Marine Areas 11 and 13
Mark-Selective Recreational Chinook Fishery,
Summer 2009

Post-season Report

REVISED DRAFT

June 21, 2010

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Background and Overview

The Washington Department of Fish and Wildlife (WDFW) implemented mark-selective Chinook fisheries (MSFs) in Marine Areas 11 (June 1-September 30) and 13 (May 1-September 30) for the third time during the summer of 2009. 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) implemented an intensive monitoring program in Area 11 in order to collect the data needed to provide in-season catch estimates and to estimate key parameters characterizing the fishery and its impacts on unmarked salmon. Area 11 sampling activities included dockside creel sampling, test fishing, on-the-water effort surveys, and intensive efforts to distribute and collect voluntary trip reports (VTRs) from the angling public. Among other parameters, Area 11 efforts emphasized data collection needs for the estimation of: *i*) the mark rate of the targeted Chinook population, *ii*) the total number of Chinook salmon harvested (by size [legal or sublegal] and mark-status [marked or unmarked] group), *iii*) the total number of Chinook salmon released (by size/mark-status group), *iv*) the coded-wire tag- (CWT) and/or DNA-based stock composition of marked and unmarked Chinook mortalities[1], and *v*) the total mortality of marked and unmarked double index tag (DIT) CWT stocks. In contrast, a reduced sampling program was employed in Area 13 for logistical reasons. Area 13 monitoring activities included sampling for the estimation of: *i*) mark rates (based on voluntary trip reports provided by private anglers), *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.

Area 11 Summary

Creel samplers staffed six different access sites (two on any given sampling day) on 140 site-days during the four months (June 1 through September 30, 2009) that Area 11 was open to Chinook retention under mark-selective regulations. Samplers interviewed an estimated 18% of all anglers fishing in the area (n = 14,663 anglers). Additionally, they sampled an estimated 26% (n = 852) of all marked Chinook harvested during the fishery. Other PSSU staff conducted 17 on-the-water effort surveys (9 on weekdays, 8 on weekends), and spent 80 days (448 hours) on the water pursuing Chinook using test-fishing methods, in support of Area 11 monitoring efforts.

[1] 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.

Based on the combination of sampling activities, we estimated that 80,715 trips were completed by Area 11 anglers between June 1st and September 30th. With a season-wide CPUE of 0.04 Chinook retained per angler trip, these anglers harvested a grand total of 3,277 marked Chinook during the fishery. Anglers additionally released an estimated 8,892 Chinook (4,305 marked, 4,587 unmarked). Overall, 2009 catch rates for Chinook (retained Chinook per angler trip) were lower than those observed in Area 11 during the summers of 2007 and 2008 (WDFW 2007b and 2009c). Effort levels (estimated angler trips) in Area 11 were similar in 2009 compared to 2008.

During the four-month Area 11 fishery, harvested Chinook averaged 76 cm (range: 37 to 99 cm) in total length and were larger than the legal minimum size limit ($\geq$22 in or 56 cm TL) in most instances (dockside marked Chinook observations, 96% of legal size). Further, more than half of all harvested individuals were 4-year olds (i.e., brood year 2005). In addition to taking length measurements and scale samples, ramp samplers recovered 63 CWTs from marked Chinook harvested in Area 11. The majority of these recoveries (63%) were from Hood Canal and Central Puget Sound facilities, primarily Voights Creek and Hoodsport hatcheries.

Over the entire Area 11 season, test fishers encountered 43 Chinook salmon, 86% of which were marked (all sizes) and 84% of which were of legal size (ad-marked and unmarked fish combined). With a "CPUE" (legal-marked Chinook *encounters* / angler trip) of 0.17, test fishers encountered legal-marked Chinook at a substantially higher rate than did the private recreational fleet. Test-fishery Chinook total lengths averaged 67 cm (marked and unmarked mean; range: 33-90 cm). For the four-month season combined, we estimated the size/mark-status composition of the test fishery to be 63% legal-marked (LM), 12% legal-unmarked (LU), 23% sublegal-marked (SM), and 2% sublegal-unmarked (SU).

Over the entire Area 11 season, fleet anglers returned 389 VTR's, representing 701 angler trips and 689 Chinook encounters. With a season-wide average CPUE of 0.28 legal-marked Chinook/angler trip, VTR anglers encountered Chinook at a greater rate than both test fishers and the recreational fleet. For the four-month season combined, we estimated the size/mark-status composition from the VTR's to be 30% legal-marked (LM), 11% legal-unmarked (LU), 32% sublegal-marked (SM), and 27% sublegal-unmarked (SU).

By combining dockside-sampling results (i.e., legal-marked Chinook harvest estimates) and VTR-based encounters data (due to high VTR sample sizes compared to test fishery data), we generated size/mark-status group-specific estimates of encounters and mortalities for Area 11. In total, 12,205 Chinook were encountered (retained and released) during the Area 11 fishery, with 3,631 of these being legal-marked, 1,293 legal-unmarked, 3,950 sublegal-marked, and 3,330 sublegal-unmarked individuals. Among released encounters, an estimated 71 legal-marked, 191 legal-unmarked, 767 sublegal-marked, and 663 sublegal-unmarked Chinook (1,691 overall) were estimated to have died due to handling and release effects of the Area 11 fishery. Thus, in total, 4,114 marked (80% due to direct harvest) and 891 unmarked Chinook mortalities occurred as a result of the Area 11 MSF. Overall, estimated impacts were similar to (unmarked mortalities) or considerably less than (marked encounters or mortalities) what was expected based on pre-season Fishery Regulation Assessment Model runs (model run

2309). Finally, regarding impacts of MSFs on the coded-wire tag (CWT) program, we estimated that as many as 10 unmarked Chinook belonging to double-index tag (DIT) groups may have died due to the handling-and-release impacts of the Area 11 MSF.

Area 13 Summary

Between May 1st and September 30th, 2009, samplers conducted Baseline sampling[2] at 23 different sites used to access the Area 13 MSF. As a result, samplers acquired catch (kept and released) and effort information on 2,149 completed angler trips. Over all interviews, ramp samplers observed anglers harvest a total of 68 Chinook (67 marked, 1 unmarked) and recorded 117 angler-reported Chinook releases (47 marked, 18 unmarked, and 52 of unknown mark status). Given these observations, we estimated the season-wide Area 13 CPUE at 0.03 Chinook retained per angler trip, a value that was low in general and half of what was observed during 2008.

During the five-month Area 13 fishery, harvested Chinook averaged 76 cm (range: 40 to 98 cm) in total length and were larger than the legal minimum size limit ($\geq$22 in or 56 cm TL) in most instances (94% of marked fish). Further, 49% of all harvested individuals were 4-year olds (i.e., brood year 2005), while 43% were 3-year olds. In addition to collecting length data and scales, ramp samplers recovered three CWTs from marked Chinook harvested in Area 13, all of which were from South Puget Sound facilities.

Though we did not test fish in Area 13 during its mark-selective Chinook season, we estimated the overall and legal-sized mark rate based on angler-supplied voluntary trip reports (VTRs). In total, 18 separate VTRs were returned, providing size/mark-status details on 36 individual Area 13 Chinook encounters. VTR-supplied data, in combination with dockside interview results, suggest that high (i.e., 60-70%) mark rates were present throughout the Area 13 mark-selective Chinook fishery.

[2] The Area 13 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 (i.e., CPUE) will be combined with catch record card (CRC) data to obtain these values at a later time.

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 encountered[3].

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 May 1 through September 30, 2009, the Washington Department of Fish and Wildlife (WDFW) implemented a summer mark-selective Chinook fishery in Areas 11 and 13 for the third time. 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 this pilot fishery 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 11 and 13 selective Chinook fisheries, WDFW's Puget Sound Sampling Unit was tasked with implementing an intensive monitoring program during the entirety of their respective four- and five-month, 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 11 fishery, we tailored sampling efforts so that we could reliably estimate: *i*) the mark rate of the targeted Chinook population (based on test fishing and voluntary trip reports [VTRs]), *ii*) *fishery-total* angling effort and Chinook salmon encounters and mortalities

[3]The regulations specific to the 2009 Areas 11 and 13 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 11 and 13 mark-selective fisheries, and *iii*) held to a handling rule that prevented them from bringing unmarked and/or sublegal Chinook aboard their vessels.

(harvest + releases, by size [legal or sublegal] and mark-status [marked or unmarked] group), *iii*) the coded-wire tag- (CWT) and/or DNA-based stock composition of marked and unmarked Chinook mortalities[4], and *iv*) *fishery-total* mortality of marked and unmarked double index tag (DIT) CWT stocks. For the Area 13 fishery, we employed a reduced monitoring program, which included sampling for the estimation of: *i*) mark rates (based on voluntary trip reports provided by private anglers), *ii*) indices of Chinook encounters and angling effort (i.e., sample frame observations, *not* fishery totals[5]), 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 Chinook, and the overall intensity of our sampling efforts.

In the following pages, we report the results generated through our Areas 11 and 13 monitoring activities, separately. We first provide a brief review 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 11 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; *iii*) results from our recreational test fishery are presented; *iv*) results from our enhanced voluntary trip report (VTR) program are presented; and *v*) 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 13 results, inclusive of items *i* and *ii*. Finally, we provide a detailed description of our estimation scheme as well as additional and relevant data in a series of appendices (i.e., sample-rate tables and sampling summaries; age composition tables [for landed catch and test fishery encounters]; and raw CWT recoveries).

Marine Catch Area and Fishery Descriptions

At just over 80 square miles (205 km^2), Area 11 encompasses the central-south Puget Sound marine waters extending from the northern end of Vashon Island southward to the northernmost Tacoma Narrows Bridge, including the marine waters of Colvos Passage on the western shore of Vashon Island (**Figure 1-1**). Extending southward from the northernmost Narrows Bridge, Marine Area 13 includes all marine waters (~125+ mi^2 [320 km^2]) in the southern terminus of Puget Sound (**Figure 1-2**). Marine Area 13 is geographically more complex than Area 11 and includes several islands, inlets, and passageways. Given their proximity to urban centers (Tacoma [Area 11] and Olympia [Area 13]), both areas 11 and 13 draw appreciable local, tourist, and charter-based angling effort during summer months. In addition to Chinook salmon, these anglers pursue and encounter coho salmon (*O. kisutch*) and, during odd years, pink salmon (*O. gorbuscha*). During the summer of 2009, Areas 11

[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 catch record card (CRC) return data to produce *fishery total* catch and effort estimates for Area 13.

and 13 were open under mark-selective Chinook harvest regulations from June 1 through September 30 and May 1 through September 30, respectively.

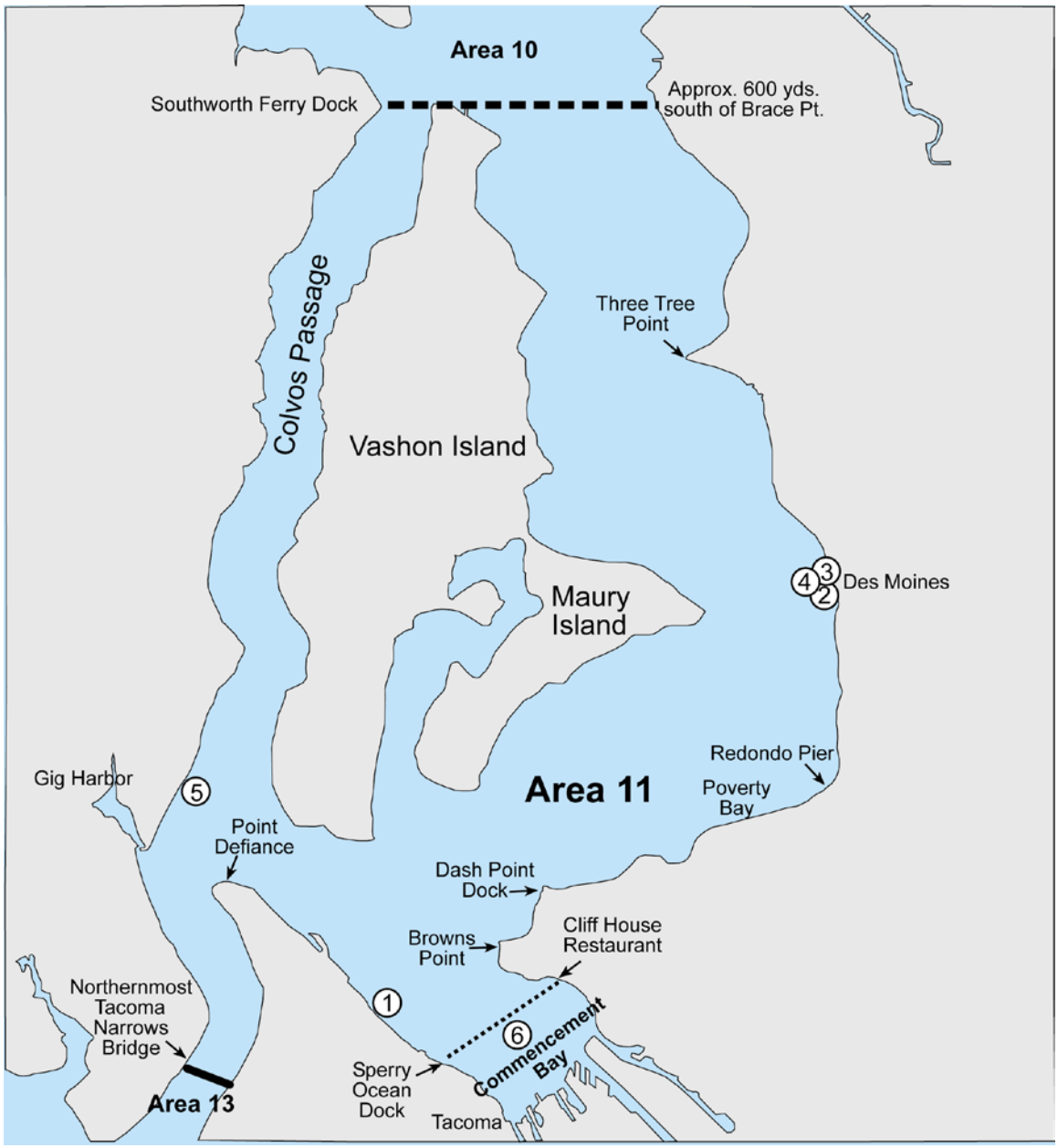

Figure 1-1. Map of Marine Catch Area 11 in Puget Sound, where the third season of the pilot selective Chinook fishery occurred from June 1-September 30, 2009. Note that the circled numbers in this figure correspond to special-area regulations for the 2009-10 fishing season (see 2009/2010 WDFW Sport Fishing Rules for details).

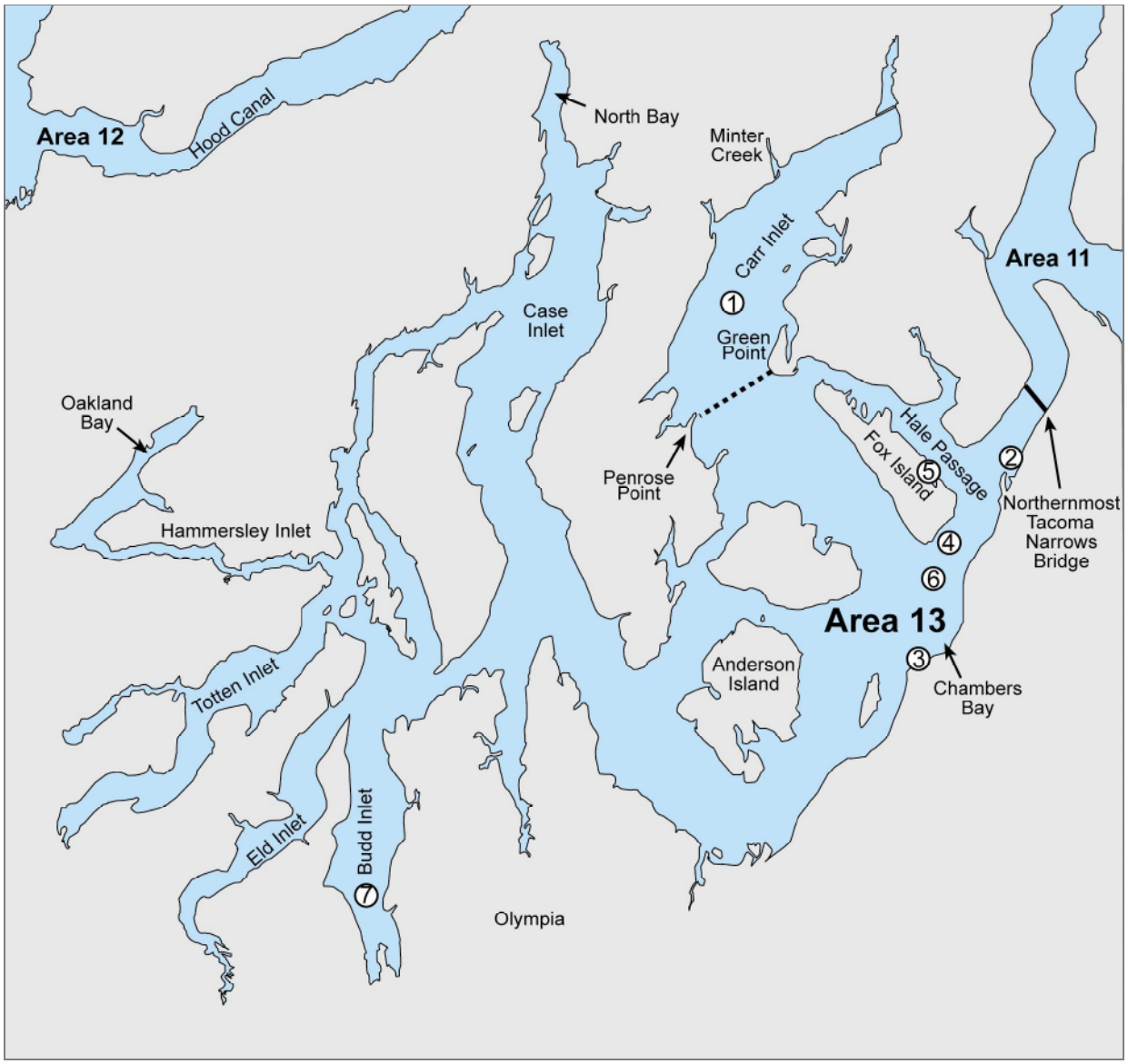

Figure 1-2. Map of Marine Catch Area 13 in Puget Sound, where the third season of the pilot selective Chinook fishery occurred from May 1-September 30, 2009. Note that the circled numbers in this figure correspond to special-area regulations for the 2009-10 fishing season (see 2009/2010 WDFW Sport Fishing Rules for details).

AREA 11 METHODS

Monitoring Program Overview

Our sampling program for the Area 11 mark-selective Chinook fishery incorporated comprehensive and complementary data collection strategies, including dockside angler interviews (with catch sampling), on-the-water (instantaneous) effort surveys, test fishing, and voluntary reports of completed trips provided by private anglers (**Figure 2**). Relative to the survey design used during Area 11's 2007 and 2008 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 11 monitoring efforts here, WDFW 2007b and WDFW 2008a provide comprehensive descriptions of all aspects of our MSF sampling program.

Catch and Effort Sampling

We collected data on total catch (observed harvest and reported releases[6]) 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), and 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 11 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 11 (Armeni Ramp, Gig Harbor Ramp, Narrows Marina, Point Defiance Boathouse, Point Defiance Ramp, and Redondo Ramp). 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 two seasons of the Area 11 MSF (2007 and 2008; WDFW 2007b and 2009c) 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.

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

[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 11 fishery.

party possessed Chinook or coho salmon, samplers inspected them for CWTs using wand detectors, and collected snouts from CWT-positive individuals for later lab processing.

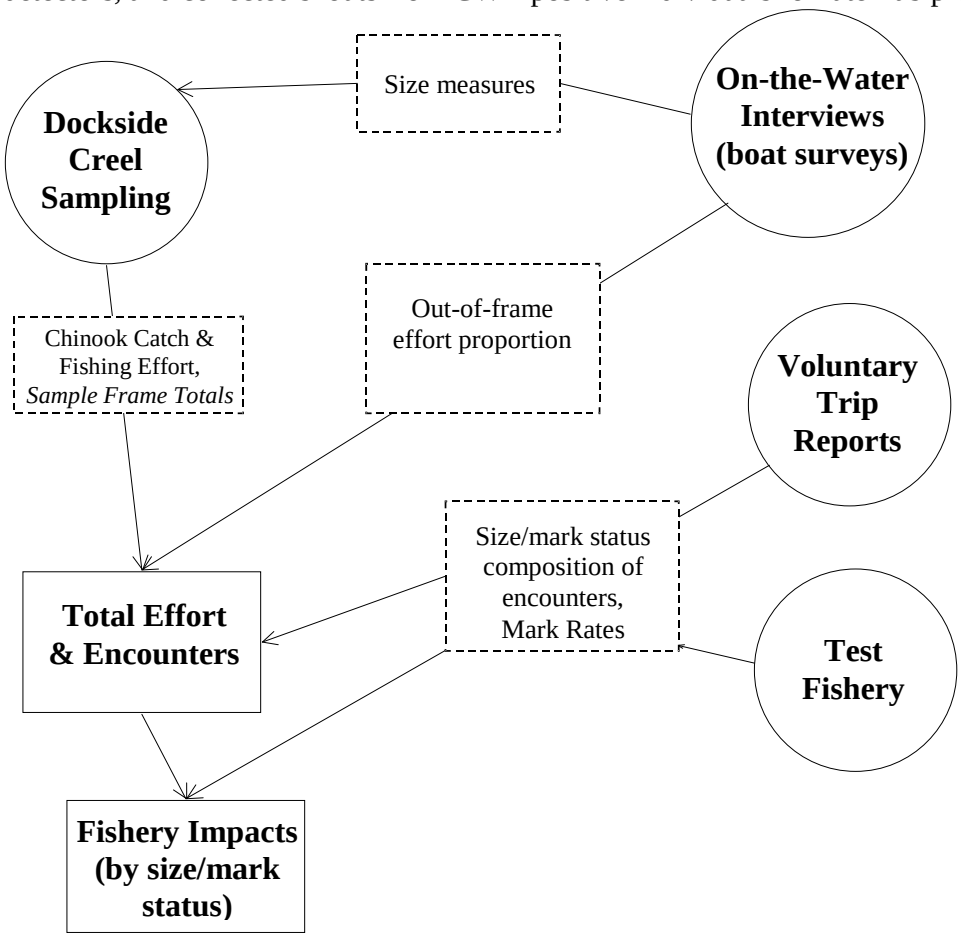

Figure 2. Conceptual diagram of the monitoring plan implemented in Area 11 during the June 1-September 30, 2009 mark-selective Chinook season. Circles represent discrete sampling activities; dashed boxes represent parameters that are estimated using data from a given activity; and solid boxes depict key quantities estimated from the comprehensive plan. 'Encounters' includes both harvested and released Chinook salmon.

Test Fishery Methods

In order to obtain estimates of the size (legal or sublegal) and mark-status (marked or unmarked) composition of the pool of Chinook salmon encountered by anglers participating in the fishery, we conducted a recreational test fishery during the entirety of the mark-selective Chinook season. Our test boat crew consisted of two WDFW technicians, each fishing with a single rod for approximately five days a week (Monday-Friday, weather and conditions permitting). Test fishers focused their efforts at locations that optimized their overall encounter rate and mirrored choices made by the at-large private fleet. Also, test fishers fished for Chinook using the same methods as the recreational fleet, as prescribed by supervisory staff based on dockside interview results for the preceding week. For each fish brought to boat, test fishers logged details on its identity (species), size (fork length and total length), and, if appropriate, mark status (marked or unmarked). For Chinook salmon encounters only, test fishers additionally collected scale and DNA samples (~1-cm^2 piece of dorsal fin tissue).

Voluntary Trip Report Methods

The 2009 Area 11 summer mark-selective Chinook season was the first season in which we evaluated the feasibility of using an enhanced voluntary trip report (VTR) sampling program to obtain estimates of the size/mark-status composition of the pool of Chinook salmon encountered by anglers during the Area 11 mark-selective Chinook fishery. Our objectives were to determine: *i*) if a dedicated on-site VTR distribution/collection effort could produce a sizeable and representative response from anglers fishing in MSFs, and *ii*) whether the Chinook encounters data (e.g., size/mark-status composition estimates) acquired from VTRs would be similar to those collected by test fishers in Area 11. For the first objective, we deemed this "enhanced" VTR effort successful if VTRs provided, at minimum, a larger encounters sample than the test fishery, as well as a larger encounters sample than the VTR program implemented during previous mark-selective Chinook seasons in Area 11 (2007 and 2008, WDFW 2007b and WDFW 2009c).

We took several measures to help ensure the success of our enhanced VTR program in Area 11. First, we developed a simplified, user-friendly form (i.e., it requires less information than our old form and participants can circle their responses) and assigned a dedicated sampler the duty of distributing forms to every possible angling party at the start of their trip during the four-month selective fishery (i.e., to recruit participants on site). The Area 11 VTR sampler focused his attention primarily on high-use access sites and began shifts early (typically 0500 hours) in order to intercept as many anglers as possible. Additionally, the VTR technician and other dockside 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.

Catch and Effort Estimation

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 11 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 Murthy estimator, 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**).

Prior to generating fishery-total Chinook encounter estimates for the 2009 Area 11 mark-selective Chinook fishery, we evaluated test fishery versus voluntary trip report (VTR)-based estimates of Chinook encounters composition 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]). Our enhanced VTR efforts in Area 11 during summer 2009 (see section below titled *Voluntary Trip Report Methods*) resulted in a relatively high sample size of Chinook encounters (n=689) versus a relatively low sample size of Chinook encounters in the test fishery (n=43) over the four-month Area 11 season. Further, estimates of Chinook encounter composition by mark-status/size class were significantly different (based on χ^2 tests for homogeneity) in comparing test fishery and VTR data sets; therefore, we could not justify pooling the test fishery and VTR data, and we elected to use only the VTR data for our encounter rate estimates by mark-status/size class (see details in ***Results*** section below).

Estimating Fishery Impacts

Total Encounters and Mortalities

We characterized the overall impacts of the fishery in terms of grand-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 11 and 13 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 test fishery-based proportion (or, in the case of the 2009 Area 11 season, VTR-based proportions) 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.

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 11 fishery on the CWT program, we estimated the total number of unmarked-tagged Chinook mortalities that may have occurred during the course of the 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 encountered[7]. We subsequently estimated the number of these fish that may have died due to hook-and-release impacts using a *sfm* analogous 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 a *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.

[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.

Table 1. Sampling/estimation details on target parameters associated with the overall Area 11 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[2]; fishing methods for encountered Chinook	Angler trip; kept fish; reported fish release	Bi-weekly[1]	Within two-week time periods, estimates are also produced by strata (weekday/weekend).
Test Fishing	Size (legal/sublegal) and mark-status composition (marked, unmarked) of encountered Chinook	Chinook length, age, and DNA-based[3] stock composition; species composition of non-Chinook encounters	Fish encounter	Season (4 months, June-Sept)	Though they were qualitatively examined, too few encounters occurred to rigorously assess mark rates on a finer time scale.
Voluntary Trip Reports (VTRs)	Size (legal/sublegal) and mark-status composition (marked, unmarked) of encountered Chinook	Encounter data for non-Chinook species (e.g., coho) that the angler may record on the VTR form	Fish encounter	Season (4 months, June-Sept)	Pooled Chinook encounter data at the season-total level and applied overall size/mark status proportions from VTRs to estimate total Chinook encounters and mortalities by size/mark-status group.
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 (4 months, June-Sept)	Estimated on a monthly time step but considered at the season-total level.
Coded-wire tag (CWT) Impacts Estimation	Marked/unmarked double-index tag (DIT) encounters and mortalities	N/A	N/A	Season (4 months, June-Sept)	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 test fishery data allow.
[2] The length and CWT composition of landed catch was assessed on a season-wide basis for impact estimation.
[3] Though samples were collected, DNA-based estimates of stock composition are not yet available for this fishery.

AREA 13 METHODS

Data collection methods used to monitor the Area 13 mark-selective Chinook fishery included dockside angler interviews (with catch sampling) and voluntary trip reports provided by private anglers. 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 described relative catch and effort patterns over the five-month (May 1 – September 30, 2009) season based on the assumption that baseline-sampling observations of these parameters are good indicators of associated fishery-wide trends.

We conducted "Baseline Sampling" at selected Area 13 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 13 baseline sample frame included 23 different access sites (listed in Area 13 ***Results*** section) each of which was visited on an average of 15 days during the five-month season. Site visits lasted 5.2 hours on average and ranged from short (e.g., "no effort" samples) to full-day (11+

hour) sampling events. When present, samplers interviewed all anglers exiting the Area 13 fishery at the selected access site. The interview and catch-sampling procedures employed in Area 13 were identical to those used in Area 11, less the collection of fishing methods information. Thus, Area 13 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 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 (i.e., the "Murthy" design) employed in Area 11, Area 13 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 13 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, by month. Thus, while these descriptors of MSF impacts are not presented in the present document, they will be available for at a future time.

AREA 11: RESULTS & DISCUSSION

Summary of Sampling Efforts

Sampled Access Sites

From June 1 through September 30, 2009, we sampled the recreational fleet via dockside creel surveys at six different access sites for a grand total of 140 site-days in Area 11 (**Table 2**). We sampled anglers at Point Defiance ramp (50% of site-days), Point Defiance boathouse (19% of all site-days), Redondo Ramp (14%), and Gig Harbor Ramp (10%) most frequently; remaining dockside sampling effort was split between Armeni Ramp (4%) and Narrows Marina (4%). Our dockside sampling efforts were generally distributed across sites in a manner proportional to the level of effort originating at each (i.e., as estimated from boat survey data, described below; **Appendix D**).

In total, our Area 11 angler-interview efforts allowed us to directly sample 14,663 completed angler trips and 6,924 completed boat trips. These efforts also yielded samples from 852 landed Chinook salmon (ad-marked and unmarked combined; e.g., **Table 5**, **Appendix C**). In addition to interviewing anglers and sampling their catch within the context of this MSF-specific study, we obtained additional samples from baseline recreational sampling activities that were ongoing during the Areas 11 and 13 seasons.

On-the-Water Survey Summary

During the four-month period that Area 11 was open under mark-selective regulations, we conducted a total of 9 weekday and 8 weekend boat surveys, intercepting a total of 2,684 anglers occupying 1,336 boats (**Appendix D**). These surveys yielded quantitative details about the set of sites anglers used to access Area 11 and thus allowed us to estimate the proportion of effort originating at each of our sample-frame sites (i.e., size measures; **Appendix E**) during both weekday and weekend strata. As suggested above, Point Defiance Ramp was the site that anglers most frequently reported using to access Area 11, followed by Des Moines Marina (not in the sample frame), Redondo Ramp, Point Defiance Boat House, Gig Harbor Ramp, Armeni Ramp, and Narrows Marina. Pooled over all surveys, less than half (41%) of all anglers interviewed during Area 11 boat surveys indicated that their trip would end at either a private or never-sampled launch site (**Appendix D**). Boat surveys revealed a modest level of variability in the relative "size" of sampled access sites (**Appendix E**); we incorporated this variation into our PPS site-selection framework.

Table 2. List of sites sampled, with the number of sampling events (site-days), during the Area 11 summer 2009 mark-selective Chinook fishery, from June 1 through September 30, 2009.

Marine Area	Location	Number Site-Days Sampled per Month				Total Site-Days	% of Total
		June	July	August	September		
11	Armeni Public Ramp	0	2	1	3	6	4%
	Gig Harbor Ramp	3	3	4	4	14	10%
	Narrows Marina	0	1	2	2	5	4%
	Point Defiance Boathouse	10	8	4	4	26	19%
	Point Defiance Public Ramp	16	20	16	18	70	50%
	Redondo Ramp	3	6	4	6	19	14%
	Grand Total	**32**	**40**	**31**	**37**	**140**	**100%**

Table 3. Monthly summary of boat surveys conducted during the Area 11 summer 2009 mark-selective Chinook fishery, between June 1 and September 30, 2009.

Boat survey sampling dates: Area 11, 2009		
Month	**Weekday**	**Weekend**
June	9, 13, 20, 30	14, 22, 26
July	16, 30	11, 17
August	16, 19	1, 7, 22
September	10	--
Total Number	**9**	**8**

Fishery Characteristics

Estimates of Fishing Effort and Chinook Catch

Across the Area 11 summer season, anglers completed an estimated total of 80,715 angler trips (40,156 boat trips) between June 1 and September 30, 2009 (**Table 4**). Estimated angler effort per week in Area 11 started off relatively low (approximately 2,400 angler trips during week 23), and then gradually climbed to a peak of 10,121 during week 34. Thereafter, weekly estimated angler trips dropped abruptly to a season low, averaging approximately 2,000 angler trips per week during weeks 38 and 39 (the last two complete weeks of the fishery; **Figure 3**).

Angler catch rates (retained Chinook per angler trip; CPUE) did not follow the same trends as effort. The season began with the highest CPUE (>0.08 marked Chinook/angler trip) and declined sharply over the next three weeks to a CPUE of 0.03 retained Chinook per angler trip. A second peak in late July (week 31, CPUE = 0.08) was followed by a steady decline in catch rates through the end of the Area 11 fishery (**Figure 4**). Chinook salmon catch rates (CPUE) averaged 0.04 marked Chinook per angler trip over the course of the Area 11 fishery.

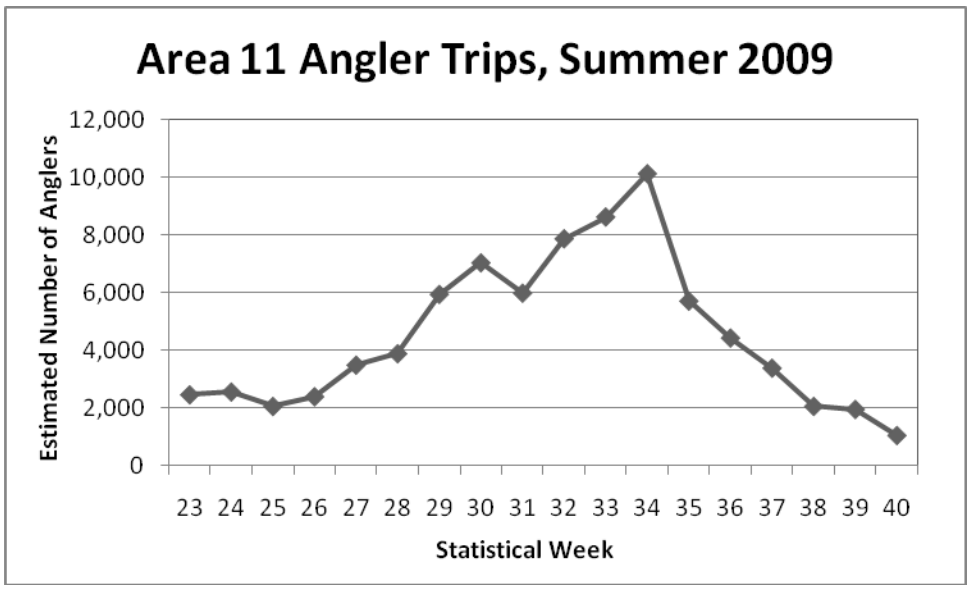

Figure 3. Temporal patterns in weekly total fishing effort (estimated number of angler trips) during the Area 11 summer 2009 mark-selective Chinook fishery, June 1 through September 30, 2009.

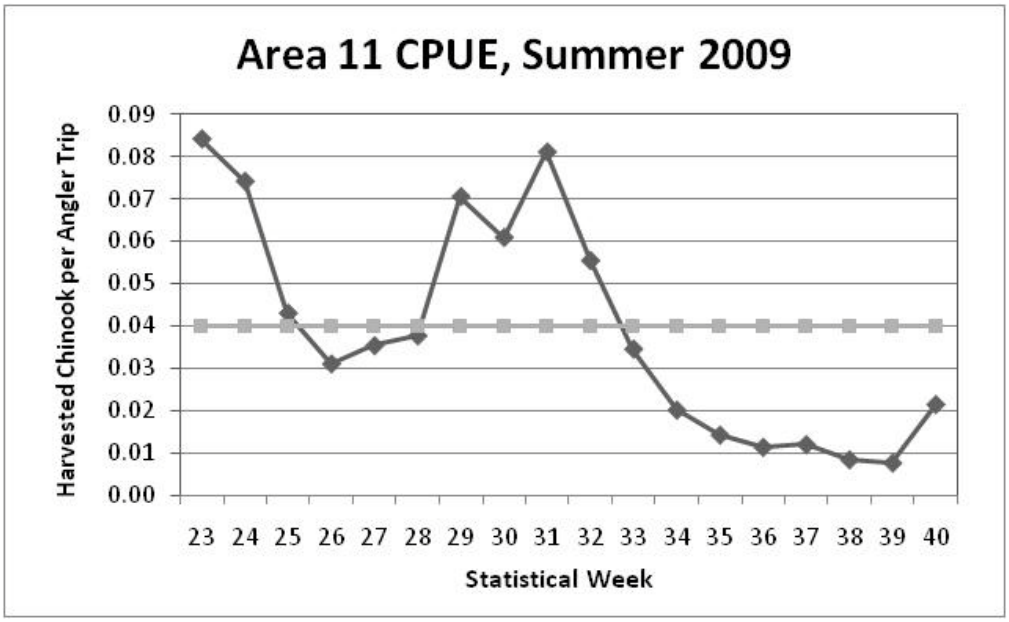

Figure 4. Temporal patterns in CPUE (landed marked Chinook per angler trip, weekly estimates) during the Area 11 summer 2009 mark-selective Chinook fishery, June 1 through September 30, 2009. The horizontal dashed line corresponds to the season-wide CPUE.

Given observed patterns in effort and catch rates, we estimated that anglers harvested a grand total of 3,314 (3,277 ad-marked and 37 unmarked) Chinook salmon in the Area 11 fishery (**Table 4**). Virtually all (99%) Chinook harvested were marked.

In addition to harvesting an estimated 3,314 Chinook salmon, anglers participating in the Areas 11 MSFs caught and released an additional estimated 4,305 marked and 4,587 unmarked Chinook salmon (**Table 4**)[8]. For anglers fishing in Area 11, weekly Chinook harvest totals were variable and averaged 184 (range: 15-482) per week during the four-month fishery. See **Figure 5** for a graphical display of temporal Chinook harvest and encounter patterns, exhibiting a unimodal trend with the peak weekly Chinook catch in late July (week 31).

On a season-total level, anglers released an estimated 1.3 marked and 1.4 unmarked Chinook per marked, harvested fish. Combining harvest and release estimates, we estimated that anglers encountered a grand total of 12,205 Chinook in Area 11 during their four-month mark-selective season (**Table 4**). For additional discussion of fishery impacts from a total encounters perspective, see the subsequent section titled *Overall Fishery Impacts*.

Finally, in addition to Chinook salmon, anglers harvested an estimated 2,810 (1,913 marked and 897 unmarked) coho salmon (*O. kisutch*), and 19,770 pink salmon (*O. gorbuscha*) during the June 1-September 30, 2009 Areas 11 fishery (**Appendix H**).

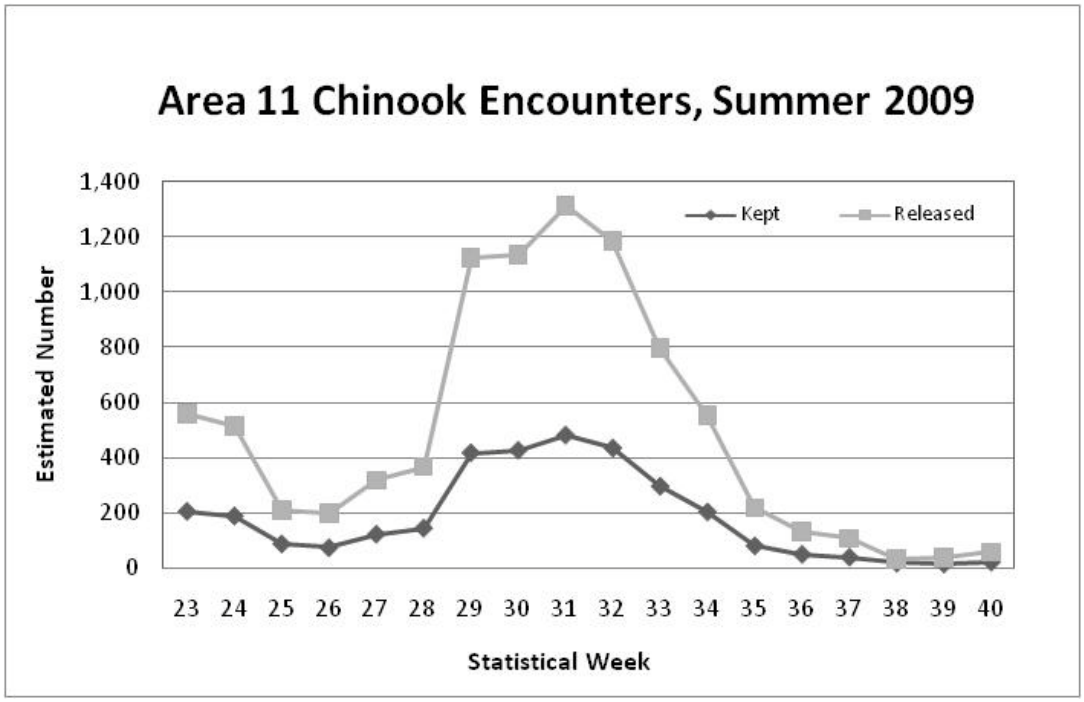

Figure 5. Temporal patterns in weekly total Chinook harvest and releases (ad-marked and unmarked combined) during the Area 11 summer 2009 mark-selective Chinook fishery, June 1 through September 30, 2009.

[8] Total Chinook releases were estimated using the bias-corrected "Method 2" encounters estimation approach (Conrad and McHugh 2008). For Murthy estimates of Chinook releases based solely on angler-reported releases (i.e., "Method 1" estimates), as well as estimates of harvest and releases for other salmon species, see **Appendix H**.

Table 4. Estimates of total fishing effort and the total number of salmon kept and released during the Area 11 summer 2009 mark-selective Chinook fishery, from June 1 through September 30, 2009. 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	
June	23	1-Jun	7-Jun	1,466	2,451	206	0	271	291	767
	24	8-Jun	14-Jun	1,462	2,549	189	0	248	267	704
	25	15-Jun	21-Jun	1,086	2,048	81	7	106	107	302
	26	22-Jun	28-Jun	1,232	2,385	74	0	97	104	276
July	27	29-Jun	5-Jul	1,817	3,482	119	4	156	164	443
	28	6-Jul	12-Jul	1,981	3,830	138	7	181	188	514
	29	13-Jul	19-Jul	3,132	5,935	414	4	544	580	1,542
	30	20-Jul	26-Jul	3,546	7,012	419	8	550	583	1,561
	31	27-Jul	2-Aug	2,843	5,956	482	0	633	680	1,795
Aug	32	3-Aug	9-Aug	3,736	7,839	435	0	571	614	1,620
	33	10-Aug	16-Aug	4,178	8,618	294	3	386	412	1,095
	34	17-Aug	23-Aug	4,532	10,121	204	0	268	288	760
	35	24-Aug	30-Aug	2,525	5,701	81	0	106	114	302
Sept	36	31-Aug	7-Sep	2,096	4,424	50	0	66	71	186
	37	8-Sep	13-Sep	1,685	3,376	40	0	53	56	149
	38	14-Sep	20-Sep	1,148	2,051	14	4	18	16	52
	39	21-Sep	27-Sep	1,034	1,909	15	0	20	21	56
	40	28-Sep	30-Sep	657	1,028	22	0	29	31	82
Season Total:				**40,156**	**80,715**	**3,277**	**37**	**4,305**	**4,587**	**12,205**
Variance:				2,307,046	9,409,802	57,425	138	310,116	175,650	1,314,442
Standard Error:				1,519	3,068	240	12	557	419	1,146
CV (%):				3.8%	3.8%	7.3%	31.7%	12.9%	9.1%	9.4%
95% CI:				37,179-43,133	74,703-86,727	2,807-3,747	14-60	3,213-5,396	3,765-5,408	9,958-14,453

[1/] Estimated boats, anglers, and retained salmon catch were estimated via the Murthy estimator method.
[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.—During the Area 11 mark-selective Chinook fishery, a total of 852 (816 legal and 36 sublegal) retained Chinook were sampled at dockside (**Table 5**). All of these fish were measured and examined for the presence of a CWT. Marked Chinook harvested from Area 11 averaged 75.9 cm TL (range: 36.5-98.8, SD = 10.9). Further, legally harvestable (≥ 22 in [56 cm] *and* marked) Chinook comprised 95% of the sampled total.

Though scales were collected from all of the 852 Chinook sampled at dockside, only 786 (92%) of these could be successfully aged (**Appendix E**). The majority of the retained Chinook were age-4 (54%, brood year 2005) and age 3 (37%, brood year 2006) individuals. Further, 93% of all retained Chinook were subyearling outmigrants.

Table 5. Summary of length samples collected from retained Chinook salmon during dockside angler interviews in the Area 11 summer mark-selective Chinook fishery, June 1 through September 30, 2009.

	Number Sampled		
Mark Type	**Legal-size**	**Sublegal-size**	**Total**
Marked	806	30	836
Unmarked	7	6	13
Undetermined	3	0	3
Total	**816**	**36**	**852**

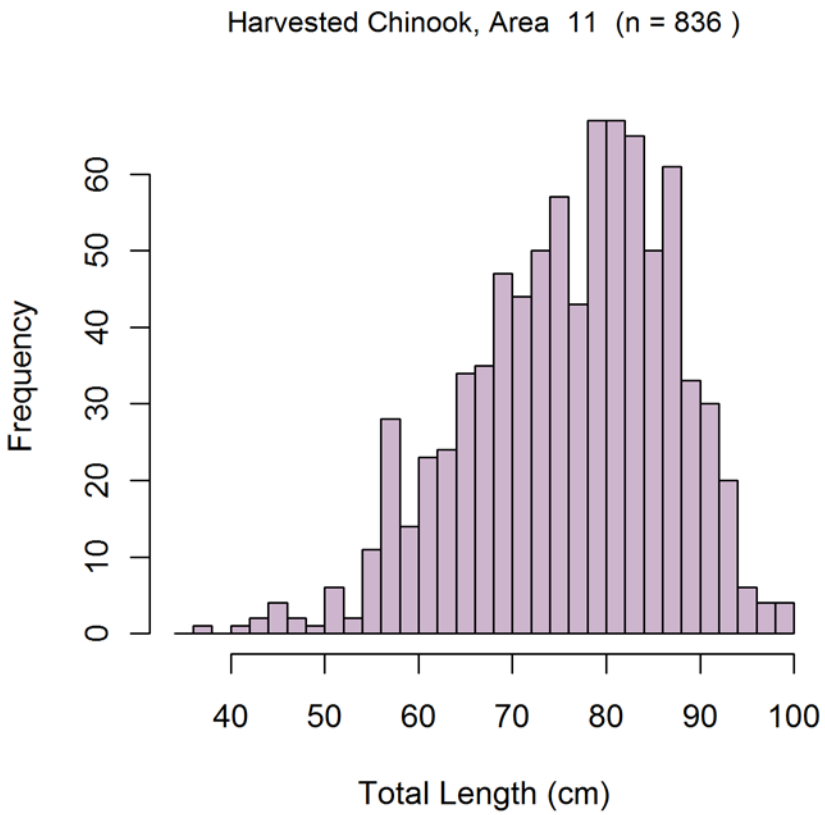

Figure 6. Length-frequency distributions of retained marked Chinook sampled at dockside during the Area 11 summer 2009 mark-selective Chinook fishery, June 1 through September 30, 2009.

CWT Samples.—In total, 63 coded-wire tags were recovered from the Areas 11 fishery. The majority of these recoveries (41%) originated from Central Puget Sound hatcheries, followed by 30% from South Puget Sound, 22% from Hood Canal, and 5% from North Puget Sound production facilities (**Table 6**). The remaining 2% of the recovered tags were from a Fraser River tag group. Considering individual hatcheries, tag recoveries from the Voights Creek Hatchery were most abundant (14% of fishery total), followed by Hoodsport Hatchery (13% of total) and Garrison and Nisqually hatcheries (11% each of total). Seventeen of all Area 11 CWT recoveries were from double index tag (DIT) releases. See **Appendix G** for individual-level details on CWT recoveries.

Table 6. Summary of coded-wire tags recovered from Chinook salmon harvested during the Area 11 summer 2009 mark-selective Chinook fishery, June 1 through September 30, 2009. 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	No. DITs
British Columbia	Lower Fraser River	Harrison River	Chehalis River Hatchery	1 (1.6%)	0
Washington	Hood Canal	Purdy Creek	George Adams Hatchery	6 (9.5%)	4
		Finch Creek	Hoodsport Hatchery	8 (12.7%)	0
	Puget Sound-Central	Cowskull Acclim Pond	Cowskull Acclim Pond	1 (1.6%)	0
		Grovers Creek	Grovers Creek Hatchery	4 (6.3%)	4
		Issaquah Creek	Issaquah Hatchery	5 (7.9%)	0
		Green River	Icy Creek Hatchery	1 (1.6%)	0
			Unreported	6 (9.5%)	0
		Voights Creek	Voights Creek Hatchery	9 (14.3%)	0
	Puget Sound-North	Friday Creek	Samish Hatchery	2 (3.2%)	2
		Nooksack River - North Fork	Kendall Creek Hatchery	1 (1.6%)	0
	Puget Sound-South	Chambers Creek	Garrison Hatchery	7 (11.1%)	0
			Lakewood Hatchery	2 (3.2%)	0
		Clear Creek	Nisqually Hatchery	7 (11.1%)	7
		White River	White River Hatchery	3 (4.8%)	0
Grand Total				**63**	**17**

[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).

Test Fishing Results

Fishing Time and Gear Types

Test fishers were scheduled to fish in Area 11 on every weekday between June 2 and September 30, 2009. In total, they spent approximately 448 hours and 80 days on the water pursuing Chinook salmon in Area 11 (**Tables 7 and 8**). Based on dockside interview results for anglers reporting successful Chinook salmon encounters (n = 964 responses [i.e., to our fishing methods question]), gear schedules were prescribed to help ensure that samplers fished using the same methods in approximately the same proportions as the private fleet. During the four months that Areas 11 was open, test fishers trolled using downriggers (84%) and mooching (i.e., "weight and bait" method; 8%) the majority of the time, with the remaining time being spent jigging and using divers (6% and 2%, respectively). Their private fleet counterparts (i.e., respondents to dockside fishery method question) pursued Chinook mainly by trolling with downriggers (82% of respondents) or mooching (11% of respondents) and, to a lesser extent, by jigging (5%) or using divers (2%); further, these private-fleet responses were comparable (i.e., in terms of overall proportions per fishing method category) to the

fishing method information recorded by the angling public on voluntary trip reports (VTRs) (**Table 7**).

Table 7. Fishing methods employed by private recreational anglers (from dockside interviews, based on number of boat trips sampled, *n* = 964), test fishers (based on hours fished, *n* = 448.4 [lines in water]), and VTR's (689 fish captured) during the Area 11 summer 2009 mark-selective Chinook fishery.

Stat Week	DR			WB			Diver			Jig		
	Test Boat	VTR	Private	Test Boat	VTR	Private	Test Boat	VTR	Private	Test Boat	VTR	Private
23	78.0%	73.2%	60.0%	8.2%	22.0%	26.7%	0.0%	2.4%	0.0%	13.7%	2.4%	13.3%
24	80.8%	81.3%	75.0%	4.8%	6.3%	12.5%	0.0%	0.0%	0.0%	14.4%	12.5%	12.5%
25	88.6%	82.4%	72.7%	4.4%	5.9%	22.7%	0.0%	0.0%	0.0%	7.0%	11.8%	4.5%
26	85.0%	83.3%	78.1%	11.4%	12.5%	15.6%	0.0%	0.0%	0.0%	3.7%	4.2%	6.3%
27	77.0%	82.8%	78.3%	17.4%	13.8%	15.2%	0.0%	0.0%	0.0%	5.7%	3.4%	6.5%
28	85.2%	66.7%	85.3%	7.8%	4.2%	10.3%	0.0%	20.8%	1.5%	7.0%	8.3%	2.9%
29	88.5%	78.4%	80.5%	5.8%	11.8%	14.2%	0.0%	2.0%	1.8%	5.8%	7.8%	3.5%
30	88.1%	79.4%	76.5%	8.9%	17.6%	15.3%	0.0%	2.9%	1.0%	3.0%	0.0%	7.1%
31	81.3%	83.0%	88.0%	7.9%	6.4%	5.1%	3.9%	4.3%	2.6%	6.9%	6.4%	4.3%
32	86.0%	86.0%	83.9%	10.6%	2.3%	6.6%	0.0%	4.7%	2.2%	3.4%	7.0%	7.3%
33	93.1%	80.8%	88.9%	3.6%	0.0%	4.2%	0.0%	0.0%	1.4%	3.3%	19.2%	5.6%
34	92.7%	94.1%	74.3%	3.6%	2.9%	11.4%	1.8%	0.0%	2.9%	1.8%	2.9%	11.4%
35	84.0%	100.0%	82.6%	0.0%	0.0%	8.7%	0.0%	0.0%	8.7%	16.0%	0.0%	0.0%
36	84.4%	55.6%	68.4%	8.8%	16.7%	15.8%	6.8%	22.2%	10.5%	0.0%	5.6%	5.3%
37	58.2%	96.0%	85.1%	23.6%	4.0%	8.5%	11.1%	0.0%	6.4%	7.1%	0.0%	0.0%
38	81.0%	72.0%	94.1%	4.2%	12.0%	5.9%	8.5%	8.0%	0.0%	6.3%	8.0%	0.0%
39	92.5%	85.8%	90.6%	7.5%	0.8%	5.7%	0.0%	6.7%	3.8%	0.0%	6.7%	0.0%
40	--	87.9%	--	--	3.0%	--	--	0.0%	--	--	9.1%	--
Total	**84.4%**	**81.6%**	**81.7%**	**7.9%**	**7.2%**	**10.8%**	**1.8%**	**4.8%**	**2.2%**	**5.9%**	**6.4%**	**5.3%**

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

During their respective mark-selective seasons, test fishers encountered 43 Chinook in Area 11 (27 legal-sized and marked [LM], 5 legal-sized and unmarked [LU], 10 sublegal-sized and marked [SM], and 1 sublegal-sized and unmarked [SU]; **Table 8**). In Area 11, 86% of all Chinook encountered were marked (84% for legal-sized fish only). Thus, mark rates were high overall. Test fisher "CPUE" (LM Chinook encountered per angler trip; 0.17 in Area 11) was 76% higher than that of the average private fleet angler.

In terms of within-season patterns, the mark rate of legal-sized Chinook remained high (>80% on average) throughout the season, but was quite variable on a weekly basis (due in part to small weekly sample sizes; **Table 8**).

Table 8. Chinook encounters by size/mark-status group for the summer 2009 Area 11 test fishery. Values in parentheses reflect the variance about proportional season-total contributions of a particular size/mark-status group to total Chinook encounters. Note, whereas the time specified in the Table 6 caption corresponds to time with lines in the water, 'Hours' reported here reflect all on-the-water time (i.e., inclusive of time spent running)

Stat Week	Fishing Effort		Legal-size		Sublegal-size		Total	Legal Mark Rate	Overall Mark Rate
	Days	Hours Fished	AD	UM	AD	UM			
23	4	21.2	2	0	2	0	4	100.0%	100.0%
24	4	22.6	0	0	1	0	1	--	100.0%
25	5	26.3	0	2	0	0	2	0.0%	0.0%
26	5	22.8	0	0	1	1	2	--	50.0%
27	4	22.1	1	0	2	0	3	100.0%	100.0%
28	5	29.8	3	0	0	0	3	100.0%	100.0%
29	5	26.0	1	0	0	0	1	100.0%	100.0%
30	5	30.8	3	0	0	0	3	100.0%	100.0%
31	5	25.3	0	1	0	0	1	0.0%	0.0%
32	5	29.2	5	0	0	0	5	100.0%	100.0%
33	5	30.2	5	1	1	0	7	83.3%	85.7%
34	5	27.6	5	0	0	0	5	100.0%	100.0%
35	5	28.2	1	1	1	0	3	50.0%	66.7%
36	5	29.4	0	0	2	0	2	--	100.0%
37	4	23.3	0	0	0	0	0	--	--
38	4	23.7	1	0	0	0	1	100.0%	100.0%
39	5	30.0	0	0	0	0	0	--	--
Total	**80**	**448.4**	**27**	**5**	**10**	**1**	**43**	**84.4%**	**86.0%**
Size/mark-status composition: 0.628 (0.006) 0.116 (0.002) 0.233 (0.004) 0.023 (0.001)									
Legal size mark rate: 0.84 (0.004)									
Overall mark rate: 0.86 (0.003)									

Chinook Size and Age

During the period that mark-selective Chinook fisheries were open, marked and unmarked Chinook salmon sampled by test fishers in Area 11 exhibited disjunctive size distributions, most likely due to low sample size (**Figure 7**). As reported by VTR anglers, most of the smaller Chinook were encountered later in the season (see **Figure 8** and **Table 10**). Based on length samples collected in the Area 11 test fishery, Chinook (marked and unmarked combined) averaged 67 cm (SD = 15 cm) and ranged from 33-90 cm in total length (TL).

Of the 43 Chinook encountered and sampled by test fishers during the four-month Area 11 fishery, 31 (26 AD, 4 UM, 1 UD) had scales that were successfully read (**Appendix F**). Test fishers encountered approximately six times more marked than unmarked fish. Overall, age-3 (brood year 2006) and age-4 (brood year 2005) individuals comprised the majority of the

season-total sample (41% and 35%, respectively). Age 2 individuals were the least represented. As a final note, the majority (94%) of Chinook sampled in the test fishery were sub-yearling outmigrants (**Appendix F**).

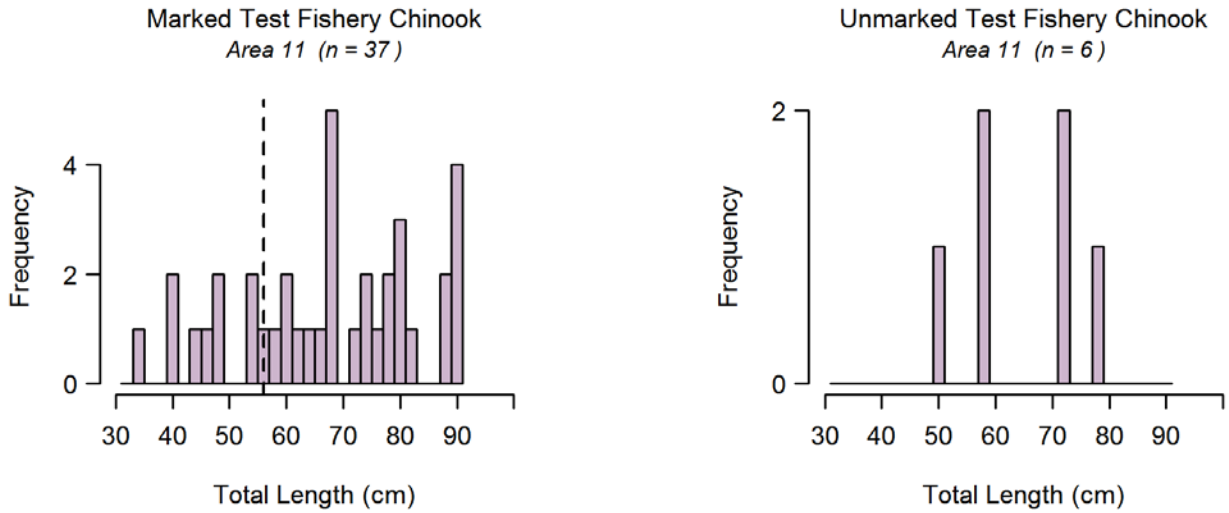

Figure 7. Length-frequency distributions of marked (*left panel*) and unmarked (*right panel*) Chinook encountered by test fishers during the Area 11 summer 2009 mark-selective Chinook fishery. The dashed vertical line in the length-frequency histograms for marked Chinook corresponds to the legal size limit (22 in or 56 cm).

Other Fish Species Encountered

Though they fished exclusively for Chinook, test fishers encountered 135 individuals belonging to at least eleven other species (i.e., encounters were also logged for two "general" categories, not identified to species) during their Area 11, summer 2009 sampling efforts. This by-catch was dominated by coho salmon (32), dogfish sharks (30), and "general" flatfish (21), followed by pink salmon (13), Pacific sanddab, and Pacific cod (10). The remaining encounters belonged to six additional species categories and one "general" rockfish category (**Table 9**).

Table 9. Test fishery catches of species other than Chinook salmon during the Area 11 summer 2009 mark-selective Chinook fishery, June 1 through September 31, 2009.

Species Common Name	Species Scientific Name	Total Catch
Coho	*Oncorhynchus kisutch*	32
Dogfish shark	*Squalus acanthias*	30
Flatfish-general	--	21
Pink	*Oncorhynchus gorbuscha*	13
Pacific sanddab	*Citharichthys sordidus*	12
Pacific cod	*Gadus macrocephalus*	10
Brown rockfish	*Sebastes auriculatus*	5
Speckled sanddab	*Citharichthys stigmaeus*	4
Lingcod	*Ophiodon elongatus*	2
Red Irish Lord	*Hemipidotus hemipidotus*	2
Rock sole	*Lepidopsetta bilineata*	2
Rockfish-general	--	1
Sand sole	*Psettichthys melanostictus*	1
	Total	**135**

Voluntary Trip Report Results

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

During the 2009 four-month summer season of the Area 11 mark-selective Chinook fishery, we implemented enhanced efforts to distribute and collect voluntary trip reports from the angling public to acquire information from the fleet about the size/mark-status composition of Chinook encountered in the fishery. Between June 1 and September 30, 2009, we received a grand total of 389 usable VTRs from Area 11 anglers, which provided data on 689 Chinook salmon encounters occurring during 701 angler trips (**Table 10**). Of the 689 total Chinook encounters recorded on VTRs, 205 (29.8%) of these fish were legal-sized and marked (LM), 73 (10.6%) were legal-sized and unmarked (LU), 223 (32.4%) were sublegal-sized and marked (SM), and 188 (27.3%) were sublegal-sized and unmarked (**Table 10**).

Additionally, based on Area 11 VTR Chinook encounter data, weekly mark rates and proportions of legal-size Chinook were variable over the four-month season but generally exhibited a declining trend over time (**Figure 8**). The legal-size mark rate from VTRs was 74%, while it was 62% for legal and sublegal fish combined. Thus, the VTR-based estimate of the legal-size mark rate was approximately 10% lower than that of the test fishery in Area 11 (84%), and the VTR-based estimate of overall mark rate was approximately 24% lower than that of the test fishery (86%; **Table 8** vs. **Table 10**).

Table 10. Total Chinook encountered (retained and released) by private anglers logging their trips on voluntary trip reports (VTRs), with estimates of legal and overall mark rates in the Area 11 mark-selective Chinook fishery, June 1 through September 30, 2009.

Month	Stat Wk	VTRs (*n*)	Angler Trips	Chinook Encounters						Legal Mark Rate	Overall Mark Rate
				LM Kept	LM Rel'd	LU	SM	SU	Total		
June	23	30	48	31	0	10	12	1	54	75.6%	79.6%
	24	14	23	7	1	5	6	2	21	61.5%	66.7%
	25	13	26	7	0	6	3	1	17	53.8%	58.8%
	26	22	43	8	2	3	16	1	30	76.9%	86.7%
July	27	24	38	13	0	5	13	1	32	72.2%	81.3%
	28	25	47	17	0	3	20	10	50	85.0%	74.0%
	29	38	70	25	1	7	20	7	60	78.8%	76.7%
	30	31	51	15	0	5	14	0	34	75.0%	85.3%
	31	30	52	14	1	8	16	9	48	65.2%	64.6%
August	32	29	50	17	1	4	18	5	45	81.8%	80.0%
	33	18	30	10	0	5	10	1	26	66.7%	76.9%
	34	27	51	18	2	3	6	5	34	87.0%	76.5%
	35	7	11	4	0	0	5	2	11	100.0%	81.8%
	36	12	23	1	0	2	4	12	19	33.3%	26.3%
September	37	14	31	4	0	1	11	11	27	80.0%	55.6%
	38	13	22	3	1	5	3	13	25	44.4%	28.0%
	39	36	73	0	0	1	36	86	123	0.0%	29.3%
	40	6	12	2	0	0	10	21	33	100.0%	36.4%
Season Total		**389**	**701**	**196**	**9**	**73**	**223**	**188**	**689**	**73.7%**	**62.1%**
Encounter Rates (LM, LU, SM, SU):				**29.8%**		**10.6%**	**32.4%**	**27.3%**	**100%**		

VTR Sample Size

In terms of meeting the minimum criterion for success under our enhanced VTR sample size objective (VTR *n* > test fishery *n*), the 2009 Area 11 VTRs (*n* = 689 Chinook encounters) provided information on 16 times as many encounters as did the Area 11 test fishery in 2009 (*n* = 43). In addition, the 2009 VTR sample size of Chinook encounters was 2.4 times higher than the test fishery sample size during 2007 (*n* = 292) and 6.2 times higher than the test fishery sample size during 2008 (*n* = 112). Further, the sample size of Chinook encounters from VTRs in 2009 was four times higher than the sample size from VTRs in both the 2007 (*n* = 164) and 2008 (*n* = 161) Area 11 mark-selective summer seasons. In sum, our 2009 VTR program in Area 11 was a success relative to our *a priori* sample size targets.

Test Fishery versus VTR-based Encounters Composition Estimates

To gauge the similarity between test fishery and fleet catch during the 2009 Area 11 fishery, we compared season-wide encounters composition estimated for the former group (**Table 8**) with that provided by anglers participating in our voluntary trip report (VTR) program (**Table 10**). As discussed above, 389 VTRs were returned by anglers participating in the Area 11 fishery, providing the size/mark-status details from 689 Chinook encounters. Based on these

results, there were significant differences (χ^2 tests for homogeneity) in the size/mark-status composition ($\chi^2 = 24.8$, df = 3, $P < 0.0001$; **Table 8** vs. **Table 10**) between the two angler groups; thus, we could not justify pooling the two datasets for estimates of encounters composition by mark-status and size class. Considering the low sample size in the test fishery (n=43 for the entire four-month season) versus the high sample size of Chinook encounters from VTRs (n=689), and considering the lack of homogeneity between VTR and test fishery-based estimates of encounters composition, we elected to use only the VTR-based estimates of encounters composition for subsequent impact estimation (**Table 10, Table 11**).

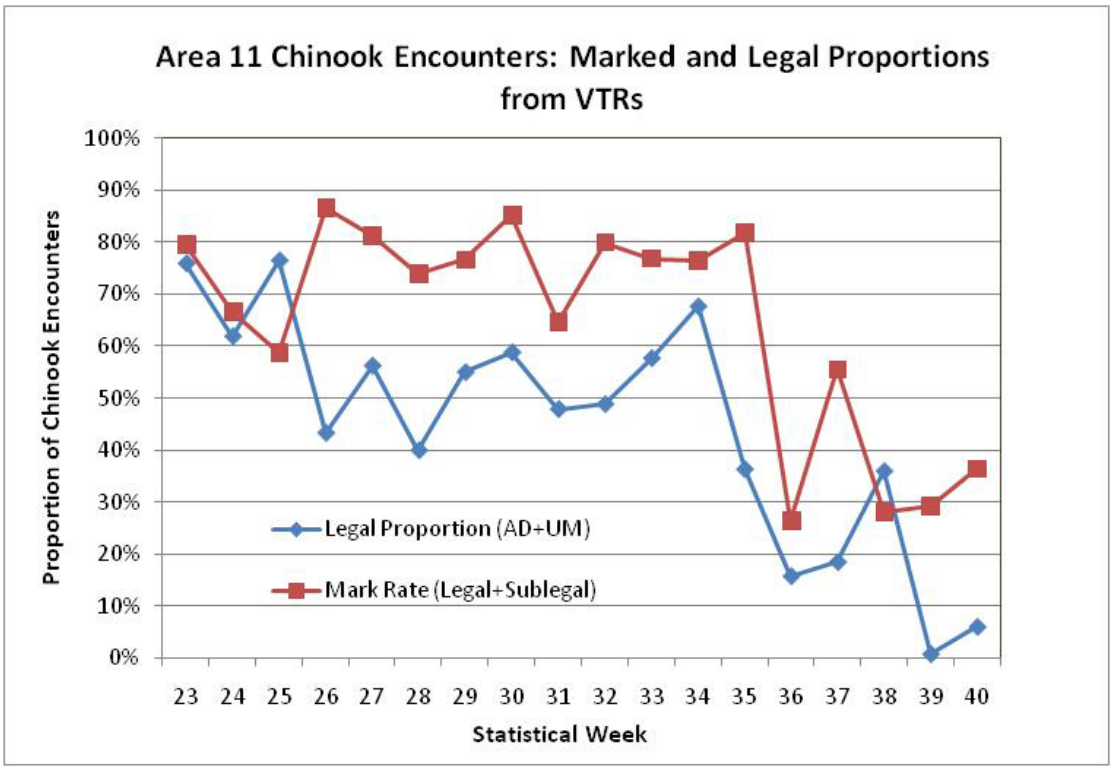

Figure 8. Trends in weekly Chinook mark rates (all size classes) and legal size fractions (marked and unmarked combined) for Chinook encounters reported by anglers on voluntary trip reports (VTRs) during the Area 11 summer 2009 mark-selective Chinook fishery, June 1 through September 30, 2009.

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 4** and **5**; see **Appendix A** for computational details) and VTR-based size/mark-status composition data (**Table 10**). In total, we estimated that anglers fishing in Area 11 encountered a total of 3,631 LM, 1,293 LU, 3,950 SM, and 3,330 SU Chinook (12,205 total) between June 1 and September 30, 2009 (**Table 11**). 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 an estimated 5,005 total mortalities (3,230 LM, 211 LU, 884 SM, 680 SU) for the duration of the

fishery (**Table 11**). Sixty-three percent of estimated mortality was due to the harvest of legal-marked Chinook, while unmarked Chinook mortality totaled 891 fish, which corresponds to 0.28 unmarked mortalities per legal-marked Chinook kept. In addition, given the 43 (27 LM, 5 LU, 10 SM, 1 SU) Chinook caught and released in the Area 11 test fishery, an estimated 7 Chinook may have died as a result of our sampling activities.

Table 11. Summary of season-wide fishery impact estimates for the summer 2009 Area 11 mark-selective Chinook fishery, June 1-September 30, 2009. Values may not add up perfectly due to rounding error.

Total Encounters (E): 12,205
V(E): 1,314,427

Size/mark group	Encounters	No. Retained	No. Rel'd	Rel. Mort. Rate	Rel. Mort.	Total Mortality	Var	SE	95% CI	CV (%)
Legal marked	3,631	3,159	472	0.15	71	3,230	58,658	242	2755 - 3705	7
Legal unmarked	1,293	20	1,273	0.15	191	211	856	29	153 - 268	14
Sublegal marked	3,950	118	3,833	0.20	767	884	7,924	89	710 - 1059	10
Sublegal unmarked	3,330	17	3,313	0.20	663	680	5,674	75	532 - 827	11
All groups combined	**12,205**	**3,314**	**8,892**		**1,691**	**5,005**	**71,085**	**267**	**4482 - 5527**	**5**

FRAM versus Creel Comparison

Relative to field data, pre-season Fishery Regulation Assessment Model (FRAM, model run 2309) runs provided a reasonably accurate depiction of fishery impacts—measured as encounters or mortalities—for unmarked but not marked fish. For instance, field estimates of total and legal-only unmarked Chinook encounters and mortalities differed from FRAM by less than 30% (**Tables 12** and **13, Figure 10**). Although estimated unmarked encounters and mortalities were comparable to predictions, FRAM tended to over-predict encounters and impacts to the marked Chinook categories by 200 – 300%. At the low end, FRAM predicted that legal-marked landed Chinook mortalities were 95% greater than our post-season estimates; at the high end, FRAM predicted that legal-size marked Chinook release mortalities were 96 times (9,600+%) greater than was estimated to have occurred during the Area 11 fishery. Finally, observed mark rates were comparable to those modeled in FRAM for total landed and legal-sized Chinook, but for sublegal-size Chinook, FRAM predicted mark rate values that were substantially higher than what was observed (**Table 12**).

Table 12. Comparison of modeled (i.e., using FRAM, model run 2309) and estimated total Chinook encounters for the Area 11 summer 2009 mark-selective Chinook fishery, June 1-September 30, 2009.

Data Source	Group	Total Encounters	Legal	Sublegal	Landed Only
FRAM Encounters	Unmark.	5,987	1,642	4,345	33
	Mark.	21,137	7,362	13,775	6,405
	Total	27,124	9,004	18,120	6,438
	% Mark.	78	82	76	100
Estimated (Creel) Encounters	Unmark.	4,623	1,293	3,330	37
	Mark.	7,582	3,631	3,950	3,277
	Total	12,205	4,925	7,281	3,314
	% Mark.	62	74	54	99

Table 13. Comparison of modeled (i.e., using FRAM, model run 2309) and estimated total Chinook mortalities for the Area 11 summer 2009 mark-selective Chinook fishery, June 1-September 30, 2009.

	FRAM Chinook Mortalities			Estimated Chinook Mortalities		
Mortality Category	**Unmark.**	**Mark.**	**Total**	**Unmark.**	**Mark.**	**Total**
Total (Landed + Released)	1,197	16,029	17,226	890	4,114	5,005
Released Legal	275	6,869	7,144	191	71	262
Released Sublegal	889	2,755	3,644	663	767	1,429
Landed Only	33	6,405	6,438	37	3,277	3,314

Estimated CWT-DIT Impacts

Of the 63 coded-wire tags recovered during the summer 2009 Area 11 mark-selective Chinook fishery, 17 belonged to double-index tag (DIT) release groups (**Table 14**). 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 11 fishery. In total, we estimated that 71 unmarked-DIT Chinook were encountered 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 the one unmarked retained DIT fish from George Adams Hatchery (brood year 2007; CWT code 634270), we estimate that approximately 10 unmarked DIT fish may have died as a result of the Area 11 mark-selective Chinook fishery.

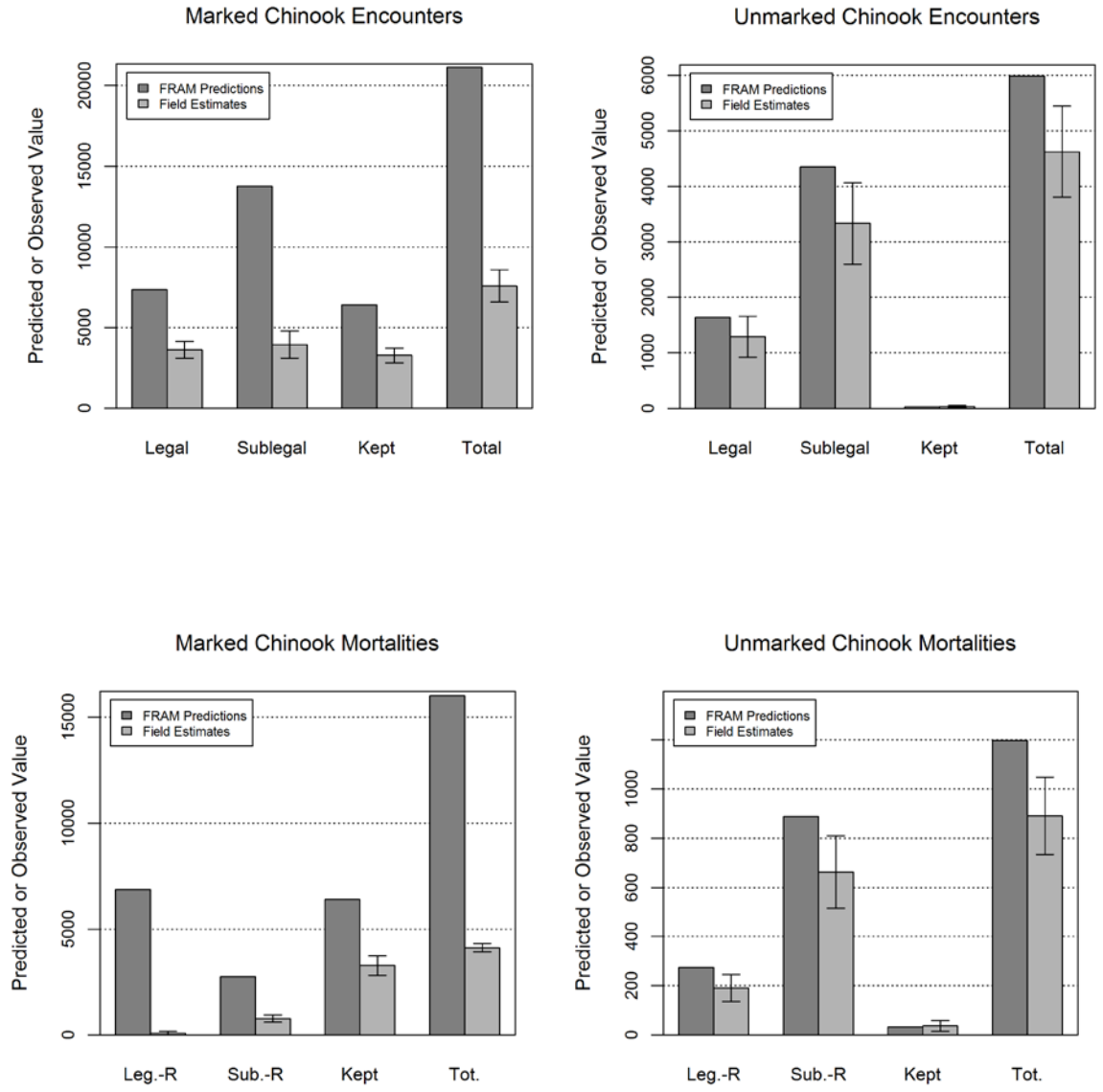

Figure 10. Comparison of modeled (i.e., using FRAM, model run 2309) and estimated total marked (*left column*) and unmarked (*right column*) Chinook encounters (*upper row*) and mortalities (*lower row*) in the Area 11 summer 2009 mark-selective Chinook fishery, June 1-September 30, 2009. Error bars represent approximate 95% confidence intervals for field estimates.

Table 14. 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 11 mark-selective Chinook fishery from June 1 through September 30, 2009. AD = marked (i.e., adipose-clipped), UM = unmarked.

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	2	7.7	21.8	8.5	0.8	0.3	0.7
	2007 [1/]	2	3.5	8.9	7.1	3.9	9.0	3.3
Grovers Creek Hatchery	2005	3	11.9	36.2	15.6	1.6	0.6	1.3
	2006	1	3.5	8.9	3.5	0.4	0.1	0.3
Nisqually Hatchery	2005	7	26.7	75.9	28.3	2.8	0.9	2.4
Samish River Hatchery	2005	1	4.6	16.4	4.2	0.4	0.1	0.4
	2007	1	3.5	8.9	3.6	0.4	0.1	0.3
TOTAL		**17**	**61.5**	**177.1**	**70.7**	**10.2**	**11.0**	**8.8**

[1/] One DIT recovery that originated from George Adams Hatchery (brood year 2007; CWT code 634270) was an unmarked retained Chinook harvested in the 2009 Area 11 summer mark-selective Chinook fishery; thus, a 100% mortality rate was applied to this unmarked DIT encounter because it was a retained fish.

AREA 13: RESULTS & DISCUSSION

Summary of Sampling Efforts

Between May 1 and September 30, 2009, we sampled the recreational fleet via dockside creel surveys on a grand total of 375 sample-days in Area 13, visiting 23 different access sites over the duration of the fishery (**Table 15**). We sampled anglers at Zittels (17% of site-days) and Narrows Marina (17% of site-days) most frequently, followed by Luhr Beach (13% of site-days), Solo Point (9% of site-days) and Point Defiance (7% of site-days) ramps. All remaining Area 13 sampling sites, as shown in **Table 15**, were sampled less than 6% of the time over the five-month season.

Table 15. List of sites sampled, with the number of sampling events (site-days) during the Area 13 summer 2009 mark-selective Chinook fishery, May 1 through September 30, 2009.

Location	Number Site-Days Sampled per Month					Total Site-Days	% of Total
	May	June	July	August	Sept		
Allyn Public Ramp	0	2	2	2	3	9	2.4%
Arcadia Ramp	0	1	0	1	0	2	0.5%
Boston Harbor Ramp	2	6	8	6	13	35	9.3%
Concrete Dock	0	0	0	1	0	1	0.3%
Day Island Yacht Club	0	1	0	0	0	1	0.3%
Fox Island Public Ramp	0	0	1	1	2	4	1.1%
Gig Harbor Ramp	0	3	0	2	1	6	1.6%
Grapeview Public Ramp	0	0	1	0	0	1	0.3%
Harper Ramp	0	2	0	1	2	5	1.3%
Harstene Island Ramp	0	2	6	5	8	21	5.6%
Johns Creek	0	0	0	0	1	1	0.3%
Luhr Beach Ramp	6	4	10	12	15	47	12.5%
Narrows Marina	3	5	16	23	16	63	16.8%
Narrows Properties Park	2	3	2	2	1	10	2.7%
Point Defiance Boat House	2	10	1	3	1	17	4.5%
Point Defiance Ramp	3	5	5	4	9	26	6.9%
Redondo Ramp	0	2	1	0	0	3	0.8%
Solo Point Ramp	4	4	7	11	9	35	9.3%
Steilacoom Public Ramp	0	0	0	3	2	5	1.3%
Vaughn Public Ramp	2	4	4	1	0	11	2.9%
Wollochet Bay Public Ramp	0	1	0	1	0	2	0.5%
Wauna Ramp/Shore	1	0	0	1	3	5	1.3%
Zittels Marina	13	6	17	12	17	65	17.3%
Grand Total	**38**	**61**	**81**	**92**	**103**	**375**	**100.0%**

In total, our sampling efforts in Area 13 enabled us to sample 2,149 completed angler trips and 1,098 completed boat trips. These efforts yielded a total of 68 (67 ad-marked and 1 unmarked) retained Chinook and 117 (47 ad-marked, 18 unmarked, and 52 unknown) released Chinook salmon (**Table 16**). In addition, samplers logged 11 retained ad-marked coho and 7 released coho, as well as 2 released pink salmon and 36 released cutthroat trout (**Table 16**).

Table 16. Observations of fishing effort, salmon harvest, and reported salmon releases, by week, for the Area 13, May 1-Sept. 30, 2009 mark-selective Chinook fishery. Note: displayed values are sample observations (i.e., summed across sampled sites) and not fishery-total estimates.

				Effort		Retained Chinook		Other Species Kept		Released Chinook			Other Species Released					
Month	Stat Week	Start Date	End Date	Boats	Anglers	AD	UM	AD Coho	UM Coho	AD	UM	UK	Ad Coho	UM Coho	UK Coho	Pink	Cutthroat Trout	Unk. Salmon
May	18	1-May	3-May	16	43	0	0	0	0	0	0	1	0	0	0	0	0	0
	19	4-May	10-May	15	28	2	0	0	0	0	0	2	0	0	0	0	0	0
	20	11-May	17-May	34	69	1	0	0	0	3	1	1	0	0	0	0	0	0
	21	18-May	24-May	19	37	3	0	0	0	0	0	4	0	0	0	0	0	0
	22	25-May	31-May	20	35	1	1	0	0	1	1	4	0	0	0	0	0	0
June	23	1-Jun	7-Jun	5	8	1	0	0	0	0	0	0	0	0	0	0	0	0
	24	8-Jun	14-Jun	21	36	1	0	1	0	0	0	0	0	0	0	0	12	0
	25	15-Jun	21-Jun	30	65	2	0	1	0	2	1	4	0	0	0	0	5	0
	26	22-Jun	28-Jun	30	47	3	0	0	0	1	1	0	0	0	1	0	0	0
July	27	29-Jun	5-Jul	16	33	1	0	0	0	0	0	1	0	0	0	0	1	0
	28	6-Jul	12-Jul	43	73	3	0	0	0	7	0	10	0	0	0	0	0	0
	29	13-Jul	19-Jul	53	100	1	0	0	0	2	0	1	0	1	0	0	0	0
	30	20-Jul	26-Jul	43	94	2	0	0	0	2	0	1	0	0	0	0	0	1
	31	27-Jul	2-Aug	58	119	1	0	0	0	0	1	0	0	0	0	0	0	0
Aug	32	3-Aug	9-Aug	107	217	6	0	1	0	3	0	3	0	2	0	0	2	0
	33	10-Aug	16-Aug	109	225	7	0	0	0	5	2	5	0	0	0	0	4	0
	34	17-Aug	23-Aug	125	255	7	0	0	0	10	2	2	0	2	0	0	1	0
	35	24-Aug	30-Aug	80	160	11	0	1	0	5	2	0	0	0	0	2	0	0
Sept	36	31-Aug	7-Sep	116	218	14	0	5	0	2	3	10	0	0	1	0	4	1
	37	8-Sep	13-Sep	54	97	0	0	1	0	1	0	0	0	0	0	0	4	0
	38	14-Sep	20-Sep	52	86	0	0	0	0	0	1	3	0	0	0	0	3	0
	39	21-Sep	27-Sep	45	91	0	0	1	0	3	3	0	0	0	0	0	0	1
	40	28-Sep	30-Sep	7	13	0	0	0	0	0	0	0	0	0	0	0	0	0
Season Total:				**1,098**	**2,149**	**67**	**1**	**11**	**0**	**47**	**18**	**52**	**0**	**5**	**2**	**2**	**36**	**3**

Fishery Characteristics

Observations of Fishing Effort and Chinook Catch

From May 1 to September 30, 2009, samplers interviewed 2,149 anglers participating in the Area 13 mark-selective Chinook fishery. Based on a summation of sample observations made across sites during the fishery (i.e., taken as an index of fishery-total effort patterns), angling effort was initially low and then increased to a peak, which occurred during the early to mid part of August (**Table 16**, **Figure 11**). Effort observations (i.e., observed angler trips) then returned to low levels during September. On average, we sampled 41 anglers per week during May and June; whereas, during July and August, we sampled an average of 142 anglers each week. On a season-total basis, we sampled 93 anglers per week at staffed Area 13 access sites.

During the majority of the summer 2009 Area 13 mark-selective Chinook fishery, Chinook salmon catch rates (landed Chinook salmon per angler trip; CPUE) were relatively low, averaging 0.03 Chinook landed per angler trip over the season. CPUE was variable on a week-to-week basis and appeared to peak on two separate occasions, once at 0.13 in late May (week 23) and then again with small peak of 0.07 in late August (week 35; **Figure 12**). September catch rates were zero, with the exception of the first week of the month, when 218 anglers successfully landed 14 Chinook (CPUE = 0.06).

Across all interviews, samplers observed Area 13 anglers land a total of 68 Chinook (67 marked and 1 unmarked), with virtually all (>98%) of these fish being marked. The nearly 2,150 interviewed anglers also reported releasing a total of 117 Chinook (47 marked, 18 unmarked, and 52 with unknown mark status; **Table 16**). On a weekly basis, samplers observed as few as zero to as many as 14 retained Chinook, and as few as zero to as many as 17 released Chinook over the course of the five-month fishery (**Figure 13**). Approximately 71% of all encounters sampled (i.e., observed harvest) or enumerated (i.e., reported releases) during the season occurred during July and August, between statistical weeks 27 and 36 (**Figure 13**). In total, interviewed anglers encountered 185 known (i.e., identified as such during interviews) Chinook salmon during the Area 13 summer selective fishery.

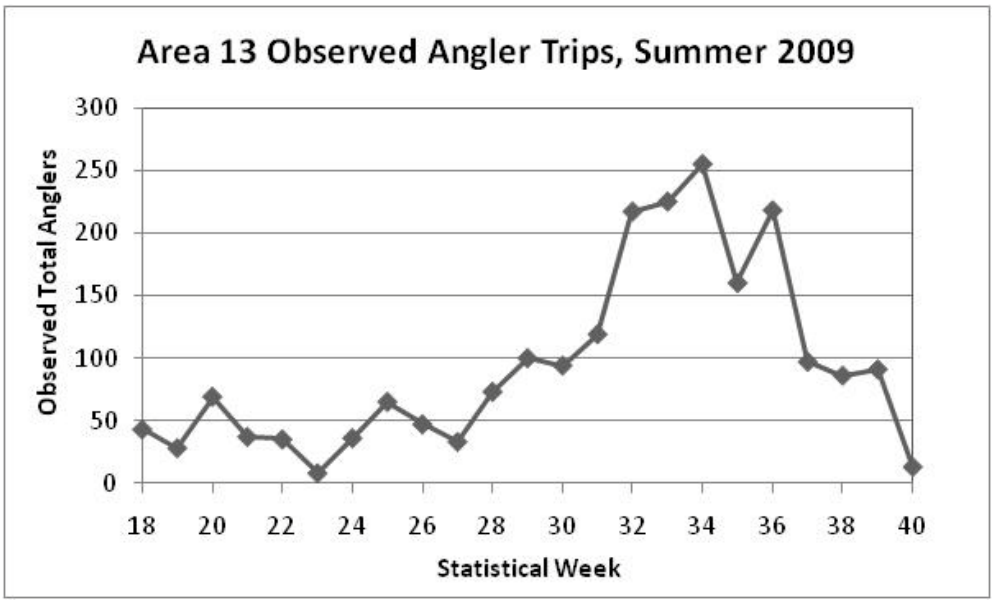

Figure 11. Temporal patterns in weekly total fishing effort (observed angler trips) during the Area 13 summer 2009 mark-selective Chinook fishery, May 1-September 30, 2009. Note: displayed values are sample observations (i.e., summed across sampled sites) and not fishery-total estimates.

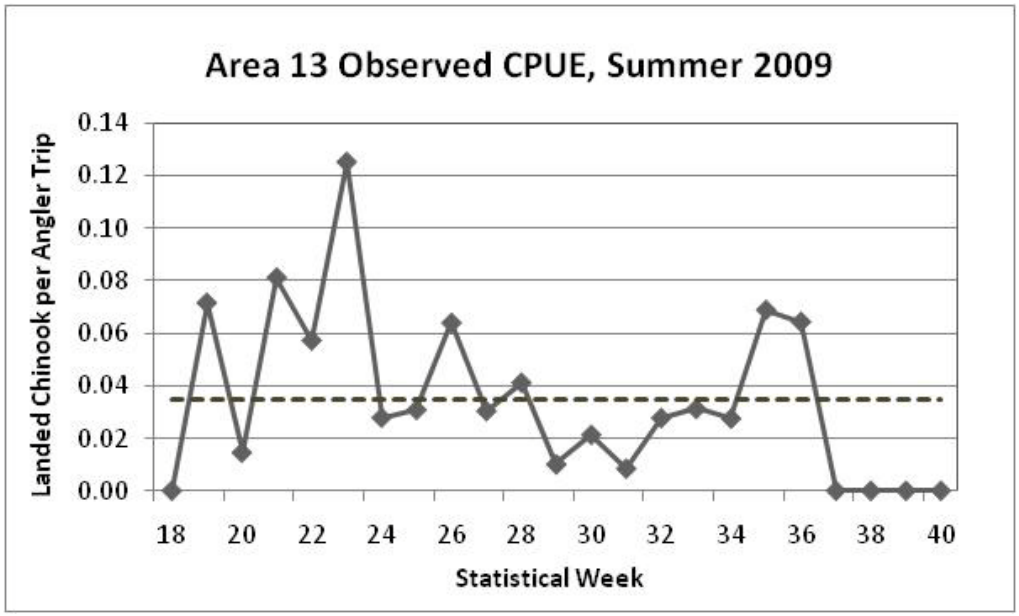

Figure 12. Temporal patterns in CPUE (landed Chinook per angler trip, by week) during the Area 13 summer 2009 mark-selective Chinook fishery, May 1-September 30, 2009. The horizontal dashed line corresponds to the season-wide CPUE. Note: displayed values are based on sample observations, and are not fishery-total estimates.

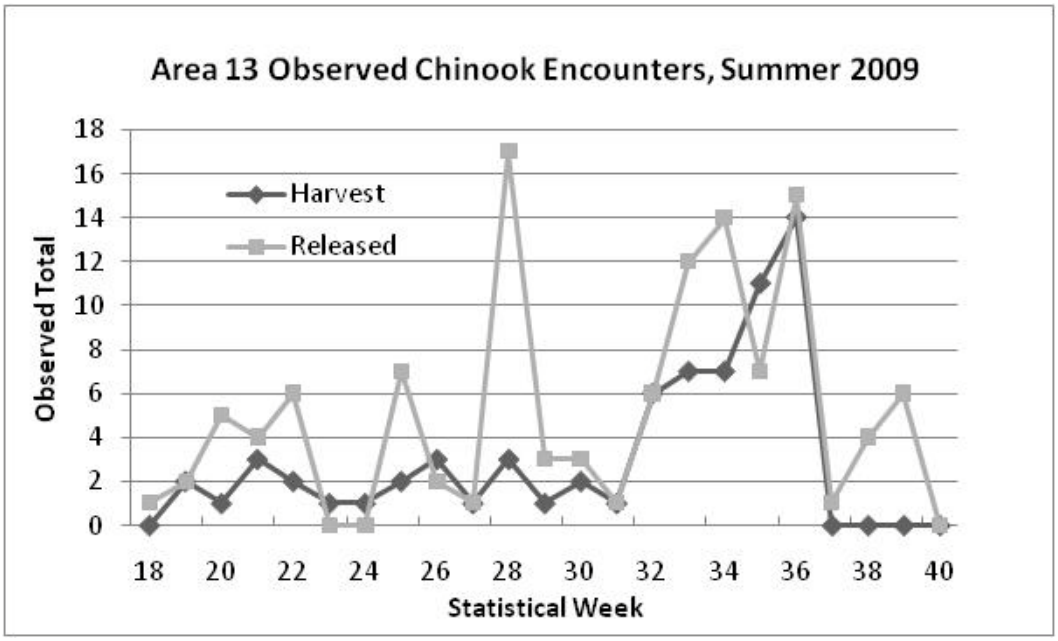

Figure 13. Temporal patterns in weekly total Chinook harvest and releases during the Area 13 summer 2009 mark-selective Chinook fishery, May 1-September 31, 2009. Note: displayed values are sample observations (i.e., summed across sampled sites) and not fishery-total estimates.

Characteristics of Harvested Chinook

Length and Age.— During the Area 13 Summer selective fishery a total of 53 Chinook were sampled at dockside, and all of these fish were measured and examined for the presence of a CWT (**Table 17**). Marked Chinook harvested from Area 13 averaged 76 cm TL (range: 40-98, SD = 11.6; **Figure 14**). Further, legally harvestable ($\geq$ 22 in [56 cm] *and* marked) Chinook comprised over 94% of the 53 fish measured at dockside.

Of the 53 Chinook sampled at dockside, 49 (92%) were successfully aged (**Appendix F**). Based on these samples, we found that retained Chinook were predominantly four-years old (49%), belonging to the 2005 brood. Age-3 fish constituted almost all (43%) of the sample remainder, with four age-2 fish also being observed (8%). Further, of the 49 Chinook samples that were aged, 92% were subyearling outmigrants (**Appendix F**).

Table 17. Summary of length samples collected from retained Chinook salmon during dockside angler interviews in the Area 13 mark-selective Chinook fishery, May 1-September 30, 2009.

		Number Chinook Sampled		
Area	**Mark Type**	**Legal-size**	**Sublegal-size**	**Total**
13	Marked	49	3	52
	Unmarked	1	0	1
	Undetermined	0	0	0
	Total	**50**	**3**	**53**

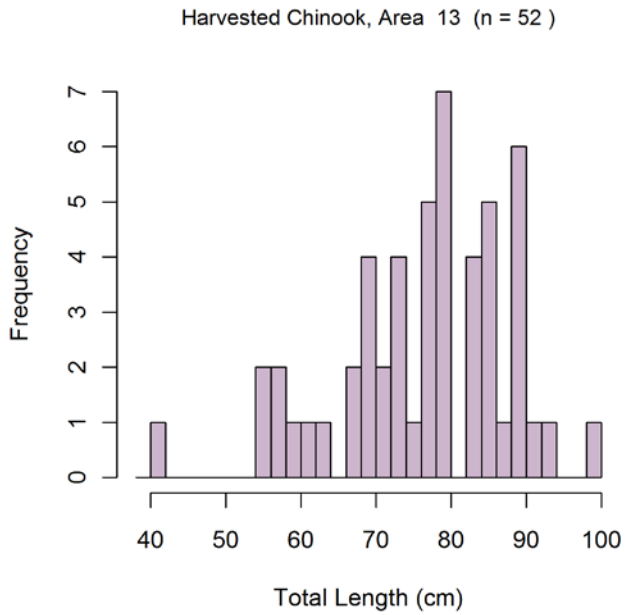

Figure 14. Length-frequency distributions of retained marked Chinook sampled at dockside during the Area 13 summer 2009 mark-selective Chinook fishery, May 1 through September 30, 2009.

CWT Samples. — In total, three coded-wire tags were recovered from the Area 13 summer recreational mark-selective fishery. All three of the recoveries were from the South Puget Sound region, and there was one tag recovery each from White River, Tumwater Falls, and Lakewood hatchery tag groups (**Table 18**). None of the tags were associated with a double-index tag group.

Table 18. Summary of coded-wire tags recovered from Chinook salmon harvested during the Area 13 summer 2009 mark-selective Chinook fishery, from May 1 through September 30, 2009. 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**	**No. DITs**
Washington	Puget Sound-South	White River	White River Hatchery	1	0
		Deschutes River	Tumwater Falls Hatchery	1	0
		Lakewood Hatchery	Lakewood Hatchery	1	0
Season Total				**3**	**0**

[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).

Voluntary Trip Reports (VTRs)

In total, 18 VTRs were returned by private anglers fishing in Area 13 between May 1 and September 30, 2009. These VTRs provided data on a total of 31 angler trips and 36 individual Chinook encounters. Based on VTR data, we estimated that Chinook encounters composition by mark-status/size class in Area 13 consisted of 36% legal-size and marked (LM), 25% legal-size and unmarked (LU), 33% sublegal-size and marked (SM), and 6% sublegal-size and unmarked (SU) (**Table 19**). In addition, the overall Area 13 mark rate was estimated at 69% (legal and sublegal combined) from VTRs, a value which differs minimally from that derived from dockside observations of observed catch and reported releases (62% mark rate, based on data summarized in **Table 19**). Available VTR data (and angler interview results) suggest that mark rates were relatively high during months where sampling coverage occurred.

Table 19. Total Chinook encountered (retained and released) by private anglers logging their trips on voluntary trip reports (VTRs), with estimates of legal-size and overall mark rates, Area 13 summer mark-selective fishery, May 1-September 30, 2009.

Month	Stat Week	VTRs (*n*)	Angler Trips	Chinook Encounters						Legal Mark Rate	Overall Mark Rate
				LM Kept	LM Rel'd	LU	SM	SU	Total		
May	18	0	0	0	0	0	0	0	0	0.0%	0.0%
	19	0	0	0	0	0	0	0	0	0.0%	0.0%
	20	0	0	0	0	0	0	0	0	0.0%	0.0%
	21	0	0	0	0	0	0	0	0	0.0%	0.0%
	22	0	0	0	0	0	0	0	0	0.0%	0.0%
June	23	0	0	0	0	0	0	0	0	0.0%	0.0%
	24	2	4	1	0	1	0	0	2	50.0%	50.0%
	25	0	0	0	0	0	0	0	0	0.0%	0.0%
	26	2	3	1	0	1	0	0	2	50.0%	50.0%
July	27	2	7	1	0	3	0	0	4	25.0%	25.0%
	28	0	0	0	0	0	0	0	0	0.0%	0.0%
	29	0	0	0	0	0	0	0	0	0.0%	0.0%
	30	1	1	0	0	0	3	0	3	0.0%	100.0%
	31	1	1	0	0	0	4	0	4	0.0%	100.0%
August	32	2	2	1	0	0	1	0	2	100.0%	100.0%
	33	0	0	0	0	0	0	0	0	0.0%	0.0%
	34	2	3	3	0	0	0	0	3	100.0%	100.0%
	35	3	4	4	0	3	2	0	9	57.1%	66.7%
	36	1	2	2	0	0	1	0	3	100.0%	100.0%
September	37	1	2	0	0	1	0	2	3	0.0%	0.0%
	38	0	0	0	0	0	0	0	0	0.0%	0.0%
	39	1	2	0	0	0	1	0	1	0.0%	100.0%
	40	0	0	0	0	0	0	0	0	0.0%	0.0%
Season Total		**18**	**31**	**13**	**0**	**9**	**12**	**2**	**36**	**59.1%**	**69.4%**
Encounter Rates (LM, LU, SM, SU):				**36.1%**		**25.0%**	**33.3%**	**5.6%**	**100%**		

ACKNOWLEDGEMENTS

This review of the summer 2009 Areas 11 and 13 mark-selective Chinook fisheries is a result of the dedicated efforts of several individuals. Dan O'Brien (South Sound Sampling Supervisor) and his sampling crew collected creel, test-fishery, and on-the-water survey data throughout the season in Area 11. Permanent samplers Justin Terry and John Moore provided logistical assistance and sampling support for both the Areas 11 and 13 fisheries. Bryan Blazer and John Rohr conducted test fishing throughout Area 11 fishery as well as on-the-water surveys in the southern portion of Area 11. Slim Simpson (Central Sound Sampling Supervisor) and members of his staff conducted boat survey activities in the northern portion of Area 11. Additionally, Scott Walker and Mike Elam conducted on-the-water surveys in the northern portion of Area 11.

Dockside samplers for the Areas 11and 13 fisheries included Lea Ronne, Katherine Kelly, Tiffany Henderson, Mary Raymond, Preston Armstrong, Paul Lorenz, David Parrao Tom Matthews, and Brian McTeague. The VTR technician and dockside sampler was Larry Peck.

At WDFW Headquarters in Olympia, we thank both Lance Campbell and John Sneva for their scale-reading expertise. We also thank Gil Lensegrav and the CWT Lab staff for their help and expertise in providing decoded CWT data. Also at the Olympia Headquarters office, Lee Dyer provided substantial help with personnel logistics and support services for the project. Mark Baltzell provided timely in-season creel estimates for Area 11 and scheduled all boat surveys. 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, 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, test fishery data, and voluntary trip report results, and (where applicable) charter and/or derby accounts. The estimation sequence builds from monthly[9] 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 ($\widehat{E}_i$, includes retained + released Chinook; See *Monthly Encounters* below) for each month of the fishery. Secondarily, encounters are apportioned to the appropriate size/mark-status group using encounters-composition data collected from voluntary trip reports (See *Voluntary Trip Report (VTR) Encounter Composition* on following page).

Monthly Encounters

$\widehat{E}_i$ = Total Chinook encounters for month *i*, which is estimated by combining creel estimates of legal-marked Chinook harvest ($\hat{K}_{LM\,i}$, defined on subsequent page) with an estimate of the proportion of the fishable Chinook population that is of legal size and marked ($\hat{p}_{LM\,i}$, defined on subsequent page). Given the potential for negative bias in $\widehat{E}_i$ if anglers release any of the legal-marked Chinook that they encounter, the $\widehat{E}_i$ estimator also includes a "correction" to account for this phenomenon (i.e., 1-$p_{\text{LM-R}}$, where $p_{\text{LM-R}}$ is the estimated legal-marked Chinook release rate)[10]. $\widehat{E}_i$ and its variance are estimated as:

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

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

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

Voluntary Trip Report (VTR) Encounter Composition

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

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

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

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

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

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

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

Where, n_i = the total number of fish encountered VTR participants during month *i*.

Encounters by Size/Mark-status Class

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

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

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

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

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

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

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

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

Before total mortality can be estimated for each class (LM, SM, LU, SU), class-specific encounters must be separated into retention and release categories. First, given that harvest is estimated only to mark-status class for creel survey purposes (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:

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

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

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

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

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

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

Apportioned Estimates of Retention to Size Classes

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

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

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

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

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

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

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

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

[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

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

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

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

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

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

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

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

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

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

Assumed Mortality Rates for Retained and Released Chinook

m_K = retention mortality rate, 100% for all retained Chinook (reincarnation is rare among fishes)
sfm_L = release mortality rate for legal (*L*) Chinook, assumed to be a constant 15%
sfm_S = release mortality rate for sublegal (*S*) Chinook, assumed to be a constant 20%

Retention-mortality Estimates

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

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

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

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

Release-mortality Estimates

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

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

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

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

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

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

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

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

D. Characterizing Precision of Estimates

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

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

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

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

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

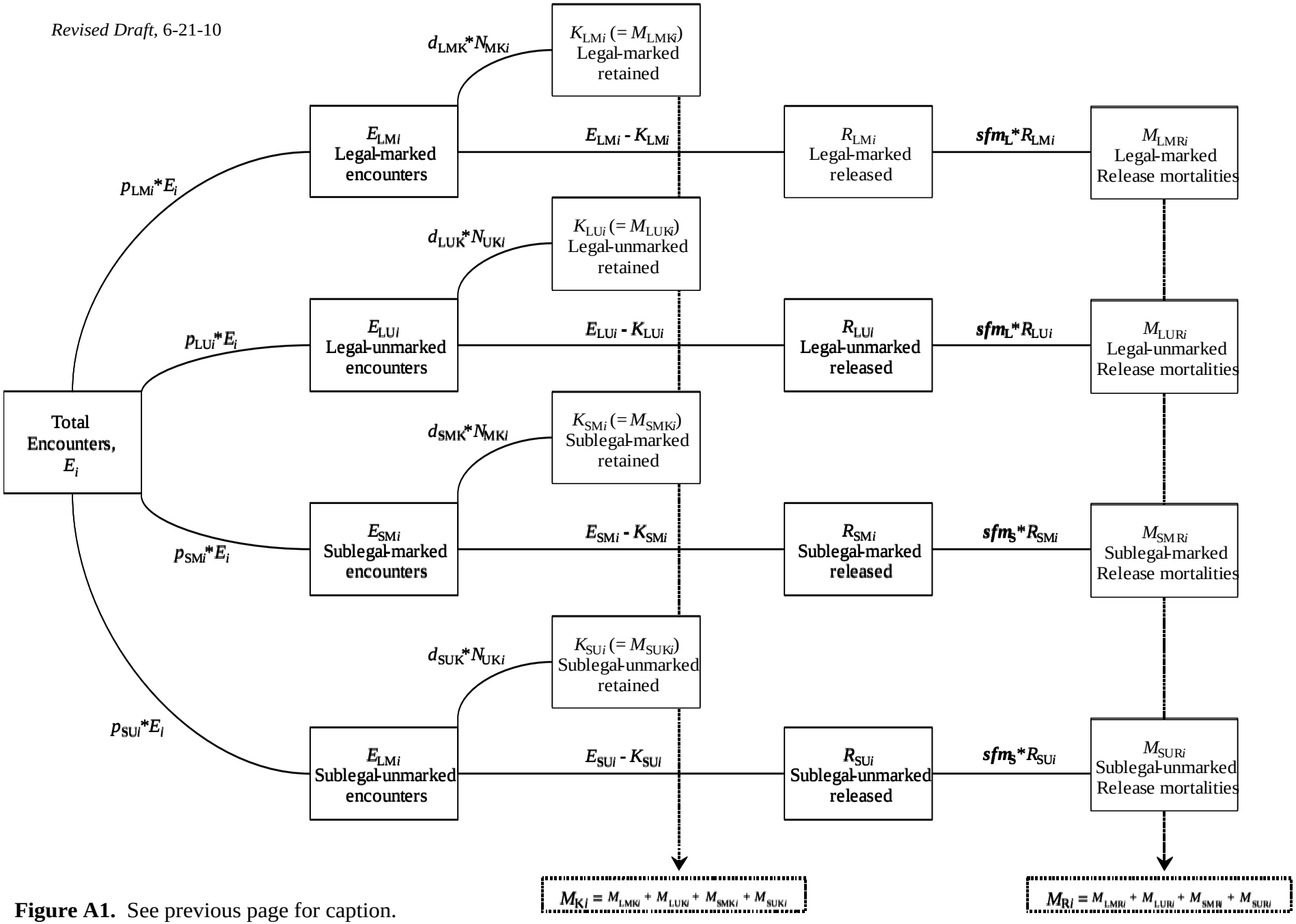

Figure A1. See previous page for caption.

Appendix B. Statistical week calendar for 2009. Note that weeks shaded in gray correspond to those during which either or both of Areas 11 or 13 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. Monthly sample rates (Retained Ad-marked Chinook Sampled/Total Estimated Retained Chinook) for the Area 11 mark-selective Chinook fishery, June 1 through September 30, 2009. Note: sample counts and totals are for adipose-clipped (i.e., marked) Chinook only.

Sample Month	Stat. Weeks	Date Range	No. Ad-marked Chinook Sampled [1/]	Estimated Ad-marked Chinook Retained	Sample Rate
June	23-26	Jun 1 - 28	120 [2/]	550	21.8%
July	27-31	Jun 29 - Aug 2	447 [3/]	1,572	28.4%
August	32-35	Aug 3 - 30	264 [4/]	1,014	26.0%
September	36-40	Aug 31 - Sep 30	24 [5/]	141	17.0%
Season Total			**855**	**3,277**	**26.1%**

[1/] Includes all retained ad-marked Chinook sampled for CWT's during dockside angler interviews (Murthy estimate sites + baseline sites) during the 2009 summer mark-selective Chinook season in Area 11.

[2/] A total of 120 ad-marked retained Chinook were recorded during dockside angler interviews in June and were sampled for coded-wire tags; of these, 103 were sampled for lengths and scales.

[3/] All 447 ad-marked retained Chinook sampled during July (323 from Murthy sites and an additional 124 from baseline sites) were sampled for lengths, scales, and CWT's.

[4/] All 264 ad-marked retained Chinook sampled during August (185 from Murthy sites and an additional 79 from baseline sites) were sampled for lengths, scales, and CWT's.

[5/] A total of 24 ad-marked retained Chinook were recorded during dockside angler interviews in September and were sampled for coded-wire tags; of these, 22 were sampled for lengths and scales.

Appendix D. Total number of anglers intercepted in Area 11 during on-the-water surveys conducted between June 1 and September 30, 2009. Gray sites were included in the dockside sample frame.

Site Name	Weekday Anglers	Weekday Total (unadjusted) size measure	Weekend Anglers	Weekend Total (unadjusted) size measure
Armeni Ramp	50	0.051	63	0.037
Beach Launch	10	0.010	6	0.004
Boston Harbor	5	0.005	0	0.000
Breakwater Marina	26	0.026	30	0.018
Browns Point	1	0.001	33	0.019
Brownsville Ramp	0	0.000	14	0.008
Chambers Bay Launch	0	0.000	1	0.001
Day Island	7	0.007	14	0.008
Della Dock Marina	4	0.004	0	0.000
Des Moines Sling	32	0.033	89	0.052
Des Moines Marina	130	0.132	191	0.112
Des Moines Dry Storage	2	0.002	3	0.002
Des Moines Yacht Club	6	0.006	23	0.014
Eagle Harbor	4	0.004	4	0.002
Edmonds -All	0	0.000	1	0.001
Elliott Bay Marina	2	0.002	13	0.008
Evergreen Park Ramp	2	0.002	9	0.005
Foss Marina	10	0.010	20	0.012
Fox Island Launch/Marina	4	0.004	12	0.007
Ft Ward St Park	0	0.000	1	0.001
Gig Harbor Ramp	71	0.072	104	0.061
Gig Harbor Marina	14	0.014	6	0.004
Hylebos Marina	2	0.002	1	0.001
Lions Park Ramp	0	0.000	2	0.001
Manchester Ramp	21	0.021	42	0.025
Narrows Ramp	34	0.035	56	0.033
Ollie and Charlie's	10	0.010	14	0.008
Olalla Public Ramp	7	0.007	10	0.006
Private Buoy/Moorage	56	0.057	46	0.027
Pt Defiance Boat House	73	0.074	115	0.068
Pt Defiance Ramp	232	0.236	436	0.256
Pt Defiance Marina	0	0.000	3	0.002
Pt Orchard Ramp Public	0	0.000	6	0.004
Pt Orchard Marina	0	0.000	3	0.002
Quartermaster Harbor	0	0.000	3	0.002
Redondo Ramp	113	0.115	231	0.136
Shilshole Ramp	6	0.006	9	0.005
Solo Point	3	0.003	6	0.004
Steilacoom Public Ramp	0	0.000	3	0.002
Tacoma Outboard Assn Ramp	23	0.023	35	0.021
Tacoma yacht club	0	0.000	4	0.002
Tyee Marina	16	0.016	30	0.018
Wollochet Bay	4	0.004	8	0.005
Zittels Marina	4	0.004	0	0.000
Total Anglers	**984**	**1.000**	**1,700**	**1.000**

Appendix E. Size measures of sites sampled during the Area 11 June 1-September 30, 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 11 Sampled Sites and Size Measures					
			Armeni Public Ramp	Gig Harbor Ramp	Narrows Marina (Boathouse; Ramp; Rental)	Point Defiance Boathouse	Point Defiance Public Ramp	Redondo Ramp
23	WD	0.665	0.031	0.101	0.057	0.239	0.484	0.088
	WE	0.691	0.043	0.118	0.000	0.151	0.543	0.145
24	WD	0.665	0.031	0.101	0.057	0.239	0.484	0.088
	WE	0.691	0.043	0.118	0.000	0.151	0.543	0.145
25	WD	0.673	0.028	0.127	0.050	0.238	0.481	0.077
	WE	0.611	0.101	0.121	0.094	0.121	0.416	0.148
26	WD	0.673	0.028	0.127	0.050	0.238	0.481	0.077
	WE	0.611	0.101	0.121	0.094	0.121	0.416	0.148
27	WD	0.610	0.085	0.138	0.023	0.215	0.423	0.115
	WE	0.617	0.111	0.121	0.101	0.152	0.369	0.146
28	WD	0.610	0.085	0.138	0.023	0.215	0.423	0.115
	WE	0.617	0.111	0.121	0.101	0.152	0.369	0.146
29	WD	0.610	0.085	0.138	0.023	0.215	0.423	0.115
	WE	0.574	0.086	0.047	0.031	0.164	0.320	0.352
30	WD	0.610	0.085	0.138	0.023	0.215	0.423	0.115
	WE	0.574	0.086	0.047	0.031	0.164	0.320	0.352
31	WD	0.618	0.062	0.206	0.041	0.082	0.278	0.330
	WE	0.696	0.102	0.068	0.034	0.091	0.438	0.267
32	WD	0.618	0.062	0.206	0.041	0.082	0.278	0.330
	WE	0.696	0.102	0.068	0.034	0.091	0.438	0.267
33	WD	0.676	0.041	0.102	0.092	0.128	0.393	0.245
	WE	0.539	0.015	0.053	0.031	0.107	0.466	0.328
34	WD	0.676	0.041	0.102	0.092	0.128	0.393	0.245
	WE	0.539	0.015	0.053	0.031	0.107	0.466	0.328
35	WD	0.481	0.210	0.098	0.042	0.042	0.594	0.014
	WE	0.513	NA	0.164	0.017	0.121	0.500	0.198
36	WD	0.481	0.210	0.098	0.042	0.042	0.594	0.014
	WE	0.513	NA	0.164	0.017	0.121	0.500	0.198
37	WD	0.481	0.210	0.098	0.042	0.042	0.594	0.014
	WE	0.513	NA	0.164	0.017	0.121	0.500	0.198
38	WD	0.481	0.210	0.098	0.042	0.042	0.594	0.014
	WE	0.513	NA	0.164	0.017	0.121	0.500	0.198
39	WD	0.506	0.138	0.087	0.055	0.096	0.505	0.119
	WE	0.564	NA	0.146	0.081	0.081	0.512	0.179
40	WD	0.506	0.138	0.087	0.055	0.096	0.505	0.119

Appendix F. Age composition of retained (dockside samples) and encountered (test fishery samples) Chinook salmon, Areas 11 (June 1-September 30, 2009) and 13 (May 1-September 30, 2009) mark-selective Chinook fisheries, summer 2009. AD = marked or adipose-fin clipped Chinook, UM = unmarked (unclipped) Chinook, UD = undetermined mark status.

Area	Data Source	Mark-status Group	Period	Age Composition [1/]							
				2.1	**3.1**	**3.2**	**4.1**	**4.2**	**5.1**	**5.2**	**Total**
11	Dockside	AD	Season	58	257	29	400	23	2	1	770
			(%)	8%	33%	4%	52%	3%	0%	0%	
		UD	Season	0	1	0	2	0	0	0	3
			(%)	0%	33%	0%	67%	0%	0%	0%	
		UM	Season	8	4	1	0	0	0	0	13
			(%)	62%	31%	8%	0%	0%	0%	0%	
		Total	**Season**	**66**	**262**	**30**	**402**	**23**	**2**	**1**	**786**
			(%)	**8%**	**33%**	**4%**	**51%**	**3%**	**0%**	**0%**	
	Test Fishing	AD	Season	6	9	1	10	0	0	0	26
			(%)	23%	35%	4%	38%	0%	0%	0%	
		UD	Season	1	0	0	0	0	0	0	1
			(%)	100%	0%	0%	0%	0%	0%	0%	
		UM	Season	0	2	1	1	0	0	0	4
			(%)	0%	50%	25%	25%	0%	0%	0%	
		Total	**Season**	**7**	**11**	**2**	**11**	**0**	**0**	**0**	**31**
			(%)	**23%**	**35%**	**6%**	**35%**	**0%**	**0%**	**0%**	
13	Dockside	AD	Season	4	18	2	23	1	0	0	48
			(%)	8%	38%	4%	48%	2%	0%	0%	
		UM	Season	0	0	1	0	0	0	0	1
			(%)	0%	0%	100%	0%	0%	0%	0%	
		Total	**Season**	**4**	**18**	**3**	**23**	**1**	**0**	**0**	**49**
			(%)	**8%**	**37%**	**6%**	**47%**	**2%**	**0%**	**0%**	

[1/] Gilbert-Rich age notation, "Total Age". "Age at outmigration", inclusive of time spent in incubation.

Appendix G. CWTs recovered from Chinook salmon during the summer 2009 Area 11 (June 1-September 30) and Area 13 (May 1-September 30) mark-selective Chinook fisheries.

Area	Recov. Date	Tag Code	Brood Year	Release Site	Rearing Hatchery	Rel. Agency	DIT codes	FKL cm	Label	Mark
11	1-Jun-09	633286	2005	CLEAR CR 11.0013C	NISQUALLY HATCHERY	NISQ	210681	75	56601	AD Fin Clp
11	1-Jun-09	633375	2005	VOIGHT CR 10.0414	VOIGHTS CR HATCHERY	WDFW		71	56602	AD Fin Clp
11	15-Jun-09	633469	2005	FINCH CR 16.0222	HOODSPORT HATCHERY	WDFW		72	56603	AD Fin Clp
11	20-Jun-09	633967	2006	GREEN R 09.0001		WDFW		53	56604	AD Fin Clp
11	21-Jun-09	633369	2005	FRIDAY CR 03.0017	SAMISH HATCHERY	WDFW	633368	88	51701	AD Fin Clp
11	21-Jun-09	633472	2005	CHAMBERS CR 12.0007	LAKEWOOD HATCHERY	WDFW		77	56751	AD Fin Clp
11	21-Jun-09	210690	2005	WHITE R 10.0031	WHITE RIVER HATCHERY	MUCK		70	56605	Unmarked
11	25-Jun-09	633285	2005	GROVERS CR 15.0299	GROVERS CR HATCHERY	SUQ	210682	90	51705	AD Fin Clp
11	27-Jun-09	633375	2005	VOIGHT CR 10.0414	VOIGHTS CR HATCHERY	WDFW		78	57719	AD Fin Clp
11	27-Jun-09	633885	2006	ISSAQUAH CR 08.0178	ISSAQUAH HATCHERY	WDFW		57	57216	AD Fin Clp
11	27-Jun-09	633885	2006	ISSAQUAH CR 08.0178	ISSAQUAH HATCHERY	WDFW		73	56606	AD Fin Clp
11	28-Jun-09	633968	2006	CHAMBERS CR 12.0007	GARRISON HATCHERY	WDFW		67	56607	AD Fin Clp
11	1-Jul-09	633383	2005	ISSAQUAH CR 08.0178	ISSAQUAH HATCHERY	WDFW		81	56608	AD Fin Clp
11	1-Jul-09	025641	2005	R-HARRISON R	H-CHEHALIS R	CDFO		87	56609	AD Fin Clp
11	1-Jul-09	210688	2006	COWSKULL ACCLIM POND	COWSKULL ACCLIM POND	PUYA		62	57720	AD Fin Clp
11	3-Jul-09	210723	2006	WHITE R 10.0031	WHITE RIVER HATCHERY	MUCK		53	56752	Unmarked
11	5-Jul-09	633885	2006	ISSAQUAH CR 08.0178	ISSAQUAH HATCHERY	WDFW		64	57721	AD Fin Clp
11	5-Jul-09	633285	2005	GROVERS CR 15.0299	GROVERS CR HATCHERY	SUQ	210682	82	46551	AD Fin Clp
11	9-Jul-09	633467	2005	GREEN R 09.0001	ICY CR HATCHERY	WDFW		72	51702	AD Fin Clp
11	9-Jul-09	633968	2006	CHAMBERS CR 12.0007	GARRISON HATCHERY	WDFW		68	51703	AD Fin Clp
11	11-Jul-09	633967	2006	GREEN R 09.0001		WDFW		59	56753	AD Fin Clp
11	11-Jul-09	633366	2005	PURDY CR 16.0005	GEORGE ADAMS HATCHRY	WDFW		73	54813	AD Fin Clp
11	13-Jul-09	633375	2005	VOIGHT CR 10.0414	VOIGHTS CR HATCHERY	WDFW		76	51704	AD Fin Clp
11	15-Jul-09	633967	2006	GREEN R 09.0001		WDFW		61	56754	AD Fin Clp
11	18-Jul-09	633286	2005	CLEAR CR 11.0013C	NISQUALLY HATCHERY	NISQ	210681	76	57722	AD Fin Clp
11	18-Jul-09	634271	2007	PURDY CR 16.0005	GEORGE ADAMS HATCHRY	WDFW	634270,634272	49	56755	AD Fin Clp
11	19-Jul-09	633382	2005	FINCH CR 16.0222	HOODSPORT HATCHERY	WDFW		89	57725	AD Fin Clp
11	19-Jul-09	633967	2006	GREEN R 09.0001		WDFW		53	57726	AD Fin Clp
11	19-Jul-09	633579	2006	GROVERS CR 15.0299	GROVERS CR HATCHERY	SUQ	210737	61	56706	AD Fin Clp
11	22-Jul-09	633286	2005	CLEAR CR 11.0013C	NISQUALLY HATCHERY	NISQ	210681	83	56610	AD Fin Clp
11	22-Jul-09	633886	2006	FINCH CR 16.0222	HOODSPORT HATCHERY	WDFW		87	56756	AD Fin Clp
11	24-Jul-09	633967	2006	GREEN R 09.0001		WDFW		74	51707	AD Fin Clp
11	24-Jul-09	633375	2005	VOIGHT CR 10.0414	VOIGHTS CR HATCHERY	WDFW		86	51706	AD Fin Clp
11	25-Jul-09	633286	2005	CLEAR CR 11.0013C	NISQUALLY HATCHERY	NISQ	210681	84	56611	AD Fin Clp
11	25-Jul-09	634270	2007	PURDY CR 16.0005	GEORGE ADAMS HATCHRY	WDFW	634271,634272	46	56612	Unmarked
11	25-Jul-09	633971	2006	FINCH CR 16.0222	HOODSPORT HATCHERY	WDFW		52	57727	AD Fin Clp
11	25-Jul-09	633375	2005	VOIGHT CR 10.0414	VOIGHTS CR HATCHERY	WDFW		81	54215	AD Fin Clp
11	25-Jul-09	633968	2006	CHAMBERS CR 12.0007	GARRISON HATCHERY	WDFW		68	56757	AD Fin Clp
11	26-Jul-09	633366	2005	PURDY CR 16.0005	GEORGE ADAMS HATCHRY	WDFW		76	56758	AD Fin Clp
11	26-Jul-09	634272	2007	FRIDAY CR 03.0017	SAMISH HATCHERY	WDFW	634270,634271	54	57728	AD Fin Clp
11	27-Jul-09	633885	2006	ISSAQUAH CR 08.0178	ISSAQUAH HATCHERY	WDFW			51709	AD Fin Clp
11	27-Jul-09	633375	2005	VOIGHT CR 10.0414	VOIGHTS CR HATCHERY	WDFW		83	56759	AD Fin Clp
11	31-Jul-09	633382	2005	FINCH CR 16.0222	HOODSPORT HATCHERY	WDFW		72	56600	AD Fin Clp
11	1-Aug-09	633375	2005	VOIGHT CR 10.0414	VOIGHTS CR HATCHERY	WDFW		79	51710	AD Fin Clp

Area	Recov. Date	Tag Code	Brood Year	Release Site	Rearing Hatchery	Rel. Agency	DIT codes	FKL cm	Label	Mark
11	2-Aug-09	633971	2006	FINCH CR 16.0222	HOODSPORT HATCHERY	WDFW		62	57729	AD Fin Clp
11	2-Aug-09	632894	2005	CHAMBERS CR 12.0007	GARRISON HATCHERY	WDFW		74	51853	AD Fin Clp
11	2-Aug-09	633875	2006	PURDY CR 16.0005	GEORGE ADAMS HATCHRY	WDFW	633876	71	51251	AD Fin Clp
11	2-Aug-09	633968	2006	CHAMBERS CR 12.0007	GARRISON HATCHERY	WDFW		72	56614	AD Fin Clp
11	3-Aug-09	633968	2006	CHAMBERS CR 12.0007	GARRISON HATCHERY	WDFW		67	56761	AD Fin Clp
11	4-Aug-09	633286	2005	CLEAR CR 11.0013C	NISQUALLY HATCHERY	NISQ	210681	78	51852	AD Fin Clp
11	5-Aug-09	632978	2004	CHAMBERS CR 12.0007	LAKEWOOD HATCHERY	WDFW			51711	AD Fin Clp
11	5-Aug-09	633889	2006	VOIGHT CR 10.0414	VOIGHTS CR HATCHERY	WDFW		70	56615	AD Fin Clp
11	8-Aug-09	633285	2005	GROVERS CR 15.0299	GROVERS CR HATCHERY	SUQ	210682	75	51252	AD Fin Clp
11	8-Aug-09	633375	2005	VOIGHT CR 10.0414	VOIGHTS CR HATCHERY	WDFW		78	51854	AD Fin Clp
11	9-Aug-09	633286	2005	CLEAR CR 11.0013C	NISQUALLY HATCHERY	NISQ	210681	74	51856	AD Fin Clp
11	12-Aug-09	633875	2006	PURDY CR 16.0005	GEORGE ADAMS HATCHRY	WDFW	633876	76	56762	AD Fin Clp
11	15-Aug-09	633886	2006	FINCH CR 16.0222	HOODSPORT HATCHERY	WDFW		73	51254	AD Fin Clp
11	16-Aug-09	633286	2005	CLEAR CR 11.0013C	NISQUALLY HATCHERY	NISQ	210681	70	51713	AD Fin Clp
11	17-Aug-09	210795	2007	WHITE R 10.0031	WHITE RIVER HATCHERY	MUCK		44	51256	Unmarked
11	17-Aug-09	634274	2007	NOOKSACK R -NF 01.0120	KENDALL CR HATCHERY	WDFW		43	51255	AD Fin Clp
11	18-Aug-09	633971	2006	FINCH CR 16.0222	HOODSPORT HATCHERY	WDFW		63	51708	AD Fin Clp
11	18-Aug-09	633967	2006	GREEN R 09.0001		WDFW		54	56616	AD Fin Clp
11	5-Sep-09	633968	2006	CHAMBERS CR 12.0007	GARRISON HATCHERY	WDFW		59	51715	AD Fin Clp
13	29-May-09	210723	2006	WHITE R 10.0031	WHITE RIVER HATCHERY	MUCK		59	57718	Unmarked
13	4-Aug-09	633494	2006	DESCHUTES R 13.0028	TUMWATER FALLS HATCH	WDFW		67	56504	AD Fin Clp
13	2-Sep-09	634299	2007	LAKEWOOD HATCHERY	LAKEWOOD HATCHERY	WDFW		39	42225	AD Fin Clp

Appendix H. Fishery-total estimates of retained and released salmon (Chinook *and* other species) catch for the Area 11 summer 2009 Chinook mark-selective fishery, June 1-September 30, 2009. Displayed Chinook harvest values are equivalent to those in **Table 4**; whereas the release estimates displayed in **Table 4** 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.

				Est. Effort		Est. Retained Chinook		Est. Other Species Kept			Est. Released Chinook			Est. Other Species Released [1/]					
Month	Stat Week	Start Date	End Date	Boats	Anglers	AD	UM	AD Coho	UM Coho	Pink	AD	UM	UK	Ad Coho	UM Coho	UK Coho	Chum	Pink	Unk. Salmon
June	23	1-Jun	7-Jun	1,466	2,451	206	0	0	0	0	22	86	45	0	0	0	0	0	3
	24	8-Jun	14-Jun	1,462	2,549	189	0	0	3	0	41	95	35	0	0	0	0	0	9
	25	15-Jun	21-Jun	1,086	2,048	81	7	4	0	0	17	37	15	0	0	0	0	0	0
	26	22-Jun	28-Jun	1,232	2,385	74	0	7	0	0	72	43	112	0	0	4	0	0	4
July	27	29-Jun	5-Jul	1,817	3,482	119	4	0	8	0	80	81	140	4	0	19	0	0	5
	28	6-Jul	12-Jul	1,981	3,830	138	7	37	47	0	208	220	333	4	8	65	0	11	67
	29	13-Jul	19-Jul	3,132	5,935	414	4	93	64	0	219	177	229	31	17	58	0	0	28
	30	20-Jul	26-Jul	3,546	7,012	419	8	12	12	21	198	135	154	15	24	34	0	0	64
	31	27-Jul	2-Aug	2,843	5,956	482	0	45	20	516	322	268	463	17	23	65	0	117	405
Aug.	32	3-Aug	9-Aug	3,736	7,839	435	0	34	16	2,049	278	275	509	13	27	84	0	1,429	223
	33	10-Aug	16-Aug	4,178	8,618	294	3	36	38	4,366	120	158	290	21	26	118	0	1,673	119
	34	17-Aug	23-Aug	4,532	10,121	204	0	103	111	6,441	67	81	276	0	30	73	0	2,074	40
	35	24-Aug	30-Aug	2,525	5,701	81	0	61	30	3,919	69	151	123	25	50	28	0	1,173	255
Sept.	36	31-Aug	7-Sep	2,096	4,424	50	0	171	52	1,900	59	107	244	10	35	32	0	811	129
	37	8-Sep	13-Sep	1,685	3,376	40	0	559	197	432	113	316	191	19	33	98	0	68	216
	38	14-Sep	20-Sep	1,148	2,051	14	4	422	91	120	67	165	72	25	12	109	0	13	82
	39	21-Sep	27-Sep	1,034	1,909	15	0	184	136	6	145	419	217	71	113	104	5	0	235
	40	28-Sep	30-Sep	657	1,028	22	0	146	73	0	112	170	102	40	0	37	7	0	119
Season Total:				**40,156**	**80,715**	**3,277**	**37**	**1,913**	**897**	**19,770**	**2,211**	**2,987**	**3,550**	**294**	**397**	**927**	**12**	**7,370**	**2,003**
Variance:				2,307,046	9,409,802	57,425	138	68,969	19,248	3,536,659	32,308	71,604	99,924	1,212	6,081	13,406	14	657,664	60,979
Standard Error:				1,519	3,068	240	12	263	139	1,881	180	268	316	35	78	116	4	811	247
CV (%):				3.8%	3.8%	7.3%	31.7%	13.7%	15.5%	9.5%	8.1%	9.0%	8.9%	11.8%	19.6%	12.5%	31.0%	11.0%	12.3%
95% CI:				37,179-43,133	74,703-86,727	2,807-3,747	14-60	1,399-2,428	625-1,168	16,085-23,456	1,859-2,564	2,462-3,511	2,930-4,169	226-363	245-550	700-1,153	2-29	5,780-8,959	1,519-2,487

[1/]In addition, we estimated that anglers released four steelhead during week 38.

Appendix I. Season-total estimates of Chinook encounters by size/mark status, and total estimates of angler effort, summarized for the previous and current seasons of the Area 11 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	
11	June 1 - September 30, 2007	78,958	10,192	74	354	21	1,511	3,015	8,033	2,357	25,558
11	June 1 - September 30, 2008	65,728	7,277	18	100	5	1,087	1,999	1,969	248	12,703
11	June 1 - September 30, 2009	80,715	3,159	20	118	17	472	1,273	3,833	3,313	12,205