

Progress Report for 2005 Chinook Encounter Study

SUBMITTED TO:

US CHINOOK TECHNICAL COMMITTEE
FOR FUNDING UNDER THE BUDGET INCREMENT ASSOCIATED
WITH THE U. S. CHINOOK LETTER OF AGREEMENT AND ABUNDANCE-
BASED MANAGEMENT

SUBMITTED BY:

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May 1, 2005 through April 30, 2006

PREFACE

The chinook annex of the 1999 PSC Agreement mandates that the Chinook Technical Committee (CTC) use estimates of total mortality to assess the impacts of fishery regulations in PSC fisheries. The current methodology uses landed catch for establishing quota values and harvest sharing between the parties. This project is focused on development of information necessary to create a new model for fishery regulation analysis. The objectives of the study reflect the requirement for the CTC to produce new estimates of stock impacts which include all sources of mortality. The goals of this project are to estimate the number of chinook salmon released and stock composition of all encountered chinook salmon in the Washington ocean and Puget Sound troll and sport fisheries.

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1. INTRODUCTION

The Pacific Fishery Management Council (PFMC) adopted 2005 recreational and commercial troll fisheries for all salmon species in the area between Cape Falcon, Oregon and the U.S./Canada border. Mark-selective fisheries for coho were included in all four Catch Record Card areas (Areas 1, 2, 3, and 4) for both recreational and commercial fisheries.

Council-area fisheries were adopted based on assumptions regarding coho and chinook abundance, distribution of stocks, chinook age class distributions, coho mark rates, compliance with selective fishery regulations, and incidental mortality. The Washington Department of Fish and Wildlife (WDFW) implemented a monitoring plan to test some of these assumptions through dockside catch and effort sampling along with on-water observations of the fisheries in progress. Both dockside and on-water sampling included collection of DNA tissue samples from chinook.

2. OBJECTIVES

The objectives of the CTC-sponsored portion of this project are: first, to estimate the number of legal and sublegal sized chinook salmon encountered during the Washington non-treaty ocean troll and recreational fisheries such that all estimates will fall within $\pm 30\%$ of the true value 90% of the time and, second, to collect genetic material (DNA tissue samples) from sublegal and legal sized chinook to estimate the stock composition by age.

The objectives of the mark-selective coho fishery monitoring portion of this project are to test some of the assumptions used during the process of modeling ocean fisheries, specifically to determine coho mark rates by area and month, to determine compliance with selective fishery regulations, to estimate incidental mortality, and to compare release information collected dockside with observed release data.

3. SEASON DESCRIPTION

3.1 Ocean Recreational Fisheries

Area 1: The ocean recreational fishery from Cape Falcon, Oregon to Leadbetter Point, Washington and west of the Buoy 10 line at the Columbia River mouth was open for all salmon species Sunday through Thursday from July 3 through July 28, and seven days per week from July 29 to September 30, for a total of 84 fishing days. A two salmon daily bag limit only one of which could be a chinook was initially in effect; between July 29 and September 8, and September 17 through 30, the bag limit was two salmon; from September 9 through September 16, chinook retention was not allowed. All retained coho were required to have a healed adipose fin clip. The Columbia Control Zone was closed; additionally, the area between Cape Falcon and Tillamook Head was closed beginning August 1.

Area 2: The ocean recreational fishery from Leadbetter Point to the Queets River was open for all salmon species Sunday through Thursday from June 26 through July 28, and seven days per week from July 29 to September 18, for a total of 77 fishing days. A two salmon daily bag limit was initially in effect, only one of which could be a chinook; between July 29 and September 18, the bag limit was two salmon. All retained coho were required to have a healed adipose fin clip. The Grays Harbor Control Zone was closed beginning August 1.

Area 3: The ocean recreational fishery from the Queets River to Cape Alava was open for all salmon species Tuesday through Saturday from July 1 through July 28, and seven days per week from July 29 through September 18. From September 24 to October 9, salmon fishing was restricted to the part of Area 3 north of 47°50'00" north latitude and south of 48°00'00" north latitude, seven days per week. A total of 88 fishing days were available in Area 3. A two salmon daily bag limit was initially in effect, only one of which could be a chinook; between July 29 and October 9, the bag limit was two salmon. All retained coho were required to have a healed adipose fin clip.

Area 4: The ocean recreational fishery from Cape Alava to the U.S./Canada border was open for all salmon species Tuesday through Saturday from July 1 through August 29, and seven days per week from August 30 through September 18, for a total of 62 fishing days. A two salmon daily bag limit was initially in effect, only one of which could be a chinook; between August 16 and September 18, the bag limit was two salmon. No chum retention was allowed from August 1 through September 18. All retained coho were required to have a healed adipose fin clip. Chinook retention east of the Bonilla-Tatoosh line was allowed from July 1 through July 31 only.

3.2 Non-Treaty Commercial Troll Fisheries

The non-treaty troll fishery was open from Cape Falcon, Oregon to the U.S./Canada border May 1-3, May 6-9, May 13-16, May 20-26, June 3-6, and June 26-30 for all salmon except coho (a total of 27 days). The fishery reopened from Cape Falcon to the U.S./Canada border July 7-11, July 14-18, July 21-25, July 28-August 1, August 3-7, August 10-14, and August 17-22 for all salmon species except no chum retention north of Cape Alava, WA in August. A total of 36 fishing days were available.

4. METHODS

Direct on-water observation of salmon encounters was the primary method used to estimate the encounter ratios of legal to sublegal sized chinook, marked to unmarked coho, and drop-offs, and to collect DNA samples from sublegal chinook. Observers from WDFW rode along on charter boats, and samplers worked from WDFW test-fishing boats to collect encounter rate data from the recreational fisheries. These observers recorded all hook-ups aboard the vessel; for each hook-up, the following information was recorded: result of the hook-up (fish kept, released, or

dropped off), species, mark status, and size class (legal or sublegal). Recreational anglers were also solicited to use voluntary trip reports while fishing to record the above information.

Observers from WDFW also rode aboard commercial vessels participating in the non-treaty troll fishery. This effort was coordinated with the CTC-sponsored study for treaty troll encounters conducted by Makah tribal biologists. Observers aboard non-treaty trollers recorded the same information as recreational fishery observers.

A sampling protocol was established for both the charter and troll observers so that the most important information relative to this study was collected first. The first priority for the observers was to record the species, mark status, and result of each hook-up aboard the vessel. This allows estimation of legal to sublegal chinook encounter ratios, marked to unmarked coho encounter ratios, and drop-off numbers. The second priority was to collect DNA samples (a small non-lethal clipping from the tip of the dorsal fin), lengths, and scale samples from sublegal sized chinook. DNA from sublegal sized chinook was prioritized above that from legal sized chinook since legal sized fish were available on the dock as well as at sea. The third priority was to collect DNA, lengths, and scale samples from legal sized chinook.

Dockside samplers were placed in the four major landing ports for the ocean fisheries: Neah Bay, La Push, Westport, and Ilwaco (including the port of Chinook). Each port was sampled a minimum of 4 to 5 days per week, with weekend and weekday days stratified. On each sample day, a total recreational boat count was obtained either by counting boats exiting the port or entering the port. A minimum of 20% of the boats returning to the port within each boat type (charter and private) was sampled, which should provide weekly estimates of catch by species and mark status with CVs no higher than 5%. Information collected during each sample included number of anglers, target species, landed catch by species, mark status of landed salmon, identification and recovery of coded wire tags, and angler estimates of released salmon by species and mark status and of released groundfish by species. Additionally, dockside samplers collected DNA samples, lengths, and scale samples from landed chinook.

For the genetic stock identification portion of this study, a target of 300 chinook genetic tissue samples per stratum with accompanying scale samples was set. The stratum was defined as week, port, and gear type. This should result in approximately 100 samples per age for the most abundant brood year ages, 3 and 4. The stratum may be redefined during or after the season depending on the size of the fishery and the success of obtaining samples.

5. RESULTS

5.1 Recreational Catch and Effort

In Catch Record Card Area 1, 45,330 anglers harvested a total of 38,693 coho (64 percent of the 60,900 coho quota) and a total of 13,203 chinook. In Area 2, 35,170 anglers harvested a total of 10,508 coho (23 percent of the 45,066 coho quota) and a total of 22,373 chinook. In Area 3, 4,961 anglers harvested a total of 2,320 coho (73 percent of the 3,167 coho quota) and a total of 1,651 chinook. In Area 4, 18,411 anglers harvested a

total of 10,218 coho (81 percent of the 12,667 coho quota) and 2,783 chinook. Table 1 shows estimated total effort and landed coho and chinook catch by month for the catch areas north of Cape Falcon.

5.2 Non-Treaty Troll Catch Landed in Washington

A total of 638 coho and 1,486 chinook harvested in Area 1 during the non-treaty troll fishery were landed in Washington State ports. From Area 2, catches landed in Washington totaled 373 coho and 15,178 chinook. A total of 94 coho and 6,411 chinook were harvested in Area 3 and landed in Washington, while Area 4 catches totaled 337 coho and 11,991 chinook. Total catches north of Cape Falcon (landed in both Washington and Oregon) were 4,064 coho (18 percent of the 23,200 coho quota) and 45,151 chinook (4 percent over the 43,250 chinook quota).

5.3 Legal and Sublegal Sized Chinook Encountered

The numbers of legal and sublegal sized chinook salmon encountered by observers in the ocean recreational fisheries are shown in Table 2. In Area 1, ride-along samplers on charter boats observed 178 chinook encountered; of those, 130 were legal sized, 47 were sublegal sized, and 1 was unknown, resulting in a sublegal sized rate of 27%, compared with 66% in 2004. In Area 2, ride-along samplers on charter boats observed 323 chinook encountered; of those, 247 were legal sized, 70 were sublegal sized, and 6 were unknown, resulting in a sublegal sized rate of 22%, compared with 67% in 2004. There were no on-board observation data in Area 3. In Area 4, samplers on charter boats and WDFW test fishers encountered 46 chinook, of which 38 were legal sized, 6 were sublegal sized, and 2 were unknown, for a sublegal sized rate of 14% compared with 77% in 2004.

Table 3 shows the number of observed chinook by size class during the non-treaty troll fisheries. On-board observers were present on trollers in Areas 2, 3, and 4. In Area 2, ride-along samplers observed 1,622 chinook; of those, 1,020 were legal sized, 576 were sublegal sized, and 26 were unknown, resulting in a sublegal sized rate of 36%, compared with 72% in 2004. In Area 3, ride-along samplers observed 691 chinook; of those, 398 were legal sized, 292 were sublegal sized, and 1 was unknown for a sublegal sized rate of 42%. (No data from Area 3 were collected in 2004.) In Area 4, ride-along samplers observed 626 chinook; of those, 366 were legal sized, 247 were sublegal sized, and 13 were unknown, resulting in a sublegal sized rate of 40%, compared with 31% in 2004.

5.4 Mark Rates in Selective Fisheries

Tables 4 and 5 show the mark rates of legal sized coho and chinook, respectively, encountered in the ocean recreational fisheries.

In Area 1, WDFW staff observed encounters on board charter boats for each week the recreational fishery was open. A total of 914 coho encounters were observed aboard chartered fishing vessels; of these encounters, 525 coho were adipose fin clipped. The overall coho mark rate through the season was 61%, while the mark rates by month were 62% in July, 63% in

August, and 48% in September (Table 4). A total of 127 chinook encounters were observed; 17 of these were adipose fin clipped. The overall chinook mark rate was 15% through the season (Table 5). Dockside landings indicated a chinook mark rate of 13% through the season.

In Area 2, WDFW staff observed anglers on board charter boats for each week the recreational fishery was open. A total of 218 coho encounters were observed aboard chartered fishing vessels; 96 of these were adipose fin clipped. The overall coho mark rate through the season was 46%, while the mark rates by month were 33% in June, 43% in July, 47% in August, and 59% in September (Table 4). A total of 247 chinook encounters were observed; 33 of these were adipose fin clipped. The overall chinook mark rate was 15% through the season (Table 5). Dockside landings indicated a chinook mark rate of 14% through the season.

No onboard observer data were collected from the recreational fishery in Area 3. Dockside interviews indicated a coho mark rate of 31%; dockside examination of landed chinook indicate a chinook mark rate of 13% (Table 5).

WDFW staff observed catch or test fished in Area 4 for each week the recreational fishery was open. A total of 352 coho were encountered; 99 of these were adipose fin clipped. The overall coho mark rate through the season was 30%, while the mark rates by month were 35% in July and 26% in August. The number of coho encountered in September was insufficient to assess mark rate (Table 4). A total of 38 chinook encounters were observed; 7 were adipose fin clipped (Table 5). Chinook mark rates through the season were 19% based on observer data and 35% based on dockside interview data.

Table 6 shows chinook mark rates observed in the non-treaty troll fisheries. On-board observation indicated an overall chinook mark rate of 9% in Area 2 through the season, compared with 14% seen dockside. In Area 3, overall chinook mark rates were calculated at 16% based on observer data, and 11% based on dockside data through the season. In Area 4, overall chinook mark rates were calculated at 11% and 14% from observer and dockside data respectively.

Mark rates on coho encountered in the non-treaty troll fisheries are shown in table 7. The number of coho encountered during on-board observation was not sufficient to assess mark rates with confidence.

5.5 Chinook to Coho Ratios

Table 8 shows observed ratios of encountered chinook to coho by month in the ocean recreational fisheries. Based on the on-board observation data, 0.18 chinook were encountered per coho in Area 1, 1.43 chinook were encountered per coho in Area 2, and 0.12 chinook per coho were encountered in Area 4.

Table 9 shows observed ratios of encountered chinook to coho by month in the non-treaty troll fisheries. During the May-June chinook-directed fishery, the chinook to coho ratios were

estimated at 14.30, 46.77, and 54.91 chinook per coho in Areas 2, 3, and 4, respectively. During the summer all-species fishery, chinook to coho encounter ratios were 4.55 in Area 2, 3.78 in Area 3, and 3.83 in Area 4.

5.6 Comparison of Pre-season and Post-season Estimates of Mark Rates

Pre-season projections of 2005 coho mark rates were estimated using the Fishery Regulation Assessment Model (FRAM). The FRAM uses inputs of pre-season run size projections and historic coded wire tag recovery data to predict the resulting impacts from a proposed fishery. FRAM model run 0519 was the final pre-season assessment of the PFMC's adopted fishery package for the 2005 ocean fisheries. Table 10 compares the coho mark rates projected by the FRAM model with those observed through on-water monitoring by month and area for the recreational fisheries. Mark rates for the non-treaty troll fisheries have not been compared due to the low numbers of encountered coho observed.

Observation data showed actual coho mark rates slightly lower than pre-season projections in all areas for the recreational fisheries. The observed coho mark rate for the season in the Area 1 selective fishery was 61% compared to 66% projected pre-season. The observed coho mark rate for the season in the Area 2 selective fishery was 46% compared to 54% projected pre-season, and the observed coho mark rate in the Area 4 selective fishery was 30% compared to 38% projected pre-season.

5.7 Comparison of Dockside and Observer Data in Recreational Selective Fisheries

Observation data during recreational selective coho fisheries were collected in part to investigate potential bias in estimates of coho mark rates based on angler recollection of released coho. Table 11 compares coho release rates based on dockside interview data with those release rates computed through on-board observation data.

Relative to estimates of released salmon from observation data, information collected at the dock showed a bias towards higher numbers of salmon released where comparisons are possible (Areas 1 and 2). This is consistent with data from previous years. Dockside sampling data from Area 1 showed an overall coho release rate of 54% compared to a rate of 42% observed on the water; in Area 2, the release rate reported dockside was 55%, compared with a release rate of 50% observed on the water.

5.8 Compliance

Information on compliance with selective regulations was collected through both dockside sampling by the WDFW sampling program and enforcement activities conducted by WDFW Enforcement staff.

Compliance with the selective fishery regulations in the recreational fisheries was high for both private and charter vessels. In Area 1, 38% of the total estimated coho landed by the recreational fishery were sampled dockside by the Ocean Sampling Program; the observed compliance rate in this area was 99.4%. In Area 2, 41% of the total estimated

coho landed by the recreational fishery were sampled dockside; a compliance rate of 98.8% was observed during the selective coho fishery. In Area 3, 86% of the total estimated coho landed by the recreational fishery were sampled; the observed compliance rate was 98.7%. In Area 4, 44% were sampled dockside; a compliance rate of 97.6% was observed. Table 12 reports compliance rates observed by dockside samplers for the recreational fisheries by area and month. These rates are similar to the compliance rates observed in the last two seasons.

The WDFW Enforcement Program monitored compliance with selective fishery regulations in the recreational fisheries coastwide. Enforcement staff estimated compliance regarding the possession of unmarked coho at 99.2% in Area 1, 99.0% in Area 2, 98.8% in Area 3, and 99.5% in Area 4.

During the non-treaty troll fisheries, a total of 128 coho (9% of the total coho landed in Washington) were examined dockside by WDFW sampling staff. These samplers encountered no unmarked coho in the landed catch.

5.9 Drop Off Rates

On-water observers were asked to record information on fish that were hooked but lost before being brought to the boat, commonly referred to as drop offs. For this study, the definition of drop off was that the fish was actually hooked but became free before it could be landed. This definition calls for some judgment on the part of the observers recording the data, resulting in potential bias.

Current Council methodology for estimating mortality due to drop off uses a rate of 5% of the total number of fish handled (retention plus release). Mortality rates for the recreational fisheries throughout the season estimated from on-water observation data were less than 1% in all areas. Estimates of drop off mortality rates from on-water observation data collected during the recreational fisheries are compared with FRAM projections in Table 13.

5.10 Estimated Mortality

Table 14 shows the FRAM pre-season projections of total coho mortality in the ocean recreational fisheries. Estimates of actual coho mortality in these fisheries are shown in Table 15. This analysis uses estimates of coho mark rates from on-water sampling to estimate total coho released. Estimates of incidental mortality are calculated using rates adopted by the Council for recreational fisheries (5% drop off mortality and 14% hooking mortality).

In Area 1, incidental mortality is estimated at 6,875 which, when combined with a total coho retention of 38,693, puts the estimate of total coho mortality in the Area 1 selective fishery at 45,568. This compares to a pre-season projected total mortality of 72,393 coho.

Incidental coho mortality in Area 2 is estimated at 2,732 which, when combined with a total coho retention of 10,508, puts the estimate of total coho mortality in the Area 2 fishery at 13,240. This compares to a pre-season projected total mortality of 57,024 coho.

In Area 3, incidental mortality is estimated at 1,837 which, when combined with a total coho retention of 4,961, puts the estimate of total coho mortality in the Area 3 selective fishery at 6,798. This compares to a pre-season projected total mortality of 4,418 coho.

Incidental coho mortality in Area 4 is estimated at 4,542 which, when combined with a total coho retention of 10,218, puts the estimate of total coho mortality in the Area 4 selective fishery at 14,760. This compares to a pre-season projected total mortality of 17,277 coho.

5.11 DNA Samples

Table 16 shows the number of chinook DNA samples collected by month, area, size class, and sampling type (on-board or dockside) from the ocean recreational fisheries. A total of 17 sublegal and 404 legal sized chinook were DNA sampled in Area 1. In Area 2, 58 DNA samples were collected from sublegal sized chinook and 686 samples were collected from legal sized chinook. From Area 3, no DNA samples were collected from sublegal sized chinook, and 255 samples were collected from legal sized chinook. In Area 4, no DNA samples were collected from sublegal sized chinook, and 526 samples were collected from legal sized chinook. In all areas, the number of sublegal DNA samples was reduced from 2004 due to significantly lower availability of sublegal sized fish.

The number of chinook DNA samples collected by month, area, size class, and sampling type from the non-treaty troll fisheries is shown in Table 17. Onboard observers in Area 2 collected DNA from a total of 459 sublegal sized chinook, while a total of 1,444 legal sized chinook were sampled. From Area 3, a total of 176 DNA samples from sublegal sized chinook and 788 from legal sized chinook were collected. In Area 4, DNA samples were collected from 133 sublegal sized chinook and from 976 legal sized chinook.

Baseline data for stock composition estimates are currently being collected and analyzed. The DNA samples collected in this project will be archived and held for future analysis when the baseline database is complete.

Table 1. Salmon catch and effort by area and month in the 2005 ocean recreational fisheries.

		Angler Trips	Coho	Chinook
Area 1	July	8,316	9,165	1,655
	August	27,098	23,406	9,646
	September	9,916	6,122	1,902
	Total	45,330	38,693	13,203
Area 2	June	1,119	126	364
	July	12,560	3,139	5,245
	August	15,488	4,869	12,179
	September	6,003	2,374	4,585
	Total	35,170	10,508	22,373
Area 3	July	1,867	274	605
	August	2,039	1,395	694
	September	895	633	309
	October	160	18	43
	Total	4,961	2,320	1,651
Area 4	July	11,462	7,033	2,254
	August	4,977	2,420	316
	September	1,972	765	213
	Total	18,411	10,218	2,783

Table 2. Number of legal and sublegal sized chinook encountered by on-board observers in the 2005 ocean recreational fisheries.

		Total Encountered	Legal Sized	Sublegal Sized	Unknown	Sublegal Sized Rate
Area 1	July	46	41	4	1	9%
	Aug.	107	74	33	0	31%
	Sept.	25	15	10	0	40%
	Total	178	130	47	1	27%
Area 2	June	19	15	1	3	6%
	July	65	49	14	2	22%
	Aug.	212	164	47	1	22%
	Sept.	27	19	8	0	30%
	Total	323	247	70	6	22%
Area 4	July	36	34	1	1	3%
	Aug.	10	4	5	1	56%
	Sept.	-	-	-	-	-
	Total	46	38	6	2	14%

Table 3. Number of legal and sublegal sized chinook encountered by on-board observers in the 2005 ocean non-treaty troll fisheries.

		Total Encountered	Legal Sized	Sublegal Sized	Unknown	Sublegal Sized Rate
Area 2	May	951	538	390	23	42%
	June	235	151	84	0	36%
	July	194	167	27	0	14%
	August	242	164	75	3	31%
	Sept.	-	-	-	-	-
	Total	1,622	1,020	576	26	36%
	Area 3	May	606	333	272	1
June		-	-	-	-	-
July		57	44	13	0	23%
August		28	21	7	0	25%
Sept.		-	-	-	-	-
Total		691	398	292	1	42%
Area 4		May	603	343	247	13
	June	-	-	-	-	-
	July	-	-	-	-	-
	August	23	23	0	0	0%
	Sept.	-	-	-	-	-
	Total	626	366	247	13	40%

Table 4. Mark rates of legal-sized coho encountered by on-board observers in the 2005 ocean recreational fisheries.

		Total Encountered	Marked	Unmarked	Unknown	Mark Rate
Area 1	July	442	255	155	32	62%
	Aug.	366	220	128	18	63%
	Sept.	106	50	54	2	48%
	Total	914	525	337	52	61%
Area 2	June	6	2	4		33%
	July	77	32	42	3	43%
	Aug.	117	52	59	6	47%
	Sept.	18	10	7	1	59%
	Total	218	96	112	10	46%
Area 4	July	180	57	108	15	35%
	Aug.	167	42	117	8	26%
	Sept.	5	0	2	3	N/A
	Total	352	99	227	26	30%

Table 5. Mark rates of legal-sized chinook encountered in the 2005 ocean recreational fisheries.

		On-board Observation					Dockside Interview				
		Total Encountered	Marked	Unmarked	Unknown	Mark Rate	Total Landed	Marked	Unmarked	Unknown	Mark Rate
Area 1	July	41	6	33	2	15%	840	117	723	0	14%
	Aug.	71	10	56	5	15%	3,121	412	2,709	0	13%
	Sept.	15	1	10	4	9%	481	63	418	0	13%
	Total	127	17	99	11	15%	4,442	592	3,850	0	13%
Area 2	June	15	1	13	1	7%	490	75	415	0	15%
	July	49	8	36	5	18%	2,214	326	1,888	0	15%
	Aug.	164	21	130	13	14%	4,769	582	4,187	0	12%
	Sept.	19	3	15	1	17%	1,326	208	1,118	0	16%
	Total	247	33	194	20	15%	8,799	1,191	7,608	0	14%
Area 3	July	-	-	-	-	-	494	64	430	0	13%
	Aug.	-	-	-	-	-	484	72	412	0	15%
	Sept.	-	-	-	-	-	181	15	166	0	8%
	Total	-	-	-	-	-	1,159	151	1,008	0	13%
Area 4	July	34	6	26	2	19%	885	354	531	0	40%
	Aug.	4	1	3	0	25%	170	40	130	0	24%
	Sept.	-	-	-	-	-	104	15	89	0	14%
	Total	38	7	29	2	19%	1,159	409	750	0	35%

Table 6. Mark rates of legal sized chinook encountered in the 2005 ocean non-treaty troll fisheries.

	On-board Observation					Dockside Interview				
	Total Encountered	Marked Encountered	Unmarked Encountered	Unknown	Mark Rate	Total Encountered	Marked Encountered	Unmarked Encountered	Unknown	Mark Rate
Area 2 May	538	44	465	29	9%	4,354	634	3,720	0	15%
June	151	14	134	3	9%	735	107	628	0	15%
July	167	13	146	8	8%	252	25	227	0	10%
August	164	14	142	8	9%	488	58	430	0	12%
Total	1,020	85	887	48	9%	5,829	824	5,005	0	14%
Area 3 May	333	55	260	18	17%	1129	131	998	0	12%
June	-	-	-	-	-	320	60	260	0	19%
July	44	5	37	2	12%	989	89	900	0	9%
August	21	0	19	2	0%	770	68	702	0	9%
Total	398	60	316	22	16%	3,208	348	2860	0	11%
Area 4 May	343	37	291	15	11%	1,772	266	1,506	0	15%
June	-	-	-	-	-	202	29	173	0	14%
July	-	-	-	-	-	734	72	662	0	10%
August	23	3	18	2	14%	0	0	0	0	-
Total	366	40	309	17	11%	2,708	367	2,341	0	14%

Table 7. Mark rates of legal-sized coho encountered by on-board observers in the 2005 ocean troll fisheries.

		Total Encountered	Marked Encountered	Unmarked Encountered	Unknown	Mark Rate
Area 2	May	-	-	-	-	-
	June	12	3	9	0	25%
	July	21	8	13	0	38%
	August	53	24	25	4	49%
	Sept.	-	-	-	-	-
	Total	86	35	47	4	43%
Area 3	May	-	-	-	-	-
	June	-	-	-	-	-
	July	8	2	5	1	29%
	August	4	4	0	0	100%
	Sept.	-	-	-	-	-
	Total	12	6	5	1	55%
Area 4	May	-	-	-	-	-
	June	2	0	0	2	-
	July	-	-	-	-	-
	August	6	2	3	1	40%
	Sept.	-	-	-	-	-
	Total	8	2	3	3	40%

Table 8. Estimates of chinook per coho in the 2005 ocean recreational fisheries based on on-board observation.

		Total Chinook Encountered	Total Coho Encountered	Chinook/Coho Ratio
Area 1	July	46	452	0.102
	Aug.	107	404	0.265
	Sept.	25	112	0.223
	Total	178	968	0.184
Area 2	June	19	6	3.167
	July	65	83	0.783
	Aug.	212	119	1.782
	Sept.	27	18	1.500
	Total	323	226	1.429
Area 4	July	36	197	0.183
	Aug.	10	169	0.059
	Sept.	0	5	0.000
	Total	46	371	0.124

Table 9. Estimates of chinook per coho in the 2005 ocean non-treaty troll fisheries based on on-board observation.

		Total Chinook Encountered	Total Coho Encountered	Chinook/Coho Ratio
Area 2	May	966	53	18.23
	June	235	31	7.58
	July	199	38	5.24
	August	242	59	4.10
	Total	1,642	181	9.07
Area 3	May	608	13	46.77
	June	-	-	-
	July	59	18	3.28
	August	28	5	5.60
	Total	695	36	19.31
Area 4	May	604	11	54.91
	June	-	-	-
	July	-	-	-
	August	23	6	3.83
	Total	627	17	36.88

Table 10. Mark rates of legal sized coho encountered during on-board observation in the 2005 ocean recreational fisheries compared with the FRAM preseason projected mark rates.

		Total Coho Encountered	Observed Mark Rate	Projected Mark Rate
Area 1	July	442	62%	66%
	Aug.	366	63%	65%
	Sept.	106	48%	69%
	Total	914	61%	66%
Area 2	June	6	33%	51%
	July	77	43%	50%
	Aug.	117	47%	54%
	Sept.	18	59%	57%
	Total	218	46%	54%
Area 4	July	180	35%	36%
	Aug.	167	26%	39%
	Sept.	5	0%	41%
	Total	352	30%	38%

Table 11. Comparison of coho release rates observed on-water and reported through dockside interviews in the 2005 ocean recreation fisheries.

		On-Board Observation			Dockside Interview		
		Coho Retained	Coho Released	Release Rate a/	Coho Retained	Coho Released	Release Rate
Area 1	July	256	156	38%	4,880	5,041	51%
	August	220	161	42%	7,803	8,864	53%
	September	49	58	54%	1,829	2,912	61%
	Total	525	375	42%	14,512	16,817	54%
Area 2	June	4	2	33%	116	122	51%
	July	38	42	53%	1,483	1,655	53%
	August	53	57	52%	1,931	2,410	56%
	September	10	6	38%	788	1026	57%
	Total	105	107	50%	4,318	5,213	55%
Area 3	July	-	-	-	220	366	62%
	August	-	-	-	950	2,226	70%
	September	-	-	-	374	894	71%
	Total	-	-	-	1,544	3,486	69%
Area 4	July	48	127	N/A	2,764	3,706	57%
	August	36	124	N/A	1,345	4,752	78%
	September	0	5	N/A	354	2,258	86%
	Total	84	256	N/A	4,463	10,716	71%

a/ A release rate for Area 4 is unavailable from on-board observer data since the majority of the data were collected from test fishers who were required to release all catch.

Table 12. Compliance with coho selective fishery regulations observed through dockside port sampling interviews in the 2005 ocean recreation fisheries.

		Total Coho Sampled	Marked Coho Sampled	Unmarked Coho Sampled	% Sampled Coho Marked
Area 1	July	4,880	4,861	19	99.61%
	August	7,803	7,756	47	99.40%
	September	1,829	1,807	22	98.80%
	Total	14,512	14,424	88	99.39%
Area 2	June	116	110	6	94.83%
	July	1483	1,476	7	99.53%
	August	1931	1,901	30	98.45%
	September	788	781	7	99.11%
	Total	4,318	4,268	50	98.84%
Area 3	July	220	216	4	98.18%
	August	950	937	13	98.63%
	September	374	371	3	99.20%
	Total	1,544	1,524	20	98.70%
Area 4	July	2,764	2,694	70	97.47%
	August	1,345	1,310	35	97.40%
	September	354	350	4	98.87%
	Total	4,463	4,354	109	97.56%

Table 13. Estimated drop off mortality in the 2005 ocean recreational fisheries using on-water observation data.

		Total Salmon Handled	Observed Drop Offs	Estimated Observed Drop Off Mortality a/	FRAM Total Drop Off Mortality b/	Observed Drop Off Mortality Rate c/
Area 1	July	455	43	3	23	0.76%
	August	467	44	4	23	0.75%
	Sept.	123	14	1	6	0.91%
	Total	1,045	101	8	52	0.77%
Area 2	June	24	1	0	1	0.33%
	July	136	12	1	7	0.71%
	August	296	35	3	15	0.95%
	Sept.	40	5	0	2	1.00%
	Total	496	53	4	25	0.85%
Area 4	July	208	26	2	10	1.00%
	August	167	16	1	8	0.77%
	Sept.	5	0	0	0	0.00%
	Total	380	42	3	19	0.88%

a/ Assume 8% hooking mortality rate on observed drop offs.

b/ Total drop off mortality calculated using FRAM methodology (5% of handled fish).

c/ Estimated drop off mortality/Total salmon handled; 5% used by FRAM pre-season.

Table 14. Preseason FRAM (model run 0519) projected coho mortality in the 2005 ocean recreational fisheries.

		Total Retention	Marked Retention	Marked Release Mortality	Unmarked Retention	Unmarked Release Mortality	Total handled a/	Predicted Mark Rate	Drop Off Mortality b/	Release Mortality c/	Incidental Mortality d/	Total Mortality e/
Area 1	July	18,000	17,798	159	202	1,385	29,027	66%	1,452	1,544	2,996	20,996
	August	35,972	35,458	317	514	3,527	63,427	65%	3,171	3,844	7,015	42,987
	Sept.	6,928	6,815	61	113	776	12,908	69%	645	837	1,482	8,410
	Total	60,900	60,071	537	829	5,688	105,362	66%	5,268	6,225	11,493	72,393
Area 2	June	1,885	1,847	17	38	260	3,859	51%	193	277	470	2,355
	July	10,811	10,591	95	220	1,509	22,264	50%	1,113	1,604	2,717	13,528
	August	19,098	18,692	167	406	2,787	40,200	54%	2,010	2,954	4,964	24,062
	Sept.	13,272	12,951	116	321	2,200	29,814	57%	1,491	2,316	3,807	17,079
	Total	45,066	44,081	395	985	6,756	96,137	54%	4,807	7,151	11,958	57,024
Area 3	July	1,326	1,283	11	43	293	3,504	38%	175	304	479	1,805
	August	1,312	1,277	11	35	237	3,087	47%	154	248	402	1,714
	Sept./Oct.	529	493	4	36	249	2,339	26%	117	253	370	899
	Total	3,167	3,053	26	114	779	8,930	40%	446	805	1,251	4,418
Area 4	July	8,360	8,106	72	254	1,739	21,302	36%	1,065	1,811	2,876	11,236
	August	4,307	4,149	37	158	1,082	12,302	39%	615	1,119	1,734	6,041
	Sept.	0	0	0	0	0	0	41%	0	0	0	0
	Total	12,667	12,255	109	412	2,821	33,604	38%	1,680	2,930	4,610	17,277

a/ Marked handled + Unmarked handled.

b/ 5% of total handled.

c/ Marked release mortality + unmarked release mortality.

d/ Drop off + Release mortality.

e/ Total retention + Incidental mortality.

Table 15. Estimated Actual Coho Mortality in the 2005 Ocean Recreational Fisheries.

		Total Retention	Marked Retention	Marked Released	Unmarked Retention	Unmarked Released	Total handled b/	Observed Mark Rate c/	Drop Off Mortality d/	Release Mortality e/	Incidental Mortality f/	Total Mortality g/
Area 1	July	9,165	9,110	182	55	5,571	14,918	62%	746	780	1,526	10,691
	August	23,406	23,266	465	140	13,618	37,489	63%	1,874	1,907	3,781	27,187
	Sept.	6,122	6,085	122	37	6,612	12,855	48%	643	926	1,568	7,690
	Total	38,693	38,461	769	232	25,801	65,263	61%	3,263	3,612	6,875	45,568
Area 2	June	126	120	2	6	252	380	33%	19	35	54	180
	July	3,139	3,075	62	64	4,120	7,320	43%	366	577	943	4,082
	August	4,869	4,786	96	83	5,524	10,489	47%	524	773	1,298	6,167
	Sept.	2,374	2,348	47	26	1,662	4,083	59%	204	233	437	2,811
	Total	10,508	10,329	207	179	11,558	22,273	46%	1,114	1,618	2,732	13,240
Area 3	July	1,867	300	6	1,567	3,046	4,919	38%	246	426	672	2,539
	August	2,039	1,369	27	670	2,299	4,366	47%	218	322	540	2,579
	Sept./Oct.	1,055	649	13	406	3,003	4,071	26%	204	420	624	1,679
	Total	4,961	2,318	46	2,643	8,348	13,356	39%	668	1,169	1,837	6,798
Area 4	July	7,033	6,648	133	385	13,326	20,492	35%	1,025	1,866	2,890	9,923
	August	2,420	2,347	47	73	6,741	9,208	26%	460	944	1,404	3,824
	Sept.	765	641	13	124	1,101	1,879	41%	94	154	248	1,013
	Total	10,218	9,636	193	582	21,168	31,579	30%	1,579	2,964	4,542	14,760

a/ The Area 2 coho fishery was modified to a non-selective fishery on August 29.

b/ Marked handled + Unmarked handled.

c/ Observed mark rate in Area 3 and in Area 4 September assumed from preseason projections.

d/ 5% of total handled.

e/ 14% of unmarked released.

f/ Drop off + Release mortality.

g/ Total retention + Incidental mortality.

Table 16. Number of chinook DNA samples collected from the ocean recreational fishery by size class and sample type.

		On-Board Sampling		Dockside Sampling	Total Number of DNA Samples
		Sublegal Sized	Legal Sized	Legal Sized	
Area 1	July	2	27	157	186
	August	15	43	154	212
	September	0	0	23	23
	Total	17	70	334	421
Area 2	June	1	17	77	95
	July	14	42	278	334
	August	36	141	69	246
	September	7	16	46	69
	Total	58	216	470	744
Area 3	July	0	14	118	132
	August	0	0	123	123
	September	0	0	0	0
	Total	0	14	241	255
Area 4	July	0	28	426	454
	August	0	1	55	56
	September	0	3	13	16
	Total	0	32	494	526

Table 17. Number of chinook DNA samples collected from the non-treaty troll fishery by size class and sample type.

		On-Board Sampling		Dockside Sampling	Total Number of DNA Samples
		Sublegal Sized	Legal Sized	Legal Sized	
Area 2	May	303	235	518	1,056
	June	68	146	161	375
	July	25	138	97	260
	August	63	149	0	212
	Total	459	668	776	1,903
Area 3	May	161	139	242	542
	June	0	0	27	27
	July	10	42	197	249
	August	5	21	120	146
	Total	176	202	586	964
Area 4	May	132	165	467	764
	June	0	0	83	83
	July	0	0	241	241
	August	1	20	0	21
	Total	133	185	791	1,109