

# **DRAFT**

**Total Encounters and Mortality Estimates for  
Puget Sound Recreational Chinook Mark-Selective Fisheries  
Monitored using Baseline Sampling: 2007-2011**

**Draft – 11/27/2013**

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## INTRODUCTION

Based on agreements between the State of Washington and the Northwest Treaty Tribes, the Washington Department of Fish and Wildlife (WDFW) has been conducting pilot<sup>1</sup> recreational mark-selective Chinook fisheries (MSFs) in the marine catch areas of Puget Sound since 2003. The goal of these fisheries is to allow increased angler opportunities on hatchery-raised, marked (adipose fin-clipped) salmon while limiting impacts on unmarked (adipose fin intact; typically wild origin) stocks of conservation concern, particularly ESA-listed Puget Sound Chinook.

To monitor each fishery, WDFW's Puget Sound Sampling Unit (PSSU) implements one of the four following sampling designs: *i*) Full Murthy Estimate Design, *ii*) Reduced Murthy Estimate Design, *iii*) Aerial-Access Design or *iv*) Baseline Sampling Design. The design selected depends on area and season considerations, the magnitude of the fishery and State-Tribal agreements made prior to the start of the fishing season. For a complete description of the methods associated with these sampling designs, see WDFW's "Methods Report: Monitoring Mark-Selective Recreational Chinook Fisheries in the Marine Catch Areas of Puget Sound (Areas 5 through 13)" (WDFW 2012a).

The first three of the above-mentioned sampling designs (all except Baseline Sampling) are characterized as comprehensive, "intensive" monitoring programs and have been tailored to reliably estimate the critical parameters needed for evaluating mark-selective fisheries (WDFW 2012a). In addition, PSSU has acquired and analyzed relevant data characterizing other aspects of the pilot MSFs, including descriptors of fishing effort, fishing success (catch [landed Chinook] per unit effort), recreational fishing methods, the length and age composition of encountered Chinook, and the overall intensity of our sampling efforts. As such, the data collected through these comprehensive monitoring programs allow biologists to produce weekly in-season estimates and timely finalized post-season estimates of effort, catch, total encounters and fishery impacts.

The fourth sampling design, *Baseline Sampling*, is a scaled-back monitoring program that is currently implemented in lower-magnitude MSFs (and year-round in non-selective sport fisheries) throughout Puget Sound. Table 1 presents a summary of the MSFs, by area and season in which PSSU has conducted Baseline Sampling, through the 2013-14 winter season. Samplers collect data on salmon catch (retained and released) and effort via dockside sampling and angler interviews and obtain on-water encounter rate data through distributing and collecting voluntary trip reports (VTR) from private anglers. In contrast to the three comprehensive monitoring programs, the data collected through Baseline Sampling does not allow for in-season or immediate post-season estimates of effort, landed catch, total encounters, or fishery impacts.

Between 2011 and 2013, an estimation framework was developed to estimate total Chinook encounters for a given MSF relying only on Baseline Sampling data and Catch Record Card (CRC) based Chinook harvest estimates (WDFW and NWIFC 2013). CRC harvest estimates are available approximately one year after the close of a fishery. Thus, while slightly delayed, this methodology allows for a full post-season analysis of Puget Sound Chinook MSFs that are

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<sup>1</sup> As stated in state-tribal agreement documents (e.g., WDFW and NWIFC 2009): "The purpose of the 'pilot' fishery is to collect information necessary to enable evaluation and planning of potential future mark-selective fisheries. The 'pilot' fishery provides a basis for determining if the data needed to estimate critical parameters can be collected and if the sample sizes needed to produce these estimates with agreed levels of precision can be realistically obtained."

sampled on a Baseline level only, including total size/mark-status specific estimates of encounters and mortalities.

As of the date of this report, finalized CRC-based estimates of Chinook harvest were available through the close of the 2011 summer season. Contained in the following sections is a full analysis of fishery-total encounters and mortalities associated with the 11 Puget Sound Chinook MSFs that were sampled on a Baseline level only through the 2011 Summer season. Included area estimates of: *i*) the total number of Chinook salmon harvested (by size [legal or sublegal] and mark-status [marked or unmarked] group), *ii*) the total number of Chinook salmon released (by size and mark-status group), *iii*) the total number of Chinook salmon mortalities (by size and mark-status group), *iv*) comparisons of Chinook salmon encounters and mortalities with pre-season expectations (based on Fishery Regulation Assessment Model [FRAM] predictions), *v*) sample rate information based on dockside sampling of harvested Chinook, and *vi*) the total mortality of marked and unmarked double index tag (DIT) CWT stocks. Estimates were derived using the estimation framework provided in WDFW and NWIFC (2013), referring to the decision support schematic to determine the estimator used.

**Table 1** Summary of Chinook MSFs in Puget Sound in which PSSU has conducted Baseline Sampling.

Catch Area	Season	Year	Dates	Sampling Design
6	Summer	2008	Jul 1 – Aug 9	Baseline sampling, VTRs, CRC estimates
		2009	Jul 1 – Aug 6	
		2010	Jul 1 – Aug 15	
		2011	Jul 1 – Aug 15	
		2012	Jul 1 – Aug 15	
		2013	Jul 1 – Aug 15	
12 (S of Ayock Pt)	Summer	2012	Jul 1 – Oct 15	
		2013	Jul 1 – Oct 15	
12	Winter	2009-10	Feb 1 – Apr 30	
		2010-11	Feb 1 – Apr 30	
		2011-12	Feb 1 – Apr 30	
		2012-13	Oct 16 – Dec 31 & Feb 1 – Apr 30	
		2013-14	Oct 16 – Dec 31 & Feb 1 – Apr 30	
13	Summer	2007	May 1 – Sep 30	
		2008	May 1 – Sep 30	
		2009	May 1 – Sep 30	
		2010	May 1 – Sep 30	
		2011	May 1 – Sep 30	
		2012	May 1 – Sep 30	
		2013	May 1 – Sep 30	

# 1 MARINE AREA 6

In this section, we present estimates of total encounters and mortalities for the Marine Area 6 summer MSFs in 2008, 2009, 2010 and 2011, which were monitored using baseline sampling. Information regarding sample sites, dockside sampling and interview data, and voluntary trip reports (VTR) related to these fisheries can be found in previous reports (WDFW 2009a, WDFW 2010a, WDFW 2011b, WDFW 2012c). Table 1.1 provides CRC-based total Chinook harvest estimates and variances for each year, along with the recommended estimation method based on VTR sample sizes and the resulting precision of encounters estimates. Sample sizes of VTR encounters were sufficient in all four years, thus, total encounters estimates were estimated using the bias-corrected M2 approach (WDFW and NWIFC 2013).

**Table 1.1** Summary of CRC-based total Chinook harvest estimates for the 2008 -2011 Area 6 summer MSFs.

<b>Year</b>	<b>Total Chinook Harvest</b>	<b>Variance</b>	<b>Estimation Method</b>
2008	537	3,840	M2
2009	2,372	29,988	M2
2010	1,400	12,932	M2
2011	3,320	79,356	M2



## 1.1 Summer 2008

**Table 1.1.1** Summary of VTR encounters and harvested Chinook sampled during dockside sampling for the Area 6 Chinook MSF from July 1 - August 9, 2008. AD = marked (adipose-clipped), UM = unmarked.

Data Type	LM	LU	SM	SU	Total
VTR Encounters	81	50	0	2	133
Dockside Harvest	339	1	0	0	340

**Table 1.1.2** Summary of season-wide fishery impact estimates for the Area 6 Chinook MSF from July 1 - August 9, 2008. Release mortality rate = 0.15 for legal fish and 0.20 for sublegal fish. Values may not add up perfectly due to rounding error. AD = marked (adipose-clipped), UM = unmarked.

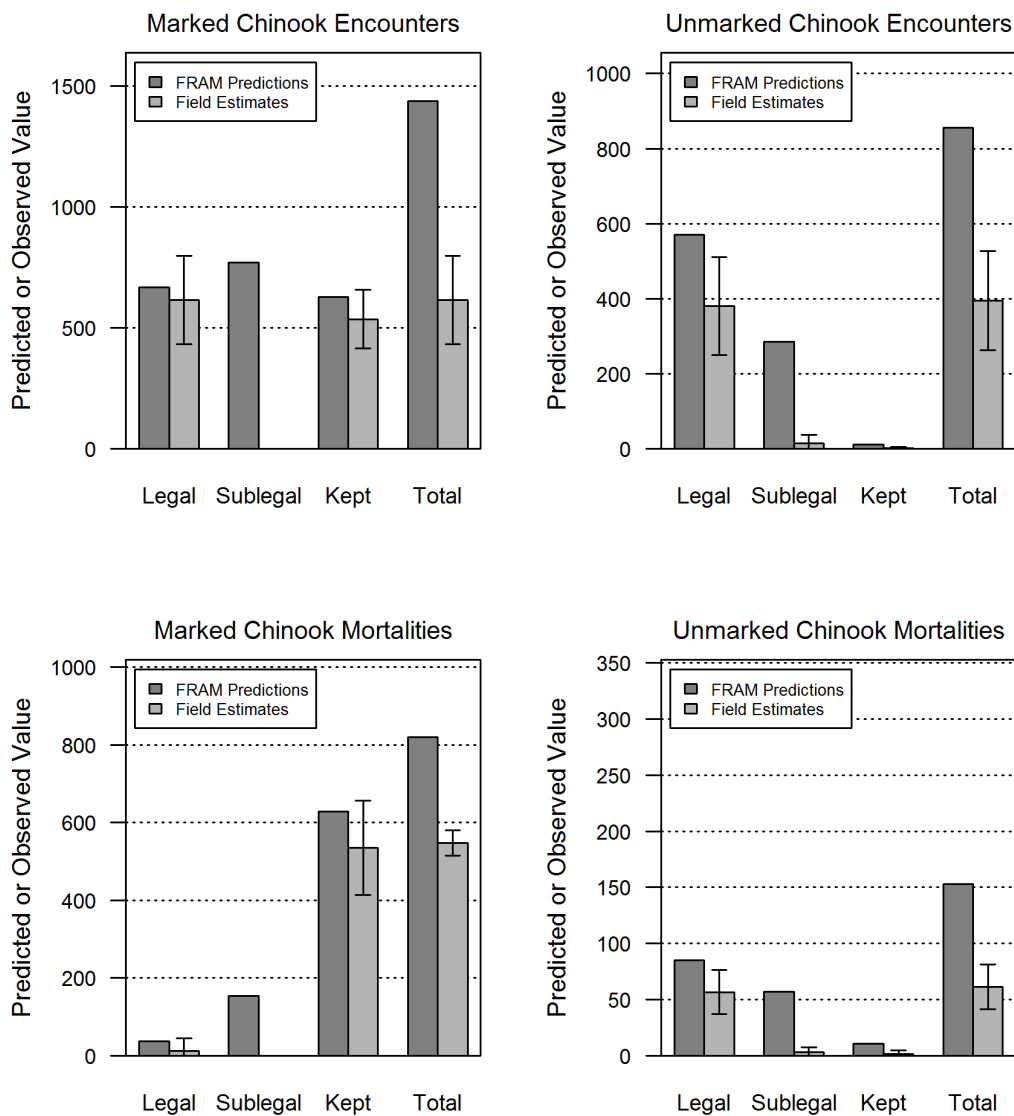
Size/mark group	Encounters	Retained	Released	Release Mortality	Total Mortality	Var	SE	95% CI	CV (%)
Legal AD	615	535	80	12	547	4,102	64	422 - 673	12
Legal UM	380	2	378	57	58	102	10	39 - 78	17
Sublegal AD	0	0	0	0	0	0	0	-	-
Sublegal UM	15	0	15	3	3	5	2	0 - 7	71
<b>Total</b>	<b>1,011</b>	<b>537</b>	<b>474</b>	<b>72</b>	<b>609</b>	<b>4,208</b>	<b>65</b>	<b>482 - 736</b>	<b>11</b>

**Table 1.1.3** Comparison of modeled (FRAM model run 2108) and estimated total Chinook encounters for the Area 6 Chinook MSF from July 1 - August 9, 2008. Values may not add up perfectly due to rounding error. AD = marked (adipose-clipped), UM = unmarked.

Data Source	Group	Total Encounters	Legal	Sublegal	Landed Only
FRAM Encounters	UM	856	571	285	11
	AD	1,439	669	770	629
	Total	2,295	1,240	1,055	640
	% Marked	63	54	73	98
Estimated (Creel) Encounters	UM	395	380	15	2
	AD	615	615	0	535
	Total	1,011	995	15	537
	% Marked	61	62	0	100

**Table 1.1.4** Comparison of modeled (FRAM model run 2108) and estimated total Chinook mortalities for the Area 6 Chinook MSF from July 1 - August 9, 2008. Values may not add up perfectly due to rounding error. AD = marked (adipose-clipped), UM = unmarked.

Mortality Category	FRAM Chinook Mortalities			Estimated Chinook Mortalities		
	UM	AD	Total	UM	AD	Total
Total (Landed + Released)	153	820	973	61	547	609
Released Legal	85	37	122	57	12	69
Released Sublegal	57	154	211	3	0	3
Landed Only	11	629	640	2	535	537



**Figure 1.1.1** Comparison of modeled (FRAM model run 2108) and estimated Chinook encounters and mortalities for the Area 6 Chinook MSF from July 1 - August 9, 2008. Error bars represent 95% confidence intervals for field estimates.

**Table 1.1.5** Season total sample rate (Total retained Chinook sampled during baseline sampling / Estimated retained Chinook) in the Area 6 Chinook MSF from July 1 - August 9, 2008.

Time period	Estimated Retained Chinook			Number of Chinook Sampled			Sample Rate
	AD	UM	Total	AD	UM	Total	
Season Total	535	2	537	345	5	350	65.4%

**Table 1.1.6** Summary of double-index tagged (DIT) Chinook kept by anglers, and estimated total mortality of unmarked DIT Chinook due to hook-and-release impacts resulting from the Area 6 Chinook MSF from July 1 - August 9, 2008. AD = marked (adipose-clipped), UM = unmarked.

Hatchery	Brood Year	DITs Obs'd	AD DIT Harvest		UM DIT Enc.	UM DIT Mortality		
			Est.	var(Est.)		Est.	var(Est.)	SE(Est.)
Clear Creek Hatchery	2004	2	3.1	1.61	3.1	0.3	0.017	0.18
George Adams Hatchery	2005	1	1.5	0.81	1.5	0.2	0.008	0.09
Grovers Creek Hatchery	2004	1	1.5	0.81	1.7	0.2	0.010	0.10
	2005	1	1.5	0.81	2.0	0.2	0.014	0.12
Samish Hatchery	2004	1	1.5	0.81	1.6	0.2	0.009	0.09
	2005	1	1.5	0.81	1.4	0.1	0.007	0.08
Soos Creek Hatchery	2004	1	1.5	0.81	1.5	0.2	0.008	0.09
Spring Creek NFH	2005	1	1.5	0.81	1.5	0.2	0.008	0.09
<b>Total</b>		<b>9</b>	<b>13.8</b>	<b>7.27</b>	<b>14.4</b>	<b>1.4</b>	<b>0.081</b>	<b>0.85</b>

## 1.2 Summer 2009

**Table 1.2.1** Summary of VTR encounters and harvested Chinook sampled during dockside sampling for the Area 6 Chinook MSF from July 1 - August 6, 2009. AD = marked (adipose-clipped), UM = unmarked.

Data Type	LM	LU	SM	SU	Total
VTR Encounters	117	53	10	12	192
Dockside Harvest	514	0	8	0	522

**Table 1.2.2** Summary of season-wide fishery impact estimates for the Area 6 Chinook MSF from July 1 - August 6, 2009. Release mortality rate = 0.15 for legal fish and 0.20 for sublegal fish. Values may not add up perfectly due to rounding error. AD = marked (adipose-clipped), UM = unmarked.

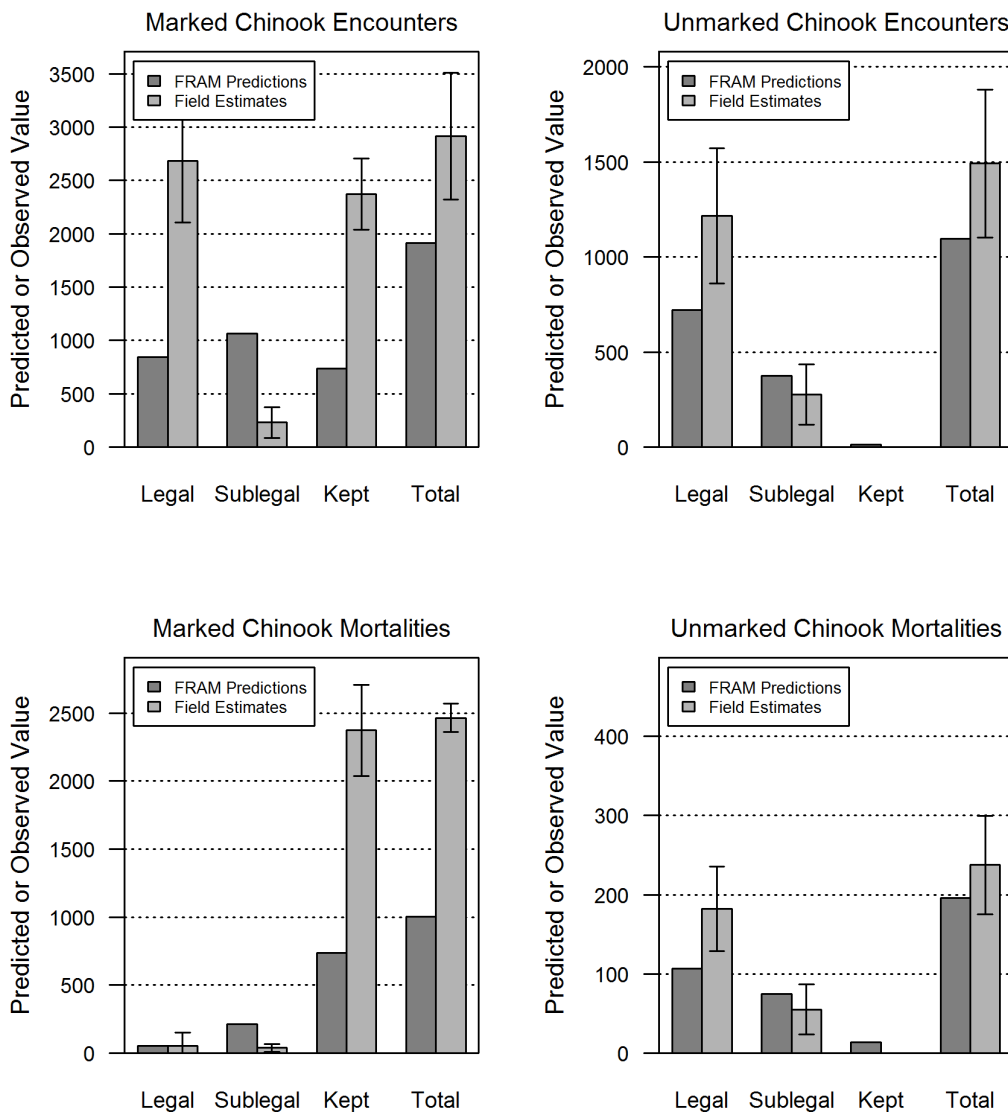
Size/mark group	Encounters	Retained	Released	Release Mortality	Total Mortality	Var	SE	95% CI	CV (%)
Legal AD	2,685	2,336	349	52	2,388	31,849	178	2,038 - 2,738	7
Legal UM	1,216	0	1,216	182	182	743	27	129 - 236	15
Sublegal AD	229	36	193	39	75	393	20	36 - 114	26
Sublegal UM	275	0	275	55	55	263	16	23 - 87	29
<b>Total</b>	<b>4,406</b>	<b>2,372</b>	<b>2,034</b>	<b>328</b>	<b>2,700</b>	<b>33,248</b>	<b>182</b>	<b>2,343 - 3,058</b>	<b>7</b>

**Table 1.2.3** Comparison of modeled (FRAM model run 2309) and estimated total Chinook encounters for the Area 6 Chinook MSF from July 1 - August 6, 2009. Values may not add up perfectly due to rounding error. AD = marked (adipose-clipped), UM = unmarked.

Data Source	Group	Total Encounters	Legal	Sublegal	Landed Only
FRAM Encounters	UM	1,095	720	375	14
	AD	1,911	846	1,065	736
	Total	3,006	1,566	1,440	750
	% Marked	64	54	74	98
Estimated (Creel) Encounters	UM	1,491	1,216	275	0
	AD	2,914	2,685	229	2,372
	Total	4,406	3,901	505	2,372
	% Marked	66	69	46	100

**Table 1.2.4** Comparison of modeled (FRAM model run 2309) and estimated total Chinook mortalities for the Area 6 Chinook MSF from July 1 - August 6, 2009. Values may not add up perfectly due to rounding error. AD = marked (adipose-clipped), UM = unmarked.

Mortality Category	FRAM Chinook Mortalities			Estimated Chinook Mortalities		
	UM	AD	Total	UM	AD	Total
Total (Landed + Released)	196	1,002	1,198	237	2,463	2,700
Released Legal	107	53	160	182	52	235
Released Sublegal	75	213	288	55	39	94
Landed Only	14	736	750	0	2,372	2,372



**Figure 1.2.1** Comparison of modeled (FRAM model run 2309) and estimated Chinook encounters and mortalities for the Area 6 Chinook MSF from July 1 - August 6, 2009. Error bars represent 95% confidence intervals for field estimates.

**Table 1.2.5** Season total sample rate (Total retained Chinook sampled during baseline sampling / Estimated retained Chinook) in the Area 6 Chinook MSF from July 1 - August 6, 2009.

Time period	Estimated Retained Chinook			Number of Chinook Sampled			Sample Rate
	AD	UM	Total	AD	UM	Total	
Season Total	2,372	0	2,372	539	0	539	22.7%

**Table 1.2.6** Summary of double-index tagged (DIT) Chinook kept by anglers, and estimated total mortality of unmarked DIT Chinook due to hook-and-release impacts resulting from the Area 6 Chinook MSF from July 1 - August 6, 2009. AD = marked (adipose-clipped), UM = unmarked.

Hatchery	Brood Year	DITs Obs'd	AD DIT Harvest		UM DIT Enc.	UM DIT Mortality		
			Est.	var(Est.)		Est.	var(Est.)	SE(Est.)
George Adams Hatchery	2006	1	4.4	14.97	4.9	0.5	0.182	0.43
Grovers Creek Hatchery	2005	3	13.2	44.90	17.2	1.7	0.764	1.51
	2006	1	4.4	14.97	4.4	0.4	0.149	0.39
Samish Hatchery	2005	1	4.4	14.97	4.0	0.4	0.124	0.35
Soos Creek Hatchery	2005	2	8.8	29.93	9.0	0.9	0.314	0.79
<b>Total</b>		<b>8</b>	<b>35.2</b>	<b>119.73</b>	<b>39.5</b>	<b>3.9</b>	<b>1.533</b>	<b>3.47</b>

### 1.3 Summer 2010

**Table 1.3.1** Summary of VTR encounters and harvested Chinook sampled during dockside sampling for the Area 6 Chinook MSF from July 1 - August 15, 2010. AD = marked (adipose-clipped), UM = unmarked.

Data Type	LM	LU	SM	SU	Total
VTR Encounters	179	61	5	3	248
Dockside Harvest	723	1	2	0	726

**Table 1.3.2** Summary of season-wide fishery impact estimates for the Area 6 Chinook MSF from July 1 - August 15, 2010. Release mortality rate = 0.15 for legal fish and 0.20 for sublegal fish. Values may not add up perfectly due to rounding error. AD = marked (adipose-clipped), UM = unmarked.

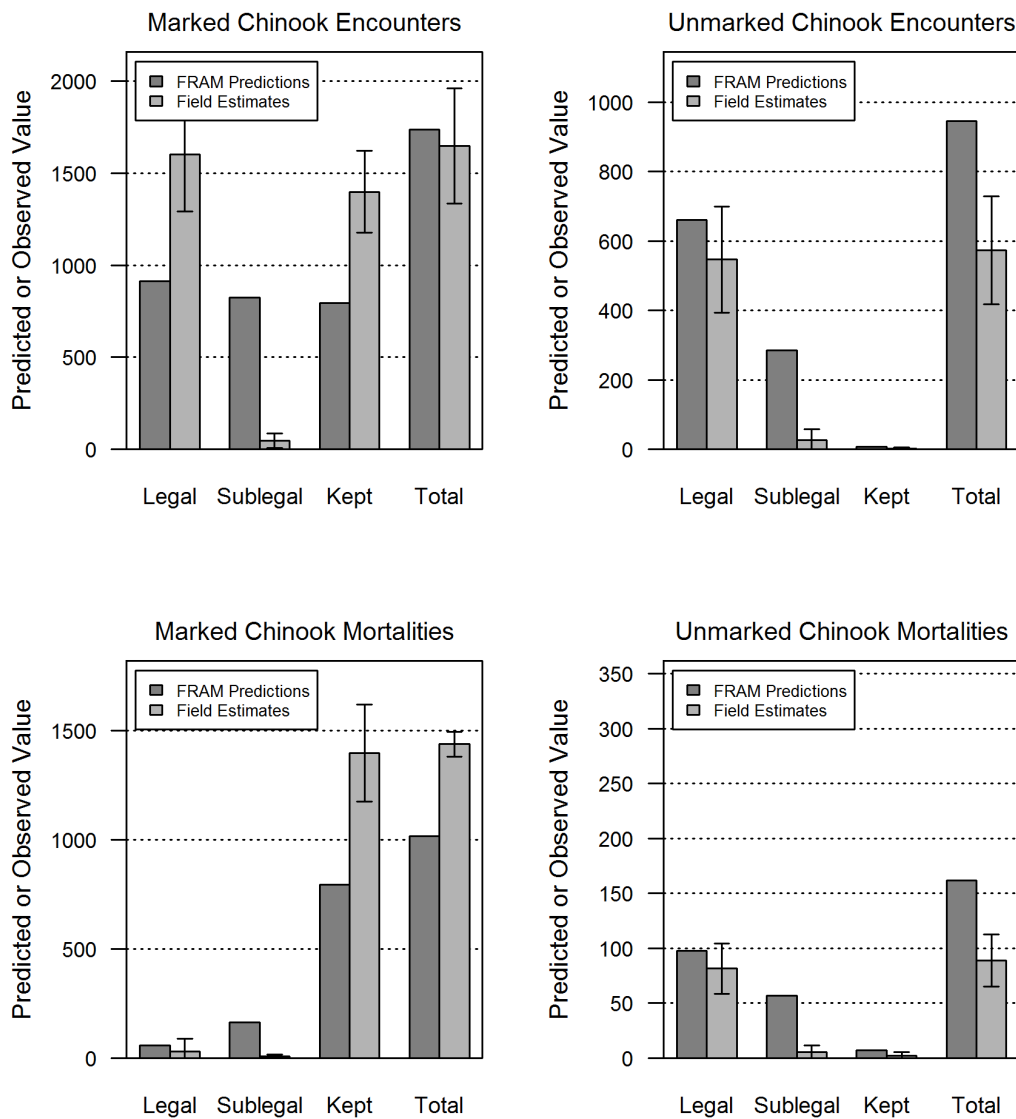
Size/mark group	Encounters	Retained	Released	Release Mortality	Total Mortality	Var	SE	95% CI	CV (%)
Legal AD	1,603	1,394	208	31	1,425	13,686	117	1,196 - 1,655	8
Legal UM	546	2	544	82	84	141	12	60 - 107	14
Sublegal AD	45	4	41	8	12	24	5	2 - 22	41
Sublegal UM	27	0	27	5	5	10	3	0 - 11	58
<b>Total</b>	<b>2,220</b>	<b>1,400</b>	<b>820</b>	<b>126</b>	<b>1,526</b>	<b>13,861</b>	<b>118</b>	<b>1,296 - 1,757</b>	<b>8</b>

**Table 1.3.3** Comparison of modeled (FRAM model run 1010) and estimated total Chinook encounters for the Area 6 Chinook MSF from July 1 - August 15, 2010. Values may not add up perfectly due to rounding error. AD = marked (adipose-clipped), UM = unmarked.

Data Source	Group	Total Encounters	Legal	Sublegal	Landed Only
FRAM Encounters	UM	945	660	285	7
	AD	1,737	912	825	793
	Total	2,682	1,572	1,110	800
	% Marked	65	58	74	99
Estimated (Creel) Encounters	UM	573	546	27	2
	AD	1,647	1,603	45	1,398
	Total	2,220	2,149	72	1,400
	% Marked	74	75	63	100

**Table 1.3.4** Comparison of modeled (FRAM model run 1010) and estimated total Chinook mortalities for the Area 6 Chinook MSF from July 1 - August 15, 2010. Values may not add up perfectly due to rounding error. AD = marked (adipose-clipped), UM = unmarked.

Mortality Category	FRAM Chinook Mortalities			Estimated Chinook Mortalities		
	UM	AD	Total	UM	AD	Total
Total (Landed + Released)	162	1,016	1,178	89	1,438	1,526
Released Legal	98	58	156	82	31	113
Released Sublegal	57	165	222	5	8	14
Landed Only	7	793	800	2	1,398	1,400



**Figure 1.3.1** Comparison of modeled (FRAM model run 1010) and estimated Chinook encounters and mortalities for the Area 6 Chinook MSF from July 1 - August 15, 2010. Error bars represent 95% confidence intervals for field estimates.



**Table 1.3.5** Season total sample rate (Total retained Chinook sampled during baseline sampling / Estimated retained Chinook) in the Area 6 Chinook MSF from July 1 - August 15, 2010.

Time period	Estimated Retained Chinook			Number of Chinook Sampled			Sample Rate
	AD	UM	Total	AD	UM	Total	
Season Total	1,398	2	1,400	736	3	739	52.8%

**Table 1.3.6** Summary of double-index tagged (DIT) Chinook kept by anglers, and estimated total mortality of unmarked DIT Chinook due to hook-and-release impacts resulting from the Area 6 Chinook MSF from July 1 - August 15, 2010. AD = marked (adipose-clipped), UM = unmarked.

Hatchery	Brood Year	DITs Obs'd	AD DIT Harvest		UM DIT Enc.	UM DIT Mortality		
			Est.	var(Est.)		Est.	var(Est.)	SE(Est.)
Big Creek Hatchery	2007	1	1.9	1.69	1.9	0.2	0.017	0.13
Clear Creek Hatchery	2006	1	1.9	1.69	1.9	0.2	0.017	0.13
	2007	1	1.9	1.69	1.9	0.2	0.017	0.13
George Adams Hatchery	2006	1	1.9	1.69	2.1	0.2	0.021	0.14
	2007	7	13.3	11.86	13.4	1.3	0.121	0.92
Grovers Creek Hatchery	2006	2	3.8	3.39	3.8	0.4	0.034	0.26
	2007	3	5.7	5.08	5.7	0.6	0.051	0.39
Chilliwack River Hatchery	2007	2	3.8	3.39	3.8	0.4	0.034	0.26
Samish Hatchery	2007	5	9.5	8.47	9.7	1.0	0.089	0.67
Soos Creek Hatchery	2007	2	3.8	3.39	3.8	0.4	0.034	0.26
Spring Creek NFH	2007	3	5.7	5.08	5.7	0.6	0.051	0.39
<b>Total</b>		<b>28</b>	<b>53.0</b>	<b>47.45</b>	<b>53.6</b>	<b>5.4</b>	<b>0.484</b>	<b>3.68</b>

## 1.4 Summer 2011

**Table 1.4.1** Summary of VTR encounters and harvested Chinook sampled during dockside sampling for the Area 6 Chinook MSF from July 1 - August 15, 2011. AD = marked (adipose-clipped), UM = unmarked.

Data Type	LM	LU	SM	SU	Total
VTR Encounters	126	60	25	18	229
Dockside Harvest	926	2	28	4	960

**Table 1.4.2** Summary of season-wide fishery impact estimates for the Area 6 Chinook MSF from July 1 - August 15, 2011. Release mortality rate = 0.15 for legal fish and 0.20 for sublegal fish. Values may not add up perfectly due to rounding error. AD = marked (adipose-clipped), UM = unmarked.

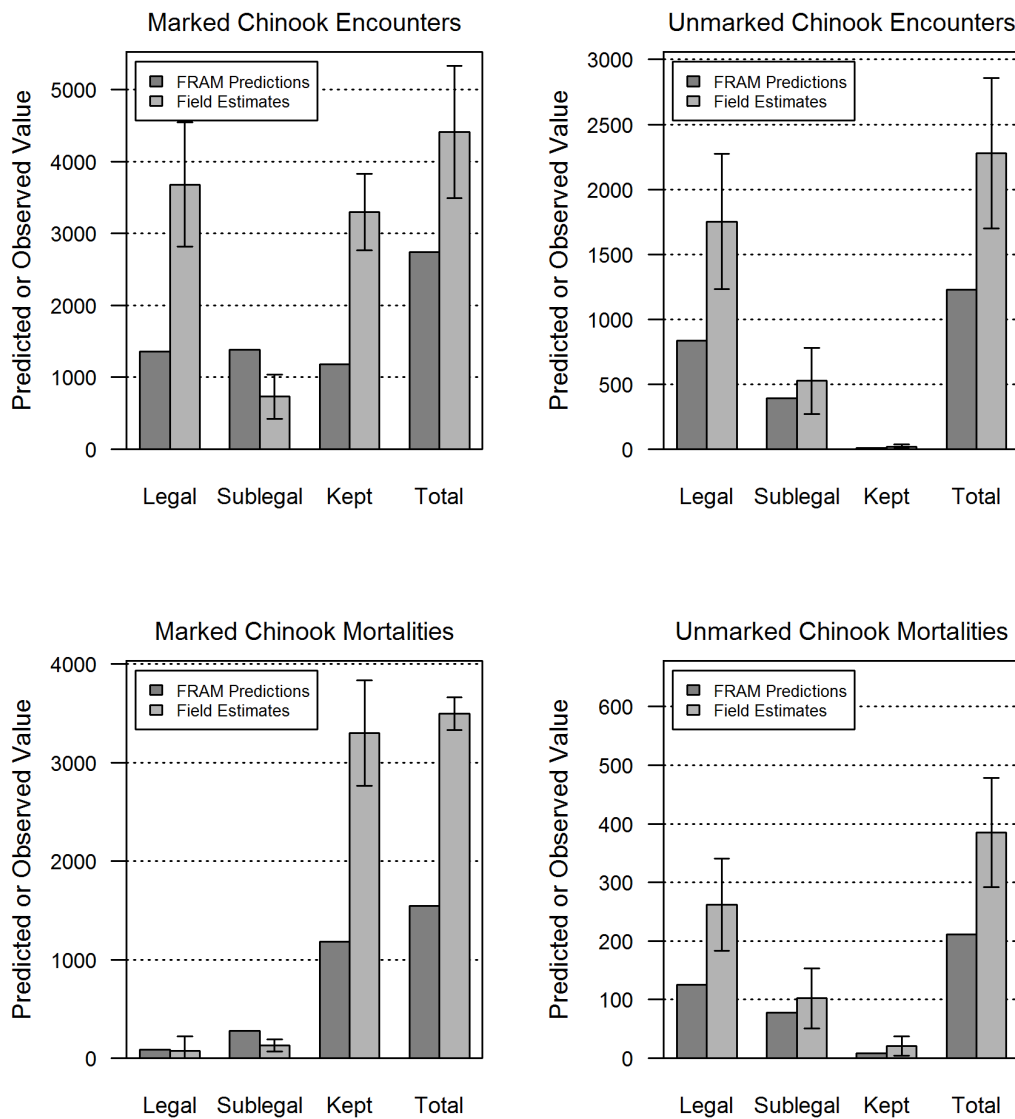
Size/mark group	Encounters	Retained	Released	Release Mortality	Total Mortality	Var	SE	95% CI	CV (%)
Legal AD	3,681	3,202	479	72	3,274	80,275	283	2,719 - 3,830	9
Legal UM	1,753	7	1,746	262	269	1,618	40	190 - 348	15
Sublegal AD	730	97	634	127	224	1,393	37	150 - 297	17
Sublegal UM	526	14	512	102	116	733	27	63 - 169	23
<b>Total</b>	<b>6,690</b>	<b>3,320</b>	<b>3,370</b>	<b>563</b>	<b>3,883</b>	<b>84,018</b>	<b>290</b>	<b>3,315 - 4,451</b>	<b>7</b>

**Table 1.4.3** Comparison of modeled (FRAM model run 1811) and estimated total Chinook encounters for the Area 6 Chinook MSF from July 1 - August 15, 2011. Values may not add up perfectly due to rounding error. AD = marked (adipose-clipped), UM = unmarked.

Data Source	Group	Total Encounters	Legal	Sublegal	Landed Only
FRAM Encounters	UM	1,226	836	390	8
	AD	2,740	1,355	1,385	1,179
	Total	3,966	2,191	1,775	1,187
	% Marked	69	62	78	99
Estimated (Creel) Encounters	UM	2,279	1,753	526	21
	AD	4,411	3,681	730	3,299
	Total	6,690	5,434	1,256	3,320
	% Marked	66	68	58	99

**Table 1.4.4** Comparison of modeled (FRAM model run 1811) and estimated total Chinook mortalities for the Area 6 Chinook MSF from July 1 - August 15, 2011. Values may not add up perfectly due to rounding error. AD = marked (adipose-clipped), UM = unmarked.

Mortality Category	FRAM Chinook Mortalities			Estimated Chinook Mortalities		
	UM	AD	Total	UM	AD	Total
Total (Landed + Released)	211	1,542	1,753	385	3,498	3,883
Released Legal	125	86	211	262	72	334
Released Sublegal	78	277	355	102	127	229
Landed Only	8	1,179	1,187	21	3,299	3,320



**Figure 1.4.1** Comparison of modeled (FRAM model run 1811) and estimated Chinook encounters and mortalities for the Area 6 Chinook MSF from July 1 - August 15, 2011. Error bars represent 95% confidence intervals for field estimates.

**Table 1.4.5** Season total sample rate (Total retained Chinook sampled during baseline sampling / Estimated retained Chinook) in the Area 6 Chinook MSF from July 1 - August 15, 2011.

Time period	Estimated Retained Chinook			Number of Chinook Sampled			Sample Rate
	AD	UM	Total	AD	UM	Total	
Season Total	3,299	21	3,320	983	6	989	29.8%

**Table 1.4.6** Summary of double-index tagged (DIT) Chinook kept by anglers, and estimated total mortality of unmarked DIT Chinook due to hook-and-release impacts resulting from the Area 6 Chinook MSF from July 1 - August 15, 2011. AD = marked (adipose-clipped), UM = unmarked.

Hatchery	Brood Year	DITs Obs'd	AD DIT Harvest		UM DIT Enc.	UM DIT Mortality		
			Est.	var(Est.)		Est.	var(Est.)	SE(Est.)
Clear Creek Hatchery	2007	2	6.7	15.82	6.7	0.7	0.156	0.56
	2008	1	3.4	7.91	3.4	0.3	0.079	0.28
George Adams Hatchery	2007	6	20.1	47.47	20.3	2.0	0.484	1.70
	2008	3	10.1	23.74	10.0	1.0	0.235	0.84
Grovers Creek Hatchery	2007	7	23.5	55.38	23.5	2.4	0.6	1.97
	2008	1	3.4	7.91	3.7	0.4	0.1	0.31
Chilliwack River Hatchery	2008	2	6.7	15.82	6.7	0.7	0.2	0.57
Kendall Creek Hatchery	2007	1	3.4	7.91	3.4	0.3	0.1	0.28
Samish Hatchery	2007	3	10.1	23.74	10.3	1.0	0.2	0.86
Soos Creek Hatchery	2007	3	10.1	23.74	10.1	1.0	0.2	0.84
Spring Creek NFH	2008	1	3.4	7.91	4.9	0.5	0.2	0.41
<b>Total</b>		<b>30</b>	<b>100.7</b>	<b>237.36</b>	<b>103.0</b>	<b>10.3</b>	<b>2.5</b>	<b>8.63</b>

## 2 MARINE AREA 12

In this section, we present estimates of total encounters and mortalities for the Marine Area 12 winter MSFs in 2009-10 and 2010-2011, which were monitored using baseline sampling. Information regarding sample sites, dockside sampling and interview data, and voluntary trip reports (VTR) related to these fisheries can be found in previous reports (WDFW 2011a, WDFW 2012b). Table 2.1 provides CRC-based total Chinook harvest estimates and variances for each year, along with the recommended estimation method based on VTR sample sizes and the resulting precision of encounters estimates. Sample sizes of VTR encounters were insufficient in both years, requiring the estimation of total encounters using the M1 approach (WDFW and NWIFC 2013). Table 2.2 provides the counts of retained and released salmon from dockside interview data required to produce M1 estimates of total Chinook encounters.

**Table 2.1** Summary of CRC-based total Chinook harvest estimates for the 2009-10 and 2010-2011 Area 12 winter MSFs.

Year	Total Chinook Harvest	Variance	Estimation Method
2009-10	252	1,026	M1
2010-11	435	6,489	M1

**Table 2.2** Number of Chinook retained and released by mark-status, number of other salmon (positively identified species other than Chinook) released and number of salmon of unidentified species released, from dockside interviews conducted during Baseline Sampling.

Year	Chinook Retained		Chinook Released			Other Salmon Released	Unidentified Salmon Released
	AD	UM	AD	UM	UNK		
2009-10	121	0	132	39	97	1	4
2010-11	78	1	77	29	48	0	0

## 2.1 Winter 2009-10

**Table 2.1.1** Summary of VTR encounters and harvested Chinook sampled during dockside sampling for the Area 12 Chinook MSF from February 1 - April 30, 2010. AD = marked (adipose-clipped), UM = unmarked.

Data Type	LM	LU	SM	SU	Total
VTR Encounters	2	6	8	4	20
Dockside Harvest	117	0	4	0	121

**Table 2.1.2** Summary of season-wide fishery impact estimates for the Area 12 Chinook MSF from February 1 - April 30, 2010. Release mortality rate = 0.15 for legal fish and 0.20 for sublegal fish. Values may not add up perfectly due to rounding error. AD = marked (adipose-clipped), UM = unmarked.

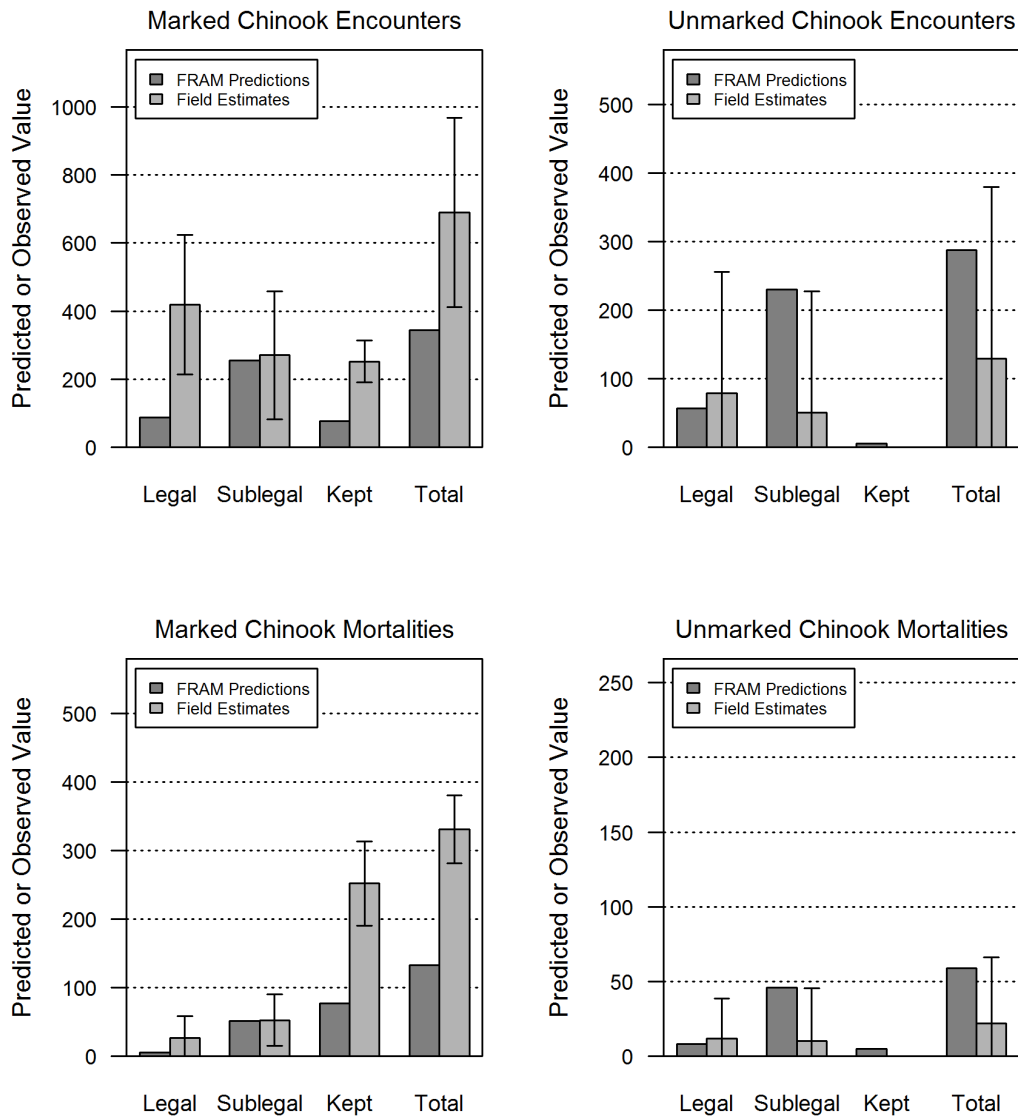
Size/mark group	Encounters	Retained	Released	Release Mortality	Total Mortality	Var	SE	95% CI	CV (%)
Legal AD	419	244	176	26	270	1,243	35	201 - 339	13
Legal UM	79	0	79	12	12	184	14	0 - 38	115
Sublegal AD	270	8	262	52	61	389	20	22 - 99	32
Sublegal UM	51	0	51	10	10	325	18	0 - 45	178
<b>Total</b>	<b>818</b>	<b>252</b>	<b>566</b>	<b>101</b>	<b>353</b>	<b>2,172</b>	<b>47</b>	<b>261 - 444</b>	<b>13</b>

**Table 2.1.3** Comparison of modeled (FRAM model run 2309) and estimated total Chinook encounters for the Area 12 Chinook MSF from February 1 - April 30, 2010. Values may not add up perfectly due to rounding error. AD = marked (adipose-clipped), UM = unmarked.

Data Source	Group	Total Encounters	Legal	Sublegal	Landed Only
FRAM Encounters	UM	287	57	230	5
	AD	343	88	255	77
	Total	630	145	485	82
	% Marked	54	61	53	94
Estimated (Creel) Encounters	UM	129	79	51	0
	AD	689	419	270	252
	Total	818	498	321	252
	% Marked	84	84	84	100

**Table 2.1.4** Comparison of modeled (FRAM model run 2309) and estimated total Chinook mortalities for the Area 12 Chinook MSF from February 1 - April 30, 2010. Values may not add up perfectly due to rounding error. AD = marked (adipose-clipped), UM = unmarked.

Mortality Category	FRAM Chinook Mortalities			Estimated Chinook Mortalities		
	UM	AD	Total	UM	AD	Total
Total (Landed + Released)	59	133	192	22	331	353
Released Legal	8	5	13	12	26	38
Released Sublegal	46	51	97	10	52	62
Landed Only	5	77	82	0	252	252



**Figure 2.1.1** Comparison of modeled (FRAM model run 2309) and estimated Chinook encounters and mortalities for the Area 12 Chinook MSF from February 1 - April 30, 2010. Error bars represent 95% confidence intervals for field estimates.

**Table 2.1.5** Season total sample rate (Total retained Chinook sampled during baseline sampling / Estimated retained Chinook) in the Area 12 Chinook MSF from February 1 - April 30, 2010.

Time period	Estimated Retained Chinook			Number of Chinook Sampled			Sample Rate
	AD	UM	Total	AD	UM	Total	
Season Total	252	0	252	121	0	121	48.0%

**Table 2.1.6** Summary of double-index tagged (DIT) Chinook kept by anglers, and estimated total mortality of unmarked DIT Chinook due to hook-and-release impacts resulting from the Area 12 Chinook MSF from February 1 - April 30, 2010. AD = marked (adipose-clipped), UM = unmarked.

Hatchery	Brood Year	DITs Obs'd	AD DIT Harvest		UM DIT Enc.	UM DIT Mortality		
			Est.	var(Est.)		Est.	var(Est.)	SE(Est.)
Clear Creek Hatchery	2007	2	4.2	4.51	4.1	0.4	0.044	0.30
George Adams Hatchery	2007	6	12.5	13.53	12.6	1.3	0.138	0.91
Samish Hatchery	2007	4	8.3	9.02	8.5	0.9	0.095	0.62
<b>Total</b>		12	25.0	27.06	25.3	2.5	0.277	1.82



## 2.2 Winter 2010-11

**Table 2.2.1** Summary of VTR encounters and harvested Chinook sampled during dockside sampling for the Area 12 Chinook MSF from February 1 - April 30, 2011. AD = marked (adipose-clipped), UM = unmarked.

Data Type	LM	LU	SM	SU	Total
VTR Encounters	6	2	9	6	23
Dockside Harvest	77	1	1	0	79

**Table 2.2.2** Summary of season-wide fishery impact estimates for the Area 12 Chinook MSF from February 1 - April 30, 2011. Release mortality rate = 0.15 for legal fish and 0.20 for sublegal fish. Values may not add up perfectly due to rounding error. AD = marked (adipose-clipped), UM = unmarked.

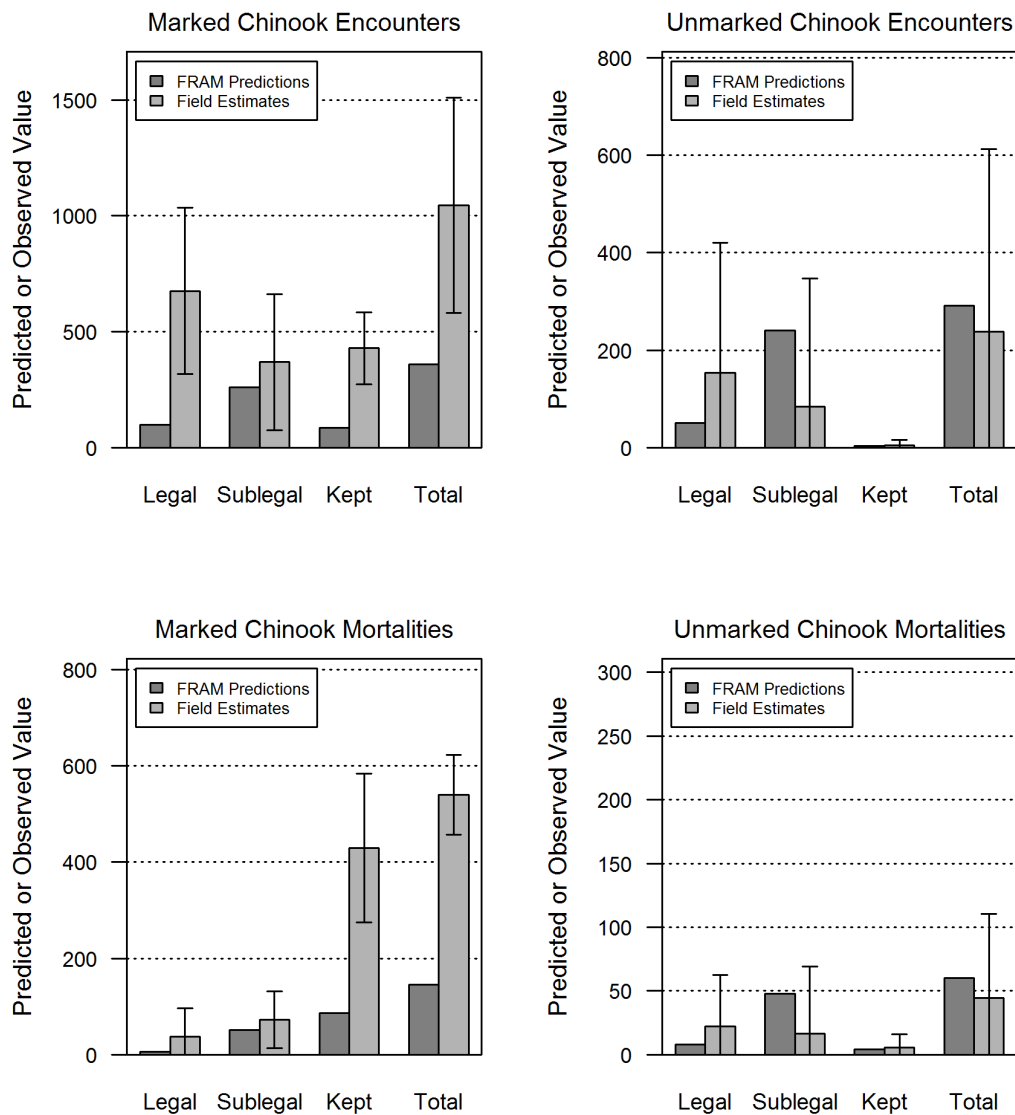
Size/mark group	Encounters	Retained	Released	Release Mortality	Total Mortality	Var	SE	95% CI	CV (%)
Legal AD	676	424	252	38	462	7,114	84	296 - 627	18
Legal UM	154	6	148	22	28	448	21	0 - 69	76
Sublegal AD	370	6	364	73	78	928	30	19 - 138	39
Sublegal UM	84	0	84	17	17	719	27	0 - 69	160
<b>Total</b>	<b>1,283</b>	<b>435</b>	<b>848</b>	<b>150</b>	<b>585</b>	<b>9,415</b>	<b>97</b>	<b>394 - 775</b>	<b>17</b>

**Table 2.2.3** Comparison of modeled (FRAM model run 1010) and estimated total Chinook encounters for the Area 12 Chinook MSF from February 1 - April 30, 2011. Values may not add up perfectly due to rounding error. AD = marked (adipose-clipped), UM = unmarked.

Data Source	Group	Total Encounters	Legal	Sublegal	Landed Only
FRAM Encounters	UM	291	51	240	4
	AD	360	100	260	87
	Total	651	151	500	91
	% Marked	55	66	52	96
Estimated (Creel) Encounters	UM	237	154	84	6
	AD	1,045	676	370	429
	Total	1,283	829	454	435
	% Marked	81	81	81	99

**Table 2.2.4** Comparison of modeled (FRAM model run 1010) and estimated total Chinook mortalities for the Area 12 Chinook MSF from February 1 - April 30, 2011. Values may not add up perfectly due to rounding error. AD = marked (adipose-clipped), UM = unmarked.

Mortality Category	FRAM Chinook Mortalities			Estimated Chinook Mortalities		
	UM	AD	Total	UM	AD	Total
Total (Landed + Released)	60	145	205	45	540	585
Released Legal	8	6	14	22	38	60
Released Sublegal	48	52	100	17	73	90
Landed Only	4	87	91	6	429	435



**Figure 2.2.1** Comparison of modeled (FRAM model run 1010) and estimated Chinook encounters and mortalities for the Area 12 Chinook MSF from February 1 - April 30, 2011. Error bars represent 95% confidence intervals for field estimates.

**Table 2.2.5** Season total sample rate (Total retained Chinook sampled during baseline sampling / Estimated retained Chinook) in the Area 12 Chinook MSF from February 1 - April 30, 2011.

Time period	Estimated Retained Chinook			Number of Chinook Sampled			Sample Rate
	AD	UM	Total	AD	UM	Total	
Season Total	429	6	435	78	1	79	18.2%

**Table 2.2.6** Summary of double-index tagged (DIT) Chinook kept by anglers, and estimated total mortality of unmarked DIT Chinook due to hook-and-release impacts resulting from the Area 12 Chinook MSF from February 1 - April 30, 2011. AD = marked (adipose-clipped), UM = unmarked.

Hatchery	Brood Year	DITs Obs'd	AD DIT Harvest		UM DIT Enc.	UM DIT Mortality		
			Est.	var(Est.)		Est.	var(Est.)	SE(Est.)
Clear Creek Hatchery	2007	1	5.5	24.81	5.5	0.5	0.244	0.49
George Adams Hatchery	2007	1	5.5	24.81	5.6	0.6	0.253	0.50
	2008	1	5.5	24.81	5.5	0.5	0.246	0.50
<b>Total</b>		3	16.5	74.44	16.5	1.7	0.743	1.49

### 3 MARINE AREA 13

In this section, we present estimates of total encounters and mortalities for the Marine Area 13 summer MSFs in 2007, 2008, 2009, 2010 and 2011, which were monitored using baseline sampling. Information regarding sample sites, dockside sampling and interview data, and voluntary trip reports (VTR) related to these fisheries can be found in previous reports (WDFW 2007a, WDFW 2009b, WDFW 2010b, WDFW 2011b, WDFW 2012c). Table 3.1 provides CRC-based total Chinook harvest estimates and variances for each year, along with the recommended estimation method based on VTR sample sizes and the resulting precision of encounters estimates. Sample sizes of VTR encounters were sufficient in 2008 and 2010, allowing us to use the bias-corrected M2 approach. In 2007, 2009 and 2011, however, VTR sample sizes were insufficient, requiring us to estimate total encounters using the M1 approach. (WDFW and NWIFC 2013). Table 3.2 provides the counts of retained and released salmon from dockside interview data required to produce M1 estimates of total Chinook encounters. No DIT coded wire tags were recovered during the 2010 summer MSF in Marine Area 13.

**Table 3.1** Summary of CRC-based total Chinook harvest estimates for the 2007 -2011 Area 13 summer MSFs.

Year	Total Chinook Harvest	Variance	Estimation Method
2007	2,876	113,855	M1
2008	1,335	15,262	M2
2009	1,268	12,176	M1
2010	667	8,776	M2
2011	1,022	26,944	M1

**Table 3.2** Number of Chinook retained and released by mark-status, number of other salmon (positively identified species other than Chinook) released and number of salmon of unidentified species released, from dockside interviews conducted during Baseline Sampling.

Year	Chinook Retained		Chinook Released			Other Salmon Released	Unidentified Salmon Released
	AD	UM	AD	UM	UNK		
2007	359	10	197	165	362	203	17
2009	52	1	47	18	52	28	3
2011	126	1	35	22	47	631	2

### 3.1 Summer 2007

**Table 3.1.1** Summary of VTR encounters and harvested Chinook sampled during dockside sampling for the Area 13 Chinook MSF from May 1 - September 30, 2007. AD = marked (adipose-clipped), UM = unmarked.

Data Type	LM	LU	SM	SU	Total
VTR Encounters	12	11	28	4	55
Dockside Harvest	346	10	13	0	369

**Table 3.1.2** Summary of season-wide fishery impact estimates for the Area 13 Chinook MSF from May 1 - September 30, 2007. Release mortality rate = 0.15 for legal fish and 0.20 for sublegal fish. Values may not add up perfectly due to rounding error. AD = marked (adipose-clipped), UM = unmarked.

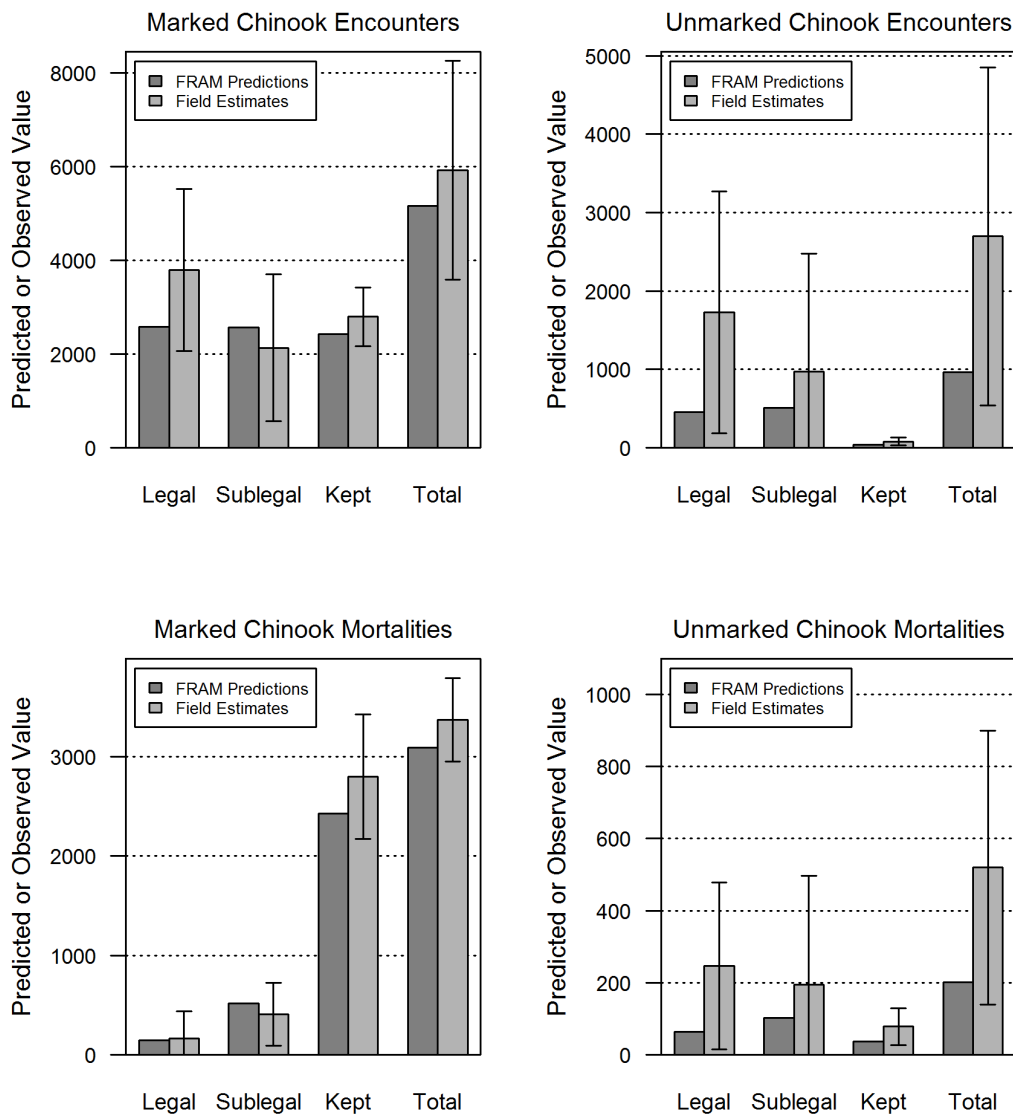
Size/mark group	Encounters	Retained	Released	Release Mortality	Total Mortality	Var	SE	95% CI	CV (%)
Legal AD	3,792	2,697	1,095	164	2,861	121,147	348	2,179 - 3,543	12
Legal UM	1,726	78	1,648	247	325	14,618	121	88 - 562	37
Sublegal AD	2,133	101	2,032	406	508	26,568	163	188 - 827	32
Sublegal UM	971	0	971	194	194	23,651	154	0 - 496	79
<b>Total</b>	<b>8,622</b>	<b>2,876</b>	<b>5,746</b>	<b>1,012</b>	<b>3,888</b>	<b>196,876</b>	<b>444</b>	<b>3,018 - 4,758</b>	<b>11</b>

**Table 3.1.3** Comparison of modeled (FRAM model run 3907) and estimated total Chinook encounters for the Area 13 Chinook MSF from May 1 - September 30, 2007. Values may not add up perfectly due to rounding error. AD = marked (adipose-clipped), UM = unmarked.

Data Source	Group	Total Encounters	Legal	Sublegal	Landed Only
FRAM Encounters	UM	964	454	510	37
	AD	5,158	2,583	2,575	2,428
	Total	6,122	3,037	3,085	2,465
	% Marked	84	85	83	98
Estimated (Creel) Encounters	UM	2,697	1,726	971	78
	AD	5,925	3,792	2,133	2,798
	Total	8,622	5,518	3,104	2,876
	% Marked	69	69	69	97

**Table 3.1.4** Comparison of modeled (FRAM model run 3907) and estimated total Chinook mortalities for the Area 13 Chinook MSF from May 1 - September 30, 2007. Values may not add up perfectly due to rounding error. AD = marked (adipose-clipped), UM = unmarked.

Mortality Category	FRAM Chinook Mortalities			Estimated Chinook Mortalities		
	UM	AD	Total	UM	AD	Total
Total (Landed + Released)	202	3,088	3,290	519	3,369	3,888
Released Legal	63	145	208	247	164	412
Released Sublegal	102	515	617	194	406	601
Landed Only	37	2,428	2,465	78	2,798	2,876



**Figure 3.1.1** Comparison of modeled (FRAM model run 3907) and estimated Chinook encounters and mortalities for the Area 13 Chinook MSF from May 1 - September 30, 2007. Error bars represent 95% confidence intervals for field estimates.

**Table 3.1.5** Season total sample rate (Total retained Chinook sampled during baseline sampling / Estimated retained Chinook) in the Area 13 Chinook MSF from May 1 - September 30, 2007.

Time period	Estimated Retained Chinook			Number of Chinook Sampled			Sample Rate
	AD	UM	Total	AD	UM	Total	
Season Total	2,798	78	2,876	359	10	369	12.8%

**Table 3.1.6** Summary of double-index tagged (DIT) Chinook kept by anglers, and estimated total mortality of unmarked DIT Chinook due to hook-and-release impacts resulting from the Area 13 Chinook MSF from May 1 - September 30, 2007. AD = marked (adipose-clipped), UM = unmarked.

Hatchery	Brood Year	DITs Obs'd	AD DIT Harvest		UM DIT Enc.	UM DIT Mortality		
			Est.	var(Est.)		Est.	var(Est.)	SE(Est.)
Clear Creek Hatchery	2003	1	7.8	52.95	7.7	0.8	0.514	0.72
	2004	2	15.6	105.91	15.8	1.6	1.083	1.47
George Adams Hatchery	2004	1	7.8	52.95	7.8	0.8	0.525	0.72
Grovers Creek Hatchery	2003	1	7.8	52.95	7.3	0.7	0.466	0.68
Chilliwack River Hatchery	2005	1	7.8	52.95	7.9	0.8	0.546	0.74
Marblemount Hatchery	2004	2	15.6	105.91	15.4	1.5	1.027	1.43
Soos Creek Hatchery	2005	1	7.8	52.95	8.0	0.8	0.556	0.75
<b>Total</b>		12	70.1	476.58	69.8	7.0	4.717	6.51

### 3.2 Summer 2008

**Table 3.2.1** Summary of VTR encounters and harvested Chinook sampled during dockside sampling for the Area 13 Chinook MSF from May 1 - September 30, 2008. AD = marked (adipose-clipped), UM = unmarked.

Data Type	LM	LU	SM	SU	Total
VTR Encounters	31	4	5	2	42
Dockside Harvest	169	0	1	0	170

**Table 3.2.2** Summary of season-wide fishery impact estimates for the Area 13 Chinook MSF from May 1 - September 30, 2008. Release mortality rate = 0.15 for legal fish and 0.20 for sublegal fish. Values may not add up perfectly due to rounding error. AD = marked (adipose-clipped), UM = unmarked.

Size/mark group	Encounters	Retained	Released	Release Mortality	Total Mortality	Var	SE	95% CI	CV (%)
Legal AD	1,525	1,327	198	30	1,357	16,833	130	1,103 - 1,611	10
Legal UM	197	0	197	30	30	214	15	1 - 58	49
Sublegal AD	246	8	238	48	55	535	23	10 - 101	42
Sublegal UM	98	0	98	20	20	192	14	0 - 47	70
<b>Total</b>	<b>2,067</b>	<b>1,335</b>	<b>732</b>	<b>127</b>	<b>1,462</b>	<b>17,774</b>	<b>133</b>	<b>1,200 - 1,723</b>	<b>9</b>

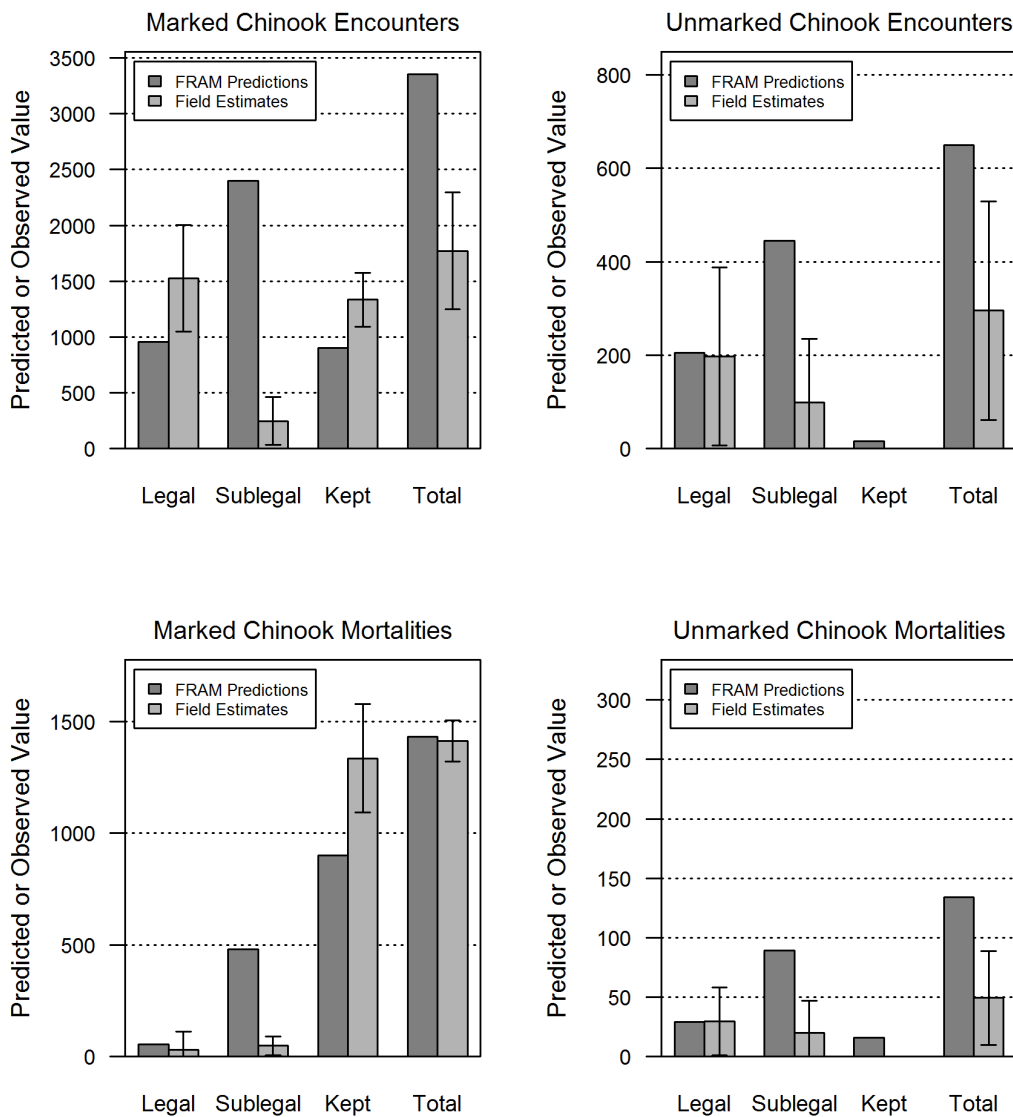
**Table 3.2.3** Comparison of modeled (FRAM model run 2108) and estimated total Chinook encounters for the Area 13 Chinook MSF from May 1 - September 30, 2008. Values may not add up perfectly due to rounding error. AD = marked (adipose-clipped), UM = unmarked.

Data Source	Group	Total Encounters	Legal	Sublegal	Landed Only
FRAM Encounters	UM	650	205	445	16
	AD	3,357	957	2,400	899
	Total	4,007	1,162	2,845	915
	% Marked	84	82	84	98
Estimated (Creel) Encounters	UM	295	197	98	0
	AD	1,771	1,525	246	1,335
	Total	2,067	1,722	344	1,335
	% Marked	86	89	71	100



**Table 3.2.4** Comparison of modeled (FRAM model run 2108) and estimated total Chinook mortalities for the Area 13 Chinook MSF from May 1 - September 30, 2008. Values may not add up perfectly due to rounding error. AD = marked (adipose-clipped), UM = unmarked.

Mortality Category	FRAM Chinook Mortalities			Estimated Chinook Mortalities		
	UM	AD	Total	UM	AD	Total
Total (Landed + Released)	134	1,432	1,566	49	1,412	1,462
Released Legal	29	53	82	30	30	59
Released Sublegal	89	480	569	20	48	67
Landed Only	16	899	915	0	1,335	1,335



**Figure 3.2.1** Comparison of modeled (FRAM model run 2108) and estimated Chinook encounters and mortalities for the Area 13 Chinook MSF from May 1 - September 30, 2008. Error bars represent 95% confidence intervals for field estimates.

**Table 3.2.5** Season total sample rate (Total retained Chinook sampled during baseline sampling / Estimated retained Chinook) in the Area 13 Chinook MSF from May 1 - September 30, 2008.

Time period	Estimated Retained Chinook			Number of Chinook Sampled			Sample Rate
	AD	UM	Total	AD	UM	Total	
Season Total	1,335	0	1,335	170	0	170	12.7%

**Table 3.2.6** Summary of double-index tagged (DIT) Chinook kept by anglers, and estimated total mortality of unmarked DIT Chinook due to hook-and-release impacts resulting from the Area 13 Chinook MSF from May 1 - September 30, 2008. AD = marked (adipose-clipped), UM = unmarked.

Hatchery	Brood Year	DITs Obs'd	AD DIT Harvest		UM DIT Enc.	UM DIT Mortality		
			Est.	var(Est.)		Est.	var(Est.)	SE(Est.)
Clear Creek Hatchery	2004	1	7.9	53.82	7.9	0.8	0.551	0.74
<b>Total</b>		1	7.9	53.82	7.9	0.8	0.551	0.74

### 3.3 Summer 2009

**Table 3.3.1** Summary of VTR encounters and harvested Chinook sampled during dockside sampling for the Area 13 Chinook MSF from May 1 - September 30, 2009. AD = marked (adipose-clipped), UM = unmarked.

Data Type	LM	LU	SM	SU	Total
VTR Encounters	13	9	12	2	36
Dockside Harvest	49	1	3	0	53

**Table 3.3.2** Summary of season-wide fishery impact estimates for the Area 13 Chinook MSF from May 1 - September 30, 2009. Release mortality rate = 0.15 for legal fish and 0.20 for sublegal fish. Values may not add up perfectly due to rounding error. AD = marked (adipose-clipped), UM = unmarked.

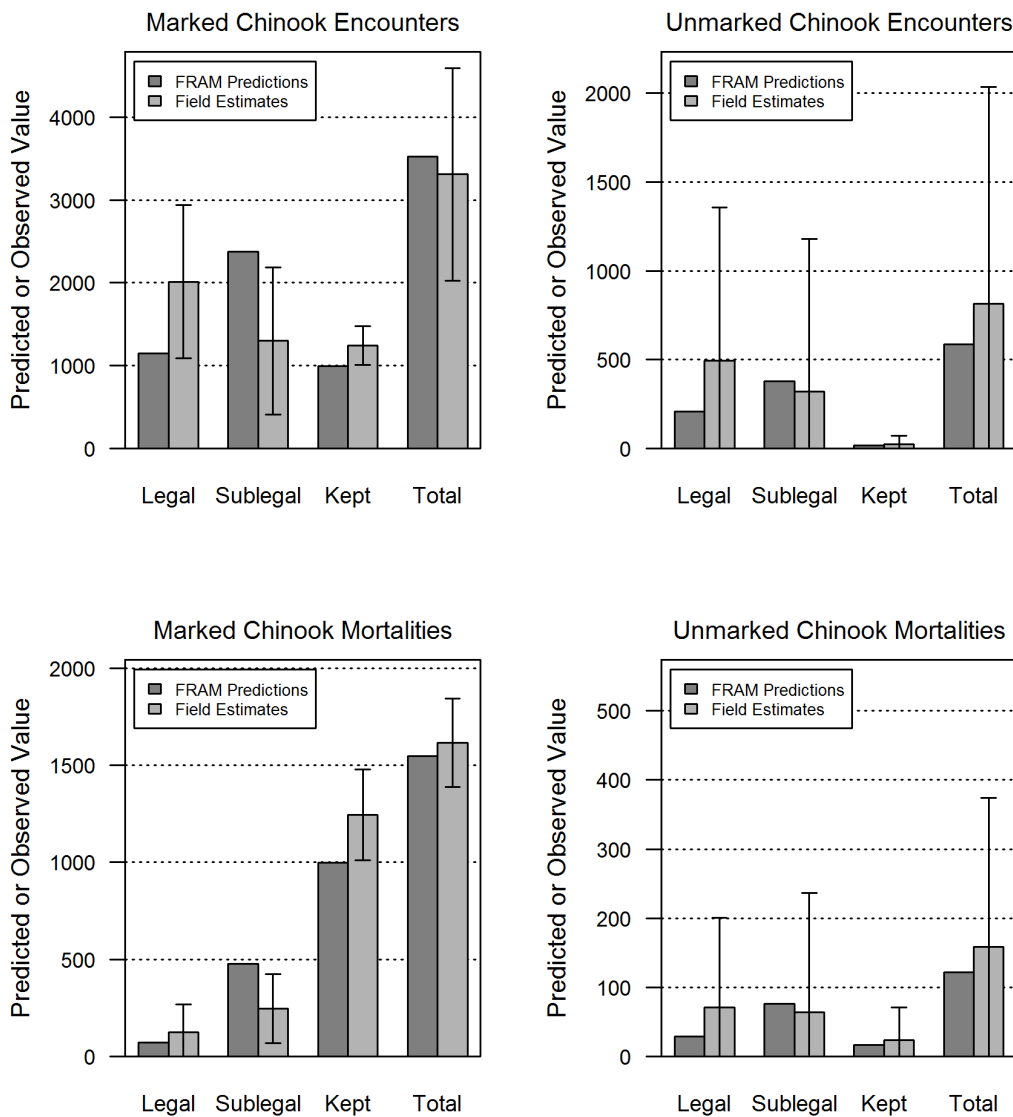
Size/mark group	Encounters	Retained	Released	Release Mortality	Total Mortality	Var	SE	95% CI	CV (%)
Legal AD	2,011	1,172	839	126	1,298	17,831	134	1,036 - 1,560	10
Legal UM	495	24	471	71	95	4,938	70	0 - 232	74
Sublegal AD	1,299	72	1,227	245	317	9,919	100	122 - 512	31
Sublegal UM	320	0	320	64	64	7,695	88	0 - 236	137
<b>Total</b>	<b>4,125</b>	<b>1,268</b>	<b>2,857</b>	<b>506</b>	<b>1,774</b>	<b>37,760</b>	<b>194</b>	<b>1,393 - 2,155</b>	<b>11</b>

**Table 3.3.3** Comparison of modeled (FRAM model run 2309) and estimated total Chinook encounters for the Area 13 Chinook MSF from May 1 - September 30, 2009. Values may not add up perfectly due to rounding error. AD = marked (adipose-clipped), UM = unmarked.

Data Source	Group	Total Encounters	Legal	Sublegal	Landed Only
FRAM Encounters	UM	588	208	380	17
	AD	3,554	1,174	2,380	998
	Total	4,142	1,382	2,760	1,015
	% Marked	86	85	86	98
Estimated (Creel) Encounters	UM	815	495	320	24
	AD	3,310	2,011	1,299	1,244
	Total	4,125	2,507	1,618	1,268
	% Marked	80	80	80	98

**Table 3.3.4** Comparison of modeled (FRAM model run 2309) and estimated total Chinook mortalities for the Area 13 Chinook MSF from May 1 - September 30, 2009. Values may not add up perfectly due to rounding error. AD = marked (adipose-clipped), UM = unmarked.

Mortality Category	FRAM Chinook Mortalities			Estimated Chinook Mortalities		
	UM	AD	Total	UM	AD	Total
Total (Landed + Released)	122	1,547	1,669	159	1,615	1,774
Released Legal	29	73	102	71	126	197
Released Sublegal	76	476	552	64	245	309
Landed Only	17	998	1,015	24	1,244	1,268



**Figure 3.3.1** Comparison of modeled (FRAM model run 2309) and estimated Chinook encounters and mortalities for the Area 13 Chinook MSF from May 1 - September 30, 2009. Error bars represent 95% confidence intervals for field estimates.

**Table 3.3.5** Season total sample rate (Total retained Chinook sampled during baseline sampling / Estimated retained Chinook) in the Area 13 Chinook MSF from May 1 - September 30, 2009.

Time period	Estimated Retained Chinook			Number of Chinook Sampled			Sample Rate
	AD	UM	Total	AD	UM	Total	
Season Total	1,244	24	1,268	52	1	53	4.2%

**Table 3.3.6** Summary of double-index tagged (DIT) Chinook kept by anglers, and estimated total mortality of unmarked DIT Chinook due to hook-and-release impacts resulting from the Area 13 Chinook MSF from May 1 - September 30, 2009. AD = marked (adipose-clipped), UM = unmarked.

Hatchery	Brood Year	DITs Obs'd	AD DIT Harvest		UM DIT Enc.	UM DIT Mortality		
			Est.	var(Est.)		Est.	var(Est.)	SE(Est.)
George Adams Hatchery	2006	1	23.9	548.46	26.4	2.6	6.671	2.58
<b>Total</b>		1	23.9	548.46	26.4	2.6	6.671	2.58

### 3.4 Summer 2010

**Table 3.4.1** Summary of VTR encounters and harvested Chinook sampled during dockside sampling for the Area 13 Chinook MSF from May 1 - September 30, 2010. AD = marked (adipose-clipped), UM = unmarked.

<b>Data Type</b>	<b>LM</b>	<b>LU</b>	<b>SM</b>	<b>SU</b>	<b>Total</b>
VTR Encounters	21	3	3	1	28
Dockside Harvest	62	2	0	0	64

**Table 3.4.2** Summary of season-wide fishery impact estimates for the Area 13 Chinook MSF from May 1 - September 30, 2010. Release mortality rate = 0.15 for legal fish and 0.20 for sublegal fish. Values may not add up perfectly due to rounding error. AD = marked (adipose-clipped), UM = unmarked.

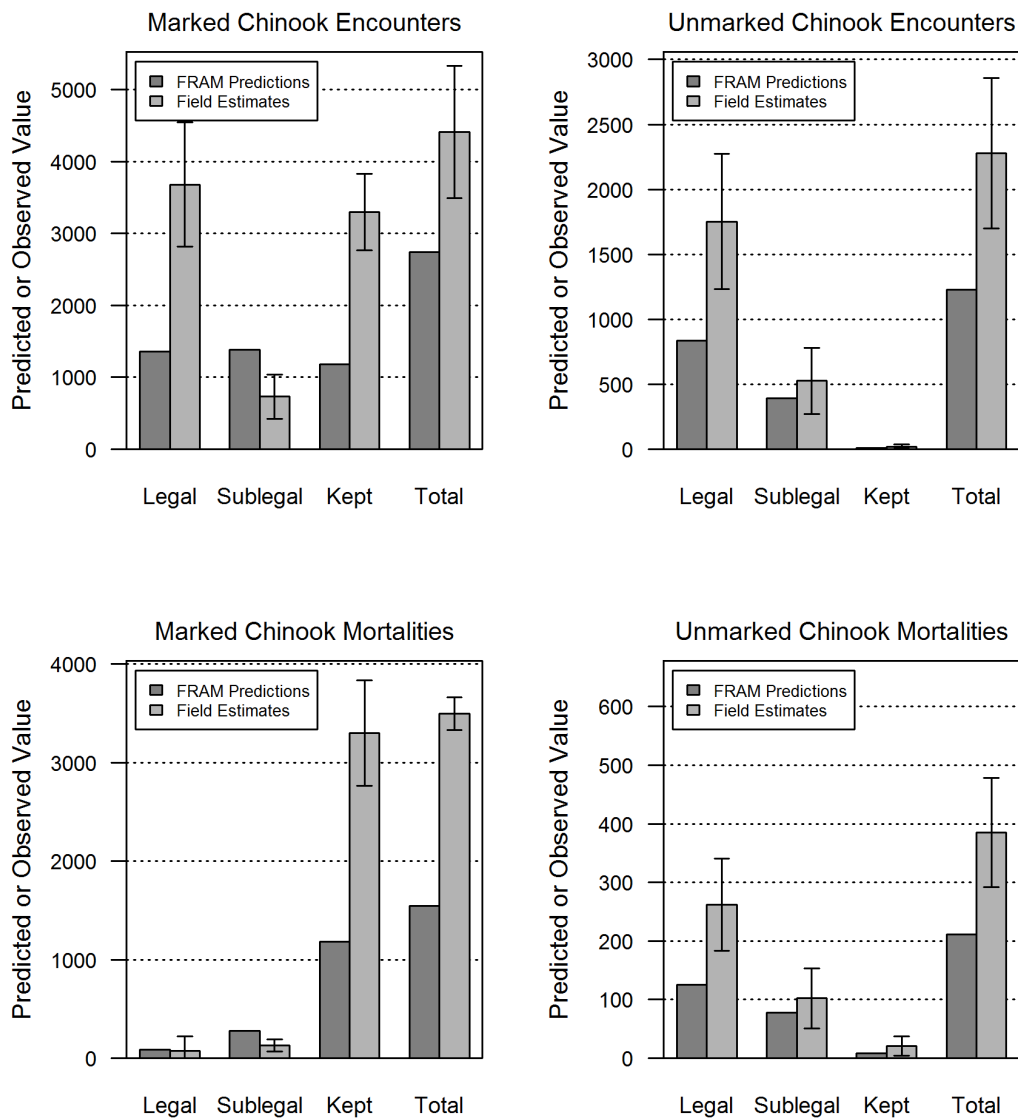
<b>Size/mark group</b>	<b>Encounters</b>	<b>Retained</b>	<b>Released</b>	<b>Release Mortality</b>	<b>Total Mortality</b>	<b>Var</b>	<b>SE</b>	<b>95% CI</b>	<b>CV (%)</b>
Legal AD	743	646	97	14	661	9,189	96	473 - 849	15
Legal UM	106	21	85	13	34	307	18	0-68	52
Sublegal AD	106	0	106	21	21	149	12	0-45	58
Sublegal UM	35	0	35	7	7	50	7	0-21	100
<b>Total</b>	<b>990</b>	<b>667</b>	<b>323</b>	<b>56</b>	<b>723</b>	<b>9,695</b>	<b>98</b>	<b>530 - 916</b>	<b>14</b>

**Table 3.4.3** Comparison of modeled (FRAM model run 1010) and estimated total Chinook encounters for the Area 13 Chinook MSF from May 1 - September 30, 2010. Values may not add up perfectly due to rounding error. AD = marked (adipose-clipped), UM = unmarked.

<b>Data Source</b>	<b>Group</b>	<b>Total Encounters</b>	<b>Legal</b>	<b>Sublegal</b>	<b>Landed Only</b>
FRAM Encounters	UM	560	160	400	12
	AD	3,364	989	2,375	860
	Total	3,924	1,149	2,775	872
	% Marked	86	86	86	99
Estimated (Creel) Encounters	UM	141	106	35	21
	AD	849	743	106	646
	Total	990	849	141	667
	% Marked	86	88	75	97

**Table 3.4.4** Comparison of modeled (FRAM model run 1010) and estimated total Chinook mortalities for the Area 13 Chinook MSF from May 1 - September 30, 2010. Values may not add up perfectly due to rounding error. AD = marked (adipose-clipped), UM = unmarked.

Mortality Category	FRAM Chinook Mortalities			Estimated Chinook Mortalities		
	UM	AD	Total	UM	AD	Total
Total (Landed + Released)	115	1,397	1,512	41	682	723
Released Legal	23	62	85	13	14	27
Released Sublegal	80	475	555	7	21	28
Landed Only	12	860	872	21	646	667



**Figure 3.4.1** Comparison of modeled (FRAM model run 1010) and estimated Chinook encounters and mortalities for the Area 13 Chinook MSF from May 1 - September 30, 2010. Error bars represent 95% confidence intervals for field estimates.

**Table 3.4.5** Season total sample rate (Total retained Chinook sampled during baseline sampling / Estimated retained Chinook) in the Area 13 Chinook MSF from May 1 - September 30, 2010.

Time period	Estimated Retained Chinook			Number of Chinook Sampled			Sample Rate
	AD	UM	Total	AD	UM	Total	
Season Total	646	21	667	62	2	64	9.6%



### 3.5 Summer 2011

**Table 3.5.1** Summary of VTR encounters and harvested Chinook sampled during dockside sampling for the Area 13 Chinook MSF from May 1 - September 30, 2011. AD = marked (adipose-clipped), UM = unmarked.

Data Type	LM	LU	SM	SU	Total
VTR Encounters	12	8	0	1	21
Dockside Harvest	125	1	1	0	127

**Table 3.5.2** Summary of season-wide fishery impact estimates for the Area 13 Chinook MSF from May 1 - September 30, 2011. Release mortality rate = 0.15 for legal fish and 0.20 for sublegal fish. Values may not add up perfectly due to rounding error. AD = marked (adipose-clipped), UM = unmarked.

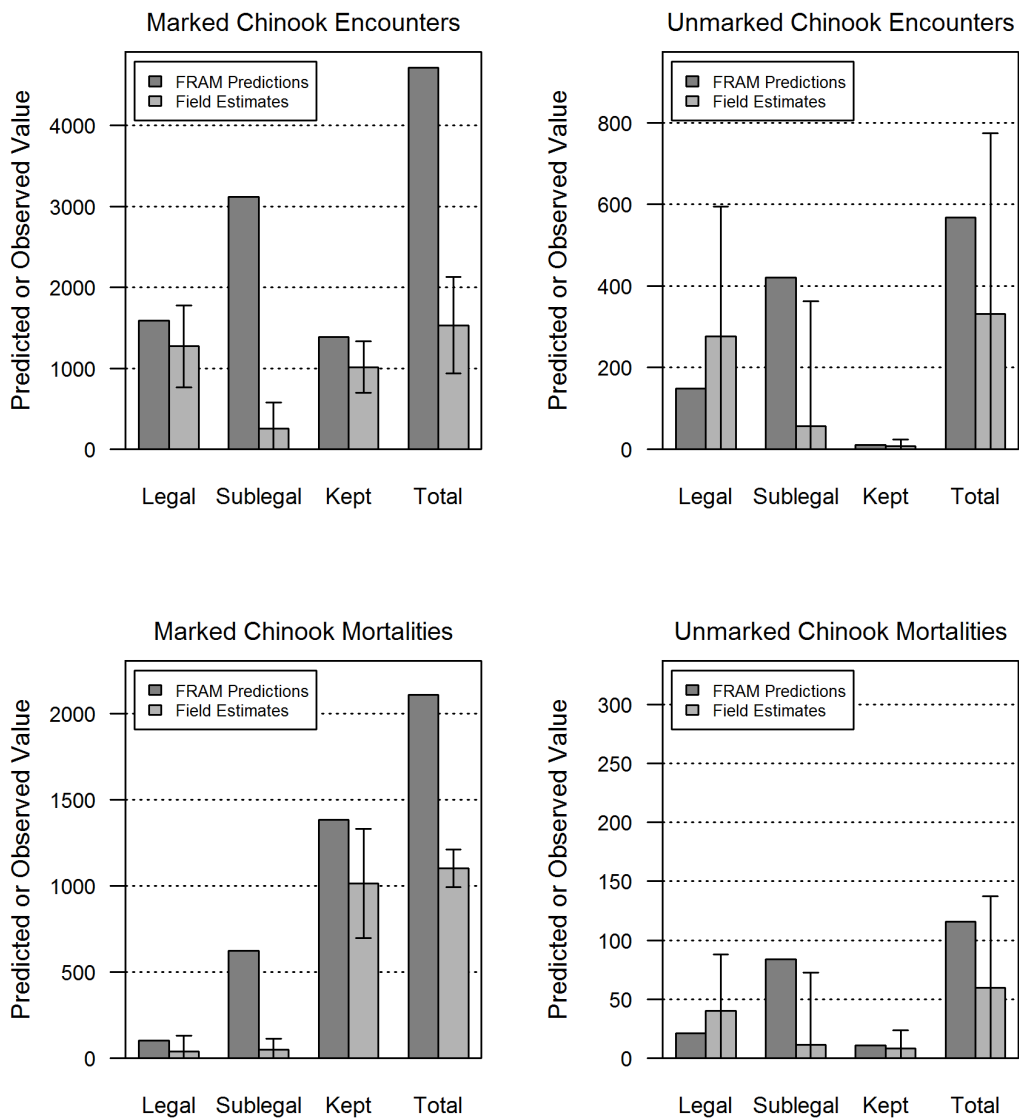
Size/mark group	Encounters	Retained	Released	Release Mortality	Total Mortality	Var	SE	95% CI	CV (%)
Legal AD	1,271	1,006	266	40	1,046	28,304	168	716 - 1,375	16
Legal UM	276	8	268	40	48	659	26	0 - 99	53
Sublegal AD	258	8	250	50	58	1,111	33	0 - 123	57
Sublegal UM	56	0	56	11	11	979	31	0 - 73	280
<b>Total</b>	<b>1,861</b>	<b>1,022</b>	<b>839</b>	<b>141</b>	<b>1,163</b>	<b>31,640</b>	<b>178</b>	<b>815 - 1,512</b>	<b>15</b>

**Table 3.5.3** Comparison of modeled (FRAM model run 1811) and estimated total Chinook encounters for the Area 13 Chinook MSF from May 1 - September 30, 2011. Values may not add up perfectly due to rounding error. AD = marked (adipose-clipped), UM = unmarked.

Data Source	Group	Total Encounters	Legal	Sublegal	Landed Only
FRAM Encounters	UM	568	148	420	11
	AD	4,711	1,591	3,120	1,384
	Total	5,279	1,739	3,540	1,395
	% Marked	89	91	88	99
Estimated (Creel) Encounters	UM	332	276	56	8
	AD	1,529	1,271	258	1,014
	Total	1,861	1,547	314	1,022
	% Marked	82	82	82	99

**Table 3.5.4** Comparison of modeled (FRAM model run 1811) and estimated total Chinook mortalities for the Area 13 Chinook MSF from May 1 - September 30, 2011. Values may not add up perfectly due to rounding error. AD = marked (adipose-clipped), UM = unmarked.

Mortality Category	FRAM Chinook Mortalities			Estimated Chinook Mortalities		
	UM	AD	Total	UM	AD	Total
Total (Landed + Released)	116	2,109	2,225	59	1,104	1,163
Released Legal	21	101	122	40	40	80
Released Sublegal	84	624	708	11	50	61
Landed Only	11	1,384	1,395	8	1,014	1,022



**Figure 3.5.1** Comparison of modeled (FRAM model run 1811) and estimated Chinook encounters and mortalities for the Area 13 Chinook MSF from May 1 - September 30, 2011. Error bars represent 95% confidence intervals for field estimates.

**Table 3.5.5** Season total sample rate (Total retained Chinook sampled during baseline sampling / Estimated retained Chinook) in the Area 13 Chinook MSF from May 1 - September 30, 2011.

Time period	Estimated Retained Chinook			Number of Chinook Sampled			Sample Rate
	AD	UM	Total	AD	UM	Total	
Season Total	1,014	8	1,022	126	1	127	12.4%

**Table 3.5.6** Summary of double-index tagged (DIT) Chinook kept by anglers, and estimated total mortality of unmarked DIT Chinook due to hook-and-release impacts resulting from the Area 13 Chinook MSF from May 1 - September 30, 2011. AD = marked (adipose-clipped), UM = unmarked.

Hatchery	Brood Year	DITs Obs'd	AD DIT Harvest		UM DIT Enc.	UM DIT Mortality		
			Est.	var(Est.)		Est.	var(Est.)	SE(Est.)
Marblemount Hatchery	2008	1	8.0	56.71	7.9	0.8	0.551	0.74
<b>Total</b>		1	8.0	56.71	7.9	0.8	0.551	0.74

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