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Hatchery Chum Salmon Contribution to Southern Southeast Alaska Commercial Net Fisheries, 2006–2010

by

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and

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November 2013

Alaska Department of Fish and Game **Divisions of Sport Fish and Commercial Fisheries**

Symbols and Abbreviations

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Weights and measures (metric)

centimeter	cm
deciliter	dL
gram	g
hectare	ha
kilogram	kg
kilometer	km
liter	L
meter	m
milliliter	mL
millimeter	mm

Weights and measures (English)

cubic feet per second	ft^3/s
foot	ft
gallon	gal
inch	in
mile	mi
nautical mile	nmi
ounce	oz
pound	lb
quart	qt
yard	yd

Time and temperature

day	d
degrees Celsius	°C
degrees Fahrenheit	°F
degrees kelvin	K
hour	h
minute	min
second	s

Physics and chemistry

all atomic symbols	
alternating current	AC
ampere	A
calorie	cal
direct current	DC
hertz	Hz
horsepower	hp
hydrogen ion activity (negative log of)	pH
parts per million	ppm
parts per thousand	ppt, ‰
volts	V
watts	W

General

Alaska Administrative Code	AAC
all commonly accepted abbreviations	e.g., Mr., Mrs., AM, PM, etc.
all commonly accepted professional titles	e.g., Dr., Ph.D., R.N., etc.
at	@
compass directions:	
east	E
north	N
south	S
west	W
copyright	©
corporate suffixes:	
Company	Co.
Corporation	Corp.
Incorporated	Inc.
Limited	Ltd.
District of Columbia	D.C.
et alii (and others)	et al.
et cetera (and so forth)	etc.
exempli gratia (for example)	e.g.
Federal Information Code	FIC
id est (that is)	i.e.
latitude or longitude	lat or long
monetary symbols (U.S.)	$, ¢
months (tables and figures): first three letters	Jan,...,Dec
registered trademark	®
trademark	™
United States (adjective)	U.S.
United States of America (noun)	USA
U.S.C.	United States Code
U.S. state	use two-letter abbreviations (e.g., AK, WA)

Mathematics, statistics

all standard mathematical signs, symbols and abbreviations	
alternate hypothesis	H_A
base of natural logarithm	*e*
catch per unit effort	CPUE
coefficient of variation	CV
common test statistics	(F, t, χ^2, etc.)
confidence interval	CI
correlation coefficient (multiple)	R
correlation coefficient (simple)	r
covariance	cov
degree (angular)	°
degrees of freedom	df
expected value	*E*
greater than	>
greater than or equal to	≥
harvest per unit effort	HPUE
less than	<
less than or equal to	≤
logarithm (natural)	ln
logarithm (base 10)	log
logarithm (specify base)	$\log_2$, etc.
minute (angular)	'
not significant	NS
null hypothesis	H_O
percent	%
probability	P
probability of a type I error (rejection of the null hypothesis when true)	α
probability of a type II error (acceptance of the null hypothesis when false)	β
second (angular)	"
standard deviation	SD
standard error	SE
variance	
population	Var
sample	var

FISHERY MANUSCRIPT SERIES NO. 13-10

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ABSTRACT

The Southeast Alaska commercial chum salmon harvest increased dramatically over the past five decades, primarily due to hatchery production. Hatchery-reared chum salmon accounted for an average 73% of the total common property chum salmon harvest from 2001 to 2010. Methods used by hatchery operators to estimate their contributions to mixed stock fisheries vary and have not been described in published reports; likewise, detailed harvest information useful for managing mixed stock fisheries, such as weekly contributions by area, are not readily available. Southern Southeast Regional Aquaculture Association has taken the lead among Alaska hatchery operators by otolith-marking 100% of their chum salmon releases and establishing a comprehensive commercial fisheries sampling program to estimate their contributions to regional harvests. Our goal was to document the abundance and distribution of hatchery summer-run and fall-run chum salmon, as well as unmarked fish, in the southern Southeast Alaska mixed stock fisheries. From 2006 to 2010, hatchery chum salmon averaged 58% (approximately 520,000 fish) of the overall chum salmon harvest in the District 101–104 purse seine fisheries combined, and 77% (approximately 499,000 fish) of the District 101, 106, and 108 drift gillnet fisheries combined. Hatchery summer-run chum salmon harvests peaked in statistical weeks 28–31 (most of July) in most net fisheries. Hatchery fall-run chum salmon harvests were greatest in District 101 and 106 fisheries and typically peaked in statistical weeks 35–37 (late August to mid-September). Peak timing for unmarked chum salmon occurred at similar times to marked fish in most cases, indicating that wild and hatchery stocks shared similar run timing in southern Southeast Alaska fisheries. This type of detailed information on the proportions of hatchery and unmarked chum salmon is currently only available for the southern half of the region.

Key words: chum salmon, commercial fisheries, drift gillnet, harvest contributions, harvest distribution, hatchery, *Oncorhynchus keta,* otolith, otolith-mark, purse seine, Southeast Alaska

INTRODUCTION

Over the past five decades, the commercial common property harvest[1] of chum salmon (*Oncorhynchus keta*) in Southeast Alaska increased from an annual average of 1.8 million fish during 1960–1990 to 7.3 million fish during 1991–2010 (Figure 1). This dramatic increase was largely due to increased hatchery production (Van Alen 2000). In 1980, hatchery operators in Southeast Alaska released 8.7 million chum salmon fry at eight locations; by 2010, 458 million fry were released at 19 locations (Piston and Heinl 2011). Chum salmon are produced in northern Southeast Alaska by Douglas Island Pink and Chum, Inc. (DIPAC), Armstrong Keta, Inc. (AKI), Sheldon Jackson Hatchery (SJ), Kake Nonprofit Fisheries Corporation (KNFC), and Northern Southeast Regional Aquaculture Association (NSRAA). In southern Southeast Alaska chum salmon are produced by Metlakatla Indian Community (MIC) and Southern Southeast Regional Aquaculture Association (SSRAA; Figure 2). Based on contribution estimates provided by hatchery operators to the Alaska Department of Fish and Game (ADF&G), hatchery-produced chum salmon accounted for an average 73% of the Southeast Alaska commercial common property chum salmon harvest from 2001 to 2010 (Piston and Heinl 2011). Chum salmon are primarily harvested incidentally to other species in traditional mixed stock fisheries, which are managed based on abundance of other target species (Piston and Heinl 2011). In years when purse seine fisheries were curtailed due to low pink salmon (*O. gorbuscha)* abundance, chum salmon fisheries in terminal hatchery areas have provided fishermen a valuable economic safety net (Piston and Heinl 2011).

[1] Common property harvest is total harvest minus hatchery cost recovery fisheries.

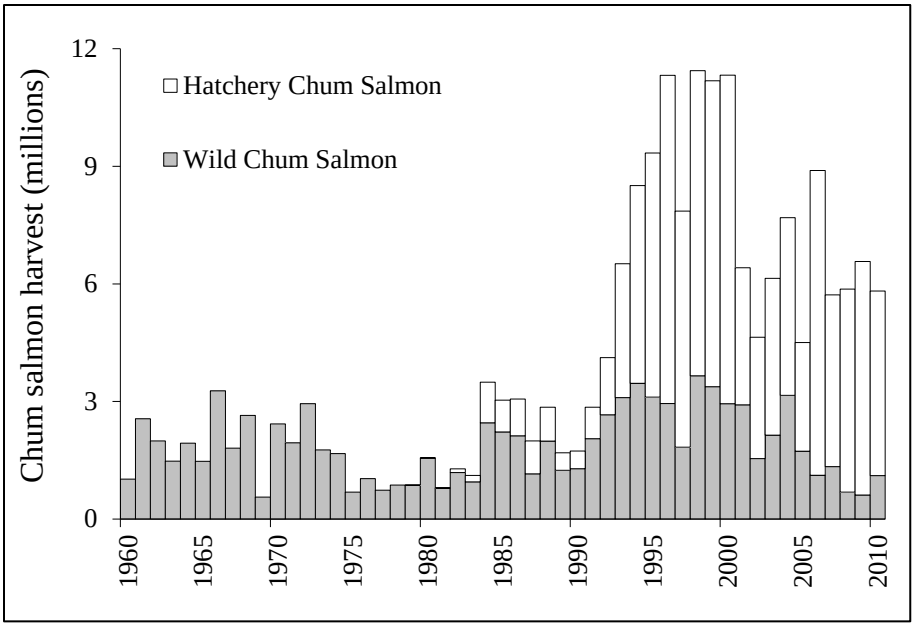

Figure 1.–Common property chum salmon harvest in Southeast Alaska, 1960–2010.

Hatchery operators are required to provide ADF&G with estimates of the annual contribution of hatchery fish to common property commercial fisheries, separated by gear group, which are included in an annual ADF&G salmon enhancement report (e.g., White 2011). A large portion of the annual common property chum salmon harvest (40% over the past decade) occurs within terminal harvest areas adjacent to hatchery release sites where stock composition is assumed to be entirely hatchery fish. However, methods used to estimate contributions to mixed stock fisheries vary among hatchery operators, from comprehensive thermal mark sampling of fisheries landings to "best estimates," which are sometimes based on consultation with ADF&G management biologists (Heinl 2005; Davidson et al. 2011). These methods are not described in published reports. Detailed harvest information useful for managing mixed stock fisheries, such as contribution by time and area, are also not readily available, and there is currently no comprehensive ADF&G program in place to sample fisheries throughout the region (Davidson et al. 2011).

Management of traditional mixed stock commercial fisheries, particularly drift gillnet fisheries, is based partly on inseason run strength, which is determined by comparing weekly fishing performance of the current year to historical performance (Davidson et al. 2012). Often this involves comparing the recent 10-year average CPUE to the current year. Where inseason management is based on fishery performance, it may be difficult or impossible to gauge wild stock run strength if significant numbers of hatchery fish are present (Davidson et al. 2012). This is particularly true for chum salmon as hatchery fish often constitute a very large portion of mixed stock fishery harvests in Southeast Alaska (Heinl 2005; Eggers and Heinl 2008; Piston and Heinl 2011).

The most comprehensive information on hatchery chum salmon harvests has been collected by SSRAA, the largest hatchery operator in the southern half of the region (Eggers and Heinl 2008). SSRAA accounted for 96% of the hatchery chum salmon production in southern Southeast Alaska from 2001 to 2010 (Figure 2), including both summer- and fall-run chum salmon, which are primarily harvested in Districts 101–108 (Figures 3 and 4). Marking has long been a

fundamental part of SSRAA's research and evaluation process and is used to estimate contribution to mixed stock fisheries, estimate total run size, develop inseason abundance estimates with which to better manage terminal hatchery fisheries, and to improve forecasts. Contributions of SSRAA chum salmon to mixed stock fisheries have been estimated annually through mark–recovery programs; first with coded-wire tags in the 1979–2002 release years, then with thermal otolith marks since the 2002 release year (Eggers and Heinl 2008).

In 2005, SSRAA implemented a program to sample and analyze otoliths from traditional mixed stock net fishery landings at Ketchikan and Petersburg. Although this sampling program was not intended to provide precise weekly estimates of the harvest of hatchery fish in every fishery, a very large portion (>90%) of annual District 101–108 catches were sampled to some degree. A recent blind test between otolith readers at the ADF&G Thermal Mark Laboratory in Juneau and the SSRAA otolith laboratory in Ketchikan showed high agreement on specimen identification and reader accuracy (Lorna Wilson, Fishery Biologist, ADF&G Thermal Mark Laboratory, personal communication).

The purpose of our report is to outline methods and results from SSRAA's commercial fisheries sampling program for the five years 2006–2010. We document the weekly harvest, distribution, and timing of otolith-marked hatchery summer- and fall-run chum salmon and unmarked chum salmon in the southern Southeast Alaska commercial net fisheries. The information collected by SSRAA forms the most complete data set of its kind in Southeast Alaska, and thus provides valuable insights into chum salmon abundance trends in southern Southeast Alaska fisheries.

METHODS

We will report on harvest in southern Southeast Alaska, which encompasses all state waters from Sumner Strait south to Dixon Entrance and is divided into eight ADF&G regulatory districts (Districts 101–108; Figure 4). Net fisheries in all districts were sampled except fisheries within Annette Island Reserve, in District 101, which is open exclusively to MIC members. Most fish harvested within the reserve were landed at the Annette Island Packing Co., in Metlakatla; however, Annette Island fish were occasionally landed in Ketchikan and opportunistically sampled by SSRAA personnel. We assume that Annette Island harvests comprised a mixture of wild and MIC and SSRAA hatchery fish, but information from those fisheries are not included in this report.

Information was summarized by "statistical week", a classification used by ADF&G to divide the year into sequentially numbered weeks for management of the salmon fisheries. Each year, statistical week 1 begins the first week of January and ends on the first Saturday of the month; subsequent statistical weeks start on Sunday at 12:01 AM and end on the following Saturday at midnight (see Appendix A for 2006–2010 ADF&G statistical week calendar).

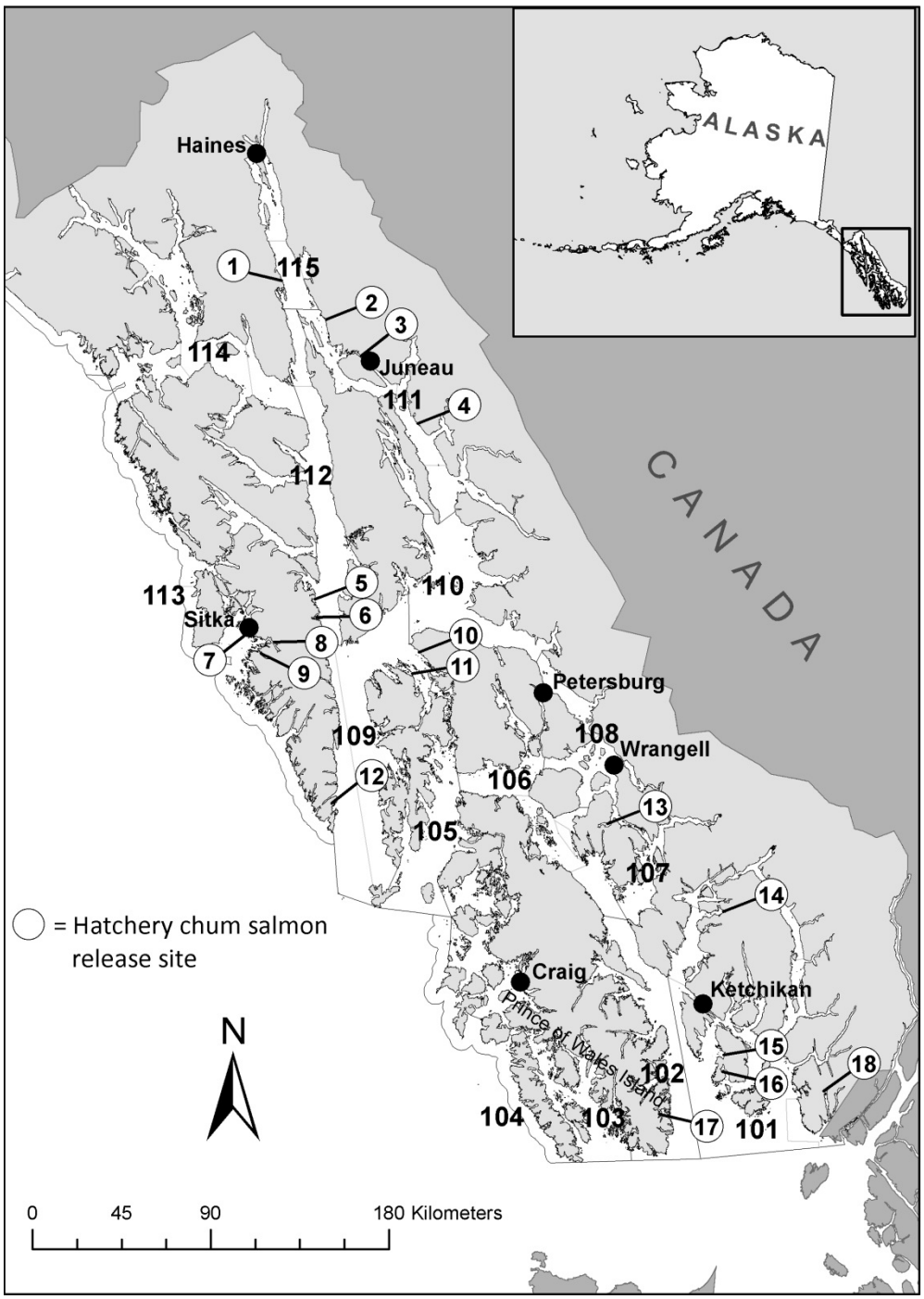

Figure 2.–Map of Southeast Alaska showing major towns, current hatchery chum salmon release sites, and regulatory fishing districts. Hatchery release sites and operators are represented by numbered circles: 1) Boat Harbor (DIPAC), 2) Amalga Harbor (DIPAC), 3) Gastineau Channel (DIPAC), 4) Limestone Inlet (DIPAC), 5) Kasnyku Bay (NSRAA), 6) Takatz Bay (NSRAA), 7) Crescent Bay (SJ), 8) Bear Cove (NSRAA), 9) Deep Inlet (NSRAA), 10) Kake (KNFC), 11) Southeast Cove (KNFC), 12) Port Armstrong (AKI), 13) Anita Bay (SSRAA), 14) Neets Bay (SSRAA), 15) Chester Bay (MIC), 16) Tamgas Harbor (MIC), 17) Kendrick Bay (SSRAA), 18) Nakat Inlet (SSRAA).

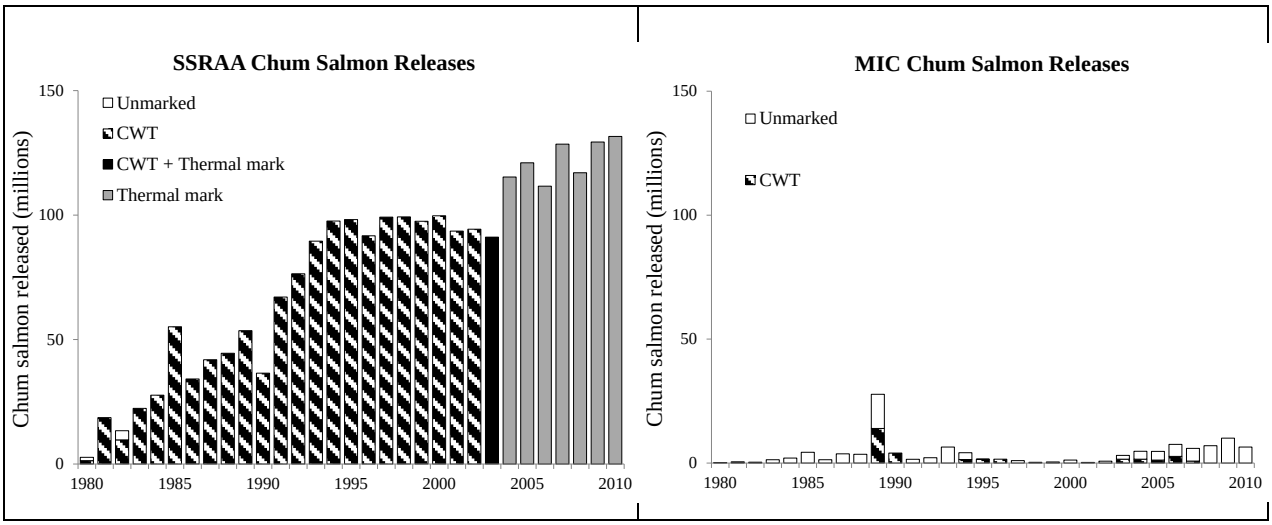

Figure 3.–Number of chum salmon fry released annually by SSRAA and Metlakatla Indian Community (MIC) in southern Southeast Alaska, 1980–2010. Releases are presented by type of mark: unmarked, coded wire tag (CWT), thermal mark (TM), or coded wire tag and thermal mark combined.

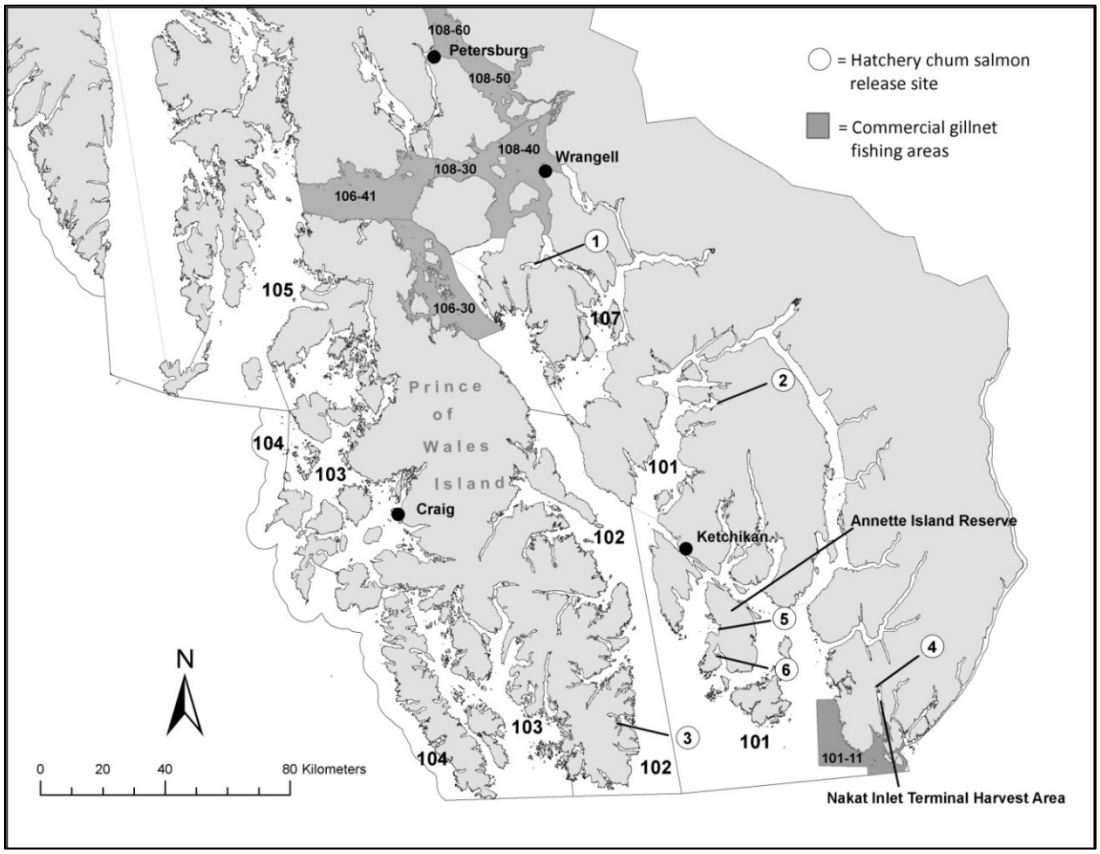

Figure 4.–Map of southern Southeast Alaska showing major towns, current hatchery chum salmon release sites, regulatory districts, and drift gillnet fishing areas mentioned in the text. Hatchery release sites and operators are represented by numbered circles: 1) Anita Bay (SSRAA), 2) Neets Bay (SSRAA), 3) Kendrick Bay (SSRAA), 4) Nakat Inlet (SSRAA), 5) Chester Bay (MIC), and 6) Tamgas Harbor (MIC).

Otolith samples were collected throughout the fishing season by SSRAA personnel stationed at processing facilities in Ketchikan and Petersburg. Initial weekly sampling targets were 100 samples from each fishery; however, objectives were often adjusted midweek depending on the proportion of SSRAA hatchery chum salmon in the harvest. Sample size was increased when preliminary analysis indicated SSRAA hatchery fish represented about 50% of the weekly harvest or when the weekly harvest in a specific fishery was very large. Conversely, fewer samples were collected from fisheries in a given week when the proportion of SSRAA hatchery fish was very large (90–95%) or very small (5%), or when harvests were very low (e.g., at the beginning or end of the season). A maximum of 12 otolith samples were collected from individual drift gillnet or purse seine boats and 36 samples were collected from tenders; however, more samples were routinely collected from tenders in areas where opportunities to sample tender deliveries were limited (e.g., ≤ 48 samples per tender in Districts 106 and 108 drift gillnet fisheries). Sampling events were distributed throughout the week and subdistricts with the most fishing effort were sampled more often. Deliveries with fish mixed from more than one gear type, harvest type, or fishing district were not sampled, and, whenever possible, samples were systematically taken from the entire hold as it was offloaded to ensure they were representative of the entire delivery.

The left and right sagittal otoliths were dissected from whole fish, cleaned using a treatment described by Hagen et al. (1995), and air dried. The left otolith was mounted to a microscope slide using thermoplastic glue and ground to reveal the primordia and potential mark. Prepared specimens were viewed through a compound microscope for thermal mark presence and identification. Detailed information including hatchcode, mark identification, brood year, rearing agency, size at release, and number released was catalogued for each specimen in a Microsoft Access database. SSRAA staff developed a dichotomous key of possible marks and variations that might be encountered by readers in a given year to assist with mark identification and to maintain consistency between readers. If a thermal mark was indistinguishable, it was entered into the database as "questionable." All otolith samples were read inseason, usually within 3–5 days. Samples from fisheries that contained many different marks from various agencies (e.g., District 106 and 108 drift gillnet fisheries) and any questionable samples were all read a second time postseason. For all other areas, 20% of otoliths were second-read postseason. Only samples that yielded a definitive result were used to estimate the weekly contribution of marked hatchery-reared chum salmon (i.e., no questionable samples were included). Samples collected from multiple districts or harvest types were also not used.

UNMARKED HATCHERY CHUM SALMON

For this analysis we report proportions of "marked" and "unmarked" chum salmon, rather than "hatchery" and "wild" chum salmon, because not all hatchery fish were otolith-marked. Hatchery chum salmon harvested from 2006 to 2010 originated from 2001 to 2008 release years (Table 1). None of the chum salmon released by SSRAA in 2002 were otolith marked. Older fish from that release year were harvested in 2006 (age 5) and 2007 (age 6). From 2002 to 2008, Metlakatla Indian Community (MIC) released an average 5 million unmarked summer chum salmon from two sites on Annette Island (Figure 4)—approximately 4% of the total number of hatchery chum salmon released in southern Southeast Alaska during those years. Several hatchery operators in northern Southeast Alaska (north of Sumner Strait; Figure 3) also released unmarked chum salmon that would not be identified in fisheries samples: AKI released unmarked chum salmon in 2004 and 2005; chum salmon released by SJ (now operated by the Sitka Sound Science

Center) and KNFC were primarily unmarked from 2002 to 2008; and 25% of the chum salmon released by NSRAA from 2002 to 2008 were also not marked.

In addition to unmarked Alaska hatchery fish, unmarked chum salmon from British Columbia hatcheries would also be undetected in southern Southeast Alaska commercial harvests. Unmarked hatchery chum salmon from the North Coast and Haida Gwaii regions of British Columbia averaged 16 million fish annually from 2001 to 2008, representing an average 16% of total annual provincial releases (Irvine et al. 2012; NPAFC 2013). Generally, most British Columbia chum salmon production occurs along the Southern Coast and West Coast of Vancouver Island where approximately 30% of annual hatchery releases were thermal marked (2001–2008; NPAFC 2013). Although the vast majority of hatchery chum salmon harvested in southern Southeast Alaska are of SSRAA origin (Appendix B), harvest estimates of hatchery chum salmon likely under-represent the actual contribution due to the presence of unmarked hatchery fish.

Table 1.–Hatchery fish brood years that contributed to harvests sampled in 2006–2010.

		Age and Return Year			
Brood Year	Release Year	3	4	5	6
2000	2001				2006
2001	2002			2006	2007
2002	2003		2006	2007	2008
2003	2004	2006	2007	2008	2009
2004	2005	2007	2008	2009	2010
2005	2006	2008	2009	2010	
2006	2007	2009	2010		
2007	2008	2010			

SAMPLING THE COMMERCIAL DRIFT GILLNET FISHERIES

District 101

The traditional District 101 drift gillnet fishery takes place entirely within subdistrict 101-11, located around Tree Point at the southernmost end of the Southeast Alaska mainland (Figure 4). Virtually all of the District 101 drift gillnet harvest was delivered by tenders to two processing facilities in Ketchikan. Gillnetters often catch hatchery chum salmon within the adjacent Nakat Inlet Terminal Harvest Area in subdistrict 101-10 (Figure 4). Tenders usually kept the traditional harvest from subdistrict 101-11 separate from the terminal harvest from subdistrict 101-10 by putting fish in separate holds; however, fish from both subdistricts occasionally arrived in Ketchikan mixed within the same hold. Samples from mixed harvest types were not included in our analysis. The District 101-11 traditional drift gillnet fishery was sampled weekly from mid-June to the third week of September each year.

District 106

The District 106 drift gillnet fishery bends around the northeastern tip of Prince of Wales Island and is composed of two main areas: Sumner Strait (subdistrict 106-41) and northern Clarence Strait (subdistrict 106-30; Figure 4). Most of the subdistrict 106-41 harvest was delivered directly to the dock in Petersburg by individual boats or tenders. Most of the subdistrict 106-30 harvest was delivered to Ketchikan by tenders; however, depending on run strength and

distribution of boats, tenders routinely moved from one district to another to accommodate the fishing fleet, consequentially mixing fish from different districts onboard before returning to port. For this reason, ADF&G deployed a tender rider specifically to collect biological samples from subdistrict 106-30 and to flag chum salmon for SSRAA samplers in Ketchikan. Otolith samples were collected weekly from mid-June to the end of September, except in 2007 when samples were not collected for three weeks during September.

District 108

District 108 lies between the mainland and Mitkof Island and includes waters surrounding the entrance to the Stikine River. Fish caught in subdistricts 108-10, 108-30, 108-40, 108-50 and 108-60 were delivered to Petersburg, Wrangell, and Ketchikan (Figure 4). To ensure sampling effort was distributed over the entire district and not mixed with other districts, tenders from District 108 set aside some chum salmon for SSRAA personnel sample in Ketchikan and Petersburg. Otolith samples were collected weekly from late June through mid-to-late September, except in 2006 when samples were only collected through early August.

SAMPLING THE COMMERCIAL PURSE SEINE FISHERIES

Nearly all chum salmon harvested in the District 101 and 102 purse seine fisheries were delivered to processing facilities in Ketchikan where SSRAA samplers and staff had access to individual boat and tender deliveries. Otolith samples were collected weekly from mid-June to early September. Chum salmon harvested along the west coast of Prince of Wales Island in Districts 103 and 104 were delivered to Petersburg, Craig, and Ketchikan (Figure 4). No SSRAA samplers were stationed at Craig, as purse seine fisheries on the outer coast were not a high sampling priority due to the small proportion of SSRAA hatchery chum salmon in the harvest. Adequate sampling opportunities for these outer coast fisheries, however, were available to SSRAA staff based in Ketchikan and Petersburg. Samples from the District 105, 106, and 107 purse seine fisheries were primarily collected by a SSRAA sampler stationed in Petersburg.

DATA ANALYSIS

Data analysis was very similar to that outlined in Heinl et al. (2007). Let π_i denote the proportion of otolith marks in one of the sampling domains (i.e., statistical weeks), and suppose there are D total domains (i = 1,2,3, ... D). Let n_i denote the number of sampled otoliths decoded in statistical week i, and let x_i denote the number of otolith marks observed from statistical week i. We assumed independent binomial models for the number of otolith marks, x_i:

$$x_i \sim \text{Bin}(n_i, \pi_i),\ i = 1, \ldots D,$$

with the number of sampled otoliths decoded, n_i , known. The parameters π_i were assumed to be independent samples from a beta distribution:

$$\pi_i \sim \text{Beta}(\alpha, \beta),\ i = 1, \ldots D.$$

The beta distribution is a prior distribution for π_i. To estimate the prior parameters, α and β, we used all the data, $\{\pi_i\} = \{x_i / n_i\}$, from total domains ($i$ = 1 ... D). Since $\pi_i \sim$ Beta (α, β), we have:

$$E(\pi_i) = \frac{\alpha}{\alpha + \beta}, \text{var}(\pi_i) = \frac{\alpha\beta}{(\alpha + \beta)^2(\alpha + \beta + 1)};$$

Then we have:

$$\alpha + \beta = \frac{E(\pi_i)(1 - E(\pi_i))}{\text{var}(\pi_i)} - 1,$$

$$\alpha = (\alpha + \beta)E(\pi_i), \text{ and}$$

$$\beta = (\alpha + \beta)(1 - E(\pi_i)).$$

$E(\pi_i)$ and $var(\pi_i)$ were estimated as the sample mean, $\bar{\pi} = \frac{1}{D}\sum_{i=1}^{D}\pi_i$, and sample variance, $s^2 = \frac{1}{D-1}\sum_{i=1}^{D}(\pi_i - \bar{\pi})^2$, respectively. The analysis using the data to estimate the prior parameters is called empirical Bayes (Gelman 2004).

The beta distribution is a conjugate prior for binomial likelihood; that is, the posterior distributions are also beta distributions with new parameters, $(\alpha + x_i)$ and $(\beta + n_i - x_i)$:

$$\pi_i|(x_i \text{ and } n_i) \sim \text{Beta}(\alpha + x_i, \beta + n_i - x_i), i = 1,2,3, \ldots D.$$

The posterior mean of π_i, given x_i and n_i, which can be interpreted as the proportion of otolith marks from the population in statistical week *i*, is now

$$E(\pi_i) = \frac{\alpha + x_i}{\alpha + \beta + n_i}, \quad (1)$$

which always lies between the sample proportion, x_i / n_i, and the prior mean, $\alpha /(\alpha+\beta)$. The posterior variance is

$$\text{var}(\pi_i) = \frac{(\alpha + x_i)(\beta + n_i - x_i)}{(\alpha + \beta + n_i)^2(\alpha + \beta + n_i + 1)}. \quad (2)$$

Inference about the proportions of otolith-marked chum salmon in each domain was calculated through this posterior distribution. We then reported the posterior mean and a measure of precision (credible interval) for each sampling domain (Appendix C). Harvest estimates for otolith-marked summer-run and fall-run chum salmon were reported rounded to the nearest thousand fish, which, in some cases, resulted in a different sum than the total marked chum salmon harvest estimate, rounded to the nearest thousand fish.

In order to calculate total annual proportions of marked and unmarked fish we had to account for weeks that were not sampled and weeks with very small sample sizes. In many cases, unsampled weeks were at the beginning or the end of the season when the weekly harvest was small and samples were difficult to obtain. In these situations, we pooled statistical weeks. If the unsampled week was in the middle of the season, sample size, harvest, and proportions of marked and unmarked fish in the preceding and following weeks were evaluated to determine if the unsampled week should be pooled with adjacent weeks. If several sequential weeks of data were missing, predicted values based on the normal distribution of the series were used and variances were calculated using bootstrap methods.

RESULTS

DISTRICT 101 DRIFT GILLNET FISHERY

From 2006 to 2010, otolith-marked hatchery fish accounted for an average 80% of the chum salmon harvested in the District 101 drift gillnet fishery, or an annual average of 212,000 fish (Table 2). The coefficient of variation of estimates ranged from 0.9% (2007) to 1.8% (2010). The harvest of otolith-marked chum salmon peaked in early July (statistical week 28) for summer chum salmon and in late August–early September (statistical weeks 35–37) for fall-run chum salmon. On average, Nakat Inlet summer chum salmon represented 43% of the total marked otoliths recovered, followed by Nakat Inlet fall chum salmon (23%), Neets Bay summer chum salmon (14%), Kendrick Bay summer chum salmon (12%), and other SSRAA chum salmon (7%; Appendix B1). On average, NSRAA and DIPAC accounted for <1% of recovered marked otoliths.

Table 2.–Proportion of otolith-marked and unmarked chum salmon caught in the District 101 drift gillnet fishery, 2006–2010.

	Total	Otolith-marked Hatchery Chum Salmon			Unmarked Chum Salmon		
Year	Chum Salmon Harvest	Proportion	Estimated Harvest	95% Credible Interval	Proportion	Estimated Harvest	95% Credible Interval
2006	267,000	74%	198,000	192,000–204,000	26%	69,000	63,000–75,000
2007	233,000	89%	207,000	203,000–210,000	11%	26,000	23,000–30,000
2008	240,000	84%	202,000	198,000–207,000	16%	37,000	33,000–42,000
2009	263,000	79%	207,000	200,000–214,000	21%	56,000	49,000–63,000
2010	325,000	75%	245,000	236,000–254,000	25%	80,000	71,000–89,000
Average		80%	212,000		20%	54,000	

2006

Otolith-marked hatchery chum salmon represented an estimated 74% of the 2006 total chum salmon harvest in the District 101 drift gillnet fishery (Table 2). We estimated 171,000 of all otolith-marked fish were summer chum salmon and 27,000 were fall chum salmon (Appendix C1). A peak harvest of 37,800 hatchery summer chum salmon occurred in statistical week 28 and peak harvests of 7,100 hatchery fall chum salmon occurred in statistical weeks 36 and 37 (Figure 5; Appendix C1). The transition from a summer chum salmon dominant fishery to fall-run chum salmon dominant fishery occurred during statistical week 34 (Figure 5). A peak harvest of 6,300 unmarked summer chum salmon occurred in statistical week 31 and a peak harvest of 15,500 unmarked fall chum salmon occurred in statistical week 35 (Figure 5; Appendix C1).

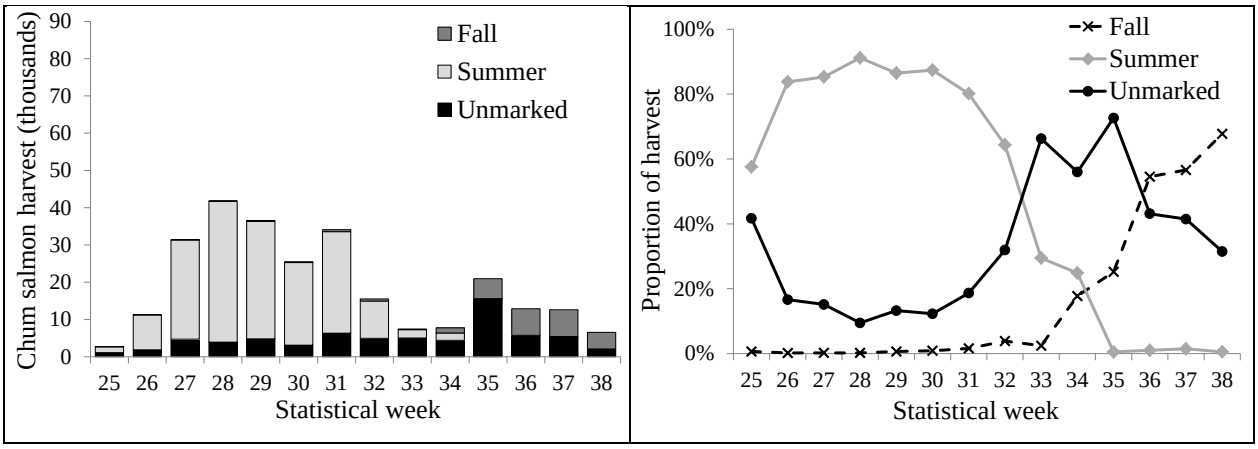

Figure 5.–Number and proportion of otolith-marked summer and fall chum salmon and unmarked chum salmon in the weekly District 101 drift gillnet harvest, 2006.

2007

Otolith-marked hatchery chum salmon represented an estimated 89% of the 2007 total chum salmon harvest in the District 101 drift gillnet fishery (Table 2). We estimated 154,000 of all otolith-marked fish were summer chum salmon and 53,000 were fall chum salmon (Appendix C1). A peak harvest of 34,400 hatchery summer chum salmon occurred in statistical week 28 and a peak harvest of 17,500 hatchery fall chum salmon occurred in statistical week 36 (Figure 6; Appendix C1). The transition from a summer chum salmon dominant fishery to fall-run chum salmon dominant fishery occurred during statistical week 34 (Figure 6). A peak harvest of 3,800 unmarked summer chum salmon occurred in statistical week 30 and a peak harvest of 3,400 unmarked fall chum salmon occurred in statistical week 35 (Figure 6; Appendix C1).

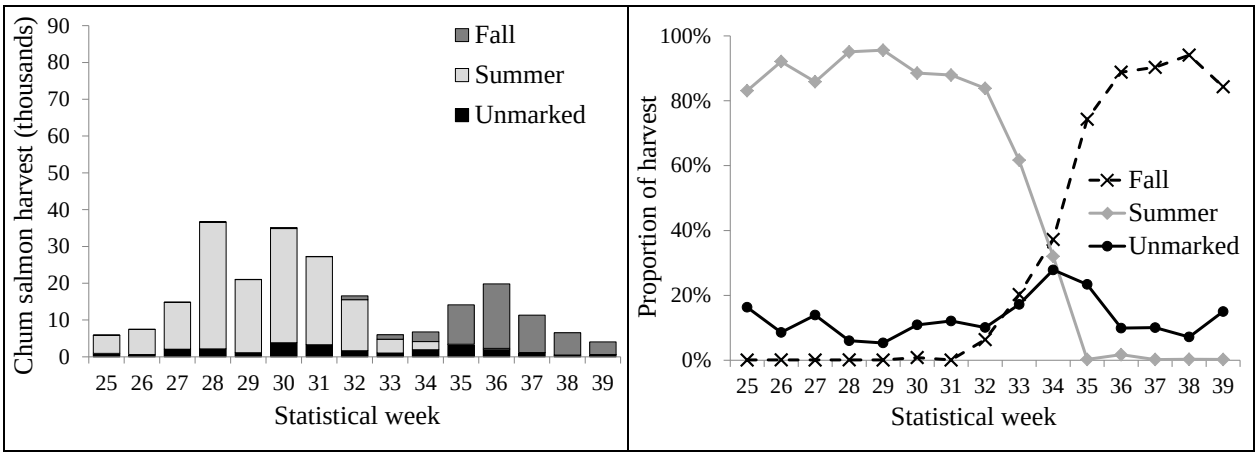

Figure 6.–Number and proportion of otolith-marked summer and fall chum salmon and unmarked chum salmon in the weekly District 101 drift gillnet harvest, 2007.

2008

Otolith-marked hatchery chum salmon represented an estimated 84% of the 2008 total chum salmon harvest in the District 101 drift gillnet fishery (Table 2). We estimated 173,000 of all otolith-marked fish were summer chum salmon and 31,000 were fall chum salmon (Appendix C1). A peak harvest of 47,400 hatchery summer chum salmon occurred in statistical

week 28 and a peak harvest of 8,400 hatchery fall chum salmon occurred in statistical week 35 (Figure 7; Appendix C1). The transition from a summer chum salmon dominant fishery to fall-run chum salmon dominant fishery occurred in statistical week 34 (Figure 7). A peak harvest of 4,000 unmarked summer chum salmon occurred in statistical week 29 and a peak harvest of 4,300 unmarked fall chum salmon occurred in statistical week 35 (Figure 7; Appendix C1).

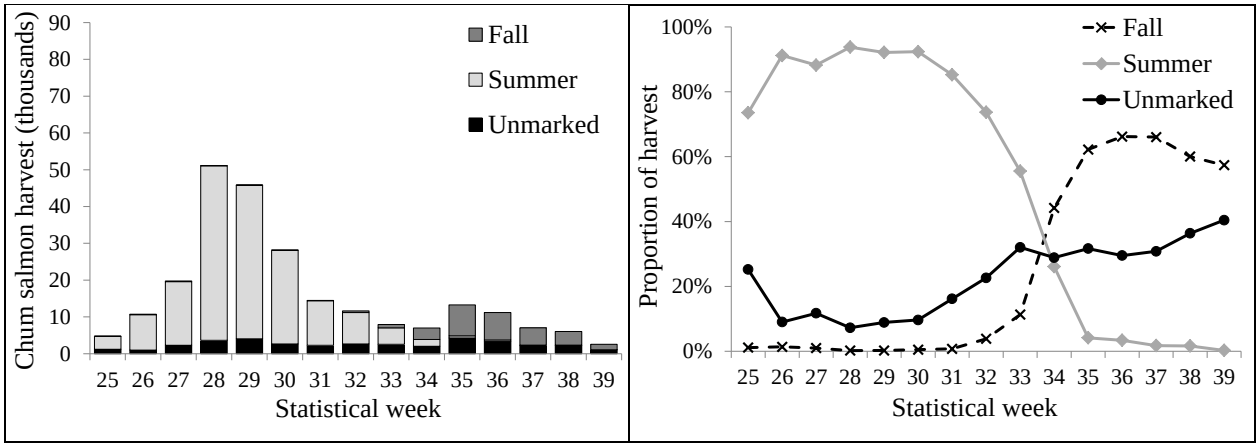

Figure 7.–Number and proportion of otolith-marked summer and fall chum salmon and unmarked chum salmon in the weekly District 101 drift gillnet harvest, 2008.

2009

Otolith-marked hatchery chum salmon represented an estimated 79% of the 2009 total chum salmon harvest in the District 101 drift gillnet fishery (Table 2). We estimated 199,000 of all otolith-marked fish were summer chum salmon and 9,000 were fall chum salmon (Appendix C1). A peak harvest of hatchery summer chum salmon occurred in statistical week 27 and 28 with a harvest of approximately 44,900 fish each week, and a peak harvest of 2,300 hatchery fall chum salmon occurred in statistical week 37 (Figure 8; Appendix C1). The transition from a summer chum salmon dominant fishery to fall-run chum salmon dominant fishery occurred during statistical week 34 (Figure 8). A peak harvest of 13,500 unmarked summer chum salmon occurred in statistical week 27 and peak harvests of 3,000 unmarked fall chum salmon occurred in both statistical weeks 35 and 37 (Figure 8; Appendix C1).

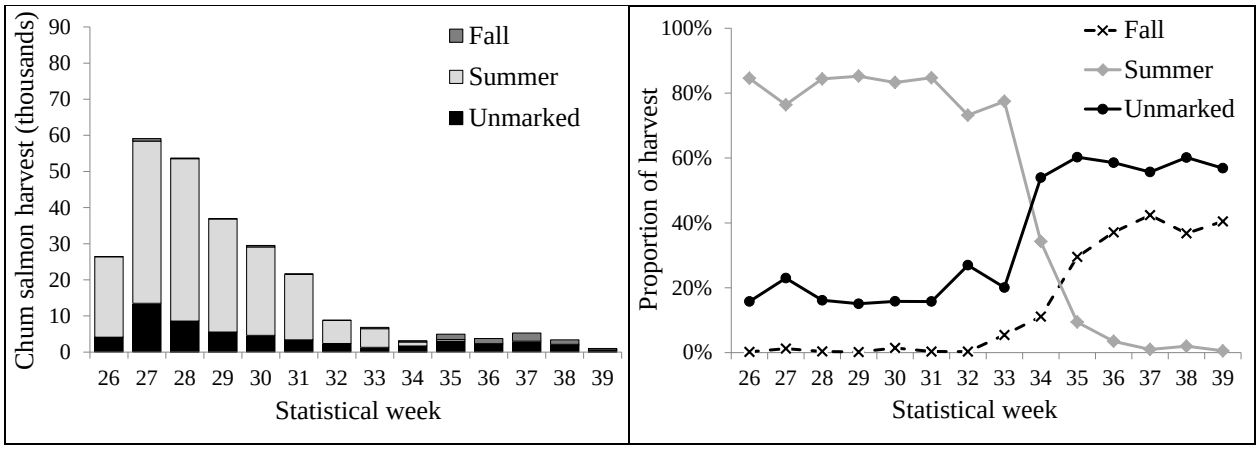

Figure 8.–Number and proportion of otolith-marked summer and fall chum salmon and unmarked chum salmon in the weekly District 101 drift gillnet harvest, 2009.

2010

Otolith-marked hatchery chum salmon represented an estimated 75% of the 2010 total chum salmon harvest in the District 101 drift gillnet fishery (Table 2). We estimated 225,000 of all otolith-marked fish were summer chum salmon and 23,000 were fall chum salmon (Appendix C1). A peak harvest of 72,700 hatchery summer chum salmon occurred in statistical week 28 and a peak harvest of 7,200 hatchery fall chum salmon occurred in statistical week 36 (Figure 9; Appendix C1). The transition from a summer chum salmon dominant fishery to fall-run chum salmon dominant fishery occurred during statistical week 34 (Figure 9). A peak harvest of 13,000 unmarked summer chum salmon occurred in statistical week 28 and a peak harvest of 5,700 unmarked fall chum salmon occurred in statistical week 37 (Figure 9; Appendix C1).

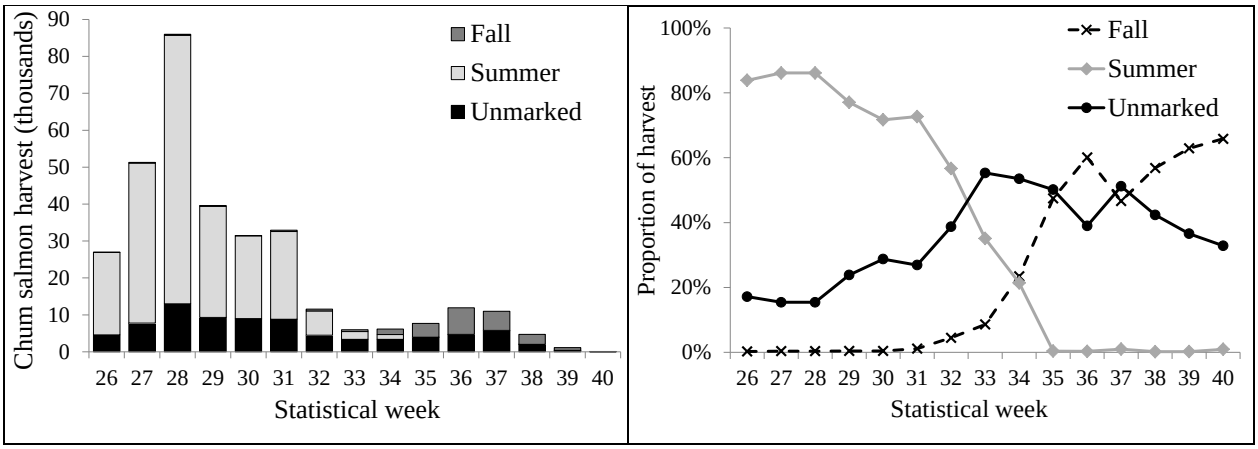

Figure 9.–Number and proportion of otolith-marked summer and fall chum salmon and unmarked chum salmon in the weekly District 101 drift gillnet harvest, 2010.

DISTRICT 106 DRIFT GILLNET FISHERY

From 2006 to 2010, otolith-marked hatchery fish accounted for an average 73% of the chum salmon harvest in the subdistrict 106-41 and subdistrict 106-30 drift gillnet fisheries combined (Table 3). The coefficient of variation of these estimates ranged from 1.2% (2006) to 2.0% (2010). Generally, otolith-marked summer chum salmon were dominant in the fishery during mid-July (statistical weeks 29 and 30). Abundance of unmarked and otolith-marked fall-run chum salmon peaked during early September (statistical week 37) in most years. On average, Neets Bay summer chum salmon represented 36% of the total marked otoliths recovered, followed by Anita Bay summer chum salmon (24%), Neets Bay fall chum salmon (19%), and Kendrick Bay summer chum salmon (10%; Appendix B1). Marked NSRAA and DIPAC fish accounted for an average 3% and 7% of marked otoliths recovered, respectively.

Table 3.–Proportion of otolith-marked and unmarked chum salmon caught in the District 106 drift gillnet fishery, 2006–2010.

		Otolith-marked Hatchery Chum Salmon			Unmarked Chum Salmon		
Year	Total Chum Salmon Harvest	Proportion	Estimated Harvest	95% Credible Interval	Proportion	Estimated Harvest	95% Credible Interval
2006	267,000	77%	205,000	200,000–210,000	23%	62,000	57,000–67,000
2007	297,000	79%	235,000	229,000–241,000	21%	62,000	55,000–69,000
2008	99,000	74%	73,000	71,000–76,000	26%	26,000	24,000–28,000
2009	285,000	75%	214,000	208,000–220,000	25%	71,000	65,000–78,000
2010	98,000	60%	58,000	56,000–61,000	40%	39,000	37,000–42,000
Average		73%	157,000		27%	52,000	

2006

Otolith-marked hatchery chum salmon represented an estimated 77% of the 2006 total chum salmon harvest in the District 106 drift gillnet fishery (subdistricts 106-30 and 106-41 combined; Table 3). We estimated 187,000 of all otolith-marked fish were summer chum salmon and 19,000 were fall chum salmon (Appendix C1). A peak harvest of 58,100 hatchery summer chum salmon occurred in statistical week 29 and peak harvests of hatchery fall chum salmon occurred in statistical weeks 36–38 (Figure 10; Appendix C1). The transition from a summer chum salmon dominant fishery to fall-run chum salmon dominant fishery occurred during statistical week 34 (Figure 10). A peak harvest of 8,200 unmarked summer chum salmon occurred in statistical week 29 and the peak harvest of unmarked fall chum salmon likely occurred in statistical week 37 (Figure 10; Appendix C1).

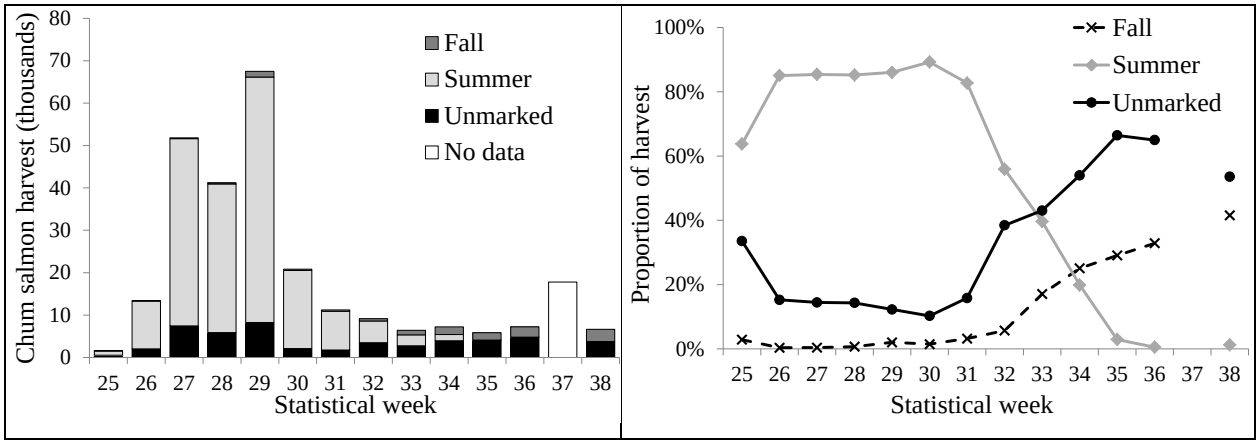

Figure 10.–Number and proportion of otolith-marked summer and fall chum salmon and unmarked chum salmon in the weekly District 106 drift gillnet harvest (subdistrict 106-30 and subdistrict 106-41 combined), 2006. No samples were collected in statistical week 37.

2007

Otolith-marked hatchery chum salmon represented an estimated 79% of the 2007 total chum salmon harvest in the District 106 drift gillnet fishery (subdistricts 106-30 and 106-41 combined, Table 3). We estimated that 200,000 of all otolith-marked fish were summer chum salmon and 35,000 were fall chum salmon (Figure 11). A peak harvest of 50,000 hatchery summer chum salmon occurred in statistical week 29 and the peak harvest of hatchery fall chum salmon likely occurred during statistical weeks 35–37 (Figure 11; Appendix C1). The transition from a summer chum salmon dominant fishery to fall-run chum salmon dominant fishery occurred during statistical week 35 (Figure 11). A peak harvest of 3,600 unmarked summer chum salmon occurred in statistical week 30 and the peak harvest of unmarked fall chum salmon likely occurred in statistical week 36 (Figure 11; Appendix C1).

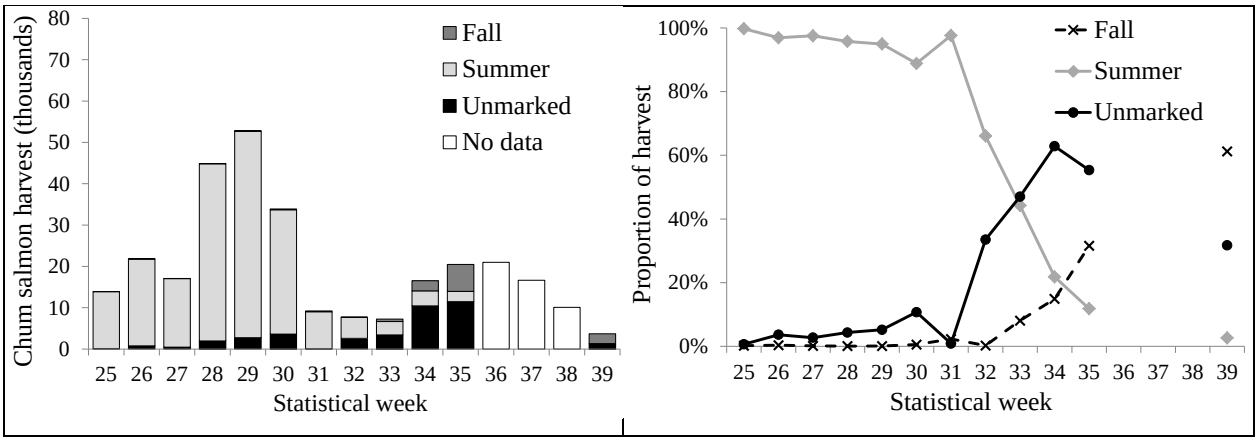

Figure 11.–Number and proportion of otolith-marked summer and fall chum salmon and unmarked chum salmon in the weekly District 106 drift gillnet harvest (subdistrict 106-30 and subdistrict 106-41 combined), 2007. No samples were collected in statistical weeks 36–38.

2008

Otolith-marked hatchery chum salmon represented an estimated 74% of the 2008 total chum salmon harvest in the District 106 drift gillnet fishery (subdistricts 106-30 and 106-41 combined; Table 3). We estimated 61,000 of all otolith-marked fish were summer chum salmon and 12,000 were fall chum salmon (Appendix C1). A peak harvest of 16,700 hatchery summer chum salmon occurred in statistical week 29 and a peak harvest of 5,000 hatchery fall chum salmon occurred in statistical week 37 (Figure 12). The transition from a summer chum salmon dominant fishery to fall-run chum salmon dominant fishery occurred during statistical week 35 (Figure 12). A peak harvest of 2,100 unmarked summer chum salmon occurred in statistical week 30 and a peak harvest of 6,200 unmarked fall chum salmon occurred in statistical week 37 (Figure 12; Appendix C1).

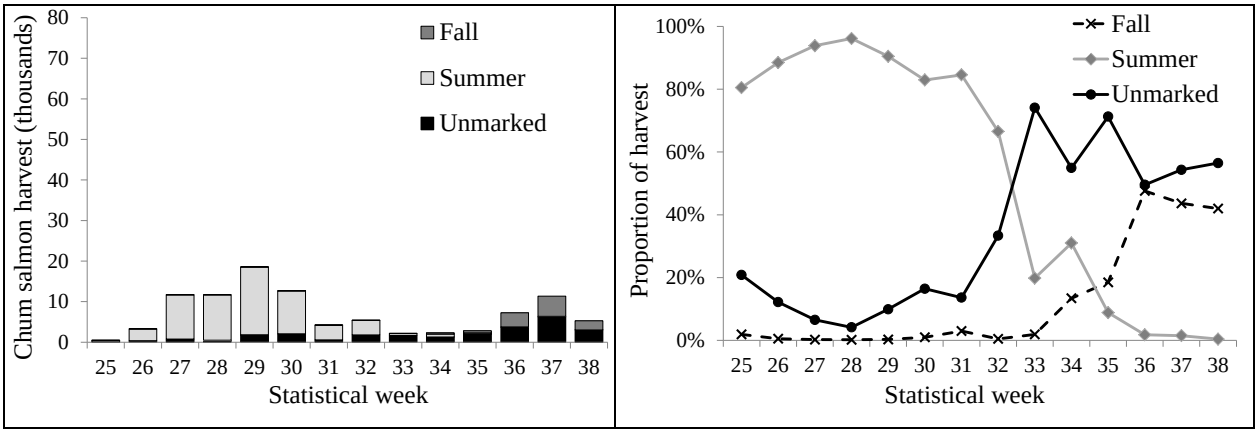

Figure 12.–Number and proportion of otolith-marked summer and fall chum salmon and unmarked chum salmon in the weekly District 106 drift gillnet harvest (subdistrict 106-30 and subdistrict 106-41 combined), 2008.

2009

Otolith-marked hatchery chum salmon represented an estimated 75% of the 2009 total chum salmon harvest in the District 106 drift gillnet fishery (subdistricts 106-30 and 106-41 combined; Table 3). We estimated 184,000 of all otolith-marked fish were summer chum salmon and 31,000 were fall chum salmon (Appendix C1). A peak harvest of 62,900 hatchery summer chum

salmon occurred in statistical week 27 and a peak harvest of 6,700 hatchery fall chum salmon occurred in statistical week 37 (Figure 13; Appendix C1). The transition from a summer chum salmon dominant fishery to fall-run chum salmon dominant fishery occurred during statistical week 34 (Figure 13). A peak harvest of 9,100 unmarked summer chum salmon occurred in statistical week 27 and a peak harvest of 9,300 unmarked fall chum salmon occurred in statistical week 37 (Figure 13; Appendix C1).

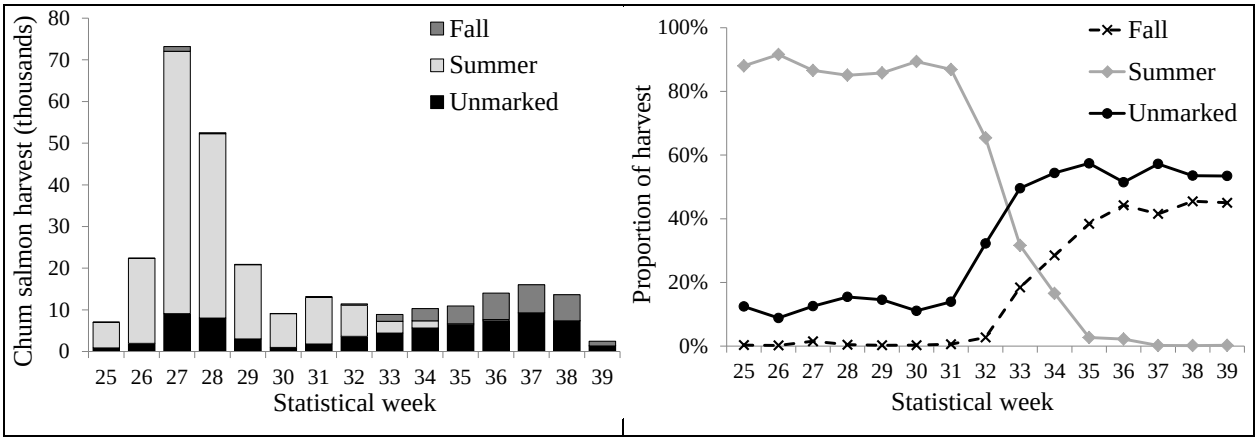

Figure 13.–Number and proportion of otolith-marked summer and fall chum salmon and unmarked chum salmon in the weekly District 106 drift gillnet harvest (subdistrict 106-30 and subdistrict 106-41 combined), 2009.

2010

Otolith-marked hatchery chum salmon represented an estimated 60% of the 2010 total chum salmon harvest in the District 106 drift gillnet fishery (subdistricts 106-30 and 106-41 combined; Table 3). We estimated 49,000 of all otolith-marked fish were summer chum salmon and 10,000 were fall chum salmon (Appendix C1). A peak harvest of 11,400 hatchery summer chum salmon occurred in statistical week 30 and a peak harvest of 3,200 hatchery fall chum salmon occurred in statistical week 37 (Figure 14). The transition from a summer chum salmon dominant fishery to fall-run chum salmon dominant fishery occurred during statistical week 34 (Figure 14). The harvest of unmarked chum salmon generally increased through the season with no clear peak for summer chum salmon. A peak harvest of 5,300 unmarked fall chum salmon occurred in statistical week 37 (Figure 14; Appendix C1).

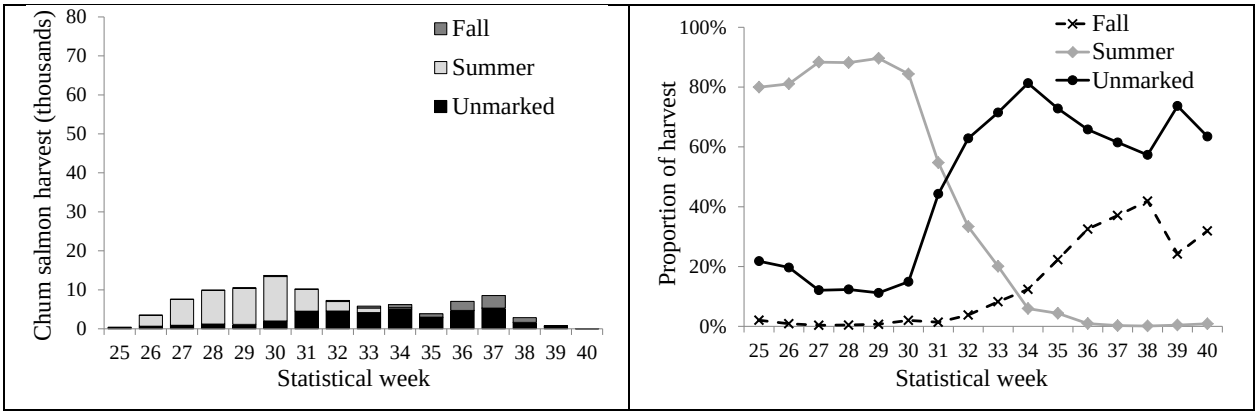

Figure 14.–Number and proportion of otolith-marked summer and fall chum salmon and unmarked chum salmon in the weekly District 106 drift gillnet harvest (subdistrict 106-30 and subdistrict 106-41 combined), 2010.

DISTRICT 108 DRIFT GILLNET FISHERY

From 2006 to 2010, otolith-marked hatchery fish accounted for an average 71% of the chum salmon harvested in the District 108 drift gillnet fishery (Table 4). The coefficient of variation of these estimates ranged from 1.6% (2007, 2009) to 12.5% (2010). On average, Anita Bay summer chum salmon represented 56% of the total marked otoliths recovered, followed by Neets Bay summer chum salmon (14%), and DIPAC Gastineau Channel summer chum salmon (8%; Appendix B1). The diversity of hatchery marks was greater in District 108 than other districts. On average SSRAA chum salmon represented 79% of marked otoliths recovered, followed by DIPAC (17%) and NSRAA (4%). Very few fall-run chum salmon were harvested in District 108.

Table 4.–Proportion of otolith-marked and unmarked chum salmon caught in the District 108 drift gillnet fishery, 2006–2010.

	Total	Otolith-marked Hatchery Chum Salmon			Unmarked Chum Salmon		
Year	Chum Salmon Harvest	Proportion	Estimated Harvest	95% Credible Interval	Proportion	Estimated Harvest	95% Credible Interval
2006	344,000	75%	258,000	246,000–269,000	25%	86,000	75,000–97,000
2007	178,000	86%	153,000	148,000–158,000	14%	24,000	20,000–29,000
2008	82,000	74%	60,000	54,000–66,000	26%	22,000	15,000–28,000
2009	191,000	85%	162,000	157,000–168,000	15%	28,000	23,000–34,000
2010	51,000	33%	17,000	13,000–21,000	67%	34,000	30,000–38,000
Average		71%	130,000		29%	39,000	

2006

Otolith-marked hatchery chum salmon represented an estimated 75% of the 2006 total chum salmon harvest in the District 108 drift gillnet fishery (subdistricts 108-10, 108-20, 108- 30, 108-40, 108-41, 108-50, and 108-60 combined; Table 4). We estimated 256,000 of all otolith-marked fish were summer chum salmon and 4,000 were fall chum salmon (Appendix C1). A peak harvest of 62,100 hatchery summer chum salmon occurred in statistical week 30 and a peak harvest of 26,900 unmarked summer chum salmon occurred in statistical week 31 (Figure 15; Appendix C1).

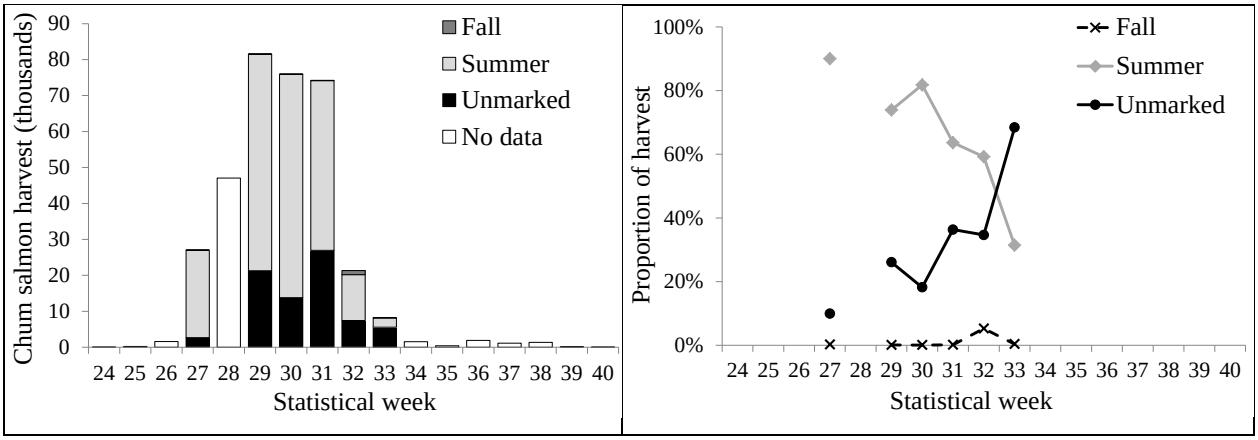

Figure 15.–Number and proportion of otolith-marked summer and fall chum salmon and unmarked chum salmon in the weekly District 108 drift gillnet harvest (subdistricts 108-10, -20, -30, -40, -41, -50, and -60 combined), 2006. No samples were collected in statistical weeks 25–26, 28, or 34–39.

2007

Otolith-marked hatchery chum salmon represented an estimated 86% of the 2007 total chum salmon harvest in the District 108 drift gillnet fishery (subdistricts 108-10, 108-20, 108-30, 108-40, 108-41, 108-50, and 108-60 combined; Table 4). We estimated 151,000 of all otolith-marked fish were summer chum salmon and 2,000 were fall chum salmon (Appendix C1). A peak harvest of 35,600 hatchery summer chum salmon occurred in statistical week 31 and a peak harvest of 7,500 unmarked summer chum salmon occurred in statistical week 30 (Figure 16; Appendix C1).

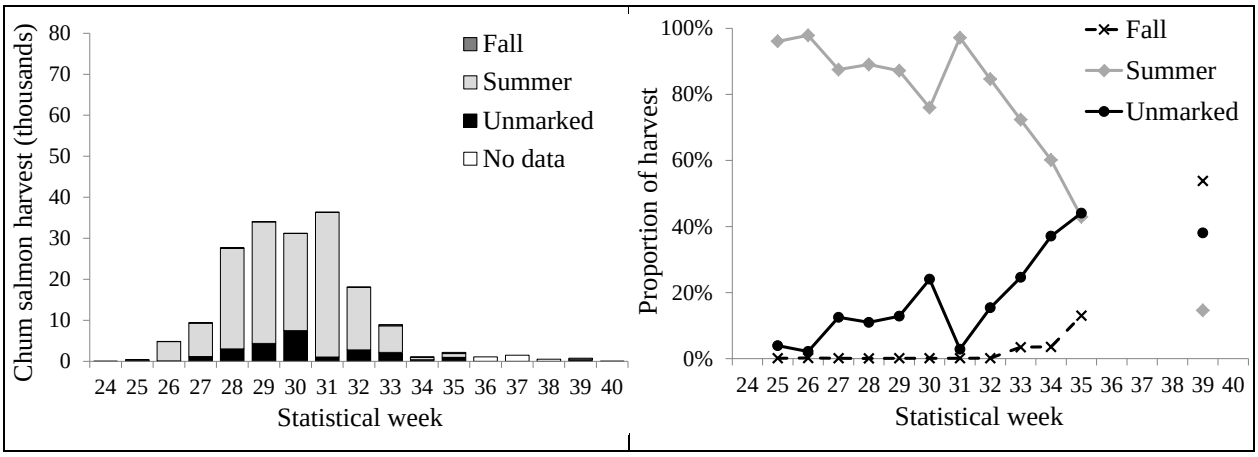

Figure 16.–Number and proportion of otolith-marked summer and fall chum salmon and unmarked chum salmon in the weekly District 108 drift gillnet harvest (subdistricts 108-10, -20, -30, -40, -41, -50, and -60 combined), 2007. No samples were collected in statistical weeks 24, 36–38 and 40.

2008

Otolith-marked hatchery chum salmon represented an estimated 74% of the 2008 total chum salmon harvest in the District 108 drift gillnet fishery (subdistricts 108-10, 108-20, 108- 30, 108-40, 108-41, 108-50, and 108-60 combined; Table 4). We estimated 59,000 of all otolith-marked fish were summer chum salmon and 1,000 were fall chum salmon (Appendix C1). A peak harvest of 14,900 hatchery summer chum salmon occurred in statistical week 29 and a peak harvest of 11,900 unmarked summer chum salmon occurred in statistical week 31 (Figure 17).

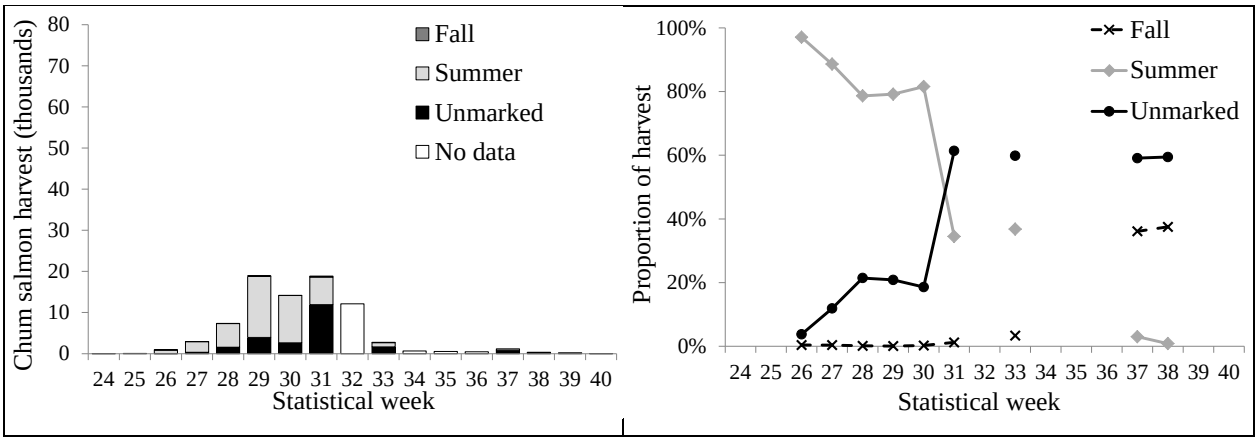

Figure 17.–Number and proportion of otolith-marked summer and fall chum salmon and unmarked chum salmon in the weekly District 108 drift gillnet harvest (subdistricts 108-10, -20, -30, -40, -41, -50, and -60 combined), 2008. No samples were collected in statistical weeks 24–25, 32, 34–36, or 39.

2009

Otolith-marked hatchery chum salmon represented an estimated 85% of the 2009 total chum salmon harvest in the District 108 drift gillnet fishery (subdistricts 108-10, 108-20, 108- 30, 108-40, 108-41, 108-50, and 108-60 combined; Table 4). We estimated 161,000 of all otolith-marked fish were summer chum salmon and 2,000 were fall chum salmon (Appendix C1). A peak harvest of 55,300 hatchery summer chum salmon occurred in statistical week 30 and the peak harvest of 7,200 unmarked summer chum salmon also occurred in statistical week 30 (Figure 18; Appendix C1).

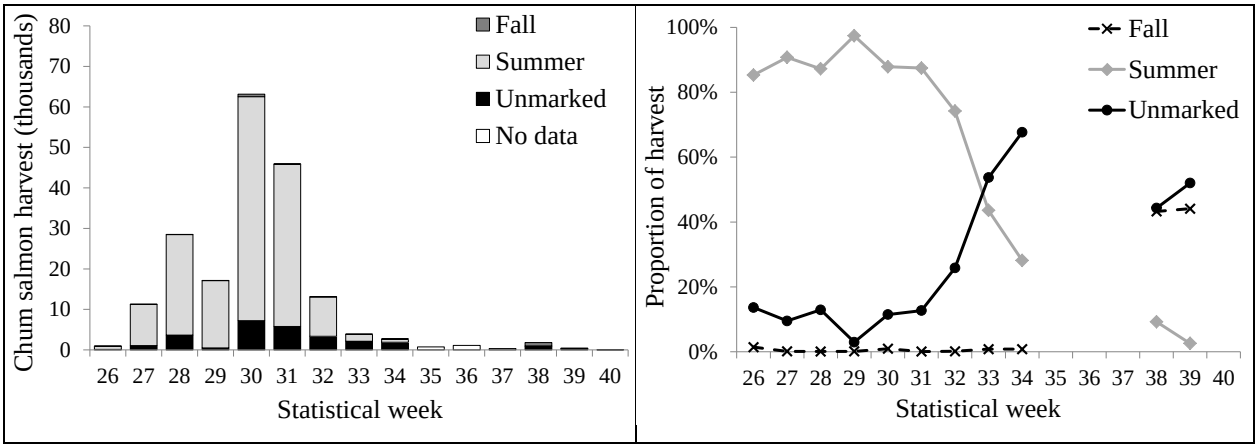

Figure 18.–Number and proportion of otolith-marked summer and fall chum salmon and unmarked chum salmon in the weekly District 108 drift gillnet harvest (subdistricts 108-10, -20, -30, -40, -41, -50, and -60 combined), 2009. No samples were collected in statistical weeks 35–37 and 40.

2010

Otolith-marked hatchery chum salmon represented an estimated 33% of the 2010 total chum salmon harvest in the District 108 drift gillnet fishery (subdistricts 108-10, 108-20, 108- 30, 108-40, 108-41, 108-50, and 108-60 combined; Table 4). We estimated 17,000 of all otolith-marked fish were summer chum salmon and fewer than 1,000 were fall chum salmon (Appendix C1). Peak harvests of 5,300 hatchery summer chum salmon and 13,700 unmarked summer chum salmon occurred in statistical week 30 (Figure 19; Appendix C1).

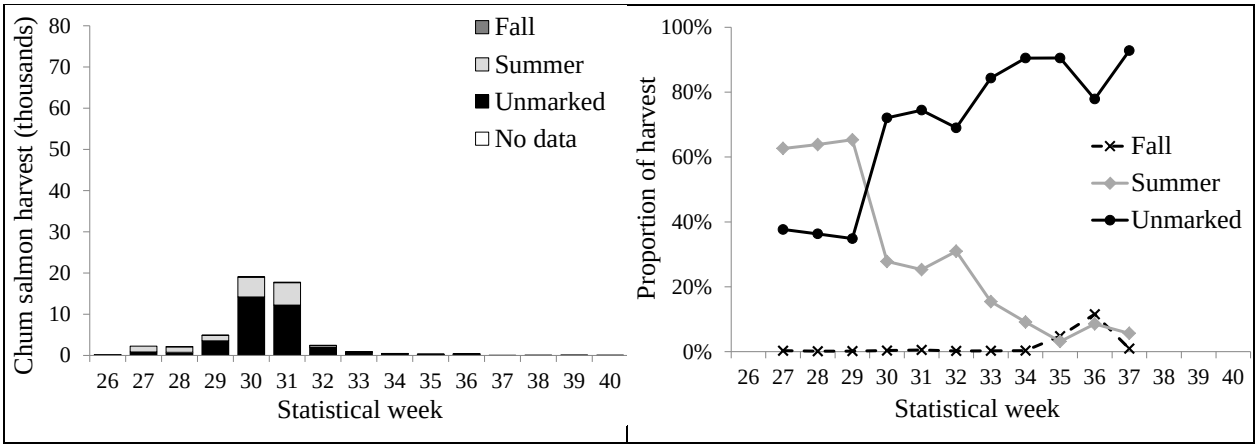

Figure 19.–Number and proportion of otolith-marked summer and fall chum salmon and unmarked chum salmon in the weekly District 108 drift gillnet harvest (subdistricts 108-10, -20, -30, -40, -41, -50, and -60 combined), 2010. No samples were collected in statistical weeks 26 or 38–40.

DISTRICT 101 PURSE SEINE FISHERY

From 2006 to 2010, the proportion of otolith-marked hatchery fish in the chum salmon harvest in the District 101 purse seine fishery ranged from 36% (2008) to 84% (2007) and averaged 61% (Table 5). The coefficient of variation of these estimates ranged from 1.6% (2007) to 5.8% (2008). Otolith-marked summer chum salmon were dominant in the fishery through late July (statistical week 31) in all years. The peak harvest of unmarked chum salmon and otolith-marked fall-run chum salmon occurred during the same week in nearly all years. On average, Neets Bay summer chum salmon represented 52% of the total marked otoliths recovered, followed by Kendrick Bay summer chum salmon (26%), Neets Bay fall chum salmon (8%) and Nakat Inlet summer chum salmon (7%; Appendix B2). On average, NSRAA and DIPAC accounted for <1% of recovered marked otoliths.

Table 5.–Proportion of otolith-marked and unmarked chum salmon caught in the District 101 purse seine fishery, 2006–2010.

	Total	Otolith-marked Hatchery Chum Salmon			Unmarked Salmon		
Year	Chum Salmon Harvest	Proportion	Estimated Harvest	95% Credible Interval	Proportion	Estimated Harvest	95% Credible Interval
2006	200,000	80%	160,000	154,000–166,000	20%	40,000	34,000–46,000
2007	174,000	84%	146,000	142,000–151,000	16%	28,000	23,000–32,000
2008	72,000	36%	24,000	22,000–27,000	64%	46,000	43,0000–49,000
2009	177,000	56%	99,000	95,000–104,000	44%	77,000	73,000–82,000
2010	405,000	46%	188,000	177,000–198,000	54%	217,000	207,000–227,000
Average		61%	123,000		40%	82,000	

2006

Otolith-marked hatchery chum salmon represented an estimated 80% of the 2006 total chum salmon harvest in the District 101 purse seine fishery (Table 5). We estimated 159,000 of all otolith-marked fish were summer chum salmon and 2,000 were fall chum salmon. A peak harvest of 46,300 hatchery summer chum salmon occurred in statistical week 29 (Figure 20; Appendix C2). Peak harvest of unmarked chum salmon occurred in statistical week 28 with an estimated 12,200 fish (Figure 20; Appendix C2). Due to low pink salmon abundance there was minimal fishing opportunity in District 101 after statistical week 32 (Figure 20).

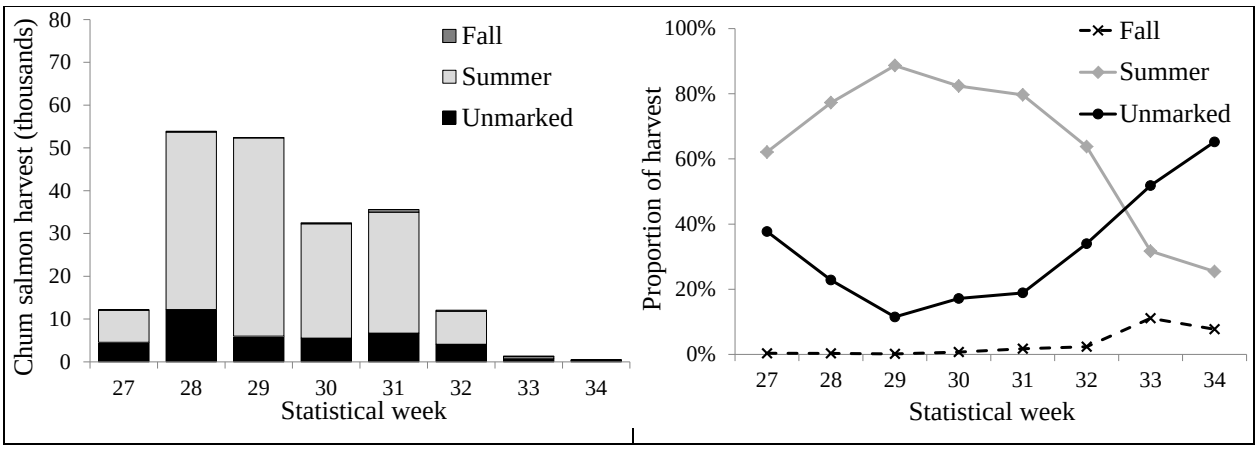

Figure 20.–Number and proportion of otolith-marked summer and fall chum salmon and unmarked chum salmon in the weekly District 101 purse seine harvest, 2006.

2007

Otolith-marked hatchery chum salmon represented an estimated 84% of the 2007 total chum salmon harvest in the District 101 purse seine fishery (Table 5). We estimated 143,000 of all otolith-marked fish were summer chum salmon and 4,000 were fall chum salmon. A peak harvest of 50,500 hatchery summer chum salmon occurred in statistical week 30 and a peak harvest of 1,600 hatchery fall chum salmon occurred in statistical week 33. Peak harvest of unmarked chum salmon also occurred in statistical week 33 with an estimated 6,300 fish (Figure 21; Appendix C2).

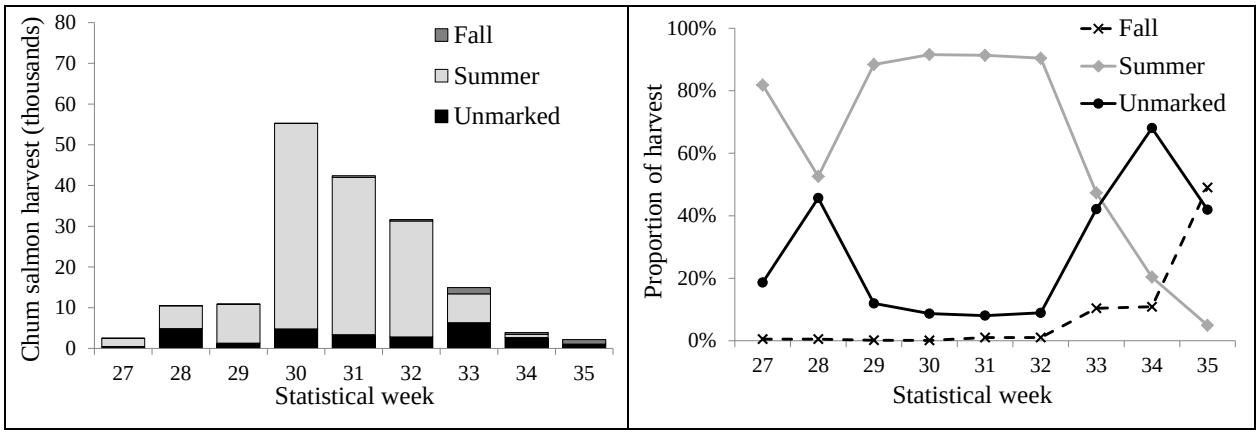

Figure 21.–Number and proportion of otolith-marked summer and fall chum salmon and unmarked chum salmon in the weekly District 101 purse seine harvest, 2007.

2008

Otolith-marked hatchery chum salmon represented an estimated 36% of the 2008 total chum salmon harvest in the District 101 purse seine fishery (Table 5). We estimated that 20,000 of all otolith-marked fish were summer chum salmon and 5,000 were fall chum salmon. A peak harvest of 5,400 hatchery summer chum salmon occurred in statistical week 31 and a peak harvest of 1,800 hatchery fall chum salmon occurred in statistical week 35 (Figure 22; Appendix C2). The contribution of unmarked chum salmon also peaked in statistical week 35 with an estimated 15,200 fish (Figure 22; Appendix C2). The transition from a summer chum salmon dominant fishery to fall-run chum salmon dominant fishery occurred in statistical week 34 (Figure 22).

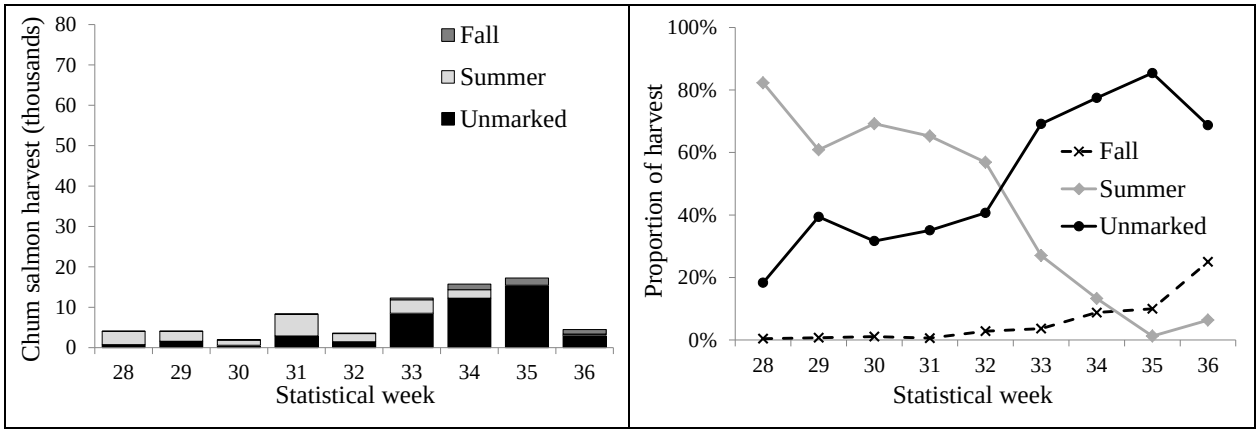

Figure 22.–Number and proportion of otolith-marked summer and fall chum salmon and unmarked chum salmon in the weekly District 101 purse seine harvest, 2008.

2009

Otolith-marked hatchery chum salmon represented an estimated 56% of the 2009 total chum salmon harvest in the District 101 purse seine fishery (Table 5). We estimated 93,000 of all otolith-marked fish were summer chum salmon and 7,000 were fall chum salmon. Peak harvests of 23,000 hatchery summer chum salmon occurred in statistical weeks 29 and 31 and a peak harvest of 3,100 hatchery fall chum salmon occurred in statistical week 35, the last week of the fishery (Figure 23; Appendix C2). The contribution of unmarked chum salmon peaked in statistical week 35 with an estimated 15,000 fish (Figure 23; Appendix C2). The transition from a summer chum salmon dominant fishery to fall-run chum salmon dominant fishery occurred in statistical week 35 (Figure 23).

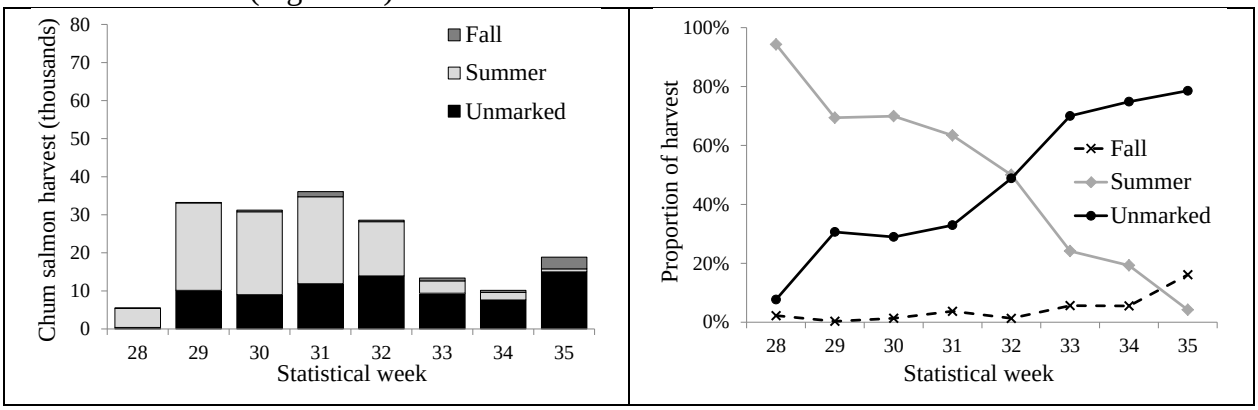

Figure 23.–Number and proportion of otolith-marked summer and fall chum salmon and unmarked chum salmon in the weekly District 101 purse seine harvest, 2009.

2010

Otolith-marked hatchery chum salmon represented an estimated 46% of the 2010 total chum salmon harvest in the District 101 purse seine fishery (Table 5). We estimated 154,000 of all otolith-marked fish were summer chum salmon and 33,000 were fall chum salmon (Appendix C2). A peak harvest of 48,400 hatchery summer chum salmon occurred in statistical week 31 and a peak harvest of 13,000 hatchery fall chum salmon occurred in statistical week 35 (Figure 24). The transition from a summer chum salmon dominant fishery to fall-run chum salmon dominant fishery occurred in statistical week 33 (Figure 24). The contribution of unmarked chum salmon was greatest in statistical week 35 with an estimated 55,800 fish (Figure 24; Appendix C2).

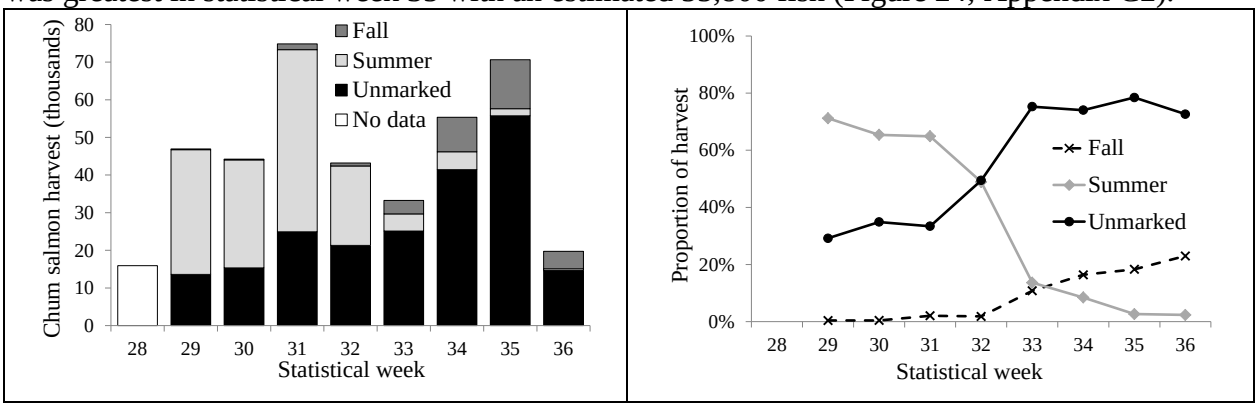

Figure 24.–Number and proportion of otolith-marked summer and fall chum salmon and unmarked chum salmon in the weekly District 101 purse seine harvest, 2010. No samples were collected in statistical weeks 28.

DISTRICT 102 PURSE SEINE FISHERY

From 2006 to 2010, the proportion of otolith-marked hatchery fish in the chum salmon harvest in the District 102 purse seine fishery ranged from 66% (2010) to 83% (2008), and averaged 79% (Table 6). The coefficient of variation of these estimates ranged from 0.7% (2007) to 1.5% (2006). Otolith-marked summer chum salmon accounted for over 90% of the harvest from late June through July (statistical weeks 26–31) in nearly all years. The harvest of unmarked chum salmon and otolith-marked fall-run chum salmon peaked in late August and early September (statistical weeks 35–36) in nearly all years. On average, Kendrick Bay summer chum salmon represented 78% of the total marked otoliths recovered, followed by Neets Bay summer chum salmon (10%), and Neets Bay fall chum salmon (6%; Appendix B2). On average, NSRAA and DIPAC accounted for <1% of recovered marked otoliths.

Table 6.–Proportion of otolith-marked and unmarked chum salmon caught in the District 102 purse seine fishery, 2006–2010.

	Total	Otolith-marked Hatchery Chum Salmon			Unmarked Chum Salmon		
Year	Chum Salmon Harvest	Proportion	Estimated Harvest	95% Credible Interval	Proportion	Estimated Harvest	95% Credible Interval
2006	408,000	82%	333,000	324,000–343,000	18%	74,000	65,000–84,000
2007	516,000	82%	422,000	416,000–428,000	18%	94,000	88,000–100,000
2008	295,000	83%	246,000	241,000–251,000	17%	49,000	45,000–54,000
2009	418,000	82%	342,000	333,000–350,000	18%	77,000	68,000–85,000
2010	431,000	66%	286,000	281,000–290,000	34%	146,000	141,000–151,000
Average		79%	326,000		21%	88,000	

2006

Otolith-marked hatchery chum salmon represented an estimated 82% of the 2006 total chum salmon harvest in the District 102 purse seine fishery (Table 6). We estimated 329,000 of all otolith-marked fish were summer chum salmon and 6,000 were fall chum salmon (Appendix C2). A peak harvest of 118,800 hatchery summer chum salmon and 8,600 unmarked summer chum salmon occurred in statistical week 28. A peak harvest of 1,700 hatchery fall chum salmon and 15,400 unmarked fall chum salmon occurred in statistical week 36. (Figure 25; Appendix C2). The transition from a summer chum salmon dominant fishery to unmarked chum salmon dominant fishery occurred in statistical week 32.

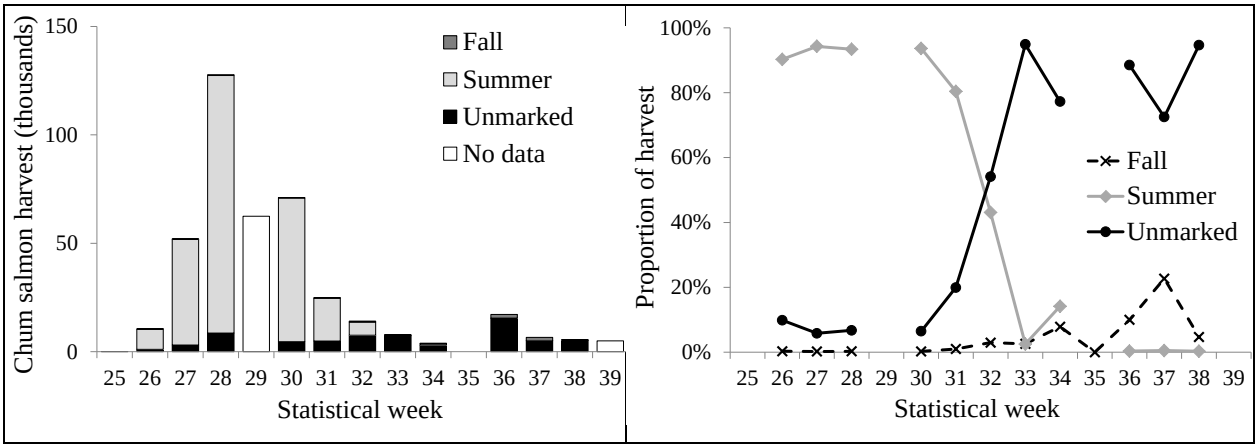

Figure 25.–Number and proportion of otolith-marked summer and fall chum salmon and unmarked chum salmon in the weekly District 102 purse seine harvest, 2006. No samples were collected in statistical weeks 29 or 39.

2007

Otolith-marked hatchery chum salmon represented an estimated 82% of the 2007 total chum salmon harvest in the District 102 purse seine fishery (Table 6). We estimated 413,000 of all otolith-marked fish were summer chum salmon and 10,000 were fall chum salmon (Appendix C2). A peak harvest of 138,400 hatchery summer chum salmon and 5,000 unmarked summer chum salmon occurred in statistical week 28 A peak harvest of 3,400 hatchery fall chum salmon and 23,600 unmarked fall chum salmon occurred in statistical week 35 (Figure 26; Appendix C2). The transition from a summer chum salmon dominant fishery to an unmarked chum salmon dominant fishery occurred in statistical week 33.

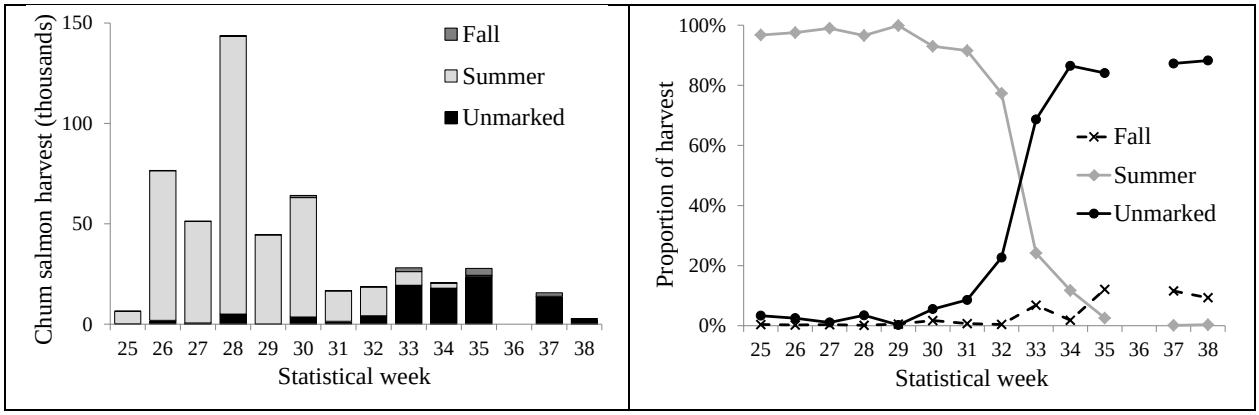

Figure 26.–Number and proportion of otolith-marked summer and fall chum salmon and unmarked chum salmon in the weekly District 102 purse seine harvest, 2007.

2008

Otolith-marked hatchery chum salmon represented an estimated 83% of the 2008 total chum salmon harvest in the District 102 purse seine fishery (Table 6). We estimated 243,000 of all otolith-marked fish were summer chum salmon and 4,000 were fall chum salmon (Appendix C2). A peak harvest of 83,000 hatchery summer chum salmon occurred in statistical week 28 and peak harvests of 2,200 unmarked summer chum salmon occurred in statistical weeks 27 and 28. A peak harvest of 800 hatchery fall chum salmon occurred in statistical week 34 and a peak harvest of 13,700 unmarked fall chum salmon occurred in statistical week 35 (Figure 27; Appendix C2). The transition from a summer chum salmon dominant fishery to an unmarked chum salmon dominant fishery occurred in statistical week 33 (Figure 27).

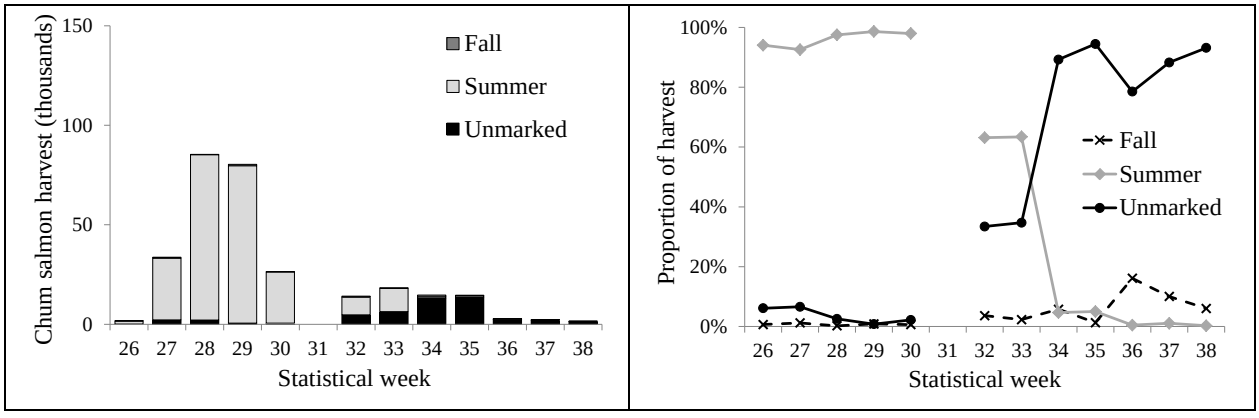

Figure 27.–Number and proportion of otolith-marked summer and fall chum salmon and unmarked chum salmon in the weekly District 102 purse seine harvest, 2008.

2009

Otolith-marked hatchery chum salmon represented an estimated 82% of the 2009 total chum salmon harvest in the District 102 purse seine fishery (Table 6). We estimated 337,000 of all otolith-marked fish were summer chum salmon and 5,000 were fall chum salmon (Appendix C2). A peak harvest of 110,000 hatchery summer chum salmon occurred in statistical week 27 and a peak harvest of 12,600 unmarked summer chum salmon occurred in statistical week 28. Peak harvests of 2,600 hatchery fall chum salmon and 15,500 unmarked fall chum salmon occurred in statistical week 35 (Figure 28; Appendix C2). The transition from a summer chum salmon dominant fishery to an unmarked chum salmon dominant fishery occurred in statistical week 31.

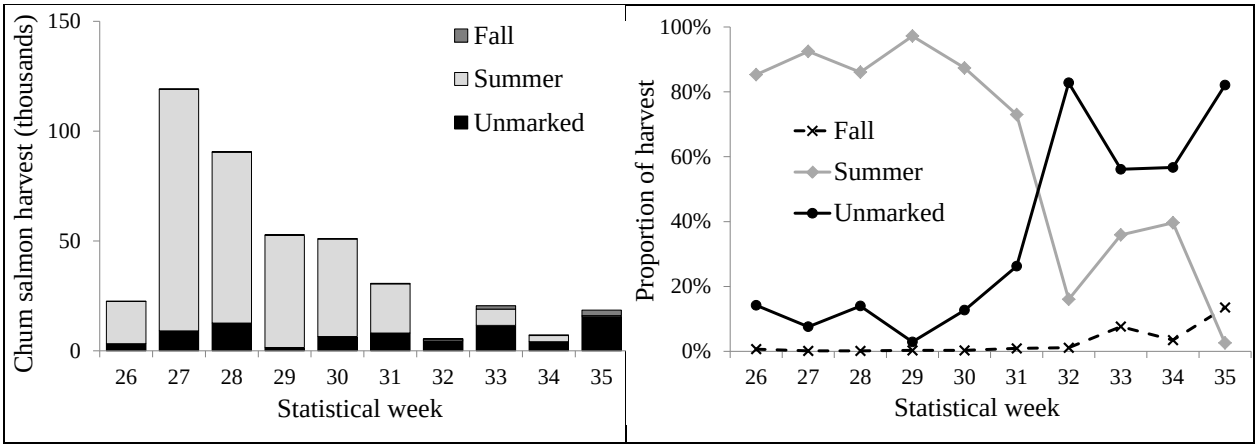

Figure 28.–Number and proportion of otolith-marked summer and fall chum salmon and unmarked chum salmon in the weekly District 102 purse seine harvest, 2009.

2010

Otolith-marked hatchery chum salmon represented an estimated 66% of the 2010 total chum salmon harvest in the District 102 purse seine fishery (Table 6). We estimated 276,000 of all otolith-marked fish were summer chum salmon and 11,000 were fall chum salmon (Appendix C2). A peak harvest of 120,700 hatchery summer chum salmon occurred in statistical week 28. Very few unmarked summer chum salmon were harvested in 2010. Peak harvests of 4,300 hatchery fall chum salmon and 38,700 unmarked fall chum salmon occurred in statistical week 36 (Figure 29; Appendix C2). The transition from a summer chum salmon dominant fishery to unmarked chum salmon dominant fishery occurred in statistical week 32.

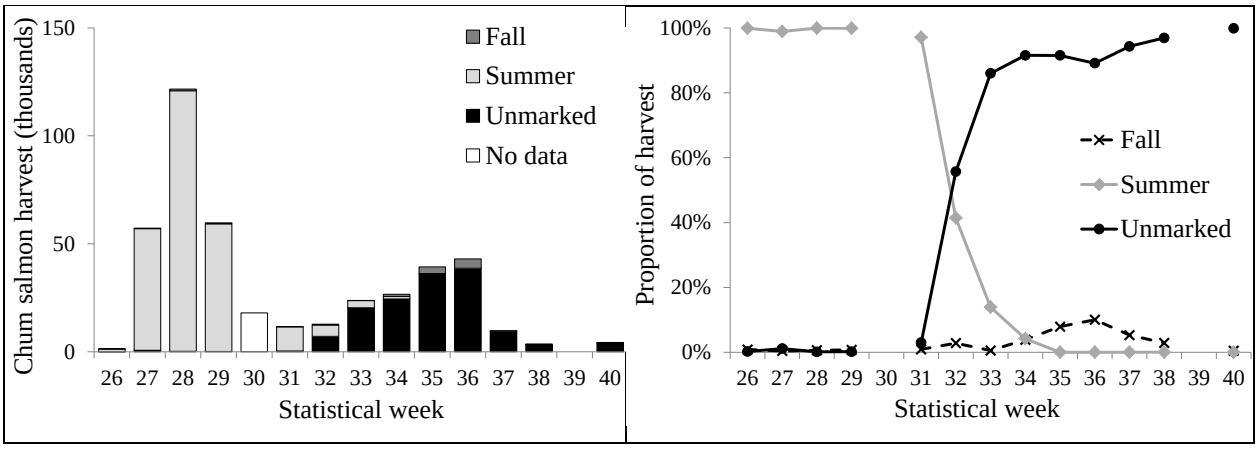

Figure 29.–Number and proportion of otolith-marked summer and fall chum salmon and unmarked chum salmon in the weekly District 102 purse seine harvest, 2010. No samples were collected in statistical week 30.

DISTRICT 103 PURSE SEINE FISHERY

From 2007 to 2010, the proportion of otolith-marked hatchery fish in the chum salmon harvest in the District 103 summer purse seine fishery ranged from 4% in 2010, to 19% in 2007 (Table 7). The coefficient of variation of these estimates ranged from 11.0% (2007) to 33.6% (2010). Unmarked chum salmon accounted for the majority of the harvest in all years, and by late August (statistical week 34) nearly all chum salmon caught in District 103 were unmarked. Very few samples were collected in 2006, so estimates are not reported for that year in this report. On average, Neets Bay summer chum salmon represented 31% of the total marked otoliths recovered, followed by Kendrick Bay summer chum salmon (25%), Neets Bay fall chum salmon (21%), Anita Bay summer chum salmon (9%) and NSRAA Deep Inlet summer chum salmon (7%; Appendix B2).

Table 7.–Proportion of otolith-marked and unmarked chum salmon caught in the District 103 purse seine fishery, 2006–2010.

	Total	Otolith-marked Hatchery Chum Salmon			Unmarked Chum Salmon		
Year	Chum Salmon Harvest	Proportion	Estimated Harvest	95% Credible Interval	Proportion	Estimated Harvest	95% Credible Interval
2006	61,000	ND	ND	ND	ND	ND	ND
2007	229,000	19%	43,000	33,000–53,000	81%	186,000	176,000–195,000
2008	156,000	11%	17,000	7,000–28,000	89%	139,000	128,000–149,000
2009	73,000	8%	6,000	4,000–8,000	92%	68,000	65,000–70,000
2010	62,000	4%	3,000	2,000–4,000	96%	60,000	59,000–61,000
Average		11%	17,000		89%	113,000	

2007

Otolith-marked hatchery chum salmon represented an estimated 19% of the 2007 total chum salmon harvest in the District 103 purse seine fishery (Table 7). We estimated 40,000 of all otolith-marked fish were summer chum salmon and 3,000 were fall chum salmon (Appendix C2). Peak harvests of 23,800 hatchery summer chum salmon and 2,200 hatchery fall chum salmon occurred in statistical week 32. A peak harvest of 59,600 unmarked chum salmon occurred in statistical week 33 (Figure 30; Appendix C2).

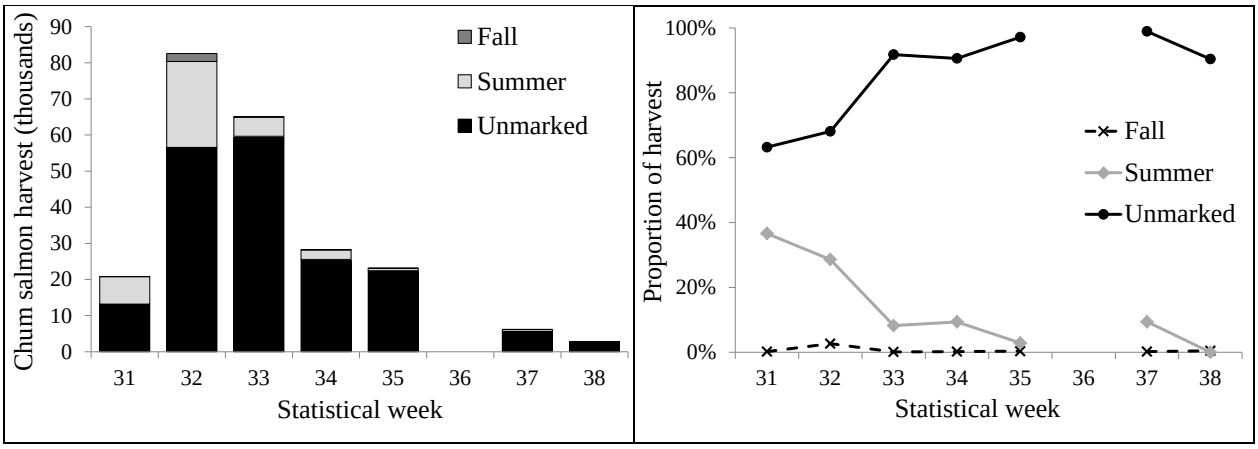

Figure 30.–Number and proportion of otolith-marked summer and fall chum salmon and unmarked chum salmon in the weekly District 103 purse seine harvest, 2007.

2008

Otolith-marked hatchery chum salmon represented an estimated 11% of the 2008 total chum salmon harvest in the District 103 purse seine fishery (Table 7). We estimated 11,000 of all otolith-marked fish were summer chum salmon and 5,000 were fall chum salmon (Appendix C2). Very few hatchery summer chum salmon were harvested in 2008. Peak harvests of 1,900 hatchery fall chum salmon and 69,500 unmarked chum salmon occurred in statistical week 34. (Figure 31; Appendix C2).

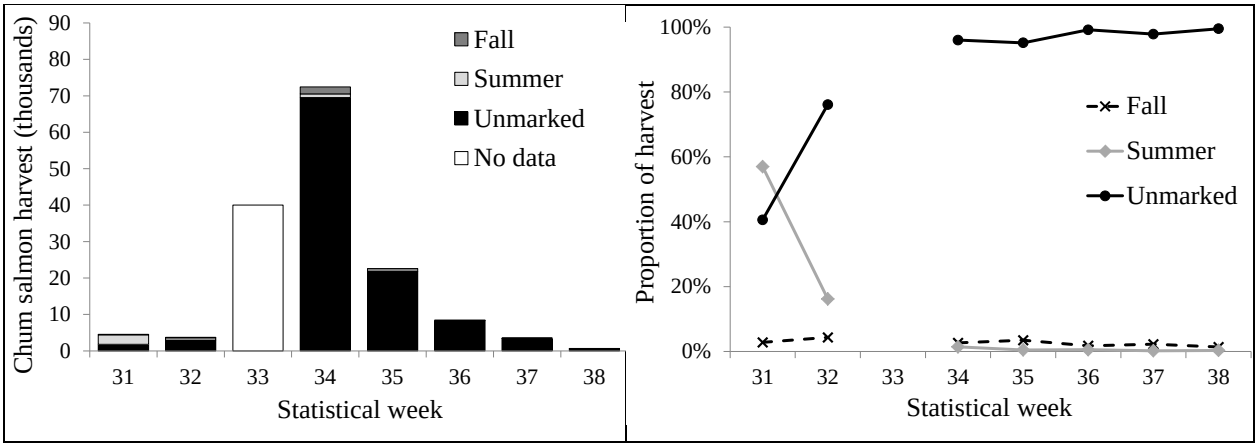

Figure 31.–Number and proportion of otolith-marked summer and fall chum salmon and unmarked chum salmon in the weekly District 103 purse seine harvest, 2008. No samples were collected in statistical week 33.

2009

Otolith-marked hatchery chum salmon represented an estimated 8% of the 2009 total chum salmon harvest in the District 103 purse seine fishery (Table 7). We estimated 5,000 of all otolith-marked fish were summer chum salmon and 1,000 were fall chum salmon (Appendix C2). A peak harvest of 1,900 hatchery summer chum salmon occurred in statistical week 31 and a peak harvest of 800 hatchery fall chum salmon occurred in statistical week 32. A peak harvest of 20,200 unmarked chum salmon occurred in statistical week 34 (Figure 32; Appendix C2).

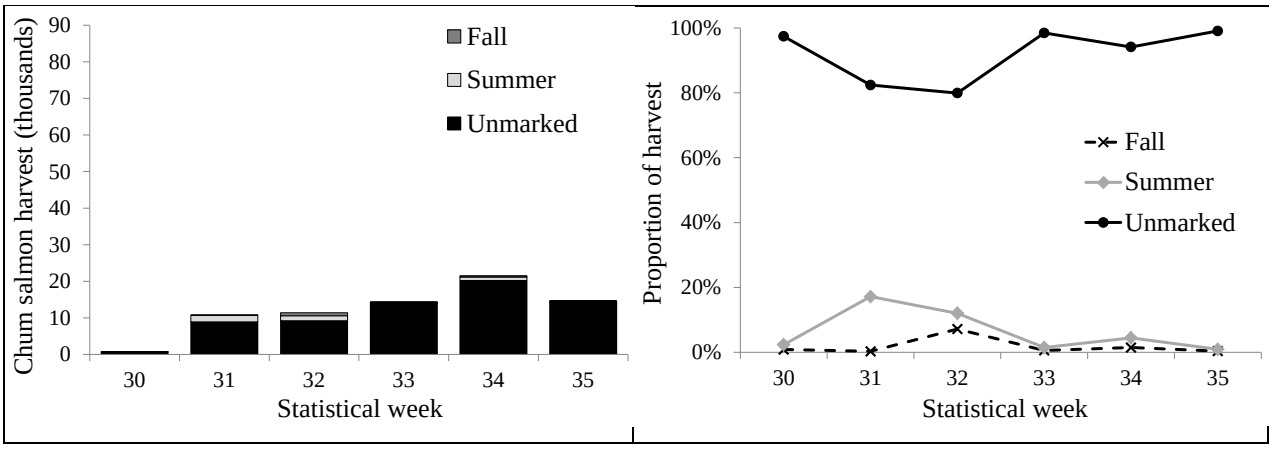

Figure 32.–Number and proportion of otolith-marked summer and fall chum salmon and unmarked chum salmon in the weekly District 103 purse seine harvest, 2009.

2010

Otolith-marked hatchery chum salmon represented an estimated 4% of the 2010 total chum salmon harvest in the District 103 purse seine fishery (Table 7). We estimated 1,000 of all otolith-marked fish were summer chum salmon and 1,000 were fall chum salmon (Appendix C2). The unmarked chum salmon harvest was relatively stable from statistical week 33 to statistical week 35 with harvests of 19,100 fish in statistical week 33 and 17,500 fish in statistical week 35 (Figure 33).

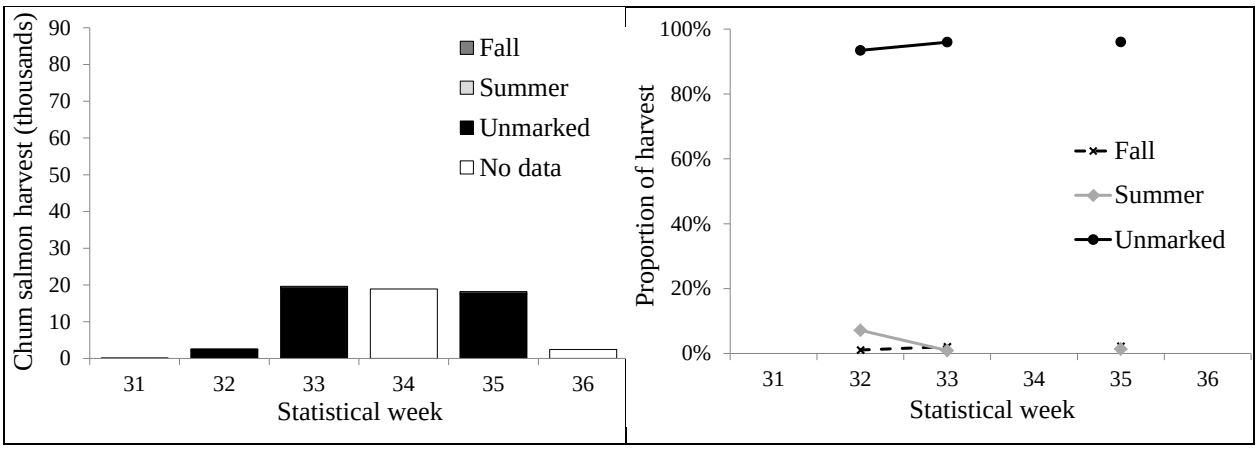

Figure 33.–Number and proportion of otolith-marked summer and fall chum salmon and unmarked chum salmon in the weekly District 103 purse seine harvest, 2010. No samples were collected in statistical weeks 31, 34, or 36.

DISTRICT 104 PURSE SEINE FISHERY

From 2006 to 2010, the proportion of otolith-marked fish in the District 104 purse seine chum salmon harvest ranged from 15% (2010) to 42% (2007) and averaged 29% (Table 8). The coefficient of variation of these estimates ranged from 3.1% (2007) to 14.1% (2010). In all years, the proportion of otolith-marked fish was lower than the proportion of unmarked fish, and by mid-August (statistical week 34) nearly all chum salmon caught in District 104 were unmarked. On average, Neets Bay summer chum salmon represented 40% of the total marked otoliths recovered, followed by Kendrick Bay summer chum salmon (24%), and Neets Bay fall chum

salmon (10%; Appendix B2). Marked NSRAA and DIPAC fish accounted for an average 7% and 1% of marked otoliths recovered, respectively.

Table 8.–Proportion of otolith-marked and unmarked chum salmon caught in the District 104 purse seine fishery, 2006–2010.

	Total	Otolith-marked Hatchery Chum Salmon			Unmarked Chum Salmon		
Year	Chum Salmon Harvest	Proportion	Estimated Harvest	95% Credible Interval	Proportion	Estimated Harvest	95% Credible Interval
2006	121,000	39%	47,000	42,000–52,000	61%	73,000	68,000–78,00
2007	424,000	42%	177,000	166,000–188,000	58%	247,000	236,000–257,000
2008	99,000	18%	18,000	14,000–21,000	82%	81,000	77,000–84,000
2009	118,000	28%	34,000	30,000–37,000	72%	84,000	81,000–88,000
2010	57,000	15%	8,000	6,000–11,000	85%	48,000	46,000–50,000
Average		29%	57,000		71%	107,000	

2006

Otolith-marked hatchery chum salmon represented an estimated 39% of the 2006 total chum salmon harvest in the District 104 purse seine fishery (Table 8). We estimated 46,000 of all otolith-marked fish were summer chum salmon and 1,000 were fall chum salmon (Appendix C2). A peak harvest of 13,700 hatchery summer chum salmon occurred in statistical week 29 and a peak harvest of 500 hatchery fall chum salmon occurred in statistical weeks 30 and 31. After statistical week 30, the majority of the chum salmon harvest was unmarked (Figure 34). An estimated peak harvest of 26,000 unmarked chum salmon occurred in statistical week 32 (Figure 34; Appendix C2).

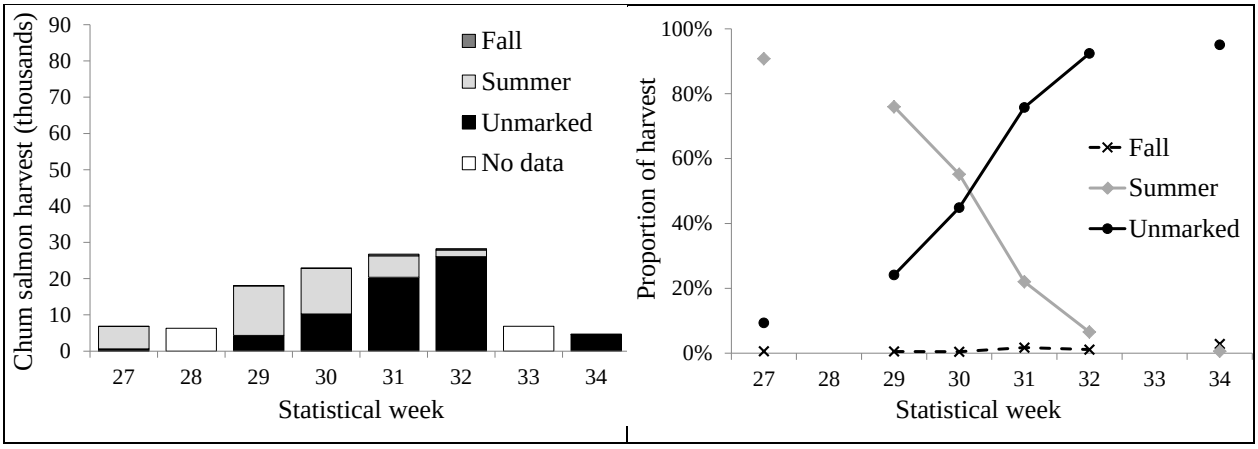

Figure 34.–Number and proportion of otolith-marked summer and fall chum salmon and unmarked chum salmon in the weekly District 104 purse seine harvest, 2006. No samples were collected in statistical weeks 28 or 33.

2007

Otolith-marked hatchery chum salmon represented an estimated 42% of the 2007 total chum salmon harvest in the District 104 purse seine fishery (Table 8). We estimated 168,000 of all otolith-marked fish were summer chum salmon and 9,000 were fall chum salmon. A peak harvest of 43,000 hatchery summer chum salmon occurred in statistical week 31. After statistical week 31, the majority of the chum salmon harvest was unmarked. Peak harvests of 3,400 hatchery fall chum salmon and 79,600 unmarked chum salmon occurred in statistical week 33 (Figure 35; Appendix C2).

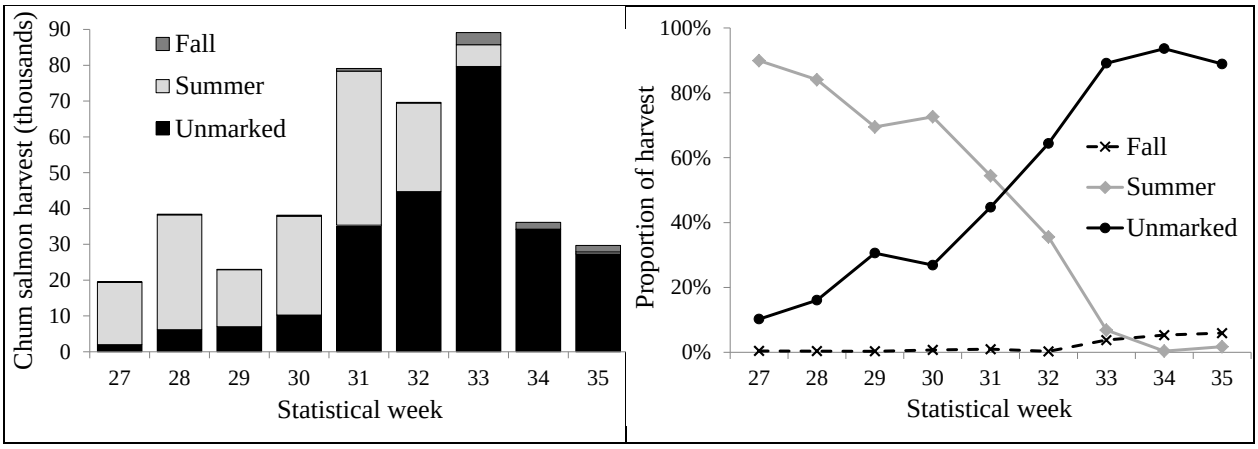

Figure 35.–Number and proportion of otolith-marked summer and fall chum salmon and unmarked chum salmon in the weekly District 104 purse seine harvest, 2007.

2008

Otolith-marked hatchery chum salmon represented an estimated 18% of the 2008 total chum salmon harvest in the District 104 purse seine fishery (Table 8). We estimated 13,000 of all otolith-marked fish were summer chum salmon and 5,000 were fall chum salmon. A peak harvest of 5,000 hatchery summer chum salmon occurred in statistical week 33. Peak harvests of 1,200 hatchery fall chum salmon and 21,000 unmarked chum salmon occurred in statistical week 34. Unmarked chum salmon were more abundant than otolith-marked chum salmon all season in 2008 (Figure 36; Appendix C2).

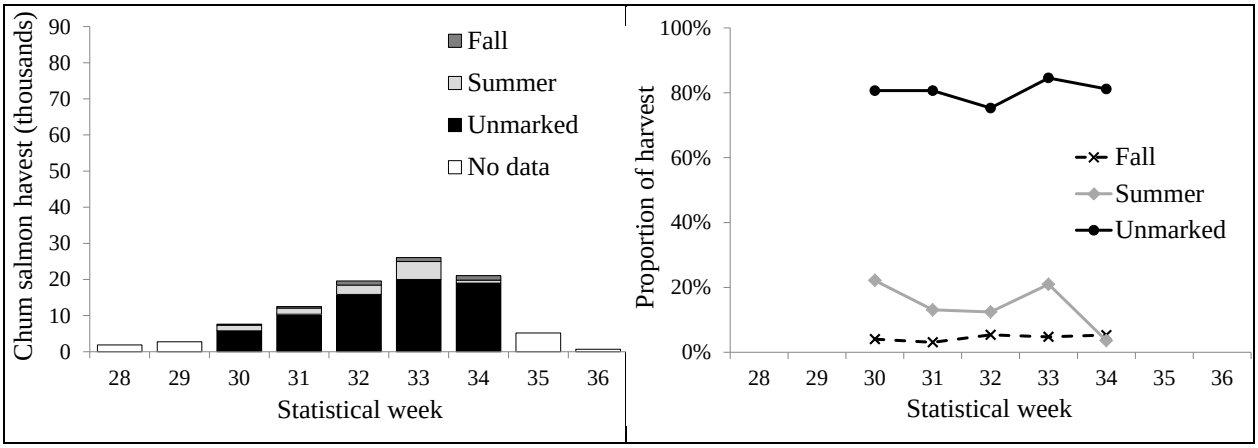

Figure 36.–Number and proportion of otolith-marked summer and fall chum salmon and unmarked chum salmon in the weekly District 104 purse seine harvest, 2008. No samples were collected in statistical weeks 28–29, or 35–36.

2009

Otolith-marked hatchery chum salmon represented an estimated 28% of the 2009 total chum salmon harvest in the District 104 purse seine fishery (Table 8). We estimated 29,000 of all otolith-marked fish were summer chum salmon and 4,000 were fall chum salmon. After statistical week 30, the majority of the chum salmon in the harvest were unmarked. A peak harvest of 9,500 hatchery summer chum salmon occurred in statistical week 31 and peak harvests of 1,500 hatchery fall chum salmon and 23,600 unmarked chum salmon occurred in statistical week 33 (Figure 37; Appendix C2).

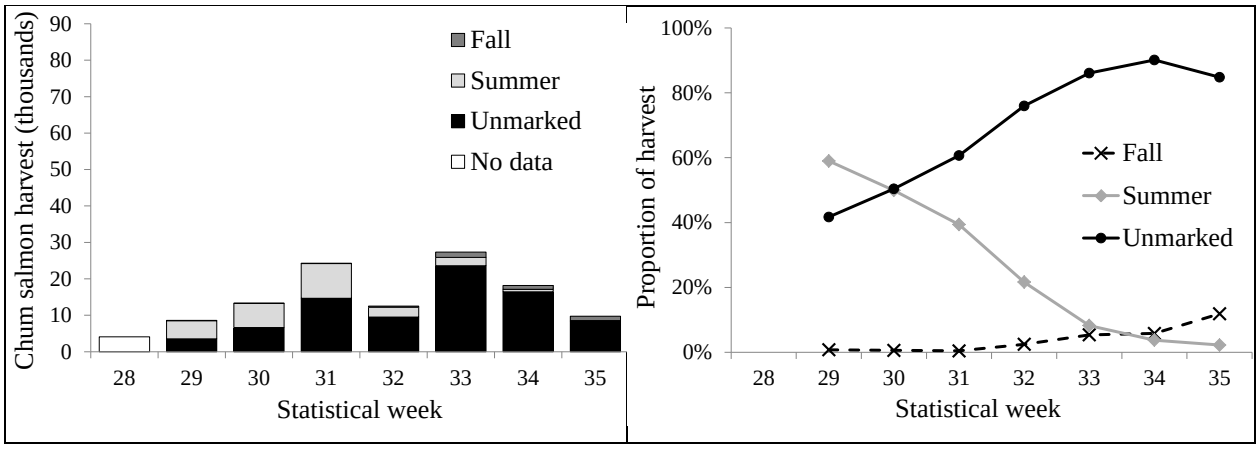

Figure 37.–Number and proportion of otolith-marked summer and fall chum salmon and unmarked chum salmon in the weekly District 104 purse seine harvest, 2009. No samples were collected in statistical week 28.

2010

Otolith-marked hatchery chum salmon represented an estimated 15% of the 2010 total chum salmon harvest in the District 104 purse seine fishery (Table 8). We estimated 8,000 of all otolith-marked fish were summer chum salmon and 1,000 were fall chum salmon. A peak harvest of 3,300 hatchery summer chum salmon occurred in statistical week 29, after that the majority of the chum salmon harvest was unmarked. A peak harvest of 15,800 unmarked chum salmon occurred in statistical week 33 and a peak harvest of 300 hatchery fall chum salmon occurred in statistical week 35 (Figure 38; Appendix C2).

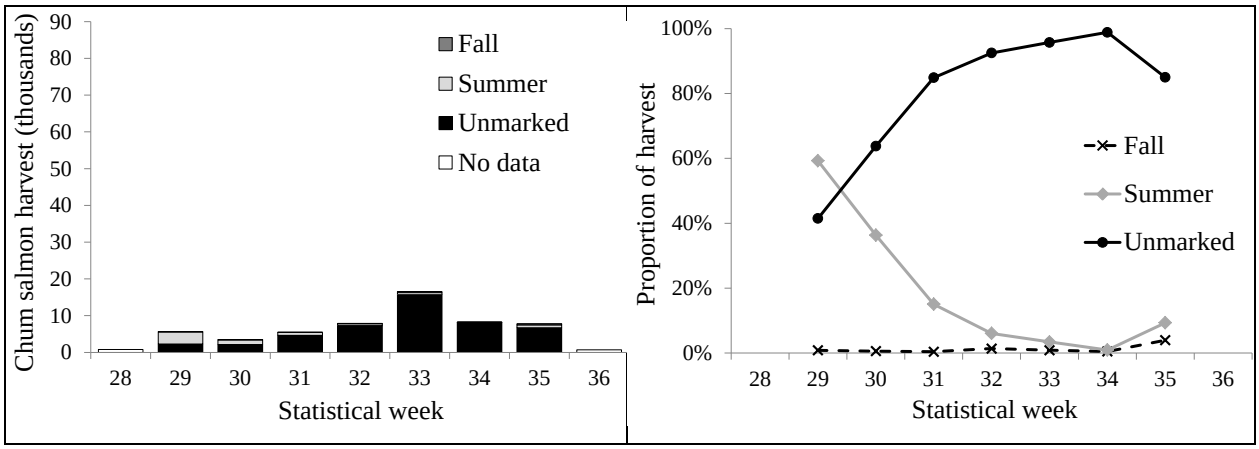

Figure 38.–Number and proportion of otolith-marked summer and fall chum salmon and unmarked chum salmon in the weekly District 104 purse seine harvest, 2010. No samples were collected in statistical weeks 28 or 36.

DISTRICT 107 PURSE SEINE FISHERY

From 2006 to 2009, the proportion of otolith-marked fish in the chum salmon harvest from the District 107 purse seine fishery ranged from 97% (2010) to 91% (2009) and averaged 93% (Table 9). The coefficient of variation of these estimates ranged from 1.2% (2009) to 3.4% (2006). On average, Anita Bay chum salmon represented 51% of the total marked otoliths recovered, followed by Neets Bay summer chum salmon (44%; Appendix B2). Marked NSRAA and DIPAC fish combined accounted for 1% of marked otoliths recovered.

Table 9.–Proportion of otolith-marked and unmarked chum salmon caught in the District 107 purse seine fishery, 2006–2010.

Year	Total Chum Salmon Harvest	Otolith-marked Hatchery Chum Salmon			Unmarked Chum Salmon		
		Proportion	Estimated Harvest	95% Credible Interval	Proportion	Estimated Harvest	95% Credible Interval
2006	104,000	92%	95,000	89,000–102,000	8%	8,000	2,000–15,000
2007	147,000	93%	138,000	132,000–143,000	7%	10,000	4,000–15,000
2008	47,000	94%	44,000	42,000–46,000	6%	3,000	1,000–5,000
2009	162,000	91%	148,000	144,000–151,000	9%	14,000	10,000–17,000
2010	34,000	97%	33,000	ND	3%	1,000	ND
Average		93%	92,000		7%	7,000	

2006

Otolith-marked hatchery chum salmon represented an estimated 92% of the 2006 total chum salmon harvest in the District 107 purse seine fishery (Table 9). We estimated 95,000 of all otolith-marked fish were summer chum salmon and fewer than 500 were fall chum salmon. Estimated peak harvests of 48,500 hatchery summer chum salmon and 4,300 unmarked chum salmon likely occurred in statistical week 29 (Figure 38; Appendix C2).

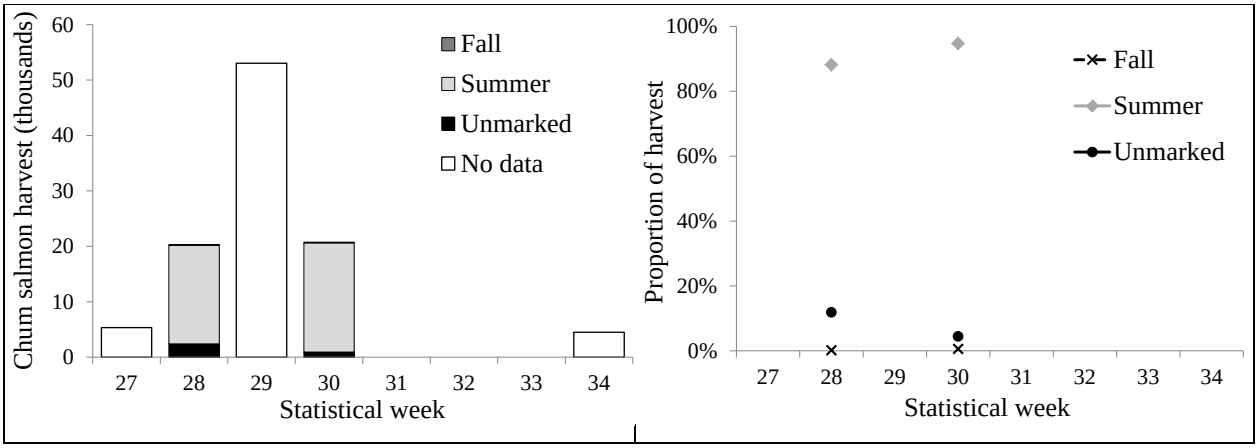

Figure 39.–Number and proportion of otolith-marked summer and fall chum salmon and unmarked chum salmon in the weekly District 107 purse seine harvest, 2006. No samples were collected in statistical weeks 27, 29, or 34.

2007

Otolith-marked hatchery chum salmon represented an estimated 93% of the 2007 total chum salmon harvest in the District 107 purse seine fishery (Table 9). We estimated 133,000 of all otolith-marked fish were summer chum salmon and 5,000 were fall chum. A peak harvest of 35,200 hatchery summer chum salmon occurred in statistical week 31 and a peak harvest of 2,300 unmarked chum salmon occurred in statistical week 33 (Figure 40; Appendix C2).

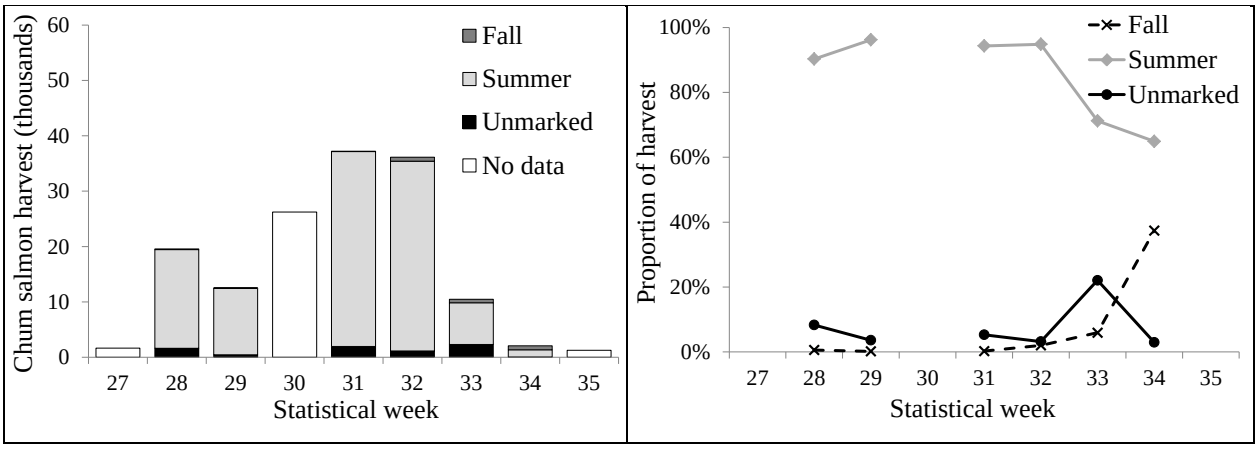

Figure 40.–Number and proportion of otolith-marked summer and fall chum salmon and unmarked chum salmon in the weekly District 107 purse seine harvest, 2007. No samples were collected in statistical weeks 27, 30, or 35.

2008

Otolith-marked hatchery chum salmon represented an estimated 94% of the 2008 total chum salmon harvest in the District 107 purse seine fishery (Table 9). We estimated 34,000 of all otolith-marked fish were summer chum salmon and 1,000 were fall-run chum salmon. A peak harvest of 1,200 unmarked chum salmon occurred in statistical week 30 and peak harvests of 14,400 hatchery summer chum salmon and 1,000 fall chum salmon occurred in statistical week 32 (Figure 41; Appendix C2).

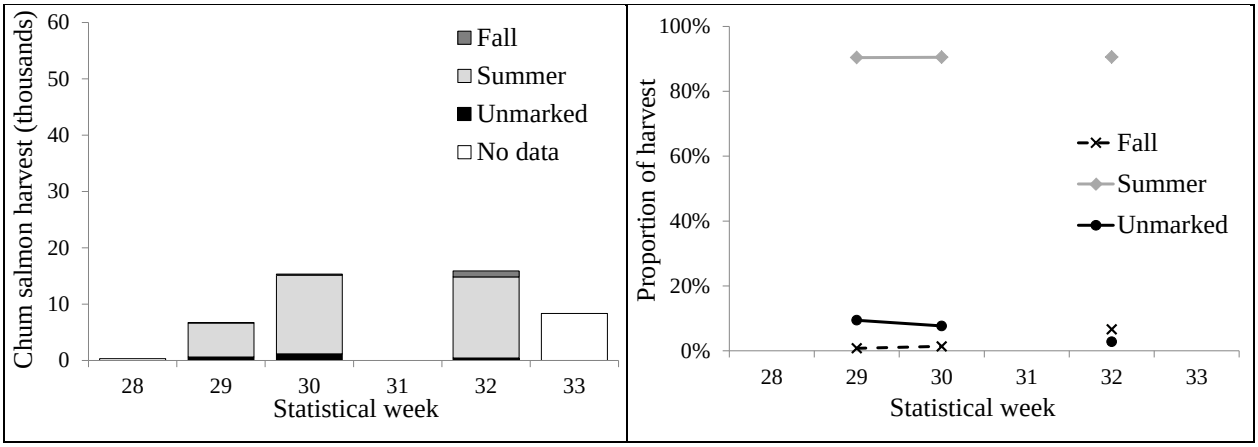

Figure 41.–Number and proportion of otolith-marked summer and fall chum salmon and unmarked chum salmon in the weekly District 107 purse seine harvest, 2008. No samples were collected in statistical weeks 28 or 33.

2009

Otolith-marked hatchery chum salmon represented an estimated 91% of the 2009 total chum salmon harvest in the District 107 purse seine fishery (Table 9). We estimated 144,000 of all otolith-marked fish were summer chum salmon and 4,000 were fall-run chum salmon.

Peak harvests of 47,000 hatchery summer chum salmon and 4,000 unmarked chum salmon occurred in statistical week 30. Peak harvests of 1,000 hatchery fall chum salmon occurred in statistical weeks 33 and 34 (Figure 42; Appendix C2).

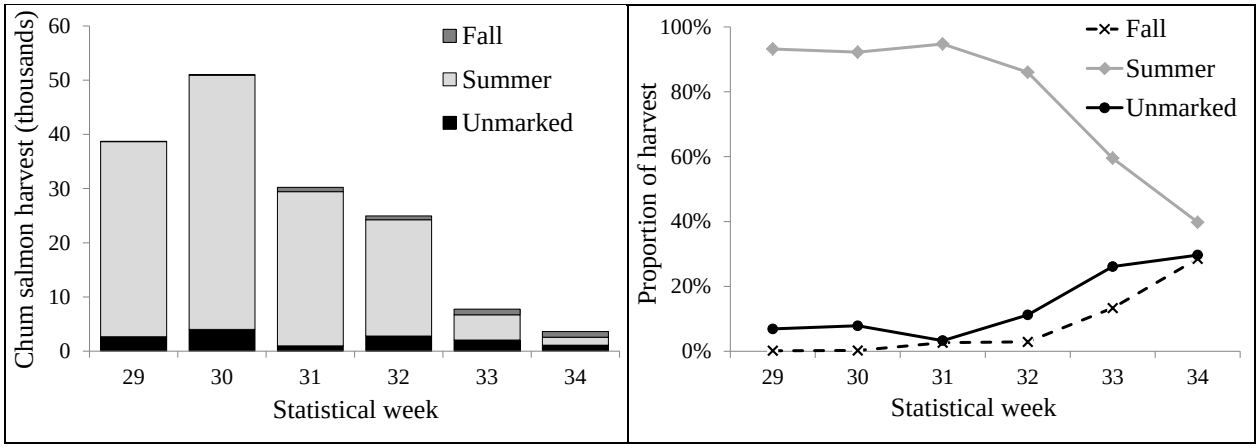

Figure 42.–Number and proportion of otolith-marked summer and fall chum salmon and unmarked chum salmon in the weekly District 107 purse seine harvest, 2009.

2010

Otolith-marked hatchery chum salmon represented an estimated 97% of the 2010 total chum salmon harvest in the District 107 purse seine fishery (Table 9). We estimated all 33,000 otolith-marked fish were summer chum salmon. Peak harvests of hatchery summer chum salmon and unmarked chum salmon occurred in statistical week 29 (Figure 43; Appendix C2).

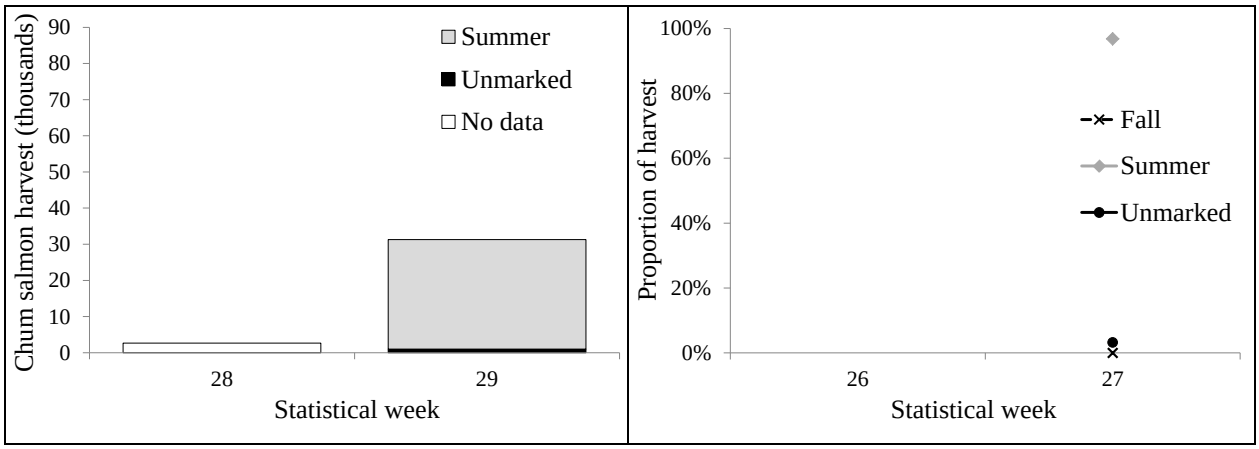

Figure 43.–Number and proportion of otolith-marked summer and fall chum salmon and unmarked chum salmon in the weekly District 107 purse seine harvest, 2010. No samples were collected in statistical week 28.

DISCUSSION

Hatchery chum salmon contributed to every mixed-stock commercial net fishery in southern Southeast Alaska. Approximately 520,000 hatchery chum salmon were caught annually in the District 101–104 purse seine fisheries and nearly 500,000 were caught annually in District 101, 106, and 108 drift gillnet fisheries combined from 2006 to 2010 (Tables 2–8). Contributions of hatchery chum salmon were highest in District 102 where annual harvests averaged 326,000 fish or 79% of the total annual chum salmon harvest (Table 6). Contributions of hatchery chum salmon were lower in coastal purse seine fisheries in Districts 103 and 104, farther from hatchery release sites, where they accounted for an annual average of only 17,000 and 57,000 fish, respectively (Tables 7 and 8). In the more inside waters of the District 101, 106, and 108 drift gillnet fisheries, hatchery chum salmon accounted for at least 130,000 fish and as many as 212,00 fish on average each year, generally comprising over 70% of the total chum salmon harvest annually from 2006 to 2010 (Tables 2–4). Annual hatchery contribution estimates for each fishery varied considerably from year-to-year due to changes in hatchery and wild stock run size, chum salmon migration routes, and fishing time and effort.

Precision of annual contribution estimates for marked chum salmon varied considerably among districts. The coefficient of variation of annual estimates ranged from 0.7% (District 102, 2007) to 33.6% (District 103, 2010). Fisheries that were consistently sampled throughout the season and generated large weekly sample sizes had the lowest coefficients of variation (District 101 and 102 purse seine fisheries, District 101-11 and 106 drift gillnet fishery; annual CV≤5.8%). Estimates of marked chum salmon in District 103 were the least precise every year (CV range=11.0–33.6%) followed by District 104. One of SSRAA's sampling priorities was to target deliveries from areas with the majority of the annual harvest in order to maximize coverage with limited staff. Since only a small fraction of the traditional chum salmon harvest in southern Southeast Alaska came from Districts 103 and 104 (Appendix C2), and no SSRAA chum salmon were released from the west coast of Prince of Wales Island, these districts were a low sampling priority.

Harvest of hatchery summer-run chum salmon peaked in statistical weeks 28–31 (July) in most southern Southeast Alaska net fisheries. The earliest peak in harvest occurred in District 102 during statistical week 27 or 28 (early July) in all five years. In the more inside waters of Districts 101, 106, and 108 peak harvests occurred slightly later during statistical weeks 29–31 (mid- to late July). Run timing of hatchery summer chum salmon in the outside waters of District 104 was difficult to discern due to Pacific Salmon Treaty restrictions that limited fishing opportunity in the early weeks of July when summer chum salmon abundance would be expected to peak (Davidson et al. 2011). In District 104, proportions of hatchery summer chum salmon were large at the very beginning of the season and gradually declined in all years, indicating that the peak timing is likely similar to, or earlier than, what was observed in District 102. Similarly, there was typically no opportunity to harvest summer chum salmon in adjacent District 103 until statistical week 31 (late July), likely after the peak passage of summer chum salmon due to the later timing of pink salmon openings in that area. Peak timing for unmarked summer chum salmon was similar to, if not the same as marked fish in most cases, indicating wild and hatchery chum salmon share similar run timing in southern Southeast Alaska fisheries. This is not unexpected as all SSRAA hatchery chum salmon released from 2001 to 2008 share ancestry with local wild summer-run and fall-run chum salmon stocks.

Both of the southern Southeast Alaska hatchery fall-run chum salmon remote release sites are located in District 101 which explains why harvests of hatchery fall-run chum salmon were greatest along their migration routes through District 101 and District 106 fisheries. Otolith-marked fall-run chum salmon were most abundant in the District 101-11 drift gillnet fishery, adjacent to the Nakat Inlet remote release site, with peak harvests generally occurring in statistical weeks 35–37 (late August to early September). Peak catches of hatchery fall-run chum salmon in the District 106 gillnet fishery typically occurred in weeks 36 or 37 (early September) and were largely composed of fish returning to Neets Bay (Appendix B1). Peak harvests of unmarked fall-run chum salmon and hatchery fall-run chum salmon generally occurred during the exact same week in these districts.

Harvests of unmarked chum salmon along the outer coast of Prince of Wales (Districts 103 and 104) averaged over 100,000 fish from 2006 to 2010. In District 104, proportions of unmarked chum salmon in the harvest exceeded 75% from statistical week 32 (early August) until the fishery closed in all years. In most years, the transition from a summer-run chum salmon fishery to a fall-run chum salmon fishery occurred in Districts 101, 102, and 106 around statistical week 34 (mid-August) so it seems likely that the large number of unmarked chum salmon harvested on the outer coast after statistical week 32 were primarily wild fall-run chum salmon. Most wild summer-run chum salmon escapements in southern Southeast Alaska are at or past their peak by statistical week 33 (mid-August) and few wild summer chum salmon destined for Southeast Alaska streams should be on the outer coast at that time.

In southern Southeast Alaska, over 90% of marked chum salmon in our unweighted samples originated from SSRAA release sites (Appendix B). In general, most marked chum salmon were harvested in the fisheries closest to their release site. For example, summer and fall-run chum salmon released from Nakat Inlet were primarily harvested in the adjacent District 101-11 drift gillnet fishery. They accounted for more than 75% of marked fish in three out of five years, and over 90% of the total in two of those years. Additionally, summer-run chum salmon returning to Kendrick Bay, located in District 102, comprised a minimum of 75% of all marked fish in samples from the District 102 purse seine fishery in four out of five years and were also prevalent in purse seine fisheries in District 101, 103, and 104, averaging 26%, 25% and 24% of the total across all years, respectively. Neets Bay summer-run chum salmon contributed to all southern Southeast Alaska commercial fisheries and averaged 52% of marked fish in samples from the District 101 purse seine fishery. The highest proportion of Neets Bay fall chum salmon were in samples from the District 106 drift gillnet fishery, which is often open through statistical week 39 (late September). Neets Bay fall chum salmon also made up 3–10% of the marked fish from every other southern Southeast Alaska commercial fishery, many of which close prior to the peak of fall chum salmon abundance. Chum salmon returning to Anita Bay were found in the highest proportions in samples from the nearby District 108 and 106 drift gillnet fisheries. Small numbers of chum salmon from northern Southeast Alaska release sites were present in southern Southeast Alaska fisheries. Northern hatchery fish accounted for an average 10% of marked fish recovered in Districts 106 and 108 but typically accounted for less than 1% in other Districts (Appendix B).

Our hatchery chum salmon harvest estimates for southern Southeast Alaska net fisheries underestimate the total contribution of hatchery fish in many cases due to the presence of unmarked hatchery chum salmon. Approximately 95% of the fish released in southern Southeast Alaska from 2003 to 2008 were otolith marked. SSRAA began thermal-marking 100% of their

fish beginning with the 2003 release year so estimated hatchery contributions for southern Southeast fisheries in 2006 did not account for 5-year-old chum salmon released by SSRAA in 2002. The primary source of unmarked hatchery fish would be from MIC releases at Annette Island in District 101, which were not otolith marked from 2002 to 2008. From 2003 to 2008, MIC chum salmon releases averaged just 4% of the total hatchery chum released in southern Southeast Alaska (Districts 101–108). It is likely that the majority of these MIC fish are harvested in the District 101 common property drift gillnet, the District 101 and 102 purse seine fisheries, and in net fisheries occurring within Annette Island Reserve. Unmarked northern hatchery fish would also have been overlooked in samples. With the exception of Districts 106 and 108, they would likely account for a tiny proportion of harvests in most southern Southeast fisheries, based on the few marked northern Southeast fish recovered.

SSRAA has taken the lead among hatchery operators in Alaska by otolith-marking 100% of their releases and establishing a comprehensive commercial fishery sampling program to provide the best possible estimates of their contributions to regional chum salmon harvests. This type of detailed information on the proportions of hatchery and unmarked chum salmon in mixed-stock fisheries is currently only available for southern Southeast Alaska fisheries. The proportion of hatchery chum salmon in Southeast Alaska that are otolith marked has continued to increase, reaching a high of 98% in 2011. The only remaining releases of unmarked summer chum salmon in the region are from MIC sites at Annette Island. That agency plans to otolith-mark their chum salmon releases in the near future, starting with proportionally-marked release groups and eventually 100% marking when new infrastructure is acquired (Steve Leask, Tamgas Hatchery Manager, personal communication). If they are successful, 100% of hatchery-reared chum salmon released in southern Southeast Alaska would be thermal marked.

SSRAA's sampling program has grown and improved each year through coordination with ADF&G port sampling staff and commercial processing facilities. Over all years, the majority of weekly chum salmon harvests in Districts 101–107 were adequately sampled throughout the season with only a handful of people covering five processing locations in two ports each year. Coverage for all fisheries harvesting chum salmon returns to SSRAA release sites is a constant challenge, particularly in the District 108 drift gillnet fishery where the majority of the total chum salmon harvest is delivered to Wrangell where no SSRAA sampler is available. Continued support for SSRAA's systematic sampling program and others like it would improve contribution estimates of hatchery and unmarked fish in the commercial harvest outside southern Southeast Alaska and provide more detailed inseason information useful to fisheries managers.

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APPENDIX A
2006–2010 STATISTICAL WEEKS

Appendix A1.–ADF&G statistical weeks 24–41 start and end dates, 2006–2010.

Statistical Week	2006		2007		2008		2009		2010	
	Start	End	Start	End	Start	End	Start	End	Start	End
24	11-Jun	17-Jun	10-Jun	16-Jun	8-Jun	14-Jun	7-Jun	13-Jun	6-Jun	12-Jun
25	18-Jun	24-Jun	17-Jun	23-Jun	15-Jun	21-Jun	14-Jun	20-Jun	13-Jun	19-Jun
26	25-Jun	1-Jul	24-Jun	30-Jun	22-Jun	28-Jun	21-Jun	27-Jun	20-Jun	26-Jun
27	2-Jul	8-Jul	1-Jul	7-Jul	29-Jun	5-Jul	28-Jun	4-Jul	27-Jun	3-Jul
28	9-Jul	15-Jul	8-Jul	14-Jul	6-Jul	12-Jul	5-Jul	11-Jul	4-Jul	10-Jul
29	16-Jul	22-Jul	15-Jul	21-Jul	13-Jul	19-Jul	12-Jul	18-Jul	11-Jul	17-Jul
30	23-Jul	29-Jul	22-Jul	28-Jul	20-Jul	26-Jul	19-Jul	25-Jul	18-Jul	24-Jul
31	30-Jul	5-Aug	29-Jul	4-Aug	27-Jul	2-Aug	26-Jul	1-Aug	25-Jul	31-Jul
32	6-Aug	12-Aug	5-Aug	11-Aug	3-Aug	9-Aug	2-Aug	8-Aug	1-Aug	7-Aug
33	13-Aug	19-Aug	12-Aug	18-Aug	10-Aug	16-Aug	9-Aug	15-Aug	8-Aug	14-Aug
34	20-Aug	26-Aug	19-Aug	25-Aug	17-Aug	23-Aug	16-Aug	22-Aug	15-Aug	21-Aug
35	27-Aug	2-Sep	26-Aug	1-Sep	24-Aug	30-Aug	23-Aug	29-Aug	22-Aug	28-Aug
36	3-Sep	9-Sep	2-Sep	8-Sep	31-Aug	6-Sep	30-Aug	5-Sep	29-Aug	4-Sep
37	10-Sep	16-Sep	9-Sep	15-Sep	7-Sep	13-Sep	6-Sep	12-Sep	5-Sep	11-Sep
38	17-Sep	23-Sep	16-Sep	22-Sep	14-Sep	20-Sep	13-Sep	19-Sep	12-Sep	18-Sep
39	24-Sep	30-Sep	23-Sep	29-Sep	21-Sep	27-Sep	20-Sep	26-Sep	19-Sep	25-Sep
40	1-Oct	7-Oct	30-Sep	6-Oct	28-Sep	4-Oct	27-Sep	3-Oct	26-Sep	2-Oct
41	8-Oct	14-Oct	7-Oct	13-Oct	5-Oct	11-Oct	4-Oct	10-Oct	3-Oct	9-Oct

APPENDIX B:
RELEASE SITE DISTRIBUTION OF RECOVERED MARKS

Appendix B1.–Unweighted number of otolith-marked chum salmon recovered annually in drift gillnet fisheries by hatchery release site and operator, 2006–2010.

		SSRAA						NSRAA[a]			DIPAC					
		Summer-run				Fall-run										
District	Year	Anita Bay	Kendrick Bay	Nakat Inlet	Neets Bay	Nakat Inlet	Neets Bay	Deep Inlet	Hidden Falls	Takatz Bay	Amalga Harbor	Boat Harbor	Gastineau Channel	Limestone Inlet	Sheep Creek	Total
101-11	2006	13	201	521	145	108	47	0	0	0	0	0	0	0	0	1,035
101-11	2007	21	159	568	254	459	11	0	0	0	2	0	0	0	0	1,474
101-11	2008	10	127	570	113	367	67	0	0	1	1	0	1	0	0	1,257
101-11	2009	22	100	613	127	187	52	0	1	1	3	1	4	1	0	1,111
101-11	2010	36	120	277	194	267	100	0	1	0	1	0	0	0	0	996
106	2006	185	84	11	339	2	121	0	0	0	7	0	4	3	3	759
106	2007	259	117	2	429	1	50	0	1	0	6	1	7	4	0	877
106	2008	167	84	8	216	1	149	4	7	5	10	2	25	21	0	699
106	2009	296	59	1	337	0	297	4	70	38	57	23	62	24	0	1,268
106	2010	178	63	3	211	1	236	1	8	9	27	10	27	11	0	784
108	2006	287	13	3	62	0	3	0	2	0	5	0	5	3	10	393
108	2007	405	22	3	114	0	24	0	1	0	5	0	26	11	3	614
108	2008	242	39	1	33	0	30	1	5	4	11	4	61	17	0	448
108	2009	284	16	2	62	0	16	6	29	17	58	21	91	34	0	637
108	2010	84	11	1	33	0	5	1	8	9	16	5	13	5	0	192
	Total	2,488	1,215	2,489	2,669	1,488	1,208	17	132	84	209	68	327	135	16	12,544

[a] Additional marked fish not included in table: three released from Chilkat River (NSRAA) and one released from Port Armstrong (AKI) in the District 108 drift gillnet fishery in 2008.

Appendix B2.–Unweighted number of otolith-marked chum salmon recovered annually in purse seine fisheries by hatchery release site and operator, 2006–2010.

		SSRAA						NSRAA[a]			DIPAC				
		Summer-run				Fall-run									
District	Year	Anita Bay	Kendrick Bay	Nakat Inlet	Neets Bay	Nakat Inlet	Neets Bay	Deep Inlet	Hidden Falls	Takatz Bay	Amalga Harbor	Boat Harbor	Gastineau Channel	Limestone Inlet	Total
101	2006	13	259	62	242	1	9	0	0	0	0	0	0	0	586
101	2007	19	135	7	321	3	30	0	0	0	0	0	0	0	515
101	2008	8	49	28	125	4	22	0	0	0	0	0	2	0	238
101	2009	61	112	55	328	3	51	0	1	2	3	2	3	1	622
101	2010	64	127	18	319	7	97	0	0	1	1	0	0	0	634
102	2006	24	392	24	66	0	19	0	0	0	1	0	0	0	526
102	2007	30	798	6	135	1	38	1	0	2	2	0	1	0	1,014
102	2008	8	543	6	28	3	25	0	1	0	0	0	2	0	616
102	2009	49	556	12	140	0	25	4	9	10	8	3	8	3	828
102	2010	4	290	2	14	0	49	2	0	2	2	1	1	1	367
103	2007	4	16	1	30	1	2	0	0	0	0	0	0	0	54
103	2008	8	7	3	5	2	4	1	0	0	0	0	0	0	30
103	2009	0	3	1	11	0	5	4	0	0	1	0	0	0	25
103	2010	0	4	0	1	0	5	1	0	0	0	0	0	0	11
104	2006	11	45	23	63	0	4	0	0	0	1	0	0	0	147
104	2007	33	182	51	272	5	12	0	1	2	1	0	2	0	561
104	2008	5	12	3	23	6	10	1	1	0	0	0	0	0	61
104	2009	25	46	6	71	2	37	16	2	2	1	1	1	1	211
104	2010	3	6	0	14	0	4	5	0	2	1	0	0	0	35
105	2006	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
105	2007	0	0	0	0	0	0	0	0	0	0	0	0	0	0
105	2008	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
105	2009	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
105	2010	0	0	0	0	0	0	2	0	0	0	0	0	0	2
106	2006	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
106	2007	31	15	0	32	0	13	0	0	0	0	0	0	0	91
106	2008	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
106	2009	2	0	0	11	0	5	0	0	0	0	0	0	0	18
106	2010	1	0	0	0	0	0	0	0	0	0	0	0	0	1

–continued–

Appendix B2.–Page 2 of 2.

		SSRAA						NSRAA			DIPAC				
		Summer-run				Fall-run									
District	Year	Anita Bay	Kendrick Bay	Nakat Inlet	Neets Bay	Nakat Inlet	Neets Bay	Deep Inlet	Hidden Falls	Takatz Bay	Amalga Harbor	Boat Harbor	Gastineau Channel	Limestone Inlet	Total
107	2006	201	2	0	76	1	0	0	0	0	0	0	1	0	281
107	2007	83	3	1	245	5	7	0	0	1	0	0	1	0	346
107	2008	29	0	0	26	0	2	0	1	0	0	0	0	0	58
107	2009	285	7	0	284	0	34	1	1	2	1	1	1	0	618
107	2010	59	2	1	29	0	0	0	0	0	0	0	0	0	91
	Total	1,060	3,611	299	2,911	55	509	38	17	26	24	7	24	5	8,587

[a] Additional marked fish not included in table: one released from Bear Cove (NSRAA) and one released from Port Armstrong (AKI) were recovered in the District 104 purse seine fishery in 2010.

APPENDIX C:
SAMPLING EFFORT, RESULTS, AND CONTRIBUTION OF MARKED AND UNMARKED CHUM SALMON TO THE COMMERCIAL NET FISHERIES

Appendix C1.–Weekly chum salmon catch, otolith sample size (*n*), and estimated proportion, 95% credible interval, and contribution of marked summer- and fall-run hatchery fish and unmarked fish in the commercial drift gillnet fisheries in Districts 101–108, 2006–2010. Boldfaced values were imputed.

					Otolith-marked Summer-run Chum Salmon				Otolith-marked Fall-run Chum Salmon				Unmarked Chum Salmon			
						95% CI				95% CI				95% CI		
Year	District	Week	Total Harvest	*n*	Estimated Proportion	Lower	Upper	Estimated Contribution	Estimated Proportion	Lower	Upper	Estimated Contribution	Estimated Proportion	Lower	Upper	Estimated Contribution
2006	101-11	25	2,681	184	58%	50.4%	64.6%	1,544	1%	0.0%	2.2%	17	42%	34.7%	48.8%	1,118
2006	101-11	26	11,187	100	84%	76.0%	90.3%	9,370	0%	0.0%	1.5%	22	17%	10.1%	24.3%	1,861
2006	101-11	27	31,224	97	85%	77.7%	91.6%	26,636	0%	0.0%	1.5%	64	15%	8.9%	22.7%	4,728
2006	101-11	28	41,456	94	91%	84.7%	96.0%	37,798	0%	0.0%	1.6%	88	9%	4.5%	16.0%	3,924
2006	101-11	29	36,420	187	86%	81.3%	91.0%	31,500	1%	0.0%	2.2%	233	13%	8.8%	18.4%	4,822
2006	101-11	30	25,377	137	87%	81.4%	92.4%	22,178	1%	0.0%	2.9%	221	12%	7.4%	18.1%	3,111
2006	101-11	31	33,972	137	80%	73.1%	86.3%	27,223	2%	0.2%	4.2%	541	19%	12.7%	25.5%	6,338
2006	101-11	32	15,518	160	64%	56.8%	71.5%	9,980	4%	1.5%	7.3%	597	32%	25.0%	39.2%	4,953
2006	101-11	33	7,596	48	29%	17.7%	42.9%	2,238	2%	0.1%	8.2%	186	66%	53.0%	78.4%	5,033
2006	101-11	34	7,861	45	25%	13.6%	38.2%	1,952	18%	8.3%	29.9%	1,395	56%	42.0%	69.5%	4,399
2006	101-11	35	21,326	71	0%	0.0%	2.9%	104	25%	16.0%	35.8%	5,376	73%	62.1%	82.1%	15,490
2006	101-11	36	13,077	34	1%	0.0%	5.9%	131	55%	38.2%	70.4%	7,131	43%	27.9%	59.0%	5,638
2006	101-11	37	12,695	91	1%	0.1%	4.7%	187	57%	46.4%	66.5%	7,187	41%	31.8%	51.5%	5,262
2006	101-11	38	6,548	67	1%	0.0%	3.0%	34	68%	56.3%	78.2%	4,435	31%	21.3%	42.7%	2,061
2006	101-11	Total	266,938	1,452	64%	62.1%	65.9	170,874	10.3%	8.9%	11.7%	27,494	26%	23.5%	28.0%	68,740
2007	101-11	25	5,918	131	83%	76.3%	89.0%	4,919	0%	0.0%	0.8%	5	16%	10.9%	22.6%	965
2007	101-11	26	7,390	103	92%	86.2%	96.4%	6,805	0%	0.0%	1.0%	8	9%	4.3%	14.1%	634
2007	101-11	27	14,866	128	86%	79.3%	91.3%	12,761	0%	0.0%	0.8%	13	14%	8.8%	19.9%	2,070
2007	101-11	28	36,216	105	95%	90.2%	98.3%	34,436	0%	0.0%	1.0%	39	6%	2.6%	10.8%	2,179
2007	101-11	29	20,811	140	96%	91.7%	98.3%	19,895	0%	0.0%	0.8%	17	5%	2.4%	9.3%	1,107
2007	101-11	30	35,057	132	89%	82.6%	93.4%	31,037	1%	0.0%	2.9%	295	11%	6.5%	16.3%	3,822
2007	101-11	31	27,216	117	88%	81.5%	93.1%	23,928	0%	0.0%	0.9%	27	12%	7.2%	18.1%	3,295
2007	101-11	32	16,517	174	84%	78.0%	88.9%	13,848	6%	3.3%	10.4%	1,053	10%	6.3%	14.7%	1,666
2007	101-11	33	6,041	94	62%	51.7%	71.2%	3,725	20%	12.8%	28.9%	1,224	17%	10.9%	24.7%	1,041
2007	101-11	34	6,958	94	32%	23.0%	41.7%	2,227	37%	27.8%	47.2%	2,590	28%	20.0%	36.4%	1,938
2007	101-11	35	14,439	90	0%	0.0%	1.7%	34	74%	64.8%	82.7%	10,726	23%	15.9%	31.7%	3,374
2007	101-11	36	19,749	127	2%	0.2%	4.6%	343	89%	82.8%	93.7%	17,542	10%	5.6%	15.2%	1,956
2007	101-11	37	11,259	95	0%	0.0%	1.6%	25	90%	83.7%	95.4%	10,169	10%	5.3%	16.2%	1,132
2007	101-11	38	6,433	71	0%	0.0%	2.2%	19	94%	87.6%	98.3%	6,051	7%	2.8%	13.3%	462
2007	101-11	39	4,084	84	0%	0.0%	1.8%	10	84%	75.9%	91.2%	3,443	15%	8.8%	22.5%	613
2007	101-11	Total	232,954	1,685	66%	64.6%	67.6%	154,012	23%	21.9%	23.8%	53,204	11%	9.7%	12.8%	26,254

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					Otolith-marked Summer-run Chum Salmon				Otolith-marked Fall-run Chum Salmon				Unmarked Chum Salmon			
						95% CI				95% CI				95% CI		
Year	District	Week	Total Harvest	*n*	Estimated Proportion	Lower	Upper	Estimated Contribution	Estimated Proportion	Lower	Upper	Estimated Contribution	Estimated Proportion	Lower	Upper	Estimated Contribution
2008	101-11	25	4,787	110	74%	65.0%	81.3%	3,520	1%	0.1%	3.8%	55	25%	17.9%	33.3%	1,208
2008	101-11	26	10,575	93	91%	84.7%	96.0%	9,643	1%	0.1%	4.5%	143	9%	4.3%	15.2%	952
2008	101-11	27	19,593	129	88%	82.2%	93.2%	17,287	1%	0.0%	3.2%	192	12%	6.9%	17.5%	2,294
2008	101-11	28	50,540	132	94%	89.1%	97.2%	47,397	0%	0.0%	1.4%	105	7%	3.6%	12.0%	3,657
2008	101-11	29	45,314	117	92%	86.7%	96.3%	41,751	0%	0.0%	1.5%	106	9%	4.6%	14.4%	4,023
2008	101-11	30	27,533	55	92%	84.1%	97.7%	25,430	0%	0.0%	3.2%	136	10%	3.8%	17.9%	2,658
2008	101-11	31	14,173	35	85%	72.0%	94.7%	12,081	1%	0.0%	5.0%	109	16%	7.1%	28.1%	2,291
2008	101-11	32	11,624	84	74%	63.9%	82.4%	8,565	4%	0.9%	8.8%	448	23%	14.8%	31.6%	2,630
2008	101-11	33	8,009	72	56%	44.1%	66.7%	4,448	11%	5.2%	19.5%	907	32%	22.4%	42.5%	2,566
2008	101-11	34	7,028	81	26%	17.2%	36.1%	1,833	44%	33.7%	55.0%	3,105	29%	20.1%	38.5%	2,029
2008	101-11	35	13,502	54	4%	0.6%	10.8%	560	62%	49.2%	74.4%	8,399	32%	21.0%	43.5%	4,276
2008	101-11	36	11,270	96	3%	0.8%	7.8%	381	66%	56.5%	75.2%	7,460	29%	21.2%	38.5%	3,324
2008	101-11	37	7,135	72	2%	0.1%	5.7%	124	66%	54.9%	76.4%	4,712	31%	21.4%	41.2%	2,199
2008	101-11	38	6,129	76	2%	0.1%	5.4%	101	60%	48.9%	70.6%	3,679	36%	26.6%	46.7%	2,228
2008	101-11	39	2,612	97	0%	0.0%	1.8%	7	57%	47.5%	66.9%	1,498	40%	31.4%	49.8%	1,056
2008	101-11	Total	239,824	1,303	72%	70.3%	74.1%	173,128	13%	11.8%	14.1%	31,054	16%	13.6%	17.6%	37,392
2009	101-11	26	26,285	170	85%	78.8%	89.6%	22,229	0%	0.0%	1.3%	62	16%	10.8%	21.5%	4,143
2009	101-11	27	58,745	111	76%	68.2%	83.8%	44,891	1%	0.1%	3.9%	726	23%	15.8%	31.0%	13,495
2009	101-11	28	53,241	104	84%	76.9%	90.7%	44,931	0%	0.0%	2.1%	203	16%	9.9%	23.6%	8,589
2009	101-11	29	36,747	198	85%	80.0%	89.8%	31,321	0%	0.0%	1.1%	74	15%	10.5%	20.3%	5,535
2009	101-11	30	29,370	163	83%	77.2%	88.6%	24,465	1%	0.2%	3.7%	426	16%	10.7%	21.7%	4,647
2009	101-11	31	21,436	113	85%	77.6%	90.7%	18,167	0%	0.0%	1.9%	75	16%	9.8%	22.8%	3,376
2009	101-11	32	8,771	120	73%	65.0%	80.7%	6,421	0%	0.0%	1.8%	29	27%	19.5%	35.1%	2,364
2009	101-11	33	6,640	23	77%	59.0%	91.5%	5,143	5%	0.4%	16.7%	363	20%	7.6%	36.8%	1,333
2009	101-11	34	3,158	82	34%	24.5%	44.8%	1,082	11%	5.4%	18.6%	350	54%	43.4%	64.3%	1,704
2009	101-11	35	5,011	141	9%	5.2%	14.7%	472	29%	22.4%	37.2%	1,478	60%	52.2%	68.1%	3,020
2009	101-11	36	3,779	152	3%	1.2%	6.9%	132	37%	29.7%	44.8%	1,402	59%	50.8%	66.2%	2,214
2009	101-11	37	5,316	135	1%	0.1%	3.2%	52	42%	34.3%	50.7%	2,254	56%	47.4%	63.8%	2,960
2009	101-11	38	3,437	118	2%	0.3%	5.1%	68	37%	28.4%	45.5%	1,264	60%	51.4%	68.6%	2,068
2009	101-11	39	1,042	60	1%	0.0%	3.3%	6	40%	28.8%	52.8%	422	57%	44.7%	68.6%	592
2009	101-11	Total	262,978	1,690	76%	73.2%	78.4%	199,378	4%	2.8%	4.1%	9,129	21%	18.7%	23.9%	56,039

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					Otolith-marked Summer-run Chum Salmon				Otolith-marked Fall-run Chum Salmon				Unmarked Chum Salmon			
						95% CI				95% CI				95% CI		
Year	District	Week	Total Harvest	*n*	Estimated Proportion	Lower	Upper	Estimated Contribution	Estimated Proportion	Lower	Upper	Estimated Contribution	Estimated Proportion	Lower	Upper	Estimated Contribution
2010	101-11	26	26,634	132	84%	77.2%	89.6%	22,336	0%	0.0%	1.6%	71	17%	11.4%	23.8%	4,568
2010	101-11	27	50,316	96	86%	78.6%	92.2%	43,337	0%	0.0%	2.1%	184	15%	9.2%	22.9%	7,757
2010	101-11	28	84,400	96	86%	78.6%	92.2%	72,693	0%	0.0%	2.1%	309	15%	9.2%	22.9%	13,012
2010	101-11	29	39,065	84	77%	67.6%	85.3%	30,111	0%	0.0%	2.4%	163	24%	15.8%	33.0%	9,315
2010	101-11	30	31,242	82	72%	61.6%	80.8%	22,396	0%	0.0%	2.5%	134	29%	20.0%	38.4%	8,984
2010	101-11	31	32,703	118	73%	64.4%	80.3%	23,772	1%	0.1%	3.7%	372	27%	19.6%	34.9%	8,799
2010	101-11	32	11,570	118	57%	47.7%	65.4%	6,558	4%	1.6%	8.8%	519	39%	30.5%	47.3%	4,478
2010	101-11	33	6,055	154	35%	27.8%	42.8%	2,124	9%	4.7%	13.5%	520	55%	47.6%	62.8%	3,348
2010	101-11	34	6,257	94	21%	13.8%	30.2%	1,339	23%	15.5%	32.4%	1,466	54%	43.9%	63.0%	3,349
2010	101-11	35	7,828	71	0%	0.0%	2.5%	29	47%	36.1%	58.9%	3,714	50%	39.3%	61.0%	3,927
2010	101-11	36	12,002	94	0%	0.0%	1.9%	34	60%	50.2%	69.7%	7,216	39%	29.8%	48.5%	4,679
2010	101-11	37	11,092	128	1%	0.0%	3.3%	109	47%	38.1%	55.2%	5,173	51%	42.9%	59.5%	5,678
2010	101-11	38	4,741	140	0%	0.0%	1.3%	9	57%	48.6%	64.9%	2,694	42%	34.6%	50.4%	2,009
2010	101-11	39	1,105	120	0%	0.0%	1.5%	2	63%	54.2%	71.2%	695	37%	28.5%	45.0%	404
2010	101-11	40	77	28	1%	0.0%	6.2%	1	66%	48.1%	81.5%	51	33%	18.9%	48.5%	25
2010	101-11	Total	325,087	1,555	69%	66.5%	71.9%	224,852	7%	6.4%	7.9%	23,281	25%	22.0%	27.4%	80,332
2006	106	25	1,587	152	64%	56.0%	71.2%	1,012	3%	0.9%	5.9%	45	34%	26.3%	41.1%	532
2006	106	26	13,280	129	85%	78.5%	90.6%	11,295	0%	0.0%	1.7%	42	15%	9.6%	21.8%	2,018
2006	106	27	51,705	372	85%	81.7%	88.8%	44,159	0%	0.0%	1.2%	196	14%	11.1%	18.1%	7,454
2006	106	28	41,120	354	85%	81.4%	88.7%	35,046	1%	0.1%	1.7%	278	14%	10.9%	18.1%	5,882
2006	106	29	67,274	267	86%	82.1%	90.2%	58,128	2%	0.5%	3.4%	1,098	12%	8.6%	16.4%	8,242
2006	106	30	20,614	96	89%	82.4%	94.6%	18,396	1%	0.1%	4.5%	293	10%	5.1%	16.8%	2,101
2006	106	31	11,027	42	83%	70.2%	92.3%	9,121	3%	0.2%	9.6%	341	16%	6.8%	27.4%	1,729
2006	106	32	9,120	127	56%	47.3%	64.4%	5,100	6%	2.4%	10.2%	516	38%	30.3%	46.8%	3,501
2006	106	33	6,436	134	40%	31.6%	48.0%	2,555	17%	11.2%	23.6%	1,091	43%	34.8%	51.3%	2,766
2006	106	34	7,305	82	20%	12.2%	29.2%	1,461	25%	16.4%	34.5%	1,817	54%	43.3%	64.3%	3,936
2006	106	35	5,930	84	3%	0.6%	7.6%	182	29%	19.9%	38.7%	1,711	66%	56.2%	75.8%	3,934
2006	106	36-38	31,984	122	0%	0.0%	2.3%	160	36%	27.9%	44.6%	11,519	62%	53.6%	70.4%	19,894
2006	106	Total	267,382	1,961	70%	68.2%	71.4%	186,615	7.1%	5.9%	8.3%	18,947	23%	21.3%	25.1%	61,989

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					Otolith-marked Summer-run Chum Salmon				Otolith-marked Fall-run Chum Salmon				Unmarked Chum Salmon			
						95% CI				95% CI				95% CI		
Year	District	Week	Total Harvest	*n*	Estimated Proportion	Lower	Upper	Estimated Contribution	Estimated Proportion	Lower	Upper	Estimated Contribution	Estimated Proportion	Lower	Upper	Estimated Contribution
2007	106	25	13,826	64	100%	98.0%	100.0%	13,793	0%	0.0%	1.8%	28	1%	0.0%	3.5%	89
2007	106	26	21,648	37	97%	89.6%	99.9%	20,981	0%	0.0%	3.1%	75	4%	0.2%	11.3%	791
2007	106	27	17,000	87	98%	93.4%	99.7%	16,581	0%	0.0%	1.3%	26	3%	0.4%	7.0%	463
2007	106	28	44,761	192	96%	92.5%	98.1%	42,865	0%	0.0%	0.6%	31	4%	2.0%	7.6%	1,944
2007	106	29	52,660	141	95%	90.8%	97.9%	49,997	0%	0.0%	0.8%	49	5%	2.2%	9.4%	2,734
2007	106	30	33,844	207	89%	84.2%	92.7%	30,067	1%	0.0%	1.9%	184	11%	6.9%	15.3%	3,632
2007	106	31	9,158	48	98%	91.9%	99.9%	8,940	2%	0.1%	7.9%	210	1%	0.0%	4.6%	78
2007	106	32	7,721	53	66%	53.0%	78.0%	5,100	0%	0.0%	2.2%	19	34%	21.8%	46.4%	2,589
2007	106	33	7,288	50	44%	30.9%	58.0%	3,223	8%	2.3%	16.8%	587	47%	33.7%	60.5%	3,426
2007	106	34	16,612	134	22%	15.3%	29.1%	3,623	15%	9.4%	21.3%	2,472	63%	54.6%	70.7%	10,438
2007	106	35	20,744	53	12%	4.7%	21.6%	2,454	32%	20.0%	44.4%	6,548	55%	42.2%	68.2%	11,485
2007	106	36	21,001	0	**8%**	**4.8%**	**19.3%**	**1,750**	**35%**	**24.0%**	**47.2%**	**7,297**	**57%**	**42.4%**	**71.7%**	**11,954**
2007	106	37	16,652	0	**5%**	**0.0%**	**14.5%**	**766**	**50%**	**38.1%**	**67.6%**	**8,267**	**46%**	**31.8%**	**61.0%**	**7,619**
2007	106	38	10,108	0	**2%**	**0.0%**	**13.4%**	**241**	**66%**	**43.3%**	**87.6%**	**6,653**	**32%**	**15.7%**	**55.5%**	**3,214**
2007	106	39	3,868	12	**3%**	**0.0%**	**15.5%**	**101**	**61%**	**34.9%**	**84.4%**	**2,369**	**32%**	**11.1%**	**57.3%**	**1,226**
2007	106	Total	296,891	1,078	68%	66.0%	69.1%	200,484	12%	10.2%	13.2%	34,814	21%	18.4%	23.1%	61,681
2008	106	25	438	11	80%	54.4%	96.8%	353	2%	0.0%	12.9%	8	21%	4.4%	45.5%	91
2008	106	26	3,243	45	88%	77.8%	95.9%	2,869	1%	0.0%	3.6%	17	12%	4.6%	22.8%	395
2008	106	27	11,639	101	94%	88.4%	97.6%	10,923	0%	0.0%	1.7%	28	7%	2.6%	12.0%	760
2008	106	28	11,622	136	96%	92.4%	98.7%	11,175	0%	0.0%	1.2%	21	4%	1.5%	8.0%	483
2008	106	29	18,449	86	90%	83.5%	95.7%	16,690	0%	0.0%	1.9%	52	10%	4.6%	16.9%	1,829
2008	106	30	12,680	124	83%	75.9%	89.0%	10,516	1%	0.0%	3.3%	126	16%	10.5%	23.4%	2,085
2008	106	31	4,251	40	85%	72.1%	93.8%	3,596	3%	0.1%	9.7%	126	14%	5.1%	25.3%	579
2008	106	32	5,380	51	67%	53.2%	78.6%	3,579	0%	0.0%	3.2%	25	33%	21.5%	46.5%	1,796
2008	106	33	2,285	11	20%	3.4%	46.0%	453	2%	0.0%	12.9%	44	74%	48.4%	92.9%	1,694
2008	106	34	2,345	52	31%	19.4%	44.0%	727	13%	5.8%	23.6%	315	55%	41.7%	67.8%	1,288
2008	106	35	2,868	48	9%	2.7%	18.2%	253	18%	9.1%	30.2%	530	71%	58.1%	82.8%	2,044
2008	106	36	7,337	72	2%	0.1%	5.8%	130	48%	36.4%	58.9%	3,493	50%	38.3%	60.8%	3,636
2008	106	37	11,430	152	1%	0.2%	3.9%	171	44%	35.9%	51.5%	4,990	54%	46.4%	62.1%	6,209
2008	106	38	5,334	70	0%	0.0%	2.6%	22	42%	30.9%	53.5%	2,240	56%	45.0%	67.6%	3,012
2008	106	Total	99,301	999	62%	60.0%	63.8%	61,456	12%	10.6%	13.6%	12,015	26%	23.7%	28.4%	25,900

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					Otolith-marked Summer-run Chum Salmon				Otolith-marked Fall-run Chum Salmon				Unmarked Chum Salmon			
						95% CI				95% CI				95% CI		
Year	District	Week	Total Harvest	*n*	Estimated Proportion	Lower	Upper	Estimated Contribution	Estimated Proportion	Lower	Upper	Estimated Contribution	Estimated Proportion	Lower	Upper	Estimated Contribution
2009	106	25	6,983	135	88%	82.1%	92.9%	6,146	0%	0.0%	1.7%	23	12%	7.5%	18.4%	869
2009	106	26	22,276	192	92%	87.3%	95.1%	20,396	0%	0.0%	1.2%	51	9%	5.3%	13.2%	1,965
2009	106	27	72,691	158	87%	80.9%	91.4%	62,948	2%	0.2%	3.9%	1,108	13%	7.9%	18.0%	9,107
2009	106	28	51,983	95	85%	77.3%	91.5%	44,229	0%	0.0%	2.4%	238	15%	9.1%	23.2%	8,035
2009	106	29	20,773	156	86%	79.9%	90.8%	17,820	0%	0.0%	1.5%	58	15%	9.5%	20.4%	3,025
2009	106	30	9,065	143	89%	83.9%	93.9%	8,102	0%	0.0%	1.6%	28	11%	6.6%	16.6%	1,005
2009	106	31	12,950	70	87%	78.1%	93.7%	11,252	1%	0.0%	3.2%	80	14%	7.1%	22.6%	1,802
2009	106	32	11,389	87	65%	55.2%	75.0%	7,452	3%	0.4%	7.0%	311	32%	23.1%	42.1%	3,671
2009	106	33	8,919	152	32%	24.5%	39.2%	2,821	18%	12.7%	24.9%	1,642	50%	41.8%	57.4%	4,423
2009	106	34	10,371	164	17%	11.3%	22.6%	1,717	28%	21.9%	35.6%	2,956	54%	46.8%	61.8%	5,640
2009	106	35	11,110	82	3%	0.4%	7.1%	300	38%	28.4%	48.9%	4,267	57%	46.9%	67.6%	6,378
2009	106	36	14,303	55	2%	0.1%	7.4%	317	44%	31.8%	57.1%	6,331	51%	38.8%	64.0%	7,360
2009	106	37	16,194	119	0%	0.0%	1.4%	31	42%	32.9%	50.4%	6,724	57%	48.4%	65.8%	9,265
2009	106	38	13,736	148	0%	0.0%	1.1%	21	45%	37.6%	53.5%	6,248	54%	45.6%	61.4%	7,353
2009	106	39	2,496	94	0%	0.0%	1.7%	6	45%	35.3%	55.0%	1,124	53%	43.6%	63.2%	1,334
2009	106	Total	285,239	1,850	64%	62.3%	66.4%	183,559	11%	9.8%	12.1%	31,187	25%	22.7%	27.2%	71,231
2010	106	25	351	21	80%	61.1%	93.6%	281	2%	0.0%	10.1%	7	22%	7.9%	40.2%	77
2010	106	26	3,414	54	81%	69.8%	90.2%	2,768	1%	0.0%	4.4%	30	20%	10.5%	30.9%	672
2010	106	27	7,530	131	88%	82.4%	93.2%	6,653	0%	0.0%	1.9%	29	12%	7.1%	18.1%	909
2010	106	28	9,816	112	88%	81.6%	93.4%	8,655	0%	0.0%	2.2%	43	12%	7.0%	18.9%	1,210
2010	106	29	10,335	70	90%	81.6%	95.6%	9,263	1%	0.0%	3.4%	72	11%	5.1%	19.3%	1,156
2010	106	30	13,496	72	84%	75.3%	91.7%	11,391	2%	0.1%	6.1%	269	15%	7.8%	23.8%	2,013
2010	106	31	10,184	104	55%	45.2%	64.1%	5,574	1%	0.1%	4.3%	143	44%	35.0%	53.8%	4,510
2010	106	32	7,272	141	33%	25.9%	41.3%	2,426	4%	1.3%	7.5%	277	63%	54.8%	70.5%	4,570
2010	106	33	5,835	160	20%	14.3%	26.6%	1,171	8%	4.6%	12.9%	482	72%	64.3%	78.2%	4,173
2010	106	34	6,233	154	6%	2.8%	10.2%	371	12%	7.7%	17.9%	771	81%	74.8%	87.0%	5,067
2010	106	35	3,858	142	4%	1.7%	8.2%	168	22%	16.0%	29.4%	861	73%	65.3%	79.7%	2,809
2010	106	36	7,088	130	1%	0.0%	3.1%	65	33%	24.9%	40.7%	2,307	66%	57.5%	73.6%	4,664
2010	106	37	8,611	84	0%	0.0%	1.8%	21	37%	27.3%	47.4%	3,193	61%	51.1%	71.4%	5,295
2010	106	38	2,898	167	0%	0.0%	0.9%	4	42%	34.6%	49.4%	1,214	57%	49.8%	64.7%	1,662
2010	106	39	847	48	0%	0.0%	3.1%	4	24%	13.7%	36.6%	205	74%	60.8%	84.8%	624
2010	106	40	68	23	1%	0.0%	6.5%	1	32%	16.0%	50.4%	22	63%	44.3%	80.7%	43
2010	106	Total	97,836	1,613	50%	47.9%	51.9%	48,814	10%	8.8%	11.5%	9,925	40%	38.0%	42.6%	39,452

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					Otolith-marked Summer-run Chum Salmon				Otolith-marked Fall-run Chum Salmon				Unmarked Chum Salmon			
						95% CI				95% CI				95% CI		
Year	District	Week	Total Harvest	*n*	Estimated Proportion	Lower	Upper	Estimated Contribution	Estimated Proportion	Lower	Upper	Estimated Contribution	Estimated Proportion	Lower	Upper	Estimated Contribution
2006	108	24-25	299	0	**83%**	**72.7%**	**94.7%**	**250**	**12%**	**5.2%**	**24.6%**	**37**	**4%**	**2.0%**	**8.2%**	**13**
2006	108	26	1,596	0	**90%**	**79.4%**	**97.2%**	**1,433**	**4%**	**1.3%**	**10.7%**	**66**	**6%**	**3.0%**	**11.1%**	**97**
2006	108	27	27,000	48	90%	80.5%	96.5%	24,300	0%	0.0%	2.1%	67	10%	3.4%	19.4%	2,685
2006	108	28	47,064	0	**93%**	**82.9%**	**98.2%**	**43,594**	**0%**	**0.0%**	**2.7%**	**0**	**11%**	**6.5%**	**18.9%**	**5,396**
2006	108	29	81,528	135	74%	66.3%	80.8%	60,235	0%	0.0%	0.9%	84	26%	19.1%	33.7%	21,273
2006	108	30	75,950	184	82%	76.0%	87.0%	62,112	0%	0.0%	0.7%	59	18%	13.0%	24.0%	13,825
2006	108	31	74,160	96	64%	54.0%	72.8%	47,188	0%	0.0%	1.2%	104	36%	27.2%	46.0%	26,944
2006	108	32	21,510	46	59%	45.3%	72.4%	12,735	5%	1.2%	12.1%	1,128	35%	22.2%	48.3%	7,452
2006	108	33	8,171	26	31%	16.3%	49.0%	2,567	0%	0.0%	3.2%	31	68%	50.9%	83.6%	5,591
2006	108	34	1,546	0	**41%**	**21.8%**	**68.4%**	**627**	**20%**	**8.7%**	**31.2%**	**317**	**39%**	**21.5%**	**54.9%**	**602**
2006	108	35	401	0	**31%**	**16.9%**	**54.4%**	**124**	**26%**	**12.7%**	**41.3%**	**104**	**43%**	**26.7%**	**61.3%**	**173**
2006	108	36	1,903	0	**23%**	**13.0%**	**41.4%**	**431**	**31%**	**16.6%**	**49.8%**	**585**	**47%**	**31.2%**	**67.9%**	**887**
2006	108	37	1,139	0	**16%**	**9.9%**	**36.6%**	**182**	**35%**	**18.6%**	**50.7%**	**400**	**49%**	**35.4%**	**72.1%**	**557**
2006	108	38	1,370	0	**11%**	**7.5%**	**19.3%**	**149**	**39%**	**24.3%**	**58.9%**	**539**	**50%**	**38.5%**	**75.8%**	**682**
2006	108	39-40	182	0	**7%**	**5.6%**	**15.6%**	**13**	**44%**	**27.8%**	**63.7%**	**79**	**49%**	**37.9%**	**71.4%**	**90**
2006	108	Total	343,819	535	74%	71.1%	77.8%	255,938	1%	0.0%	2.4%	3,600	25%	21.8%	28.3%	86,266
2007	108	24-25	318	71	97%	91.8%	99.5%	308	0%	0.0%	1.2%	0	4%	0.9%	9.3%	13
2007	108	26	4,806	42	99%	95.8%	100.0%	4,775	0%	0.0%	1.9%	9	2%	0.1%	7.8%	106
2007	108	27	9,329	66	88%	78.9%	94.3%	8,180	0%	0.0%	1.2%	11	13%	6.0%	21.0%	1,166
2007	108	28	27,616	140	89%	83.6%	93.7%	24,628	0%	0.0%	0.6%	16	11%	6.5%	16.5%	3,028
2007	108	29	34,016	72	87%	78.9%	93.9%	29,706	0%	0.0%	1.1%	37	13%	6.4%	21.0%	4,361
2007	108	30	31,177	73	75%	65.0%	84.4%	23,501	0%	0.0%	1.1%	34	24%	15.3%	33.9%	7,475
2007	108	31	36,304	65	98%	93.7%	99.9%	35,601	0%	0.0%	1.3%	44	3%	0.4%	7.8%	1,050
2007	108	32	18,059	59	85%	74.6%	92.5%	15,277	0%	0.0%	1.4%	24	15%	7.8%	25.0%	2,775
2007	108	33	8,914	59	71%	59.4%	81.9%	6,357	3%	0.5%	9.3%	308	25%	15.0%	35.5%	2,186
2007	108	34-35	3,191	36	59%	43.0%	74.0%	1,882	13%	0.5%	41.6%	420	31%	18.0%	45.2%	980
2007	108	36	1,095	0	**42%**	**27.0%**	**63.1%**	**457**	**27%**	**9.3%**	**48.5%**	**297**	**31%**	**16.6%**	**46.0%**	**341**
2007	108	37	1,478	0	**34%**	**21.4%**	**57.0%**	**501**	**32%**	**16.6%**	**52.5%**	**476**	**34%**	**18.5%**	**47.9%**	**501**
2007	108	38	505	0	**27%**	**16.7%**	**40.1%**	**136**	**37%**	**21.3%**	**57.3%**	**186**	**36%**	**19.9%**	**54.7%**	**183**
2007	108	39-40	757	36	5%	0.7%	14.3%	38	54%	38.1%	69.5%	409	38%	24.0%	52.6%	288
2007	108	Total	177,565	719	85%	82.5%	88.0%	151,347	1%	0.7%	1.8%	2,270	14%	11.1%	16.5%	24,453

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					Otolith-marked Summer-run Chum Salmon				Otolith-marked Fall-run Chum Salmon				Unmarked Chum Salmon			
						95% CI				95% CI				95% CI		
Year	District	Week	Total Harvest	*n*	Estimated Proportion	Lower	Upper	Estimated Contribution	Estimated Proportion	Lower	Upper	Estimated Contribution	Estimated Proportion	Lower	Upper	Estimated Contribution
2008	108	24-26	954	40	97%	90.0%	99.9%	925	0%	0.0%	3.3%	4	5%	0.5%	12.3%	43
2008	108	27	2,905	45	89%	77.9%	96.0%	2,572	0%	0.0%	2.9%	10	12%	4.7%	22.8%	358
2008	108	28	7,328	108	79%	70.5%	85.8%	5,761	0%	0.0%	1.2%	11	22%	14.4%	29.6%	1,577
2008	108	29	18,848	231	79%	73.7%	84.1%	14,923	0%	0.0%	0.6%	14	21%	15.9%	26.3%	3,937
2008	108	30	14,113	71	82%	71.8%	89.6%	11,506	0%	0.0%	1.9%	33	19%	10.8%	28.3%	2,649
2008	108	31-33	34,310	12	67%	47.2%	83.4%	22,834	1%	0.0%	5.3%	224	33%	16.8%	51.1%	11,239
2008	108	34	669	0	**34%**	**21.1%**	**54.9%**	**227**	**22%**	**10.2%**	**34.4%**	**150**	**44%**	**33.1%**	**60.5%**	**292**
2008	108	35	548	0	**25%**	**16.2%**	**48.0%**	**137**	**26%**	**12.1%**	**38.1%**	**145**	**49%**	**39.8%**	**66.2%**	**266**
2008	108	36	444	0	**18%**	**12.2%**	**41.3%**	**78**	**29%**	**15.8%**	**41.1%**	**130**	**53%**	**47.2%**	**69.6%**	**235**
2008	108	37	1,175	43	3%	0.2%	9.9%	37	36%	22.9%	50.5%	424	58%	43.9%	71.8%	684
2008	108	38-40	580	36	1%	0.0%	5.7%	6	38%	23.0%	53.3%	218	58%	42.8%	73.1%	338
2008	108	Total	81,874	586	72%	64.0%	80.1%	59,006	2%	0.3%	3.0%	1,363	26%	18.9%	33.9%	21,618
2009	108	26	906	76	85%	76.6%	92.2%	773	1%	0.0%	4.9%	12	14%	6.9%	21.9%	123
2009	108	27	11,215	89	91%	84.0%	95.8%	10,180	0%	0.0%	0.7%	6	9%	4.3%	16.2%	1,056
2009	108	28	28,434	119	87%	80.7%	92.6%	24,806	0%	0.0%	0.5%	12	13%	7.5%	19.3%	3,657
2009	108	29	17,048	88	97%	93.3%	99.6%	16,606	0%	0.0%	0.7%	10	3%	0.5%	7.1%	488
2009	108	30	62,958	117	88%	81.4%	93.1%	55,322	1%	0.0%	3.2%	561	11%	6.4%	17.7%	7,176
2009	108	31	45,815	137	87%	81.5%	92.4%	40,068	0%	0.0%	0.4%	17	13%	7.7%	18.6%	5,788
2009	108	32	13,100	70	74%	63.5%	83.6%	9,720	0%	0.0%	0.8%	10	26%	16.4%	36.4%	3,373
2009	108	33	3,961	12	44%	19.0%	70.0%	1,726	0%	0.0%	4.6%	16	54%	28.4%	77.8%	2,121
2009	108	34	2,797	12	28%	8.3%	54.3%	787	0%	0.0%	4.6%	11	68%	42.3%	88.4%	1,893
2009	108	35	753	0	**24%**	**19.0%**	**37.6%**	**183**	**2%**	**0.0%**	**8.8%**	**19**	**73%**	**57.6%**	**87.0%**	**551**
2009	108	36	1,107	0	**15%**	**12.4%**	**27.2%**	**171**	**9%**	**3.6%**	**15.5%**	**101**	**75%**	**60.8%**	**93.4%**	**835**
2009	108	37	350	0	**9%**	**7.3%**	**18.5%**	**32**	**22%**	**15.8%**	**32.3%**	**76**	**69%**	**53.3%**	**85.6%**	**242**
2009	108	38	1,854	6	9%	0.0%	37.5%	171	44%	12.3%	78.4%	809	44%	14.2%	76.4%	814
2009	108	39-40	502	24	3%	0.0%	11.3%	13	44%	25.7%	63.6%	222	52%	33.2%	70.4%	261
2009	108	Total	190,800	750	84%	81.4%	86.9%	160,559	1%	0.3%	1.7%	1,883	15%	12.2%	17.6%	28,378

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					Otolith-marked Summer-run Chum Salmon				Otolith-marked Fall-run Chum Salmon				Unmarked Chum Salmon			
						95% CI				95% CI				95% CI		
Year	District	Week	Total Harvest	*n*	Estimated Proportion	Lower	Upper	Estimated Contribution	Estimated Proportion	Lower	Upper	Estimated Contribution	Estimated Proportion	Lower	Upper	Estimated Contribution
2010	108	26–27	2,413	42	63%	48.0%	76.1%	1,511	0%	0.0%	2.5%	7	38%	24.2%	52.2%	909
2010	108	28	2,094	96	64%	54.1%	73.0%	1,337	0%	0.0%	1.2%	3	36%	27.1%	46.0%	760
2010	108	29	4,883	80	65%	54.8%	75.2%	3,189	0%	0.0%	1.4%	8	35%	25.0%	45.4%	1,702
2010	108	30	19,067	36	28%	15.0%	42.8%	5,300	0%	0.0%	2.9%	64	72%	57.1%	84.9%	13,743
2010	108	31	17,667	20	25%	9.9%	44.9%	4,467	1%	0.0%	4.5%	94	74%	55.0%	89.8%	13,152
2010	108	32	2,388	58	31%	20.0%	43.1%	739	0%	0.0%	1.9%	5	69%	56.9%	79.9%	1,648
2010	108	33	870	47	15%	6.9%	26.7%	134	0%	0.0%	2.3%	2	84%	73.1%	92.9%	734
2010	108	34	437	37	9%	2.4%	19.8%	40	0%	0.0%	2.8%	1	90%	79.7%	97.4%	395
2010	108	35	303	16	3%	0.0%	14.4%	10	5%	0.2%	16.0%	15	91%	74.1%	99.0%	274
2010	108	36	324	28	9%	1.5%	20.6%	28	12%	3.4%	23.6%	37	78%	61.8%	90.5%	252
2010	108	37–40	558	8	6%	0.0%	25.2%	32	1%	0.0%	7.9%	5	93%	72.1%	99.9%	518
2010	108	Total	51,004	468	33%	24.7%	41.1%	16,785	1%	0.0%	1.6%	243	67%	58.7%	75.0%	34,088

Appendix C2.–Weekly chum salmon catch, otolith sample size (*n*), and estimated proportion, 95% credible interval, and contribution of marked summer- and fall-run hatchery fish and unmarked fish in the commercial purse seine fisheries in Districts 101–107, 2006–2010. Bold values were imputed.

					Otolith-marked Summer-run Chum Salmon				Otolith-marked Fall-run Chum Salmon				Unmarked Chum Salmon			
						95% CI				95% CI				95% CI		
Year	District	Week	Total Harvest	*n*	Estimated Proportion	Lower	Upper	Estimated Contribution	Estimated Proportion	Lower	Upper	Estimated Contribution	Estimated Proportion	Lower	Upper	Estimated Contribution
2006	101	27	12,149	87	62%	51.9%	71.8%	7,544	0%	0.0%	2.1%	42	38%	28.1%	47.8%	4,582
2006	101	28	53,662	94	77%	68.4%	85.0%	41,464	0%	0.0%	1.9%	172	23%	15.1%	31.6%	12,243
2006	101	29	52,262	182	89%	83.7%	92.8%	46,330	0%	0.0%	1.0%	91	11%	7.3%	16.4%	6,009
2006	101	30	32,414	173	82%	76.4%	87.6%	26,700	1%	0.0%	2.4%	237	17%	12.0%	23.0%	5,562
2006	101	31	35,487	125	80%	72.3%	86.2%	28,268	2%	0.3%	4.5%	617	19%	12.6%	26.0%	6,704
2006	101	32	12,069	47	64%	50.1%	76.4%	7,698	2%	0.1%	7.6%	287	34%	21.8%	47.4%	4,102
2006	101	33	1,449	12	32%	11.4%	56.7%	459	11%	1.8%	27.2%	161	52%	28.4%	74.8%	751
2006	101	34	477	47	25%	14.5%	38.3%	121	8%	2.3%	16.0%	37	65%	51.8%	77.5%	311
2006	101	Total	199,969	767	79%	76.2%	82.4%	158,584	1%	0.2%	1.4%	1,644	20%	17.0%	23.2%	40,264
2007	101	27	2,447	23	82%	64.5%	94.2%	2,002	1%	0.0%	4.7%	13	19%	6.5%	35.4%	456
2007	101	28	10,651	23	53%	33.0%	71.8%	5,601	1%	0.0%	4.7%	56	46%	27.3%	64.6%	4,864
2007	101	29	10,813	71	88%	80.1%	94.7%	9,558	0%	0.0%	1.6%	19	12%	5.6%	20.2%	1,292
2007	101	30	55,090	122	92%	86.1%	95.8%	50,452	0%	0.0%	0.9%	57	9%	4.4%	14.2%	4,778
2007	101	31	42,229	107	91%	85.4%	95.9%	38,571	1%	0.0%	3.6%	439	8%	3.7%	13.8%	3,394
2007	101	32	31,502	107	90%	84.2%	95.2%	28,481	1%	0.0%	3.6%	328	9%	4.4%	14.9%	2,818
2007	101	33	14,987	125	47%	38.7%	56.0%	7,091	10%	5.7%	16.2%	1,556	42%	33.7%	50.7%	6,307
2007	101	34	3,926	110	20%	13.4%	28.3%	799	11%	5.8%	17.3%	427	68%	59.2%	76.3%	2,672
2007	101	35	2,239	11	5%	0.0%	21.8%	111	49%	23.1%	75.4%	1,098	42%	18.4%	67.6%	939
2007	101	Total	173,884	699	82%	79.3%	84.8%	142,667	2%	1.4%	3.2%	3,994	16%	13.2%	18.5%	27,520
2008	101	28	4,029	71	82%	72.8%	90.1%	3,315	0%	0.0%	2.6%	17	18%	10.4%	27.8%	737
2008	101	29	4,027	39	61%	45.6%	75.1%	2,451	1%	0.0%	4.4%	29	39%	25.4%	54.4%	1,587
2008	101	30	1,892	24	69%	50.4%	85.2%	1,310	1%	0.0%	6.6%	21	32%	15.9%	50.0%	599
2008	101	31	8,239	47	65%	51.5%	77.9%	5,377	1%	0.0%	3.7%	50	35%	22.6%	48.7%	2,892
2008	101	32	3,578	77	57%	45.9%	67.6%	2,035	3%	0.4%	7.3%	101	41%	30.2%	51.6%	1,456
2008	101	33	12,315	86	27%	18.3%	36.7%	3,326	4%	0.9%	8.3%	448	69%	59.2%	78.3%	8,517
2008	101	34	15,828	101	13%	7.5%	20.5%	2,104	9%	4.2%	14.8%	1,388	77%	69.0%	84.9%	12,260
2008	101	35	17,825	48	1%	0.0%	5.6%	223	10%	3.5%	19.3%	1,780	85%	74.6%	93.6%	15,223
2008	101	36	4,488	24	6%	0.6%	18.3%	285	25%	11.4%	41.9%	1,122	69%	50.4%	84.4%	3,084
2008	101	Total	72,221	517	28%	25.3%	31.3%	20,423	7%	4.5%	9.3%	4,956	64%	60.2%	68.2%	46,354

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					Otolith-marked Summer-run Chum Salmon				Otolith-marked Fall-run Chum Salmon				Unmarked Chum Salmon			
						95% CI				95% CI				95% CI		
Year	District	Week	Total Harvest	*n*	Estimated Proportion	Lower	Upper	Estimated Contribution	Estimated Proportion	Lower	Upper	Estimated Contribution	Estimated Proportion	Lower	Upper	Estimated Contribution
2009	101	28	5,315	11	94%	76.9%	100.0%	5,013	2%	0.0%	10.9%	118	8%	0.2%	26.3%	408
2009	101	29	33,106	148	69%	61.8%	76.5%	22,979	0%	0.0%	1.6%	105	31%	23.5%	38.2%	10,141
2009	101	30	31,123	174	70%	63.0%	76.5%	21,771	1%	0.2%	3.4%	420	29%	22.5%	35.8%	9,010
2009	101	31	36,034	271	63%	57.6%	69.0%	22,845	4%	1.8%	6.2%	1,339	33%	27.5%	38.6%	11,872
2009	101	32	28,528	178	50%	42.7%	57.3%	14,264	1%	0.2%	3.4%	377	49%	41.6%	56.1%	13,932
2009	101	33	13,408	192	24%	18.4%	30.4%	3,238	6%	2.9%	9.2%	757	70%	63.4%	76.3%	9,390
2009	101	34	10,173	106	19%	12.4%	27.2%	1,961	6%	2.2%	10.3%	562	75%	66.3%	82.5%	7,616
2009	101	35	19,073	134	4%	1.5%	8.2%	804	16%	10.6%	22.5%	3,076	79%	71.3%	85.0%	14,984
2009	101	Total	176,760	1,214	53%	49.9%	55.1%	92,874	4%	2.9%	4.8%	6,755	44%	41.1%	46.4%	77,352
2010	101	28-29	62,465	144	71%	63.6%	78.2%	44,466	0%	0.0%	2.0%	301	29%	22.2%	36.8%	18,261
2010	101	30	43,921	137	65%	57.3%	73.1%	28,720	1%	0.0%	2.1%	222	35%	27.3%	43.0%	15,345
2010	101	31	74,606	266	65%	59.1%	70.5%	48,408	2%	0.8%	4.1%	1,561	33%	27.9%	39.2%	24,941
2010	101	32	43,109	245	49%	42.7%	55.1%	21,081	2%	0.6%	3.9%	807	49%	43.3%	55.7%	21,338
2010	101	33	33,371	230	14%	9.5%	18.3%	4,539	11%	7.2%	15.1%	3,610	75%	69.6%	80.6%	25,132
2010	101	34	55,983	88	8%	3.6%	14.9%	4,678	16%	9.7%	24.4%	9,190	74%	64.8%	82.5%	41,517
2010	101	35	71,047	209	3%	0.9%	5.1%	1,846	18%	13.5%	23.7%	13,019	79%	72.8%	83.7%	55,778
2010	101	36	20,145	65	2%	0.2%	6.8%	445	23%	14.1%	33.2%	4,628	73%	61.8%	82.5%	14,665
2010	101	Total	404,647	1,384	38%	36.0%	40.2%	154,182	8%	6.7%	9.8%	33,338	54%	51.1%	56.2%	216,978
2006	102	25-26	10,447	104	90%	83.9%	95.2%	9,430	0%	0.0%	1.8%	30	10%	4.9%	16.2%	1,029
2006	102	27	51,837	142	94%	89.9%	97.5%	48,867	0%	0.0%	1.3%	111	6%	2.6%	10.2%	3,018
2006	102	28	127,254	108	93%	88.0%	97.2%	118,849	0%	0.0%	1.7%	353	7%	2.8%	12.1%	8,558
2006	102	29-30	133,298	128	94%	88.8%	97.2%	124,827	0%	0.0%	1.5%	314	6%	2.9%	11.3%	8,607
2006	102	31	24,581	26	80%	63.6%	92.9%	19,763	1%	0.0%	6.0%	241	20%	7.4%	36.7%	4,897
2006	102	32	14,027	72	43%	31.9%	54.6%	6,041	3%	0.5%	7.7%	415	54%	42.7%	65.4%	7,591
2006	102	33	7,771	45	3%	0.1%	8.6%	194	3%	0.1%	8.3%	200	95%	87.0%	99.2%	7,375
2006	102	34	3,879	36	14%	5.0%	27.0%	549	8%	1.9%	17.5%	304	77%	62.6%	89.1%	2,997
2006	102	36	17,365	37	0%	0.0%	3.2%	62	10%	3.0%	20.4%	1,733	89%	76.7%	96.5%	15,369
2006	102	37	6,839	26	1%	0.0%	4.5%	35	23%	10.2%	38.4%	1,552	72%	54.4%	87.4%	4,958
2006	102	38-39	10,467	43	0%	0.0%	2.7%	32	5%	0.7%	12.1%	492	95%	86.4%	99.2%	9,909
2006	102	Total	407,765	767	81%	78.3%	82.9%	328,648	1%	0.7%	2.1%	5,745	18%	15.9%	20.6%	74,308

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					Otolith-marked Summer-run Chum Salmon				Otolith-marked Fall-run Chum Salmon				Unmarked Chum Salmon			
						95% CI				95% CI				95% CI		
Year	District	Week	Total Harvest	*n*	Estimated Proportion	Lower	Upper	Estimated Contribution	Estimated Proportion	Lower	Upper	Estimated Contribution	Estimated Proportion	Lower	Upper	Estimated Contribution
2007	102	25	6,402	94	97%	92.3%	99.3%	6,193	0%	0.0%	2.1%	25	3%	0.7%	7.8%	214
2007	102	26	76,350	165	98%	94.7%	99.3%	74,464	0%	0.0%	1.3%	179	3%	0.7%	5.4%	1,918
2007	102	27	51,095	105	99%	96.4%	100.0%	50,570	0%	0.0%	1.9%	181	1%	0.0%	3.8%	561
2007	102	28	143,385	292	97%	94.2%	98.3%	138,439	0%	0.0%	0.7%	195	3%	1.7%	5.9%	4,980
2007	102	29	44,367	65	100%	98.7%	#N/A	44,313	1%	0.0%	2.9%	240	0%	0.0%	2.0%	106
2007	102	30	63,952	129	93%	88.0%	96.7%	59,458	2%	0.3%	4.4%	1,099	6%	2.3%	10.1%	3,536
2007	102	31	16,523	48	92%	82.3%	97.6%	15,124	1%	0.0%	3.8%	115	9%	2.5%	17.8%	1,418
2007	102	32	18,546	84	77%	67.9%	85.6%	14,344	0%	0.0%	2.4%	80	23%	14.5%	32.1%	4,207
2007	102	33	28,192	112	24%	16.7%	32.5%	6,815	7%	3.1%	11.9%	1,923	69%	59.8%	76.8%	19,345
2007	102	34	20,722	120	12%	6.7%	18.1%	2,435	2%	0.3%	4.7%	381	86%	79.9%	92.0%	17,920
2007	102	35	28,107	83	3%	0.3%	6.8%	717	12%	6.4%	19.4%	3,400	84%	75.6%	91.1%	23,632
2007	102	37	15,827	96	0%	0.0%	1.2%	20	12%	6.3%	18.2%	1,830	87%	80.0%	93.1%	13,811
2007	102	38	2,794	36	0%	0.0%	3.1%	10	9%	2.9%	19.0%	260	88%	76.2%	96.4%	2,466
2007	102	Total	516,262	1,429	80%	78.9%	81.1%	412,902	2%	1.3%	2.5%	9,907	18%	17.0%	19.4%	94,115
2008	102	26	1,675	52	94%	86.3%	98.7%	1,575	1%	0.0%	3.6%	11	6%	1.4%	13.9%	102
2008	102	27	33,555	109	93%	87.0%	96.7%	31,065	1%	0.1%	3.8%	397	7%	2.8%	11.9%	2,206
2008	102	28	85,159	165	98%	94.7%	99.3%	83,043	0%	0.0%	1.3%	196	3%	0.7%	5.4%	2,159
2008	102	29	80,180	152	99%	96.3%	99.8%	79,071	1%	0.1%	2.8%	696	1%	0.0%	2.7%	628
2008	102	30	26,297	54	98%	92.9%	99.9%	25,761	1%	0.0%	3.5%	166	2%	0.1%	7.4%	577
2008	102	32	14,113	57	63%	50.3%	75.0%	8,907	4%	0.6%	9.2%	510	33%	21.9%	46.0%	4,716
2008	102	33	18,347	52	63%	50.0%	75.8%	11,634	2%	0.1%	7.2%	418	35%	22.5%	47.9%	6,366
2008	102	34	14,702	67	5%	1.0%	10.7%	680	6%	1.7%	11.9%	846	89%	80.9%	95.4%	13,123
2008	102	35	14,474	22	5%	0.2%	16.9%	724	1%	0.0%	7.0%	185	94%	82.2%	99.7%	13,671
2008	102	36	3,012	24	0%	0.0%	4.3%	14	16%	5.9%	30.1%	486	79%	60.6%	92.0%	2,366
2008	102	37	2,352	104	1%	0.0%	3.7%	25	10%	5.2%	16.2%	236	88%	81.5%	93.7%	2,076
2008	102	38	1,582	47	0%	0.0%	2.2%	4	6%	1.5%	13.5%	95	93%	84.5%	98.4%	1,474
2008	102	Total	295,448	905	82%	80.5%	83.6%	242,505	1%	0.7%	2.1%	4,242	17%	15.2%	18.3%	49,464

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					Otolith-marked Summer-run Chum Salmon				Otolith-marked Fall-run Chum Salmon				Unmarked Chum Salmon			
						95% CI				95% CI				95% CI		
Year	District	Week	Total Harvest	*n*	Estimated Proportion	Lower	Upper	Estimated Contribution	Estimated Proportion	Lower	Upper	Estimated Contribution	Estimated Proportion	Lower	Upper	Estimated Contribution
2009	102	26	22,566	178	85%	79.7%	90.1%	19,243	1%	0.0%	2.2%	153	14%	9.5%	19.7%	3,204
2009	102	27	119,029	176	92%	88.1%	95.9%	110,050	0%	0.0%	1.0%	174	8%	4.2%	11.9%	9,031
2009	102	28	90,445	188	86%	80.8%	90.6%	77,831	0%	0.0%	0.9%	124	14%	9.4%	19.2%	12,640
2009	102	29	52,577	83	97%	92.8%	99.6%	51,108	0%	0.0%	1.9%	154	3%	0.5%	7.4%	1,528
2009	102	30	50,873	81	87%	79.4%	93.6%	44,447	0%	0.0%	2.0%	152	13%	6.5%	20.7%	6,463
2009	102	31	30,673	130	73%	65.1%	80.2%	22,390	1%	0.0%	3.0%	279	26%	19.1%	34.1%	8,051
2009	102	32	5,433	15	16%	3.0%	36.9%	870	1%	0.0%	7.2%	60	83%	61.7%	96.3%	4,497
2009	102	33	20,577	151	36%	28.5%	43.7%	7,389	8%	4.1%	12.2%	1,572	56%	48.2%	63.9%	11,549
2009	102	34	7,238	56	40%	27.4%	52.5%	2,868	3%	0.5%	9.0%	250	57%	43.8%	69.1%	4,103
2009	102	35	18,897	59	3%	0.2%	7.8%	487	14%	6.6%	22.5%	2,552	82%	71.5%	90.6%	15,510
2009	102	Total	418,308	1,117	81%	78.5%	82.5%	336,683	1%	0.8%	1.8%	5,471	18%	16.3%	20.3%	76,574
2010	102	26	1,307	39	100%	98.6%	100.0%	1,305	1%	0.0%	4.5%	13	0%	0.0%	3.0%	4
2010	102	27	56,970	96	99%	96.1%	100.0%	56,348	0%	0.0%	2.3%	277	1%	0.0%	4.1%	669
2010	102	28	120,810	59	100%	99.1%	100.0%	120,711	1%	0.0%	3.4%	864	0%	0.0%	2.0%	264
2010	102	29-31	88,683	48	99%	95.5%	100.0%	87,577	1%	0.0%	2.6%	481	1%	0.0%	4.6%	1,189
2010	102	32	12,746	70	41%	30.2%	53.1%	5,280	3%	0.5%	7.2%	365	56%	44.1%	67.1%	7,103
2010	102	33	23,674	72	14%	7.0%	22.7%	3,294	1%	0.0%	2.9%	145	86%	77.2%	93.0%	20,366
2010	102	34	26,714	72	4%	0.9%	9.9%	1,123	4%	1.0%	8.7%	1,042	92%	84.2%	96.8%	24,461
2010	102	35	39,551	190	0%	0.0%	0.2%	6	8%	4.7%	11.9%	3,130	92%	87.2%	95.1%	36,206
2010	102	36	43,395	166	0%	0.0%	0.2%	8	10%	6.1%	14.7%	4,347	89%	84.0%	93.4%	38,672
2010	102	37	9,798	142	0%	0.0%	0.2%	2	5%	2.4%	9.2%	520	94%	90.0%	97.5%	9,241
2010	102	38	3,488	68	0%	0.0%	0.5%	2	3%	0.5%	7.3%	102	97%	91.8%	99.6%	3,381
2010	102	40	4,180	83	0%	0.0%	0.4%	2	1%	0.0%	2.6%	23	100%	98.9%	100.0%	4,175
2010	102	Total	431,316	1,105	64%	63.1%	64.8%	275,658	3%	1.7%	3.5%	11,309	34%	32.7%	34.9%	145,731
2007	103	31	20,829	36	37%	22.5%	52.0%	7,623	0%	0.0%	2.1%	52	63%	47.8%	77.4%	13,169
2007	103	32	83,096	89	29%	19.9%	38.2%	23,782	3%	0.6%	6.3%	2,235	68%	58.3%	77.1%	56,573
2007	103	33	64,967	99	8%	3.8%	14.3%	5,392	0%	0.0%	1.0%	82	92%	85.7%	96.2%	59,570
2007	103	34	28,211	33	10%	2.5%	20.9%	2,711	0%	0.0%	2.2%	73	90%	79.1%	97.5%	25,494
2007	103	35	23,080	11	4%	0.0%	16.9%	822	0%	0.0%	3.3%	94	96%	83.1%	100.0%	22,265
2007	103	37-38	8,758	35	1%	0.0%	6.6%	118	0%	0.0%	2.1%	22	99%	93.5%	100.0%	8,642
2007	103	Total	228,941	303	18%	13.5%	21.8%	40,447	1%	0.0%	2.2%	2,557	81%	76.9%	85.4%	185,713

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					Otolith-marked Summer-run Chum Salmon				Otolith-marked Fall-run Chum Salmon				Unmarked Chum Salmon			
						95% CI				95% CI				95% CI		
Year	District	Week	Total Harvest	*n*	Estimated Proportion	Lower	Upper	Estimated Contribution	Estimated Proportion	Lower	Upper	Estimated Contribution	Estimated Proportion	Lower	Upper	Estimated Contribution
2008	103	31	4,510	36	57%	41.0%	72.3%	2,571	3%	0.3%	7.8%	127	41%	25.6%	56.5%	1,829
2008	103	32-33	43,892	12	16%	2.4%	39.6%	7,113	4%	0.5%	11.9%	1,899	76%	50.9%	93.9%	33,406
2008	103	34	72,426	78	1%	0.0%	4.9%	1,020	3%	0.5%	6.3%	1,917	96%	90.7%	99.1%	69,522
2008	103	35	22,800	23	0%	0.0%	4.4%	108	3%	0.4%	9.6%	791	95%	84.0%	99.8%	21,693
2008	103	36	8,334	20	1%	0.0%	5.1%	45	2%	0.0%	6.6%	147	99%	93.4%	100.0%	8,263
2008	103	37	3,508	53	0%	0.0%	2.0%	7	2%	0.3%	6.3%	79	98%	92.7%	99.9%	3,432
2008	103	38	604	35	0%	0.0%	3.0%	2	1%	0.0%	5.2%	8	100%	96.1%	100.0%	601
2008	103	Total	156,074	257	7%	1.4%	12.5%	10,866	3%	0.9%	5.5%	4,967	89%	82.2%	95.6%	138,746
2009	103	30	732	12	2%	0.0%	11.9%	17	1%	0.0%	6.3%	6	97%	87.0%	100.0%	713
2009	103	31	10,801	59	17%	9.2%	27.0%	1,854	0%	0.0%	2.2%	32	82%	72.3%	90.6%	8,898
2009	103	32	11,540	46	12%	4.8%	21.9%	1,387	7%	2.1%	15.0%	829	80%	68.1%	89.5%	9,222
2009	103	33	14,289	24	1%	0.0%	7.5%	210	1%	0.0%	4.3%	83	98%	92.1%	100.0%	14,066
2009	103	34	21,467	70	4%	1.1%	10.0%	957	1%	0.1%	4.9%	315	94%	87.9%	98.2%	20,206
2009	103	35	14,593	44	1%	0.0%	4.6%	132	0%	0.0%	2.8%	55	99%	95.2%	100.0%	14,456
2009	103	Total	73,422	255	6%	3.7%	8.7%	4,557	2%	0.4%	3.2%	1,321	92%	89.2%	94.9%	67,562
2010	103	31-32	2,621	48	7%	2.2%	14.7%	188	1%	0.1%	3.5%	28	93%	87.8%	97.4%	2,449
2010	103	33-34	38,782	36	1%	0.0%	4.7%	179	2%	0.3%	5.5%	413	96%	91.0%	99.0%	19,059
2010	103	35-36	20,675	164	1%	0.2%	3.5%	285	2%	0.8%	4.4%	460	96%	93.1%	98.2%	19,856
2010	103	Total	62,078	248	1%	0.0%	3.1%	867	2%	0.3%	3.9%	1,307	96%	93.2%	98.6%	59,527
2006	104	27-28	13,117	47	91%	81.2%	97.2%	11,908	1%	0.0%	2.9%	76	9%	2.9%	18.9%	1,225
2006	104	29	17,986	55	76%	64.0%	86.1%	13,659	1%	0.0%	2.6%	96	24%	13.9%	36.1%	4,339
2006	104	30	22,808	76	55%	44.0%	66.0%	12,577	0%	0.0%	2.2%	100	45%	34.0%	56.0%	10,233
2006	104	31	26,883	46	22%	11.5%	34.8%	5,922	2%	0.1%	5.3%	467	76%	62.7%	86.8%	20,365
2006	104	32	28,189	96	6%	2.5%	12.2%	1,832	1%	0.1%	3.4%	311	92%	86.4%	96.8%	26,049
2006	104	33-34	11,637	47	1%	0.0%	3.8%	69	3%	0.5%	7.2%	332	95%	87.5%	99.2%	11,065
2006	104	Total	107,503	320	38%	34.1%	42.1%	45,969	1%	0.3%	2.0%	1,381	61%	56.6%	64.9%	73,274

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					Otolith-marked Summer-run Chum Salmon				Otolith-marked Fall-run Chum Salmon				Unmarked Chum Salmon			
						95% CI				95% CI				95% CI		
Year	District	Week	Total Harvest	*n*	Estimated Proportion	Lower	Upper	Estimated Contribution	Estimated Proportion	Lower	Upper	Estimated Contribution	Estimated Proportion	Lower	Upper	Estimated Contribution
2007	104	27	19,415	83	90%	82.7%	95.4%	17,455	0%	0.0%	2.3%	82	10%	4.7%	17.5%	1,987
2007	104	28	38,210	96	84%	76.2%	90.6%	32,109	0%	0.0%	2.0%	144	16%	9.5%	24.0%	6,139
2007	104	29	22,897	112	69%	60.7%	77.6%	15,905	0%	0.0%	1.8%	76	31%	22.5%	39.3%	7,002
2007	104	30	38,068	176	73%	65.8%	78.9%	27,636	1%	0.0%	2.3%	279	27%	20.6%	33.6%	10,230
2007	104	31	79,038	235	54%	48.1%	60.7%	43,026	1%	0.2%	2.5%	757	45%	38.4%	51.1%	35,343
2007	104	32	69,476	124	36%	27.4%	44.1%	24,703	0%	0.0%	1.6%	210	64%	55.8%	72.5%	44,739
2007	104	33	89,383	151	7%	3.4%	11.4%	6,119	4%	1.5%	7.1%	3,380	89%	83.7%	93.5%	79,649
2007	104	34	36,405	102	0%	0.0%	2.1%	140	5%	2.1%	9.9%	1,934	94%	88.2%	97.5%	34,086
2007	104	35	30,748	22	2%	0.0%	9.5%	532	6%	1.0%	14.8%	1,819	89%	73.6%	97.9%	27,335
2007	104	Total	423,640	1,101	40%	37.3%	41.9%	167,625	2%	1.1%	3.0%	8,680	58%	55.7%	60.7%	246,511
2008	104	28-30	11,738	36	22%	11.9%	34.5%	2,601	4%	1.4%	8.0%	474	75%	63.4%	85.5%	8,838
2008	104	31	12,888	109	13%	7.7%	19.5%	1,684	3%	1.2%	5.9%	397	85%	77.9%	90.2%	10,900
2008	104	32	21,029	59	12%	5.9%	20.9%	2,614	5%	2.4%	9.5%	1,134	81%	71.9%	88.9%	17,070
2008	104	33	23,645	58	21%	12.4%	31.0%	4,952	5%	2.0%	8.7%	1,128	75%	64.5%	83.5%	17,634
2008	104	34-36	29,250	99	4%	1.0%	7.7%	1,054	5%	2.6%	8.9%	1,554	90%	84.0%	94.7%	26,317
2008	104	Total	98,550	361	13%	9.8%	16.4%	12,905	5%	3.2%	6.3%	4,688	82%	78.3%	85.6%	80,758
2009	104	28-29	12,561	58	59%	46.5%	71.0%	7,409	1%	0.0%	3.7%	99	42%	29.9%	54.1%	5,240
2009	104	30	13,217	81	50%	39.3%	60.6%	6,597	1%	0.0%	2.8%	79	50%	39.9%	60.9%	6,661
2009	104	31	24,162	116	39%	30.8%	48.3%	9,516	0%	0.0%	2.1%	106	61%	51.8%	69.2%	14,661
2009	104	32	12,522	130	22%	15.1%	29.0%	2,708	2%	0.6%	5.5%	309	76%	68.4%	82.8%	9,510
2009	104	33	27,445	163	8%	4.6%	12.9%	2,263	5%	2.6%	9.1%	1,476	86%	80.5%	90.9%	23,623
2009	104	34	18,251	201	4%	1.6%	6.8%	686	6%	3.1%	9.3%	1,062	90%	85.7%	93.8%	16,447
2009	104	35	9,841	116	2%	0.4%	5.5%	220	12%	6.9%	17.9%	1,169	85%	77.9%	90.6%	8,344
2009	104	Total	117,999	865	25%	22.1%	27.8%	29,400	4%	2.5%	4.8%	4,301	72%	68.6%	74.6%	84,486
2010	104	28-29	6,355	9	59%	30.1%	85.1%	3,766	1%	0.0%	5.5%	53	41%	15.6%	70.2%	2,635
2010	104	30	3,406	24	36%	19.3%	55.4%	1,237	1%	0.0%	3.8%	20	64%	44.8%	80.7%	2,171
2010	104	31	5,445	47	15%	6.6%	26.2%	820	0%	0.0%	2.5%	21	85%	73.7%	93.4%	4,622
2010	104	32	7,914	70	6%	1.8%	12.6%	478	1%	0.1%	4.5%	108	92%	85.4%	97.3%	7,320
2010	104	33	16,516	125	3%	1.0%	7.2%	564	1%	0.0%	2.8%	142	96%	91.6%	98.5%	15,813
2010	104	34	8,237	33	1%	0.0%	5.7%	78	0%	0.0%	3.2%	40	99%	93.7%	100.0%	8,143
2010	104	35-36	8,646	34	9%	2.3%	20.6%	807	4%	0.6%	10.2%	341	85%	71.8%	94.5%	7,347
2010	104	Total	56,519	342	14%	9.7%	17.7%	7,749	1%	0.2%	2.3%	724	85%	80.9%	89.2%	48,051

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					Otolith-marked Summer-run Chum Salmon				Otolith-marked Fall-run Chum Salmon				Unmarked Chum Salmon			
						95% CI				95% CI				95% CI		
Year	District	Week	Total Harvest	*n*	Estimated Proportion	Lower	Upper	Estimated Contribution	Estimated Proportion	Lower	Upper	Estimated Contribution	Estimated Proportion	Lower	Upper	Estimated Contribution
2006	105	33	21,628	0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
2006	105	34	83	0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
2006	105	Total	21,711	0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
2007	105	32	2,125	0	0%	0%	0%	0	0%	0%	0%	0	100%	ND	100%	2,125
2007	105	33	4,522	12	0%	0%	0%	0	0%	0%	0%	0	100%	ND	100%	4,522
2007	105	34	3,037	12	0%	0%	0%	0	0%	0%	0%	0	100%	ND	100%	3,037
2007	105	35	428	0	0%	0%	0%	0	0%	0%	0%	0	100%	ND	100%	428
2007	105	Total	10,112	24	0%	0%	0%	0	0%	0%	0%	0	100%	ND	100%	10,112
2008	105	33	95	0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
2008	105	Total	95	0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
2009	105	32	5,589	0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
2009	105	33	685	0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
2009	105	34	1,741	0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
2009	105	35	343	0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
2009	105	Total	8,358	0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
2010	105	32	3,120	34	3%	0.2%	10.7%	103	0%	0%	0%	0	97%	89.3%	99.8%	3,017
2010	105	33	9,267	59	0%	0.0%	2.8%	40	0%	0%	0%	0	100%	97.2%	100.0%	9,227
2010	105	34	162	59	0%	0.0%	2.8%	1	0%	0%	0%	0	100%	97.2%	100.0%	161
2010	105	35	187	5	13%	0.7%	38.6%	24	0%	0%	0%	0	87%	61.4%	99.3%	163
2010	105	Total	12,736	157	1%	0%	3.1%	168	0%	0%	0%	0	99%	96.9%	100.0%	12,337
2006	106	34	3,365	0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
2006	106	Total	3,365	0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
2007	106	31-32	9,555	70	66%	54.5%	76.1%	6,277	3%	0.5%	7.3%	279	33%	23.2%	44.3%	3,187
2007	106	33	8,098	120	22%	15.1%	29.6%	1,777	8%	3.8%	12.6%	618	70%	62.1%	78.0%	5,695
2007	106	34	4,643	12	27%	8.3%	50.6%	1,233	12%	3.1%	24.9%	542	59%	35.3%	79.8%	2,716
2007	106	35	4,690	12	20%	4.6%	42.7%	934	8%	1.6%	20.3%	395	70%	47.3%	88.5%	3,287
2007	106	Total	26,986	214	38%	31.2%	44.6%	10,220	7%	3.7%	9.9%	1,834	55%	48.2%	62.1%	14,886
2008	106	32	415	0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
2008	106	33	2,659	0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
2008	106	34	305	0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
2008	106	Total	3,379	0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

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					Otolith-marked Summer-run Chum Salmon				Otolith-marked Fall-run Chum Salmon				Unmarked Chum Salmon			
						95% CI				95% CI				95% CI		
Year	District	Week	Total Harvest	*n*	Estimated Proportion	Lower	Upper	Estimated Contribution	Estimated Proportion	Lower	Upper	Estimated Contribution	Estimated Proportion	Lower	Upper	Estimated Contribution
2009	106	31	1,596	0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
2009	106	32	745	0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
2009	106	33	1,452	24	54%	ND	ND	784	21%	ND	ND	305	25%	ND	ND	363
2009	106	34	1,374	0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
2009	106	Total	5,167	24	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
2010	106	33–35	853	24	4%	ND	ND	36	0%	ND	ND	0	96%	ND	ND	817
2010	106	Total	853	24	4%	ND	ND	36	0%	ND	ND	0	96%	ND	ND	817
2006	107	27	5,358	0	**92%**	**78.3%**	**98.8%**	**4,904**	**0%**	**0.0%**	**2.0%**	**21**	**8%**	**0.7%**	**23.0%**	**433**
2006	107	28	20,217	179	88%	83.4%	92.2%	17,829	0%	0.0%	0.8%	33	12%	7.8%	16.7%	2,399
2006	107	29	53,026	0	**92%**	**78.3%**	**98.8%**	**48,534**	**0%**	**0.0%**	**2.0%**	**206**	**8%**	**0.7%**	**23.0%**	**4,286**
2006	107	30	20,801	129	95%	90.7%	97.7%	19,702	1%	0.0%	1.8%	121	4%	1.8%	8.3%	924
2006	107	34	4,497	0	**92%**	**78.3%**	**98.8%**	**4,116**	**0%**	**0.0%**	**2.0%**	**17**	**8%**	**0.7%**	**23.0%**	**364**
2006	107	Total	103,899	308	92%	86.0%	97.1%	95,085	0%	0.0%	1.0%	397	8%	2.0%	14.2%	8,406
2007	107	27	1,670	0	**85%**	**41.7%**	**99.9%**	**1,412**	**8%**	**0.0%**	**63.0%**	**138**	**7%**	**0.0%**	**30.9%**	**121**
2007	107	28	19,733	23	90%	76.9%	98.2%	17,818	1%	0.0%	5.0%	116	8%	1.5%	20.0%	1,639
2007	107	29	12,507	92	96%	91.6%	99.0%	12,035	0%	0.0%	1.3%	19	4%	0.9%	8.0%	449
2007	107	30	26,224	0	**85%**	**41.7%**	**99.9%**	**22,168**	**8%**	**0.0%**	**63.0%**	**2,161**	**7%**	**0.0%**	**30.9%**	**1,894**
2007	107	31	37,286	60	94%	87.6%	98.5%	35,176	0%	0.0%	2.0%	88	5%	1.3%	11.6%	1,965
2007	107	32	36,123	105	95%	90.0%	98.1%	34,260	2%	0.3%	5.4%	726	3%	0.8%	7.1%	1,148
2007	107	33	10,566	85	71%	61.4%	80.1%	7,525	6%	2.0%	11.7%	627	22%	14.3%	31.0%	2,333
2007	107	34	1,981	12	65%	40.9%	85.4%	1,286	37%	14.9%	63.3%	740	3%	0.0%	13.3%	59
2007	107	35	1,281	0	**85%**	**41.7%**	**99.9%**	**1,083**	**8%**	**0.0%**	**63.0%**	**106**	**7%**	**0.0%**	**30.9%**	**93**
2007	107	Total	147,371	377	90%	83.9%	96.2%	132,763	3%	0.0%	9.1%	4,721	7%	2.9%	10.2%	9,699
2008	107	28	320	0	**90%**	**87.5%**	**93.1%**	**290**	**3%**	**0.0%**	**17.2%**	**9**	**7%**	**0.3%**	**22.2%**	**22**
2008	107	29	6,682	27	90%	87.5%	93.0%	6,040	1%	0.0%	5.0%	53	9%	2.8%	19.5%	630
2008	107	30	15,416	11	90%	87.5%	93.1%	13,951	1%	0.0%	8.6%	211	8%	1.1%	19.8%	1,181
2008	107	32	15,909	24	91%	87.7%	93.1%	14,406	7%	1.0%	16.8%	1,054	3%	0.1%	9.5%	443
2008	107	33	8,364	0	**90%**	**87.5%**	**93.1%**	**7,568**	**3%**	**0.0%**	**17.2%**	**232**	**7%**	**0.3%**	**22.2%**	**563**
2008	107	Total	46,691	62	91%	89.0%	92.0%	42,255	3%	0.0%	7.0%	1,558	6%	1.7%	10.4%	2,839

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					Otolith-marked Summer-run Chum Salmon				Otolith-marked Fall-run Chum Salmon				Unmarked Chum Salmon			
						95% CI				95% CI				95% CI		
Year	District	Week	Total Harvest	*n*	Estimated Proportion	Lower	Upper	Estimated Contribution	Estimated Proportion	Lower	Upper	Estimated Contribution	Estimated Proportion	Lower	Upper	Estimated Contribution
2009	107	28	5,637	53	96%	88.9%	99.3%	5,389	1%	0.0%	3.2%	29	5%	1.0%	11.5%	274
2009	107	29	38,617	166	93%	89.0%	96.5%	35,993	0%	0.0%	1.1%	66	7%	3.6%	11.1%	2,660
2009	107	30	50,891	119	92%	86.9%	96.3%	46,931	0%	0.0%	1.5%	119	8%	3.9%	13.1%	4,005
2009	107	31	30,014	82	95%	89.1%	98.4%	28,435	3%	0.4%	6.9%	798	3%	0.7%	7.8%	986
2009	107	32	24,934	144	86%	80.0%	91.1%	21,449	3%	0.9%	6.1%	722	11%	6.7%	16.7%	2,792
2009	107	33	7,821	73	60%	48.3%	70.3%	4,654	13%	6.8%	21.7%	1,043	26%	17.2%	36.2%	2,041
2009	107	34	3,682	60	40%	28.1%	52.1%	1,464	29%	18.2%	40.1%	1,050	30%	19.4%	41.0%	1,092
2009	107	Total	161,596	697	89%	87.1%	91.5%	14,314	2%	1.4%	3.3%	3,826	9%	6.5%	10.7%	13,851
2010	107	28	2,675	0	97%	ND	ND	2,590	0%	ND	ND	0	3%	ND	ND	85
2010	107	29	31,279	94	97%	ND	ND	30,281	0%	ND	ND	0	3%	ND	ND	998
2010	107	Total	33,954	94	97%	ND	ND	32,870	0%	0%	0%	0	3%	ND	ND	1,083