

**Marine Areas 5 and 6
Mark-Selective Recreational Chinook Fishery,
Summer 2009**

Post-season Report

REVISED DRAFT

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EXECUTIVE SUMMARY

Background and Overview

The Washington Department of Fish and Wildlife (WDFW) implemented mark-selective Chinook fisheries (MSFs) in Marine Areas 5 and 6 for the seventh time during the summer of 2009 (July 1-August 6). Consistent with the 2004 Puget Sound Chinook Harvest Management Plan (Puget Sound Indian Tribes and WDFW 2004) and the intent of previous Puget Sound/Strait of Juan de Fuca mark-selective Chinook fisheries, the primary goal for these fisheries was to provide meaningful opportunity to the recreational angling public while minimally impacting ESA-listed Puget Sound Chinook salmon.

WDFW's Puget Sound Sampling Unit (PSSU) conducted comprehensive fishery monitoring activities during the Areas 5 and 6 mark-selective Chinook fisheries. The study designs used in the two areas during 2009, however, differed markedly from those previously employed (2003-2008). First, a scaled-back version (i.e., with fewer sites and days sampled) of the former dockside sample design (i.e., Intensive or "Murthy" [probability-based] sampling) was used to provide coarse in-season estimates of catch and effort for Area 5; to ensure that long-term fishery sampling targets were not compromised, this effort was accompanied by a high level of opportunistic Baseline Sampling. In addition, 2009 was the first season in which we did not operate a test fishing vessel in Area 5. The Area 6 design consisted of Baseline angler/catch sampling only and therefore did not have an on-the-water (i.e., boat surveys, test fishing) sampling component¹. In both Areas 5 and 6, we employed an enhanced Voluntary Trip Report (VTR) program to obtain estimates of Chinook encounter rates by size class (legal or sub-legal) and mark status (ad-marked or unmarked), similar to our approach used successfully during summer 2008. For the enhanced VTR program, an additional WDFW technician was hired to work exclusively on distributing and collecting VTRs from the angling public.

Area 5 sampling activities included dockside creel sampling (Intensive and Baseline), on-the-water effort surveys, and the enhanced Voluntary Trip Report distribution and collection efforts. Among other parameters, Area 5 efforts emphasized data collection needs for the estimation of: *i*) the mark rate of the targeted Chinook population (based on VTRs), *ii*) the total number of Chinook salmon harvested (by size [legal or sublegal] and mark-status [marked or unmarked] group), *iii*) the total number of Chinook salmon released (by size/mark-status group), *iv*) the coded-wire tag- (CWT) stock composition of marked and unmarked Chinook mortalities², and *v*) the total mortality of marked and unmarked double index tag (DIT) CWT stocks. The Area 6 design provided data for the estimation of: *i*) mark rates (based on VTRs), *ii*) indices of Chinook salmon encounters and angling effort (i.e., sample-frame observations, not fishery totals), and *iii*) the age, length, and CWT composition of landed catch.

¹ The Area 6 fishery was monitored using a reduced, Baseline sampling approach. While this approach does not provide a means for generating in- or immediately post-season estimates of *fishery total* catch and effort, these sampling observations will be combined with catch record card data to obtain these values at a later time.

² In the present report, CWT-based (unexpanded) estimates of the stock composition of marked Chinook harvest are provided.

Area 5 Summary

For in-season catch and effort estimation, creel samplers staffed two of six possible sites in our sample site frame (Olson's Resort-East Docks, Olson's Resort-Ramp and Docks, Olson's Resort-West Docks, Van Riper's North Docks, Van Riper's South Docks, and Curley's/Straitside Resort) on each sampling day, for a grand total of 35 site-days during the 37 days that Area 5 was open to Chinook retention under mark-selective regulations. Additionally, Baseline sampling occurred at two primary sites (Olson's and Van Riper's Resorts; includes sub-sites), resulting in an additional 32 site-days of sampling. In combination, these sampling efforts allowed us to directly sample 5,647 completed angler trips and 2,320 completed boat trips during Intensive sampling; Baseline efforts yielded an additional 1,075 boat trip and 2,548 angler trip observations. For all dockside angler interviews combined, we obtained samples from 1,699 Chinook salmon harvested (1,158 from Intensive; 541 from Baseline) during the July 1 – August 6, 2009 mark-selective Chinook fishery in Area 5. In addition, PSSU staff conducted 3 on-the-water effort surveys (2 weekday, 1 weekend) in support of Area 5 monitoring efforts.

Based on the combination of dockside and on-the-water sampling activities, we estimated that 23,662 angler trips were completed in Area 5 between July 1st and August 6th. Landing a grand total of 6,397 estimated Chinook (5,958 marked and 439 unmarked) during the fishery, these anglers experienced a season-wide CPUE of 0.26 Chinook retained per angler trip. Additionally, anglers released an estimated 31,065 Chinook (10,546 marked, 20,519 unmarked) over the season.

During the thirty-seven-day Area 5 fishery, harvested Chinook averaged 64 cm (range: 39 to 103 cm) in total length and were larger than the legal minimum size limit (≥ 22 in or 56 cm TL) in the majority instances (dockside marked Chinook observations, $>81\%$ of legal size). Further, for marked and unmarked Chinook combined, the majority (57%) of all harvested individuals were 3-year olds (i.e., brood year 2006).

In addition, ramp samplers recovered 259 CWTs from marked Chinook harvested in Area 5. The majority of these recoveries (56%) were from Columbia River production facilities; a single Columbia River tag group accounted for 23% (62 tags) of the sample. The remaining CWTs were from Puget Sound (24%), Hood Canal (8%), Canada (5%), Upper Skagit River (3.5%), Oregon coastal (1.2%), California coastal (1.2%), and Washington coastal (0.8%) production facilities.

Although we did not test fish in Area 5 in 2009, we estimated the size/mark-status composition of encountered Chinook using results from our angler-submitted VTRs. Over the entire Area 5 season, anglers who submitted VTRs encountered 572 Chinook salmon, 44% of which were marked (all sizes) with 47% of the legal-sized encounters marked. With a "CPUE" (legal-marked Chinook *encounters* / angler trip) of 0.24, VTR anglers encountered legal-marked Chinook at approximately the same rate as the private recreational fleet. For the 37-day season, we estimated the size/mark-status composition at 15% legal-marked (LM), 17% legal-unmarked (LU), 29% sublegal-marked (SM), and 39% sublegal-unmarked (SU).

The 2009 Area 5 VTRs ($n = 572$ Chinook encounters) provided information on 11.4 times as many encounters as did the Area 5 test fishery in 2008 ($n = 50$), and, on average, 6.4 times more encounters than the average test fishery sample size during the 2003-2007 seasons (average $n = 89$; range: 80-335). Furthermore, the sample size of Chinook encounters from VTRs in 2009 was 4.2 times higher than the sample size from VTRs in 2008 ($n = 135$), the first year of our enhanced VTR program.

By combining dockside-sampling results (i.e., legal-marked Chinook harvest estimates) and VTR encounters data, we generated size/mark-status group-specific estimates of encounters and mortalities for Area 5. In total, an estimated 37,463 Chinook were encountered (retained and released) during the Area 5 fishery, with 5,567 of these being legal-marked, 6,287 legal-unmarked, 10,937 sublegal-marked, and 14,671 sublegal-unmarked individuals. Among released encounters, an estimated 109 legal-marked, 931 legal-unmarked, 1,965 sublegal-marked, and 2,862 sublegal-unmarked Chinook (5,866 overall) were estimated to have died due to handling and release effects of the Area 5 fishery. Thus, in total, 8,031 marked (74% due to direct harvest) and 4,232 unmarked Chinook mortalities occurred as a result of the fishery. Overall, field estimates of encounters were higher than pre-season expectations (i.e., Fishery Regulation Assessment Model results [FRAM, model run 2309]) for legal-marked Chinook salmon; substantial differences, however, were documented for other size/mark-status groups. Specifically, sublegal and/or unmarked Chinook encounter estimates were considerably higher than expected based on pre-season FRAM runs.

Finally, regarding impacts of the Area 5 fishery on the coded-wire tag (CWT) program, we estimated that 25 unmarked Chinook belonging to double-index tag (DIT) groups may have died due to this MSF.

Area 6 Summary

From July 1st through August 6th, 2009, samplers conducted Baseline sampling at three different sites (Freshwater Bay, Port Angeles West Ramp, and Port Angeles Public Ramp-Ediz Hood) used to access the Area 6 MSF. As a result, samplers acquired catch (kept and released) and effort information on 1,949 completed angler trips. Over all interviews, ramp samplers observed 539 harvested Chinook (all marked) and recorded 750 angler-reported Chinook releases (168 marked, 418 unmarked, and 164 of unknown mark status). Given these observations, we estimated the season-wide Area 6 CPUE at 0.28 Chinook retained per angler trip.

During the thirty-seven-day Area 6 fishery, harvested Chinook averaged 77 cm (range: 47 to 104 cm) in total length and were larger than the legal minimum size limit (≥ 22 in or 56 cm TL) nearly all instances (8 sublegal fish [1.4%] were harvested). Sixty-two percent of all harvested individuals were 4-year olds (i.e., brood year 2005), with the majority of the remaining individuals being age-3 fish (35%).

In addition to collecting length data and scales, ramp samplers recovered 16 CWTs from marked Chinook harvested in Area 6, two-thirds of which were from Central Puget Sound

facilities. Outside of Puget Sound tag groups, four tags were recovered from Hood Canal tag groups. A total of 8 (50%) of the recovered CWTs were associated with double index tag (DIT) groups.

Although we did not test fish in Area 6 in 2009, we acquired data on the size/mark-status composition of encountered Chinook using results from our angler-submitted VTRs. In total, we received a total of 89 VTRs from participating anglers which provided data on 192 Chinook encounters. From the VTR response, we estimated that 66% of all Area 6 Chinook encounters were marked, while 69% of legal-sized encounters were marked. Twenty-two (11%) of the total Chinook encounters were sublegal in size.

INTRODUCTION

In recent years, abundant runs of hatchery Chinook salmon (*Oncorhynchus tshawytscha*) have been mixed with depressed runs of wild Chinook salmon in the marine environments of the Puget Sound and Strait of Juan de Fuca. Providing recreational anglers with opportunities to harvest abundant hatchery stocks while simultaneously protecting weaker, wild stocks has proven to be a significant conservation and management challenge. The combination of large-scale hatchery marking (i.e., fin clipping) programs and mark-selective harvest regulations makes it possible for anglers to pursue and harvest hatchery Chinook salmon while minimally impacting wild salmon populations. In such “mark-selective fisheries” (MSFs), anglers are generally allowed to retain adipose-fin clipped (“marked”) hatchery fish and are required to release unharmed any unclipped (“unmarked”, predominantly wild) salmon encountered³.

Since the first marine selective Chinook fishery occurred in Marine Catch Areas 5 and 6 (Strait of Juan de Fuca) in 2003 (WDFW 2008a), mark-selective Chinook salmon fishing regulations have been implemented on a pilot basis in multiple Puget Sound Marine Catch Areas during both summer and winter seasons. As of the close of the 2008-09 fishing season, pilot *summer* selective Chinook seasons have occurred in Areas 5 and 6 for six years (2003-2008; WDFW 2008a; WDFW 2009a) and in Areas 9, 10, 11, and 13 for two years (2007 and 2008; WDFW 2007a and 2007b, WDFW 2009b and 2009c); pilot *winter* selective Chinook fisheries have occurred in Areas 8-1 and 8-2 for four complete seasons (2005-06, 2006-07, 2007-08, and 2009; WDFW 2008b, WDFW 2009d, WDFW 2009f), Areas 9 and 10 for two winter seasons (WDFW 2009g, WDFW 2009h), and Area 7 for two winter seasons (WDFW 2009e, WDFW 2009i). From July 1 through August 6, 2009, the Washington Department of Fish and Wildlife (WDFW) implemented mark-selective Chinook fisheries in Areas 5 and 6 for the seventh consecutive summer, with the Areas 5 and 6 MSFs being managed on season-rather than quota-based criteria, and monitored at a lower intensity. Consistent with the 2004 Puget Sound Chinook Harvest Management Plan (Puget Sound Indian Tribes and WDFW 2004) and the intent of previous mark-selective Chinook fisheries, the primary goal for these fisheries was to provide meaningful opportunity to the recreational angling public while minimally impacting ESA-listed Puget Sound Chinook salmon.

Given the pilot nature of the Areas 5 and 6 mark-selective Chinook fisheries, WDFW’s Puget Sound Sampling Unit was tasked with implementing a comprehensive monitoring program during the entirety of their thirty-seven day summer seasons. As per State–Tribal agreement (WDFW and NWIFC 2009), our primary goal was to collect the data needed to estimate key parameters characterizing these fisheries and their impacts on unmarked salmon. For the Area 5 fishery, we tailored sampling efforts to provide in-season estimates of: *i*) the mark rate of the targeted Chinook population (based on voluntary trip reports [VTRs]), *ii*) *fishery-total*

³The regulations specific to the 2009 Areas 5 and 6 mark-selective fisheries allowed for the retention of up to two legal-sized (≥ 22 inches [56 cm]) marked Chinook salmon per day and required the immediate release of all unmarked or sublegal Chinook. Additionally, anglers were: *i*) required to use single-point, barbless hooks while fishing for salmon, *ii*) held to a combined (all salmon species) two-fish daily limit during the Areas 5 and 6 mark-selective fisheries, and *iii*) held to a handling rule that prevented them from bringing unmarked and/or sublegal Chinook aboard their vessels.

angling effort and Chinook salmon encounters (harvest + releases) and mortalities (by size/mark-status class), *iii*) the coded-wire tag- (CWT) based stock composition of marked and unmarked Chinook mortalities⁴, and *iv*) *fishery-total* mortality of marked and unmarked double index tag (DIT) CWT stocks. For the Area 6 fishery, we employed a reduced monitoring program, which included sampling for the estimation of: *i*) mark rates (based on VTRs), *ii*) indices of Chinook encounters and angling effort (i.e., sample frame-observations, not fishery totals⁵), and *iii*) the CWT composition of landed catch. In both areas, we acquired and analyzed relevant data characterizing other aspects of the pilot fishery, including descriptors of fishing success (catch [landed Chinook] per unit effort, CPUE), the length and age composition of encountered and/or landed Chinook, and the overall intensity of our sampling efforts. In addition, for the second season, we continued implementing our “enhanced VTR” program (i.e., incorporating expanded efforts to increase the sample size of returned VTRs from the angling public) to obtain reliable and cost-effective estimates (i.e., in lieu of test fishing) of the size/mark-status composition of the Chinook encountered during the Areas 5 and 6 MSFs.

In the following pages, we report the results generated through our Areas 5 and 6 monitoring activities. We first provide a brief review of our in-season sampling and post-season assessment methods and then present detailed results for each component of our selective-fishery monitoring program, by area. Area 5 results are then presented, according to the following sequence: *i*) the intensity (i.e., spatial and temporal coverage) of sampling efforts is described; *ii*) estimates of fishery characteristics obtained from creel survey data are reviewed; and *iii*) total fishery impacts—estimated based on the combination of creel and VTR data—are reviewed and compared with pre-season expectations (i.e., based on Fishery Regulation Assessment Model [FRAM] predictions). Next, we review our Area 6 results, which include only the first two items listed for the Area 5 results presentation sequence. In addition, within each Area’s results section, we summarize our analysis of “enhanced VTR” sampling results.

Marine Catch Area and Fishery Descriptions

At nearly 1,000 square miles (>2,500 km²), Marine Areas 5 and 6 encompass the majority of U.S. waters in the Strait of Juan de Fuca (**Figure 1**). Area 5 stretches eastward from the mouth of the Sekiu River (eastern end of Area 4) in the west to the Lyre River in the east, and northward from the Olympic Peninsula to the U.S.-Canada border. Extending from Area 5 in the west to Whidbey Island in the east, and southward from the US-Canada/Area 7 boundaries to Admiralty Inlet, Marine Area 6 encompasses the east-central end of the Strait of Juan de Fuca, including Discovery and Sequim bays. During the summer of 2009 (and as in previous years), however, only the western portion Area 6 (westward of Ediz Hook) was open to Chinook harvest under MSF regulations in order to meet both fishery management and

⁴ Though the necessary tissue samples have been collected, DNA-based estimates of stock composition are presently unavailable for Puget Sound/Strait of Juan de Fuca mark-selective fisheries. In the present report, CWT-based (unexpanded) estimates of the stock composition of marked Chinook harvest are provided.

⁵ Within one to two years of the fishery’s close, Baseline sampling observations of CPUE will be combined with catch record card (CRC) data to produce *fishery total* catch and effort estimates for Area 6.

assessment objectives (WDFW 2008a); the entirety of Area 5 was open during the Chinook MSF. While both areas attract local, tourist, and charter-based angling activity during summer months, Area 5 is generally regarded as being more of a “destination” fishery than Area 6. In addition to Chinook salmon, Areas 5 and 6 anglers pursue and encounter coho salmon (*O. kisutch*; also under mark-selective regulations during the 2009 season) and, during odd years, pink salmon (*O. gorbuscha*). During the summer of 2009, Areas 5 and 6 were open under mark-selective Chinook harvest regulations for a grand total of thirty-seven days (July 1 to August 6).

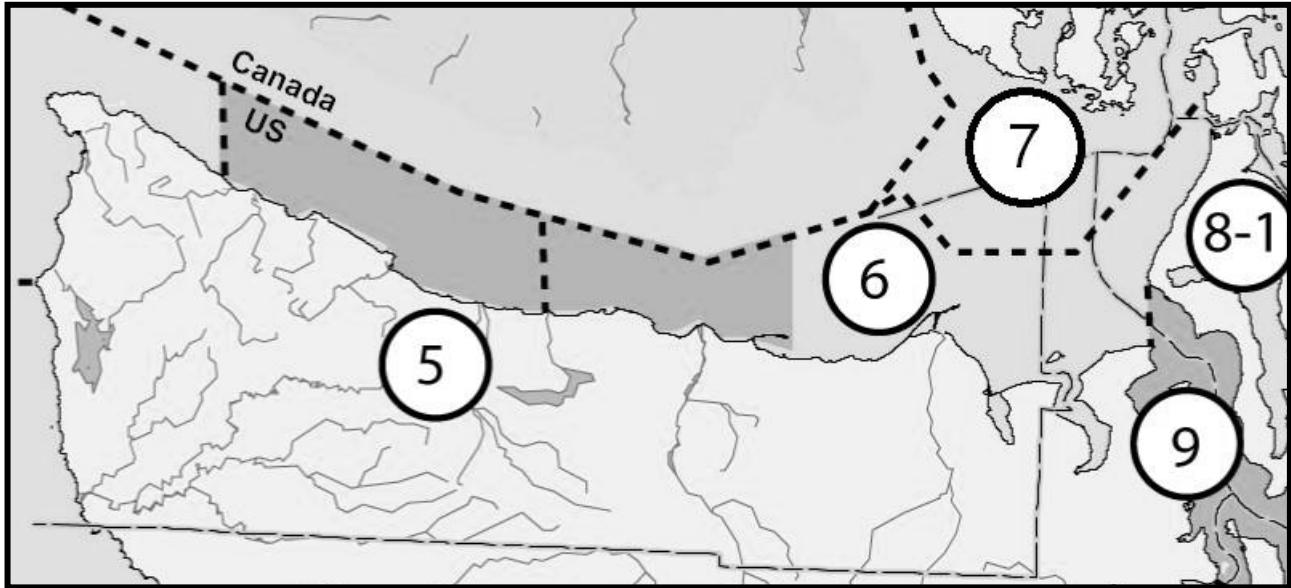


Figure 1. Map of Marine Catch Areas 5 and 6 in the Strait of Juan de Fuca, where the seventh season of the selective Chinook fishery occurred from July 1-August 6, 2009. Areas or sub-Areas (i.e., west of Ediz Hook in Area 6) open under mark-selective Chinook harvest regulations during the summer of 2009 are shaded in dark gray (see 2009/2010 WDFW Sport Fishing Rules for additional details). *Map courtesy of David Bramwell, WDFW.*

AREA 5 METHODS

Monitoring Program Overview

Our sampling program for the Area 5 fishery incorporated comprehensive and complementary data collection strategies, including dockside angler interviews (with catch sampling), on-the-water (instantaneous) effort surveys, and voluntary reports of completed trips provided by private anglers (**Figure 2, Table 1**). Relative to the survey design used during Area 5’s 2003-07 summer MSF seasons (see WDFW 2008a for a complete description), however, our 2009 approach provided in-season catch estimates based on a reduced dockside-sampling component (i.e., fewer sites and days were sampled; see below for details). While we briefly review the field and analytical methods associated with our Area 5 monitoring efforts here, WDFW (2007b and 2008a) provide comprehensive descriptions of all aspects of our MSF sampling program.

Catch and Effort: Sampling and Estimation

We collected data on total catch (observed harvest and reported releases⁶) and total angling effort using a two-stage stratified cluster sample design. At the first stage, for each two-week period of the fishery, we randomly selected $n=2$ sample days from the $N=8$ possible weekday stratum days (distributed so there was at least one weekday sampled in each of the two weeks). For the weekend stratum (Friday through Sunday), we selected $n=2$ sample days out of the $N=3$ possible weekend days each week.

On each selected sample day, we selected two access sites (i.e., public ramps, boathouses, etc.) from our Area 5 sample frame for creel sampling. Access site (i.e., cluster) selection was achieved at the second stage using a probability-proportional-to-size (PPS) sampling algorithm (the Yates-Grundy or “natural” method, Cochran 1977). The measure of size used in PPS sampling was equivalent to the fraction of total sample-frame effort attributed to a given site; this quantity was estimated using data collected during instantaneous on-the-water surveys (i.e., “boat surveys”, during which anglers are asked about where their trips will end that day) conducted during the course of the 2009 fishery. Our sample frame included the six boat launch facilities most frequently used to access Area 5 (Olson’s Resort-East Docks, Olson’s Resort-Ramp and Central Docks, Olson’s Resort-West Docks, Van Riper’s Resort-South Docks, Van Riper’s Resort-North Docks, and Curley’s Straitside). In total, we sampled 12 site-days every two weeks using the 2009 reduced creel survey design.

In comparison, the full creel survey design implemented during the first five seasons of the Area 5 MSF (2003-2007) only varied from the 2009 reduced design in terms of frequency of days sampled – i.e., using the full creel design, we sampled two sites per day on five (2 weekday, 3 weekend) days per week. In contrast, for the 2008 Area 5 MSF reduced creel survey design, we sampled one site per sample day, with the reduced number of days sampled per week (WDFW 2009a), resulting in coarse fishery-total estimates without estimates of variance between sites for each sample day. Thus, the 2009 reduced creel survey design in Area 5 produced improved, higher-quality estimates compared to the 2008 reduced design, due to sampling two sample sites per day on six sampling days per two-week period, enabling us to estimate a variance between sites for our fishery-total estimates.

At access sites selected for sampling on scheduled sample days, samplers interviewed *all* anglers exiting the fishery. During interviews, samplers acquired data on trip duration, trip intent (i.e., targeted species), and fish encountered (kept and/or released, by species). When an interviewed party possessed Chinook or coho salmon, samplers inspected them for CWTs using wand detectors, and collected snouts from CWT+ individuals for later lab processing. Additionally, samplers took length measurements (fork and total) and scale samples from landed Chinook.

⁶ In a recent evaluation of bias in mark-selective fishery parameter estimates, Conrad and McHugh (2008) concluded that recall errors likely cause bias in interview-based estimates of total salmon *releases*. Thus, although estimates of total salmon releases based solely on angler-reported data were generated for this report (**Appendix H**), we focus exclusively on bias-corrected “Method 2” estimates of Chinook encounters (and releases) in our review of the Area 5 fishery.

By combining dockside interview data with estimated size measures, we generated daily estimates (and variances) of total fishing effort and landed Chinook catch (by mark-status group) for our sample frame using Murthy's population-total estimator (Murthy 1957, Cochran 1977, WDFW 2008b). We then expanded these estimates to account for the out-of-frame effort proportion and then again to obtain stratum-wide totals. To generate weekly catch and effort estimates for the Area 5 fishery, the four-day "weekday stratum" estimate for Monday-Thursday of each week (based on $n=2$ days sampled out of $N=8$ available weekdays per two-week period) was added to the "weekend stratum" (Friday-Sunday) estimate for the particular week (based on $n=2$ days sampled out of $N=3$ available weekend days per week). The eight-day weekday estimates for each two-week period were split evenly between individual weeks in the two-week block to enable weekly estimates, with variances computed using the $n=2$ days sampled out of $N=8$ available weekdays in the appropriate variance equation.

To minimize the influence of recall bias on our assessment, we estimated Chinook releases as the difference between retained catch (i.e., from the creel estimate, based on *observed* landings) and total Chinook encounters (i.e., $releases = encounters - retained\ catch$) generated using the bias-corrected Conrad and McHugh (2008) approach. Briefly, encounters were estimated by dividing the creel estimate of legal-marked Chinook harvest by a VTR-based estimate of the proportion of the fishable Chinook population that is of legal size and marked (i.e., our former "Method 2" approach; e.g., WDFW 2007b). Given that this approach yields negatively biased estimates if anglers release any of the legal-marked Chinook they encounter, Conrad and McHugh estimated a "correction" factor to account for this phenomenon and incorporated it into their estimator (See **Appendix A** for complete computational details). Although we do not review estimates of Chinook releases based solely on angler accounts in our assessment, we supply these estimates, as well estimates of retained catch and/or reported releases for other salmon species, in appendices to this report (**Appendix H**).

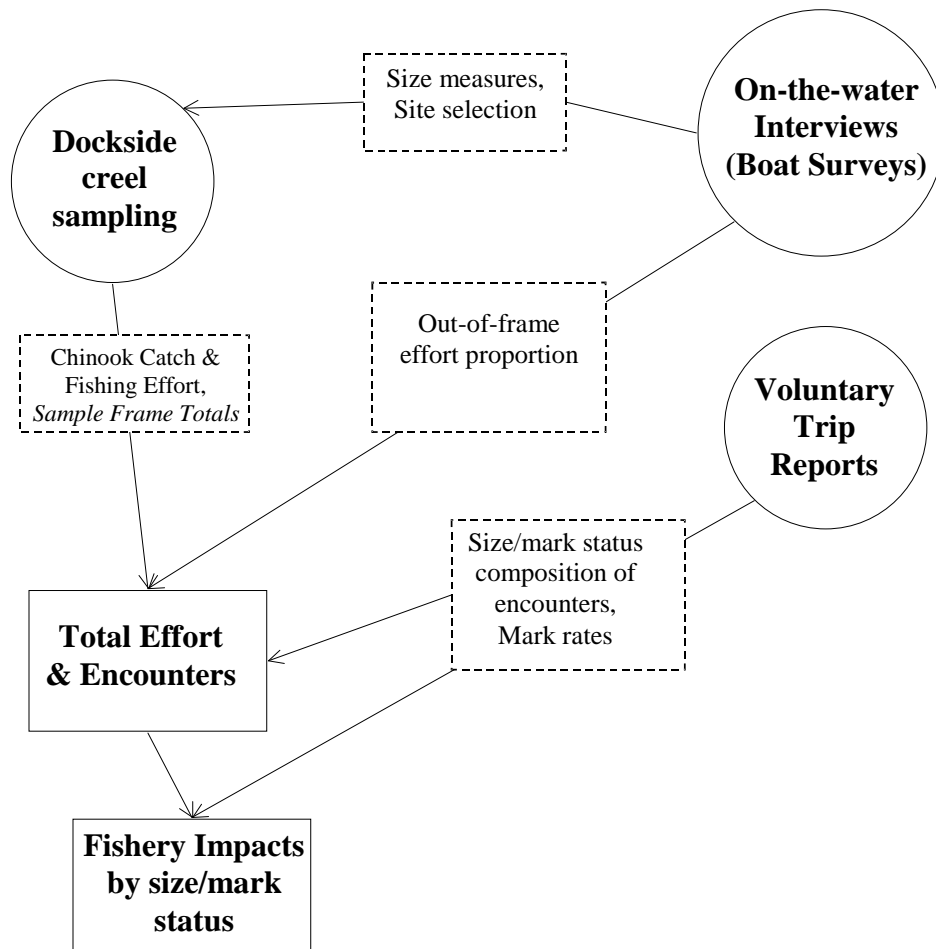


Figure 2. Conceptual diagram of the monitoring plan implemented in Area 5 during the July 1-August 6, 2009 mark-selective Chinook season. Circles represent discrete sampling activities, dashed boxes represent parameters that are estimated using data from a given activity, and solid boxes depict key quantities estimated from the comprehensive plan. ‘Encounters’ includes both harvested and released Chinook salmon.

Finally, it should be noted that in addition to sampling Area 5 anglers according to the design described above (“Intensive sampling” hereafter), extensive Baseline sampling was also conducted so as to not compromise other sampling goals (e.g., 20% CWT harvest sample rate). In brief, Baseline sampling is the main source of biological (length, age, and CWT), catch-rate, and catch-composition data in Puget Sound/Strait of Juan de Fuca fisheries, independent of special studies associated with MSFs (See “AREA 6 METHODS” for a detailed description). While we used these data in catch-composition estimates (length, age, and CWT), Baseline interview results could not be used for fishery-total parameter estimation, due to design constraints.

Estimating Fishery Impacts

Total Encounters and Mortalities

We characterized the overall impacts of the Area 5 fishery in terms of season-total estimates of 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**). As indicated above and in contrast to the previous post-season summer Areas 5 and 6 reports, we used only one approach to estimate total Chinook encounters and, consequently, mortalities. This single method was selected as a result of a thorough state-tribal review of bias potential in estimators of encounters in MSFs (see Conrad and McHugh 2008 for details). In brief, encounters were estimated by dividing creel estimates of legal-marked Chinook harvest by the VTR-based proportion of the targeted Chinook population that was of legal size and marked, inclusive of a bias correction accounting for the modest level legal-marked Chinook release that occurs in this fishery. We then decomposed total encounters into size/mark-status group-specific estimates using VTR encounters composition data.

Table 1. Sampling/estimation details on target parameters associated with the overall Area 5 mark-selective fishery monitoring program (**Figure 2**).

Activity	Focal Parameter(s)	Secondary Parameter(s)	Sample Unit(s)	Finest Estimation Time Step	Comments
Dockside Creel Sampling	Fishing effort (boat & angler trips); kept and released fish ¹	Catch rates (CPUE); length, age, and CWT composition of harvest	Angler trip; kept fish; reported fish release	Week ¹	Within weeks, estimates are also produced by strata (weekday/weekend).
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 (37 days)	The temporal resolution of impact estimates is constrained by that of the VTR encounters data.
Coded-wire tag (CWT) Impacts Estimation	Marked/unmarked double-index tag (DIT) encounters and mortalities	N/A	N/A	Season (37 days)	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 VTR data allow.

² Though samples were collected, DNA-based estimates of stock composition are not yet available for this fishery.

We estimated total Chinook mortality resulting from the 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 selective fishing mortality (*sfm*) rates of 15% and 20% to legal (marked and unmarked) and sublegal (marked and unmarked) release totals, respectively, to estimate release mortality. 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. 2309) for each size and mark status category.

CWT Impacts

To understand the potential effects of the Area 5 fishery on the CWT program, we estimated the total number of unmarked-tagged Chinook mortalities that may have occurred during its 37-day season. 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 Selective Fisheries Evaluation Committee–Analysis Work Group (SFEC-AWG 2002) to estimate the number of unmarked DIT fish encountered⁷. 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. Thus, we used 10% instead of 15% (applied above to legal-sized releases) since unseen drop-off mortality (the 5% differential) is a feature common to selective and non-selective recreational Chinook fisheries.

AREA 6 METHODS

Data collection methods used to monitor the Area 6 mark-selective Chinook fishery included dockside angler interviews (with catch sampling) and voluntary trip reports provided by private anglers (from our enhanced VTR effort, as in Area 5, described below). From these activities, we were able to estimate catch rates (i.e., CPUE), mark rates (based on VTRs), and landed-catch composition (age, length, and CWT). Additionally, we summarized relative catch and effort patterns over the 37-day season based on the assumption that Baseline-sampling observations of these parameters are good indicators of associated fishery-wide trends.

To acquire dockside data, we conducted Baseline sampling at selected Area 6 access sites. Baseline sampling is opportunistic in nature, with overall sampling effort allocated across space and time in a manner that maximizes the number of angler interviews obtained per sample effort. The Area 6 access-site sample frame included 3 different locations (Freshwater Bay Public Ramp, Port Angeles West Ramp, and Port Angeles Public Ramp-Ediz Hook), each of which was visited on an average of 18 times (54 site-days total) during the 37-day season. Site visits lasted 6.9 hours on average and ranged from short (e.g., “no effort” samples) to full-day sampling events. When present, samplers interviewed all (or nearly so) anglers exiting the Area 6 fishery at the selected access site. The interview and catch-sampling procedures employed in Area 6 were identical to those used in Area 5. Thus, Area 6 samplers acquired information about: 1) angling effort (boat and angler trips, trip length), 2) encounters composition (retained and/or released) by species and mark status (marked vs. unmarked, Chinook and coho salmon only), and 3) landed Chinook size (fork and total

⁷ 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.

length) and age (scales were collected and ultimately read) composition. Samplers also inspected landed Chinook and coho salmon for CWTs using wand detectors and acquired snouts when tags were present; resulting tag data were used to estimate the CWT-based composition (unexpanded) of landed catch.

In contrast to the survey design employed in Area 5, Area 6 sampling results could not be used to produce fishery-total estimates of effort, encounters (retained catch + releases), and unmarked-DIT Chinook impacts. It should be noted, however, that Area 6 baseline sampling observations will ultimately (one to two years from the close of the fishery) be combined with CRC data to estimate catch and effort at the fishery-total level. Thus, while these descriptors of MSF impacts are not presented in the present document, they will be available at a future time.

VOLUNTARY TRIP REPORT METHODS

In Areas 5 and 6, we employed an enhanced Voluntary Trip Report (VTR) program to obtain estimates of Chinook encounter rates by size class (legal or sub-legal) and mark status (ad-marked or unmarked), similar to our approach used successfully in both Areas during summer 2008 (WDFW 2009a). For the enhanced VTR program, an additional WDFW technician was hired to work exclusively on distributing and collecting VTRs from the angling public. In addition, we took several measures to help expand and ensure the success of our VTR program. First, we developed a simplified form (i.e., it requires less information than our old form) and assigned a dedicated sampler the duty of distributing forms to every possible angling party at the start of their trip during the 37-day MSF (i.e., to recruit participants on site). The Areas 5 and 6 VTR samplers focused their attention on high-use access sites only and began their shifts early (typically 0500 hours) in order to intercept as many anglers as possible. Additionally, samplers provided participants with a brochure describing the intent of VTRs and their significance to fishery monitoring, and answered VTR-related questions. To increase the response rate, participants were given three options for returning completed VTRs to WDFW: hand-delivering them to samplers, placing them in on-site drop boxes, or sending them via U.S. mail (pre-paid); if they were unsuccessful (i.e., no encounters occurred [harvested *or* released]) on their trip, participants were encouraged to keep their forms for future trips.

AREA 5: RESULTS & DISCUSSION

Summary of Sampling Efforts

Sampled Access Sites

From July 1 through August 6, 2009, we intensively sampled (i.e., for fish total catch/effort estimation purposes) the Area 5 recreational fleet via dockside creel surveys at two of six possible sites in our sample site frame, on a grand total of 35 site-days throughout the 37-day mark-selective Chinook fishery (**Table 2**). We interviewed anglers most frequently at the Olson's Resort–Central Ramp and Docks site (12/35 site-days or 34% of the time) and Olson's Resort–East Docks (8/35 site-days or 23% of time). We also intensively sampled the South and North Docks at Van Riper's Resort for four (11%) and two (6%) site-days, respectively, while we sampled at Curley's/Straitside Resort docks on three (9%) site-days over the season. During the 2009 Area 5 MSF, in contrast to previous seasons (2003-2008; e.g., WDFW 2008a and WDFW 2009a), Coho Resort was not included in our sample site frame because it was closed for public use beginning in summer 2009.

The proportion of our sampling effort (site-days) expended at each sample-frame site was comparable to the proportions of angler effort using these sites to access the Area 5 fishery (i.e., from on-the-water survey results, **Appendix D**). For example, over the season, 66%, 4%, and 26% of anglers accessing the fishery (includes pooled weekend and weekday boat survey results; **Appendix D**) from sites in our sample frame ended their trips at Olson's, Curley's/Straitside, and Van Riper's resorts (inclusive of sub-sites), respectively; in comparison, 74%, 9%, and 17% of all sampling effort (site-days) was expended at each of these respective locations (from **Table 2**).

In total, our Area 5 Intensive sampling efforts allowed us to directly sample 5,647 completed angler trips and 2,320 completed boat trips; Baseline efforts yielded an additional 1,075 boat trip and 2,548 angler trip observations. In combination, these efforts yielded samples from 1,699 (1,614 marked and 85 unmarked) Chinook salmon harvested (1,158 [1,101 marked and 57 unmarked] from Intensive; 541 [513 marked and 28 unmarked] from Baseline) during the July 1 – August 6, 2009 mark-selective Chinook fishery in Area 5 (**Appendix C**).

Table 2. List of sites sampled, with the number of sampling events (site-days), during the Area 5 July 1-August 6, 2009 mark-selective Chinook fishery.

Area 5 Sampled Sites	Intensive Sampling Site-Days ¹				Baseline Sampling Site-Days ¹			
	July	Aug.	Total	% of Total	July	Aug.	Total	% of Total
Olson's Resort--East Docks	6	2	8	22.9%				
Olson's Resort--West Docks	4	2	6	17.1%				
Olson's Resort--Ramp & Docks	11	1	12	34.3%				
Olson's Resort--General ²	--	--	--	--	15	3	18	56.3%
Van Riper's North	2	0	2	5.7%				
Van Riper's South	4	0	4	11.4%				
Van Riper's--General ²	--	--	--	--	12	2	14	43.8%
Curley's/Straitside Resort	1	2	3	8.6%				
TOTAL	28	7	35	100.0%	27	5	32	100.0%

¹The duration of an Intensive site-day encompasses the entire dawn-dusk period (~16 hours), whereas Baseline site-days averaged 6.9 hours in length (i.e., ranging from “no effort” site-checks to full eight-hour shifts).

²For Baseline sampling activities, the “General” category at Olson’s and Van Riper’s resorts encompasses all within-resort sub-sites defined for Intensive sampling purposes.

On-the-Water Survey Summary

During the 37-day period that Area 5 was open under mark-selective Chinook regulations, we conducted a total of three boat surveys, including two weekday surveys (July 1 and August 4) and one weekend survey (July 5) (**Appendix D**). For the three surveys combined, we contacted a total 285 boats with 660 anglers. These surveys yielded quantitative details about the set of sites anglers used to access Area 5 and thus allowed us to estimate the proportion of effort originating at each of our sample-frame sites (i.e., size measures; **Appendices D and E**) during both weekday and weekend strata. As suggested above, Olson’s Resort (percent of *all* weekend & weekday Area 5 anglers: 30% Ramp-and-Docks sub-site, 23% East Docks sub-site, 10% West Docks sub-site) was the site that anglers most frequently reported using to access Area 5, followed by Van Riper’s Resort (17% South Docks sub-site, 8% North Docks sub-site), and approximately 4% from Curley’s/Straitside. Pooled over all surveys, 5% of all anglers interviewed during boat surveys indicated that their trip would end at either a private or never-sampled launch site (relative to Intensive sample-frame sites only; **Appendix D**). The relative “size” of sampled access sites and the proportion of total effort captured in our sample frame remained relatively constant over the three surveys (**Appendix E**).

Fishery Characteristics

Estimates of Fishing Effort and Chinook Catch

On a season-total level, anglers completed an estimated total of 23,662 angler trips (10,118 boat trips) from July 1 through August 6, 2009 (**Table 3**). In terms of within-season trends, angler participation was generally higher during the first two weeks of the season, and then

varied marginally from week to week (**Figure 3**); anglers completed an average of approximately 3,900 trips during each week that the Area 5 mark-selective Chinook fishery was open.

For the entire July 1-August 6, 2009 season, Chinook salmon catch rates (CPUE, landed Chinook per angler trip) averaged 0.26 landed Chinook per angler trip. CPUE ranged from a low of 0.15 (week 29 [13-19 July]) to a high of 0.33 (week 27 [26 Jun - 05 July]) across all weeks of the fishery (**Figure 4**).

Given the combination of relatively high effort and high catch rates, the total Area 5 Chinook harvest—6,397 Chinook for the 37-day season (**Table 3**)—was approximately two-fold higher than the recent five-year MSF average (2003-07 mean: 2,757 Chinook; WDFW 2008a) and similarly two-fold higher than the 2008 Area 5 MSF estimate of 2,818 Chinook harvested (WDFW 2009a, **Appendix I**). On average, anglers harvested 1,066 (range: 461-1,646) Chinook per week and 173 per day, with the greatest number harvested during week 28 (July 6-12; **Figure 5**). Finally, in addition to Chinook salmon, anglers harvested an estimated 8,537 marked and 175 unmarked coho salmon (*O. kisutch*), 8,499 pink salmon (*O. gorbuscha*), during the summer 2009 Area 5 MSF Chinook season (**Appendix H**).

In addition to harvesting 6,397 (5,958 marked and 439 unmarked) Chinook salmon, we estimated that anglers participating in the Area 5 MSF caught and released an additional 10,546 marked and 20,519 unmarked Chinook salmon (**Table 3, Figure 5**)⁸. Thus, on a season-total level, anglers released an estimated two marked and three unmarked Chinook for every one harvested Chinook. Combining these releases with harvest estimates, we estimated that anglers encountered a grand total of 37,463 Chinook in Area 5 during its 37-day mark-selective season (**Table 3, Figure 5**). For more on fishery impacts from a total encounters perspective, see the section entitled *Overall Fishery Impacts*.

⁸ Total Chinook releases were estimated using the bias-corrected “Method 2” encounters estimation approach (Conrad and McHugh 2008). For estimates of Chinook releases based solely on angler-reported releases, as well as estimates of harvest and releases for other salmon species, see **Appendix H**.

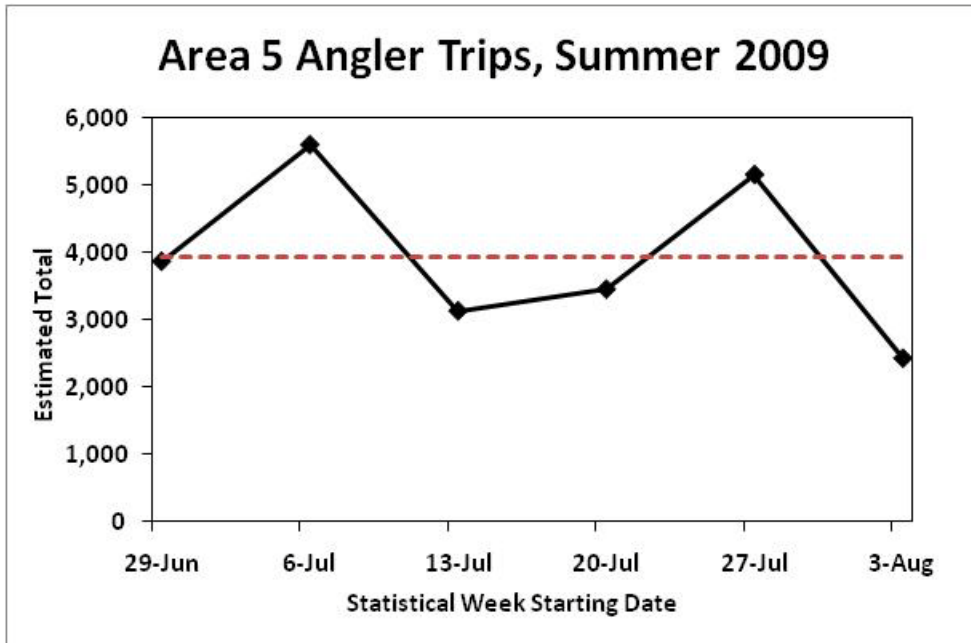


Figure 3. Temporal patterns in weekly total fishing effort during the Area 5, July 1-August 6, 2009 mark-selective Chinook fishery. The horizontal dashed line corresponds to the season-wide weekly average.

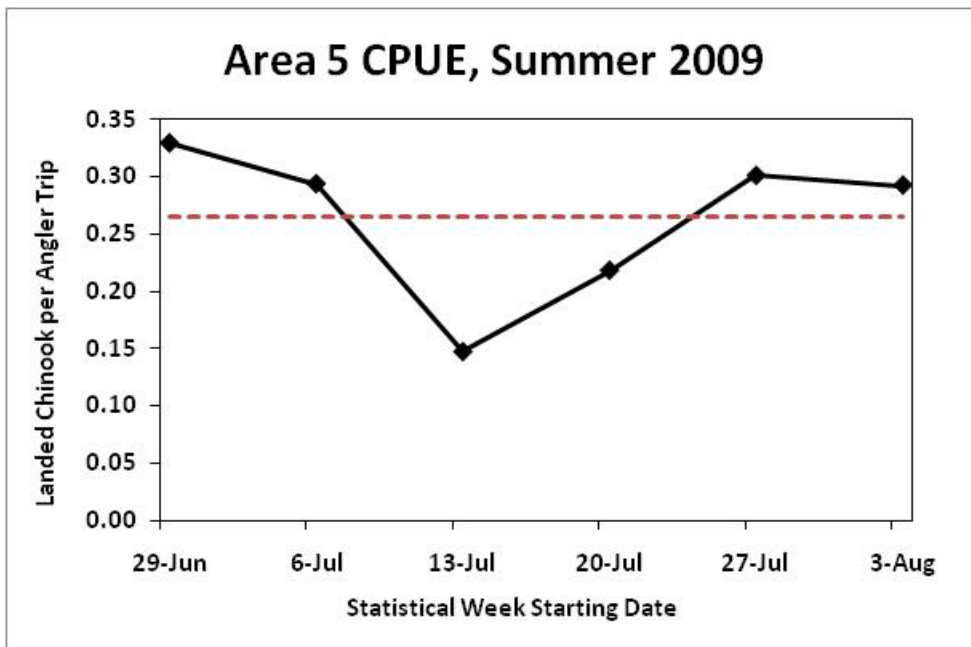


Figure 4. Temporal patterns in CPUE (landed Chinook per angler trip, weekly estimates) during the Area 5 July 1-August 6, 2009 mark-selective Chinook fishery. The horizontal dashed line corresponds to the season-wide CPUE.

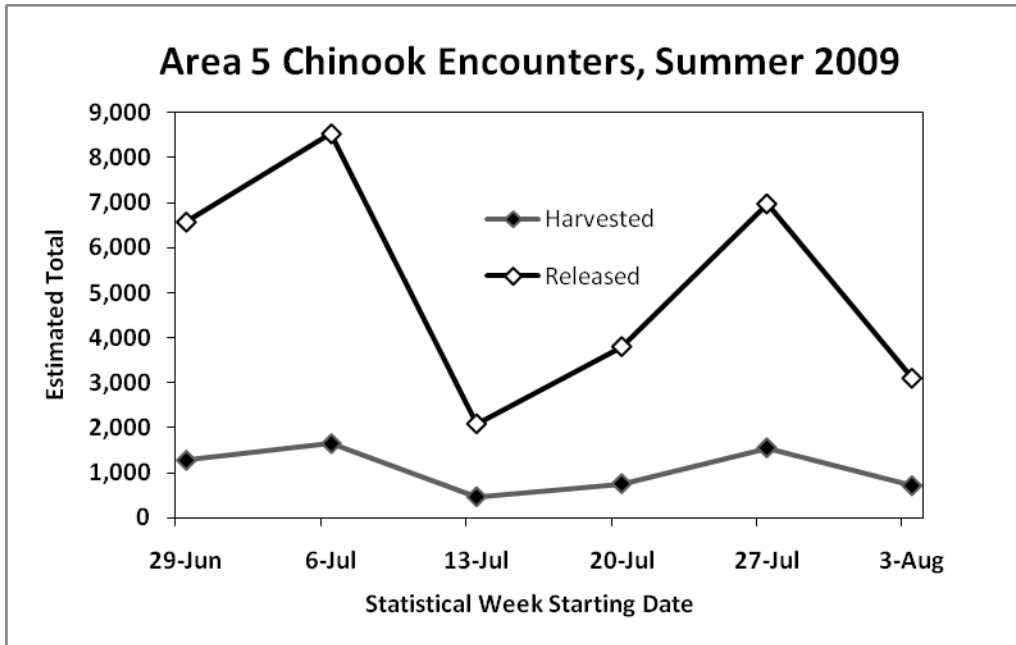


Figure 5. Temporal patterns in weekly total estimated Chinook harvest and releases during the Area 5, July 1-August 6, 2009 mark-selective Chinook fishery. Estimates of released Chinook were based on the Conrad and McHugh (2008) method.

Table 3. Estimates of total fishing effort and the total number of salmon kept and released during the Area 5, July 1-August 6, 2009 mark-selective Chinook fishery. Values may not add exactly due to rounding error.

Month	Stat. Week	Start Date	End Date	Est. Effort ^{1/}		Est. Retained Chinook ^{1/}		Est. Released Chinook ^{2/}		Est. Total Chinook Encounters
				Boats	Anglers	AD	UM	AD	UM	
July	27	Jul-01	Jul-05	1,719	3,872	1,248	26	2,208	4,362	7,844
	28	Jul-06	Jul-12	2,443	5,609	1,619	27	2,866	5,669	10,181
	29	Jul-13	Jul-19	1,343	3,133	405	57	717	1,368	2,545
	30	Jul-20	Jul-26	1,434	3,457	724	29	1,282	2,518	4,554
	31	Jul-27	Aug-02	2,157	5,164	1,357	196	2,401	4,576	8,531
August	32	Aug-03	Aug-06	1,022	2,427	605	104	1,072	2,026	3,807
Season Total:				10,118	23,662	5,958	439	10,546	20,519	37,463
Variance:				484,551	2,521,086	419,937	40,075	3,799,067	6,543,244	30,882,061
Standard Error:				696	1,588	648	200	1,949	2,558	5,557
CV (%):				6.9%	6.7%	10.9%	45.6%	18.5%	12.5%	14.8%
95% CI:				8,753-11,482	20,550-26,774	4,688-7,228	47-832	6,726-14,367	15,505-25,533	26,571-48,355

^{1/} Estimated boats, anglers, and retained salmon catch were estimated from angler interview data.

^{2/} Released Chinook were estimated as the difference between total Chinook encounters generated using a bias-corrected "Method 2" estimator (see **Appendix A** and Conrad and McHugh (2008) for additional details) and creel estimates of retained Chinook.

Characteristics of Harvested Chinook

Length and Age.— Over the course of the 37-day Area 5 mark-selective Chinook fishery, 1,699 retained Chinook were sampled at dockside (**Table 4**). From each of these Chinook, samplers collected scales, measured (total and fork lengths [TL, FL]), and examined each fish for the presence of a CWT. Among sampled individuals, marked Chinook lengths were unimodally distributed and averaged 64.3 cm (range: 38.5 – 103.2, SD = 11.0; **Figure 6**). The majority (81.3%) of these fish were of legally harvestable size (≥ 22 in [56 cm]).

Based on dockside angler interviews, we observed that the majority of the Area 5 anglers who harvested and kept sublegal-size unmarked Chinook misidentified their sublegal Chinook as pink salmon. We believe this problem occurred due to a combination of factors occurring in Area 5 during the summer of 2009, such as abundant pink salmon returns through the Strait of Juan de Fuca, numerous sublegal-size Chinook feeding in the area, as well as some of the Area 5 anglers having trouble identifying pink salmon versus small Chinook salmon. We addressed the salmon species identification issue in-season by implementing an education/outreach program for the angling public at Area 5 boat ramps, which included distributing education materials on salmon species identification and conducting in-person training sessions at the docks using actual salmon specimens.

Table 4. Summary of length samples collected during dockside angler interviews from retained Chinook salmon, Area 5 mark-selective Chinook fishery, July 1 – August 6, 2009.

Mark Type	Number Sampled		
	Legal-size	Sublegal-size	Total
Marked	1,312	302	1,614
Unmarked	15	70	85
Total	1,327	372	1,699

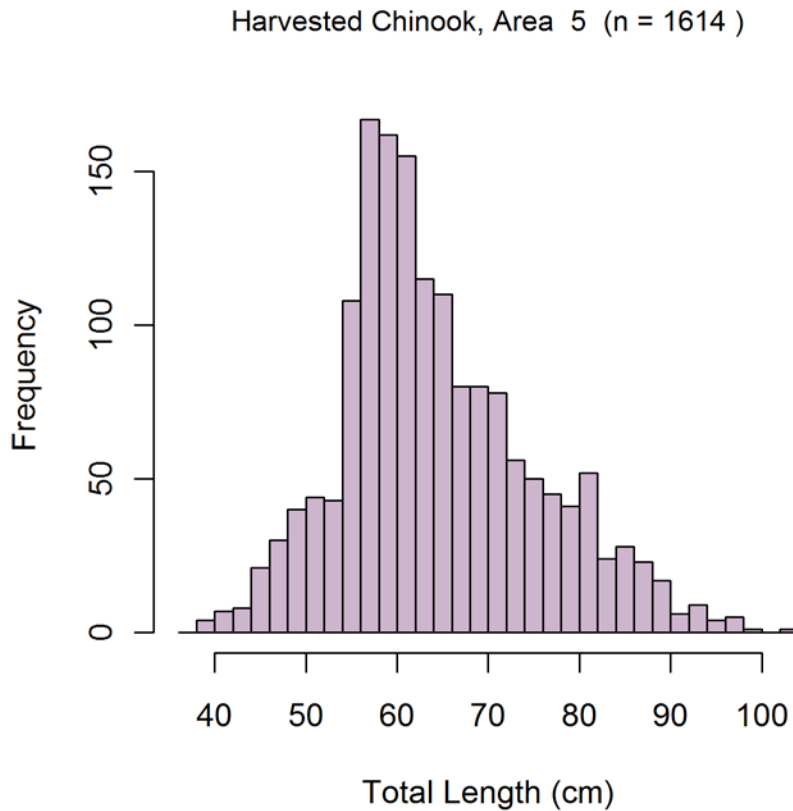


Figure 6. Length-frequency distributions of retained marked Chinook sampled at dockside during the Area 5, July 1-August 6, 2009 mark-selective Chinook fishery.

Of the scale samples collected from the 1,699 harvested Chinook sampled at dockside, 1,526 (90%; 1,444 marked and 82 unmarked) were successfully aged (**Appendix F**). Of these samples, for marked and unmarked fish combined, we found that the majority (57%) of the retained Chinook were age-3 (brood year 2006) individuals; the remaining sample was comprised of 24% age-2 fish, 18% age-4, and less than 1% age-5. Almost all (85%) of the retained Chinook were subyearling outmigrants.

CWT Samples.—In total, 259 coded-wire tags were recovered from the Area 5 fishery (**Appendix G**). Twenty-four percent of these recoveries came from a combination of Puget Sound rearing facilities, with 6%, 12%, and 6% coming from each of the respective North, Central, and South Puget Sound regions (**Table 5**). Over half of the total of tag recoveries (146/259, or 56%) came from Columbia River rearing facilities in Washington, Oregon, and Idaho, with the largest single group of recoveries (62 tags, 24% of total recoveries) coming from a Lyons Ferry tag group. Ranked from greatest to least, Hood Canal (20 tags, 8%), Canadian (13 tags, 5%), Upper Skagit River (9 tags, 3.5%), Oregon coastal (3 tags, 1.2%), California coastal (3 tags, 1.2%), and Washington coastal (2 tags, 0.8%) facilities were the source of the remaining CWTs. Finally, 56 of the 259 CWTs (22%) were associated with DIT releases.

Table 5. Summary of coded-wire tags recovered from Chinook salmon harvested during the Area 5 July 1-Aug. 6, 2009 mark-selective Chinook fishery. The field “No. DITs” corresponds to the number of tags that belonged to double-index tag groups.

Release Region ^{1/}		Release Site	Rearing Location	CWTs Recovered ^{2/}	No. DITs	
British Columbia	Lower Fraser River (4.2%)	Harrison River	Chehalis River Hatchery	3 (1.2%)	0	
		Chilliwack River	Chilliwack River Hatchery	8 (3.1%)	8	
	Thompson River (0.8%)	Lower Shuswap River	Shuswap River Hatchery	1 (0.4%)	0	
Washington	Hood Canal (7.7%)	Nicola River	Spilus Cr. Hatchery	1 (0.4%)	0	
		Purdy Creek	George Adams Hatchery	11 (4.2%)	11	
		Finch Creek	Hoodsport Hatchery	6 (2.3%)	0	
		Big Quilcene River	Quilcene NFH	1 (0.4%)	0	
		Hamma Hamma River	RFE6 Hood Canal	1 (0.4%)	0	
	Puget Sound-Central (11.6%)	John Creek + Hamma Hamma River		1 (0.4%)	0	
		Cowskull Acclim Pond	Cowskull Acclim Pond	1 (0.4%)	0	
		Grovers Creek	Grovers Creek Hatchery	9 (3.5%)	9	
		Issaquah Creek	Issaquah Hatchery	3 (1.2%)	0	
		Elliott Bay Tribal Net Pens	Keta Creek Hatchery	1 (0.4%)	0	
		Big Soos Creek	Soos Creek Hatchery	6 (2.3%)	6	
		Green River		1 (0.4%)	0	
	Puget Sound-North (6.2%)	Voight Creek	Voights Creek Hatchery	9 (3.5%)	0	
		Friday Creek	Samish Hatchery	8 (3.1%)	8	
		Tulalip Creek	Bernie Gobin Hatchery	2 (0.8%)	0	
		Wallace River	Wallace R. Hatchery	4 (1.5%)	0	
	Puget Sound-South (6.2%)	Whitehorse Springs	Whitehorse Pond	2 (0.8%)	0	
		Chambers Creek	Garrison Hatchery	2 (0.8%)	0	
		Kalama Creek	Kalama Creek Hatchery	3 (1.2%)	0	
	Strait of Juan de Fuca (0.4%)	Clear Creek	Nisqually Hatchery	10 (3.9%)	2	
		Deschutes River	Tumwater Falls Hatchery	1 (0.4%)	0	
	Washington	Upper Skagit (3.5%)	Hoko Creek	Hoko Falls Hatchery	1 (0.4%)	0
			Baker River	Unreported	3 (1.2%)	0
		County Line		2 (0.8%)	0	
		Cascade River	Marblemount Hatchery	4 (1.5%)	0	
	Willapa Bay (0.8%)	Naselle River	Naselle Hatchery	1 (0.4%)	0	
		North Nemah River	Nemah Hatchery	1 (0.4%)	0	
Oregon	Southern Coastal Oregon (1.2%)	Rock Creek (N. Umpqua River)	Rock Creek Hatchery	2 (0.8%)	0	
		Coquille River	Cole Rivers Hatchery	1 (0.4%)	0	
California	Central Coastal Calif. (1.2%)	San Pablo Bay Net Pens (SF Bay)	Feather River Hatchery	3 (1.2%)	0	
Columbia River (WA, OR, ID)	Columbia River (56.4%)	Klickitat Hatchery	Klickitat Hatchery	1 (0.4%)	0	
		Spring Creek	Spring Creek NFH	12 (4.6%)	12	
		Umatilla River	Umatilla Hatchery	1 (0.4%)	0	
		Col. River at Priest Rapids	Priest Rapids Hatchery	2 (0.8%)	0	
		Columbia River - General		1 (0.4%)	0	
		Columbia River - General	Wells Hatchery	5 (1.9%)	0	
		Big Creek (Lower Col. River)	Big Creek (Lower Col. River)	4 (1.5%)	0	
		Big Creek (Lower Col. River)	Big Creek Hatchery	4 (1.5%)	0	
		Youngs River & Bay	CEDC Youngs Bay Net Pens	1 (0.4%)	0	
		Cedar Cr. #1 (Sandy River)	Clackamas Hatchery	1 (0.4%)	0	
		Cowlitz River	Cowlitz Hatchery + Cowlitz Friends	4 (1.5%)	0	

Release Region ^{1/}	Release Site	Rearing Location	CWTs Recovered ^{2/}	No. DITs
	Cowlitz River	Cowlitz Salmon Hatchery	2 (0.8%)	0
	Willamette River Middle Fork	Dexter Ponds	1 (0.4%)	0
	Gobar Creek	Kalama Falls Hatchery	1 (0.4%)	0
	Lewis River NF	Lewis River Hatchery	1 (0.4%)	0
	Washougal River	Washougal Hatchery	2 (0.8%)	0
	Big Canyon		7 (2.7%)	0
	Captain Johns Pond	Lyons Ferry Hatchery	9 (3.5%)	0
	Snake R. (Below Grande Rhonde River)		62 (23.9%)	0
	Snake River at Hells Canyon Dam	Oxbow Hatchery	3 (1.2%)	0
	Lake Chelan + Columbia River		2 (0.8%)	0
	Similkameen River	Unreported	4 (1.5%)	0
	Wenatchee River		14 (5.4%)	0
	Methow River	Carlton Rearing Pond	2 (0.8%)	0
Grand Total			259	56

^{1/}Unofficial release regions. Puget Sound regions were designated based on the WDFW marine catch area containing the river/stream network where juvenile releases originated (i.e., Areas 11 and 13 = South; Areas 9 and 10 = Central; and Areas 7, 8-1, and 8-2 = North).

^{2/}In addition, we recovered 8 CWT's with unknown release information. The coast-wide CWT database (RMIS) referred to these CWT codes as "invalid codes". The "invalid" CWT codes were: 090136 (4 recoveries); 612694 (1 recovery); 612517 (2 recoveries); 612518 (1 recovery).

Voluntary Trip Reports

Encounters, Mark Rates, and Size/Mark-status Composition

While we did not conduct a test fishery in Area 5 during the summer of 2009, we acquired information about the size/mark-status composition of Chinook encountered in this fishery from the response received from our VTRs. Between July 1 and August 6, 2009, we received a grand total of 132 usable VTRs from Area 5 anglers, which provided data on 572 Chinook salmon encounters occurring during 356 angler trips (**Table 6**). Of the 572 total Chinook encounters that anglers recorded on VTRs, 85 (15%) of these fish were legal-sized and marked (LM), 96 (17%) were legal-sized and unmarked (LU), 167 (29%) were sublegal-sized and marked (SM), and 224 (39%) were sublegal-sized and unmarked (**Table 6**). Thus, with 44% of all Chinook encountered being marked (47% for legal-sized fish only), the Area 5 mark rate was about average compared to previous seasons. This is especially true given that overall (i.e., legal and sublegal encounters combined) mark rates have averaged 46% (range: 34-58%) over the past five MSF seasons (2003-07; WDFW 2008a); whereas, the 2003-2007 average is relatively lower than the mark rate estimated during summer 2008 (test fishery mark rate: 63% legal-marked; 60% overall). Additionally, the majority of VTR encounters were of sublegal size (68%, marked and unmarked, combined).

In terms of meeting the minimum criterion for success under our enhanced VTR sample size objective (VTR $n >$ test fishery n [i.e., test fishery data from previous seasons]), the 2009 VTRs ($n = 572$ Chinook encounters) provided information on 11.4 times as many encounters as did the Area 5 test fishery in 2008 ($n = 50$), and, on average, 6.4 times more encounters than the average test fishery sample size during the 2003-2007 seasons (average $n = 89$; range: 80-335). Furthermore, the sample size of Chinook encounters from VTRs in 2009 was

4.2 times higher than the sample size from VTRs in 2008 ($n = 135$), the first year of our enhanced VTR program.

Estimates of the average weekly CPUE (retained Chinook per angler trip) in Area 5 did not differ significantly ($t = -1.632$, $df = 5$, $P = 0.164$) between VTR and dockside data sources, although values were on average higher for the latter compared to the former group (i.e., $CPUE_{vtr}$: 0.19 vs. $CPUE_{dock}$: 0.25). Considering these similarities and the qualitative patterns of respondent diversity, it appears that our enhanced VTR effort was successful at acquiring participation from a representative and diverse subset Areas 5.

Table 6. Chinook encounters by size/mark-status group for the July 1-August 6, 2009 Area 5 VTR reports, with proportional season-total contributions of a particular size/mark-status group to total Chinook encounters.

Month	Stat Wk	VTRs (n)	Angler Trips	Chinook Encounters						Legal Mark Rate	Overall Mark Rate
				LM Kept	Released Chinook				TOTAL		
					LM	LU	SM	SU			
July	27	11	29	4	1	10	7	7	29	33.3%	41.4%
	28	25	67	19	7	19	44	60	149	57.8%	47.0%
	29	34	91	13	1	30	36	64	144	31.8%	34.7%
	30	34	86	22	6	26	48	38	140	51.9%	54.3%
	31	18	53	8	1	4	13	36	62	69.2%	35.5%
August	32	10	30	3	0	7	19	19	48	30.0%	45.8%
Season Total		132	356	69	16	96	167	224	572	47.0%	44.1%
Encounter Rates (LM, LU, SM, SU):				14.9%		16.8%	29.2%	39.2%	100.0%		

Overall Fishery Impacts

Total Encounters and Mortalities

We derived size/mark-status group-specific estimates of Chinook encounters from a combination of dockside sampling results (i.e., size/mark-status group-specific harvest estimates derived from data in **Tables 3** and **4**) and VTR size/mark-status composition data (**Table 6**; see **Appendix A** for computational details). In total, we estimated that anglers fishing in Area 5 encountered a total of 5,567 LM, 6,287 LU, 10,937 SM, and 14,671 SU Chinook (37,463 total) from July 1 through August 6, 2009 (**Tables 7** and **8**). Given estimates of harvest and the assumed selective fishing mortality (*sfm*) mortality rates of 0.15 for legal-sized and 0.20 for sublegal-sized Chinook, these encounters translated into 12,264 total mortalities (**Tables 7** and **9**). Thirty-nine percent of the total mortality estimate was attributed to the direct harvest of legal-marked Chinook. Unmarked Chinook mortality totaled 4,232 fish (1,009 legal, 3,223 sublegal), which corresponds to almost one unmarked mortality (0.87) per every legal-marked Chinook kept.

FRAM versus Creel Comparison

Total encounters predicted by FRAM (18,038) were approximately half of what was estimated from the field estimates (37,463), with the main differences attributable to sublegal Chinook encounter rates. For instance, FRAM predicted that a total of 8,645 sublegal Chinook (2,255 unmarked and 6,390 marked) would be encountered by anglers participating in the Area 5 fishery, while our field surveys estimated that 25,608 sublegal Chinook (14,671 unmarked, 10,937 marked) may have actually been encountered (**Table 8, Figure 7**). In contrast, differences between model predictions and field estimates of overall total mortality (landed + released) were less striking, with the exception of released legal-marked Chinook (4,733 predicted, versus 109 estimated [**Figure 7, Tables 8 and 9**]) However, the total unmarked mortalities predicted by FRAM (1,263) were 70% less than the field estimate (4,232).

Table 7. Summary of season-wide estimated Chinook encounters and mortalities, by size/mark status group, for the July 1-Aug. 6, 2009, Area 5 mark-selective Chinook fishery. Values may not add up perfectly due to rounding error.

<p style="text-align: center;">Total Encounters (E): 37,463 V(E): 30,882,061</p>										
Size/mark group	Encounters	No. Retained	No. Rel'd	Rel. Mort. Rate	Rel. Mort.	Total Mortality	Var	SE	95% CI	CV (%)
Legal marked	5,567	4,843	724	0.15	109	4,952	309,301	556	3862 - 6042	11
Legal unmarked	6,287	78	6,210	0.15	931	1,009	28,672	169	677 - 1341	17
Sublegal marked	10,937	1,115	9,823	0.20	1,965	3,079	143,902	379	2336 - 3823	12
Sublegal unmarked	14,671	362	14,309	0.20	2,862	3,223	240,889	491	2262 - 4185	15
All groups combined	37,463	6,397	31,065		5,866	12,264	722,764	850	10597 - 13930	7

Table 8. Comparison of modeled (i.e., using FRAM, model run 2309) and estimated total Chinook encounters for the Area 5, July 1-Aug. 6, 2009 mark-selective Chinook fishery.

Data Source	Group	Total Encounters	Legal	Sublegal	Landed Only
FRAM Encounters	Unmark.	6,574	4,319	2,255	86
	Mark.	11,464	5,074	6,390	4,414
	Total	18,038	9,393	8,645	4,500
	% Mark.	64	54	74	98
Estimated (Creel) Encounters	Unmark.	20,958	6,287	14,671	439
	Mark.	16,504	5,567	10,937	5,958
	Total	37,463	11,854	25,608	6,397
	% Mark.	44	47	43	93

Table 9. Comparison of modeled (i.e., using FRAM, model run 2309) and estimated total Chinook mortalities for the Area 5, July 1-Aug. 6, 2009, mark-selective Chinook fishery.

Mortality Category	FRAM Chinook Mortalities			Estimated Chinook Mortalities		
	Unmark.	Mark.	Total	Unmark.	Mark.	Total
Total (Landed + Released)	1,263	10,425	11,688	4,232	8,031	12,264
Released Legal	726	4,733	5,459	931	109	1,040
Released Sublegal	451	1,278	1,729	2,862	1,965	4,826
Landed Only	86	4,414	4,500	439	5,958	6,397

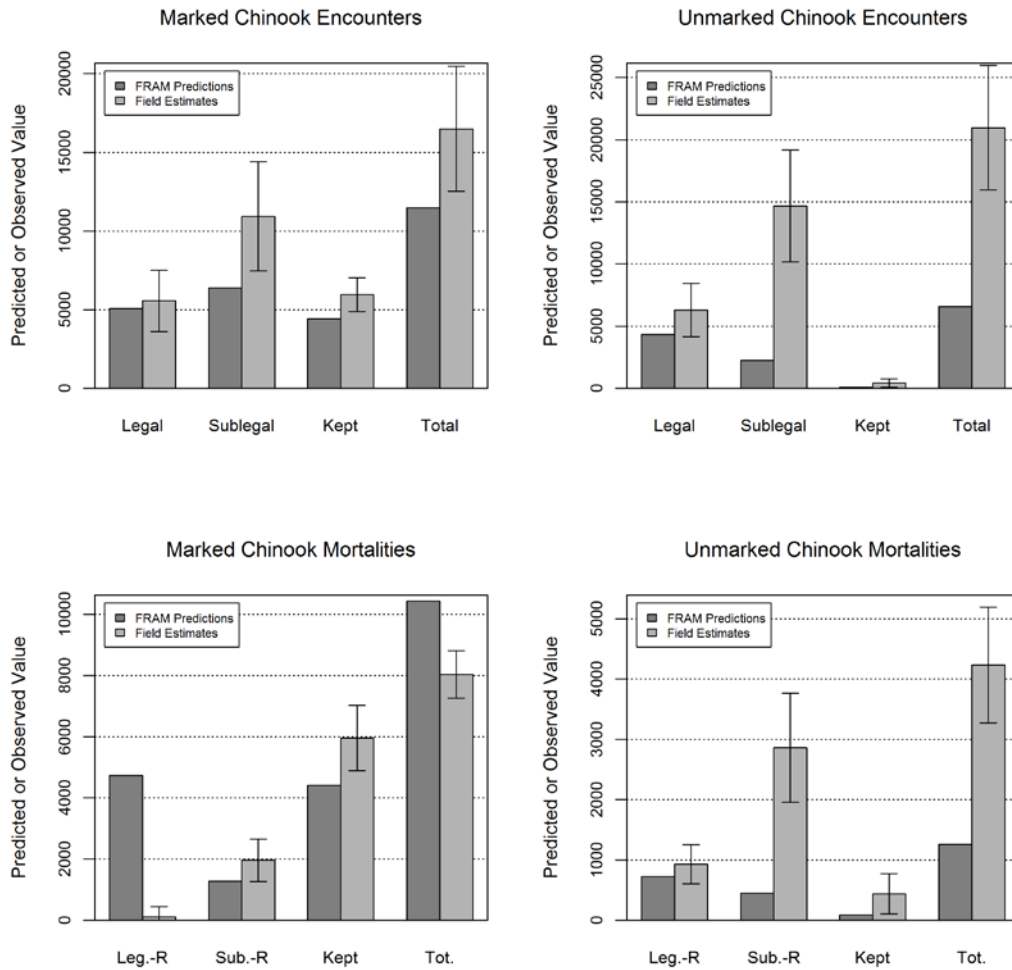


Figure 7. Comparison of modeled (i.e., using FRAM, model run 2309) and estimated total marked (*left column*) and unmarked (*right column*) Chinook encounters (*upper row*) and mortalities (*lower row*) the Area 5, July 1-Aug. 6, 2009, mark-selective Chinook fishery. Error bars represent approximate 95% confidence intervals for field estimates. *x*-axis labels ‘Leg.’, ‘Sub.’ and ‘Tot.’ correspond to Legal, Sublegal, and Total, whereas the suffix ‘-R’ (mortality plots only) denotes Released.

Estimated CWT-DIT Impacts

Of the 259 coded-wire tags recovered during the summer 2009 Area 5 mark-selective Chinook fishery, 56 belonged to double-index tag (DIT) release groups (**Table 10**). 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 Area 5 fishery. In total, we estimated that 208 unmarked-DIT Chinook were caught and released during the fishery. Given an assumed *sfm* rate of 0.10 for the estimated unmarked DIT fish that were encountered and released, and applying a 100% mortality rate to one unmarked DIT fish that was retained (CWT code 054275; originated from Spring Creek National Fish Hatchery, brood year 2007), we estimate that as many as 25 of the encountered unmarked DIT fish may have died in the 2009 Area 5 fishery.

Table 10. 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 Area 6 July 1-August 6, 2009 mark-selective Chinook fishery.

Hatchery	Brood Year	DITs Obs'd	AD DIT Harvest		UM DIT Enc.	UM DIT Mortality		
			Est.	var(Est.)		Est.	var(Est.)	SE(Est.)
George Adams Hatchery	2006	10	36.9	99.4	40.7	4.1	1.2	3.5
	2007	1	3.7	9.9	3.7	0.4	0.1	0.3
Grovers Creek Hatchery	2005	1	3.7	9.9	4.8	0.5	0.2	0.4
	2006	8	29.5	79.5	29.4	2.9	0.8	2.5
Chilliwack River Hatchery	2005	2	7.4	19.9	7.5	0.7	0.2	0.6
	2006	4	14.8	39.7	14.9	1.5	0.4	1.3
	2007	2	7.4	19.9	7.4	0.7	0.2	0.6
Nisqually Hatchery	2005	2	7.4	19.9	7.8	0.8	0.2	0.7
Samish River Hatchery	2005	2	7.4	19.9	6.7	0.7	0.2	0.6
	2006	5	18.5	49.7	18.4	1.8	0.5	1.6
	2007	1	3.7	9.9	3.8	0.4	0.1	0.3
Soos Creek Hatchery	2005	1	3.7	9.9	3.8	0.4	0.1	0.3
	2006	5	18.5	49.7	18.4	1.8	0.5	1.6
Spring Creek NFH	2007	12	40.6	109.3	40.6	7.8	11.0	6.6
TOTAL		56	203.0	546.5	208.0	24.5	15.7	20.9

AREA 6: RESULTS & DISCUSSION

Summary of Sampling Efforts

From July 1st through August 6th, 2009, samplers staffed three different Area 6 access sites for Baseline sampling (**Table 11**). Each site was visited on an average of 18 days during the fishery, and samplers most frequently sampled at the Ediz Hook Ramp (Port Angeles Public Ramp; 53.7% of time), followed by Freshwater Bay (25.9%), and the Port Angeles West Ramp (20.4%). Over all sites and days, sampling shifts lasted an average of 6.9 hours during the course of the season.

Table 11. List of sites sampled, with the number of sampling events (site-days), during the Area 6 July 1-Aug. 6, 2009 mark-selective Chinook fishery.

Area 6 Dockside Sample Sites	Sample days per month		Sample Days	% of total
	July	Aug.		
Freshwater Bay Ramp	11	3	14	25.9%
Port Angeles Public Ramp, Ediz Hook	25	4	29	53.7%
Port Angeles West Ramp	10	1	11	20.4%
TOTAL	46	8	54	100.0%

Fishery Characteristics

Observations of Fishing Effort and Chinook Catch

From July 1 through August 6, 2009, samplers interviewed 1,949 anglers participating in the Area 6 Chinook MSF. Based on a summation of sample observations made across sites (i.e., taken as an index of fishery-total effort patterns), weekly angling effort was initially high and then decreased slowly throughout the fishery (**Table 12, Figure 8**). On average, we sampled 324 anglers (175 boat parties) during each week.

During the 2009 mark-selective Chinook fishery in Area 6, catch per unit of effort (CPUE) averaged 0.28 retained Chinook per angler trip over the season. The Area 6 CPUE started out at a moderate level (0.25) and then dropped to a low of 0.13 during week two of the fishery. Thereafter, CPUE increased each successive week until it peaked (0.67) during the last week of the fishery (**Table 12, Figure 9**).

Across all interviews, samplers observed a total of 539 landed Chinook, and all of these fish were marked. The 1,949 interviewed anglers also reported releasing a total of 750 Chinook (168 marked, 418 unmarked, and 164 with unknown mark status; **Table 12**). On a weekly basis, samplers observed as few as 29 to as many as 114 retained Chinook, and as few as 43 to as many as 331 released Chinook over the course of the 37-day fishery (**Figure 10**).

In total, interviewed anglers encountered 1,289 Chinook salmon (identified or reported to species during interviews) during the Area 6 summer selective fishery. Finally, Area 6

anglers also kept 29 coho salmon (*O. kisutch*) and 780 pink samon (*O. gorbuscha*), while also releasing 101 coho and 898 pink salmon (**Table 12**).

Table 12. Observations of fishing effort, salmon harvest, and reported salmon releases, by week, for the Area 6, July 1-Aug. 6, 2009 mark-selective Chinook fishery. Note: displayed values are sample observations (i.e., summed across sampled sites) and not fishery-total estimates.

Month	Stat Week	Effort		Retained Chin.		Other Sp. Kept.			Rel'd Chin.			Other Sp. Released			
		Boats	Anglers	AD	UM	AD Coho	UM Coho	Pink	AD	UM	UNK	AD Coho	UM Coho	UNK Coho	Pink
July	27	244	452	111	0	0	0	1	3	50	1	1	0	0	0
	28	224	409	82	0	0	0	2	4	49		1	2	0	0
	29	122	219	29	0	5	0	0	4	35	4	0	5	0	0
	30	178	348	97	0	1	0	162	2	54	1	3	17	0	142
	31	190	351	106	0	8	0	306	83	122	7	12	27	0	384
Aug.	32	91	170	114	0	14	1	309	72	108	151	1	29	3	372
Grand Total:		1,049	1,949	539	0	28	1	780	168	418	164	18	80	3	898

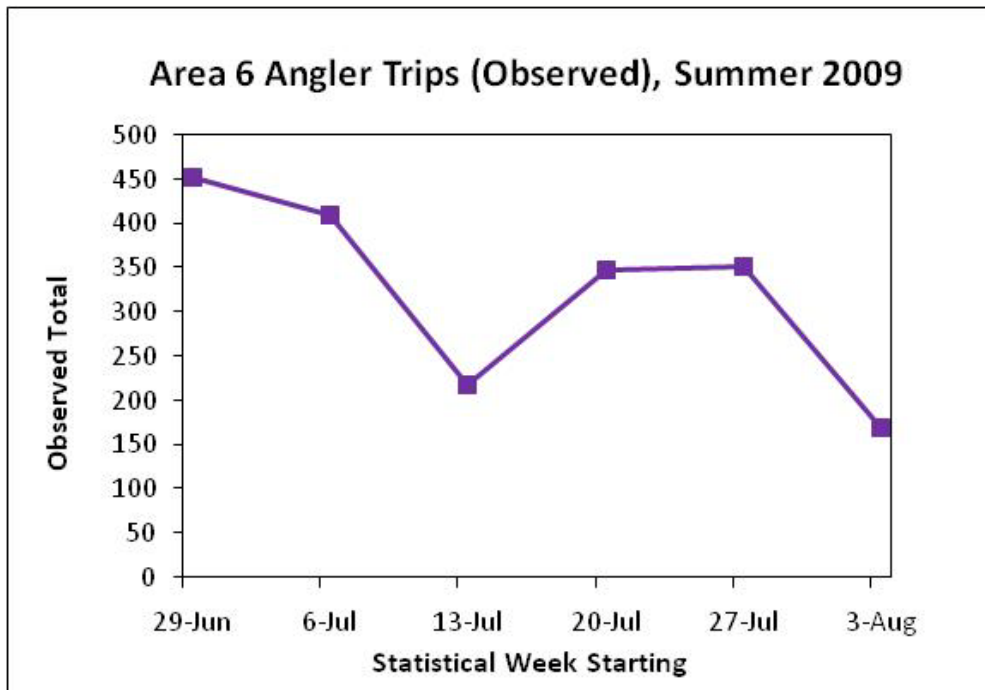


Figure 8. Temporal patterns in fishing effort during the Area 6, July 1-Aug. 6, 2009 mark-selective Chinook fishery. Note: displayed values are sample observations (i.e., summed across sampled sites) and not fishery-total estimates.

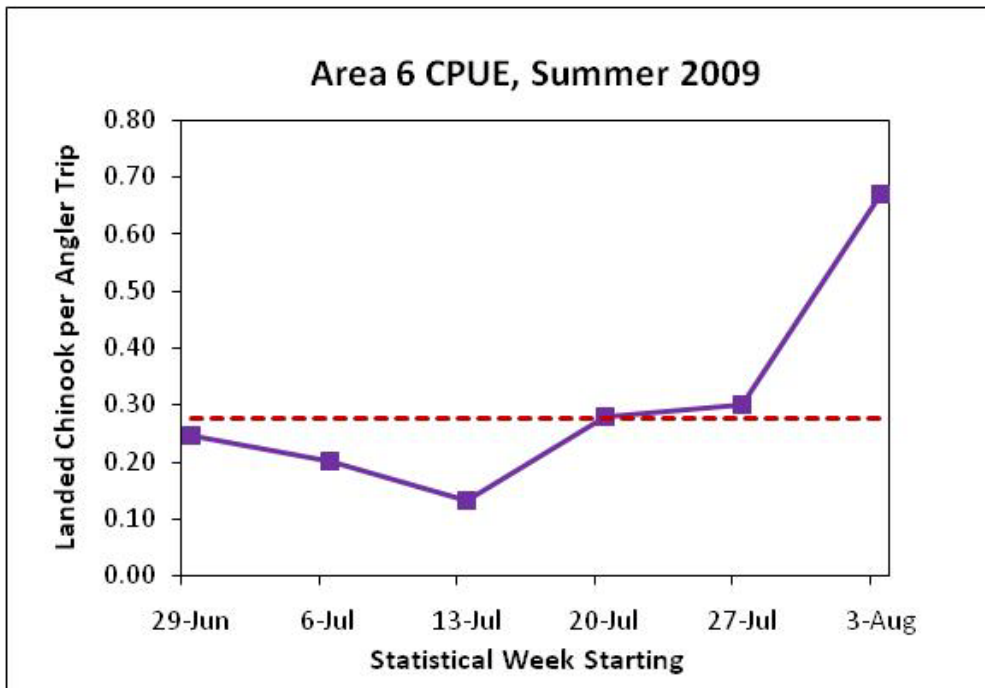


Figure 9. Temporal patterns in CPUE (landed Chinook per angler trip, weekly estimates) during the Area 6 July 1-Aug. 6, 2008 mark-selective Chinook fishery. The horizontal dashed line corresponds to the season-wide CPUE.

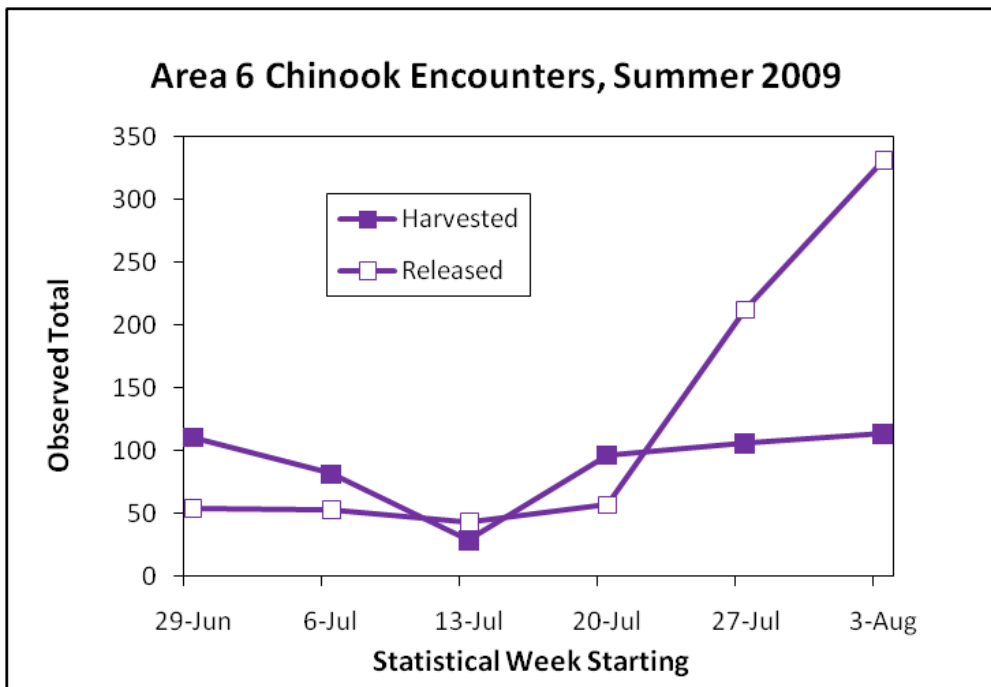


Figure 10. Temporal patterns in weekly observations of harvested Chinook salmon harvest and reported Chinook salmon releases during the Area 6, July 1-Aug. 6, 2009, mark-selective Chinook fishery. Note: displayed values are sample observations (i.e., summed across sampled sites) and not fishery-total estimates.

Characteristics of Harvested Chinook

Length and Age.—During the Area 6 summer 2009 selective Chinook fishery, a total of 522 Chinook were sampled at dockside (**Table 13**). All of these fish were measured and examined for the presence of a CWT. Marked Chinook harvested from Area 6 averaged 77.3 cm TL (range: 47.1- 104.3, SD = 8.3; **Figure 11**). Eight (i.e., 1.5%) of the 522 fish sampled were not legally harvestable (≥ 22 in [56 cm]). No unmarked fish were sampled.

Of the 522 Chinook sampled, 468 (90%) were successfully aged (**Appendix F**). Based on these samples, we found that nearly two-thirds of retained Chinook were four years of age (291/468, 62%), belonging to the 2005 brood. Age-3 fish composed nearly all (165/468, 35%) of the sample remainder. In addition, we observed eleven age-2 (2%) and one age-5 fish (<1%). Ninety-nine percent of aged Area 6 landed Chinook were subyearling outmigrants (**Appendix F**).

Table 13. Summary of length samples from retained Chinook salmon collected during dockside angler interviews, Area 6, July 1-August 6, 2009.

Mark Type	Number Sampled		
	Legal-size	Sublegal-size	Total
Marked	514	8	522
Unmarked	0	0	0
Total	514	8	522

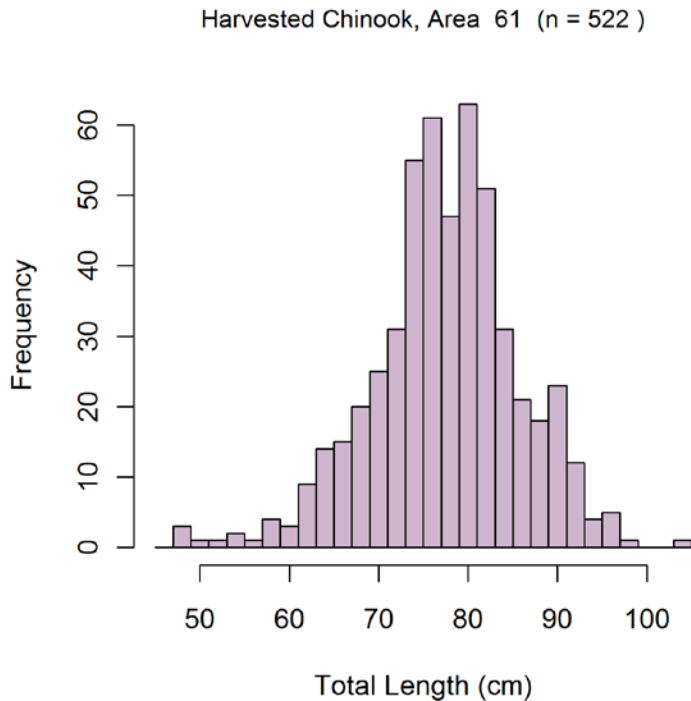


Figure 11. Length-frequency distributions of retained marked Chinook sampled at dockside during the Area 6, July 1-August 6, 2009, mark-selective Chinook fishery.

CWT Samples.— In total, 16 coded-wire tags were recovered from the Area 6 summer 2009 Chinook MSF. The majority of the recovered CWTs (12/16 or 75%) were from Puget Sound production facilities, with the remaining coming from Hood Canal facilities. Eight (50%) of the Puget Sound recoveries were from the Central Puget Sound region, whereas 6% (1 tag) originated from North Sound and 19% (3 tags) came from South Puget Sound facilities (**Table 14**). Finally, eight of the 16 (50%) recovered CWTs were associated with double-index tag groups.

Table 14. Summary of coded-wire tags recovered from Chinook salmon harvested during the Area 6 July 1-Aug. 6, 2009 mark-selective Chinook fishery. The field “No. DITs” corresponds to the number of tags that belonged to double-index tag groups.

Release Region	Release Site	Rearing Location	CWTs Recovered	No. DITs
Puget Sound-North	Friday Creek	Samish Hatchery	1 (6.3%)	1
Puget Sound-South	Voight Creek	Voights Creek	3 (18.8%)	
Hood Canal	Purdy Creek	George Adams Hatchery	1 (6.3%)	1
	Finch Creek	Hoodsport Hatchery	3 (18.8%)	
Puget Sound-Central	Big Soos Creek	Unreported	2 (12.5%)	2
	Green River	Icy Creek Hatchery	1 (6.3%)	
	Issaquah Creek	Issaquah Hatchery	1 (6.3%)	
	Grovers Creek Hatchery	Grovers Creek Hatchery	4 (25.0%)	4
Grand Total			16	8

¹Unofficial release regions. Puget Sound regions were designated based on the WDFW marine catch area containing the river/stream network where juvenile releases originated (i.e., Areas 11 and 13 = South; Areas 9 and 10 = Central; and Areas 7, 8-1, and 8-2 = North).

Voluntary Trip Reports

While we did not conduct a test fishery in Area 6 during the summer of 2009, we acquired information about the size/mark-status composition of Chinook encountered in this fishery from the response received from VTRs. In total we received 89 VTRs, providing information on 162 angler trips and 192 Chinook salmon encounters. Two-thirds (66%) of the total Chinook encounters reported on Area 6 VTRs were marked, and 69% of legal-size Chinook encounters were marked (**Table 15**). Twenty-two individuals (i.e., 11% of total) were smaller than the legal size limit (i.e., 22 in [56 cm]).

In comparing 2009 VTR and dockside estimates of average weekly CPUE (retained Chinook per angler trip) in Area 6, we found that catch rates were significantly different ($t=4.31$, $df=5$, $P=0.008$) between VTR and dockside data sources. CPUE was on average higher from VTRs compared to the dockside data (i.e., $CPUE_{vtr}$: 0.68 vs. $CPUE_{dock}$: 0.30).

Angler participation in our Area 6 VTR program was even higher in 2009 (89 VTRs returned with $n=192$ Chinook encounters) than in 2008 (58 VTRs returned with $n=133$ Chinook encounters), the first year of implementing our enhanced VTR program (WDFW 2009a). Moreover, compared to the first five mark-selective Chinook seasons (2003-2007) in Area 6, the number of Chinook encounters recorded on returned VTRs in 2009 was over three-fold

higher than the average number of Chinook encounters (average: 59, range: 15-112) from VTRs during the previous 2003-2007 seasons (WDFW 2008a). Results showed that our enhanced VTR program was successful at acquiring increased, diverse angler participation compared to previous years, from a representative subset of the Area 6 fleet.

Table 15. Chinook encounters by size/mark-status group from the July 1-August 6, 2009 Area 6 VTR reports.

Month	Stat Wk	VTRs (n)	Angler Trips	Chinook Encounters						Legal Mark Rate	Overall Mark Rate
				LM Kept	LM Rel'd	LU	SM	SU	TOTAL		
July	27	30	52	36	1	13		1	51	74.0%	72.5%
	28	13	22	18	1	9	1	4	33	67.9%	60.6%
	29	10	22	8	0	7			15	53.3%	53.3%
	30	24	36	30	1	20	2	4	57	60.8%	57.9%
	31	7	13	13	9	1	4	1	16	71.4%	68.8%
Aug.	32	5	17	12	0	0	6	2	20	100.0%	90.0%
Season Total		89	162	113	4	53	10	12	192	68.8%	66.1%

ACKNOWLEDGEMENTS

This review of the summer 2009 Areas 5 and 6 mark-selective Chinook fisheries is a result of the dedicated efforts of several individuals. Larry Bennett (Peninsula Sampling Supervisor), Connie Warren (Assistant Supervisor), and their sampling crew collected dockside creel survey data throughout the season in both Areas 5 and 6, and collected on-the-water survey data in Area 5. Dockside samplers stationed in Areas 5 and 6 included Jessica Slipper, Kimberley McFarlen, Connie Warren, Raese Reeves, Jaron Sikes, Lars Swartling, Joe Boucher, Chris O'Connell, and Anthony Rodriguez. Jaron Sikes and Connie Warren worked as roving samplers dedicated to distributing and collecting Voluntary Trip Reports to/from Areas 5 and 6 anglers. Additionally, Peninsula sampling supervisor Larry Bennett and Connie Warren spent many hours summarizing and error checking data, and on many other aspects of the planning and implementation of the Areas 5 and 6 monitoring effort.

At WDFW Headquarters in Olympia, we thank both Lance Campbell and John Sneva for their scale-reading expertise. We also thank Susan Markey, Gil Lensegrav, and the CWT Lab staff for their help and expertise in providing decoded CWT data. Also from WDFW Headquarters, Lee Dyer provided substantial help with personnel logistics and support services for the project. Karen Kloempken managed the WDFW sampling databases and provided finalized post-season data. WDFW Biologists Steve Caromile and Are Strom worked on database development in order to better manage, query, and report on the selective fishery data; in addition, Are Strom completed "R" programming updates to enable efficient analyses of selective fishery data and produce tables and figures for this post-season report. Biologists Mark Baltzell, Steve Caromile, Karen Kloempken, and Laurie Peterson prepared this post-season report.

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APPENDICES

Appendix A. Mark-selective fishery impact estimation details.

Below are definitions and equations for all quantities used in estimating mark-selective fishery impacts from the combination of creel survey information and voluntary trip report (VTR) results. The estimation sequence builds from monthly⁹ 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. Secondly, encounters are apportioned to the appropriate size/mark-status group using encounters-composition data collected via our voluntary trip report program (See *Voluntary Trip Report (VTR) 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}_{LMi} , defined on subsequent page) with a VTR-based estimate of the proportion of the fishable Chinook population that is of legal size and marked (\hat{p}_{LMi} , 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., $1-p_{LM-R}$, where p_{LM-R} is the estimated legal-marked Chinook release rate)¹⁰. \hat{E}_i and its variance are estimated as:

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

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

Voluntary Trip Report (VTR) Encounter Composition

⁹ **Note:** For fisheries characterized by short-duration seasons (i.e., ~ 1 month), the “monthly” estimators described in this appendix are synonymous season-total estimators.

¹⁰ Equations 1 and 2 were modified based on a recent 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_{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.

\hat{p}_{LMi} = the VTR-based estimate of the proportion of Chinook encounters that are legal-sized (L) and marked (M) during month i

\hat{p}_{LUi} = the estimated proportion of encounters that are legal-sized (L) and unmarked (U)

\hat{p}_{SMi} = the estimated proportion of encounters that are sublegal-sized (S) and unmarked (M)

\hat{p}_{LUI} = 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}_{XYi} and its variance is estimated as:

$$(3) \quad \hat{p}_{XYi} = n_{XYi} / n_i, \text{ and}$$

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

where n_i = the total number of fish encountered VTR participants during month i .

Encounters by Size/Mark-status Class

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

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

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

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

For each XY combination (where $X = L$ or S and $Y = M$ or U), and an estimate of its variance are obtained from:

$$(5) \quad \hat{E}_{XYi} = \hat{E}_i * \hat{p}_{XYi}$$

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

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 (i.e., Murthy estimates or otherwise), 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*¹¹ 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:

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

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

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}_{LMi} = the estimated number of legal (L), marked (M) Chinook kept in month i

\hat{K}_{LUi} = 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:

$$(9) \quad \hat{K}_{XMi} = \hat{d}_{XMK} * \hat{N}_{MKi}$$

$$(10) \quad \text{var}(\hat{K}_{XMi}) = \text{var}(\hat{N}_{MKi}) * \hat{d}_{XMK}^2 + \hat{N}_{MKi}^2 * \text{var}(\hat{d}_{XMK}) - \text{var}(\hat{N}_{MKi}) * \text{var}(\hat{d}_{XMK})$$

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

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

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

¹¹ 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}

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.

Estimating Release Numbers by Class

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

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

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

\hat{R}_{SUi} = 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}_{XYi}) and retention (\hat{K}_{XYi}) during month i . The estimator and its variance are:

$$(11) \quad \hat{R}_{XYi} = \hat{E}_{XYi} - \hat{K}_{XYi}$$

$$(12) \quad \text{var}(\hat{R}_{XYi}) = \text{var}(\hat{E}_{XYi}) + \text{var}(\hat{K}_{XYi})$$

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 15%

sfm_S = release mortality rate for sublegal (S) Chinook, assumed to be a constant 20%

Retention-mortality Estimates

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

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

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

\hat{M}_{SUKi} = estimated mortality due to harvest of sublegal (S), unmarked (U) Chinook in month i ($=\hat{K}_{SUi}$).

Release-mortality Estimates

\hat{M}_{LMRi} = 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:

$$(13) \quad \hat{M}_{XYR_i} = \hat{R}_{XY_i} * sfm_Y$$

$$(14) \quad \text{var}(\hat{M}_{XYR_i}) = \text{var}(\hat{R}_{XY_i}) * sfm_Y^2$$

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.,

$$\hat{M}_{total} = \sum_{i=1}^{\max i} (\hat{M}_{XYK_i} + \hat{M}_{XYR_i}) \quad] \text{ and variances}$$

[$\text{var}(\hat{M}_{total}) = \sum_{i=1}^{\max i} [\text{var}(\hat{M}_{XYK_i}) + \text{var}(\hat{M}_{XYR_i})$] , 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:

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

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

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

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).

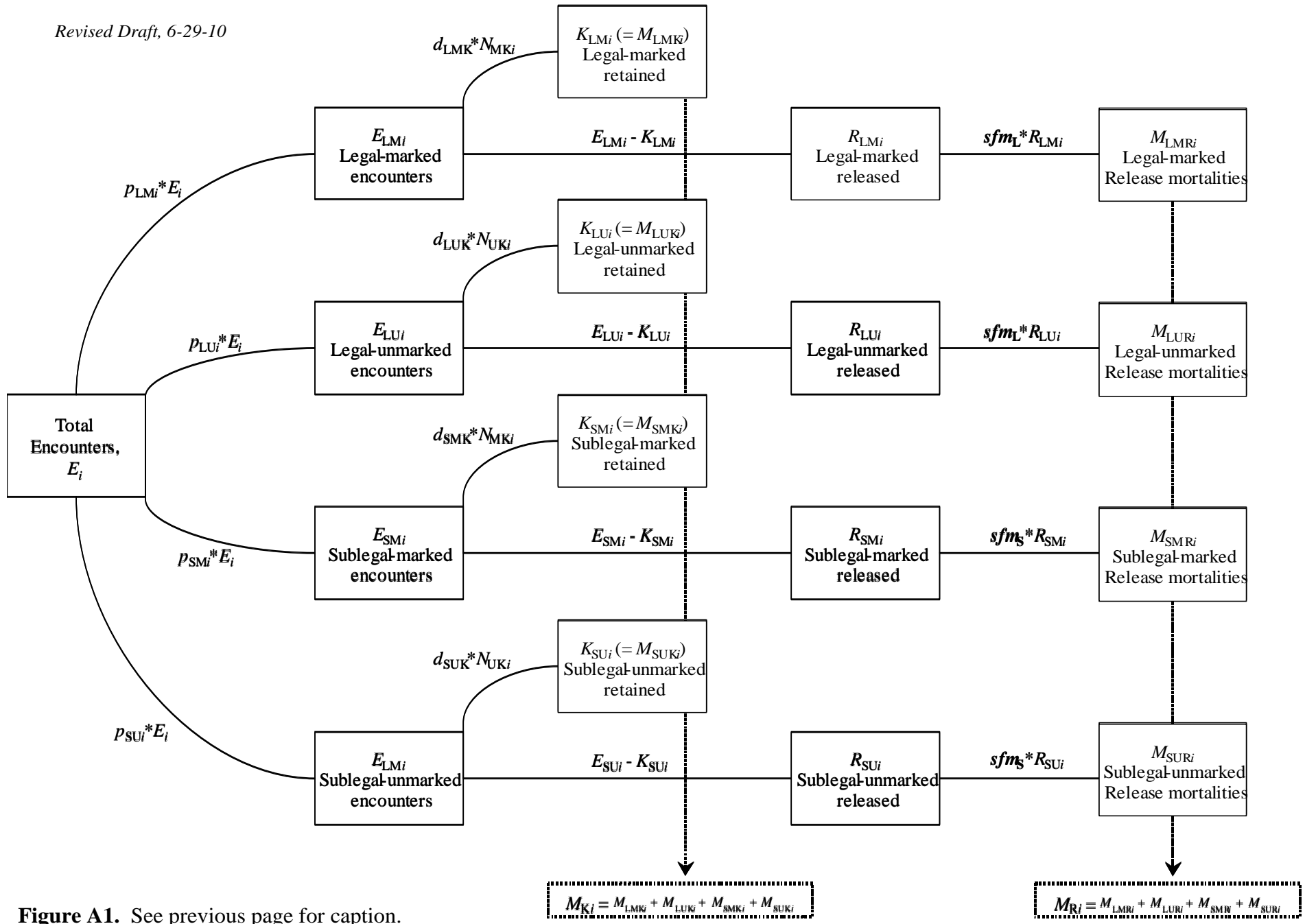


Figure A1. See previous page for caption.

Appendix B. Statistical week calendar for 2009. Note that grayed weeks correspond to those during which Areas 5 and 6 were open under mark-selective harvest regulations.

STAT MONTH	WEEK NO.	START DATE	END DATE	STAT MONTH	WEEK NO.	START DATE	END DATE
1	1	01-Jan	04-Jan	7	27	29-Jun	05-Jul
	2	05-Jan	11-Jan		28	06-Jul	12-Jul
	3	12-Jan	18-Jan		29	13-Jul	19-Jul
	4	19-Jan	25-Jan		30	20-Jul	26-Jul
	5	26-Jan	01-Feb		31	27-Jul	02-Aug
2	6	02-Feb	08-Feb	8	32	03-Aug	09-Aug
	7	09-Feb	15-Feb		33	10-Aug	16-Aug
	8	16-Feb	22-Feb		34	17-Aug	23-Aug
	9	23-Feb	01-Mar		35	24-Aug	30-Aug
3	10	02-Mar	08-Mar	9	36	31-Aug	06-Sep
	11	09-Mar	15-Mar		37	07-Sep	13-Sep
	12	16-Mar	22-Mar		38	14-Sep	20-Sep
	13	23-Mar	29-Mar		39	21-Sep	27-Sep
4	14	30-Mar	05-Apr	10	40	28-Sep	04-Oct
	15	06-Apr	12-Apr		41	05-Oct	11-Oct
	16	13-Apr	19-Apr		42	12-Oct	18-Oct
	17	20-Apr	26-Apr		43	19-Oct	25-Oct
	18	27-Apr	03-May		44	26-Oct	01-Nov
5	19	04-May	10-May	11	45	02-Nov	08-Nov
	20	11-May	17-May		46	09-Nov	15-Nov
	21	18-May	24-May		47	16-Nov	22-Nov
	22	25-May	31-May		48	23-Nov	29-Nov
6	23	01-Jun	07-Jun	12	49	30-Nov	06-Dec
	24	08-Jun	14-Jun		50	07-Dec	13-Dec
	25	15-Jun	21-Jun		51	14-Dec	20-Dec
	26	22-Jun	28-Jun		52	21-Dec	27-Dec
					53	28-Dec	31-Dec

Appendix C. Sample rates (monthly sampled retained ad-marked Chinook/estimated total retained ad-marked Chinook) for the Area 5 (July 1-Aug. 6, 2009) mark-selective Chinook fishery. Sample counts and totals are for adipose-clipped (AD) Chinook only.

Month	Stat. Weeks	Date Range	No. AD Chinook Sampled	Estimated AD Chinook Retained	Sample Rate
July	27-31	1 July-2 Aug.	1,499	5,353	28.0%
August	32	4-6 Aug.	115	605	19.0%
Season Total			1,614	5,958	27.1%

Appendix D. Total number of anglers intercepted in Area 5 during on-the-water surveys between July 1 and Aug. 6, 2009. Grayed sites were included in the dockside sample frame.

Site Name	Weekday Anglers	Weekday Total (unadjusted) size measure	Weekend Anglers	Weekend Total (unadjusted) size measure
COHO	3	0.0066	1	0.005
CURLEYS	20	0.044	7	0.035
NEAH BAY	0	0.000	0	0.000
OLSON'S EAST	97	0.212	52	0.257
OLSON'S GENERAL	14	0.031	4	0.020
OLSON'S RAMP & DOCKS	128	0.279	70	0.347
OLSON'S WEST	54	0.118	14	0.069
PILLAR POINT	2	0.004	0	0.000
PORT ANGELES WEST RAMP	5	0.011	0	0.000
SILVER KING	12	0.026	4	0.020
SNOW CREEK	0	0.000	3	0.015
VAN RIPER'S GENERAL	2	0.004	2	0.010
VAN RIPER'S NORTH	42	0.092	12	0.059
VAN RIPER'S SOUTH	79	0.172	33	0.163
WHISKEY CREEK	0	0.000	0	0.000
Total Anglers	458	1.000	202	1.000

Appendix E. Size measures of sites sampled during the Area 5 July 1-Aug. 6, 2009 creel survey, by statistical week. WD and WE correspond to weekday and weekend strata, respectively.

Stat Week	Day Type	Prop'n Effort In Sample Frame	Area 5 Sampled Sites and Size Measures					
			Curley's	Olson's West	Olson's Ramp & Dock	Olson's East	Van Riper's South	Van Riper's North
27	WD	0.895	0.091	0.048	0.262	0.198	0.251	0.150
	WE	0.773	0.066	0.038	0.410	0.210	0.221	0.055
28	WD	0.919	0.031	0.142	0.319	0.199	0.195	0.115
	WE	0.773	0.066	0.038	0.410	0.210	0.221	0.055
29	WD	0.919	0.031	0.142	0.319	0.199	0.195	0.115
	WE	0.960	0.036	0.072	0.371	0.278	0.175	0.067
30	WD	0.919	0.031	0.142	0.319	0.199	0.195	0.115
	WE	0.960	0.036	0.072	0.371	0.278	0.175	0.067
31	WD	0.919	0.031	0.142	0.319	0.199	0.195	0.115
	WE	0.960	0.036	0.072	0.371	0.278	0.175	0.067
32	WD	0.919	0.031	0.142	0.319	0.199	0.195	0.115
	WE	0.960	0.036	0.072	0.371	0.278	0.175	0.067

Appendix F. Age composition of retained (dockside samples) Chinook salmon, Areas 5 and 6 mark-selective Chinook fisheries, July 1 – August 6, 2009. AD = marked or adipose-fin clipped Chinook, UM = unmarked (unclipped) Chinook.

Area	Source	Mark-status Group	Period	Age Composition ¹								Total
				2.1	2.2	3.1	3.2	4.1	4.2	5.1	5.2	
5	Dockside	AD	Season (%)	305 (21%)	0 (0%)	663 (46%)	195 (14%)	258 (18%)	21 (1%)	0 (0%)	2 (0.1%)	1,444
	Dockside	UM	Season (%)	67 (82%)	0 (0%)	7 (9%)	6 (7%)	2 (2%)	0 (0%)	0 (0%)	0 (0%)	82
	Total Dockside	AD+UM	Season (%)	372 (24%)	0 (0%)	670 (44%)	201 (13%)	260 (17%)	21 (1%)	0 (0%)	2 (0.1%)	1,526
6	Dockside	AD	Season (%)	11 (2%)	0 (0%)	163 (35%)	2 (0.4%)	289 (62%)	2 (0.4%)	1 (0.2%)	0 (0%)	468

¹Gilbert-Rich age notation: “Total Age”. “Age at outmigration”, inclusive of time spent in incubation.

Appendix G. CWTs recovered from Chinook salmon during the Areas 5 and 6 July 1-Aug. 6, 2009 mark-selective Chinook fisheries.

Area	Recov Date	Tag Code	Brood Yr	Release Site	Rearing Hatchery	Rel Agency	DIT codes	FKLcm	Mark	Label
5	1-Jul-09	634172	2006	NORTH NEMAH R24.0460	NEMAH HATCHERY	WDFW		62	AD Fin Clp	49602
5	1-Jul-09	633285	2005	GROVERS CR 15.0299	GROVERS CR HATCHERY	SUQ	210682	75	AD Fin Clp	49601
5	1-Jul-09	633389	2006	FRIDAY CR 03.0017	SAMISH HATCHERY	WDFW	633390	62	AD Fin Clp	49701
5	1-Jul-09	612511		Captains Johns Ponds	LYONS FERRY HATCHERY			54	AD Fin Clp	49749
5	1-Jul-09	633987	2006	SNK BLW GRANDE RHOND	LYONS FERRY HATCHERY	WDFW		50	AD Fin Clp	49802
5	1-Jul-09	210733	2006	WHITEHORSE SPRINGS	WHITEHORSE POND	COOP		55	AD Fin Clp	41309
5	1-Jul-09	094526	2006	BIG CR (LWR COL R)	BIG CR (LWR COL R)	ODFW		67	AD Fin Clp	49702
5	1-Jul-09	094526	2006	BIG CR (LWR COL R)	BIG CR HATCHERY	ODFW		67	AD Fin Clp	49702
5	1-Jul-09	210744	2006	KALAMA CR 11.0017	KALAMA CR HATCHERY	NISQ		64	AD Fin Clp	49801
5	2-Jul-09	633882	2006	BIG SOOS CR 09.0072	SOOS CREEK HATCHERY	WDFW	633883	56	AD Fin Clp	49554
5	2-Jul-09	633987	2006	SNK BLW GRANDE RHOND	LYONS FERRY HATCHERY	WDFW		60	AD Fin Clp	41349
5	2-Jul-09	210684	2005	WHITEHORSE SPRINGS	WHITEHORSE POND	COOP		72	AD Fin Clp	49603
5	2-Jul-09	612513		Big Canyon	LYONS FERRY HATCHERY			56	AD Fin Clp	49707
5	2-Jul-09	633987	2006	SNK BLW GRANDE RHOND	LYONS FERRY HATCHERY	WDFW		57	AD Fin Clp	49703
5	3-Jul-09	633987	2006	SNK BLW GRANDE RHOND	LYONS FERRY HATCHERY	WDFW		62	AD Fin Clp	49709
5	3-Jul-09	633886	2006	FINCH CR 16.0222	HOODSPORT HATCHERY	WDFW		54	AD Fin Clp	49804
5	3-Jul-09	094556	2006	WILLAMETTE R M FK-1	DEXTER PONDS (WILLAM	ODFW		56	AD Fin Clp	41311
5	3-Jul-09	633799	2006	COLUMBIA R - GENERAL		WDFW		45	AD Fin Clp	49559
5	3-Jul-09	103680	2007	SNAKE@ HLLS CNYON DM	OXBOW HATCHERY	IDFG		55	AD Fin Clp	49710
5	3-Jul-09	634182	2006	SIMILKAMEEN R 490325		WDFW		59	AD Fin Clp	49711
5	3-Jul-09	633987	2006	SNK BLW GRANDE RHOND	LYONS FERRY HATCHERY	WDFW		52	AD Fin Clp	49806
5	3-Jul-09	633987	2006	SNK BLW GRANDE RHOND	LYONS FERRY HATCHERY	WDFW		53	AD Fin Clp	41327
5	3-Jul-09	633889	2006	VOIGHT CR 10.0414	VOIGHTS CR HATCHERY	WDFW		51	AD Fin Clp	49557
5	3-Jul-09	210744	2006	KALAMA CR 11.0017	KALAMA CR HATCHERY	NISQ		63	AD Fin Clp	49558
5	3-Jul-09	633391	2006	CLEAR CR 11.0013C	NISQUALLY HATCHERY	NISQ		61	AD Fin Clp	49604
5	3-Jul-09	210671	2005	KALAMA CR 11.0017	KALAMA CR HATCHERY	NISQ		73	AD Fin Clp	49712
5	3-Jul-09	612513		Big Canyon	LYONS FERRY HATCHERY			53	AD Fin Clp	49803
5	3-Jul-09	633987	2006	SNK BLW GRANDE RHOND	LYONS FERRY HATCHERY	WDFW		56	AD Fin Clp	49823
5	4-Jul-09	633987	2006	SNK BLW GRANDE RHOND	LYONS FERRY HATCHERY	WDFW		54	AD Fin Clp	13658
5	5-Jul-09	633389	2006	FRIDAY CR 03.0017	SAMISH HATCHERY	WDFW	633390	54	AD Fin Clp	49605
5	5-Jul-09	633894	2006	COLUMBIA R - GENERAL	PRIEST RAPIDS HATCHERY	WDFW		59	AD Fin Clp	49608
5	5-Jul-09	633987	2006	SNK BLW GRANDE RHOND	LYONS FERRY HATCHERY	WDFW		57	AD Fin Clp	49610
5	5-Jul-09	633987	2006	SNK BLW GRANDE RHOND	LYONS FERRY HATCHERY	WDFW		57	AD Fin Clp	49714
5	5-Jul-09	185710	2006	R-CHILLIWACK R	H-CHILLIWACK R	CDFO	185658,185706	64	AD Fin Clp	49609
5	5-Jul-09	633482	2006	JOHN CR + HAMMA R	RFEG 6 HOOD CANAL	WDFW		66	AD Fin Clp	49713
5	5-Jul-09	633389	2006	FRIDAY CR 03.0017	SAMISH HATCHERY	WDFW	633390	56	AD Fin Clp	49607
5	5-Jul-09	633967	2006	GREEN R 09.0001		WDFW		58	AD Fin Clp	49563
5	5-Jul-09	612511		Captains Johns Ponds	LYONS FERRY HATCHERY			53	AD Fin Clp	49606
5	5-Jul-09	633875	2006	PURDY CR 16.0005	GEORGE ADAMS HATCHRY	WDFW	633876	58	AD Fin Clp	49612
5	5-Jul-09	633987	2006	SNK BLW GRANDE RHOND	LYONS FERRY HATCHERY	WDFW		55	AD Fin Clp	49717
5	6-Jul-09	612513		Big Canyon	LYONS FERRY HATCHERY			60	AD Fin Clp	49722
5	6-Jul-09	054274	2007	SPRING CR 29.0159	SPRING CR NFH	FWS	054275,054276	54	AD Fin Clp	49756
5	6-Jul-09	094526	2006	BIG CR (LWR COL R)	BIG CR HATCHERY	ODFW		60	AD Fin Clp	49808
5	6-Jul-09	633691	2006	CASCADE R 03.1411	MARBLEMOUNT HATCHERY	WDFW		49	AD Fin Clp	49810
5	6-Jul-09	634272	2007	FRIDAY CR 03.0017	SAMISH HATCHERY	WDFW	634270,634271	42	AD Fin Clp	49812
5	6-Jul-09	633799	2006	COLUMBIA R - GENERAL		WDFW		53	AD Fin Clp	49758
5	6-Jul-09	094526	2006	BIG CR (LWR COL R)	BIG CR (LWR COL R)	ODFW		60	AD Fin Clp	49808

Area	Recov Date	Tag Code	Brood Yr	Release Site	Rearing Hatchery	Rel Agency	DIT codes	FKLcm	Mark	Label
5	6-Jul-09	633875	2006	PURDY CR 16.0005	GEORGE ADAMS HATCHRY	WDFW	633876	54	AD Fin Clp	49809
5	7-Jul-09	633987	2006	SNK BLW GRANDE RHOND	LYONS FERRY HATCHERY	WDFW		56	AD Fin Clp	49616
5	7-Jul-09	633875	2006	PURDY CR 16.0005	GEORGE ADAMS HATCHRY	WDFW	633876	57	AD Fin Clp	49759
5	7-Jul-09	185706	2006	R-CHILLIWACK R	H-CHILLIWACK R	CDFO	185706,185658	57	AD Fin Clp	49620
5	7-Jul-09	633987	2006	SNK BLW GRANDE RHOND	LYONS FERRY HATCHERY	WDFW		57	AD Fin Clp	49725
5	7-Jul-09	210571	2005	TULALIP CR 07.0001	BERNIE GOBIN HATCH	TULA		81	AD Fin Clp	49760
5	7-Jul-09	633391	2006	CLEAR CR 11.0013C	NISQUALLY HATCHERY	NISQ		55	AD Fin Clp	49816
5	7-Jul-09	633473	2006	COWLITZ R 26.0002	COWL SALM + COWL FRIENDS	WDFW		59	AD Fin Clp	49617
5	7-Jul-09	633889	2006	VOIGHT CR 10.0414	VOIGHTS CR HATCHERY	WDFW		51	AD Fin Clp	49618
5	7-Jul-09	094526	2006	BIG CR (LWR COL R)	BIG CR (LWR COL R)	ODFW		68	AD Fin Clp	49619
5	7-Jul-09	094526	2006	BIG CR (LWR COL R)	BIG CR HATCHERY	ODFW		68	AD Fin Clp	49619
5	7-Jul-09	633389	2006	FRIDAY CR 03.0017	SAMISH HATCHERY	WDFW	633390	66	AD Fin Clp	49724
5	7-Jul-09	633885	2006	ISSAQUAH CR 08.0178	ISSAQUAH HATCHERY	WDFW		60	AD Fin Clp	49813
5	7-Jul-09	633397	2006	LEWIS R -NF 27.0168	LEWIS RIVER HATCHERY	WDFW		51	AD Fin Clp	49814
5	8-Jul-09	184907	2005	R-SHUSWAP R LOW	H-SHUSWAP R	CDFO		85	AD Fin Clp	49726
5	8-Jul-09	633391	2006	CLEAR CR 11.0013C	NISQUALLY HATCHERY	NISQ		60	AD Fin Clp	40588
5	8-Jul-09	633987	2006	SNK BLW GRANDE RHOND	LYONS FERRY HATCHERY	WDFW		53	AD Fin Clp	49729
5	8-Jul-09	633487	2006	CASCADE R 03.1411	MARBLEMOUNT HATCHERY	WDFW		55	AD Fin Clp	50956
5	9-Jul-09	633579	2006	GROVERS CR 15.0299	GROVERS CR HATCHERY	SUQ	210737	68	AD Fin Clp	13580
5	9-Jul-09	633987	2006	SNK BLW GRANDE RHOND	LYONS FERRY HATCHERY	WDFW		55	AD Fin Clp	41342
5	9-Jul-09	633987	2006	SNK BLW GRANDE RHOND	LYONS FERRY HATCHERY	WDFW		54	AD Fin Clp	41343
5	9-Jul-09	185238	2005	R-CHILLIWACK R	H-CHILLIWACK R	CDFO	185240,185030	81	AD Fin Clp	40590
5	9-Jul-09	633875	2006	PURDY CR 16.0005	GEORGE ADAMS HATCHRY	WDFW	633876	55	AD Fin Clp	41345
5	9-Jul-09	054276	2007	SPRING CR 29.0159	SPRING CR NFH	FWS	054275,054274	58	AD Fin Clp	49034
5	9-Jul-09	612511		Captains Johns Ponds	LYONS FERRY HATCHERY			54	AD Fin Clp	40591
5	10-Jul-09	107171	2007	SNAKE@ HLLS CNYON DM	OXBOW HATCHERY	IDFG		50	AD Fin Clp	41335
5	10-Jul-09	185263	2006	R-HARRISON R	H-CHEHALIS R	CDFO		58	AD Fin Clp	41340
5	10-Jul-09	633987	2006	SNK BLW GRANDE RHOND	LYONS FERRY HATCHERY	WDFW		59	AD Fin Clp	49765
5	10-Jul-09	633987	2006	SNK BLW GRANDE RHOND	LYONS FERRY HATCHERY	WDFW		53	AD Fin Clp	50959
5	10-Jul-09	633473	2006	COWLITZ R 26.0002	COWL SALM + COWL FRIENDS	WDFW		56	AD Fin Clp	41332
5	10-Jul-09	633391	2006	CLEAR CR 11.0013C	NISQUALLY HATCHERY	NISQ		56	AD Fin Clp	49762
5	10-Jul-09	633987	2006	SNK BLW GRANDE RHOND	LYONS FERRY HATCHERY	WDFW		49	AD Fin Clp	49763
5	10-Jul-09	633966	2006	WALLACE R 07.0940		WDFW		50	AD Fin Clp	49766
5	10-Jul-09	633987	2006	SNK BLW GRANDE RHOND	LYONS FERRY HATCHERY	WDFW		56	AD Fin Clp	40503
5	10-Jul-09	633886	2006	FINCH CR 16.0222	HOODSPORT HATCHERY	WDFW		62	AD Fin Clp	49761
5	11-Jul-09	633579	2006	GROVERS CR 15.0299	GROVERS CR HATCHERY	SUQ	210737	64	AD Fin Clp	40572
5	11-Jul-09	210745	2006	BAKER R 03.0435		WDFW		64	AD Fin Clp	49033
5	11-Jul-09	052978	2007	SPRING CR 29.0159	SPRING CR NFH	FWS	053768	56	AD Fin Clp	41337
5	11-Jul-09	633987	2006	SNK BLW GRANDE RHOND	LYONS FERRY HATCHERY	WDFW		54	AD Fin Clp	49624
5	11-Jul-09	633692	2006	VOIGHT CR 10.0414	VOIGHTS CR HATCHERY	WDFW		53	AD Fin Clp	49621
5	12-Jul-09	633987	2006	SNK BLW GRANDE RHOND	LYONS FERRY HATCHERY	WDFW		52	AD Fin Clp	49628
5	12-Jul-09	634182	2006	SIMILKAMEEN R 490325		WDFW		56	AD Fin Clp	41350
5	12-Jul-09	633987	2006	SNK BLW GRANDE RHOND	LYONS FERRY HATCHERY	WDFW		52	AD Fin Clp	49626
5	12-Jul-09	054276	2007	SPRING CR 29.0159	SPRING CR NFH	FWS	054275,054274	58	AD Fin Clp	49627
5	12-Jul-09	210745	2006	BAKER R 03.0435		WDFW		54	AD Fin Clp	41336
5	13-Jul-09	633168	2004	SIMILKAMEEN R 490325		WDFW		82	AD Fin Clp	49770
5	13-Jul-09	633895	2006	LK CHELAN + COLUMBIA R		WDFW		54	AD Fin Clp	50717
5	13-Jul-09	633987	2006	SNK BLW GRANDE RHOND	LYONS FERRY HATCHERY	WDFW		54	AD Fin Clp	41314
5	13-Jul-09	633867	2006	CASCADE R 03.1411	MARBLEMOUNT HATCHERY	WDFW		54	AD Fin Clp	49771
5	14-Jul-09	633987	2006	SNK BLW GRANDE RHOND	LYONS FERRY HATCHERY	WDFW		52	AD Fin Clp	41325
5	14-Jul-09	612513		Big Canyon	LYONS FERRY HATCHERY			53	AD Fin Clp	43315
5	14-Jul-09	634184	2006	WENATCHEE R 45.0030		WDFW		50	AD Fin Clp	50965

Area	Recov Date	Tag Code	Brood Yr	Release Site	Rearing Hatchery	Rel Agency	DIT codes	FKLcm	Mark	Label
5	14-Jul-09	633971	2006	FINCH CR 16.0222	HOODSPORT HATCHERY	WDFW		64	AD Fin Clp	50966
5	14-Jul-09	612513		Big Canyon	LYONS FERRY HATCHERY			62	AD Fin Clp	50719
5	14-Jul-09	633987	2006	SNK BLW GRANDE RHOND	LYONS FERRY HATCHERY	WDFW		58	AD Fin Clp	45005
5	14-Jul-09	634184	2006	WENATCHEE R 45.0030		WDFW		49	AD Fin Clp	50720
5	14-Jul-09	210720	2006	ELLIOTT BAY TRIBAL NP	KETA CREEK HATCHERY	MUCK		55	AD Fin Clp	50964
5	15-Jul-09	633987	2006	SNK BLW GRANDE RHOND	LYONS FERRY HATCHERY	WDFW		56	AD Fin Clp	41318
5	15-Jul-09	633391	2006	CLEAR CR 11.0013C	NISQUALLY HATCHERY	NISQ		52	AD Fin Clp	50722
5	15-Jul-09	634184	2006	WENATCHEE R 45.0030		WDFW		54	AD Fin Clp	41319
5	16-Jul-09	633976	2006	WASHOUGAL R 28.0159	WASHOUGAL HATCHERY	WDFW		54	AD Fin Clp	41266
5	16-Jul-09	633579	2006	GROVERS CR 15.0299	GROVERS CR HATCHERY	SUQ	210737	57	AD Fin Clp	49629
5	16-Jul-09	633987	2006	SNK BLW GRANDE RHOND	LYONS FERRY HATCHERY	WDFW		58	AD Fin Clp	49822
5	16-Jul-09	634184	2006	WENATCHEE R 45.0030		WDFW		55	AD Fin Clp	50969
5	16-Jul-09	185936	2006	R-NICOLA R	H-SPIUS CR	CDFO		50	AD Fin Clp	49630
5	17-Jul-09	185658	2006	R-CHILLIWACK R	H-CHILLIWACK R	CDFO	185706,185710	64	AD Fin Clp	50732
5	17-Jul-09	633877	2006	COWLITZ R 26.0002	COWLITZ SALMON HATCH	WDFW		57	AD Fin Clp	50975
5	17-Jul-09	185030	2005	R-CHILLIWACK R	H-CHILLIWACK R	CDFO	185238,185240	60	AD Fin Clp	50733
5	17-Jul-09	633375	2005	VOIGHT CR 10.0414	VOIGHTS CR HATCHERY	WDFW		78	AD Fin Clp	50970
5	17-Jul-09	633887	2006	WALLACE R 07.0940	WALLACE R HATCHERY	WDFW		58	AD Fin Clp	50974
5	17-Jul-09	633286	2005	CLEAR CR 11.0013C	NISQUALLY HATCHERY	NISQ	210681	58	AD Fin Clp	41284
5	18-Jul-09	090136						46	AD Fin Clp	45004
5	18-Jul-09	612512	2006	CAPTAIN JOHNS PD	LYONS FERRY HATCHERY			53	AD Fin Clp	50723
5	19-Jul-09	633987	2006	SNK BLW GRANDE RHOND	LYONS FERRY HATCHERY	WDFW		52	AD Fin Clp	41321
5	19-Jul-09	633887	2006	WALLACE R 07.0940	WALLACE R HATCHERY	WDFW		54	AD Fin Clp	50727
5	19-Jul-09	185558	2007	R-HARRISON R	H-CHEHALIS R	CDFO		46	AD Fin Clp	50993
5	19-Jul-09	633987	2006	SNK BLW GRANDE RHOND	LYONS FERRY HATCHERY	WDFW		53	AD Fin Clp	50994
5	19-Jul-09	633889	2006	VOIGHT CR 10.0414	VOIGHTS CR HATCHERY	WDFW		57	AD Fin Clp	50724
5	19-Jul-09	633874	2006	KLICKITAT HATCHERY (YKFP)	KLICKITAT HATCHERY (YKFP)	YAKA		62	AD Fin Clp	50976
5	19-Jul-09	612694			LYONS FERRY HATCHERY			42	Unkn Marks	41286
5	19-Jul-09	634271	2007	PURDY CR 16.0005	GEORGE ADAMS HATCHRY	WDFW	634270,634272	54	AD Fin Clp	41324
5	19-Jul-09	090136						42	AD Fin Clp	50725
5	19-Jul-09	633987	2006	SNK BLW GRANDE RHOND	LYONS FERRY HATCHERY	WDFW		56	AD Fin Clp	50726
5	19-Jul-09	186030	2006	R-HARRISON R	H-CHEHALIS R	CDFO		65	AD Fin Clp	50979
5	20-Jul-09	634184	2006	WENATCHEE R 45.0030		WDFW		54	AD Fin Clp	50728
5	21-Jul-09	633987	2006	SNK BLW GRANDE RHOND	LYONS FERRY HATCHERY	WDFW		46	AD Fin Clp	44948
5	21-Jul-09	053776	2007	SPRING CR 29.0159	SPRING CR NFH	FWS	053777,053874	45	AD Fin Clp	44949
5	21-Jul-09	634391	2007	COL R @ PRIEST RAPIDS	PRIEST RAPIDS HATCHERY	WDFW		51	AD Fin Clp	49825
5	21-Jul-09	633465	2005	COWLITZ R 26.0002	COWL SALM + COWL FRIENDS	WDFW		55	AD Fin Clp	50731
5	21-Jul-09	634391	2007	COLUMBIA R AT PRIEST	PRIEST RAPIDS HATCHERY	WDFW		51	AD Fin Clp	49825
5	22-Jul-09	633987	2006	SNK BLW GRANDE RHOND	LYONS FERRY HATCHERY	WDFW		55	AD Fin Clp	49829
5	22-Jul-09	612511		Captains Johns Ponds	LYONS FERRY HATCHERY			49	AD Fin Clp	50981
5	22-Jul-09	612517			LYONS FERRY HATCHERY			47	AD Fin Clp	49631
5	22-Jul-09	634184	2006	WENATCHEE R 45.0030		WDFW		53	AD Fin Clp	50736
5	23-Jul-09	094513	2006	ROCK CR (N UMPQUA R)	ROCK CR HATCHERY	ODFW		59	AD Fin Clp	50982
5	23-Jul-09	634184	2006	WENATCHEE R 45.0030		WDFW		49	AD Fin Clp	50987
5	23-Jul-09	054275	2007	SPRING CR 29.0159	SPRING CR NFH	FWS	054274,054276	53	Unmarked	49634
5	23-Jul-09	612518			LYONS FERRY HATCHERY			49	AD Fin Clp	49635
5	23-Jul-09	090136						50	AD Fin Clp	50985
5	23-Jul-09	210745	2006	BAKER R 03.0435		WDFW		58	AD Fin Clp	50986
5	23-Jul-09	633987	2006	SNK BLW GRANDE RHOND	LYONS FERRY HATCHERY	WDFW		56	AD Fin Clp	49640
5	23-Jul-09	633882	2006	BIG SOOS CR 09.0072	SOOS CREEK HATCHERY	WDFW	633883	53	AD Fin Clp	50738
5	24-Jul-09	633887	2006	WALLACE R 07.0940	WALLACE R HATCHERY	WDFW		54	AD Fin Clp	49638
5	24-Jul-09	186241	2007	R-CHILLIWACK R	H-CHILLIWACK R	CDFO	186240,186243	48	AD Fin Clp	49733

Area	Recov Date	Tag Code	Brood Yr	Release Site	Rearing Hatchery	Rel Agency	DIT codes	FKLcm	Mark	Label
5	24-Jul-09	633875	2006	PURDY CR 16.0005	GEORGE ADAMS HATCHRY	WDFW	633876	58	AD Fin Clp	50988
5	24-Jul-09	633375	2005	VOIGHT CR 10.0414	VOIGHTS CR HATCHERY	WDFW		84	AD Fin Clp	49646
5	24-Jul-09	633496	2006	DESCHUTES R 13.0028	TUMWATER FALLS HATCH	WDFW		52	AD Fin Clp	50989
5	24-Jul-09	612513		Big Canyon	LYONS FERRY HATCHERY			48	AD Fin Clp	41267
5	24-Jul-09	633799	2006	COLUMBIA R - GENERAL		WDFW		55	AD Fin Clp	49642
5	24-Jul-09	185658	2006	R-CHILLIWACK R	H-CHILLIWACK R	CDFO	185706,185710	58	AD Fin Clp	50747
5	24-Jul-09	633987	2006	SNK BLW GRANDE RHOND	LYONS FERRY HATCHERY	WDFW		52	AD Fin Clp	50992
5	25-Jul-09	068009	2007	SAN PABLO BAY NET PENS	FEATHER R HATCHERY	CDWR		53	AD Fin Clp	45486
5	25-Jul-09	633987	2006	SNK BLW GRANDE RHOND	LYONS FERRY HATCHERY	WDFW		49	AD Fin Clp	49738
5	25-Jul-09	633369	2005	FRIDAY CR 03.0017	SAMISH HATCHERY	WDFW	633368	74	AD Fin Clp	49649
5	25-Jul-09	210735	2006	COUNTY LINE CR3.2363		WDFW		54	AD Fin Clp	49736
5	25-Jul-09	634184	2006	WENATCHEE R 45.0030		WDFW		54	AD Fin Clp	50741
5	25-Jul-09	633485	2006	HAMMA HAMMA 16.0251	RFEG 6 HOOD CANAL	WDFW		55	AD Fin Clp	49647
5	25-Jul-09	633579	2006	GROVERS CR 15.0299	GROVERS CR HATCHERY	SUQ	210737	67	AD Fin Clp	49831
5	25-Jul-09	634184	2006	WENATCHEE R 45.0030		WDFW		56	AD Fin Clp	49648
5	25-Jul-09	634183	2006	METHOW R 48.0002	CARLTON REARING POND	WDFW		52	AD Fin Clp	49734
5	25-Jul-09	633885	2006	ISSAQUAH CR 08.0178	ISSAQUAH HATCHERY	WDFW		68	AD Fin Clp	49735
5	26-Jul-09	633987	2006	SNK BLW GRANDE RHOND	LYONS FERRY HATCHERY	WDFW		54	AD Fin Clp	49093
5	26-Jul-09	633968	2006	CHAMBERS CR 12.0007	GARRISON HATCHERY	WDFW		64	AD Fin Clp	49740
5	26-Jul-09	634184	2006	WENATCHEE R 45.0030		WDFW		54	AD Fin Clp	45484
5	26-Jul-09	633895	2006	LK CHELAN + COLUMBIA R		WDFW		48	AD Fin Clp	45492
5	26-Jul-09	633579	2006	GROVERS CR 15.0299	GROVERS CR HATCHERY	SUQ	210737	69	AD Fin Clp	49091
5	26-Jul-09	633886	2006	FINCH CR 16.0222	HOODSPORT HATCHERY	WDFW		55	AD Fin Clp	49742
5	26-Jul-09	633886	2006	FINCH CR 16.0222	HOODSPORT HATCHERY	WDFW		57	AD Fin Clp	49052
5	26-Jul-09	633968	2006	CHAMBERS CR 12.0007	GARRISON HATCHERY	WDFW		59	AD Fin Clp	49054
5	26-Jul-09	633875	2006	PURDY CR 16.0005	GEORGE ADAMS HATCHRY	WDFW	633876	58	AD Fin Clp	44946
5	26-Jul-09	053972	2006	BIG QUILCENE 17.0012	QUILCENE NFH	FWS		55	AD Fin Clp	45483
5	27-Jul-09	634184	2006	WENATCHEE R 45.0030		WDFW		55	AD Fin Clp	49835
5	27-Jul-09	094646	2007	BIG CR (LWR COL R)	BIG CR (LWR COL R)	ODFW		48	AD Fin Clp	45488
5	27-Jul-09	186240	2007	R-CHILLIWACK R	H-CHILLIWACK R	CDFO	186241,186243	50	AD Fin Clp	49836
5	27-Jul-09	094646	2007	BIG CR (LWR COL R)	BIG CR HATCHERY	ODFW		48	AD Fin Clp	45488
5	27-Jul-09	633889	2006	VOIGHT CR 10.0414	VOIGHTS CR HATCHERY	WDFW		59	AD Fin Clp	50831
5	27-Jul-09	053874	2007	SPRING CR 29.0159	SPRING CR NFH	FWS	053777,053776	55	AD Fin Clp	49834
5	27-Jul-09	633987	2006	SNK BLW GRANDE RHOND	LYONS FERRY HATCHERY	WDFW		55	AD Fin Clp	50834
5	29-Jul-09	612511		Captains Johns Ponds	LYONS FERRY HATCHERY			54	AD Fin Clp	45175
5	29-Jul-09	633987	2006	SNK BLW GRANDE RHOND	LYONS FERRY HATCHERY	WDFW		56	AD Fin Clp	49057
5	29-Jul-09	094505	2006	UMATILLA R	UMATILLA HATCHERY	ODFW		61	AD Fin Clp	49061
5	29-Jul-09	090136						42	AD Fin Clp	50742
5	29-Jul-09	633885	2006	ISSAQUAH CR 08.0178	ISSAQUAH HATCHERY	WDFW		78	AD Fin Clp	45174
5	29-Jul-09	633987	2006	SNK BLW GRANDE RHOND	LYONS FERRY HATCHERY	WDFW		59	AD Fin Clp	49058
5	29-Jul-09	633987	2006	SNK BLW GRANDE RHOND	LYONS FERRY HATCHERY	WDFW		53	AD Fin Clp	49062
5	29-Jul-09	633488	2006	CASCADE R 03.1411	MARBLEMOUNT HATCHERY	WDFW		51	AD Fin Clp	49644
5	29-Jul-09	633987	2006	SNK BLW GRANDE RHOND	LYONS FERRY HATCHERY	WDFW		60	AD Fin Clp	50743
5	29-Jul-09	094513	2006	ROCK CR (N UMPQUA R)	ROCK CR HATCHERY	ODFW		58	AD Fin Clp	50745
5	29-Jul-09	633875	2006	PURDY CR 16.0005	GEORGE ADAMS HATCHRY	WDFW	633876	70	AD Fin Clp	45167
5	29-Jul-09	633579	2006	GROVERS CR 15.0299	GROVERS CR HATCHERY	SUQ	210737	57	AD Fin Clp	45168
5	29-Jul-09	210688	2006	COWSKULL ACCLIM POND	COWSKULL ACCLIM POND	PUYA		63	AD Fin Clp	45169
5	29-Jul-09	633372	2005	BIG SOOS CR 09.0072		WDFW	633371	78	AD Fin Clp	45172
5	29-Jul-09	634184	2006	WENATCHEE R 45.0030		WDFW		57	AD Fin Clp	45176
5	30-Jul-09	054276	2007	SPRING CR 29.0159	SPRING CR NFH	FWS	054275,054274	46	AD Fin Clp	41283
5	30-Jul-09	633987	2006	SNK BLW GRANDE RHOND	LYONS FERRY HATCHERY	WDFW		62	AD Fin Clp	49066
5	30-Jul-09	633367	2005	NASELLE R 24.0543	NASELLE HATCHERY	WDFW		75	AD Fin Clp	45178

Area	Recov Date	Tag Code	Brood Yr	Release Site	Rearing Hatchery	Rel Agency	DIT codes	FKLcm	Mark	Label
5	30-Jul-09	633469	2005	FINCH CR 16.0222	HOODSPORT HATCHERY	WDFW		78	AD Fin Clp	45152
5	31-Jul-09	633579	2006	GROVERS CR 15.0299	GROVERS CR HATCHERY	SUQ	210737	53	AD Fin Clp	45156
5	31-Jul-09	632883	2005	WASHOUGAL R 28.0159	WASHOUGAL HATCHERY	WDFW		80	AD Fin Clp	45153
5	31-Jul-09	633875	2006	PURDY CR 16.0005	GEORGE ADAMS HATCHRY	WDFW	633876	54	AD Fin Clp	45494
5	31-Jul-09	633799	2006	COLUMBIA R - GENERAL		WDFW		58	AD Fin Clp	50550
5	31-Jul-09	633987	2006	SNK BLW GRANDE RHOND	LYONS FERRY HATCHERY	WDFW		50	AD Fin Clp	50552
5	31-Jul-09	612517			LYONS FERRY HATCHERY			41	AD Fin Clp	45180
5	31-Jul-09	633286	2005	CLEAR CR 11.0013C	NISQUALLY HATCHERY	NISQ	210681	77	AD Fin Clp	45182
5	31-Jul-09	633987	2006	SNK BLW GRANDE RHOND	LYONS FERRY HATCHERY	WDFW		53	AD Fin Clp	49067
5	31-Jul-09	633877	2006	COWLITZ R 26.0002	COWLITZ SALMON HATCH	WDFW		68	AD Fin Clp	45181
5	31-Jul-09	634182	2006	SIMILKAMEEN R 490325		WDFW		53	AD Fin Clp	49068
5	31-Jul-09	633882	2006	BIG SOOS CR 09.0072	SOOS CREEK HATCHERY	WDFW	633883	73	AD Fin Clp	49069
5	31-Jul-09	633987	2006	SNK BLW GRANDE RHOND	LYONS FERRY HATCHERY	WDFW		62	AD Fin Clp	49070
5	31-Jul-09	633889	2006	VOIGHTS CR 10.0414	VOIGHTS CR HATCHERY	WDFW		57	AD Fin Clp	49094
5	1-Aug-09	633883	2006	BIG SOOS CR 09.0072	SOOS CREEK HATCHERY	WDFW	633882	67	AD Fin Clp	45157
5	1-Aug-09	094611	2006	CEDAR CR #1 (SANDY R	CLACKAMAS HATCHERY	ODFW		57	AD Fin Clp	49071
5	1-Aug-09	634183	2006	METHOW R 48.0002	CARLTON REARING POND	WDFW		52	AD Fin Clp	49072
5	1-Aug-09	633391	2006	CLEAR CR 11.0013C	NISQUALLY HATCHERY	NISQ		59	AD Fin Clp	49848
5	1-Aug-09	633987	2006	SNK BLW GRANDE RHOND	LYONS FERRY HATCHERY	WDFW		56	AD Fin Clp	50558
5	1-Aug-09	090126	2007	YOUNGS R & BAY	CEDC YOUNGS BAY NET	ODFW		44	AD Fin Clp	45210
5	1-Aug-09	633579	2006	GROVERS CR 15.0299	GROVERS CR HATCHERY	SUQ	210737	76	AD Fin Clp	49098
5	1-Aug-09	634184	2006	WENATCHEE R 45.0030		WDFW		46	AD Fin Clp	50561
5	1-Aug-09	633389	2006	FRIDAY CR 03.0017	SAMISH HATCHERY	WDFW	633390	60	AD Fin Clp	45208
5	1-Aug-09	068608	2007	SAN PABLO BAY NET PENS	FEATHER R HATCHERY	CDFG		49	AD Fin Clp	45209
5	1-Aug-09	633987	2006	SNK BLW GRANDE RHOND	LYONS FERRY HATCHERY	WDFW		55	AD Fin Clp	49096
5	1-Aug-09	612512	2006	CAPTAIN JOHNS PD	LYONS FERRY HATCHERY			60	AD Fin Clp	49097
5	1-Aug-09	633986	2006	SNK BLW GRANDE RHOND	LYONS FERRY HATCHERY	WDFW		61	AD Fin Clp	49844
5	1-Aug-09	054276	2007	SPRING CR 29.0159	SPRING CR NFH	FWS	054275,054274	50	Unkn Marks	49849
5	1-Aug-09	633987	2006	SNK BLW GRANDE RHOND	LYONS FERRY HATCHERY	WDFW		53	AD Fin Clp	45158
5	1-Aug-09	633987	2006	SNK BLW GRANDE RHOND	LYONS FERRY HATCHERY	WDFW		51	AD Fin Clp	45207
5	1-Aug-09	633987	2006	SNK BLW GRANDE RHOND	LYONS FERRY HATCHERY	WDFW		50	AD Fin Clp	49850
5	2-Aug-09	612513		Big Canyon	LYONS FERRY HATCHERY			57	AD Fin Clp	45202
5	2-Aug-09	633987	2006	SNK BLW GRANDE RHOND	LYONS FERRY HATCHERY	WDFW		59	AD Fin Clp	45162
5	2-Aug-09	634184	2006	WENATCHEE R 45.0030		WDFW		54	AD Fin Clp	45163
5	2-Aug-09	633987	2006	SNK BLW GRANDE RHOND	LYONS FERRY HATCHERY	WDFW		54	AD Fin Clp	45195
5	2-Aug-09	054276	2007	SPRING CR 29.0159	SPRING CR NFH	FWS	054275,054274	56	AD Fin Clp	45203
5	2-Aug-09	633598	2005	SNK BLW GRANDE RHOND	LYONS FERRY HATCHERY	WDFW		66	AD Fin Clp	45205
5	2-Aug-09	612516	2006	CAPTAIN JOHNS PD	LYONS FERRY HATCHERY			57	Unmarked	45164
5	2-Aug-09	633987	2006	SNK BLW GRANDE RHOND	LYONS FERRY HATCHERY	WDFW		60	AD Fin Clp	45191
5	2-Aug-09	068009	2007	SAN PABLO BAY NET PENS	FEATHER R HATCHERY	CDWR		56	AD Fin Clp	45198
5	2-Aug-09	633473	2006	COWLITZ R 26.0002	COWL SALM + COWL FRIENDS	WDFW		72	AD Fin Clp	45201
5	2-Aug-09	633391	2006	CLEAR CR 11.0013C	NISQUALLY HATCHERY	NISQ		52	AD Fin Clp	45204
5	2-Aug-09	633882	2006	BIG SOOS CR 09.0072	SOOS CREEK HATCHERY	WDFW	633883	61	AD Fin Clp	49078
5	2-Aug-09	633875	2006	PURDY CR 16.0005	GEORGE ADAMS HATCHRY	WDFW	633876	74	AD Fin Clp	45192
5	3-Aug-09	053874	2007	SPRING CR 29.0159	SPRING CR NFH	FWS	053777,053776	55	AD Fin Clp	49837
5	3-Aug-09	633799	2006	COLUMBIA R - GENERAL		WDFW		48	AD Fin Clp	45221
5	3-Aug-09	210735	2006	COUNTY LINE CR3.2363		WDFW		67	AD Fin Clp	45165
5	3-Aug-09	633987	2006	SNK BLW GRANDE RHOND	LYONS FERRY HATCHERY	WDFW		55	AD Fin Clp	45222
5	5-Aug-09	633987	2006	SNK BLW GRANDE RHOND	LYONS FERRY HATCHERY	WDFW		53	AD Fin Clp	45227
5	5-Aug-09	210739	2006	HOKO R 19.0148	HOKO FALLS HATCHERY	MAKA		61	AD Fin Clp	49082
5	5-Aug-09	107502	2007	SNAKE@ HLLS CNYON DM	OXBOW HATCHERY	IDFG		44	AD Fin Clp	45189
5	5-Aug-09	633899	2006	GOBAR CR 27.0073	KALAMA FALLS HATCHRY	WDFW		70	AD Fin Clp	45188

Area	Recov Date	Tag Code	Brood Yr	Release Site	Rearing Hatchery	Rel Agency	DIT codes	FKLcm	Mark	Label
5	5-Aug-09	633889	2006	VOIGHT CR 10.0414	VOIGHTS CR HATCHERY	WDFW		72	AD Fin Clp	45223
5	5-Aug-09	633987	2006	SNK BLW GRANDE RHOND	LYONS FERRY HATCHERY	WDFW		56	AD Fin Clp	41292
5	5-Aug-09	633875	2006	PURDY CR 16.0005	GEORGE ADAMS HATCHRY	WDFW	633876	57	AD Fin Clp	45224
5	5-Aug-09	633369	2005	FRIDAY CR 03.0017	SAMISH HATCHERY	WDFW	633368	67	AD Fin Clp	49845
5	6-Aug-09	633987	2006	SNK BLW GRANDE RHOND	LYONS FERRY HATCHERY	WDFW		48	AD Fin Clp	41279
5	6-Aug-09	633987	2006	SNK BLW GRANDE RHOND	LYONS FERRY HATCHERY	WDFW		58	AD Fin Clp	41280
5	6-Aug-09	612511		Captains Johns Ponds	LYONS FERRY HATCHERY			58	AD Fin Clp	49085
5	6-Aug-09	210730	2006	TULALIP CR 07.0001	BERNIE GOBIN HATCH	TULA		48	AD Fin Clp	45186
5	6-Aug-09	054276	2007	SPRING CR 29.0159	SPRING CR NFH	FWS	054275,054274	54	AD Fin Clp	49086
5	6-Aug-09	633391	2006	CLEAR CR 11.0013C	NISQUALLY HATCHERY	NISQ		69	AD Fin Clp	45187
5	6-Aug-09	094515	2006	COQUILLE R	COLE RIVERS HATCHERY	ODFW		73	AD Fin Clp	45257
5	6-Aug-09	633987	2006	SNK BLW GRANDE RHOND	LYONS FERRY HATCHERY	WDFW		52	AD Fin Clp	45252

Area	Recov Date	Tag Code	Brood Yr	Release Site	Rearing Hatchery	Rel Agency	DIT codes	FKLcm	Mark	Label
6	3-Jul-09	633372	2005	BIG SOOS CR 09.0072		WDFW	633371	74	AD Fin Clp	50769
6	16-Jul-09	633467	2005	GREEN R 09.0001	ICY CR HATCHERY	WDFW		80	AD Fin Clp	60051
6	19-Jul-09	633375	2005	VOIGHT CR 10.0414	VOIGHTS CR HATCHERY	WDFW		80	AD Fin Clp	60052
6	29-Jul-09	633875	2006	PURDY CR 16.0005	GEORGE ADAMS HATCHRY	WDFW	633876	70	AD Fin Clp	60053
6	2-Aug-09	633579	2006	GROVERS CR 15.0299	GROVERS CR HATCHERY	SUQ	210737	78	AD Fin Clp	60054
6	21-Jul-09	633382	2005	FINCH CR 16.0222	HOODSPORT HATCHERY	WDFW		78	AD Fin Clp	50770
6	26-Jul-09	633285	2005	GROVERS CR 15.0299	GROVERS CR HATCHERY	SUQ	210682	78	AD Fin Clp	60031
6	2-Aug-09	633375	2005	VOIGHT CR 10.0414	VOIGHTS CR HATCHERY	WDFW		74	AD Fin Clp	60055
6	4-Aug-09	633889	2006	VOIGHT CR 10.0414	VOIGHTS CR HATCHERY	WDFW		73	AD Fin Clp	50771
6	5-Aug-09	633382	2005	FINCH CR 16.0222	HOODSPORT HATCHERY	WDFW		78	AD Fin Clp	60058
6	6-Aug-09	633885	2006	ISSAQUAH CR 08.0178	ISSAQUAH HATCHERY	WDFW		64	AD Fin Clp	60056
6	1-Jul-09	633372	2005	BIG SOOS CR 09.0072		WDFW	633371	92	AD Fin Clp	60032
6	2-Jul-09	633285	2005	GROVERS CR 15.0299	GROVERS CR HATCHERY	SUQ	210682	76	AD Fin Clp	60038
6	2-Jul-09	633382	2005	FINCH CR 16.0222	HOODSPORT HATCHERY	WDFW		73	AD Fin Clp	60033
6	2-Jul-09	633285	2005	GROVERS CR 15.0299	GROVERS CR HATCHERY	SUQ	210682	79	AD Fin Clp	60034
6	2-Jul-09	633369	2005	FRIDAY CR 03.0017	SAMISH HATCHERY	WDFW	633368	74	AD Fin Clp	60037

Appendix H. Fishery-total estimates of retained and released salmon (Chinook and other species) catch for the Area 5 summer 2009 Chinook mark-selective Chinook fishery, July 1 – August 6, 2009. Displayed Chinook harvest values are equivalent to those in **Table 3**; whereas the release estimates displayed in **Table 3** are based on the Conrad and McHugh (2008) method, these are based solely on angler-reported data. Values may not add exactly due to rounding error.

Month	Stat. Week	Start Date	End Date	Effort		Retained Chinook		Other Species Kept			Released Chinook			Other Species Released					
				Boats	Anglers	AD	UM	AD Coho	UM Coho	Pink	AD	UM	Unk	AD Coho	UM Coho	Unk Coho	Pink	Chum	Unk Salmon
July	27	29-Jun	05-Jul	1,719	3,872	1,248	26	677	0	111	456	2,410	745	80	1,160	117	14	9	87
	28	06-Jul	12-Jul	2,443	5,609	1,619	27	953	5	1,425	528	3,002	1,131	156	3,319	59	233	0	393
	29	13-Jul	19-Jul	1,343	3,133	405	57	452	29	539	495	2,217	938	98	1,566	72	401	0	162
	30	20-Jul	26-Jul	1,434	3,457	724	29	1,302	41	1,268	318	2,280	920	175	2,880	299	327	0	426
	31	27-Jul	02-Aug	2,157	5,164	1,357	196	1,680	34	3,210	837	3,209	1,954	225	3,710	1,204	920	0	366
Aug.	32	03-Aug	06-Aug	1,022	2,427	605	104	3,473	66	1,946	1,038	2,350	1,986	177	2,050	1,195	391	0	178
Season Total:				10,118	23,662	5,958	439	8,537	175	8,499	3,671	15,469	7,675	911	14,684	2,944	2,286	9	1,613
Variance:				484,551	2,521,086	419,937	40,075	848,108	1,601	3,214,310	1,247,056	2,019,665	1,474,590	126,896	5,119,402	4,997,773	219,489	55	271,372
Standard Error:				696	1,588	648	200	921	40	1,793	1,117	1,421	1,214	356	2,263	2,236	468	7	521
CV (%):				6.9%	6.7%	10.9%	45.6%	10.8%	22.8%	21.1%	30.4%	9.2%	15.8%	39.1%	15.4%	75.9%	20.5%	84.1%	32.3%
95% CI:				8,753-11,482	20,550-26,774	4,688-7,228	47-832	6,732-10,342	97-254	4,985-12,013	1,482-5,860	12,684-18,254	5,295-10,055	213-1,609	10,250-19,119	1,438-7,326	1,368-3,205	6-23	592-2,634

Appendix I. Season-total estimates of Chinook encounters by size/mark status, and total estimates of angler effort, summarized for all seasons to date (2003-2009) of the Area 5 summer mark-selective Chinook fishery.

Area	Season Dates	Effort (Angler Trips)	Retained Chinook				Released Chinook				Total Encounters
			LM	LU	SM	SU	LM	LU	SM	SU	
5	July 5 - August 3, 2003	19,398	2,251	53	225	0	336	3,435	1,656	5,174	13,131
5	July 1 - August 10, 2004	25,174	2,706	0	194	0	404	4,017	1,167	2,462	10,950
5	July 1 - August 10, 2005	30,115	1,520	23	100	26	227	1,418	1,210	1,459	5,984
5	July 1 - August 14, 18-21, 2006	23,177	3,105	10	196	7	464	3,125	1,010	2,212	10,129
5	July 1 - August 9, 2007	18,830	2,969	23	280	94	444	2,509	1,371	1,118	8,808
5	July 1 - August 10, 2008	13,004	2,773	0	45	0	414	1,869	65	330	5,496
5	July 1 - August 6, 2009	23,662	4,843	78	1,115	362	724	6,210	9,823	14,309	37,463