	743	2,607	3,350
Scott River basin	563	3,021	3,584	524	5,729	6,253	744	5,398	6,142
Shasta River basin	1,901	1,296	3,197	1,271	11,025	12,296	2,641	8,452	11,093
Bogus Creek basin	2,628	3,537	6,165	373	34,678	35,051	648	11,927	12,575
Main Stem Klamath River ^{n/}									
(excluding IGH)	630	1,978	2,608	184	3,271	3,455	1,016	9,832	10,848
Misc. Klamath-Trinity tributaries ^{o/}									
(above Hoopa and Yurok Reservations)	251	777	1,028	261	2,051	2,312	565	2,969	3,534
Hoopa and Yurok Reservation tribs. ^{p/}	210	425	635	177	962	1,139	54	657	711
Subtotals	10,447	18,457	28,904	6,394	82,728	89,122	7,747	77,833	85,580
Total Spawner Escapement	17,304	32,784	50,088	8,303	180,339	188,642	9,378	132,945	142,323

IN-RIVER HARVEST

	1999			2000			2001		
	Grilse	Adults	Totals	Grilse	Adults	Totals	Grilse	Adults	Totals
Angler Harvest									
Klamath River (below Hwy 101 bridge)	37	177	214	108	1,190	1,298	298	4,620	4,918
Klamath River (Hwy 101 to Coon Cr Falls)	869 ^{yt}	1,112 ^{yt}	1,981 ^{yt}	972	1,006	1,978	825	1,960	2,785
Klamath River (Coon Cr Falls to IGH)	138 ^{zt}	571 ^{zt}	709 ^{zt}	117	1,549	1,666 ^{bbv}	242	3,041	3,283
Trinity River basin above Weitchpec ^{aa/}	572	422	994	385	1,905	2,290	135	2,513	2,648
Subtotals	1616	2282	3898	1582	5650	7232	1,500	12,134	13,634
Indian Net Harvest ^{e/}									
Klamath River (below Hwy 101 bridge)	126	4,387	4,513	35	17,278	17,313	261	28,967	29,228
Klamath River (Hwy 101 to Trinity mouth)	49	7,295	7,344	140	6,175	6,315	78	4,724	4,802
Trinity River (Hoopa Reservation)	96	2,978	3,074	128	5,962	6,090	60	4,954	5,014
Subtotals	271	14,660	14,931	303	29,415	29,718	399	38,645	39,044
Total In-river Harvest	1,887	16,942	18,829	1,885	35,065	36,950	1,899	50,779	52,678

IN-RIVER RUN

	1999			2000			2001		
	Grilse	Adults	Totals	Grilse	Adults	Totals	Grilse	Adults	Totals
Totals									
In-river Harvest and Escapement	19,191	49,726	68,917	10,188	215,404	225,592	11,277	183,724	195,001
Angling Mortality (2.04% of harvest) ^{f/}	33	47	80	32	115	148	31	248	278
Net Mortality (8.70% of harvest) ^{f/}	24	1,275	1,298	26	2,558	2,584	35	3,360	3,395
Total In-river Run	19,248	51,048	70,296	10,246	218,077	228,323	11,343	187,332	198,675

**Klamath River Basin Fall Chinook Salmon Spawner Escapement, In-river Harvest and Run-size Estimates
1978-2004 a/**

SPAWNER ESCAPEMENT

	2002			2003			2004		
	Grilse	Adults	Totals	Grilse	Adults	Totals	Grilse	Adults	Totals
Hatchery Spawners									
Iron Gate Hatchery (IGH)	1,294	23,667	24,961	290	31,970	32,260	1,122	10,397	11,519
Trinity River Hatchery (TRH)	1,037	3,516	4,553	586	29,800	30,386	1,059	12,384	13,443
Hatchery Spawner Subtotals:	2,331	27,183	29,514	876	61,770	62,646	2,181	22,781	24,962
Natural Spawners									
Main Stem Klamath River n/ (excluding IGH)	658	21,650	22,308	298	17,722	18,020	205	5,037	5,242
Shasta River basin	386	6,432	6,818	155	4,134	4,289	129	833	962
Scott River basin	47	4,261	4,308	65	11,988	12,053	22	445	467
Salmon River basin	78	2,669	2,747	73	3,302	3,375	96	530	626
Bogus Creek basin	304	17,530	17,834	188	15,422	15,610	295	3,493	3,788
Misc. Klamath tributaries o/ (above Yurok Reservation)	44	1,344	1,388	38	1,761	1,799	80	477	557
Yurok Reservation tribs. (Klamath River) p/	12	339	351	31	1,094	1,125	64	144	208
Klamath Natural Spawner Subtotals:	1,529	54,225	55,754	848	55,423	56,271	891	10,959	11,850
Main Stem Trinity River dd/ (excluding TRH)	2,230	10,880	13,110	1,054	31,184	32,238	3,799	12,885	16,684
Misc. Trinity tributaries o/ (above Hoopa Reservation)	66	324	390	109	602	711	75	258	333
Hoopa Reservation tribs. (Trinity River) p/	42	206	248	80	444	524	42	144	186
Trinity Natural Spawner Subtotals:	2,338	11,410	13,748	1,243	32,230	33,473	3,916	13,287	17,203
Natural Spawner Subtotals:	3,867	65,635	69,502	2,091	87,653	89,744	4,807	24,246	29,053
Total Spawner Escapement	6,198	92,818	99,016	2,967	149,423	152,390	6,988	47,027	54,015

IN-RIVER HARVEST

	2002			2003			2004		
	Grilse	Adults	Totals	Grilse	Adults	Totals	Grilse	Adults	Totals
Angler Harvest									
Klamath River (below Hwy 101 bridge)	274	3,285	3,559	180	1,589	1,769	748	725	1,473
Klamath River (Hwy 101 to Coon Cr Falls)	284	3,268	3,552	369	3,336	3,705	1,493	1,472	2,965
Klamath River (Coon Cr Falls to IGH)	93	3,216	3,309	40	2,397	2,437	52	1,266	1,318
Trinity River basin above Weitchpec aa/	219	726	945	225	2,358	2,583	397	496	893
Angler Harvest Subtotals:	870	10,495	11,365	814	9,680	10,494	2,690	3,959	6,649
Indian Net Harvest e/									
Klamath River (below Hwy 101 bridge)	17	20,149	20,166	15	22,688	22,703	73	20,856	20,929
Klamath River (Hwy 101 to Trinity mouth)	41	3,257	3,298	17	4,575	4,592	73	3,083	3,156
Trinity River (Hoopa Reservation)	68	1,168	1,236	12	2,771	2,783	19	1,635	1,654
Indian Net Harvest Subtotals:	126	24,574	24,700	44	30,034	30,078	165	25,574	25,739
Total In-river Harvest	996	35,069	36,065	858	39,714	40,572	2,855	29,533	32,388

IN-RIVER RUN

	2002			2003			2004		
	Grilse	Adults	Totals	Grilse	Adults	Totals	Grilse	Adults	Totals
Totals									
In-river Harvest and Escapement	7,194	127,887	135,081	3,825	189,137	192,962	9,843	76,560	86,403
Angling Mortality (2.04% of harvest) f/	18	214	232	17	198	215	55	81	136
Net Mortality (8.70% of harvest) f/	11	2,137	2,148	4	2,612	2,616	14	2,224	2,238
Fish Die Off ee/	2,003	30,550	32,553						
Total In-river Run	9,226	160,788	170,014	3,846	191,947	195,793	9,912	78,865	88,777

**Footnotes for Klamath River Basin Fall Chinook Salmon Spawner Escapement,
In-river Harvest and Run-size Estimates, 1978-2004 ^a**

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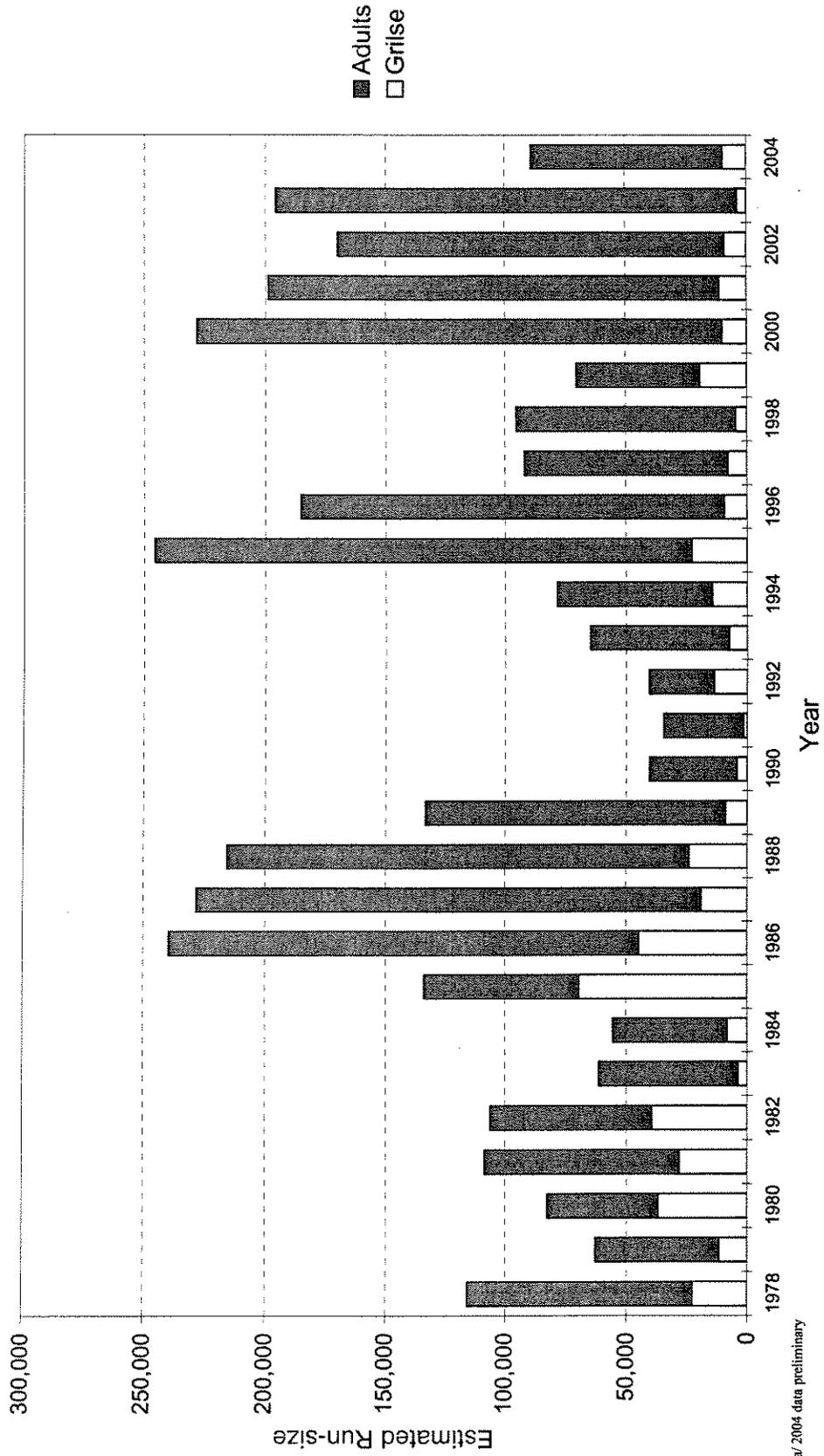
- a/ Prepared February 11, 2005. All figures are California Department of Fish and Game (CDFG) counts/estimates unless otherwise indicated. All figures for Iron Gate and Trinity River hatcheries represent counts of fish entering those facilities. All spawner escapement figures for the Shasta River basin for 1978-1987 and 1989-2004, plus those for Bogus Creek basin for 1980-1991 and 2003-2004 are based on counts made at counting/video stations located near the mouths of those streams. All remaining spawner escapements and all harvest figures are estimates developed from data obtained through ongoing field investigations in the Klamath-Trinity system. Figures for years through 2003 are final; 2004 figures are preliminary, subject to revision.
- b/ Figure not available.
- c/ USFWS estimate.
- d/ In 1978, the Klamath River system sport salmon fishing season was closed August 25. There was essentially no sport harvest of fall chinook in the Trinity River basin in 1978.
- e/ USFWS estimates for years through 1982; 1983 through 1993 estimates jointly made by USFWS and Hoopa Valley Business Council Fisheries Department (HVBCFD); 1994 through 2004 estimates made by HVBCFD for the Hoopa Reservation and Yurok Tribal Fisheries Department for the Yurok Reservation.
- f/ Factors for non-landed catch mortality calculated by the Klamath River Technical Advisory Team (KRTAT, 1986, "Recommended Spawning Escapement Policy for Klamath River Fall-run Chinook"). Modified non-landed catch mortality rates of 2.04% and 8.70% were applied to sport and net harvest respectively following the 2003 season. These rates were applied retrospectively to all years, replacing the historical rates of 2.0% (sport harvest) and 8.0% (net harvest).
- g/ U.S. Forest Service estimate.
- h/ HVBCFD estimate. Estimate for streams in Hoopa Reservation only.
- i/ In 1985, the Klamath River system sport salmon fishing season was closed to the taking of all salmon below the U.S. Highway 101 bridge from September 9 through December 31; the Klamath from the U.S. Highway 101 bridge to Iron Gate Dam and the Trinity River from its mouth to Lewiston Dam were closed to the taking of salmon 22 inches and longer from September 23 through December 31, 1985.
- j/ Estimates for Hoopa Reservation portion of catch (=947 grilse and 1,941 adults) are of catch occurring during open fishing periods only.
- k/ Estimates jointly made by USFWS and HVBCFD.
- l/ Final figures for Salmon River basin natural spawners shown in the December 11, 1991 table were incorrect. Corrected figures, plus necessary revisions to the 1990 totals, are presented here.
- m/ Figure does not include adults that, following entry into Iron Gate Hatchery, were returned to the river alive and un-spawned, and which are presumed to have spawned naturally. This includes 2,333 fish in 1994 and 8,932 fish in 1995.
- n/ CDFG estimate based on USFWS redd count data through 2000. Estimates for 2001-04 are USFWS estimates based on a combination of redd count data (Shasta River downstream to Indian Cr.) and carcass mark-recapture estimates upstream of the Shasta River.
- o/ CDFG and USFS, estimates.
- p/ HVBCFD and YTFD estimates. YTFD fish count for Blue Creek is based on one survey conducted at peak of spawning and should not be construed as an escapement estimate. HVBCFD tributary estimates based on redd counts.
- q/ 750 of these adults were harvested between I-5 and IGH after the river reopened to sport angling on 13 OCT. 1995
- r/ Includes 51 grilse and 178 adults harvested in the main stem Trinity River between Willow Creek weir and the mouth of the Trinity River. HVBCFD estimate.
- s/ Includes 251 grilse and 645 adults harvested in the main stem Trinity River between Willow Creek weir and the mouth of the Trinity River. HVBCFD estimate.
- t/ Additional, but unknown harvest occurred upstream of Interstate 5 for jacks between Oct.2-18 after the 28 day "window" and Oct.18-Nov.30th.for all chinook after Iron Gate Hatchery reached its' required 8,000 adult chinook spawning escapement.
- u/ Includes 298 grilse and 799 adults harvested in the main stem Trinity River between Willow Creek weir and the mouth of the Trinity River. HVBCFD estimate.
- v/ Additional, but unknown harvest occurred upstream of Interstate 5 for jacks between Oct.4-17 after the 28 day "window" and Oct.17-Nov.30th.for all chinook after Iron Gate Hatchery reached its' required 8,000 adult chinook spawning escapement.

**Footnotes for Klamath River Basin Fall Chinook Salmon Spawner Escapement,
In-river Harvest and Run-size Estimates, 1978-2004 ^a**

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- x/ Includes fish originally classified as grilse, based on the 24 inch TL specified in the 1998 sport angling regulations, which were re-classified as adult based on preliminary analysis of 1998 data.
- y/ Includes 21 Grilse and 42 adults harvested after the lower river reopened on Oct 15, 1999.
- z/ Harvest estimate based on creel census data and includes 54 grilse and 206 adults harvested during the secondary season allowed above the Interstate 5 bridge after IGH achieved 8,000 adult spawners.
- aa/ Harvest estimate based on HVBCFD creel census below the Willow Creek Weir and CDFG's estimate based on tag returns for the Trinity River above Willow Creek Weir.
- bb/ Harvest estimate based on creel census data and includes 113 grilse and 938 adults harvested during the secondary season allowed above the Interstate 5 bridge after IGH achieved 8,000 adult spawners.
- cc/ Includes 9 jacks and 252 adults estimated to have spawned in the mainstem Trinity River downstream of the Willow Creek Weir. Estimate based on HVBCFD expanded redd count data.
- dd/ Estimates upstream of Willow Creek weir provided by CDFG; estimates downstream of Willow Creek weir provided by HVBCFD.
- ee/ Prespawn mortality estimate for Chinook salmon that died in the lower Klamath River fish die off, 2002. Estimate provided by USFWS.

Klamath River Basin Fall-Run Chinook Salmon Run-size Estimates, 1978-2004 a/

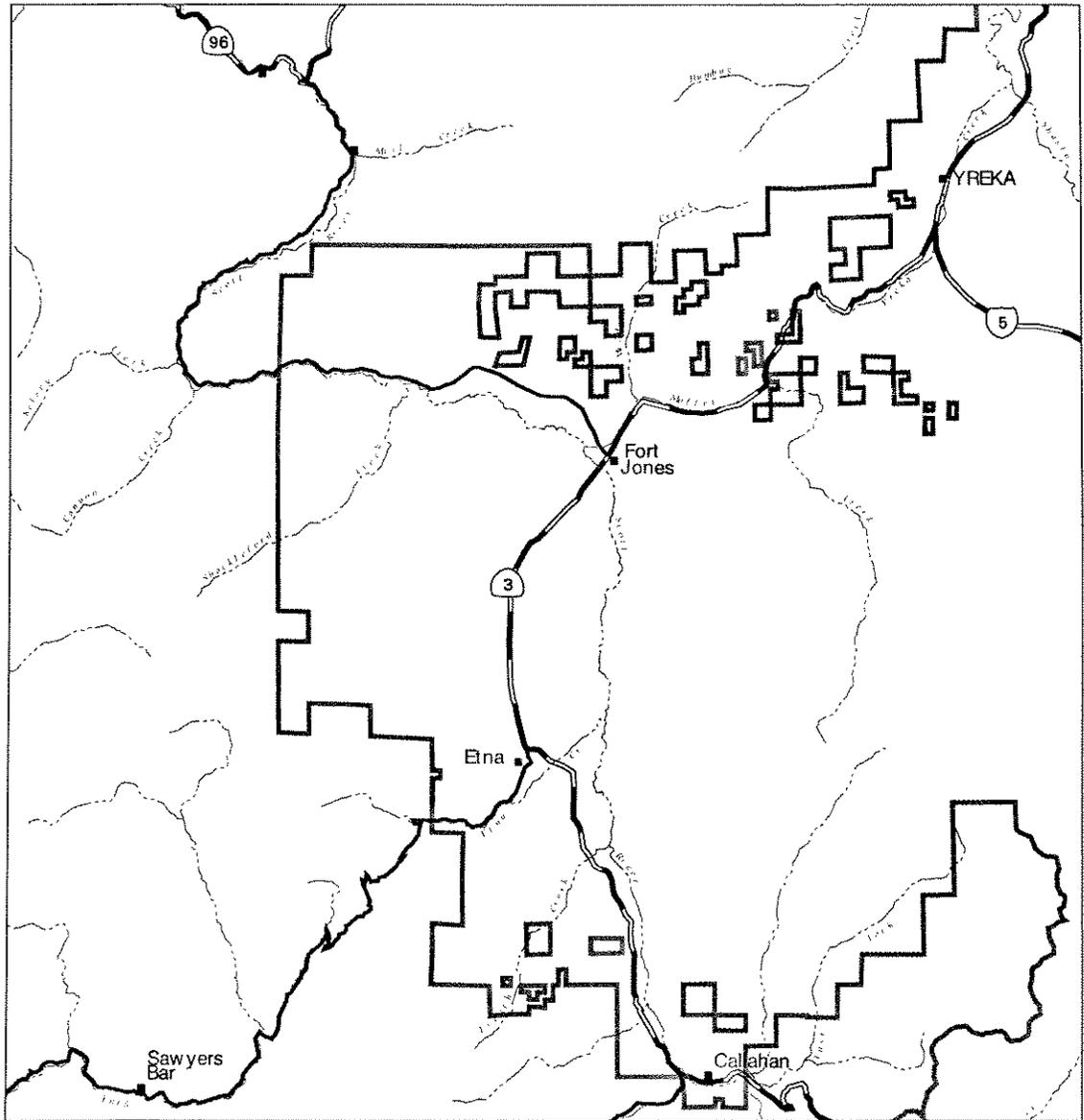


a/ 2004 data preliminary

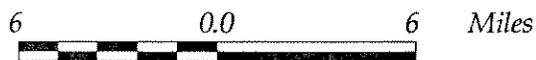
Appendix B
Map of Reaches Surveyed, Scott River



Scott River Survey Reaches Klamath National Forest * Westside



 National Forest Boundary
 Stream Miles Surveyed



May 06, 2005

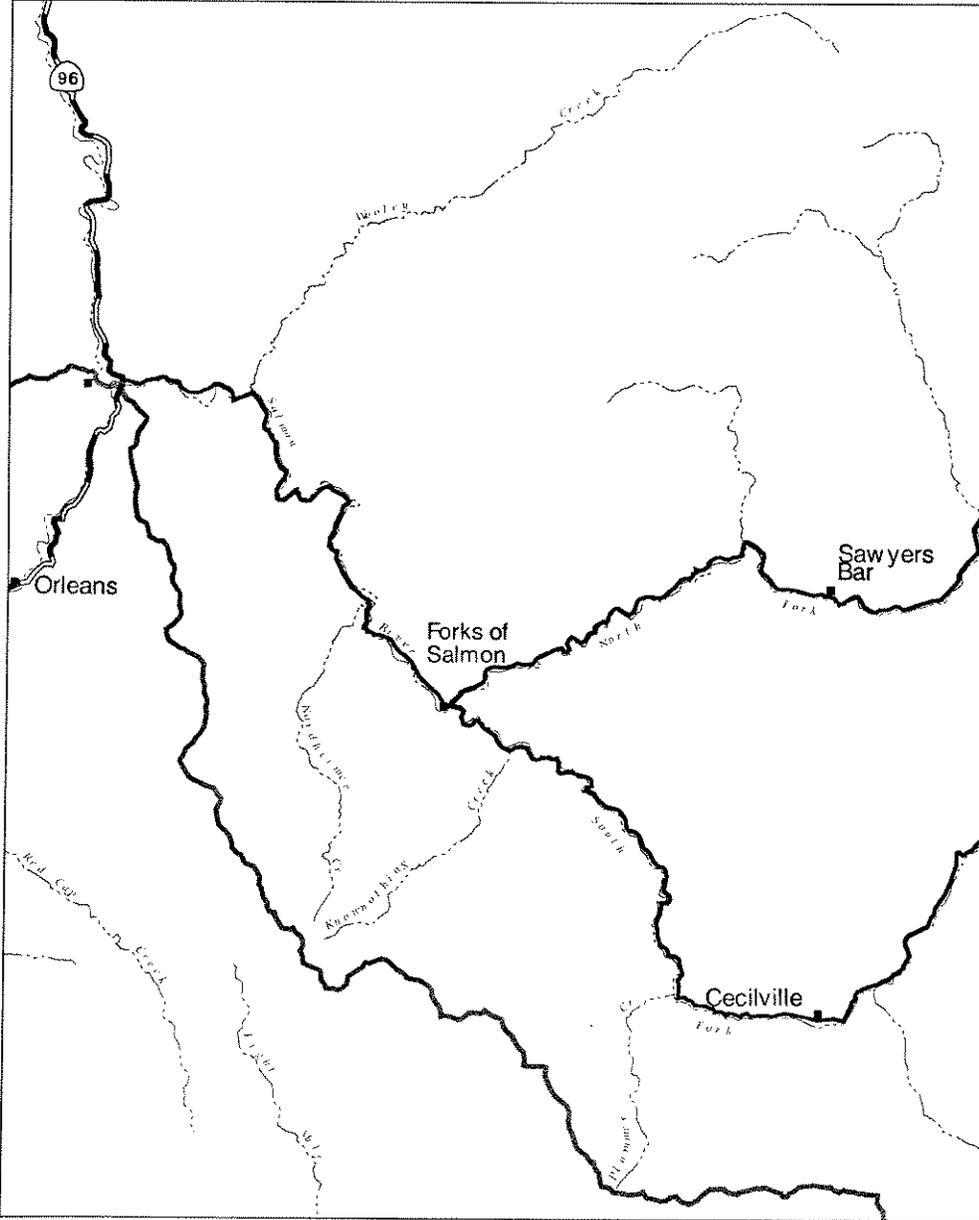
Figure 2

Appendix C
Map of Reaches Surveyed, Salmon River

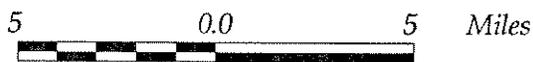


Salmon River Survey Reaches

Klamath National Forest * Westside



———— National Forest Boundary
 ——— Stream Miles Surveyed



May 06, 2005

Figure 3

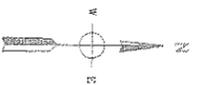
Appendix D
Map of mid-Klamath tributaries surveyed



Mid-Klamath Tributaries Surveyed Klamath National Forest * Westside



----- National Forest Boundary
 - - - - - Stream Miles Surveyed



May 06, 2005

Figure 1

Appendix E
Klamath River Fall Chinook Age-Specific Escapement, 2004 run
(California Department of Fish and Game, 2005)

Klamath River Fall Chinook Age-Specific Escapement, 2004 Run

Klamath River Technical Advisory Team
3 February 2005

Executive Summary

The number of Klamath River fall chinook returning to the Klamath River Basin (Basin) in 2004 was estimated to be

<i>Age</i>	<i>Run Size</i>	
	<i>Number</i>	<i>Proportion</i>
2	9,710	0.11
3	33,180	0.37
4	40,590	0.46
5	5,290	0.06
Total	88,780	1.00

Preseason forecasts of number of adults returning to the Basin and the corresponding post-season estimates are

<i>Sector</i>	<i>Adults</i>	
	<i>Preseason Forecast</i>	<i>Postseason Estimate</i>
<i>Run Size</i>	96,800	79,100
<i>Fishery Mortality</i>		
Tribal Harvest	31,100	25,600
Recreational Harvest	4,700	4,000
Dropoff Mortality	2,800	2,300
<i>Escapement</i>		
Hatchery Spawners	23,200	23,000
Natural Area Spawners	35,000	24,200

Table 1 gives estimates of age-specific returns to hatcheries and spawning grounds, as well as in-basin estimates of harvest (by Tribal and recreational fisheries) and drop-off mortality associated with these fisheries.

Introduction

This report describes the data and methods used by the Klamath River Technical Advisory Team (KRTAT) to estimate age-specific numbers of fall chinook returning to the Basin in 2004. The estimates provided in this report are consistent with the Klamath River Megatable (CDFG 2005) and with the 2005 forecast of ocean stock abundance (KRTAT 2005).

Age-specific estimates of escapement for 2004 and previous years, coupled with data on coded-wire tag (CWT) recoveries from hatchery stocks, allow for cohort reconstruction of both hatchery and natural components of Klamath River fall chinook (KRTAT 2004, Goldwasser et al. 2001). The results of cohort reconstruction further admit model-based forecasting of next year's abundance in the ocean, ocean fishery contact rates, and percentage of spawners escaping to natural areas (KRTAT 2005). The forecasts are used by the Pacific Fishery Management Council, as essential inputs to the Klamath Ocean Harvest Model (see Mohr et al. 2001), to predict effects of salmon fisheries on Klamath River fall chinook.

Methods

The KRTAT obtained estimates of abundance and age composition separately for each sector of harvest and escapement. Random and nonrandom sampling methods of various types were used throughout the Basin (Table 2) to obtain the data from which the Klamath River Megatable totals and estimates of age composition were derived.

Estimates of age composition were based on random samples of scales whenever possible. Generally, each scale is read and aged independently by two persons. In cases of disagreement, a third person arbitrates. In 2004, the KRTAT decided to use data provided from a single reader for Klamath River samples because the second reader did not demonstrate the desired accuracy. Statistical methods (see Kimura and Chikuni 1987, Cook and Lord 1978, Cook 1983) then were used, with ages known from CWT recoveries, to adjust the data for potential reader bias. A summary of the scale samples is provided in Table 3.

Where the sample of scales was non-representative of the age-two component, the KRTAT relied on results of length-frequency analysis. In these cases, all fish less than or equal to a given fork-length "cutoff" were assumed to be age-two, and all fish greater than the cutoff length were assumed to be adults. The cutoff value varied by sector, and was based on location of the length-frequency nadir and, if appropriate, CWT data. As before, scales were used to estimate the age composition of adults.

Where the sample of scales was insufficient for estimation of age composition, or was altogether lacking, the KRTAT relied on surrogate data (see Table 4).

An indirect method of subtraction was used to estimate age composition for natural spawners in the Trinity River above Willow Creek Weir (WCW). Age-specific numbers of fall chinook that immigrated above the WCW were estimated by applying the age composition from scales collected at the weir to the estimate of total abundance above the weir. The age compositions of fish returned to the Trinity River Hatchery (TRH) and harvest above WCW then were estimated. From these data, the age composition of natural spawners above the weir was taken as the age-specific abundances above the WCW, minus hatchery and harvest.

For natural spawners in the Trinity River below WCW, total escapement was estimated by redd survey (Table 2). Age-composition was estimated from scales that were collected in the survey areas.

Results

The specific protocols used to develop estimates of age composition for each sector are provided in Table 4. A summary of the KRTAT minutes is given in Appendix A for the Klamath River and Appendix B for the Trinity River.

A total of 13,619 scales from 15 different sectors were provided for this analysis (Table 3). Of the total, 683 and 1,171 were collected from CWT fish from the Trinity and Klamath Rivers, respectively. The scales from fish with CWT's provide a direct check, or "validation," of accuracy of the scale-based age estimates (Tables 5a, 5b). Overall, the scale-based ages were accurate and precise, particularly in the case of the Trinity River (>85% accuracy, across all ages). For the Klamath River, the accuracy indicated from comparing scale read-ages to known-ages (CWT fish) was only 35% for age-5 fish. Whereas the accuracy of classifying age-5 fish was low, this result was based on classifying only 23 of 1,280 known age fish, with overall accuracy exceeding 90%. The statistical bias-adjustment methods employed are intended to correct for scale-reading bias, but the methods assume that the known-age/read-age validation matrices are themselves well estimated (Kimura and Chikuni 1987).

The resulting sector-specific age composition is given in Table 6 and further summarized in Table 1. Calculations underlying the results for the Klamath and Trinity Rivers are presented in Appendices C and D, respectively.

Literature Cited

- CDFG (California Department of Fish and Game). 2005. Klamath River basin fall chinook salmon spawner escapement, in-river harvest and run-size estimates, 1978-2003. Available from W. Sinnen, CDFG, 5341 Ericson Way, Arcata, CA 95521.
- Cook, R.C. and G.E. Lord. 1978. Identification of stocks of Bristol Bay sockeye salmon, *Oncorhynchus nerka*, by evaluating scale patterns with a polynomial discriminant method. *Fishery Bulletin* 76:415-423.
- Cook, R.C. 1983. Simulation and application of stock composition estimators. *Canadian Journal of Fisheries and Aquatic Sciences* 40:2113-2118.
- Goldwasser, L., M.S. Mohr, A.M. Grover, and M.L. Palmer-Zwahlen. 2001. The supporting databases and biological analyses for the revision of the Klamath Ocean Harvest Model. Available from M.S. Mohr, NOAA Fisheries, 110 Shaffer Road, Santa Cruz, CA 95060.
- Kimura, D.K. and Chikuni, S. 1987. Mixtures of empirical distributions: an iterative application of the age-length key. *Biometrics* 43:23-35.
- KRTAT (Klamath River Technical Advisory Team). 2005. Ocean abundance projections and prospective harvest levels for Klamath River fall chinook, 2005 season. Available from U.S. Fish and Wildlife Service, 1829 South Oregon Street, Yreka, CA, 96097.
- Mohr, M.S., A.M. Grover, M.L. Palmer-Zwahlen, and M. Burner. 2001. Klamath Ocean Harvest Model Revision Documentation Outline. Available from M.S. Mohr, NOAA Fisheries, 110 Shaffer Road, Santa Cruz, CA 95060.

Acknowledgements

This work is the result of a joint effort by the California Department of Fish and Game (CDFG), Hoopa Valley Tribe (HVT), NOAA Fisheries, U.S. Fish and Wildlife Service (USFWS), U.S. Forest Service (USFS), and Yurok Tribe (YT). The YT and HVT performed the scale reading analysis for the Klamath and Trinity Rivers, respectively. The USFWS provided scale reading assistance to the YT. Scale collection was done by CDFG, HVT, USFWS, USFS, and YT.

List of Participants Age-Composition Meeting, Arcata, CA 26-28 January 2005

California Department of Fish and Game

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Mark Hampton – Klamath River Project
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Desma Williams

ODFW
Craig Foster

Editorial Assistance

Appendix F
Fiscal Year 2005 Budget and Matching Funds

FY 2005 Budget Fall Spawn (2004 field season)

	2004 funds
Klamath National Forest	10725.00
Six Rivers National Forest	9750.00
Yurok Tribe	14137.50
Karuk Tribe	9262.50
Quartz Valley Tribe	1250.00
Salmon River Restoration Council	3900.00
Siskiyou RCD	975.00
Total	50000.00

Estimated Matching Funds

USFS (combination of Klamath National Forest and Six Rivers National Forest)	49408.00
Yurok Tribe	7269.00
Karuk Tribe	4742.00
Quartz Valley Indian Reservation	6769.00
Salmon River Restoration Council	3910.00
Siskiyou RCD	1622.00
California Department of Fish and Game	27342.00
Total	101062.00

Matching funds pay for project training, supervision, quality control, coordination, data analysis and report writing. Matching funds also pay for some operating expenses (vehicles, computer as well as materials and supplies).

Appendix G
Data for mid-Klamath Tributaries Surveyed in FY 2005

Fall Chinook Redd Totals and Survey Effort
Data Collected by the USFS
Orleans / Happy Camp Ranger Districts

Year	ORD	Miles	HCRD	Miles	TOTAL Redds	TOTAL Miles	Bluff	Miles	Red Cap	Miles	Camp	Miles	Woolley	Miles	Lower Salmon	Miles	Dillon	Miles	Clear
1984	106	28.1	3	1.0	109	29.1	0	0.5	42	13.6	64	14.0	-	0.0	-	0.0	-	0.0	-
1985	405	27.8	25	5.7	430	33.5	3	0.5	212	15.6	190	11.4	-	0.0	-	0.0	-	0.0	-
1986	613	26.0	26	3.4	639	29.4	210	5.6	252	14.0	151	6.4	-	0.0	-	0.0	-	0.0	-
1987	162	21.5	285	250.6	447	272.1	76	11.9	57	6.9	29	2.7	-	0.0	-	0.0	-	0.0	46
1988	528	19.6	410	98.2	938	117.8	363	7.8	96	6.4	69	5.4	-	0.0	-	0.0	-	0.0	79
1989	470	58.9	296	121.0	766	179.9	108	8.4	238	15.1	94	7.4	6	3.0	24	25.0	-	0.0	25
1990	182	115.0	186	38.4	368	153.4	51	16.6	69	19.6	19	2.2	-	0.0	43	26.1	28	12.0	66
1991	196	78.6	142	217.6	338	296.2	35	5.0	29	18.3	17	2.9	-	0.0	115	52.4	7	15.0	31
1992	160	205.0	70	211.8	230	416.8	14	23.7	53	42.4	41	30.5	4	3.6	48	104.8	3	12.0	8
1993	417	208.6	577	212.0	994	420.6	38	33.6	137	27.6	80	24.4	43	7.2	111	104.8	23	15.0	99
1994	477	318.0	229	234.8	706	552.8	38	62.6	99	74.9	61	42.6	56	12.6	222	106.0	21	7.0	45
1995	708	233.4	462	170.8	1170	404.2	74	32.1	192	62.2	152	42.4	60	8.2	223	81.0	51	9.0	67
1996	2003	249.7	810	156.2	2813	405.9	151	29.2	706	55.7	450	50.1	159	12.6	512	81.2	98	12.0	180
1997	1677	260.1	988	127.2	2665	387.3	150	27.6	362	70.3	464	55.8	398	12.6	235	68.5	83	7.0	136
1998	217	209.1	284	79.4	501	288.5	11	37.1	64	61.0	41	54.0	55	12.6	46	26.1	23	7.3	95
1999	147	228.1	116	75.5	263	303.6	2	12.6	24	84.9	53	60.4	27	12.6	41	48.0	8	6.5	23
2000	265	418.3	423	114.5	688	532.8	3	34.8	69	160.6	49	94.7	36	12.6	102	91.7	29	7.0	54
2001	393	263.3	594	129.1	987	392.4	12	27.7	69	67.0	93	50.3	63	12.6	156	87.8	25	6.0	105
2002	614	308.7	422	131.3	1036	440.0	16	37.4	53	70.1	87	59.9	390	12.6	62	103.6	16	6.0	149
2003	504	178.0	537	114.9	1041	292.9	5	13.2	78	45.9	168	47.0	70	12.6	183	50.7	34	6.0	171
2004	133	265.8	75	106.0	208	371.8	6	24.3	30	41.3	16	53.8	24	13.3	56	118.4	11	5.6	29

Notes:
1/ "Dashes" represent streams not surveyed.
2/ "Others" represent small tributaries between Aikens and Grider Creeks along this portion of the Lower-middle Klamath River.

Miles	Elk	Miles	Indian	Miles	Thompson	Miles	Grider	Miles	Others	Miles
0.0	-	0.0	3	1.0	-	0.0	-	0.0	0	0.0
0.0	0	0.3	17	5.1	-	0.3	-	0.0	8	0.3
0.0	16	1.4	10	2.0	-	0.0	-	0.0	0	0.0
7.2	71	39.6	95	64.0	-	0.0	-	0.0	73	139.8
4.2	96	52.8	214	38.4	-	0.0	-	0.0	21	2.8
5.0	103	79.2	145	30.0	3	0.8	-	0.0	20	6.0
16.8	37	47.3	55	12.8	-	0.0	-	0.0	0	0.0
21.0	34	79.2	70	102.4	-	0.0	-	0.0	0	0.0
16.8	13	84.0	46	99.0	-	0.0	-	0.0	0	0.0
16.8	103	66.0	337	105.4	15	8.8	-	0.0	8	11.0
13.0	55	52.5	101	156.2	0	4.5	-	0.0	8	20.9
16.8	142	52.8	200	88.8	0	1.4	-	0.0	9	9.5
21.0	157	52.8	327	66.6	48	2.8	-	0.0	25	21.9
12.6	236	41.1	333	47.2	33	4.0	156	13.3	79	27.3
16.8	99	37.1	-	0.0	0	1.4	66	16.3	1	18.8
12.6	34	36.2	-	0.0	-	0.0	51	19.2	0	10.6
25.2	58	54.0	-	0.0	58	7.0	220	20.3	10	24.9
16.8	99	52.1	68	17.8	68	6.0	224	29.4	5	18.9
33.6	115	54.8	1	1.4	24	8.0	112	26.5	11	26.1
26.0	159	52.8	-	0.0	53	6.0	120	23.6	0	9.1
17.1	18	55.7	-	0.0	8	4.0	9	23.6	1	14.7