2011 OCEAN SELECTIVE FISHERY SAMPLING REPORT

SUBMITTED BY:

WASHINGTON DEPARTMENT OF FISH AND WILDLIFE
FISH MANAGEMENT PROGRAM
600 CAPITOL WAY NORTH
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1. INTRODUCTION

The Pacific Fishery Management Council (PFMC) adopted 2011 recreational and commercial troll fisheries for all salmon species in the area between Cape Falcon, Oregon and the U.S./Canada border. Mark-selective recreational fisheries for Chinook and coho and mark-selective coho commercial fisheries were included in all four Catch Record Card (CRC) areas of coastal Washington (Areas 1, 2, 3, and 4). 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 PFMC adopted an ocean mark-selective Chinook fishery (MSF) in Marine Areas 1 through 4 for the second consecutive year, operating for eight days from June 18 through June 25, 2011, following state-tribal agreement during the North of Falcon process. Consistent with the Washington Department of Fish and Wildlife's (WDFW) intent of Puget Sound/Strait of Juan de Fuca mark-selective Chinook fisheries as well as the 2010 ocean mark-selective Chinook pilot fishery, the primary goal for this selective fishery was to provide meaningful opportunity to the recreational angling public while minimally impacting ESA-listed Chinook salmon encountered in the mixed-stock ocean fisheries. WDFW's Ocean Sampling Program (OSP) implemented an intensive monitoring program in all ocean ports during the season to collect data to estimate key parameters characterizing the fishery and its impacts on unmarked salmon. Sampling activities included dockside creel sampling, on-water observation, and a Voluntary Trip Report (VTR) system. Among other parameters, sampling activities emphasized data collection needs for the estimation of: *i*) the mark rate of the targeted Chinook population, *ii*) the total number of Chinook salmon harvested (by size [legal or sublegal] and mark-status [marked or unmarked]), *iii*) the total number of Chinook salmon released (by size/mark-status), *iv*) the coded-wire tag- (CWT) and/or DNA-based stock composition of marked and unmarked Chinook mortalities, and v) the total mortality of marked and unmarked double index tag (DIT) CWT stocks.

Additionally, coho mark-selective fisheries were adopted in 2011 for the thirteenth consecutive year, and the OSP continued its intensive monitoring program in all ocean ports. Sampling activities were identical to those employed during the Chinook MSF. Sampling activities during the coho MSF emphasized data collection needs for the estimation of: *i*) the mark rate of the targeted coho population, *ii*) the total number of coho harvested by mark-status, including an estimate of angler compliance rate with coho MSF regulations, *iii*) the total number of coho released (by size/mark-status), *iv*) the coded-wire tag- (CWT) stock composition of landed coho, and *v*) the total mortality of marked and unmarked coho.

2. SEASON DESCRIPTION

2.1 Ocean Recreational Chinook pilot MSF

Catch Record Card (CRC) Areas 1 through 4 (**Figure 1**) were open for all salmon except coho seven days per week from June 18 through June 25. A daily bag limit of two salmon was in effect. All retained Chinook were required to have a healed adipose fin clip, and the minimum size limit was 24 inches total length for Chinook. A total of 8 fishing days were available during this fishery.

2.2 Ocean Recreational All-Species Fisheries (Coho Mark-Selective)

CRC Area 1: The ocean recreational fishery in Area 1 was open for all salmon species seven days per week from June 26 through September 30. A daily bag limit of two salmon, one of which could be a Chinook, was in effect June 26 - August 6, August 14 – August 28, and September 5 – September 30; the bag limit was modified in-season to two salmon from August 7 – August 13, and to 2 salmon with no Chinook retention August 29 – September 4. All retained coho were required to have a healed adipose fin clip. The Columbia Control Zone was closed. A total of 97 fishing days were available in the area.

CRC Area 2: The ocean recreational fishery from Leadbetter Point to the Queets River was open for all salmon species Sunday through Thursday June 26 - July 31 and August 19 – August 28, and seven days per week August 1 – August 18 and August 29 - September 18. A daily bag limit of two salmon, one of which could be a Chinook, was in effect June 26 - August 6, August 14 – August 28, and September 5 – September 18; the bag limit was modified in-season to two salmon from August 7 – August 13, and to 2 salmon with no Chinook retention August 29 – September 4. All retained coho were required to have a healed adipose fin clip. The Grays Harbor Control Zone was closed beginning August 1. A total of 71 fishing days were available in the area.

CRC 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 26 through September 18. From September 24 - October 9, salmon fishing was open and 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 daily bag limit of two salmon, one of which could be a Chinook, was in effect June 26 - July 30, September 5 – September 18, and September 24 - October 9; the bag limit was modified in-season to two salmon August 1 – August 28, and to 2 salmon with no Chinook retention August 29 – September 4. All retained coho were required to have a healed adipose fin clip. A total of 101 fishing days were available in the area.

CRC Area 4: The ocean recreational fishery from Cape Alava to the U.S./Canada border was open for all salmon species seven days per week from June 26 through September 18. A daily bag limit of two salmon, one of which could be a Chinook, was in effect June 26 - July 30 and September 5 – September 18; the bag limit was modified in-season to two salmon August 1 – August 28, and to 2 salmon with no Chinook retention August 29 – September 4. Beginning

August 1, Chinook retention east of the Bonilla-Tatoosh line and chum retention were prohibited. All retained coho were required to have a healed adipose fin clip. A total of 85 fishing days were available in the area.

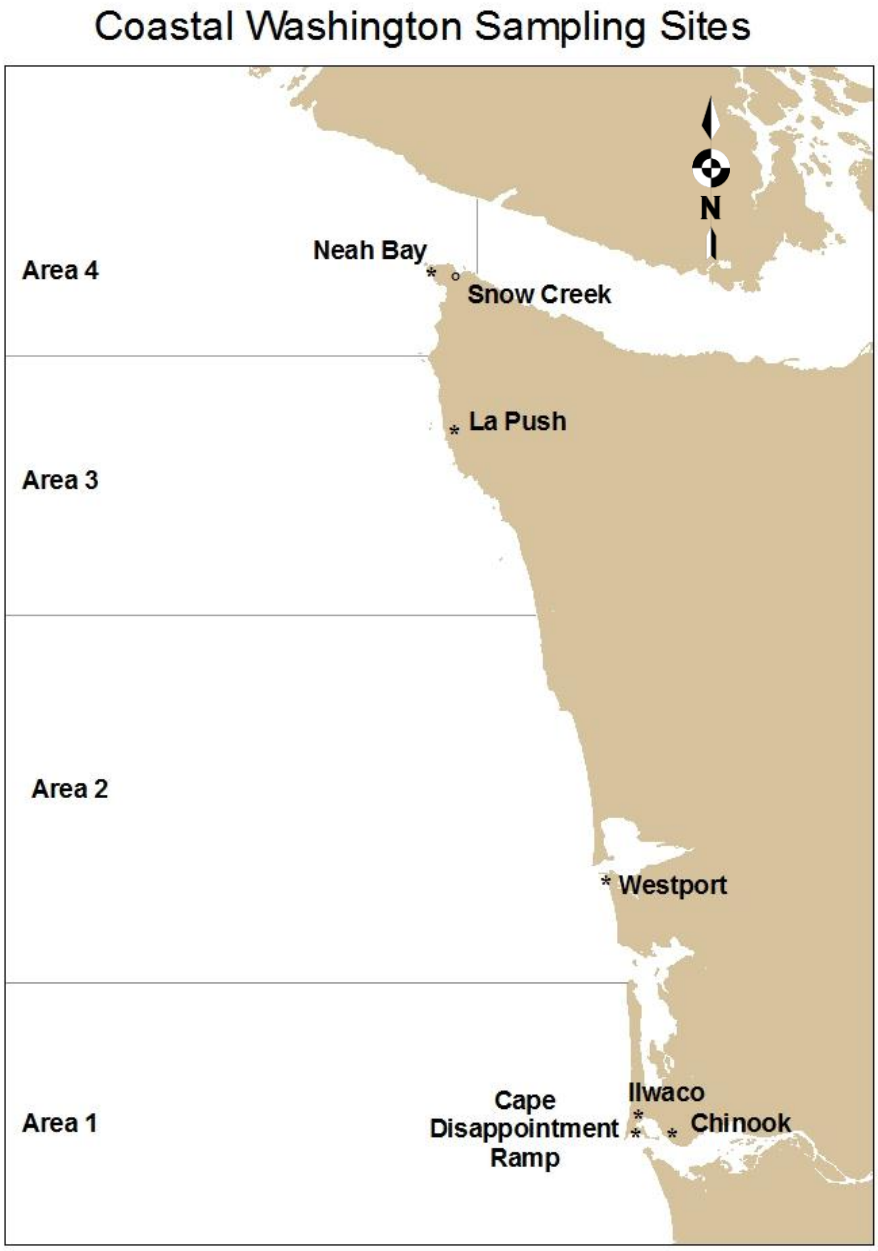

Figure 1. Map of coastal Washington showing the ocean catch record card areas (Areas 1 through 4) and major sampling sites.

2.3 Non-Treaty Commercial Troll Fisheries (Coho Mark-Selective)

The non-Treaty troll fishery was open from Cape Falcon, Oregon to the U.S./Canada border May 1-June 21 and June 23-30 for all salmon except coho (a total of 60 days). The fishery reopened from Cape Falcon to the U.S./Canada border July 1-5, 8-12, 15-19, 22-26, July 29-August 2, August 5-9, 19, 27-29, September 3-6, and 10-13 for all salmon species except no chum retention north of Cape Alava, WA in August and September. All retained coho were required to have a healed adipose fin clip. A total of 42 fishing days were available during the summer fishery.

3. METHODS

WDFW's Ocean Sampling Program (OSP) implemented a comprehensive monitoring program in all ocean ports during the Chinook and coho selective fishery seasons in Washington ocean Areas 1-4. OSP collected the data needed to estimate key fishery parameters characterizing the ocean mark-selective fisheries and associated impacts on unmarked salmon. Sampling activities included dockside angler interviews (with catch sampling), total boat counts via exit or entrance counts at each major coastal port, direct on-the-water observations of salmon encounters during charter ride-along trips, and voluntary trip reports of completed trips provided by the angling public.

3.1 On-Board Observation

WDFW samplers conducted direct on-water observation of salmon encounters onboard charter vessels during both the recreational Chinook MSF and the recreational all-species coho MSF. Data collected onboard the charter boats were used to estimate the encounter rates of Chinook by size class and mark group (legal-size and marked [LM], legal-size and unmarked [LU], sublegal-size and marked [SM], and sublegal-size and unmarked [SU]), as well as encounter rates of marked and unmarked coho, and drop-offs. In addition, samplers collected DNA samples from legal sized and sublegal sized Chinook while onboard the charter vessels.

WDFW observers rode along on charter vessels and 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 (marked or unmarked), and size class (legal or sublegal). A sampling protocol was established for the charter 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, size category, and result of each hook-up aboard the vessel. Collection of these data enabled estimation of encounter rates for Chinook (by size/mark status) and coho (by mark status), 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 all Chinook during the June Chinook MSF and from sublegal-sized Chinook during the all-species fishery. DNA from sublegal-sized Chinook was prioritized above that from legal-sized Chinook when Chinook retention was not mark-selective 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.

Direct on-water observation of salmon encounters was the primary method used in CRC Areas 1 and 2 to determine mark rates, encounter rates, and drop-off rates where charter vessel salmon fishing trips are numerous. The Voluntary Trip Report (VTR) system (see Section 3.2 below) was the secondary method used to collect encounter data in these two areas.

In CRC Areas 3 and 4, where few charter vessels take salmon fishing trips, and those who do are very small, the VTR system was the primary method used to collect on-water encounter data; the charter ride-along method was used secondarily in these areas.

3.2 Voluntary Trip Reports

Selective fishery encounter statistics were also acquired through Voluntary Trip Reports that WDFW samplers distributed and collected from the angling public in Areas 1 through 4. The VTR form is designed to capture information identical to that collected by on-board observers. Anglers complete the information on the form as they fish, minimizing recall error.

Samplers distributed VTRs beginning at 5:00 AM five days per week in La Push (CRC Area 3) and Neah Bay (CRC Area 4) during the Chinook MSF and the all-species fishery. In Ilwaco (CRC Area 1) and Westport (CRC Area 2), samplers were dedicated to distributing VTRs every weekend day and one to two days per week during weekdays. These samplers approached anglers as they prepared to depart for fishing, explained the purpose of the VTR and how to complete it, and encouraged anglers to record all encounters and return the form to a dockside sampler at the end of the day. Anglers could also mail these forms to the WDFW Region 6 office postage-paid.

Collection of VTR data was the primary method used in CRC Areas 3 and 4 to estimate mark rates, encounter rates, and drop-off rates. The VTR method was the secondary method used in CRC Areas 1 and 2.

3.3 Dockside Sampling

Dockside samplers were stationed in the four major landing ports for the ocean fisheries: Neah Bay, La Push, Westport, and Ilwaco (including the port of Chinook). The recreational fisheries in each port were sampled a minimum of 4 to 5 days per week, with weekend (Saturday, Sunday, and holidays) and weekday days (non-holiday Monday through Friday) stratified. Typically, all weekend days and a randomly-selected 3 of 5 weekdays were sampled. Total fishery catch and effort estimates were generated by the OSP using three types of data obtained during dockside sampling: effort counts, interview data, and examination of catch. Each is described below.

Effort Counts

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. An exit count (a count of boats leaving the port) typically began at 4:30AM and continued through the end of the sampling day

(exact time was port-specific). An entrance count (a count of boats entering the port) usually began near 8:00AM and continued through dusk. Whether OSP samplers conducted exit or entrance counts varied based on specific considerations for each port. Regardless of the method used, this effort count, taken on every sampled day, provided the total counts of charter and private boats to which sample data were expanded.

Angler Interviews and Catch Sampling

WDFW samplers stationed in coastal ports collected catch and effort information during dockside angler interviews of boats exiting the fishery in Areas 1-4. 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 as time allowed.

3.4 Estimating Catch and Effort

3.4.i Estimated Stratum Totals (Primary Stage)

Combined (total) catch estimates are typically stratified by weekend/holiday and weekday. In some strata, every day is sampled. In those strata the combined estimates are simply sums of the daily catches. In other strata, where some days are not sampled, the average catch per day over all sampled days is multiplied by the number of days in the stratum to estimate the total catch.

Let:

a = the marine catch area,

i = trip type,

t = Weekend/holiday or Weekday stratum,

N_t = the number of days in stratum t,

T_t = collection of all days in stratum t,

n_t = the number of days sampled in stratum t,

S_t = collection of sampled days in stratum t (when S=T, n=N),

Y_{taik} = estimated catch (or effort) on day k for stratum t in area a from trip type i,

C_{tai} = catch for stratum t in area a from trip type i,

Then

$$\hat{C}_{tai} = N_t \frac{\sum_{k \in S_t} \hat{Y}_{taik}}{n_t}$$

with estimated variance (see Thompson 1992, p. 129):

$$\hat{V}\left(\hat{C}_{tai}\right) = \frac{N_t (N_t - n_t)}{n_t} \frac{\sum_{k \in S_t} \left(\hat{Y}_{taik} - \hat{\bar{Y}}_{tai}\right)^2}{n_t - 1} + \frac{N_t}{n_t} \sum_{k \in S_t} \hat{V}\left(\hat{Y}_{taik}\right)$$

where

$$\hat{\bar{Y}}_{tai} = \frac{\sum_{k \in S_t} \hat{Y}_{taik}}{n_t}.$$

For strata with all days sampled, $n_t = N_t$, and the catch and variance estimators reduce to:

$$\hat{C}_{tai} = \sum_{k \in T_t} \hat{Y}_{taik}$$

and

$$\hat{V}\left(\hat{C}_{tai}\right) = \sum_{k \in T_t} \hat{V}\left(\hat{Y}_{taik}\right).$$

3.4.ii Daily Catch and Effort Estimation (Secondary Stage)

Both catch and effort are post-stratified by trip-type and area fished. Effort in terms of boat-trips is simply the sample number of boats for each trip-type and area expanded by the appropriate boat-type (charter or private) exit/entrance count. Effort in terms of angler-trips is calculated as the mean number of anglers per boat (indexed by trip-type and area) expanded by the counted total population of boats.

The total catch for a given species on a sampled day is the product of the population of boats and the estimated catch per boat, again post-stratified by trip-type and area fished. Key assumptions in the current estimation procedures are that:

1) All boats exiting/entering a port are included in the exit/entrance count
2) Exit/entrance counts are made without error
3) The approximate systematic sample of boats can be treated as a simple random sample
4) Anglers answer questions accurately and do not conceal fish

In the following discussion, subscripts referring to port and boat-type are suppressed. Let:

M_t = total exit or entrance count for a given port on day *t* (assumed known without error),

m_t = total boats sampled on day *t*,

m_{tai} = number of boats sampled of trip type *i* fishing in area *a* on day *t*,

a_{taij} = number of anglers on the *j*th boat from trip type *i* fishing in area *a* on day *t*,

y_{taij} = number of species specific fish caught on the *j*th boat from trip type *i* in area *a* on day *t*, and

Y_{tai} = total catch of specific species caught from trip type *i* in area *a* on day *t*.

The estimate of the number of boat-trips of trip-type *i* and area *a* follows the procedure outlined in Lai et. al. (1991) where the proportion of boats in each category is estimated by:

$$\hat{p}_{tai} = \frac{m_{tai}}{m_t}$$

with estimated variance (see Cochran 1977, p. 52):

$$V(\hat{p}_{tai}) = \frac{\hat{p}_{tai} \cdot (1 - \hat{p}_{tai})}{(m_t - 1)} \cdot (\frac{M_t - m_t}{M_t})$$

The estimated total boat-trips is then obtained by:

$$\hat{M}_{tai} = M_t \cdot \hat{p}_{tai}$$

with estimated variance:

$$\hat{V}(\hat{M}_{tai}) = M^2{}_t \cdot \hat{V}(\hat{p}_{tai})$$

Effort expressed in terms of angler-trips is the product of the average anglers per boat-trip times the total number of boat-trips. The mean number of anglers per boat-trip (for trip-type *i* and fishing area *a*) is estimated as:

$$\hat{\bar{a}}_{tai} = \frac{\sum_j a_{taij}}{m_t}$$

with variance:

$$\hat{V}(\hat{\bar{a}}_{tai}) = \frac{\sum_j (a_{taij} - \hat{\bar{a}}_{tai})^2}{m_t (m_t - 1)} \cdot (\frac{M_t - m_t}{M_t})$$

Thus the estimated total number of angler-trips is:

$$\hat{a}_{tai} = M_t \cdot \hat{\bar{a}}_{tai}$$

with variance:

$$\hat{V}(\hat{a}_{tai}) = M^2{}_t \cdot \hat{V}(\hat{\bar{a}}_{tai})$$

The catch (or number released) for a specific species on sampled day *t* in area *a* from trip type *i* is similarly estimated by:

$$\hat{Y}_{tai} = \frac{\sum_j y_{taij}}{m_t} M_t$$

with estimated variance:

$$\hat{V}\left(\hat{Y}_{tai}\right) = \frac{\sum_j \left(y_{taij} - \hat{\bar{y}}_{tai}\right)^2}{m_t\left(m_t - 1\right)} M_t\left(M_t - m_t\right)$$

This estimate and its variance differs somewhat from that described in Lai et al. (1991) since the total count, M_t (assumed to be a known quantity), is used to expand the estimated CPUE (calculated over all sampled boats) rather than the estimated boat-trips by trip-type and area fished.

3.5 Estimating Chinook Encounters and Mortalities

The overall impacts of the June 2011 recreational mark-selective Chinook fishery in ocean Areas 1-4 are characterized in terms of grand-total estimates of Chinook encounters and mortalities and by using estimates specific to each of the four size/mark-status groups (i.e., legal-marked [LM], sublegal-marked [SM], legal-unmarked [LU], and sublegal-unmarked [SU]; **Table 1**). The method described above in section 3.4 was used to generate total estimates of angler effort, retained catch by species, and releases of all fish species except for Chinook salmon released during the June 2011 Chinook MSF in Areas 1-4. To estimate Chinook salmon releases (and thus, total encounters) by size/mark group, we applied Conrad and McHugh's (2008) bias-corrected approach, the same method that the Puget Sound Sampling Unit (PSSU) has used since 2008 to estimate Chinook releases in Puget Sound mark-selective Chinook fisheries (e.g., WDFW 2011).

Prior to summer 2008, PSSU had generated two different Chinook encounters estimates based on two separate estimation methods ("Method 1" and "Method 2"; see WDFW 2011 and Conrad and McHugh 2008 for details). Method 1 estimates of total Chinook encounters were derived from the combination of dockside observations of landed catch and angler interview responses about salmon releases; thus, as Conrad and McHugh explain, the accuracy of Method 1 estimates depended heavily on the ability of anglers to correctly recall and report the number of Chinook they actually encountered and released. Method 2 estimates of Chinook encounters were obtained using the creel survey estimates of the total number of legal-size, marked Chinook harvested in combination with the on-water observation or VTR data to estimate both the total number of Chinook encounters and to apportion the encounters to four size/mark status categories (LM, LU, SM, SU). The Method 2 estimator was derived assuming that anglers retain all LM Chinook encountered; therefore, its accuracy depended on the extent

to which angler behavior deviates from this idealized case. Based on their analyses and practical considerations regarding the most feasible bias correction approaches, Conrad and McHugh ultimately recommended using Method 2 with a correction for the release of legal-size marked Chinook as the preferred method for estimating total Chinook encounters in mark-selective Chinook fisheries. After a thorough state-tribal technical review of Conrad and McHugh's method in August 2008, state and tribal technical representatives agreed to use this bias-corrected approach to produce a "best estimate" of Chinook encounters.

Thus, we estimated Chinook releases in the June 2011 Chinook MSF as the difference between retained catch (i.e., from the dockside creel survey) and total Chinook encounters (i.e., releases = encounters – retained catch) generated using Conrad and McHugh (2008) approach. We first divided the creel estimate of legal-marked Chinook harvest by the onboard observer-based estimate of the proportion of the fishable Chinook population that was of legal size and marked (i.e., the former "Method 2" approach; WDFW 2011). Given that this approach yields negatively biased estimates if anglers release any of the legal-marked Chinook they encounter, we then applied Conrad and McHugh's bias correction factor to account for this phenomenon (13%) and incorporated it into the estimator (See **Appendix A** for complete computational details).

Table 1. Sampling/estimation details on target parameters associated with the overall mark-selective Chinook fishery monitoring program in Washington coastal Areas 1 through 4.

Activity	Focal Parameter(s)	Secondary Parameter(s)	Sample Unit(s)	Finest Estimation Time Step	Comments
Dockside Creel Sampling	Fishing effort (boat & angler trips); retained and released fish[1]	Catch rates (CPUE); length, age, and CWT composition of harvest	Boat trip; kept fish; reported fish release	Week	Within weeks, estimates are also produced by strata (weekday/weekend).
Onboard observation and VTRs	Size (legal/sublegal) and mark-status composition (marked, unmarked) of encountered Chinook	Chinook length, age, and DNA-based stock composition; species composition of non-Chinook encounters	Fish encounter	Season	Too few encounters occurred to assess mark rates on a finer time scale.
Overall Fishery Impacts Estimation	Total Chinook encounters and mortalities, by size/mark-status group	Ratios of encounters and mortalities per kept Chinook	N/A	Season	The temporal resolution of impact estimates is constrained by that of the observer encounters data.
Coded-wire tag (CWT) Impacts Estimation	Marked/unmarked double-index tag (DIT) encounters and mortalities	N/A	N/A	Season	The temporal resolution of DIT impacts is constrained by the total number of tags recovered.

[1/] Under the "bias-corrected Method-2" approach, Chinook releases can be estimated only as finely as onboard observer data allow.

We estimated total Chinook mortality resulting from the June 2011 selective Chinook fishery by applying assumed mortality rates to the total harvest and release estimates for the four size/mark-status groups (LM, LU, SM, and SU). For retained Chinook, the mortality estimate was equivalent to the total harvest estimate for the applicable size/mark-status group. We applied a selective fishing mortality (*sfm*) rate of 14% to legal (marked and unmarked) and sublegal (marked and unmarked) release totals, to estimate release mortality in the ocean (the same *sfm* value used in FRAM). See **Appendix A** for a complete description of our impact estimation procedure, including formulae for total and variance estimators.

The final step of our overall impacts assessment involved comparing fishery outcomes to pre-season expectations. To do this, we compared season-total estimates of Chinook encounters and mortalities to pre-season modeled values (FRAM model run no. 1811) for each size and mark status category.

3.6 CWT Impacts

To understand the potential effects of the June 18-25, 2011 recreational mark-selective Chinook fishery in the ocean on the CWT program, we estimated the total number of unmarked-tagged Chinook mortalities that may have occurred during the course of the fishery. To do this, we acquired information for all marked CWT double index tag (DIT) groups present in landed catch from the Pacific States Marine Fisheries Commission's Regional Mark Information System (RMIS) and then applied the methods described by the Pacific Salmon

Commission's Selective Fisheries Evaluation Committee–Analysis Work Group (SFEC-AWG 2002) to estimate the number of unmarked DIT fish encountered[1]. We subsequently estimated the number of these fish that may have died due to hook-and-release impacts using an *sfm* analogous to that used in FRAM modeling. Given our interest in characterizing the impacts of mark-selective regulations on the CWT program and not recreational fishing in general, we used an *sfm* of 10% in all unmarked-DIT mortality calculations. The *sfm* value of 10% did not include unseen drop-off mortality (assumed to be 5% in FRAM) because drop-off mortality occurs in both selective and non-selective recreational Chinook fisheries.

We estimated Chinook encounters and mortalities for each recovered DIT individually and then summed estimates for each hatchery, brood year, and area based on the methods described by SFEC-AWG 2002. Thus, the estimated number of unmarked mortalities was calculated as:

$$\hat{U}_a^{MSF} = \lambda^{REL} \hat{M}_a^{MSF} sfm$$

with associated variance:

$$Var(\hat{U}_a^{MSF}) \approx \left(\lambda^{REL}\right)^2 sfm^2 \hat{M}_a^{MSF} \frac{1-s}{s}.$$

where:

sfm = selective fishing mortality rate (10%, *excludes drop-off mortality*),
$U_{a,i}^{MSF}$ = aged *a* unmarked DIT mortalities from stock *i* in the selective fishery,
$M_{a,i}^{MSF}$ = aged *a* marked DIT mortalities from stock *i* in the selective fishery,
s = sampling rate of the catch,
λ^{REL} = unmarked-to-marked ratio *at release* for fish in a DIT group
$Var(U_{a,i}^{MSF})$ = variance of $U_{a,i}^{MSF}$.

In addition to estimating unmarked-DIT mortalities, we pooled all CWTs (DIT and otherwise) recovered during the fishery and, based on this total, report the proportional contribution (unexpanded recoveries) of different hatcheries to the total Chinook harvest (See CWT Results below).

[1] For all unmarked-DIT encounters and mortalities calculations, we relied on the unmarked-to-marked abundance ratio (λ) estimated for DIT groups at the time of juvenile release.

4. RESULTS IN JUNE CHINOOK MARK SELECTIVE RECREATIONAL FISHERY

4.1 Dockside Sampling Results

WDFW dockside samplers interviewed an estimated 42% of all anglers fishing in Washington coastal Areas 1 through 4 during the June 2011 mark-selective Chinook fishery; a total of 2,048 anglers in 576 boats were enumerated in-sample (**Table 2**). In addition, a total of 43% (995) of all Chinook harvested in ocean Areas 1 through 4 were sampled, and 154 readable coded wire tags (CWTs) were collected in Washington's coastal ports (**Table 2**).

Estimates of Fishing Effort and Chinook Catch

An estimated 5,032 angler trips (4,895 from Washington, 137 from Oregon) were completed by private and charter anglers during the coastwide Chinook MSF from June 18 through June 25, 2011. These anglers harvested a total of 2,393 Chinook coastwide (2,335 WA, 58 OR) (**Table 3**). Landed Chinook catch totaled 50% of the overall fishery quota of 4,800.

A total of 8,146 Chinook encounters were estimated in Washington ocean waters during the June 18-25, 2011 mark-selective Chinook fishery, for CRC Areas 1 through 4 combined (**Table 4**). This total consisted of an estimated 2,335 retained (2,301 marked, 35 unmarked) and 5,811 released (3,103 marked, 2,708 unmarked) Chinook salmon.

Table 2. Dockside sampling statistics during the June 18-25, 2011 recreational Chinook mark-selective fishery in Washington coastal Areas 1 through 4.

	Boats Sampled	Sample Rate	Anglers Sampled	Sample Rate	Landed Chinook Sampled	Sample Rate	Coded wire tags collected
Area 4	135	66%	354	68%	134	68%	4
Area 3	39	80%	103	80%	17	81%	3
Area 2	329	33%	1,324	34%	648	35%	95
Area 1	73	72%	267	70%	196	74%	52

Table 3. Estimates of total fishing effort and number of Chinook retained during the June 18-25, 2011 recreational Chinook mark-selective fishery in Washington coastal Areas 1 through 4.

	Total Boat Trips	Total Angler Trips	**Estimated Chinook Retained**		
			Marked	Unmarked	TOTAL
Area 4	206	517	195	1	196
Area 3	49	128	21	0	21
Area 2	1,006	3,869	1,821	31	1,852
Area 1	102	381	264	2	266
TOTAL WA	**1,363**	**4,895**	**2,301**	**34**	**2,335**
TOTAL OR	N/A	137	58	0	58
Season Total:	**1,363**	**5,032**	**2,359**	**34**	**2,393**
WA Variance: [1/]	1,233	29,214	10,333	142	
WA Standard Error:	35	171	102	12	
WA CV (%):	3%	3%	4%	35%	
WA 95% CI:	1,294-1,432	4,560-5,230	2,102-2,500	11-57	

[1/] Variance estimates are unavailable for Oregon statistics.

CWT Samples

In total, 154 decoded coded-wire tags were recovered from Chinook salmon sampled dockside during the June 18-25, 2011 mark-selective Chinook fishery in Washington coastal Areas 1 through 4 combined. Observed (unexpanded) stock composition results for these in-sample tag recoveries are presented by area in **Tables 5-1** through **5-4** for Areas 1 through 4, respectively. In Area 1, samplers recovered a total of 52 CWTs, 34% of the CWTs recovered in all four areas combined. The majority of these recoveries (46%) were from Upper Columbia River (above McNary Dam, excluding Snake River) and Snake River (23%) hatcheries, while recoveries from California (12%), Lower Columbia River (mouth to Bonneville Dam) (6%), Central Columbia River (Bonneville to McNary Dam) (4%), Columbia River General (4%), Puget Sound Washington (4%), and coastal Oregon (2%) hatcheries made up the remaining tags in the sample (**Table 5-1**). Four of the CWT recoveries in Area 1 were from double index tag (DIT) release groups.

In Area 2, samplers recovered a total of 95 CWTs, 62% of the total tags recovered in all four ocean areas combined. The majority of these recoveries were from Upper Columbia River (above McNary Dam) (39%), and Snake River (32%) hatcheries. The remaining Area 2 tag recoveries represented hatcheries from the Central Columbia River (Bonneville to McNary Dam) (11%), Lower Columbia River (mouth to Bonneville Dam) (10%), California (4%), general Columbia River (2%), Puget Sound Washington (2%), and the Lower Fraser River in British Columbia (1%) (**Table 5-2**). Of the CWT recoveries in Area 2, 11 were from double index tag (DIT) release groups.

In Area 3, samplers recovered a total of 3 CWTs, 2% of the total tags recovered in all four ocean areas combined. All of these CWT recoveries were from the Upper Columbia River (above McNary Dam) (**Table 5-3**). None of these CWT recoveries from Area 3 belonged to DIT groups.

In Area 4, samplers recovered a total of 4 CWTs, 3% of the total tags recovered in all four ocean areas combined. Three of these CWT recoveries were from the Columbia River – two from the Central Columbia River (50%) and one from the Lower Columbia River (25%). The fourth tag was from WA Puget Sound (25%) (**Table 5-4**). Three of the CWT recoveries in Area 4 were from double index tag (DIT) release groups.

Table 4. Total estimates of fishing effort and the number of Chinook retained and released by mark status and by week, during the June 18-25, 2011 recreational Chinook mark-selective fishery in Washington coastal Areas 1 through 4 combined.

Month	Stat Week	Stratum Start Date	Stratum End Date	Effort		Retained Chinook		Released Chinook 1/		Chinook Encounters Total
				Boats	Anglers	Marked	Unmarked	Marked	Unmarked	
June 18 - June 25, 2011	25	18-Jun	19-Jun	444	1,757	829	3	1,119	986	2,937
	26	20-Jun	25-Jun	919	3,138	1,471	31	1,984	1,723	5,209
Season Total:				1,363	4,895	2,301	35	3,103	2,708	8,146
Variance:				1,233	29,214	10,333	142	159,302	60,676	408,531
Standard Error:				35	171	102	12	399	246	639
CV (%):				3%	3%	4%	35%	12.9%	9.1%	7.8%
95% CI:				1,294-1,432	4,560-5,230	2,101-2,500	11-58	2,321-3,885	2,226-3,191	6,894-9,399

1/ Released Chinook were estimated as the difference between total Chinook encounters generated using the bias-corrected "Method 2" estimator (see Conrad and McHugh 2008) and creel-based estimates of retained Chinook.

Table 5-1. Summary of coded-wire tags recovered from Chinook salmon harvested in Washington coastal **Area 1** during the June 18-25, 2011 mark-selective Chinook fishery. The field "No. DITs" corresponds to the number of tags that belonged to double--index tag groups. Percentages in parentheses indicate the proportional contribution (unexpanded recoveries) of different hatcheries to the total Chinook harvest in Area 1.

ReleaseDomain	ReleaseRegion	ReleaseSite	RearingLocation	CWTsRecovered	NoDITs
Washington	Northern Washington (1.9%)	EAST SOUND BAY (SAN)	GLENWOOD SPRINGS	1 (1.9%)	0
	Mid Puget Sound (1.9%)	GROVERS CR HATCHERY	GROVERS CR HATCHERY	1 (1.9%)	1
Columbia River	Columbia River General Region (3.8%)	COLUMBIA R - GENERAL		2 (3.8%)	0
	Upper Columbia R (above McNary Dam; excludes Snake River) (46.2%)	CHELAN R 47.0052	CHELAN RIVER NP	3 (5.8%)	0
		METHOW R 48.0002	CARLTON ACCLIMATION POND	1 (1.9%)	0
		COLUMBIA NEAR WELLS	WELLS HATCHERY	1 (1.9%)	0
		WENATCHEE R 45.0030		3 (5.8%)	0
		COL R @ TURTLE ROCK	TURTLE ROCK HATCHERY	2 (3.8%)	0
		SIMILKAMEEN R 490325	SIMILKAMEEN HATCHERY	10 (19.2%)	0
		OKANOGAN R 49.0019	CARLTON ACCLIMATION POND	1 (1.9%)	0
		WENATCHEE R 45.0030	DRYDEN POND	3 (5.8%)	0
	Central Columbia River (Bonneville Dam to McNary Dam) (3.8%)	SPRING CR 29.0159	SPRING CR NFH	1 (1.9%)	1
		UMATILLA R	BONNEVILLE HATCHERY	1 (1.9%)	1
	Lower Columbia River (mouth to Bonneville Dam) (5.8%)	COWLITZ R 26.0002	COWLITZ SALMON HATCH	1 (1.9%)	0
		MCKENZIE R 1	MCKENZIE HATCHERY	1 (1.9%)	1
		SANDY R	CLACKAMAS HATCHERY	1 (1.9%)	0
	Snake River (23.1%)	BIG CANYON ACCL POND	LYONS FERRY HATCHERY	2 (3.8%)	0
		COTTONWOOD CR POND	LYONS FERRY HATCHERY	1 (1.9%)	0
		CAPTAIN JOHNS PD	LYONS FERRY HATCHERY	3 (5.8%)	0
		LOSTINE R	LOOKINGGLASS HATCH	1 (1.9%)	0
		SNAKE R @ ASOTIN	LYONS FERRY HATCHERY	1 (1.9%)	0
		LYONS FERRY REL.SITE	LYONS FERRY HATCHERY	3 (5.8%)	0
		SNAKE R@PITT. LNDG	LYONS FERRY HATCHERY	1 (1.9%)	0
Oregon	Southern Oregon Coast (1.9%)	ROCK CR (N UMPQUA R)	ROCK CR HATCHERY	1 (1.9%)	0
California	Central California Coast (5.8%)	MARE ISLAND MINOR PT	COLEMAN NFH	1 (1.9%)	0
		WICKLAND OIL NET PEN	FEATHER R HATCHERY	1 (1.9%)	0
		SAN PABLO BAY NET PENS	FEATHER R HATCHERY	1 (1.9%)	0
	Sacramento River (1.9%)	SAC R COLUSA TO RBDD	COLEMAN NFH	1 (1.9%)	0
	San Joaquin River (3.8%)	SHERMAN ISLAND NET PENS	MOK R FISH INS	2 (3.8%)	0
			TOTAL	**52**	**4**

Table 5-2. Summary of coded-wire tags recovered from Chinook salmon harvested in Washington coastal **Area 2** during the June 18-25, 2011 mark-selective Chinook fishery. The field "No. DITs" corresponds to the number of tags that belonged to double-index tag groups. Percentages in parentheses indicate the proportional contribution (unexpanded recoveries) of different hatcheries to the total Chinook harvest in Area 2.

ReleaseDomain	ReleaseRegion	ReleaseSite	RearingLocation	CWTsRecovered	NoDITs
British Columbia	Fraser River – Thompson River (1.1%)	R-Chilliwack R	H-Chilliwack River H	1 (1.1%)	1
Washington	Northern Washington (1.1%)	EAST SOUND BAY (SAN)	GLENWOOD SPRINGS	1 (1.1%)	0
	Northern Puget Sound (1.1%)	WHITEHORSE SPRINGS	WHITEHORSE POND	1 (1.1%)	0
Columbia River	Columbia River General Region (2.1%)	COLUMBIA R - GENERAL		2 (2.1%)	0
	Upper Columbia R (above McNary Dam; excludes Snake River) (38.9%)	CHELAN R 47.0052	CHELAN RIVER NP	3 (3.2%)	0
		COL R @ PRIEST RAPIDS	PRIEST RAPIDS HATCHERY	1 (1.1%)	0
		CHIWAWA R 45.0759		1 (1.1%)	0
		SIMILKAMEEN R 490325	SIMILKAMEEN HATCHERY	11 (11.6%)	0
		COLUMBIA NEAR WELLS	WELLS HATCHERY	5 (5.3%)	0
		METHOW R 48.0002	CARLTON ACCLIMATION POND	2 (2.1%)	0
		LK CHELAN + COLUMBIA R		1 (1.1%)	0
		WENATCHEE R 45.0030		3 (3.2%)	0
		SIMILKAMEEN R 490325		2 (2.1%)	0
		COL R @ TURTLE ROCK	TURTLE ROCK HATCHERY	6 (6.3%)	0
		WENATCHEE R 45.0030	DRYDEN POND	2 (2.1%)	0
	Central Columbia River (Bonneville Dam to McNary Dam) (10.5%)	SPRING CR 29.0159	SPRING CR NFH	7 (7.4%)	7
		LTL WHITE SALMON@NFH	LTL WHITE SALMON NFH	3 (3.2%)	0
		FALLERT CR 27.0017	FALLERT CR HATCHERY	2 (2.1%)	0
		COWLITZ SALMON HATCH	COWLITZ SALMON HATCH	1 (1.1%)	0
	Lower Columbia River (mouth to Bonneville Dam) (9.5%)	SANTIAM R S FK	SOUTH SANTIAM HATCH	1 (1.1%)	0
		COWLITZ R 26.0002	COWLITZ SALMON HATCH	1 (1.1%)	0
		CLACKAMAS R	CLACKAMAS HATCHERY	1 (1.1%)	0
		BIG CR (LWR COL R)	BIG CR HATCHERY	3 (3.2%)	1
		SFK SAL@ KNOX BRIDGE	MCCALL HATCHERY	1 (1.1%)	1
	Snake River (31.6%)	SNAKE R@PITT. LNDG	LYONS FERRY HATCHERY	1 (1.1%)	0
		CAPTAIN JOHNS PD	LYONS FERRY HATCHERY	5 (5.3%)	0
		SNAKE R @ ASOTIN	LYONS FERRY HATCHERY	9 (9.5%)	0
		BIG CANYON ACCL POND	LYONS FERRY HATCHERY	4 (4.2%)	0
		CLWTR @ LAPWAI CRK	NPT HATCHERY	1 (1.1%)	0
		LYONS FERRY REL.SITE	LYONS FERRY HATCHERY	7 (7.4%)	0
		SNAKE@ HLLS CNYON DM	OXBOW HATCHERY	1 (1.1%)	1
		SNAKE R-1 (HELLS CAN	UMATILLA HATCHERY	1 (1.1%)	0

California	Central California Coast (2.1%)	SAN PABLO BAY NET PENS	FEATHER R HATCHERY	1 (1.1%)	0
		WICKLAND OIL NET PEN	FEATHER R HATCHERY	1 (1.1%)	0
	Sacramento River (2.1%)	FEATHER BOYDS PUMP RAMP	FEATHER R HATCHERY	1 (1.1%)	0
		COLEMAN NFH	COLEMAN NFH	1 (1.1%)	0
			TOTAL	**95**	**11**

Table 5-3. Summary of coded-wire tags recovered from Chinook salmon harvested in Washington coastal **Area 3** during the June 18-25, 2011 mark-selective Chinook fishery. The field "No. DITs" corresponds to the number of tags that belonged to double-index tag groups. Percentages in parentheses indicate the proportional contribution (unexpanded recoveries) of different hatcheries to the total Chinook harvest in Area 3.

ReleaseDomain	ReleaseRegion	ReleaseSite	RearingLocation	CWTsRecovered	NoDITs
Columbia River	Upper Columbia R (above McNary Dam; excludes Snake River) (100%)	COLUMBIA NEAR WELLS	WELLS HATCHERY	1 (33.3%)	0
		LK CHELAN + COLUMBIA R		2 (66.7%)	0
			Total	3	0

Table 5-4. Summary of coded-wire tags recovered from Chinook salmon harvested in Washington coastal **Area 4** during the June 18-25, 2011 mark-selective Chinook fishery. The field "No. DITs" corresponds to the number of tags that belonged to double-index tag groups. Percentages in parentheses indicate the proportional contribution (unexpanded recoveries) of different hatcheries to the total Chinook harvest in Area 4.

ReleaseDomain	ReleaseRegion	ReleaseSite	RearingLocation	CWTsRecovered	NoDITs
Washington	Mid Puget Sound (25%)	GROVERS CR HATCHERY	GROVERS CR HATCHERY	1 (25%)	1
Columbia River	Central Columbia River (Bonneville Dam to McNary Dam) (50%)	SPRING CR 29.0159	SPRING CR NFH	2 (50%)	2
	Lower Columbia River (mouth to Bonneville Dam) (25%)	CLACKAMAS R	CLACKAMAS HATCHERY	1 (25%)	0
			Total	**4**	**3**

4.2 On-water Observations of Chinook Encounters

On-Board Observer Data

WDFW's observer staff conducted 9 on-the-water catch surveys onboard charter boats during the 8-day June 2011 selective Chinook fishery. Observers recorded a total of 275 encountered Chinook salmon in all four ocean areas combined; 79% of these encounters were in Area 1 and most were sub-legal sized encounters. The size/mark status composition of these Chinook encounters is presented in **Table 6**. Chinook encounters of unknown size and/or unknown mark status were excluded in determining the overall size/mark status composition (legal-marked [LM], legal-unmarked [LU], sublegal-marked [SM], and sublegal-unmarked [SU]), yielding a useable sample size of 265 Chinook encounters based on onboard observer data for Areas 1-4 combined. The following size/mark group composition was estimated from the 265 useable encounters: 18.9% LM, 7.9% LU, 48.3% SM, and 24.9% SU.

These estimated size/mark group proportions based on onboard observer data were combined with those estimated from our VTR data and used in subsequent impact estimation steps, as discussed further in the section below titled *Estimated Chinook Encounters and Mortalities* (see **Table 10** and **Appendix A)**. The decision to combine these data was based on *i)* the short duration of the fishery and the limited numbers of fish encountered during on-water observer trips, *ii)* the potential for differences in fishing patterns between charter and private vessels and the desire to represent both patterns, and *iii)* the lack of representation of catch in Areas 3 and 4 in the observer data.

DNA Results

Chinook DNA samples were collected only by onboard observers who had access to both marked and unmarked Chinook encounters during the June 2011 Chinook MSF. A total of 53 DNA samples were collected from legal sized Chinook and 107 from sublegal sized Chinook during the 8-day season (**Table 7**).

VTR Data

Additional on-the-water encounters data was provided via angler-completed voluntary trip reports (VTRs). Dockside samplers collected 55 completed and useable VTRs containing 311 Chinook encounters (**Table 8**). Chinook encounters of unknown size and/or unknown mark status were excluded in determining the size/mark status composition results based on VTR data, yielding a useable sample size of 231 Chinook encounters for Areas 1-4 combined. The following size/mark group composition was estimated from these 231 useable encounters: 48.1% LM, 24.7% LU, 17.3% SM, and 10.0% SU. The VTR data were used in conjunction with observer data in subsequent fishery-wide impacts estimation steps (i.e., **Appendix A**).

We also combined the onboard observer- and VTR-based encounters data to compare observed (field-estimated) mark rates in each area with preseason FRAM-predicted values. The combined onboard observer and VTR data indicated mark rates of 67% for legal sized Chinook and 65% for sublegal sized Chinook coast-wide (**Table 9**).

Table 6. Summary of on-water Chinook encounters data by size and mark group, collected by WDFW observers sampling onboard charter boats during the June 18-25, 2011 recreational Chinook mark-selective fishery in Washington coastal Areas 1 through 4.

	Total Observer Trips	OBSERVER DATA LEGAL SIZED			SUBLEGAL SIZED			UNKNOWN SIZE		
		Marked	Unmarked	Unknown	Marked	Unmarked	Unknown	Marked	Unmarked	Unknown
Area 4	2	7	12	0	1	0	0	0	0	0
Area 3	0	0	0	0	0	0	0	0	0	0
Area 2	3	23	2	0	10	2	0	0	0	0
Area 1	4	20	7	1	117	64	9	0	0	0
TOTAL	**9**	**50**	**21**	**1**	**128**	**66**	**9**	**0**	**0**	**0**
Size/Mark Comp		18.9%	7.9%	-	48.3%	24.9%	-	-	-	-

[1/] Chinook encounters of unknown size and/or unknown mark status were excluded in determining the overall size/mark status composition based on observer data, as indicated by the dash (**--**).

Table 7. Number of Chinook DNA samples collected by WDFW observers onboard charter vessels during the June 18-25, 2011 mark-selective Chinook fishery in Washington coastal Areas 1-4.

	LEGAL SIZED			SUBLEGAL SIZED		
	Marked	Unmarked	Total	Marked	Unmarked	Total
Area 4	7	10	17	1	0	1
Area 3	0	0	0	0	0	0
Area 2	23	2	25	9	2	11
Area 1	8	3	11	66	29	95
TOTAL	**38**	**15**	**53**	**76**	**31**	**107**

Table 8. Summary of on-water Chinook encounters by size class and mark status, as reported on angler-completed voluntary trip reports (VTRs) during the June 18-25, 2011 recreational Chinook mark-selective fishery in Washington coastal Areas 1 through 4.

	Total VTRs Collected	VOLUNTARY TRIP REPORT DATA LEGAL SIZED			SUBLEGAL SIZED			UNKNOWN SIZE		
		Marked	Unmarked	Unknown	Marked	Unmarked	Unknown	Marked	Unmarked	Unknown
Area 4	12	24	9	0	0	2	1	0	2	0
Area 3	6	2	3	0	1	1	0	0	0	0
Area 2	33	82	42	0	36	16	6	0	1	0
Area 1	4	3	3	0	3	4	15	0	0	0
TOTAL	**55**	**111**	**57**	**0**	**40**	**23**	**22**	**0**	**3**	**0**
Size/Mark Comp		48.1%	24.7%	-	17.3%	10.0%	-	-	-	-

[1/] Chinook encounters of unknown size and/or unknown mark status were excluded in determining the overall size/mark status composition based on VTR data, as indicated by the dash (**--**).

Table 9. Estimated mark rates for legal- and sublegal-sized Chinook during the June 18-25, 2011 recreational Chinook mark-selective fishery in Washington coastal Areas 1 through 4, based on onboard observer and VTR data combined, compared with FRAM preseason predicted values.

	LEGAL SIZED			SUBLEGAL SIZED			FRAM preseason projected mark rate (legal sized)
	Marked	Unmarked	Mark Rate	Marked	Unmarked	Mark Rate	
Area 4	31	21	60%	1	2	33%	85%
Area 3	2	3	40%	1	1	50%	85%
Area 2	105	44	70%	46	18	72%	71%
Area 1	23	10	70%	120	68	64%	87%
TOTAL	**161**	**78**	**67%**	**168**	**89**	**65%**	

4.3 Overall Fishery Impacts

Estimated Total Chinook Encounters and Mortalities

We derived size/mark-status group-specific estimates of Chinook encounters from a combination of the dockside sampling results (i.e., retained harvest estimates presented in **Tables 2** and **4**) and the on-water observer and VTR based size/mark-status composition data (**Tables 6 and 8**; see **Appendix A** for computational details). In total, we estimated that anglers fishing in Washington coastal Areas 1 through 4 (combined) encountered 2,644 LM, 1,281 LU, 2,759 SM, and 1,462 SU Chinook during the 8-day June 2011 selective Chinook fishery (**Table 10**). Given the estimates of harvest and the assumed selective fishing mortality (*sfm*) mortality rate of 0.14 for both legal-sized and sublegal-sized Chinook, these encounters translated into a total of 3,149 estimated Chinook mortalities (2,335 retained and 814 released; 2,349 LM, 209 LU, 386 SM, and 205 SU) in ocean Areas 1 through 4 combined (**Table 10**). Of the total estimated mortalities, 75% were attributed to retention of legal-size marked Chinook.

FRAM versus Creel Comparison

Comparisons of Chinook encounters and mortalities projected in the final preseason FRAM model run (FRAM number 1811) with observed encounters and mortalities are presented in **Tables 11** and **12**. These comparisons are illustrated in **Figure 2**. FRAM projections include encounters and mortalities in Oregon waters; however, observed total encounters and mortalities are not available for Oregon waters. Oregon landed catch comprised 2% of the total landed catch in the ocean Chinook MSF. Both observed encounters and estimated mortalities were less than those projected in preseason FRAM model run 1811 for legal marked and unmarked Chinook; observed encounters and estimated mortalities were greater than those projected in preseason FRAM model run 1811 for sublegal marked and unmarked Chinook (**Tables 11** and **12**, **Figure 2**).

Table 10. Summary of the fishery impact estimates for the June 18-25, 2011 mark-selective Chinook fishery in Washington coastal Areas 1 through 4.

Size/Mark Group	Encounters	Number Retained	Number Released	Release Mortality Rate	Release Mortality	Total Mortality	Variance	SE	95% CI	CV (%)
Legal Marked	2,644	2,301	344	0.14	48	2,349	11,952	109	2,134-2,563	5%
Legal Unmarked	1,281	35	1,247	0.14	175	209	689	26	158-260	13%
Sublegal Marked	2,759	0	2,759	0.14	386	386	1,504	39	310-462	10%
Sublegal Unmarked	1,462	0	1,462	0.14	205	205	642	25	155-254	12%
TOTAL ALL GROUPS	8,146	2,335	5,811	0.14	814	3,149	14,787	122	2,910-3,387	4%

Table 11. Comparison of modeled (FRAM model run #1811) and estimated total Chinook encounters in the June 18-25, 2011 mark-selective Chinook fishery in Washington coastal Areas 1 through 4.

Data Source	Group	Total Encounters 1/	Legal	Sublegal	Landed Only (WA + OR)
FRAM Encounters (WA and OR)	Unmarked	3,392	2,092	1,300	20
	Marked	7,235	5,492	1,743	4,779
	Total	10,627	7,584	3,043	4,799
	% Marked	68%	72%	57%	100%
Estimated (Creel) Encounters (WA only)	Unmarked	2,743	1,281	1,462	34
	Marked	5,404	2,644	2,759	2,359
	Total	8,146	3,925	4,221	2,393
	% Marked	66%	67%	65%	99%

1/ Observed (field-estimated) Chinook encounters by size class and mark status are not available for Oregon waters; landed catch includes Oregon.

Table 12. Comparison of modeled (FRAM model run #1811) and estimated total Chinook mortalities in the June 18-25, 2011 mark-selective Chinook fishery in Washington coastal Areas 1 through 4.

	FRAM Chinook Mortalities (WA + OR)			**Estimated Chinook Mortalities 1/ (WA only)**		
Mortality Category	Unmarked	Marked	Total	Unmarked	Marked	Total
Total (Landed + Released)	492	5,124	5,616	413	2,793	3,207
Released Legal	290	101	391	175	48	223
Released Sublegal	182	244	426	205	386	591
Landed Only (WA + OR)	20	4,779	4,799	34	2,359	2,393

1/ Observed (field-estimated) Chinook mortalities by size class and mark status are not available for Oregon waters; landed catch includes Oregon.

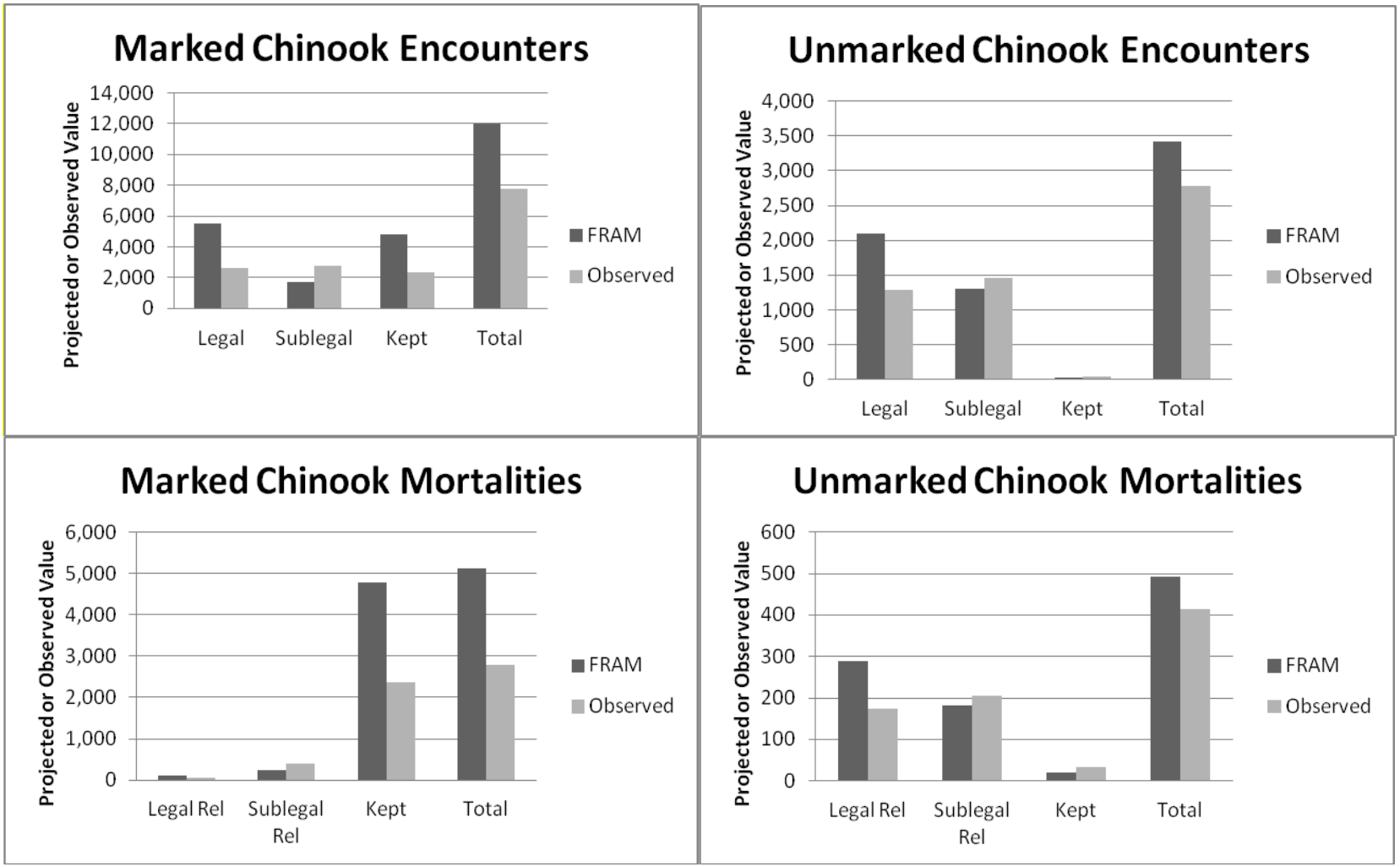

Figure 2. Comparison of modeled (i.e., using FRAM, model run 1811) and estimated total Chinook encounters (*top panel*) and mortalities (*bottom panel*) for the June 18-25, 2011 mark-selective Chinook fishery in Washington coastal Areas 1-4.

Estimated CWT-DIT Impacts

Of the 154 decoded coded-wire tags recovered during the June 18-25, 2011 ocean mark-selective Chinook fishery in Areas 1-4 combined, a total of 18 belonged to double-index tag (DIT) release groups (**Table 13**). Based on the release details associated with these tags and their unmarked sister groups, we obtained an estimate of the unmarked-to-marked ratio (λ) at juvenile release for each applicable hatchery of origin and brood year, and we used this value to estimate total unmarked DIT encounters for the entirety of the June 2011 selective Chinook fishery the four areas. In total, we estimated that 38 unmarked-DIT Chinook were encountered during the fishery. Given an assumed *sfm* rate of 0.14 for the estimated unmarked DIT fish that were encountered and released, we estimate that 5 unmarked DIT fish may have died as a result of the June 2011 ocean selective Chinook fishery (**Table 13**).

Table 13. Summary of double-index tagged (DIT) Chinook kept by anglers, and estimated total mortality of unmarked DIT Chinook due to hook-and-release impacts resulting from the June 18-25, 2011 mark-selective Chinook fishery in Washington coastal Areas 1 through 4.

Marine Area [1/]	Hatchery	Brood Year	DITs Obs.	AD DIT Harvest		UM DIT Enc	UM DIT Mortality		
				Est. AD	var (Est. AD)		Est. UM	var (Est. UM)	SE (Est. UM)
Area 1	BONNEVILLE HATCHERY	2008	1	1.4	0.5	2.2	0.3	0.026	0.2
	GROVERS CR HATCHERY	2008	1	1.4	0.5	1.5	0.2	0.012	0.1
	MCKENZIE HATCHERY	2008	1	1.4	0.5	0.001	0.000	0.000	0.000
	SPRING CR NFH	2008	1	1.4	0.5	1.4	0.2	0.009	0.1
	Total		4	5.4	1.9	5.1	0.7	0.046	0.4
Area 2	BIG CR HATCHERY	2009	1	2.9	5.3	2.8	0.4	0.1	0.3
	H-Chilliwack River H	2008	1	2.9	5.3	2.9	0.4	0.1	0.3
	MCCALL HATCHERY	2008	1	2.9	5.3	0.000	0.000	0.000	0.000
	OXBOW HATCHERY	2007	1	2.9	5.3	0.000	0.000	0.000	0.000
	SPRING CR NFH	2008	7	20.0	37.1	22.5	3.2	1.0	2.5
	Total		11	31.4	58.4	28.3	4.0	1.2	3.2
Area 4	GROVERS CR HATCHERY	2007	1	1.5	0.7	1.5	0.2	0.013	0.1
	SPRING CR NFH	2008	2	2.9	1.4	2.9	0.4	0.026	0.2
	Total		3	4.4	2.0	4.4	0.6	0.040	0.3
Grand Total (all WA Ocean Areas)			**18**	**41.2**	**62.3**	**37.8**	**5.3**	**1.286**	**3.9**

[1/] In Area 3, dockside samplers did not recover any DIT Chinook in their samples.

5. RESULTS IN THE ALL-SPECIES COHO MARK SELECTIVE RECREATIONAL FISHERY

An estimated 75,931 angler trips (68,685 from Washington, 7,246 from Oregon) were completed by private and charter anglers during the coastwide all-species coho MSF operating June 26 through October 9, 2011. These anglers harvested a total of 28,434 Chinook coastwide (26,869 WA, 1,565 OR) and 45,624 coho (39,582 WA, 6,042 OR). Landed Chinook catch totaled 94% of the overall adjusted fishery quota of 30,100[2]; landed coho catch totaled 68% of the adjusted fishery quota of 67,000[3]. **Table 14** shows effort and catch by month and area.

WDFW dockside samplers interviewed an estimated 45% of all anglers fishing from WA coastwide. A total of 40% of all Chinook and 49% of all coho harvested in WA were sampled; 1,257 coded wire tags (CWTs) were collected from sampled Chinook and 2,692 were collected from sampled coho in WA ports (**Table 15**).

OSP observer staff conducted a total of 43 on-the-water catch surveys during the all-species fishery and encountered a total of 257 legal sized Chinook, 495 sublegal sized Chinook, 930 legal sized coho, and 26 sublegal sized coho. Dockside samplers also collected 300 completed and useable VTRs containing 441 legal sized Chinook encounters, 587 sublegal sized Chinook encounters, 1,355 legal sized coho encounters, and 85 sublegal sized coho encounters (**Tables 16 and 17**). Mark rates calculated from onboard observer and VTR data are shown in **Table 18** and compared to preseason FRAM coho mark rate projections.

FRAM pre-season projections of total coho mortality in the 2011 ocean recreational all-species fisheries are shown in **Table 19**. **Table 20** details observed coho mortality in those fisheries. Both tables include catch from Oregon. An explanation of the calculations and assumptions used in table 20 follows:

Observed marked and unmarked coho retention is calculated from dockside sampling data as described in Section 3.4; note that since catch estimates are stratified by week, monthly total proportions of marked and unmarked retained estimated catch may vary slightly from monthly total proportions of marked and unmarked sampled coho. Marked release mortality is calculated as 6% of the marked retained coho multiplied by the hooking mortality rate of 14% adopted by the PFMC for recreational fisheries north of Cape Falcon. Unmarked release mortality is calculated by dividing total retention by the observed mark rate (to get total encounters), subtracting the total retention (to get unmarked released coho), and multiplying by the ocean recreational hooking mortality rate of 14%. Observed mark rates from on-water sampling and VTRs is used in this calculation. Where there is no observed estimate of mark rate (in 2011, this did not occur), we estimate mark rate from dockside sampling data ([total marked retained + marked reported released]/[total retained + total reported released]). Total coho handled is

[2] In-season adjustments included impact-neutral rollover of remainder from June MSF. Preseason recreational quota was 33,700.
[3] In-season adjustments included an impact-neutral transfer between Catch Areas 3 and 4. Preseason recreational quota was 67,200.

estimated by dividing the total release mortality by the 14% hooking mortality rate (to get total released coho) and adding that to the total retained. Drop off mortality is calculated as 5% of the total estimated handled coho, the rate adopted for ocean recreational fisheries by the PFMC. Total incidental mortality is the sum of release mortality and drop off mortality. Total estimated mortality is the sum of total retention and total incidental mortality.

Tables 21 and **22** and **Figure 3** summarize the projected and observed coho encounters and mortality in the all-species fishery. Both observed coho encounters and total mortality were lower than projected preseason in Catch Areas 1, 2, and 4 since total catch was below preseason expectations. Observed coho encounters and total mortality were higher than projected preseason in Catch Area 3, as total catch was greater than preseason expectations.

Table 23 reports compliance rates observed by dockside samplers for the recreational fisheries by area and month. Coastwide, compliance with selective fishery regulations averaged 99%, similar to that observed in the last eight seasons.

On-water observers and volunteer anglers 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. Current PFMC methodology for estimating mortality due to drop off uses a rate of 5% of the total number of fish handled (retention plus release).

Estimates of drop off mortality rates from on-water observation and VTR data collected during the recreational fisheries are compared with FRAM projections in **Table 24**.

A total of 1,664 DNA samples were collected from Chinook by onboard and dockside samplers during the summer all-species recreational fishery. **Table 25** describes the numbers of samples by size class, mark status, and method of collection.

Table 14. Estimates of total fishing effort and number of Chinook and coho retained during the 2011 all-species recreational fishery (coho mark-selective) between Cape Falcon, Oregon and the U.S.-Canada border.

	TOTAL ANGLER TRIPS						CHINOOK RETAINED						COHO RETAINED					
	June	July	August	September	October	**TOTAL**	June	July	August	September	October	**TOTAL**	June	July	August	September	October	**TOTAL**
Area 4	121	5,500	4,259	671	-	**10,552**	61	1,382	1,330	14	-	**2,787**	54	1,918	943	140	-	**3,054**
Area 3	66	1,406	1,946	676	16	**4,109**	11	501	907	90	5	**1,514**	48	572	1,029	398	2	**2,050**
Area 2	836	10,428	14,973	3,440	-	**29,676**	368	5,579	10,835	455	-	**17,237**	229	4,499	6,723	2,392	-	**13,843**
Area 1	293	5,358	15,127	3,586	-	**24,363**	86	808	4,107	329	-	**5,330**	289	5,104	12,678	2,564	-	**20,634**
TOTAL WA	**1,316**	**22,692**	**36,305**	**8,372**		**68,685**	**526**	**8,271**	**17,178**	**889**	**5**	**26,869**	**620**	**12,093**	**21,372**	**5,494**	**2**	**39,582**
OREGON (Area 1)	322	1,402	4,645	877	-	**7,246**	71	147	1,268	79	-	**1,565**	178	981	4,128	755	-	**6,042**
TOTAL NOF	**1,638**	**24,094**	**40,950**	**8,372**		**75,931**	**597**	**8,418**	**18,446**	**968**	**5**	**28,434**	**798**	**13,074**	**25,500**	**5,494**	**2**	**45,624**
WA Variance: 1/						624,263						222,924						310,937
WA Standard Error:						790						472						558
WA CV (%):						1%						2%						1%
WA 95% CI:						67,137-70,234						25,943-27,794						38,489-40,675

[1/] Variance estimates are unavailable for Oregon statistics.

Table 15. WA dockside sampling statistics during the 2011 all-species recreational fishery (coho mark-selective) between Cape Falcon, Oregon and the U.S.-Canada border.

	Anglers Sampled	Sample Rate	Landed Chinook Sampled	Sample Rate	Landed Coho Sampled	Sample Rate	Chinook CWTs collected	Coho CWTs collected
Area 4	5,695	54%	1,574	56%	1,652	54%	128	162
Area 3	2,788	68%	1,000	66%	1,446	71%	54	130
Area 2	10,764	36%	5,541	32%	5,072	37%	643	743
Area 1	11,444	47%	2,598	49%	11,063	54%	432	1,657
TOTAL WA	**30,691**	**45%**	**10,713**	**40%**	**19,233**	**49%**	**1,257**	**2,692**

Table 16. On-board Chinook encounters by size class and mark status in the 2011 all-species recreational fishery (coho mark-selective) between Cape Falcon, Oregon and the U.S.-Canada border.

		On-board observation							VTRs						
		Total Observer Trips	LEGAL-SIZED			SUBLEGAL-SIZED			Total VTRs Collected	LEGAL-SIZED			SUBLEGAL-SIZED		
			Marked	Unmarked	Unknown	Marked	Unmarked	Unknown		Marked	Unmarked	Unknown	Marked	Unmarked	Unknown
Area 4	June	0	-	-	-	-	-	-	5	13	3	1	2	4	0
	July	0	-	-	-	-	-	-	26	16	18	0	6	9	7
	August	0	-	-	-	-	-	-	29	9	26	3	6	7	3
	September	0	-	-	-	-	-	-	3	0	0	0	0	0	0
	TOTAL	**0**	**-**	**-**	**-**	**-**	**-**	**-**	**63**	**38**	**47**	**4**	**14**	**20**	**10**
Area 3	June		-	-	-	-	-	-	4	0	3	0	0	0	1
	July	0	-	-	-	-	-	-	36	27	29	2	5	9	5
	August	0	-	-	-	-	-	-	23	14	24	0	0	8	3
	September	0	-	-	-	-	-	-	12	3	6	0	6	10	0
	TOTAL	**0**	**-**	**-**	**-**	**-**	**-**	**-**	**75**	**44**	**62**	**2**	**11**	**27**	**9**
Area 2	June	3	36	8	0	11	2	0	2	7	1	0	0	0	0
	July	8	30	10	0	5	5	0	21	24	18	1	25	17	3
	August	9	37	42	0	16	20	1	42	63	53	4	40	33	13
	September	2	2	2	0	6	2	0	5	0	4	0	1	0	2
	TOTAL	**22**	**105**	**62**	**0**	**38**	**29**	**1**	**70**	**94**	**76**	**5**	**66**	**50**	**18**
Area 1	June	1	23	9	1	133	90	12	4	3	1	0	4	13	20
	July	11	14	14	0	44	34	12	36	9	5	2	32	54	73
	August	8	18	10	1	46	45	6	45	17	14	13	48	40	70
	September	1	0	0	0	2	2	1	7	3	2	0	8	0	0
	TOTAL	**21**	**55**	**33**	**2**	**225**	**171**	**31**	**92**	**32**	**22**	**15**	**92**	**107**	**163**

Table 17. On-board coho encounters by size class and mark status in the 2011 all-species recreational fishery (coho mark-selective) between Cape Falcon, Oregon and the U.S.-Canada border.

		On-board observation							VTRs						
		Total Observer Trips	LEGAL-SIZED			SUBLEGAL-SIZED			Total VTRs Collected	LEGAL-SIZED			SUBLEGAL-SIZED		
			Marked	Unmarked	Unknown	Marked	Unmarked	Unknown		Marked	Unmarked	Unknown	Marked	Unmarked	Unknown
Area 4	June	0	-	-	-	-	-	-	5	3	10	0	1	0	0
	July	0	-	-	-	-	-	-	26	29	40	0	4	8	0
	August	0	-	-	-	-	-	-	29	22	36	0	0	1	0
	September	0	-	-	-	-	-	-	3	0	1	0	2	1	0
	TOTAL	**0**	**-**	**-**	**-**	**-**	**-**	**-**	**63**	**54**	**87**	**0**	**7**	**10**	**0**
Area 3	June		-	-	-	-	-	-	4	12	20	0	0	1	0
	July	0	-	-	-	-	-	-	36	43	61	0	0	3	1
	August	0	-	-	-	-	-	-	23	45	87	0	3	0	0
	September	0	-	-	-	-	-	-	12	47	130	0	1	2	0
	TOTAL	**0**	**-**	**-**	**-**	**-**	**-**	**-**	**75**	**147**	**298**	**0**	**4**	**6**	**1**
Area 2	June	3	12	10	0	0	0	0	2	1	2	0	0	0	0
	July	8	29	56	0	1	0	0	21	32	46	0	1	1	0
	August	9	100	129	0	2	1	0	42	46	94	1	2	5	0
	September	2	12	8	0	0	0	0	5	11	14	0	0	15	0
	TOTAL	**22**	**153**	**203**	**0**	**3**	**1**	**0**	**70**	**90**	**156**	**1**	**3**	**21**	**0**
Area 1	June	1	23	13	2	3	2	1	4	19	12	0	0	0	1
	July	11	156	124	0	0	3	1	36	99	77	0	0	5	2
	August	8	99	116	0	2	4	1	45	136	141	1	12	6	5
	September	1	26	15	0	3	0	2	7	18	19	0	2	0	0
	TOTAL	**21**	**304**	**268**	**2**	**8**	**9**	**5**	**92**	**272**	**249**	**1**	**14**	**11**	**8**

Table 18. Estimated Chinook and coho mark rates during the 2011 all-species recreational fishery (coho mark-selective) by size class using onboard observer and VTR encounters.

		LEGAL SIZED CHINOOK			SUBLEGAL SIZED CHINOOK			LEGAL SIZED COHO			FRAM Projected Coho Mark Rate
		Observer	VTR	Combined	Observer	VTR	Combined	Observer	VTR	Combined	
Area 4	June	-	81%	81%	-	33%	33%	-	23%	23%	28%
	July	-	47%	47%	-	40%	40%	-	42%	42%	42%
	August	-	26%	26%	-	46%	46%	-	38%	38%	40%
	September	-	-	**-**	-	-	-	-	N/A	N/A	45%
	TOTAL	**-**	**45%**	**45%**	**-**	**41%**	**41%**	**-**	**38%**	**38%**	**42%**
Area 3	June	-	0%	0%	-	-	-		38%	38%	50%
	July	-	48%	48%	-	36%	36%	-	41%	41%	45%
	August	-	37%	37%	-	0%	0%	-	34%	34%	50%
	September	-	33%	33%	-	38%	38%	-	27%	27%	44%
	TOTAL	**-**	**42%**	**42%**	**-**	**29%**	**29%**	**-**	**33%**	**33%**	**46%**
Area 2	June	82%	88%	83%	85%	-	85%	55%	33%	52%	57%
	July	75%	57%	66%	50%	60%	58%	34%	41%	37%	55%
	August	47%	54%	51%	44%	55%	51%	44%	33%	40%	54%
	September	50%	0%	25%	75%	100%	78%	60%	44%	51%	48%
	TOTAL	**63%**	**55%**	**59%**	**57%**	**57%**	**57%**	**43%**	**37%**	**40%**	**54%**
Area 1	June	72%	75%	72%	60%	24%	57%	64%	61%	63%	68%
	July	50%	64%	55%	56%	37%	46%	56%	56%	56%	65%
	August	64%	55%	59%	51%	55%	53%	46%	49%	48%	62%
	September	-	-	-	50%	100%	83%	63%	49%	56%	65%
	TOTAL	**63%**	**59%**	**61%**	**57%**	**46%**	**53%**	**53%**	**52%**	**53%**	**63%**

Table 19. Preseason FRAM (model run 1116) projected coho mortality in the 2011 all-species recreational fishery (coho mark-selective).

		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 4	June	104	99	1	5	37	377	28%	19	38	57	161
	July	3,022	2,937	26	85	586	7,393	42%	370	612	982	4,004
	August	3,295	3,194	29	101	696	8,472	40%	424	725	1,149	4,444
	Sept.	570	554	5	16	108	1,377	45%	69	113	182	752
	Total	**6,991**	**6,784**	**61**	**207**	**1,427**	**17,619**	42%	**881**	**1,488**	**2,369**	**9,360**
Area 3	June	105	103	1	2	16	227	50%	11	17	28	133
	July	409	399	4	10	69	927	45%	46	73	119	528
	August	1,050	1,028	9	22	148	2,176	50%	109	157	266	1,316
	Sept./Oct.	186	179	2	7	48	537	44%	27	50	77	263
	Total	**1,750**	**1,709**	**16**	**41**	**281**	**3,867**	46%	**193**	**297**	**490**	**2,240**
Area 2	June	410	403	4	7	45	760	57%	38	49	87	497
	July	5,590	5,493	49	97	668	10,713	55%	536	717	1,253	6,843
	August	13,732	13,468	120	264	1810	27,517	54%	1,376	1,930	3,306	17,038
	Sept.	5,129	4999	45	130	892	11,822	48%	591	937	1,528	6,657
	Total	**24,861**	**24,363**	**218**	**498**	**3,415**	**50,812**	54%	**2,541**	**3,633**	**6,174**	**31,035**
Area 1	June	448	444	4	4	31	697	68%	35	35	70	518
	July	7,723	7,631	68	92	628	12,696	65%	635	696	1,331	9,054
	August	23,006	22,676	203	330	2,261	40,600	62%	2,030	2,464	4,494	27,500
	Sept.	2,424	2,388	21	36	247	4,337	65%	217	268	485	2,909
	Total	**33,601**	**33,139**	**296**	**462**	**3,167**	**58,330**	63%	**2,917**	**3,463**	**6,380**	**39,981**

[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 20. Estimated actual coho mortality in the 2011 all-species recreational fishery (coho mark-selective).

		Total Retention	Marked Retention	Marked Released Mortality a/	Unmarked Retention	Unmarked Released Mortality b/	Total Handled c/	Observed Mark Rate d/ i/	Drop Off Mortality e/	Release Mortality f/	Incidental Mortality g/	Total Mortality h/
Area 4	June	54	52	0	2	25	235	23%	12	25	37	91
	July	1,918	1,868	16	50	370	4,676	42%	234	386	620	2,538
	August	943	911	8	32	216	2,540	38%	127	224	351	1,293
	Sept.	140	138	1	2	32	376	38%	19	33	52	192
	Total	**3,054**	**2,969**	**25**	**85**	**643**	**7,827**	**38%**	**391**	**668**	**1,060**	**4,114**
Area 3	June	48	48	0	0	11	131	38%	7	12	18	66
	July	572	567	5	5	114	1,419	41%	71	118	189	762
	August	1,029	1,010	8	19	278	3,078	34%	154	287	441	1,470
	Sept./Oct	401	401	3	0	155	1,534	27%	77	159	235	636
	Total	**2,050**	**2,026**	**17**	**24**	**559**	**6,162**	**33%**	**308**	**576**	**884**	**2,934**
Area 2	June	229	229	2	0	30	455	52%	23	32	54	284
	July	4,499	4,473	38	26	1,053	12,289	37%	614	1,091	1,705	6,204
	August	6,723	6,608	56	115	1,438	17,387	40%	869	1,493	2,362	9,085
	Sept.	2,392	2,366	20	26	320	4,823	51%	241	340	581	2,974
	Total	**13,843**	**13,676**	**115**	**167**	**2,841**	**34,954**	**40%**	**1,748**	**2,956**	**4,703**	**18,546**
Area 1	June	467	452	4	15	39	772	63%	39	43	81	548
	July	6,085	6,074	51	11	671	11,246	56%	562	722	1,285	7,370
	August	16,806	16,740	141	66	2,573	36,190	48%	1,809	2,714	4,523	21,329
	Sept.	3,319	3,304	28	15	359	6,081	56%	304	387	691	4,009
	Total	**26,676**	**26,570**	**223**	**106**	**3,643**	**54,289**	**53%**	**2,714**	**3,866**	**6,580**	**33,257**

a/ 6% of marked retention multiplied by 0.14 hooking mortality

b/ Total retention divided by observed mark rate less total retention multiplied by 0.14 hooking mortality

c/ Total retention + (Total released mortality divided by 0.14 mooking mortality).

d/ Observed mark rates assumed from dockside sampling data where observer data and VTR data are unavailable (Area 4 September).

e/ 5% of total handled.
f/ Unmarked released mortality + marked released mortality.
g/ Drop off + release mortality.
h/ Total retention + incidental mortality.

Table 21. Comparison of modeled (FRAM model run #1116) and estimated total coho encounters[a/] in the 2011 all-species recreational fishery (coho mark-selective).

	Projected	Observed
Area 4	17,620	7,740
Area 3	3,871	6,129
Area 2	50,811	34,929
Area 1	58,337	54,312
Coastwide Total	**130,639**	**103,109**

[a/]Total retention + (Total released mortality divided by 0.14 hooking mortality).

Table 22. Comparison of modeled (FRAM model run #1116) and estimated total coho mortalities in the 2011 all-species recreational fishery (coho mark-selective).

	Projected	Observed
Area 4	9,360	4,097
Area 3	2,240	2,928
Area 2	31,035	18,541
Area 1	39,981	33,261
Coastwide Total	**82,615**	**58,827**

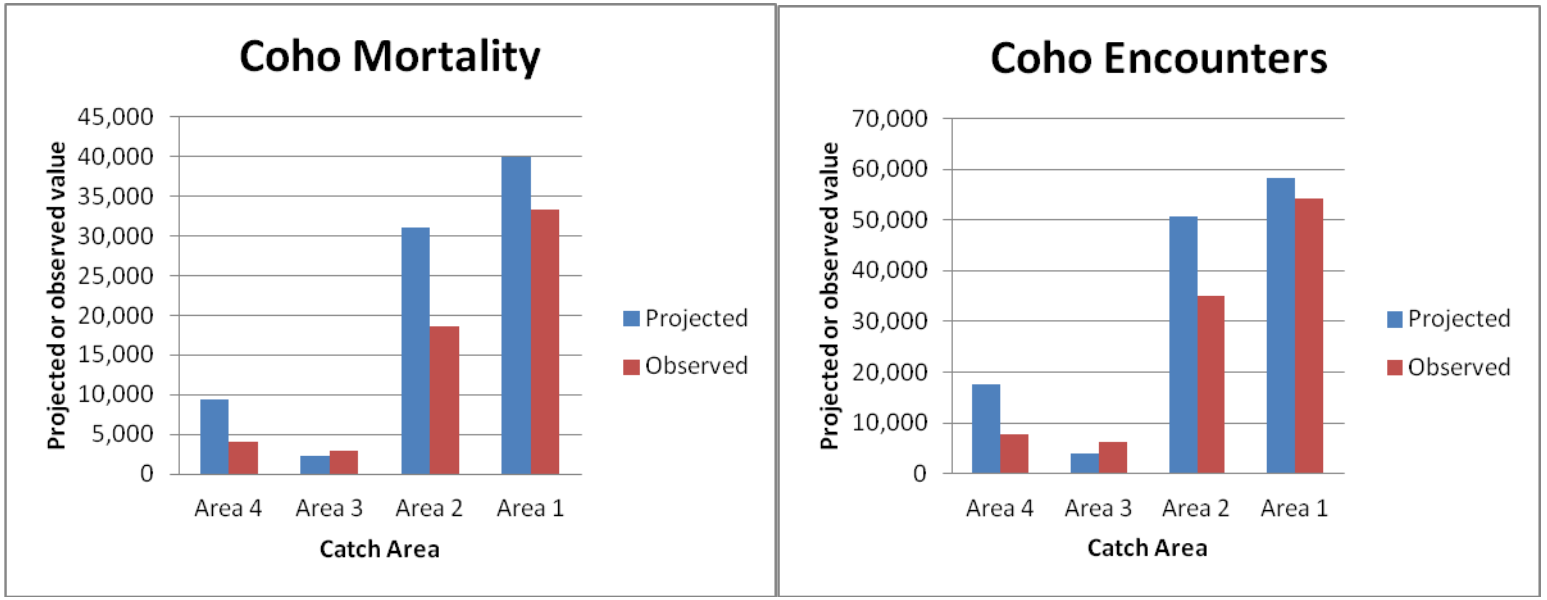

Figure 3. Comparison of modeled (FRAM model run #1116) and estimated total coho encounters and mortality in the 2011 all-species recreational fishery (coho mark-selective).

Table 23. Compliance with coho selective fishery regulations observed during dockside sampling interviews in the 2011 all-species recreational fishery (coho mark-selective) between Cape Falcon, Oregon and the U.S.-Canada border.

		Total Coho Sampled	Marked Coho Sampled	Unmarked Coho Sampled	% Sampled Coho Marked
Area 4	June	155	154	1	99.4%
	July	895	864	31	96.5%
	August	528	510	18	96.6%
	September	74	73	1	98.6%
	Total	**1,652**	**1,601**	**51**	**96.9%**
Area 3	June	66	65	1	98.5%
	July	424	421	3	99.3%
	August	661	651	10	98.5%
	Sept./Oct.	295	295	0	100.0%
	Total	**1,446**	**1,432**	**14**	**99.0%**
Area 2	June	236	236	0	100.0%
	July	1,599	1,590	9	99.4%
	August	2,221	2,181	40	98.2%
	September	1,016	1,009	7	99.3%
	Total	**5,072**	**5,016**	**56**	**98.9%**
Area 1	June	364	359	5	98.6%
	July	3,320	3,315	5	99.8%
	August	6,175	6,159	16	99.7%
	September	1,204	1,200	4	99.7%
	Total	**11,063**	**11,033**	**30**	**99.7%**

Table 24. Estimated drop off mortality rate in the 2011 all-species recreational fishery (coho mark-selective) using on-water observation data and voluntary trip reports.

		On-Board Observation					VTRs				
		Total Salmon Handled	Observed Drop Offs	Estimated Observed Drop Off Mortality a/	FRAM Total Drop Off Mortality b/	Observed Drop Off Mortality Rate c/	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 4	June	-	-	-	-	-	90	7	1	5	1.1%
	July						137	19	3	7	1.9%
	August	-	-	-	-	-	113	26	4	6	3.2%
	September	-	-	-	-	-	4	4	1	0	14.0%
	Total	-	-	-	-	-	**344**	**56**	**8**	**17**	**2.3%**
Area 3	June	-	-	-	-	-	67	8	1	3	1.7%
	July						185	22	3	9	1.7%
	August	-	-	-	-	-	184	20	3	9	1.5%
	Sept./Oct.	-	-	-	-	-	205	12	2	10	0.8%
	Total	**-**	**-**	**-**	**-**	**-**	**641**	**62**	**9**	**32**	**1.4%**
Area 2	June	79	15	2	4	2.7%	286	27	4	14	1.3%
	July	136	47	7	7	4.8%	170	31	4	9	2.6%
	August	348	55	8	17	2.2%	354	19	3	18	0.8%
	September	32	5	1	2	2.2%	47	3	0	2	0.9%
	Total	**595**	**122**	**17**	**30**	**2.9%**	**857**	**80**	**11**	**43**	**1.3%**
Area 1	June	312	100	14	16	4.5%	103	44	6	5	6.0%
	July	406	91	13	20	3.1%	367	83	12	18	3.2%
	August	348	72	10	17	2.9%	510	121	17	26	3.3%
	September	51	1	0	3	0.3%	58	10	1	3	2.4%
	Total	**1,117**	**264**	**37**	**56**	**3.3%**	**1,038**	**258**	**36**	**52**	**3.5%**

[a/] Assume 14% 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 25. Number of Chinook DNA samples collected by onboard and dockside samplers from the ocean recreational all-species fishery, by size class, mark status, and sample type.

		On-Board Sampling						Dockside Sampling			Total Number of DNA Samples
		Legal Sized			Sublegal Sized			Legal-Sized			
		Marked	Unmarked	Unknown	Marked	Unmarked	Unknown	Marked	Unmarked	Unknown	
Area 4	June	-	-	-	-	-	-	16	14	3	33
	July	-	-	-	-	-	-	116	130	5	251
	August	-	-	-	-	-	-	32	58	1	91
	September	-	-	-	-	-	-	2	0	0	2
	Total	**-**	**-**	**-**	**-**	**-**	**-**	**166**	**202**	**9**	**377**
Area 3	June	-	-	-	-	-	-	0	3	0	3
	July	-	-	-	-	-	-	54	75	0	129
	August	-	-	-	-	-	-	20	45	0	65
	Sept./Oct.	-	-	-	-	-	-	4	20	0	24
	Total	**-**	**-**	**-**	**-**	**-**	**-**	**78**	**143**	**0**	**221**
Area 2	June	13	6	0	1	0	0	0	0	0	20
	July	30	10	0	5	5	0	157	88	0	295
	August	23	31	0	14	16	0	72	59	0	215
	September	2	2	0	5	2	0	3	1	0	15
	Total	**68**	**49**	**0**	**25**	**23**	**0**	**232**	**148**	**0**	**545**
Area 1	June	0	0	0	12	24	0	7	5	0	48
	July	13	15	0	34	30	0	69	38	0	199
	August	20	8	0	40	41	0	119	40	0	268
	September	1	0	0	1	1	0	3	0	0	6
	Total	**34**	**23**	**0**	**87**	**96**	**0**	**198**	**83**	**0**	**521**

6. RESULTS IN THE ALL-SPECIES COHO MARK SELECTIVE NON-TREATY COMMERCIAL TROLL FISHERY

The non-Treaty commercial troll fishery harvested a total of 9,269 Chinook (8,890 WA, 379 OR) and 3,517 coho (3,053 WA, 464 OR) during the coastwide all-species coho MSF operating July 1 through September 13, 2011. Landed Chinook catch totaled 90% of the overall fishery quota of 10,300; landed coho catch totaled 27% of the fishery quota of 12,800. **Table 26** shows catch by month and area.

WDFW dockside samplers sampled a total of 40% of all Chinook and 38% of all coho harvested in WA. Coded wire tag collections totaled 151 from Chinook and 75 from coho in WA ports (**Table 27**).

Table 28 details numbers of Chinook DNA samples collected in WA by month and area, including during the non mark-selective spring Chinook fishery. A total of 1,999 DNA samples were collected from Chinook by dockside samplers throughout the May – September non-Treaty troll fishery (1,304 in May-June, 695 in July-September).

Table 26. Total Chinook and coho retained during the 2011 all-species non-Treaty commercial troll fishery (coho mark-selective) between Cape Falcon, Oregon and the U.S.-Canada border.

	Chinook				Coho			
	July	August	September	TOTAL	July	August	September	TOTAL
Area 4	276	30	93	399	1	0	139	140
Area 3	2,683	781	179	3,643	574	436	157	1,167
Area 2	3,056	1,709	66	4,831	1,055	456	197	1,708
Area 1	1	12	4	17	1	25	12	38
TOTAL WA	**6,016**	**2,532**	**342**	**8,890**	**1,631**	**917**	**505**	**3,053**
OREGON (Area 1)	114	239	26	379	234	147	83	464
TOTAL NOF	**6,130**	**2,771**	**368**	**9,269**	**1,865**	**1,064**	**588**	**3,517**

Table 27. Chinook and coho sampled in WA during the 2011 all-species non-Treaty commercial troll fishery (coho mark-selective) between Cape Falcon, Oregon and the U.S.-Canada border.

	Chinook			Coho		
	Total Sampled	Sample Rate	CWTs Collected	Total Sampled	Sample Rate	CWTs Collected
Area 4	70	18%	4	2	1%	0
Area 3	1,300	36%	50	484	41%	46
Area 2	2,196	45%	96	665	39%	28
Area 1	5	29%	1	12	32%	1
TOTAL WA	**3,571**	**40%**	**151**	**1,163**	**38%**	**75**

Table 28. Number of chinook DNA samples collected from the 2011 non-treaty troll fishery by size class, mark status.

AREA	MONTH	Dockside Sampling			Total Number of DNA Samples
		Legal-Sized			
		Marked	Unmarked	Unknown	
Area 4	May	30	38	0	68
	June	0	0	0	0
	July	0	0	0	0
	August	0	0	0	0
	September	1	9	0	10
	Total	**31**	**47**	**0**	**78**
Area 3	May	114	169	0	283
	June	145	293	0	438
	July	47	168	1	216
	August	23	86	0	109
	September	0	13	0	13
	Total	**329**	**729**	**1**	**1,059**
Area 2	May	39	16	0	55
	June	167	81	0	248
	July	145	106	0	251
	August	50	41	0	91
	September	0	0	0	0
	Total	**401**	**244**	**0**	**645**
Area 1	May	48	23	0	71
	June	104	37	0	141
	July	1	0	0	1
	August	0	0	0	0
	September	2	2	0	4
	Total	**155**	**62**	**0**	**217**

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APPENDICES

Appendix A. Mark-selective fishery impact estimation details for the pilot recreational selective Chinook fishery in Washington coastal Areas 1 through 4.

Below are definitions and equations for all quantities used in estimating mark-selective fishery impacts from the combination of dockside creel survey information, on-water observer data, and/or voluntary trip report (VTR) results as applicable. The estimation sequence builds from monthly[4] estimators of encounters-by-class (i.e., the four size [legal, sublegal] × mark-status [marked, unmarked] groups) to season-wide impact estimates.

A. Total and Class-specific Encounters Estimation

The first step towards quantifying mark-selective fishery impacts by size/mark-status class is to estimate total Chinook encounters ($\hat{E}_i$, includes retained + released Chinook; See *Monthly Encounters* below) for each month of the fishery. Secondarily, encounters are apportioned to the appropriate size/mark-status group using encounters-composition data collected from onboard sampling on charter boats (See *Estimating Chinook Encounter Composition* on following page).

Monthly Encounters

$\hat{E}_i$ = Total Chinook encounters for month *i*, which is estimated by combining creel estimates of legal-marked Chinook harvest ($\hat{K}_{LM\,i}$, defined on subsequent page) with an estimate of the proportion of the fishable Chinook population that is of legal size and marked ($\hat{p}_{LM\,i}$, defined on subsequent page). Given the potential for negative bias in $\hat{E}_i$ if anglers release any of the legal-marked Chinook that they encounter, the $\hat{E}_i$ estimator also includes a "correction" to account for this phenomenon (i.e., 1-$p_{\text{LM-R}}$, where $p_{\text{LM-R}}$ is the estimated legal-marked Chinook release rate)[5]. $\hat{E}_i$ and its variance are estimated as:

$$(1) \qquad \hat{E}_i = \frac{\hat{K}_{LM}}{[\hat{p}_{LM}(1-p_{LM-R})]}$$

$$(2) \qquad \text{var}(\hat{E}_i) = \frac{1}{[(1-p_{LM-R})^2]} * \left[\frac{\hat{K}_{LM\,i}{}^2}{\hat{p}_{LM\,i}{}^2} * \left(\frac{\text{var}(\hat{K}_{LM\,i})}{\hat{K}_{LM\,i}{}^2} + \frac{\text{var}(\hat{p}_{LM\,i})}{\hat{p}_{LM\,i}{}^2} \right) \right]$$

[4] **Note:** For fisheries characterized by short-duration seasons (i.e., ~ 1 month), the "monthly" estimators described in this appendix are synonymous season-total estimators.

[5] Equations 1 and 2 were modified based on a 2008 state–tribal evaluation of sources of bias in estimates of total Chinook encounters in mark-selective fisheries. Based on a review of relevant data, the current operational $p_{\text{LM-R}}$ (combined intentional and unintentional LM Chinook release rate) applied in the bias-corrected $\hat{E}_i$ estimator is 0.13. See Conrad and McHugh (2008) for further detail.

Estimating Chinook Encounter Composition

$\hat{p}_{LM\,i}$ = the onboard observer (charter ride-along)-based estimate of the proportion of Chinook encounters that are legal-sized (*L*) and marked (*M*) during month *i*

$\hat{p}_{LU\,i}$ = the estimated proportion of encounters that are legal-sized (*L*) and unmarked (*U*)

$\hat{p}_{SM\,i}$ = the estimated proportion of encounters that are sublegal-sized (*S*) and unmarked (*M*)

$\hat{p}_{LU\,i}$ = the estimated proportion of encounters that are sublegal-sized (*S*) and unmarked (*U*)

For each *XY* combination (where *X* = *L* or *S* and *Y* = *M* or *U*), $\hat{p}_{XY\,i}$ and its variance is estimated as:

(3) $\hat{p}_{XY\,i} = n_{XY\,i} / n_i$, and

(4) $\text{var}(\hat{p}_{XY\,i}) = [\hat{p}_{XY\,i}(1 - \hat{p}_{XY\,i})]/(n_i - 1)$,

Where, n_i = the total number of fish encountered by the onboard observers during month *i*.

Encounters by Size/Mark-status Class

$\hat{E}_{LM\,i}$ = estimated legal (*L*), marked (*M*) encounters during month *i*

$\hat{E}_{LU\,i}$ = estimated legal (*L*), unmarked (*U*) encounters during month *i*

$\hat{E}_{SM\,i}$ = estimated sublegal (*S*), marked (*M*) encounters during month *i*

$\hat{E}_{SU\,i}$ = estimated sublegal (*S*), marked (*U*) encounters during month *i*

For each *XY* combination (where *X* = *L* or *S* and *Y* = *M* or *U*) $\hat{E}_{XY\,i}$ and an estimate of its variance are obtained from:

(5) $\hat{E}_{XY\,i} = \hat{E}_i * \hat{p}_{XY\,i}$

(6) $\text{var}(\hat{E}_{XY\,i}) = \text{var}(\hat{E}_i) * \hat{p}_{XY\,i}^{\,2} + \hat{E}_i^{\,2} * \text{var}(\hat{p}_{XY\,i}) - \text{var}(\hat{E}_i) * \text{var}(\hat{p}_{XY\,i})$

B. Estimating Retained and Released Numbers by Size/Mark-status Class

Before total mortality can be estimated for each class (LM, SM, LU, SU), class-specific encounters must be separated into retention and release categories. First, given that harvest is estimated only to mark-status class for creel survey purposes, estimates of marked and unmarked Chinook retention must be assigned to size classes (See *Apportioned Estimates of Retention to Size Classes* on subsequent page); this is done using mark-status-specific size composition data from dockside sampling (See *Dockside Observations for Apportioning Retained Catch to Class* on subsequent page). Subsequently, size/mark-status group-specific releases are estimated as the difference between class-specific encounters and retention (See *Estimating Release Numbers by Class* on subsequent page).

Dockside Observations for Apportioning Retained Catch to Class

$\hat{d}_{LMK}$ = the estimated proportion of retained (kept, *K*), marked (*M*) Chinook salmon that were legal (*L*); based on *season-wide*[6] dockside observations of marked Chinook (as is $\hat{d}_{SMK}$)

$\hat{d}_{SMK}$ = the estimated proportion of retained (kept, *K*), marked (*M*) Chinook that were sublegal (*S*)

The proportion of retained, marked fish in size class *X* (*X* = *L* or *S*) and its variance are estimated as:

$$(7) \qquad \hat{d}_{XMK} = n_{XMK} / n_{MK}$$

$$(8) \qquad \text{var}(\hat{d}_{XMK}) = [\hat{d}_{XMK} * (1 - \hat{d}_{XMK})] / (n_{MK} - 1),$$

where n_{MK} and n_{XMK} are *season-wide* total dockside counts of marked fish and the subset of marked fish in size-class *X*, respectively.

$\hat{d}_{LUK}$ = the estimated proportion of retained (kept, *K*), unmarked (*U*) Chinook salmon that are legal (*L*); estimated from *season-wide* dockside observations of unmarked Chinook (as is $\hat{d}_{SUK}$)

$\hat{d}_{SUK}$ = the estimated proportion of retained (kept, *K*), unmarked (*U*) Chinook that are sublegal (*S*)

The proportions of retained, unmarked fish belonging to legal and sublegal size classes and their respective variances are estimated as above (Eqns. 7 and 8) but using *season-wide* dockside observations on unmarked (*U*), not marked Chinook salmon.

Apportioned Estimates of Retention to Size Classes

$\hat{K}_{LM\,i}$ = the estimated number of legal (*L*), marked (*M*) Chinook kept in month *i*

$\hat{K}_{LU\,i}$ = the estimated number of legal (*L*), unmarked (*U*) Chinook kept in month *i*

The number of kept, marked encounters, marked fish in size class *X* (*L* or *S*) and its variance is estimated as:

$$(9) \qquad \hat{K}_{XM\,i} = \hat{d}_{XMK} * \hat{N}_{MK\,i}$$

$$(10) \qquad \text{var}(\hat{K}_{XM\,i}) = \text{var}(\hat{N}_{MK\,i}) * \hat{d}_{XMK}^{\,2} + \hat{N}_{MK\,i}^{\,2} * \text{var}(\hat{d}_{XMK}) - \text{var}(\hat{N}_{MK\,i}) * \text{var}(\hat{d}_{XMK})$$

where $\hat{d}_{XMK}$ and its variance are from 6 and 7 above and $\hat{N}_{MK\,i}$ is the survey estimate of retained marked fish for month *i* defined in Eqn. 1.

$\hat{K}_{SM\,i}$ = estimated number of sublegal (*S*), marked (*M*) Chinook kept in month *i*

$\hat{K}_{SU\,i}$ = estimated number of sublegal (*S*), unmarked (*U*) Chinook kept in month *i*

The number of retained, unmarked fish belonging to legal and sublegal size classes is estimated according to Eqns. 9 and 10 above but using unmarked fish proportions and monthly retention estimates.

[6] Due to small sample sizes for observed, harvested Chinook—particularly for sublegal and/or unmarked classes—dockside length data are pooled across the season to estimate $\hat{d}_{XYK}$.

Estimating Release Numbers by Class

$\hat{R}_{LM\,i}$ = the estimated number of legal (*L*), marked (*M*) Chinook released in month *i*

$\hat{R}_{LU\,i}$ = the estimated number of legal (*L*), unmarked (*U*) Chinook released in month *i*

$\hat{R}_{SM\,i}$ = the estimated number of sublegal (*S*), marked (*M*) Chinook released in month *i*

$\hat{R}_{SU\,i}$ = the estimated number of sublegal (*S*), unmarked (*U*) Chinook released in month *i*

For each size/mark-status class (i.e., *XY* combination [*X* = *L* or *S* and *Y* = *M* or *U*]), the number of fish encountered and released is estimated as the difference between total size/mark-status class encounters ($\hat{E}_{XY\,i}$) and retention ($\hat{K}_{XY\,i}$) during month *i*. The estimator and its variance are:

$$\hat{R}_{XY\,i} = \hat{E}_{XY\,i} - \hat{K}_{XY\,i} \quad (11)$$

$$\mathrm{var}(\hat{R}_{XY\,i}) = \mathrm{var}(\hat{E}_{XY\,i}) + \mathrm{var}(\hat{K}_{XY\,i}) \quad (12)$$

C. Estimating Total (and Class-specific) Monthly and Season-wide Mortality

The application of assumed mortality rates (See *Assumed Mortality Rates for Retained and Released Chinook* below) to class-specific estimates of total retention and releases constitutes the final step in quantifying mark-selective fishery impacts.

Assumed Mortality Rates for Retained and Released Chinook

m_K = retention mortality rate, 100% for all retained Chinook (reincarnation is rare among fishes)
sfm_L = release mortality rate for legal (*L*) Chinook, assumed to be a constant of 14% in ocean fisheries
sfm_S = release mortality rate for sublegal (*S*) Chinook, assumed to be a constant of 14% in ocean fisheries

Retention-mortality Estimates

$\hat{M}_{LMK_i}$ = estimated mortality due to legal (*L*), marked (*M*) Chinook harvest in month *i* (= $\hat{K}_{LM\,i}$).

$\hat{M}_{LUK_i}$ = estimated mortality due to harvest of legal (*L*), unmarked (*U*) Chinook in month *i* (= $\hat{K}_{LU\,i}$).

$\hat{M}_{SMK_i}$ = estimated mortality due to harvest of sublegal (*S*), marked (*M*) Chinook in month *i* (= $\hat{K}_{SM\,i}$).

$\hat{M}_{SUK_i}$ = estimated mortality due to harvest of sublegal (*S*), marked (*M*) Chinook in month *i* (= $\hat{K}_{SU\,i}$).

Release-mortality Estimates

$\hat{M}_{LMR_i}$ = estimated post-release mortality for legal (*L*), marked (*M*) Chinook in month *i*

$\hat{M}_{LUR_i}$ = estimated post-release mortality for legal (*L*), unmarked (*U*) Chinook in month *i*

$\hat{M}_{SMR_i}$ = estimated post-release mortality for sublegal (*S*), marked (*M*) Chinook in month *i*

$\hat{M}_{SUR_i}$ = estimated post-release mortality for sublegal (*S*), unmarked (*U*) Chinook in month *i*

All class-specific (*XY* [*X* = *L* or *S*, *Y* = *M* or *U*]) release mortality estimates are obtained from:

(13) $\hat{M}_{XYRi} = \hat{R}_{XYi} * sfm_Y$

(14) $\text{var}(\hat{M}_{XYRi}) = \text{var}(\hat{R}_{XYi}) * sfm_Y{}^2$

Season-wide Total and Class-specific Mortality Estimation

$\hat{M}_{total}$ = total season-wide Chinook salmon mortality; this parameter and its variance [$\text{var}(\hat{M}_{total})$] are computed as the sum of all monthly retention and release mortality estimates [i.e., $\hat{M}_{total} = \sum_{i=1}^{\max i} (\hat{M}_{XYK\,i} + \hat{M}_{XYR\,i})$] and variances [$\text{var}(\hat{M}_{total}) = \sum_{i=1}^{\max i} [\text{var}(\hat{M}_{XYK\,i}) + \text{var}(\hat{M}_{XYR\,i})]$], respectively, for all four size/mark-status groups (*X* = *L* or *S*, *Y* = *M* or *U*). Season total estimates for subgroups of interest (e.g., unmarked, sublegal Chinook, $\hat{M}_{SU-total}$) are obtained by summing monthly estimates (and variances) across the season for just that group.

D. Characterizing Precision of Estimates

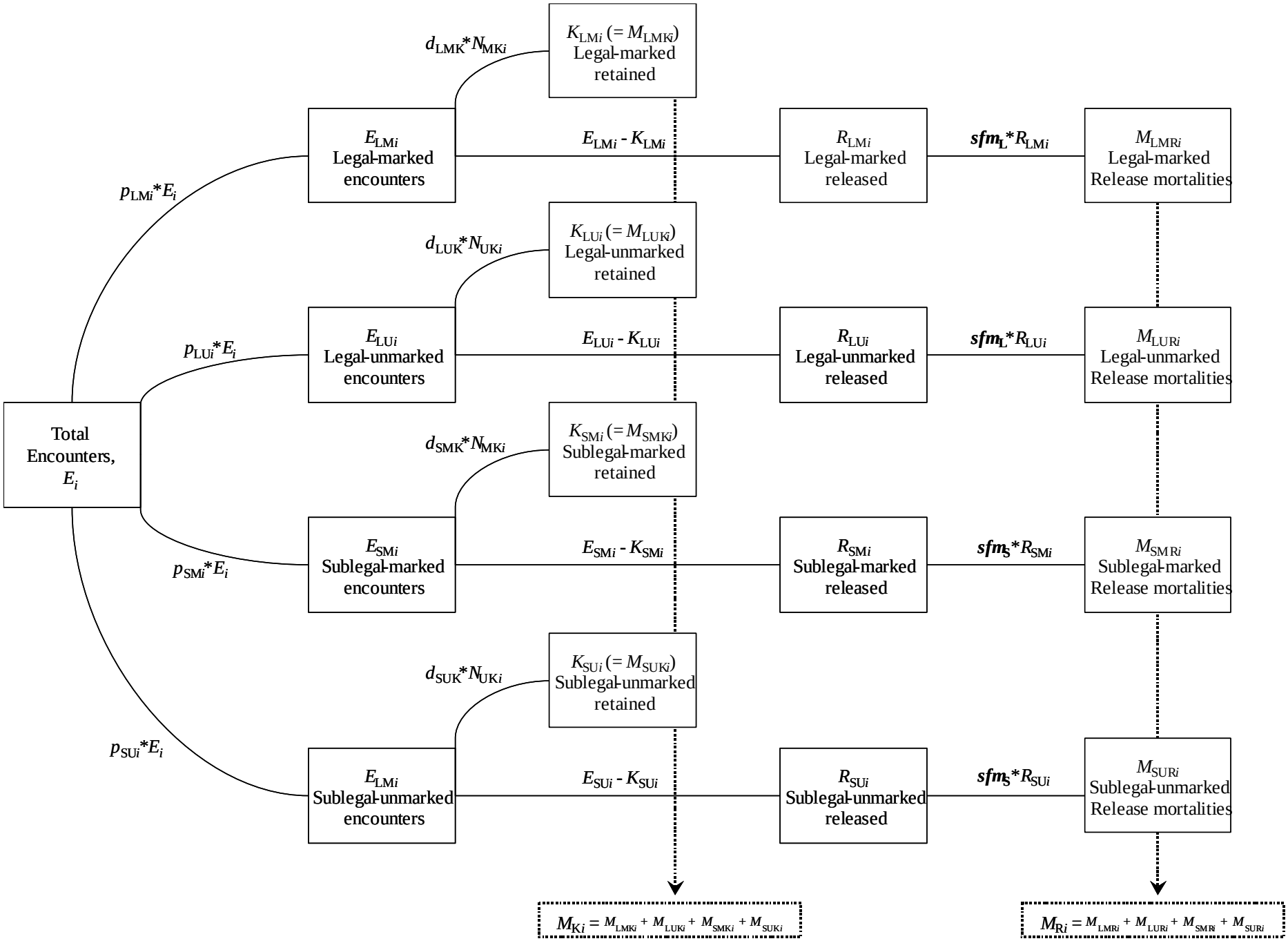
The precision of estimates generated from creel surveys and the preceding fishery impact estimation scheme is characterized using estimates of a parameter's standard error (*SE*), coefficient of variation (*CV* or relative standard error), and approximate 95% confidence interval. For any parameter estimate $\hat{\theta}$ (e.g., $\hat{M}_{total}$, $\hat{K}_{LM\,i}$, $\hat{E}_i$, etc.), these metrics are estimated using:

(15) $SE(\hat{\theta}) = \sqrt{\text{var}(\hat{\theta})}$

(16) $CV(\hat{\theta}) = [SE(\hat{\theta}) / \hat{\theta}] * 100$

(17) $CI = \hat{\theta} \pm 1.96 * SE(\hat{\theta})$

Figure A1. (*On following page*) Graphical representation of the approach used to estimate monthly encounters and mortalities by size/mark-status category in mark-selective Chinook fisheries. Boxes depict abundance estimates (encounters, mortalities) whereas the mathematical operations depicted on intermediate connector lines are estimator formulae yielding quantities found in subsequent boxes (moving from left to right). Parameter definitions, complete formulae, and variances are defined in the preceding pages. For short-duration fisheries (~ 1 month or less), monthly and season-total values are equivalent; for all others, season-total impacts are equivalent to the sum of monthly impact estimates (and variances).


Total Encounters, E_i
$p_{LMi}*E_i$
$p_{LUi}*E_i$
$p_{SMi}*E_i$
$p_{SUi}*E_i$
E_{LMi} Legal-marked encounters
E_{LUi} Legal-unmarked encounters
E_{SMi} Sublegal-marked encounters
E_{LMi} Sublegal-unmarked encounters
$d_{LMK}*N_{MKi}$
$d_{LUK}*N_{UKi}$
$d_{SMK}*N_{MKi}$
$d_{SUK}*N_{UKi}$
K_{LMi} (= M_{LMKi}) Legal-marked retained
K_{LUi} (= M_{LUKi}) Legal-unmarked retained
K_{SMi} (= M_{SMKi}) Sublegal-marked retained
K_{SUi} (= M_{SUKi}) Sublegal-unmarked retained
$E_{LMi} - K_{LMi}$
$E_{LUi} - K_{LUi}$
$E_{SMi} - K_{SMi}$
$E_{SUi} - K_{SUi}$
R_{LMi} Legal-marked released
R_{LUi} Legal-unmarked released
R_{SMi} Sublegal-marked released
R_{SUi} Sublegal-unmarked released
sfm_L*R_{LMi}
sfm_L*R_{LUi}
sfm_S*R_{SMi}
sfm_S*R_{SUi}
M_{LMRi} Legal-marked Release mortalities
M_{LURi} Legal-unmarked Release mortalities
M_{SMRi} Sublegal-marked Release mortalities
M_{SURi} Sublegal-unmarked Release mortalities
$M_{Ki} = M_{LMKi} + M_{LUKi} + M_{SMKi} + M_{SUKi}$
$M_{Ri} = M_{LMRi} + M_{LURi} + M_{SMRi} + M_{SURi}$

Appendix B. Coded-wire tag recovery data collected during dockside sampling activities in the June 18-25, 2011 recreational mark-selective Chinook fishery in Washington coastal Marine Areas 1, 2, 3, and 4.

Area	Recov_Date	Tag_Code	Brood_Year	Release_Site	Rearing_Hatchery	Rel_Agency	DIT_codes	FKLcm	Label	Mark
MARINE AREA 1	19-Jun-11	635098	2008	WENATCHEE R 45.0030	DRYDEN POND	WDFW		59	11505	AD Fin Clp
MARINE AREA 1	19-Jun-11	90239	2008	MCKENZIE R 1	MCKENZIE HATCHERY	ODFW		62	11506	AD Fin Clp
MARINE AREA 1	19-Jun-11	634875	2008	SIMILKAMEEN R 490325	SIMILKAMEEN HATCHERY	WDFW		57	11507	AD Fin Clp
MARINE AREA 1	19-Jun-11	634875	2008	SIMILKAMEEN R 490325	SIMILKAMEEN HATCHERY	WDFW		62	11508	AD Fin Clp
MARINE AREA 1	19-Jun-11	635179	2008	COL R @ TURTLE ROCK	TURTLE ROCK HATCHERY	WDFW		62	11509	AD Fin Clp
MARINE AREA 1	25-Jun-11	634875	2008	SIMILKAMEEN R 490325	SIMILKAMEEN HATCHERY	WDFW		62	13001	AD Fin Clp
MARINE AREA 1	25-Jun-11	634875	2008	SIMILKAMEEN R 490325	SIMILKAMEEN HATCHERY	WDFW		58	13002	AD Fin Clp
MARINE AREA 1	24-Jun-11	634875	2008	SIMILKAMEEN R 490325	SIMILKAMEEN HATCHERY	WDFW		57	13201	AD Fin Clp
MARINE AREA 1	25-Jun-11	220304	2008	SNAKE R@PITT. LNDG	LYONS FERRY HATCHERY	NEZP		59	13203	AD Fin Clp
MARINE AREA 1	18-Jun-11	68621	2008	WICKLAND OIL NET PEN	FEATHER R HATCHERY	CDFG		75	88838	AD Fin Clp
MARINE AREA 1	18-Jun-11	633897	2007	COLUMBIA R - GENERAL		WDFW		71	88841	AD Fin Clp
MARINE AREA 1	18-Jun-11	634184	2006	WENATCHEE R 45.0030		WDFW		79	88842	AD Fin Clp
MARINE AREA 1	18-Jun-11	220303	2008	BIG CANYON ACCL POND	LYONS FERRY HATCHERY	NEZP		58	88843	AD Fin Clp

MARINE AREA 1	18-Jun-11	54870	2008	MARE ISLAND MINOR PT	COLEMAN NFH	FWS		76	88844	AD Fin Clp
MARINE AREA 1	18-Jun-11	634691	2007	OKANOGAN R 49.0019	CARLTON ACCLIMATION POND	WDFW		61	88845	AD Fin Clp
MARINE AREA 1	18-Jun-11	220303	2008	BIG CANYON ACCL POND	LYONS FERRY HATCHERY	NEZP		62	88846	AD Fin Clp
MARINE AREA 1	19-Jun-11	210822	2008	GROVERS CR HATCHERY	GROVERS CR HATCHERY	SUQ	634796	71	88848	AD Fin Clp
MARINE AREA 1	19-Jun-11	633799	2006	COLUMBIA R - GENERAL		WDFW		84	88849	AD Fin Clp
MARINE AREA 1	19-Jun-11	635081	2008	EAST SOUND BAY (SAN)	GLENWOOD SPRINGS	WDFW		64	88850	AD Fin Clp
MARINE AREA 1	19-Jun-11	220305	2008	CAPTAIN JOHNS PD	LYONS FERRY HATCHERY	NEZP		62	88872	AD Fin Clp
MARINE AREA 1	19-Jun-11	94665	2008	LOSTINE R	LOOKINGGLASS HATCH	ODFW		60	88873	AD Fin Clp
MARINE AREA 1	19-Jun-11	612676	2008	COTTONWOOD CR POND	LYONS FERRY HATCHERY	WDFW		67	88883	AD Fin Clp
MARINE AREA 1	19-Jun-11	634875	2008	SIMILKAMEEN R 490325	SIMILKAMEEN HATCHERY	WDFW		58	88884	AD Fin Clp
MARINE AREA 1	19-Jun-11	634390	2007	COLUMBIA NEAR WELLS	WELLS HATCHERY	WDFW		61	88885	AD Fin Clp
MARINE AREA 1	20-Jun-11	634875	2008	SIMILKAMEEN R 490325	SIMILKAMEEN HATCHERY	WDFW		58	88886	AD Fin Clp
MARINE AREA 1	25-Jun-11	634184	2006	WENATCHEE R 45.0030		WDFW		80	88887	AD Fin Clp
MARINE AREA 1	20-Jun-11	634184	2006	WENATCHEE R 45.0030		WDFW		75	97014	AD Fin Clp

MARINE AREA 1	20-Jun-11	68606	2008	SAN PABLO BAY NET PENS	FEATHER R HATCHERY	CDFG		76	97015	AD Fin Clp
MARINE AREA 1	20-Jun-11	634680	2007	SNAKE R @ ASOTIN	LYONS FERRY HATCHERY	WDFW		61	97016	AD Fin Clp
MARINE AREA 1	20-Jun-11	612752	2007	CAPTAIN JOHNS PD	LYONS FERRY HATCHERY	NEZP		68	97017	AD Fin Clp
MARINE AREA 1	20-Jun-11	635177	2008	CHELAN R 47.0052	CHELAN RIVER NP	WDFW		58	97018	AD Fin Clp
MARINE AREA 1	20-Jun-11	68613	2009	SHERMAN ISLAND NET PENS	MOK R FISH INS	CDFG		61	97019	AD Fin Clp
MARINE AREA 1	20-Jun-11	54879	2008	SAC R COLUSA TO RBDD	COLEMAN NFH	FWS		63	97021	AD Fin Clp
MARINE AREA 1	20-Jun-11	634776	2008	COWLITZ R 26.0002	COWLITZ SALMON HATCH	WDFW		62	97022	AD Fin Clp
MARINE AREA 1	20-Jun-11	634778	2008	COL R @ TURTLE ROCK	TURTLE ROCK HATCHERY	WDFW		63	97023	AD Fin Clp
MARINE AREA 1	21-Jun-11	90177	2007	SANDY R	CLACKAMAS HATCHERY	ODFW		85	97024	AD Fin Clp
MARINE AREA 1	21-Jun-11	635166	2008	LYONS FERRY REL.SITE	LYONS FERRY HATCHERY	WDFW		60	97025	AD Fin Clp
MARINE AREA 1	21-Jun-11	635177	2008	CHELAN R 47.0052	CHELAN RIVER NP	WDFW		64	97026	AD Fin Clp
MARINE AREA 1	21-Jun-11	68639	2009	SHERMAN ISLAND NET PENS	MOK R FISH INS	CDFG		63	97027	AD Fin Clp
MARINE AREA 1	21-Jun-11	634875	2008	SIMILKAMEEN R 490325	SIMILKAMEEN HATCHERY	WDFW		65	97028	AD Fin Clp

MARINE AREA 1	21-Jun-11	634875	2008	SIMILKAMEEN R 490325	SIMILKAMEEN HATCHERY	WDFW		59	97029	AD Fin Clp
MARINE AREA 1	21-Jun-11	634875	2008	SIMILKAMEEN R 490325	SIMILKAMEEN HATCHERY	WDFW		58	97030	AD Fin Clp
MARINE AREA 1	21-Jun-11	635098	2008	WENATCHEE R 45.0030	DRYDEN POND	WDFW		58	97031	AD Fin Clp
MARINE AREA 1	21-Jun-11	635166	2008	LYONS FERRY REL.SITE	LYONS FERRY HATCHERY	WDFW		62	97032	AD Fin Clp
MARINE AREA 1	21-Jun-11	634183	2006	METHOW R 48.0002	CARLTON ACCLIMATION POND	WDFW		88	97033	AD Fin Clp
MARINE AREA 1	25-Jun-11	90156	2006	ROCK CR (N UMPQUA R)	ROCK CR HATCHERY	ODFW		86	11203	AD Fin Clp
MARINE AREA 1	24-Jun-11	220305	2008	CAPTAIN JOHNS PD	LYONS FERRY HATCHERY	NEZP		59	11401	AD Fin Clp
MARINE AREA 1	24-Jun-11	90245	2008	UMATILLA R	BONNEVILLE HATCHERY	ODFW	090246	57	11402	AD Fin Clp
MARINE AREA 1	18-Jun-11	54866	2008	SPRING CR 29.0159	SPRING CR NFH	FWS	054867	71	11501	AD Fin Clp
MARINE AREA 1	19-Jun-11	635177	2008	CHELAN R 47.0052	CHELAN RIVER NP	WDFW		62	11502	AD Fin Clp
MARINE AREA 1	19-Jun-11	635166	2008	LYONS FERRY REL.SITE	LYONS FERRY HATCHERY	WDFW		61	11503	AD Fin Clp
MARINE AREA 1	19-Jun-11	635097	2008	WENATCHEE R 45.0030	DRYDEN POND	WDFW		61	11504	AD Fin Clp
MARINE AREA 2	22-Jun-11	634680	2007	SNAKE R @ ASOTIN	LYONS FERRY HATCHERY	WDFW		71	11016	AD Fin Clp
MARINE AREA 2	21-Jun-11	54866	2008	SPRING CR 29.0159	SPRING CR NFH	FWS	054867	85	13402	AD Fin Clp

MARINE AREA 2	21-Jun-11	634680	2007	SNAKE R @ ASOTIN	LYONS FERRY HATCHERY	WDFW		73	13403	AD Fin Clp
MARINE AREA 2	21-Jun-11	612518	2007	CAPTAIN JOHNS PD	LYONS FERRY HATCHERY	NEZP		72	13404	AD Fin Clp
MARINE AREA 2	21-Jun-11	54865	2008	SPRING CR 29.0159	SPRING CR NFH	FWS	054864	79	13405	AD Fin Clp
MARINE AREA 2	21-Jun-11	634182	2006	SIMILKAMEEN R 490325		WDFW		86	13407	AD Fin Clp
MARINE AREA 2	21-Jun-11	220305	2008	CAPTAIN JOHNS PD	LYONS FERRY HATCHERY	NEZP		56	13408	AD Fin Clp
MARINE AREA 2	21-Jun-11	54866	2008	SPRING CR 29.0159	SPRING CR NFH	FWS	054867	77	13409	AD Fin Clp
MARINE AREA 2	21-Jun-11	220304	2008	SNAKE R@PITT. LNDG	LYONS FERRY HATCHERY	NEZP		60	13410	AD Fin Clp
MARINE AREA 2	22-Jun-11	635177	2008	CHELAN R 47.0052	CHELAN RIVER NP	WDFW		60	13412	AD Fin Clp
MARINE AREA 2	22-Jun-11	634680	2007	SNAKE R @ ASOTIN	LYONS FERRY HATCHERY	WDFW		66	13413	AD Fin Clp
MARINE AREA 2	22-Jun-11	635166	2008	LYONS FERRY REL.SITE	LYONS FERRY HATCHERY	WDFW		57	13414	AD Fin Clp
MARINE AREA 2	24-Jun-11	634392	2007	SIMILKAMEEN R 490325	SIMILKAMEEN HATCHERY	WDFW		73	13415	AD Fin Clp
MARINE AREA 2	24-Jun-11	635177	2008	CHELAN R 47.0052	CHELAN RIVER NP	WDFW		61	13417	AD Fin Clp
MARINE AREA 2	24-Jun-11	634995	2008	LYONS FERRY REL.SITE	LYONS FERRY HATCHERY	WDFW		66	13418	AD Fin Clp
MARINE AREA 2	18-Jun-11	633475	2007	SIMILKAMEEN R 490325	SIMILKAMEEN HATCHERY	WDFW		77	13420	AD Fin Clp
MARINE AREA 2	24-Jun-11	180480	2008	R-Chilliwack R	H-Chilliwack River H	CDFO	180481,180482, 180483	72	13421	AD Fin Clp

MARINE AREA 2	24-Jun-11	634184	2006	WENATCHEE R 45.0030		WDFW		88	13426	AD Fin Clp
MARINE AREA 2	19-Jun-11	633799	2006	COLUMBIA R - GENERAL		WDFW		70	13601	AD Fin Clp
MARINE AREA 2	19-Jun-11	90199	2008	BIG CR (LWR COL R)	BIG CR HATCHERY	ODFW		69	13602	AD Fin Clp
MARINE AREA 2	18-Jun-11	634875	2008	SIMILKAMEEN R 490325	SIMILKAMEEN HATCHERY	WDFW		57	11002	AD Fin Clp
MARINE AREA 2	18-Jun-11	634875	2008	SIMILKAMEEN R 490325	SIMILKAMEEN HATCHERY	WDFW		54	11003	AD Fin Clp
MARINE AREA 2	19-Jun-11	635166	2008	LYONS FERRY REL.SITE	LYONS FERRY HATCHERY	WDFW		60	11004	AD Fin Clp
MARINE AREA 2	19-Jun-11	90323	2009	BIG CR (LWR COL R)	BIG CR HATCHERY	ODFW	090148	59	11005	AD Fin Clp
MARINE AREA 2	19-Jun-11	68034	2009	FEATHER BOYDS PUMP RAMP	FEATHER R HATCHERY	CDWR		56	11006	AD Fin Clp
MARINE AREA 2	19-Jun-11	634184	2006	WENATCHEE R 45.0030		WDFW		71	11007	AD Fin Clp
MARINE AREA 2	21-Jun-11	68621	2008	WICKLAND OIL NET PEN	FEATHER R HATCHERY	CDFG		73	11008	AD Fin Clp
MARINE AREA 2	21-Jun-11	635164	2008	COL R @ TURTLE ROCK	TURTLE ROCK HATCHERY	WDFW		60	11009	AD Fin Clp
MARINE AREA 2	21-Jun-11	610179	2008	BIG CANYON ACCL POND	LYONS FERRY HATCHERY	NEZP		84	11010	AD Fin Clp
MARINE AREA 2	21-Jun-11	94657	2007	SANTIAM R S FK	SOUTH SANTIAM HATCH	ODFW		67	11011	AD Fin Clp
MARINE AREA 2	21-Jun-11	635092	2008	COLUMBIA NEAR WELLS	WELLS HATCHERY	WDFW		57	11012	AD Fin Clp

MARINE AREA 2	21-Jun-11	634875	2008	SIMILKAMEEN R 490325	SIMILKAMEEN HATCHERY	WDFW		57	11013	AD Fin Clp
MARINE AREA 2	22-Jun-11	635166	2008	LYONS FERRY REL.SITE	LYONS FERRY HATCHERY	WDFW		63	11014	AD Fin Clp
MARINE AREA 2	22-Jun-11	635098	2008	WENATCHEE R 45.0030	DRYDEN POND	WDFW		61	11015	AD Fin Clp
MARINE AREA 2	19-Jun-11	634183	2006	METHOW R 48.0002	CARLTON ACCLIMATION POND	WDFW		89	13603	AD Fin Clp
MARINE AREA 2	19-Jun-11	634799	2008	COL R @ PRIEST RAPIDS	PRIEST RAPIDS HATCHERY	WDFW		68	13604	AD Fin Clp
MARINE AREA 2	21-Jun-11	635093	2008	COLUMBIA NEAR WELLS	WELLS HATCHERY	WDFW		62	13605	AD Fin Clp
MARINE AREA 2	21-Jun-11	610180	2008	CAPTAIN JOHNS PD	LYONS FERRY HATCHERY	NEZP		76	13606	AD Fin Clp
MARINE AREA 2	21-Jun-11	54866	2008	SPRING CR 29.0159	SPRING CR NFH	FWS	054867	73	13607	AD Fin Clp
MARINE AREA 2	21-Jun-11	634875	2008	SIMILKAMEEN R 490325	SIMILKAMEEN HATCHERY	WDFW		63	13608	AD Fin Clp
MARINE AREA 2	22-Jun-11	610180	2008	CAPTAIN JOHNS PD	LYONS FERRY HATCHERY	NEZP		70	13609	AD Fin Clp
MARINE AREA 2	22-Jun-11	103680	2007	SNAKE@ HLLS CNYON DM	OXBOW HATCHERY	IDFG	104381,107271, 107502,107171	68	13610	AD Fin Clp
MARINE AREA 2	25-Jun-11	635164	2008	COL R @ TURTLE ROCK	TURTLE ROCK HATCHERY	WDFW		67	13611	AD Fin Clp
MARINE AREA 2	25-Jun-11	612750	2007	BIG CANYON ACCL POND	LYONS FERRY HATCHERY	NEZP		66	13612	AD Fin Clp
MARINE AREA 2	18-Jun-11	90178	2007	CLACKAMAS R	CLACKAMAS HATCHERY	ODFW			13802	AD Fin Clp

MARINE AREA 2	18-Jun-11	634182	2006	SIMILKAMEEN R 490325		WDFW		77	13803	AD Fin Clp
MARINE AREA 2	19-Jun-11	634183	2006	METHOW R 48.0002	CARLTON ACCLIMATION POND	WDFW		71	13804	AD Fin Clp
MARINE AREA 2	19-Jun-11	210840	2008	WHITEHORSE SPRINGS	WHITEHORSE POND	STIL		75	13805	AD Fin Clp
MARINE AREA 2	19-Jun-11	635177	2008	CHELAN R 47.0052	CHELAN RIVER NP	WDFW		59	13806	AD Fin Clp
MARINE AREA 2	19-Jun-11	634694	2007	COL R @ TURTLE ROCK	TURTLE ROCK HATCHERY	WDFW		72	13807	AD Fin Clp
MARINE AREA 2	19-Jun-11	220303	2008	BIG CANYON ACCL POND	LYONS FERRY HATCHERY	NEZP		67	13808	AD Fin Clp
MARINE AREA 2	19-Jun-11	634680	2007	SNAKE R @ ASOTIN	LYONS FERRY HATCHERY	WDFW		68	13809	AD Fin Clp
MARINE AREA 2	18-Jun-11	634287	2007	COLUMBIA NEAR WELLS	WELLS HATCHERY	WDFW		73	13810	AD Fin Clp
MARINE AREA 2	18-Jun-11	634875	2008	SIMILKAMEEN R 490325	SIMILKAMEEN HATCHERY	WDFW		59	13811	AD Fin Clp
MARINE AREA 2	18-Jun-11	53480	2008	LTL WHITE SALMON@NFH	LTL WHITE SALMON NFH	FWS		65	13812	AD Fin Clp
MARINE AREA 2	19-Jun-11	54866	2008	SPRING CR 29.0159	SPRING CR NFH	FWS	054867	77	13813	AD Fin Clp
MARINE AREA 2	19-Jun-11	634876	2008	COLUMBIA NEAR WELLS	WELLS HATCHERY	WDFW		71	13814	AD Fin Clp
MARINE AREA 2	19-Jun-11	634288	2007	FALLERT CR 27.0017	FALLERT CR HATCHERY	WDFW		69	13815	AD Fin Clp
MARINE AREA 2	19-Jun-11	634875	2008	SIMILKAMEEN R 490325	SIMILKAMEEN HATCHERY	WDFW		57	13816	AD Fin Clp

MARINE AREA 2	19-Jun-11	633799	2006	COLUMBIA R - GENERAL		WDFW		71	13817	AD Fin Clp
MARINE AREA 2	19-Jun-11	634778	2008	COL R @ TURTLE ROCK	TURTLE ROCK HATCHERY	WDFW		58	13819	AD Fin Clp
MARINE AREA 2	21-Jun-11	634184	2006	WENATCHEE R 45.0030		WDFW		73	13820	AD Fin Clp
MARINE AREA 2	21-Jun-11	54875	2008	COLEMAN NFH	COLEMAN NFH	FWS		69	13822	AD Fin Clp
MARINE AREA 2	21-Jun-11	634694	2007	COL R @ TURTLE ROCK	TURTLE ROCK HATCHERY	WDFW		83	13823	AD Fin Clp
MARINE AREA 2	24-Jun-11	635166	2008	LYONS FERRY REL.SITE	LYONS FERRY HATCHERY	WDFW		60	13824	AD Fin Clp
MARINE AREA 2	24-Jun-11	634680	2007	SNAKE R @ ASOTIN	LYONS FERRY HATCHERY	WDFW		67	13825	AD Fin Clp
MARINE AREA 2	24-Jun-11	634280	2007	COWLITZ R 26.0002	COWLITZ SALMON HATCH	WDFW		75	13826	AD Fin Clp
MARINE AREA 2	24-Jun-11	634875	2008	SIMILKAMEEN R 490325	SIMILKAMEEN HATCHERY	WDFW		58	13827	AD Fin Clp
MARINE AREA 2	24-Jun-11	634680	2007	SNAKE R @ ASOTIN	LYONS FERRY HATCHERY	WDFW		69	13829	AD Fin Clp
MARINE AREA 2	24-Jun-11	612752	2007	CAPTAIN JOHNS PD	LYONS FERRY HATCHERY	NEZP		67	13830	AD Fin Clp
MARINE AREA 2	25-Jun-11	635164	2008	COL R @ TURTLE ROCK	TURTLE ROCK HATCHERY	WDFW		59	13831	AD Fin Clp
MARINE AREA 2	25-Jun-11	90199	2008	BIG CR (LWR COL R)	BIG CR HATCHERY	ODFW		74	13832	AD Fin Clp
MARINE AREA 2	25-Jun-11	54866	2008	SPRING CR 29.0159	SPRING CR NFH	FWS	054867	78	13833	AD Fin Clp

MARINE AREA 2	25-Jun-11	634680	2007	SNAKE R @ ASOTIN	LYONS FERRY HATCHERY	WDFW		58	13834	AD Fin Clp
MARINE AREA 2	25-Jun-11	633974	2007	COWLITZ SALMON HATCH	COWLITZ SALMON HATCH	WDFW		77	13835	AD Fin Clp
MARINE AREA 2	25-Jun-11	634774	2008	FALLERT CR 27.0017	FALLERT CR HATCHERY	WDFW		76	13836	AD Fin Clp
MARINE AREA 2	25-Jun-11	90136	2007	SNAKE R-1 (HELLS CAN	UMATILLA HATCHERY	ODFW		73	13837	AD Fin Clp
MARINE AREA 2	18-Jun-11	635081	2008	EAST SOUND BAY (SAN)	GLENWOOD SPRINGS	WDFW		62	90301	AD Fin Clp
MARINE AREA 2	18-Jun-11	634875	2008	SIMILKAMEEN R 490325	SIMILKAMEEN HATCHERY	WDFW		64	90302	AD Fin Clp
MARINE AREA 2	22-Jun-11	612694	2007	CLWTR @ LAPWAI CRK	NPT HATCHERY	NEZP		79	90303	AD Fin Clp
MARINE AREA 2	22-Jun-11	635166	2008	LYONS FERRY REL.SITE	LYONS FERRY HATCHERY	WDFW		64	90304	AD Fin Clp
MARINE AREA 2	24-Jun-11	612750	2007	BIG CANYON ACCL POND	LYONS FERRY HATCHERY	NEZP		67	90305	AD Fin Clp
MARINE AREA 2	24-Jun-11	634680	2007	SNAKE R @ ASOTIN	LYONS FERRY HATCHERY	WDFW		75	90306	AD Fin Clp
MARINE AREA 2	24-Jun-11	634680	2007	SNAKE R @ ASOTIN	LYONS FERRY HATCHERY	WDFW		76	90308	AD Fin Clp
MARINE AREA 2	24-Jun-11	635166	2008	LYONS FERRY REL.SITE	LYONS FERRY HATCHERY	WDFW		62	90309	AD Fin Clp
MARINE AREA 2	19-Jun-11	53480	2008	LTL WHITE SALMON@NFH	LTL WHITE SALMON NFH	FWS		75	99020	AD Fin Clp
MARINE AREA 2	19-Jun-11	632869	2007	WENATCHEE R 45.0030	DRYDEN POND	WDFW		71	99021	Unmarked

MARINE AREA 2	19-Jun-11	53480	2008	LTL WHITE SALMON@NFH	LTL WHITE SALMON NFH	FWS		74	99022	AD Fin Clp
MARINE AREA 2	19-Jun-11	54864	2008	SPRING CR 29.0159	SPRING CR NFH	FWS	054865	79	99023	AD Fin Clp
MARINE AREA 2	19-Jun-11	634868	2008	CHIWAWA R 45.0759		WDFW		60	99024	AD Fin Clp
MARINE AREA 2	19-Jun-11	634875	2008	SIMILKAMEEN R 490325	SIMILKAMEEN HATCHERY	WDFW		57	99025	AD Fin Clp
MARINE AREA 2	18-Jun-11	103083	2008	SFK SAL@ KNOX BRIDGE	MCCALL HATCHERY	IDFG	102883,102783, 102983	60	99375	AD Fin Clp
MARINE AREA 2	18-Jun-11	635092	2008	COLUMBIA NEAR WELLS	WELLS HATCHERY	WDFW		58	99376	AD Fin Clp
MARINE AREA 2	19-Jun-11	633895	2006	LK CHELAN + COLUMBIA R		WDFW		63	99377	AD Fin Clp
MARINE AREA 2	19-Jun-11	68635	2008	SAN PABLO BAY NET PENS	FEATHER R HATCHERY	CDFG		76	99378	AD Fin Clp
MARINE AREA 3	18-Jun-11	633895	2006	LK CHELAN + COLUMBIA R		WDFW		79	97325	AD Fin Clp
MARINE AREA 3	19-Jun-11	635092	2008	COLUMBIA NEAR WELLS	WELLS HATCHERY	WDFW		66	70446	AD Fin Clp
MARINE AREA 3	25-Jun-11	633895	2006	LK CHELAN + COLUMBIA R		WDFW		85	97326	AD Fin Clp
MARINE AREA 4	19-Jun-11	90178	2007	CLACKAMAS R	CLACKAMAS HATCHERY	ODFW		87	84701	AD Fin Clp
MARINE AREA 4	18-Jun-11	210790	2007	GROVERS CR HATCHERY	GROVERS CR HATCHERY	SUQ	634276	72	91480	AD Fin Clp
MARINE AREA 4	18-Jun-11	54866	2008	SPRING CR 29.0159	SPRING CR NFH	FWS	054867	80	96602	AD Fin Clp

MARINE AREA 4	21-Jun-11	54866	2008	SPRING CR 29.0159	SPRING CR NFH	FWS	054867	73	99556	AD Fin Clp