

# **Progress Report for 2004 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 2004 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 June 27 through July 23, and seven days per week from July 24 to September 30, for a total of 90 fishing days. A two salmon daily bag limit was in effect, only one of which could be a chinook. 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 27 through July 23, and

seven days per week from July 24 to September 6, for a total of 66 fishing days. A two salmon daily bag limit was in effect, only one of which could be a chinook. All retained coho were required to have a healed adipose fin clip between June 27 and August 28; from August 29 through September 6, all legal sized coho, regardless of fin clip, could be retained.

Area 3: The ocean recreational fishery from the Queets River to Cape Alava was open for all salmon species seven days per week from June 27 through September 19. From September 25 to October 10, salmon fishing was restricted to the part of Area 3 north of 47°50'00" north latitude and south of 47°58'00" north latitude inside state waters (inside 3 nautical miles), seven days per week. A total of 101 fishing days were available in Area 3. A two salmon daily bag limit was in effect; only one chinook could be retained per day. 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 seven days per week from June 27 through September 2, then from September 10 through September 19, for a total of 78 fishing days. All salmon species could be retained, except no chum retention was allowed from August 1 through September 19. A two salmon daily bag limit was in effect; only one chinook could be retained per day. All retained coho were required to have a healed adipose fin clip. Chinook retention east of the Bonilla-Tatoosh line was allowed from June 27 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 through May 5, May 15 through May 18, May 24 through May 26, and June 26 through June 30 for all salmon except coho (a total of 17 days). The fishery reopened from Cape Falcon to the U.S./Canada border July 8 through 12, July 16 through 19, July 22 through 26, July 29 through August 2, August 5 through 9, August 11 through 15, August 18 through 22, August 25 through 29, and September 1 through 5 for all salmon species for a total of 44 days. The area between the Queets River and the U.S./Canada border remained open September 8 through 15 for an additional 8 available days.

## **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, 63,142 anglers harvested a total of 73,875 coho (73 percent of the 101,250 coho quota) and a total of 8,898 chinook. In Area 2, 37,490 anglers harvested a total of 28,999 coho (83 percent of the revised 34,900 coho quota) and a total of 10,859 chinook. In Area 3, 4,563 anglers harvested a total of 3,163 coho (60 percent of the 5,300 coho quota) and a total of 1,830 chinook. In Area 4, 26,128 anglers harvested a total of 29,400 coho (97 percent of the revised 30,750 coho quota) and 5,515 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 1,130 coho and 358 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 6,365 coho and 11,088 chinook. A total of 3,175 coho and 4,842 chinook were harvested in Area 3 and landed in Washington, while Area 4 catches totaled 2,623 coho and 19,084 chinook. Total catches north of Cape Falcon (landed in both Washington and Oregon) were 22,582 coho (33 percent of the 67,500 coho quota) and 47,011 chinook (95 percent of the adjusted 49,500 chinook quota).

## **5.3 Legal and Sublegal Sized Chinook Encountered**

The numbers of legal and sublegal sized chinook salmon observed in the ocean recreational fisheries are shown in Table 2. In Area 1, ride-along samplers on charter boats observed 383 chinook encountered; of those, 124 were legal sized, 240 were sublegal sized, and 19 were unknown, resulting in a sublegal sized rate of 66%. In Area 2, ride-along samplers on charter boats observed 413 chinook encountered; of those, 137 were legal sized and 276 were sublegal sized, for a sublegal sized rate of 67%. There were no on-board observation data in Area 3; voluntary trip reports showed a 36% sublegal sized rate for this area. In Area 4, WDFW encountered 13 chinook during its test fishery, of which 3 were legal sized and 10 were sublegal sized, for a sublegal sized rate of 77%. Sublegal sized rates from voluntary trip reports were 88%, 33% and 25% for Area 1, Area 2, and Area 4 respectively.

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 and 4. In Area 2, ride-along samplers observed 771 chinook; of those, 214 were legal sized, 556 were sublegal sized, and 1 was unknown, resulting in a sublegal sized rate of 72%. In Area 4, ride-along samplers observed 798 chinook; of those, 529 were legal sized, 240 were sublegal sized, and 30 were unknown for a sublegal sized rate of 31%.

## **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 834 coho encounters were observed aboard chartered fishing vessels; of these encounters, 484 coho were adipose fin clipped. The overall coho mark rate through the season was 60%, while the mark rates by month were 71% in June, 56% in July, 66% in August, and 52% in September (Table 4). Angler logbooks collected from Area 1 showed a coho mark rate of 42% through the season. A total of 124 chinook encounters were observed; 11 of these were adipose fin clipped. The overall chinook mark rate was 9% through the season (Table 5). Docksides landings indicated a chinook mark rate of 16% 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 640 coho encounters were observed aboard chartered fishing vessels; 278 of these were adipose fin clipped. The overall coho mark rate through the season was 46%, while the mark rates by month were 40% in June, 42% in July, 49% in August, and 46% in September (Table 4). Angler logbooks collected from Area 2 showed a coho mark rate of 32% through the season. A total of 137 chinook encounters were observed; 17 of these were adipose fin clipped. The overall chinook mark rate was 14% through the season (Table 5). Dockside landings indicated a chinook mark rate of 15% through the season.

Angler logbooks were collected from the Area 3 recreational fishery during July and August. A total of 64 coho were reported encountered, 26 of which were adipose fin clipped, resulting in a mark rate of 41% through the season. The coho mark rate by month was 58% in July and 31% in August (Table 4). The chinook mark rate through the season was 14% based on dockside interview data, compared with 19% based on angler logbook data (Table 5).

WDFW staff observed catch or test fished in Area 4 for each week the recreational fishery was open. A total of 447 coho were encountered; 161 of these were adipose fin clipped. The overall coho mark rate through the season was 37%, while the mark rates by month were 80% in June, 38% in July, 35% in August, and 44% in September (Table 4). Angler logbooks collected from Area 4 showed a coho mark rate of 44% through the season. A total of only 3 chinook encounters were observed; all were adipose fin clipped (Table 5). Chinook mark rates through the season were 21% based on dockside interview data and 22% based on angler logbook data.

Table 6 shows chinook mark rates observed in the non-treaty troll fisheries. On-board observation indicated an overall chinook mark rate of 11% in Area 2 through the season, compared with 17% seen dockside. In Area 3, dockside data showed a chinook mark rate of 18% through the season. In Area 4, overall chinook mark rates were calculated at 11% and 17% from observer and dockside data respectively.

Mark rates on coho encountered in the non-treaty troll fisheries are shown in table 7. On-board observation indicated overall coho mark rates of 48% in Area 2 and 29% in Area 4 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, 0.40 chinook were encountered per coho in Area 1, 0.62 chinook were encountered per coho in Area 2, and 0.03 chinook per coho were encountered in Area 4; in comparison, angler logbook data showed chinook per coho ratios of 0.19 in Area 1, 0.42 in Area 2, 0.53 in Area 3, and 0.76 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 9.92 and 18.81 chinook per coho in Areas 2 and 4, respectively. During the summer all-species fishery, chinook to coho encounter ratios were 4.08 in Area 2 and 1.68 in Area 4.

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

Pre-season projections of 2004 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 0420 was the final pre-season assessment of the PFMC's adopted fishery package for the 2004 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 60% compared to 67% projected pre-season. The observed coho mark rate for the season in the Area 2 selective fishery was 46% compared to 55% projected pre-season, and the observed coho mark rate in the Area 4 selective fishery was 37% compared to 50% 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 in all areas. Dockside sampling data from Area 1 showed an overall coho release rate of 61% compared to a rate of 42% observed on the water; in Area 2, the release rate reported dockside was 51%, compared with a release rate of 43% observed on the water; in Area 4, the release rate reported dockside was 73%, compared with a release rate of 59% seen during on-water observation.

## **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, 33% 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 99.6%. In Area 2, 37% of the total estimated coho landed by the recreational fishery were sampled dockside; a compliance rate of 99.2% was observed during the selective coho fishery. In Area 3, 73% of the total estimated coho landed by the recreational fishery were sampled; the observed compliance rate was 98.7%. In Area 4, 36% were sampled dockside; a compliance rate of 99.1% 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 2003.

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 99.0% in Area 1, 98.7% in Area 2, 99.3% in Area 3, and 98.8% in Area 4 (Exhibit C.2.b, Supplemental WDFW Report, presented to the Pacific Fisheries Management Council on March 10, 2004).

During the non-treaty troll fisheries, a total of 1,337 coho (15% of the total coho landed in Washington) were examined dockside by WDFW sampling staff. These samplers observed a coho mark-selective compliance rate of 99.3%.

## **5.9 Drop Off Rates**

On-water observers and recreational anglers completing voluntary logs 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 or anglers 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 ranged from less than 1% to just under 2% 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 and voluntary angler logbooks 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 14,849 which, when combined with a total coho retention of 73,875, puts the estimate of total coho mortality in the Area 1 selective fishery at 88,724. This compares to a pre-season projected total mortality of 117,903 coho.

Incidental coho mortality in Area 2 is estimated at 6,679 which, when combined with a total coho retention of 28,999, puts the estimate of total coho mortality in the Area 2 fishery at 35,678. This compares to a pre-season projected total mortality of 91,430 coho.

In Area 3, incidental mortality is estimated at 880 which, when combined with a total coho retention of 3,163, puts the estimate of total coho mortality in the Area 3 selective fishery at 4,040. This compares to a pre-season projected total mortality of 7,169 coho.

Incidental coho mortality in Area 4 is estimated at 12,296 which, when combined with a total coho retention of 29,400, puts the estimate of total coho mortality in the Area 4 selective fishery at 41,696. This compares to a pre-season projected total mortality of 29,013 coho.

### **5.11 DNA Samples**

Goals for DNA collection were not met in all strata for either the ocean recreational or non-treaty troll fisheries. Shortened numbers of available fishing days relative to 2003, lower catch rates in some fisheries, and a reduced number of non-treaty troll vessels willing to carry on-board observers limited the number of DNA samples collected. This was particularly true in the Area 4 recreational fishery, where only 3 chinook were encountered all season during on-board observation.

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 151 sublegal and 631 legal sized chinook were DNA sampled in Area 1. In Area 2, 168 DNA samples were collected from sublegal sized chinook and 761 samples were collected from legal sized chinook. No on-board or dockside DNA data collection occurred in Area 3. In Area 4, no DNA samples were collected from sublegal sized chinook, and 813 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 17. Onboard observers in Area 2 collected DNA from a total of 457 sublegal sized chinook, while a total of 916 legal sized chinook were sampled. No DNA samples were taken from Area 3. In Area 4, a total of 219 DNA samples from sublegal sized chinook and 1,287 from legal sized chinook were collected.

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 2004 ocean recreational fisheries.

Area	Month	Angler Trips	Coho	Chinook
Area 1	June	859	1,306	47
	July	16,119	23,786	1,074
	August	35,021	40,641	5,465
	September	11,143	8,142	2,312
	<b>Total</b>	<b>63,142</b>	<b>73,875</b>	<b>8,898</b>
Area 2	June	1,455	1,183	254
	July	15,722	7,060	4,087
	August	15,045	12,476	5,358
	September	5,268	8,280	1,160
	<b>Total</b>	<b>37,490</b>	<b>28,999</b>	<b>10,859</b>
Area 3	June	123	37	38
	July	1,883	1,437	853
	August	1,484	1,266	529
	September	1,053	420	404
	<b>Total</b>	<b>4,563</b>	<b>3,163</b>	<b>1,830</b>
Area 4/4B	June	435	361	235
	July	14,337	14,188	4,117
	August	10,366	13,846	1,090
	September	990	1,005	73
	<b>Total</b>	<b>26,128</b>	<b>29,400</b>	<b>5,515</b>

Table 2. Number of legal and sublegal sized chinook encountered in the 2004 ocean recreational fisheries.

	On-Board Observation					Voluntary Trip				
	Total Encountered	Legal Sized	Sublegal Sized	Unknown	Sublegal Sized Rate	Total Encountered	Legal Sized	Sublegal Sized	Unknown	Sublegal Sized Rate
Area 1 June	4	1	3	0	75%	-	-	-	-	-
July	107	14	90	3	87%	9	1	8	-	89%
Aug.	202	85	101	16	54%	43	5	36	2	88%
Sept.	70	24	46	0	66%	7	1	6	-	86%
<b>Total</b>	<b>383</b>	<b>124</b>	<b>240</b>	<b>19</b>	<b>66%</b>	<b>59</b>	<b>7</b>	<b>50</b>	<b>2</b>	<b>88%</b>
Area 2 June	24	9	15	0	63%	-	-	-	-	-
July	114	34	80	0	70%	4	2	2	-	50%
Aug.	264	92	172	0	65%	4	2	-	2	-
Sept.	11	2	9	0	82%	-	-	-	-	-
<b>Total</b>	<b>413</b>	<b>137</b>	<b>276</b>	<b>0</b>	<b>67%</b>	<b>8</b>	<b>4</b>	<b>2</b>	<b>2</b>	<b>33%</b>
Area 3 June	-	-	-	-	-	-	-	-	-	-
July	-	-	-	-	-	24	11	7	6	39%
Aug.	-	-	-	-	-	10	7	3	-	30%
Sept.	-	-	-	-	-	-	-	-	-	-
<b>Total</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>34</b>	<b>18</b>	<b>10</b>	<b>6</b>	<b>36%</b>
Area 4 June	-	-	-	-	-	-	-	-	-	-
July	9	3	6	0	67%	32	24	8	-	25%
Aug.	3	0	3	0	100%	-	-	-	-	-
Sept.	1	0	1	0	100%	-	-	-	-	-
<b>Total</b>	<b>13</b>	<b>3</b>	<b>10</b>	<b>0</b>	<b>77%</b>	<b>32</b>	<b>24</b>	<b>8</b>	<b>0</b>	<b>25%</b>

Table 3. Number of legal and sublegal sized chinook encountered in the 2004 ocean non-treaty troll fisheries (on-board observation).

		Total Encountered	Legal Sized	Sublegal Sized	Unknown	Sublegal Sized Rate
Area 2	May	494	144	349	1	71%
	June	32	13	19	0	59%
	July	-	-	-	-	-
	August	245	57	188	0	77%
	<b>Total</b>	<b>771</b>	<b>214</b>	<b>556</b>	<b>1</b>	<b>72%</b>
Area 4	May	386	225	140	21	38%
	June	103	47	56	0	54%
	July	235	189	39	7	17%
	August	74	68	5	1	7%
	Sept.	-	-	-	-	-
	<b>Total</b>	<b>798</b>	<b>529</b>	<b>240</b>	<b>30</b>	<b>31%</b>

Table 4. Mark rates of legal-sized coho encountered in the 2004 ocean recreational fisheries.

		On-Board Observation					Voluntary Trip				
		Total Encountered	Marked	Unmarked	Unknown	Mark Rate	Total Encountered	Marked	Unmarked	Unknown	Mark Rate
Area 1	June	86	60	24	2	71%	-	-	-	-	-
	July	407	219	175	13	56%	102	42	35	25	55%
	Aug.	236	151	78	7	66%	168	49	91	28	35%
	Sept.	105	54	49	2	52%	32	13	17	2	43%
	<b>Total</b>	<b>834</b>	<b>484</b>	<b>326</b>	<b>24</b>	<b>60%</b>	<b>302</b>	<b>104</b>	<b>143</b>	<b>55</b>	<b>42%</b>
Area 2	June	23	8	12	3	40%	-	-	-	-	-
	July	253	99	138	16	42%	16	5	11	0	31%
	Aug.	323	153	161	9	49%	3	1	2	0	33%
	Sept.	41	18	21	2	46%	-	-	-	-	-
	<b>Total</b>	<b>640</b>	<b>278</b>	<b>332</b>	<b>30</b>	<b>46%</b>	<b>19</b>	<b>6</b>	<b>13</b>	<b>0</b>	<b>32%</b>
Area 3	June	-	-	-	-	-	-	-	-	-	-
	July	-	-	-	-	-	24	14	10	0	58%
	Aug.	-	-	-	-	-	40	12	27	1	31%
	Sept.	-	-	-	-	-	-	-	-	-	-
	<b>Total</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>64</b>	<b>26</b>	<b>37</b>	<b>1</b>	<b>41%</b>
Area 4	June	5	4	1	0	80%	-	-	-	-	-
	July	196	72	120	4	38%	42	18	24	1	44%
	Aug.	227	77	145	5	35%	-	-	-	-	-
	Sept.	19	8	10	1	44%	-	-	-	-	-
	<b>Total</b>	<b>447</b>	<b>161</b>	<b>276</b>	<b>10</b>	<b>37%</b>	<b>42</b>	<b>18</b>	<b>24</b>	<b>1</b>	<b>44%</b>

Table 5. Mark rates of legal-sized chinook encountered in the 2004 ocean recreational fisheries.

		On-board Observation					Dockside Interview					Voluntary Trip				
		Total En- countered	Marked	Un- marked	Un- known	Mark Rate	Total En- countered	Marked	Un- marked	Un- known	Mark Rate	Total En- countered	Marked	Un- marked	Un- known	Mark Rate
Area 1	June	1	0	1	0	0%	32	8	24	0	25%	-	-	-	-	-
	July	14	3	11	0	21%	427	95	332	0	22%	1	0	0	1	0%
	Aug.	85	7	73	5	8%	1,921	299	1,622	0	16%	5	0	4	1	0%
	Sept.	24	1	22	1	4%	794	94	700	0	12%	1	0	1	0	0%
	<b>Total</b>	<b>124</b>	<b>11</b>	<b>107</b>	<b>6</b>	<b>9%</b>	<b>3,174</b>	<b>496</b>	<b>2,678</b>	<b>0</b>	<b>16%</b>	<b>7</b>	<b>0</b>	<b>5</b>	<b>2</b>	<b>0%</b>
Area 2	June	9	2	7	0	22%	268	49	219	0	18%	-	-	-	-	-
	July	34	3	28	3	10%	1,410	203	1,207	0	14%	2	0	2	0	0%
	Aug.	92	11	68	13	14%	2,218	358	1,860	0	16%	2	0	2	0	0%
	Sept.	2	1	1	0	50%	504	67	437	0	13%	-	-	-	-	-
	<b>Total</b>	<b>137</b>	<b>17</b>	<b>104</b>	<b>16</b>	<b>14%</b>	<b>4,400</b>	<b>677</b>	<b>3,723</b>	<b>0</b>	<b>15%</b>	<b>4</b>	<b>0</b>	<b>4</b>	<b>0</b>	<b>0%</b>
Area 3	June	-	-	-	-	-	95	15	80	0	16%	-	-	-	-	-
	July	-	-	-	-	-	494	86	408	0	17%	11	3	7	1	30%
	Aug.	-	-	-	-	-	417	50	367	0	12%	7	0	6	1	0%
	Sept.	-	-	-	-	-	135	17	152	0	13%	-	-	-	-	-
	Oct.	-	-	-	-	-	92	10	82	0	11%	-	-	-	-	-
	<b>Total</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>1,233</b>	<b>178</b>	<b>1,089</b>	<b>0</b>	<b>14%</b>	<b>18</b>	<b>3</b>	<b>13</b>	<b>2</b>	<b>19%</b>
Area 4	June	-	-	-	-	-	221	50	171	0	23%	-	-	-	-	-
	July	3	3	0	0	100%	1,431	307	1,124	0	21%	24	5	18	1	22%
	Aug.	-	-	-	-	-	378	73	305	0	19%	-	-	-	-	-
	Sept.	-	-	-	-	-	28	8	20	0	29%	-	-	-	-	-
	<b>Total</b>	<b>3</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>100%</b>	<b>2,058</b>	<b>438</b>	<b>1,620</b>	<b>0</b>	<b>21%</b>	<b>24</b>	<b>5</b>	<b>18</b>	<b>1</b>	<b>22%</b>

Table 6. Mark rates of legal sized chinook encountered in the 2004 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	144	13	125	4	9%	5,003	866	4,137	0	17%
	June	13	1	12	0	8%	149	24	125	0	16%
	July	-	-	-	-	-	57	8	49	0	14%
	August	57	8	49	0	14%	55	10	45	0	18%
	Sept.	-	-	-	-	-	76	15	61	0	20%
	<b>Total</b>	<b>214</b>	<b>22</b>	<b>186</b>	<b>4</b>	<b>11%</b>	<b>5,340</b>	<b>923</b>	<b>4,417</b>	<b>0</b>	<b>17%</b>
Area 3	May	-	-	-	-	-	99	18	81	0	18%
	June	-	-	-	-	-	60	12	48	0	20%
	July	-	-	-	-	-	636	115	521	0	18%
	August	-	-	-	-	-	49	7	42	0	14%
	Sept.	-	-	-	-	-	170	33	137	0	19%
	<b>Total</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>1,014</b>	<b>185</b>	<b>829</b>	<b>0</b>	<b>18%</b>
Area 4	May	225	32	147	1	14%	4,060	774	3,286	0	19%
	June	47	11	36	0	23%	477	61	416	0	13%
	July	189	11	171	0	6%	1,498	239	1,259	0	16%
	August	68	6	61	1	9%	654	65	589	0	10%
	Sept.	-	-	-	-	-	465	52	413	0	11%
	<b>Total</b>	<b>529</b>	<b>60</b>	<b>415</b>	<b>2</b>	<b>11%</b>	<b>7,154</b>	<b>1,191</b>	<b>5,963</b>	<b>0</b>	<b>17%</b>

Table 7. Mark rates of legal-sized coho encountered in the 2004 ocean troll fisheries.

		On-board Observation				Mark Rate
		Total Encountered	Marked Encountered	Unmarked Encountered	Unknown	
Area 2	May	4	3	0	1	100%
	June	4	0	0	4	0%
	July	-	-	-	-	-
	August	57	26	31	0	46%
	Sept.	-	-	-	-	-
	<b>Total</b>	<b>65</b>	<b>29</b>	<b>31</b>	<b>5</b>	<b>48%</b>
Area 4	May	-	-	-	-	-
	June	8	4	4	0	50%
	July	117	31	86	0	26%
	August	56	17	39	0	30%
	Sept.	-	-	-	-	-
	<b>Total</b>	<b>181</b>	<b>52</b>	<b>129</b>	<b>0</b>	<b>29%</b>



Table 8. Estimates of chinook per coho in the 2004 ocean recreational fisheries.

	On-board Observation			Voluntary Trip		
	Total Chinook Encountered	Total Coho Encountered	Chinook/Coho	Total Chinook Encountered	Total Coho Encountered	Chinook/Coho
Area 1 June	4	99	0.04	-	-	-
July	107	425	0.25	9	102	0.09
Aug.	202	277	0.73	43	168	0.26
Sept.	70	114	0.61	7	33	0.21
<b>Total</b>	<b>383</b>	<b>915</b>	<b>0.40</b>	<b>59</b>	<b>303</b>	<b>0.19</b>
Area 2 June	24	24	1.0	-	-	-
July	114	259	0.44	4	16	0.25
Aug.	264	334	0.79	4	3	1.33
Sept.	11	42	0.26	-	-	-
<b>Total</b>	<b>413</b>	<b>659</b>	<b>0.62</b>	<b>8</b>	<b>19</b>	<b>0.42</b>
Area 3 June	-	-	-	-	-	-
July	-	-	-	24	24	1.00
Aug.	-	-	-	10	40	0.25
Sept.	-	-	-	-	-	-
<b>Total</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>34</b>	<b>64</b>	<b>0.53</b>
Area 4 June	0	5	0.00	-	-	-
July	9	208	0.04	32	42	0.76
Aug.	3	262	0.01	-	-	-
Sept.	1	22	0.05	-	-	-
<b>Total</b>	<b>13</b>	<b>497</b>	<b>0.03</b>	<b>32</b>	<b>42</b>	<b>0.76</b>

Table 9. Estimates of chinook per coho in the 2004 ocean non-treaty troll fisheries.

		Total Chinook Encountered	Total Coho Encountered	Chinook/Coho
Area 2	May	494	43	11.49
	June	32	10	3.20
	July	-	-	-
	August	245	60	4.08
	September	-	-	-
	<b>Total</b>	<b>771</b>	<b>113</b>	<b>6.82</b>
	Area 4/4B	May	386	17
June		103	9	11.44
July		235	127	1.85
August		74	57	1.30
September		-	-	-
<b>Total</b>		<b>798</b>	<b>210</b>	<b>3.80</b>

Table 10. Mark rates of legal sized coho encountered during on-board observation in the 2004 ocean recreational fisheries compared with the FRAM preseason projected mark rates.

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		Total Coho Encountered	Observed Mark Rate	Projected Mark Rate
Area 1	June	86	71%	74%
	July	407	56%	71%
	Aug.	236	66%	64%
	Sept.	105	52%	57%
	<b>Total</b>	<b>834</b>	<b>60%</b>	<b>67%</b>
Area 2	June	23	40%	60%
	July	253	42%	58%
	Aug.	323	49%	55%
	Sept.	41	46%	47%
	<b>Total</b>	<b>640</b>	<b>46%</b>	<b>55%</b>
Area 4	June	5	80%	30%
	July	196	38%	44%
	Aug.	227	35%	34%
	Sept.	19	44%	40%
	<b>Total</b>	<b>447</b>	<b>37%</b>	<b>50%</b>

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Table 11. Comparison of coho release rates observed on-water and reported through dockside interviews in the 2004 ocean recreation fisheries.

		On-Board Observation/ Angler Logs			Dockside Interview		
		Coho Retained	Coho Released	Release Rate	Coho Retained	Coho Released	Release Rate
Area 1	June	60	27	31%	1,006	827	45%
	July	216	177	45%	9,718	15,382	61%
	August	156	107	41%	12,636	19,151	60%
	September	53	54	50%	1,970	4,396	69%
	<b>Total</b>	<b>485</b>	<b>365</b>	<b>42%</b>	<b>25,330</b>	<b>39,756</b>	<b>61%</b>
Area 2	June	8	14	64%	799	1,425	64%
	July	98	141	59%	2,238	3,863	63%
	August	166	147	47%	5,480	6,822	55%
	September	39	1	3%	3,544	614	15%
	<b>Total</b>	<b>311</b>	<b>303</b>	<b>43%</b>	<b>12,061</b>	<b>12,724</b>	<b>51%</b>
Area 3	June	N/A	N/A	N/A	60	176	75%
	July	N/A	N/A	N/A	856	1,856	68%
	August	N/A	N/A	N/A	977	2,496	72%
	September	N/A	N/A	N/A	240	788	77%
	<b>Total</b>	N/A	N/A	N/A	<b>2,133</b>	<b>5,316</b>	<b>71%</b>
Area 4	June	4	1	20%	257	480	65%
	July	67	129	66%	4,704	12,707	73%
	August	62	183	75%	5,134	13,433	72%
	September	5	16	76%	483	1,621	77%
	<b>Total</b>	<b>138</b>	<b>329</b>	<b>59%</b>	<b>10,578</b>	<b>28,241</b>	<b>73%</b>

Table 12. Compliance with coho selective fishery regulations observed through dockside port sampling interviews in the 2004 ocean recreation fisheries.

		Total Coho Sampled	Marked Coho Sampled	Unmarked Coho Sampled	% Sampled Coho Marked
Area 1	June	1,006	1,006	0	100.00%
	July	9,718	9,699	19	99.80%
	August	12,636	12,576	60	99.53%
	September	1,970	1,953	17	99.14%
	<b>Total</b>	<b>25,330</b>	<b>25,234</b>	<b>96</b>	<b>99.62%</b>
Area 2	June	799	792	7	99.12%
	July	2,238	2,223	15	99.33%
	August a/	5,480	4,680	800	85.40%
	September	3,544	1,412	2,132	39.84%
	<b>Total</b>	<b>12,061</b>	<b>9,107</b>	<b>2,954</b>	<b>75.51%</b>
Area 3	June	60	60	0	100.00%
	July	856	844	12	98.60%
	August	977	971	6	99.39%
	September	240	229	11	95.42%
	October	23	23	0	100.00%
	<b>Total</b>	<b>2,156</b>	<b>2,127</b>	<b>29</b>	<b>98.65%</b>
Area 4	June	257	245	12	95.33%
	July	4,704	4,656	48	98.98%
	August	5,134	5,101	33	99.36%
	September	483	482	1	99.79%
	<b>Total</b>	<b>10,578</b>	<b>10,484</b>	<b>94</b>	<b>99.11%</b>

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

Table 13. Estimated drop off mortality in the 2004 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	June	145	53	4	7	2.9%
	July	621	131	10	31	1.7%
	August	556	121	10	28	1.7%
	Sept.	231	59	5	12	2.0%
	<b>Total</b>	<b>1,553</b>	<b>364</b>	<b>29</b>	<b>78</b>	<b>1.9%</b>
Area 2	June	48	7	1	2	1.2%
	July	378	34	3	19	0.7%
	August	599	63	5	30	0.8%
	Sept.	53	3	0	3	0.5%
	<b>Total</b>	<b>1,078</b>	<b>107</b>	<b>9</b>	<b>54</b>	<b>0.8%</b>
Area 4/4B	June	5	0	0	0	0.0%
	July	225	17	1	11	0.6%
	August	270	22	2	14	0.7%
	Sept.	24	2	0	1	0.7%
	<b>Total</b>	<b>524</b>	<b>41</b>	<b>3</b>	<b>26</b>	<b>0.6%</b>

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 0420) Projected Coho Mortality in the 2004 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	June	650	645	6	5	33	925	74%	46	39	85	735
	July	32,000	31,727	284	273	1,871	47,386	71%	2,369	2,155	4,524	36,524
	August	63,000	62,255	556	745	5,110	103,473	64%	5,174	5,666	10,840	73,840
	Sept.	5,600	5,508	49	92	632	10,463	57%	523	681	1,204	6,804
	<b>Total</b>	<b>101,250</b>	<b>100,135</b>	<b>895</b>	<b>1,115</b>	<b>7,646</b>	<b>162,247</b>	<b>67%</b>	<b>8,112</b>	<b>8,541</b>	<b>16,653</b>	<b>117,903</b>
Area 2	June	5,177	5,105	46	72	495	9,041	60%	452	541	993	6,170
	July	28,387	27,963	250	424	2,907	50,938	58%	2,547	3,157	5,704	34,091
	August	33,081	32,498	290	583	3,997	63,707	55%	3,185	4,287	7,472	40,553
	Sept.	8,255	8,056	72	199	1,363	18,507	47%	925	1,435	2,360	10,615
	<b>Total</b>	<b>74,900</b>	<b>73,622</b>	<b>658</b>	<b>1,278</b>	<b>8,762</b>	<b>142,193</b>	<b>55%</b>	<b>7,110</b>	<b>9,420</b>	<b>16,530</b>	<b>91,430</b>
Area 3	June	212	208	2	4	28	428	52%	21	30	51	263
	July	2,433	2,365	21	68	467	5,921	42%	296	488	784	3,217
	August	2,337	2,281	20	56	383	5,216	47%	261	403	664	3,001
	Sept./Oct.	318	281	3	38	258	2,181	14%	109	261	370	688
	<b>Total</b>	<b>5,300</b>	<b>5,135</b>	<b>46</b>	<b>166</b>	<b>1,136</b>	<b>13,746</b>	<b>40%</b>	<b>687</b>	<b>1,182</b>	<b>1,869</b>	<b>7,169</b>
Area 4/4B	June	837	797	7	40	276	2,860	30%	143	283	426	1,263
	July	9,704	9,446	84	258	1,770	22,951	44%	1,148	1,854	3,002	12,706
	August	9,296	8,920	80	376	2,580	28,295	34%	1,415	2,660	4,075	13,371
	Sept.	1,213	1,172	10	42	285	3,322	40%	166	295	461	1,674
	<b>Total</b>	<b>21,050</b>	<b>20,335</b>	<b>181</b>	<b>716</b>	<b>4,911</b>	<b>57,428</b>	<b>50%</b>	<b>2,871</b>	<b>5,092</b>	<b>7,963</b>	<b>29,013</b>

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 2004 Ocean Recreational Fisheries.

		Total Retention	Marked Retention	Marked Released	Unmarked Retention a/	Unmarked Released	Total handled b/	Observed Mark Rate c/	Drop Off Mortality d/	Release Mortality e/	Incidental Mortality f/	Total Mortality g/
Area 1	June	1,306	1,306	84	0	596	1,985	70%	99	95	194	1,500
	July	23,786	23,721	1,518	65	21,435	46,739	54%	2,337	3,213	5,550	29,336
	August	40,641	40,381	2,584	260	23,908	67,133	64%	3,357	3,709	7,066	47,707
	Sept.	8,142	8,020	513	122	8,076	16,731	51%	837	1,203	2,039	10,181
	<b>Total</b>	<b>73,875</b>	<b>73,428</b>	<b>4,699</b>	<b>447</b>	<b>54,015</b>	<b>132,589</b>	<b>60%</b>	<b>6,629</b>	<b>8,220</b>	<b>14,849</b>	<b>88,724</b>
Area 2	June	1,183	1,179	75	4	2,326	3,584	35%	179	336	515	1,698
	July	7,060	7,007	448	53	11,608	19,117	39%	956	1,688	2,644	9,704
	August	12,476	11,282	722	1,194	12,342	25,541	47%	1,277	1,829	3,106	15,582
	Sept.	8,280	3,300	0	4,980	0	8,280	44%	414	0	414	8,694
	<b>Total</b>	<b>28,999</b>	<b>22,768</b>	<b>1,246</b>	<b>6,231</b>	<b>26,276</b>	<b>56,521</b>	<b>41%</b>	<b>2,826</b>	<b>3,853</b>	<b>6,679</b>	<b>35,678</b>
Area 3	June	37	37	2	0	36	76	52%	4	5	9	46
	July	1,437	1,418	91	19	2,065	3,592	42%	180	302	481	1,918
	August	1,266	1,258	81	8	1,501	2,848	47%	142	221	364	1,630
	Sept./Oct.	420	404	26	16	0	446	14%	22	4	26	446
	<b>Total</b>	<b>3,163</b>	<b>3,117</b>	<b>199</b>	<b>46</b>	<b>3,602</b>	<b>6,962</b>	<b>65%</b>	<b>348</b>	<b>532</b>	<b>880</b>	<b>4,040</b>
Area 4/4B	June	361	342	22	19	72	455	80%	23	13	36	397
	July	14,188	14,013	897	175	25,212	40,297	37%	2,015	3,655	5,670	19,858
	August	13,846	13,768	881	78	28,359	43,086	34%	2,154	4,094	6,248	20,094
	Sept.	1,005	1,003	64	2	1,472	2,541	42%	127	215	342	1,347
	<b>Total</b>	<b>29,400</b>	<b>29,126</b>	<b>1,864</b>	<b>274</b>	<b>55,114</b>	<b>86,378</b>	<b>48%</b>	<b>4,319</b>	<b>7,977</b>	<b>12,296</b>	<b>41,696</b>

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 assumed from pre-season 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	June	2	1	9	12
	July	65	46	130	241
	August	58	76	322	456
	September	26	23	24	73
	<b>Total</b>	<b>151</b>	<b>146</b>	<b>485</b>	<b>782</b>
Area 2	June	10	5	3	18
	July	40	31	248	319
	August	110	76	358	544
	September	8	1	39	48
	<b>Total</b>	<b>168</b>	<b>113</b>	<b>648</b>	<b>929</b>
Area 3	June	0	0	0	0
	July	0	0	0	0
	August	0	0	0	0
	September	0	0	0	0
	<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
Area 4/4B	June	0	0	122	122
	July	0	0	606	606
	August	0	0	77	77
	September	0	0	8	8
	<b>Total</b>	<b>0</b>	<b>0</b>	<b>813</b>	<b>813</b>

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	246	1	656	903
	June	19	41	18	78
	July	0	0	170	170
	August	192	0	30	222
	September	0	0	0	0
	<b>Total</b>	<b>457</b>	<b>42</b>	<b>874</b>	<b>1,373</b>
	Area 3	May	0	0	0
June		0	0	0	0
July		0	0	0	0
August		0	0	0	0
September		0	0	0	0
<b>Total</b>		<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
Area 4		May	122	178	500
	June	54	46	0	100
	July	36	180	120	336
	August	7	69	162	238
	September	0	0	32	32
	<b>Total</b>	<b>219</b>	<b>473</b>	<b>814</b>	<b>1,506</b>