

Progress Report for 2006 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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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 2006 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 August 10, and seven days per week from August 11 to September 30, for a total of 80 fishing days. A two salmon daily bag limit only one of which could be a chinook was initially in effect; beginning August 11, the bag limit was two salmon. 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 between August 1 and August 25.

Area 2: The ocean recreational fishery from Leadbetter Point to the Queets River was open for all salmon species Sunday through Thursday from July 3 to August 10, and seven days per week from August 11 to September 17, for a total of 67 fishing days. A two salmon daily bag limit was initially in effect, only one of which could be a chinook; between August 11 and September 17, 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 June 30 through August 10, and seven days per week from August 11 through September 17. From September 23 to October 8, 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 84 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 August 11 and October 8, 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 June 30 through August 10, and seven days per week from August 11 through September 17, for a total of 68 fishing days. A two salmon daily bag limit was initially in effect, only one of which could be a chinook; between August 11 and September 17, the bag limit was two salmon. No chum retention was allowed from August 1 through September 17. All retained coho were required to have a healed adipose fin clip. Chinook retention east of the Bonilla-Tatoosh line was allowed from June 30 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 1-2, May 6-9, May 13-16, May 20-23, May 27-30, June 3-6, June 10-13 and June 27-30 for all salmon except coho (a total of 30 days). The fishery reopened from Cape Falcon to the U.S./Canada border July 15-18, July 22-25, July 29-August 1, August 5-7, August 12-14, August 19-22, August 26-29, September 2-5, and September 8-15 for all salmon species except no chum retention north of Cape Alava, WA in August and September. A total of 38 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, area fished, 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, a total of 31,270 anglers harvested 24,812 coho (68 percent of the 36,600 coho quota) and 2,274 chinook. In Area 2, a total of 24,541 anglers harvested 8,779 coho (34 percent of the 25,603 coho quota) and 5,815 chinook. In Area 3, a total of 4,143 anglers harvested 1,884 coho (61 percent of the 3,079 coho quota) and 1,670 chinook. In Area 4, a total of 13,409 anglers harvested 6,023 coho (85 percent of

the 7,058 coho quota) and 1,417 chinook. Table 1 shows estimated total recreational 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 74 coho and 2,124 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 184 coho and 2,557 chinook. A total of 766 coho and 7,877 chinook were harvested in Area 3 and landed in Washington, while Area 4 catches totaled 241 coho and 4,211 chinook. Total catches north of Cape Falcon (landed in both Washington and Oregon) were 2,679 coho (39 percent of the 6,800 coho quota) and 27,258 chinook (80 percent of the 34,000 chinook quota). Table 2 shows estimated total non-treaty commercial troll landed coho and chinook catch by month for the catch areas north of Cape Falcon.

5.3 Legal and Sublegal Sized Chinook Encountered

The numbers of legal and sublegal sized chinook salmon encountered by observers in the ocean fisheries are shown in Table 3.

During the recreational fisheries, in Area 1, ride-along samplers on charter boats observed 94 chinook encountered; of those, 38 were legal sized and 56 were sublegal sized, resulting in a sublegal sized rate of 60%, compared with 27% in 2005. In Area 2, ride-along samplers on charter boats observed 110 chinook encountered; of those, 101 were legal sized and 9 were sublegal sized, resulting in a sublegal sized rate of 8%, compared with 22% in 2005. In Areas 3 and 4 (combined for chinook in this report since the FRAM chinook model combines those areas), observers on charter boats and WDFW test fishers encountered 52 chinook, of which 17 were legal sized and 35 were sublegal sized, for a sublegal sized rate of 67% compared with 14% in 2005.

During the non-treaty troll fisheries, on-board observers were present on vessels in Areas 2, 3, and 4. In Area 2, ride-along samplers observed 232 chinook; of those, 157 were legal sized and 75 were sublegal sized, resulting in a sublegal sized rate of 32%, compared with 36% in 2005. In Areas 3 and 4, ride-along samplers observed 1,089 chinook; of those, 431 were legal sized and 658 were sublegal sized, for a sublegal sized rate of 42%, compared with 38% in 2005 (table 3).

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, a total of 688 coho encounters were observed aboard chartered fishing vessels; of these encounters, 425 coho were adipose fin clipped. The overall coho mark rate through the season was 65%, while the mark rates by month were 69% in July, 63% in August, and 33% in September (Table 4). For chinook, a total of 38 encounters were observed; 11 of these were

adipose fin clipped. The overall observed chinook mark rate was 31% through the season (Table 5). Dockside landings indicated a chinook mark rate of 9% through the season.

In Area 2, a total of 293 coho encounters were observed aboard chartered fishing vessels; 157 of these were adipose fin clipped. The overall coho mark rate through the season was 55%, while the mark rates by month were 56% in July, 46% in August, and 70% in September (Table 4). For chinook, a total of 100 encounters were observed; 15 of these were adipose fin clipped. The overall observed chinook mark rate was 16% through the season (Table 5). Dockside landings indicated a chinook mark rate of 8% through the season.

No onboard observer data were collected from the recreational fishery in Area 3. Dockside interviews indicated a coho mark rate of 43%; dockside examination of landed chinook indicate a chinook mark rate of 7%.

In Area 4, a total of 141 coho were encountered; 55 of these were adipose fin clipped. The overall coho mark rate through the season was 40%. The number of coho encountered in June, July, and September was insufficient to assess mark rate by month (Table 4). For chinook, a total of 17 encounters were observed; 3 were adipose fin clipped (Table 5). Chinook mark rates through the season were 18% based on observer data and 17% based on dockside interview data.

Tables 6 and 7 show the mark rates of legal sized coho and chinook, respectively, encountered in the ocean non-treaty troll fisheries. The number of coho encountered during on-board observation was not sufficient to assess monthly mark rates with confidence; however, observed overall coho mark rates through the season were 30% in Area 3 and 37% in Area 4.

On-board observation indicated an overall chinook mark rate of 27% in Area 2 through the season, compared with 26% seen dockside. In Areas 3 and 4, overall chinook mark rates were calculated at 20% based on observer data, and 17% based on dockside data through the season.

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, 0.13 chinook were encountered per coho in Area 1, 0.37 chinook were encountered per coho in Area 2, and 0.34 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 1.15, 6.10, and 29.00 chinook per coho in Areas 2, 3, and 4, respectively. During the summer all-species fishery, chinook to coho encounter ratios were 2.18 in Area 2, 1.69 in Area 3, and 2.67 in Area 4.

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

Pre-season projections of 2006 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 0619 was the final pre-season assessment of the PFMC's adopted fishery package for the 2006 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. In all areas, the observed coho mark rate was very similar to the projected mark rate. The observed coho mark rate for the season in the Area 1 recreational selective fishery was 65% compared to 69% projected pre-season. The observed coho mark rate for the season in the Area 2 recreational selective fishery was 55% compared to 57% projected pre-season, and the observed coho mark rate in the Area 4 selective fishery was 40% compared to 45% projected pre-season.

Table 11 compares the projected and observed coho mark rates for the non-treaty troll fisheries for areas with sufficient numbers of encountered coho observed. Observation data showed actual coho mark rates consistently lower than pre-season projections. The observed coho mark rate in the Area 3 non-treaty troll fishery was 30% compared to the projected rate of 44%, while in Area 4, the observed coho mark rate was 37% compared to 43% 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 12 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 48% compared to a rate of 36% observed on the water; in Area 2, the release rate reported dockside was 53%, compared with a release rate of 47% 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, 48% 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 99.8%. In Area 2, 44% of the total estimated

coho landed by the recreational fishery were sampled dockside; a compliance rate of 98.9% was observed during the selective coho fishery. In Area 3, 66% of the total estimated coho landed by the recreational fishery were sampled; the observed compliance rate was 98.3%. In Area 4, 36% were sampled dockside; a compliance rate of 98.2% was observed. Table 13 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 three 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 99.5% in Area 1, 99.6% in Area 2, 100% in Area 3, and 98.2% in Area 4.

During the non-treaty troll fisheries, a total of 614 coho (49% of the total coho landed in Washington) were examined dockside by WDFW sampling staff. These samplers encountered 1 unmarked coho in the landed catch, for a compliance rate of 99.8%.

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). Drop-off mortality rates for the recreational fisheries throughout the season estimated from on-water observation data were 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 14.

5.10 Estimated Mortality

Table 15 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 16. This analysis uses estimates of coho mark rates from on-water sampling where available 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 4,053 which, when combined with a total coho retention of 24,812, puts the estimate of total coho mortality in the Area 1 selective fishery at 28,865. This compares to a pre-season projected total mortality of 42,420 coho.

Incidental coho mortality in Area 2 is estimated at 2,071 which, when combined with a total coho retention of 8,779, puts the estimate of total coho mortality in the Area 2 fishery at 10,850. This compares to a pre-season projected total mortality of 33,660 coho.

In Area 3, incidental mortality is estimated at 499 which, when combined with a total coho retention of 1,884, puts the estimate of total coho mortality in the Area 3 selective fishery at 2,382. This compares to a pre-season projected total mortality of 2,553 coho.

Incidental coho mortality in Area 4 is estimated at 1,683 which, when combined with a total coho retention of 6,023, puts the estimate of total coho mortality in the Area 4 selective fishery at 7,706. This compares to a pre-season projected total mortality of 13,281 coho.

5.11 DNA Samples

Table 17 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 43 sublegal and 291 legal sized chinook were DNA sampled in Area 1. In Area 2, 9 DNA samples were collected from sublegal sized chinook and 534 samples were collected from legal sized chinook. From Area 3, no DNA samples were collected from sublegal sized chinook, and 291 samples were collected from legal sized chinook. In Area 4, 5 DNA samples were collected from sublegal sized chinook, and 218 samples were collected from legal sized chinook.

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 18. Onboard observers in Area 2 collected DNA from a total of 75 sublegal sized chinook, while a total of 608 legal sized chinook were sampled. From Area 3, a total of 388 DNA samples from sublegal sized chinook and 1,005 from legal sized chinook were collected. In Area 4, DNA samples were collected from 135 sublegal sized chinook and from 743 legal sized chinook. In most areas for both the recreational and non-treaty troll fisheries, the number of DNA samples was reduced from 2005 due to significantly lower availability of 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. Chinook and coho catch by month from the 2006 recreational fishery between Cape Falcon, Oregon and the U.S.-Canada border.

	CHINOOK						COHO					
	June	July	August	September	October	TOTAL	June	July	August	September	October	TOTAL
Area 1	-	478	1,148	140	-	1,765	-	6,533	12,222	646	-	19,401
Area 2	-	2,293	3,125	398	-	5,815	-	2,008	5,675	1,096	-	8,779
Area 3	36	247	955	342	91	1,670	36	744	1,041	61	2	1,884
Area 4	166	734	443	73	-	1,417	380	3,763	1,570	309	-	6,023
TOTAL WA	202	3,751	5,670	953	91	10,667	416	13,047	20,509	2,112	2	36,087
OREGON (Area 1)	-	81	370	58	-	509	-	1,616	3,560	235	-	5,411
TOTAL NOF	202	3,832	6,040	1,011	91	11,176	416	14,663	24,069	2,347	2	41,498

Table 2. Chinook and coho catch by month from the 2006 non-treaty troll fishery between Cape Falcon, Oregon and the U.S.-Canada border.

	CHINOOK						COHO			
	May	June	July	August	September	TOTAL	July	August	September	TOTAL
Area 1	1,746	364	0	1	13	2,124	7	29	38	74
Area 2	1,578	632	120	138	89	2,557	10	59	115	184
Area 3	723	2,371	844	2,658	1,281	7,877	100	551	115	766
Area 4	2,434	545	109	662	461	4,211	12	206	23	241
TOTAL WA	6,481	3,912	1,073	3,459	1,844	16,769	129	845	291	1,265
OREGON (Area 1)	7,167	3,168	1	61	92	10,489	10	1,182	222	1,414
TOTAL NOF	13,648	7,080	1,074	3,520	1,936	27,258	139	2,027	513	2,679

Table 3: On-board chinook encounters by size class in the 2006 ocean recreational and non-treaty troll fisheries.

Statistical	RECREATIONAL FISHERY						NON-TREATY TROLL FISHERY			
	Area 1		Area 2		Area 3/4		Area 2		Area 3/4	
Month	Legal	Sublegal	Legal	Sublegal	Legal	Sublegal	Legal	Sublegal	Legal	Sublegal
May	-	-	-	-	-	-	92	24	97	155
June	-	-	-	-	1	2	44	48	184	248
July	21	28	36	2	4	1	12	0	18	6
August	12	24	47	4	12	31	9	3	132	249
September	5	4	18	3	0	1	0	0	0	0
TOTALS	38	56	101	9	17	35	157	75	431	658

Table 4. Mark rates of legal-sized coho encountered by on-board observers in the 2006 ocean recreational fisheries.

		Total Coho				
		Encountered	Marked	Unmarked	Unknown	Mark Rate
Area 1	July	428	281	126	21	69%
	August	222	133	78	11	63%
	September	38	11	22	5	33%
	TOTAL	688	425	226	37	65%
Area 2	July	86	48	37	1	56%
	August	146	66	76	4	46%
	September	61	43	18	0	70%
	TOTAL	293	157	131	5	55%
Area 4	July	11	5	3	3	N/A
	August	121	46	74	1	38%
	September	9	4	5	0	N/A
	TOTAL	141	55	82	4	40%

Table 5. Mark rates of legal-sized chinook encountered by on-board observers in the 2006 ocean recreational fisheries.

		Total Chinook				
		Encountered	Marked	Unmarked	Unknown	Mark Rate
Area 1	July	21	7	14	0	33%
	August	14	4	8	2	33%
	September	3	0	3	0	N/A
	TOTAL	38	11	25	2	31%
Area 2	July	44	11	29	4	28%
	August	44	3	38	3	7%
	September	12	1	11		N/A
	TOTAL	100	15	78	7	16%
Area 4	June	0	0	0	0	N/A
	July	5	1	4	0	20%
	August	12	2	10	0	17%
	September	0	0	0	0	N/A
	TOTAL	17	3	14	0	18%

Table 6. Mark rates of legal-sized coho encountered by on-board observers in the 2006 ocean non-treaty troll fisheries.

		Total Coho				Mark Rate
		Encountered	Marked	Unmarked	Unknown	
Area 2	July	7	3	4	0	N/A
	August	2	1	1	0	N/A
	September	0	0	0	0	N/A
	TOTAL	9	4	5	0	N/A
Area 3	July	32	11	21	0	34%
	August	57	15	41	1	27%
	September	0	0	0	0	N/A
	TOTAL	89	26	62	1	30%
Area 4	July	2	1	1	0	N/A
	August	73	27	46	0	37%
	September	0	0	0	0	N/A
	TOTAL	75	28	47	0	37%

Table 7. Mark rates of legal-sized chinook encountered by on-board observers in the 2006 ocean non-treaty troll fisheries.

		Total Chinook				Mark Rate
		Encountered	Marked	Unmarked	Unknown	
Area 2	May	106	30	72	4	29%
	June	29	6	23	0	21%
	July	12	2	10	0	N/A
	August	9	3	4	2	N/A
	September	0	0	0	0	N/A
	TOTAL	156	41	109	6	27%
Area 3/4	May	119	15	94	10	14%
	June	162	35	120	7	23%
	July	23	6	14	3	30%
	August	127	22	94	11	19%
	September	0	0	0	0	N/A
	TOTAL	431	78	322	31	20%

Table 8. Numbers of chinook and coho encountered by on-board observers in the 2006 ocean recreational fisheries.

		Total Chinook Encountered	Total Coho Encountered	Chinook per Coho Ratio
Area 1	July	50	465	0.11
	August	40	226	0.18
	September	5	38	0.13
	TOTAL	95	729	0.13
Area 2	July	46	96	0.48
	August	52	155	0.34
	September	18	65	0.28
	TOTAL	116	316	0.37
Area 4	July	8	8	1.00
	August	45	136	0.33
	September	1	16	0.06
	TOTAL	54	160	0.34

Table 9. Numbers of chinook and coho encountered by on-board observers in the 2006 ocean non-treaty troll fisheries.

		Total Chinook Encountered	Total Coho Encountered	Chinook per Coho Ratio	
Area 2	May	146	97	1.51	
	June	62	84	0.74	
	Spring Total	208	181	1.15	
	July	12	8	1.50	
	August	12	3	4.00	
	September	0	0	N/A	
	Summer Total	24	11	2.18	
	Area 3	May	234	31	7.55
		June	394	72	5.47
Spring Total		628	103	6.10	
July		40	38	1.05	
August		143	70	2.04	
September		0	0	N/A	
Summer Total		183	108	1.69	
Area 4		May	58	2	29.00
		June	0	0	N/A
	Spring Total	58	2	29.00	
	July	0	2	N/A	
	August	222	81	2.74	
	September	0	0	N/A	
	Summer Total	222	83	2.67	

Table 10. Mark rates of legal sized coho encountered during on-board observation in the 2006 ocean recreational fisheries compared with the FRAM preseason projected mark rates.

		Total Coho Encountered	Observed Mark Rate	Projected Mark Rate
Area 1	July	428	69%	70%
	Aug.	222	63%	68%
	Sept.	38	33%	71%
	Total	688	65%	69%
Area 2	July	86	56%	55%
	Aug.	146	46%	58%
	Sept.	61	70%	63%
	Total	293	55%	57%
Area 4	July	11	N/A	46%
	Aug.	121	38%	42%
	Sept.	9	N/A	46%
	Total	141	40%	45%

Table 11. Mark rates of legal sized coho encountered during on-board observation in the 2006 ocean non-treaty troll fisheries compared with the FRAM preseason projected mark rates.

		Total Coho Encountered	Observed Mark Rate	Projected Mark Rate
Area 3	July	32	34%	45%
	Aug.	57	27%	44%
	Sept.	0	N/A	42%
	Total	89	30%	44%
Area 4	July	2	N/A	40%
	Aug.	73	37%	43%
	Sept.	0	N/A	46%
	Total	75	37%	43%

Table 12. Comparison of coho release rates observed on-water and reported through dockside interviews in the 2006 ocean recreation fisheries.

		On-Board Observation			Dockside Interview		
		Coho Retained	Coho Released	Release Rate a/	Coho Retained	Coho Released	Release Rate
Area 1	July	276	136	33%	5,283	4,434	46%
	August	130	73	36%	5,523	5,287	49%
	September	10	20	67%	1,123	1,126	50%
	Total	416	229	36%	11,929	10,847	48%
Area 2	July	46	41	47%	1,142	1,228	52%
	August	66	79	54%	1,938	2,258	54%
	September	45	18	29%	776	908	54%
	Total	157	138	47%	3,856	4,394	53%
Area 3	June	-	-	-	33	59	64%
	July	-	-	-	568	1,098	66%
	August	-	-	-	592	1,401	70%
	September	-	-	-	54	109	67%
	October	-	-	-	2	29	94%
	Total	-	-	-	1,249	2,696	68%
Area 4	June	-	-	-	80	130	62%
	July	5	3	N/A	1,373	2,323	63%
	August	45	81	N/A	461	1,013	69%
	September	4	12	N/A	261	781	75%
	Total	54	96	N/A	2,175	4,247	66%

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

Table 13. Compliance with coho selective fishery regulations observed through dockside port sampling interviews in the 2006 ocean recreation fisheries.

		Total Coho Sampled	Marked Coho Sampled	Unmarked Coho Sampled	% Sampled Coho Marked
Area 1	July	5,283	5,271	12	99.8%
	August	5,523	5,515	8	99.9%
	September	1,123	1,115	8	99.3%
	Total	11,929	11,901	28	99.8%
Area 2	July	1,142	1,127	15	98.7%
	August	1,938	1,920	18	99.1%
	September	776	768	8	99.0%
	Total	3,856	3,815	41	98.9%
Area 3	June	33	32	1	97.0%
	July	568	562	6	98.9%
	August	592	585	7	98.8%
	September	54	47	7	87.0%
	October	2	2	0	100.0%
	Total	1,249	1,228	21	98.3%
Area 4	June	80	77	3	96.3%
	July	1373	1,367	6	99.6%
	August	461	439	22	95.2%
	September	261	253	8	96.9%
	Total	2,175	2,136	39	98.2%

Table 14. Estimated drop off mortality in the 2006 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	457	58	5	23	1.0%
	August	236	30	2	12	1.0%
	Sept.	34	9	1	2	2.1%
	Total	727	97	8	36	1.1%
Area 2	July	129	33	3	6	2.0%
	August	191	23	2	10	1.0%
	Sept.	78	5	0	4	0.5%
	Total	398	61	5	20	1.2%
Area 4	June	1	2	0	0	16.0%
	July	15	1	0	1	0.5%
	August	166	15	1	8	0.7%
	Sept.	17	0	0	1	0.0%
	Total	199	18	1	10	0.7%

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 15. Preseason FRAM (model run 0619) projected coho mortality in the 2006 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	19,311	19,132	171	179	1,228	29,300	70%	1,465	1,399	2,864	22,175
	August	17,289	17,087	153	202	1,388	28,291	68%	1,415	1,541	2,956	20,245
	Sept.	0	0	0	0	0	0	71%	0	0	0	0
	Total	36,600	36,219	324	381	2,616	57,591	69%	2,880	2,940	5,820	42,420
Area 2	July	7,183	7,062	63	121	831	13,573	55%	679	894	1,573	8,756
	August	15,000	14,742	132	258	1,770	28,582	58%	1,429	1,902	3,331	18,331
	Sept.	5,420	5,332	48	88	602	10,058	63%	503	650	1,153	6,573
	Total	27,603	27,136	243	467	3,203	52,213	57%	2,611	3,446	6,057	33,660
Area 3	June	87	85	1	2	15	198	47%	10	16	26	113
	July	692	673	6	19	133	1,684	42%	84	139	223	915
	August	955	934	8	21	142	2,032	52%	102	150	252	1,207
	Sept./Oct.	206	195	2	11	73	743	31%	37	75	112	318
	Total	1,940	1,887	17	53	363	4,657	49%	233	380	613	2,553
Area 4	June	573	547	5	26	175	1,861	31%	93	180	273	846
	July	6,464	6,304	56	160	1,100	14,727	46%	736	1,156	1,892	8,356
	August	3,021	2,927	26	94	642	7,790	42%	390	668	1,058	4,079
	Sept.	0	0	0	0	0	0	46%	0	0	0	0
	Total	10,058	9,778	87	280	1,917	24,378	45%	1,219	2,004	3,223	13,281

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 16. Estimated Actual Coho Mortality in the 2006 Ocean Recreational Fisheries.

		Total Retention	Marked Retention	Marked Released	Unmarked Retention	Unmarked Released	Total Handled a/	Observed Mark Rate b/	Drop Off Mortality c/	Release Mortality d/	Incidental Mortality e/	Total Mortality f/
Area 1	July	8,149	8,130	163	19	3,654	11,965	69%	598	512	1,110	9,259
	August	15,782	15,760	315	23	9,256	25,353	63%	1,268	1,296	2,563	18,346
	Sept.	881	875	17	6	1,762	2,661	33%	133	247	380	1,261
	Total	24,812	24,765	495	48	14,672	39,980	65%	1,999	2,054	4,053	28,865
Area 2	July	2,008	1,988	40	20	1,548	3,595	56%	180	217	396	2,404
	August	5,675	5,606	112	70	6,535	12,323	46%	616	915	1,531	7,207
	Sept.	1,096	1,082	22	14	459	1,576	70%	79	64	143	1,239
	Total	8,779	8,675	174	104	8,542	17,494	55%	875	1,196	2,071	10,850
Area 3	June	36	34	1	2	41	77	47%	4	6	10	46
	July	744	735	15	9	1,027	1,786	42%	89	144	233	977
	August	1,041	1,026	21	14	961	2,022	52%	101	135	236	1,276
	Sept./Oct.	63	56	1	7	140	205	31%	10	20	30	93
	Total	1,884	1,851	37	32	2,128	4,012	43%	201	298	499	2,382
Area 4	June	380	377	8	4	847	1,235	31%	62	119	180	561
	July	3,763	3,711	74	52	4,417	8,254	46%	413	618	1,031	4,794
	August	1,570	1,511	30	59	2,562	4,163	38%	208	359	567	2,137
	Sept.	309	263	5	46	363	677	46%	34	51	85	394
	Total	6,023	5,862	117	161	7,342	13,095	40%	655	1,028	1,683	7,706

a/ Marked handled + Unmarked handled.

b/ Observed mark rates in Area 3 and in Area 4 June, July, and September assumed from preseason projections.

c/ 5% of total handled.

d/ 14% of unmarked released.

e/ Drop off + Release mortality.

f/ Total retention + Incidental mortality.

Table 17. 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	21	21	124	166
	August	21	12	69	102
	September	1	3	62	66
	Total	43	36	255	334
Area 2	July	2	35	305	342
	August	4	41	112	157
	September	3	12	29	44
	Total	9	88	446	543
Area 3	June	-	-	4	4
	July	-	-	88	88
	August	-	-	97	97
	September	-	-	56	56
	October	-	-	46	46
	Total	-	-	291	291
Area 4	July	1	4	8	13
	August	4	11	127	142
	September	0	0	68	68
	Total	5	15	203	223

Table 18. 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
		Sublegal Sized	Legal Sized	Legal Sized	DNA Samples
Area 2	May	40	94	313	447
	June	32	29	129	190
	July	0	12	0	12
	August	3	7	24	34
	September	0	0	20	20
	Total	75	142	466	703
Area 3	May	106	2	96	204
	June	207	1	293	501
	July	14	17	98	129
	August	61	38	460	559
	September	0	0	0	0
	Total	388	58	947	1,393
Area 4	May	3	41	283	327
	June	0	0	123	123
	July	0	0	17	17
	August	132	18	261	411
	September	0	0	0	0
	Total	135	59	684	878