

WDFW Puget Sound Sampling Program

Monthly Progress Report for April 2006: Areas 8-1 and 8-2 Selective Chinook Fishery Monitoring

1. Introduction

On October 1, 2005 the Puget Sound Sampling Program began intensively monitoring the selective chinook fishery in Areas 8-1 and 8-2. We generated estimates of salmon catch (including total chinook and coho landed and released) and angler effort (total boats and anglers) and reported these estimates on a monthly basis, for the period from October 1, 2005 through April 30, 2006.

During the month of April, as in the previous months of the fishery, sampling was implemented as planned in our sample design document. The study design was based on Murthy's estimator (Cochran 1977) to obtain daily estimates of total catch and effort. Two ramp samplers were stationed at selected sampled sites in Area 8-1, and two ramp samplers were stationed at selected sampled sites in Area 8-2. Permanent sampling staff conducted two boat surveys in Area 8-1 and two boat surveys in Area 8-2 during April, to estimate the percent of effort from sampled sites (versus non-sampled sites) and the proportion of angler effort at each sampled site.

We operated two test boats, one in Area 8-1 and the other in Area 8-2. The crew consisted of two WDFW technicians per boat. These test boats fished approximately five days per week during April (weather permitting). For each hook-up, the encounter number, time sampled, species, mark status, and DNA vial number (if applicable) was recorded. Samplers collected scales, fork lengths, and total lengths on all chinook brought on board. All fish were immediately released.

In this progress report we include in-season preliminary estimates of catch, effort, and encounter rates with accompanying variance estimates for the month of April 2006. In addition, we present cumulative estimates for the entire seven-month fishery, from October 2005 through April 2006. We also include preliminary test fishing results, documentation of how the fishery progressed through April, updates on implementing the sampling plan, and any adjustments needed.

2. Dockside Sampling Methods

Sampling Strata and Shifts

Sampling strata were divided into weekday (Monday through Thursday) and 'weekend' (Friday, Saturday, and Sunday) strata. Each week we randomly selected two days from the Monday through Thursday stratum for dockside sampling. Selected sample days within weekday strata included April 4th, 6th, 11th, 12th, 17th, 18th, 24th, and 26th. In addition, we sampled every Friday, Saturday, and Sunday during the month. Dockside sampling shifts lasted from approximately dawn until dark in order to intercept all boats.

Sampled Sites

Sites to be sampled were selected as follows: Access sites in Areas 8-1 and 8-2 were divided into sampled and non-sampled sites. Access sites with low effort, as determined from boat survey data (see section 3 below) were excluded in the sample. All anglers and fish exiting the fishery through the sampled sites were counted. Any boats that were missed at sampled sites were counted and recorded on the sampling forms.

Area 8-1 Sites

In Area 8-1, for each scheduled sampling day, two sites were randomly selected for sampling based on a weighted random site selection process. We calculated the “weights” (or “size measures”) of Area 8-1 sites based on the most recently available boat survey data. We completed two boat surveys in Area 8-1 during April to update the size measures, as documented in section 3 below.

The ‘sampled sites’ for Area 8-1 included Camano Island State Park Ramp, Cornet Bay Public Ramp, Freeland Ramp (also called Holmes Harbor Ramp), Oak Harbor Public Ramp, Maple Grove Ramp, Utsalady Ramp, LaConner Ramp, and Coupeville Ramp (Table 1). Table 1 also lists the dates that these ramps were randomly selected for sampling during April.

Table 1. List of possible ‘sampled sites’ for the Area 8-1 selective chinook fishery and dates that the sites were actually sampled during April 2006.

Area 8-1 Sampled Sites	Dates Sampled in April 2006
Camano Island State Park Ramp	2 nd , 4 th , 6 th , 7 th , 9 th , 12 th , 14 th , 15 th , 16 th , 17 th , 18 th , 21 st , 23 rd , 24 th , 28 th , 29 th , 30 th
Cornet Bay Public Ramp	--
Freeland Ramp (Holmes Harbor)	23 rd
Oak Harbor Public Ramp	24 th , 30 th
Maple Grove Ramp	2 nd , 6 th , 7 th , 8 th , 9 th , 11 th , 12 th , 14 th , 17 th , 22 nd , 26 th , 28 th
Utsalady Ramp	1 st , 4 th , 11 th , 16 th , 18 th , 21 st , 26 th
LaConner Ramp	--
Coupeville Ramp	1 st , 8 th , 15 th , 22 nd , 29 th

Area 8-2 Sites

In Area 8-2, for each scheduled sampling day, two samplers were stationed at the Everett Ramp. In addition, during each week, one day in the weekday stratum and one day in the weekend stratum was randomly selected for sampling at an additional site in order to compute a variance between sites. A third sampler (existing permanent staff based in Central Sound) was stationed at the alternate site on the randomly selected days in each stratum. We sampled an alternate site on the following randomly selected days in April: 1st, 4th, 8th, 12th, 14th, 17th, 22nd, 26th, and 29th.

In addition to Everett Ramp, the possible alternate ‘sampled sites’ are listed in Table 2, as well as the dates that the ramps were randomly selected for sampling during April. We calculated the weights of Area 8-2 sites based on the most recently available boat survey data. We conducted two boat surveys in Area 8-2 during April to update the weights, as documented in section 3 below.

Table 2. List of possible ‘sampled sites’ for the Area 8-2 selective chinook fishery and dates that the sites were actually sampled during April 2006.

Area 8-2 Sampled Sites	Dates Sampled in April 2006
Everett Ramp	1 st , 2 nd , 4 th , 6 th , 7 th , 8 th , 9 th , 11 th , 12 th , 14 th , 15 th , 16 th , 17 th , 18 th , 21 st , 22 nd , 23 rd , 24 th , 26 th , 28 th , 29 th , 30 th
Camano Island State Park Ramp	1 st , 8 th , 14 th , 17 th , 22 nd , 26 th
Dagmars Landing	--
Langley Ramp	--
Mukilteo Public Ramp	4 th , 12 th , 29 th
Kayak Point Ramp	--

3. Boat Surveys

Methods

Boat surveys were used to estimate the percent of effort from sampled sites (versus non-sampled sites) and the proportion of angler effort at each sampled site. Boat surveys covered the entire area to pick up effort from all launch sites. We asked boat occupants where they intended to tie up or exit the fishery rather than where they launched. We excluded non-fishing vessels and charter boats from the boat survey data. Charter boats were treated separately and excluded from our Murthy estimate due to their significantly higher CPUE compared to kicker boats, and because charter vessels were not necessarily exiting the fishery via our “sampled sites,” which precluded sampling their catch (see the subheading “Charter Boats” within Section 4: Estimated Harvest and Effort).

Results

Area 8-1

In Area 8-1, we conducted boat surveys on April 7th and 14th. For these two boat surveys combined, plus the three boat surveys conducted in March and one of the surveys conducted in February, a total of 55 boats and 102 anglers were surveyed. Of these anglers, 79% exited the fishery via sampled sites.

Area 8-2

In Area 8-2, we conducted boat surveys on April 7th and 9th. For these two boat surveys combined, plus the four boat surveys conducted in March and two of the surveys conducted in February, a total of 157 boats and 284 anglers were surveyed. Of these anglers, 78% exited the fishery via sampled sites.

4. Harvest and Effort Estimates

The catch and effort (excluding charter vessels) observed at sampled sites was expanded to all access sites, based on their “size measure”, to estimate total daily catch and effort in Areas 8-1 and 8-2. Sample data were combined and expanded to create stratum estimates of harvest and effort with variances (Tables 3 through 6).

Area 8-1

We estimated that a total of 21 marked chinook were landed in 329 angler trips during the month of April, with a catch per unit effort (CPUE) of 0.06 chinook per angler trip (Table 3). For the months of October through April combined, we estimated that a total of 351 chinook (348 marked and 3 unmarked) were landed in 3,944 angler trips, with an overall CPUE of 0.09 chinook per angler trip (Table 4).

In addition, we estimated that 67 chinook were released during April (19 marked, 27 unmarked, and 21 unknown mark status). The total number of chinook encountered (retained plus released) in Area 8-1 during April was estimated at 88 (Table 3).

From October through April, we estimated that a total of 1,135 chinook were released (342 marked, 429 unmarked, and 364 unknown mark status) (Table 4). The total number of chinook encountered (retained plus released) in Area 8-1 during the seven months of the fishery was estimated at 1,486.

We estimated that no salmon species other than chinook were caught during April in Area 8-1. In comparison, during February we estimated that a total of 3 unmarked coho were landed and 3 coho were released (1 unmarked and 2 unknown mark status), while in March 4 coho of unknown mark status were released. During the months of November through January we estimated that no species of salmon other than chinook were landed or released. For the month of October, we estimated that 55 coho (24 marked and 31 unmarked) and 7 chum were landed, while 8 unknown species of salmon were released (Table 4).

Area 8-2

We estimated that a total of 136 chinook (129 marked and 7 unmarked) were landed in 1,358 angler trips in Area 8-2 during the month of April, with a CPUE of 0.10 chinook per angler trip (Table 5). For October through April combined, we estimated that a total of 734 chinook (697 marked and 37 unmarked) were landed in 8,331 angler trips, with an overall CPUE of 0.09 chinook per angler trip (Table 6).

In addition, we estimated that 237 chinook were released during April (47 marked, 77 unmarked and 113 unknown mark status). The total number of chinook encountered (retained plus released) during the month was estimated at 373.

From October through April, we estimated that a total of 2,197 chinook were released (399 marked, 699 unmarked, and 1,099 unknown mark status) in Area 8-2. Thus, the total number of chinook encountered (retained plus released) in this area during the seven months of the fishery was estimated at 2,931 (Table 6).

In addition to chinook, we estimated that anglers landed 408 coho (105 marked and 303 unmarked), 8 chum, and one pink salmon during the months of October through April. Of the 408 retained coho, 403 (104 marked and 299 unmarked) were landed during October. Total estimates of released salmon other than chinook for the seven months included 157 coho (5 marked, 18 unmarked, and 134 unknown mark status), 4 chum, 1 pink, and 155 unknown species of salmon (Table 6).

Charter BoatsMethods

After consulting with the WDFW biometrician early in the study, we elected to separate charter vessels from kicker boats in generating the catch estimates for Areas 8-1 and 8-2, to reduce potential bias and improve the precision in our estimates. Charter boats were treated separately and excluded from our Murthy estimate due to their high catch per unit of effort compared to kicker boats. In addition, charter boats were not necessarily exiting the fishery via our “sampled sites”, and the landed catch from these vessels was not being sampled.

This stratification of charter and kicker vessels was an adjustment compared to our initial study design due to the unique situation of this fall/winter fishery in which the fishery is very slow and sample sizes are extremely low (unlike high effort summer fisheries, such as the chinook selective fishery in Areas 5 and 6). We modified our approach to include a census of catch from the charter boats operating in the fishery. We relied on the Murthy estimator method to estimate total salmon encounters for kicker boats in Areas 8-1 and 8-2, while a complete census approach was used for charter boats.

We contacted all possible charter boat operators that fished in Areas 8-1 or 8-2 during the months of October through April. The charter operators reported complete counts of salmon encounters and number of trips via Voluntary Trip Report (VTR) forms. VTR data included the date of the fishing trip, number of anglers, target species, CRC Area, each chinook or coho hooked, whether the fish was kept or released, species (if they positively identified the fish), total length to the nearest 1/8th inch, and whether the fish was adipose fin-clipped or not clipped.

Results

One charter boat operator fished in Area 8-2 during April and reported a total of 39 chinook encounters in 75 angler trips. These 39 encounters included 14 ad-marked retained chinook and 25 released chinook (15 ad-marked and 10 unmarked) (Table 7).

The CPUE for this charter boat was 0.19 chinook per angler trip in Area 8-2 during April. In comparison, the CPUE for kicker boats was estimated at 0.09 chinook per angler trip for the month. The CPUE of the charter boat was two times higher than that estimated for kicker boats during April. In some of the previous months of the Area 8-2 fishery (October through January), the CPUE for charter boats was four to six times higher than that of kicker boats.

For the months of October through April combined, the CPUE for kicker boats fishing in Area 8-2 was 0.09 chinook per angler trip, while that for charter boats was 0.37 chinook per angler trip. Thus, over the seven months of the fishery, anglers were approximately four times more successful in landing chinook on charter vessels compared to kicker vessels under the particular circumstances of this fishery (Table 7).

Total Estimates: Areas 8-1 and 8-2 Combined

Adding the estimated chinook encounters in Area 8-2 for kicker boats (373) to the counts of chinook encounters reported from charter boats (39), estimates that a total of 412 chinook were encountered in Area 8-2 during April (150 retained and 262 released) (Table 7).

Combining the Area 8-1 and Area 8-2 estimates results in a **total of 500 estimated chinook encounters (171 retained and 329 released) for the two areas during the month of April. For the months of October through April, we estimated a total of 4,653 chinook encounters in Areas 8-1 and 8-2 combined** (Table 7).

5. Observed versus Predicted Mortalities

In a preliminary analysis, we compared observed versus predicted mortalities for unmarked chinook encountered in the fishery during the months of October through April, for Areas 8-1 and 8-2 combined (Table 8). The observed unmarked chinook mortalities were determined based on preliminary estimates of chinook encounters from creel surveys and an assumed mortality rate of 20% for released chinook.

The Fishery Regulation Assessment Model (FRAM) predicted a total of 2,608 impacts on unmarked chinook encountered in the fishery from October through April, for Areas 8-1 and 8-2 combined. We applied the monthly proportions of effort used in FRAM to the total number of modeled impacts for the fishery in order to determine the predicted monthly impacts shown in Table 8.

Results of our comparison showed that the observed unmarked mortalities were far below the mortalities predicted from FRAM. The modeled cumulative mortalities totaled 2,608 through April, whereas cumulative observed impacts totaled 454 (Table 8). In this preliminary analysis we did not separate out legal versus sub-legal sized chinook to estimate the mortalities; we applied an assumed mortality rate of 20% (mortality rate assumed for sub-legal chinook) for all released fish. Therefore, the estimate of observed impacts is considered a high estimate.

Table 3. Preliminary Area 8-1 Recreational Fishery In-season Catch Estimates (Extrapolated Numbers), Based on Dockside Angler Interviews, April 1 through April 30, 2006.

Start Date	End Date	Est. Effort		Est. Retained Catch						Est. Releases							
		Boats	Anglers	Chinook		Coho		Chum	Pink	Chinook				Coho	Chum	Pink	Unk. Salmon
				Marked	Unmark	Marked	Unmark			Total	Mark	Unmark	Unk.				
1-Apr	1-Apr	13	27	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2-Apr	2-Apr	9	17	0	0	0	0	0	0	4	2	0	2	0	0	0	0
3-Apr	6-Apr	17	34	0	0	0	0	0	0	3	0	0	3	0	0	0	0
7-Apr	7-Apr	12	17	2	0	0	0	0	0	12	3	0	9	0	0	0	0
8-Apr	8-Apr	25	43	3	0	0	0	0	0	3	0	3	0	0	0	0	0
9-Apr	9-Apr	9	19	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10-Apr	13-Apr	5	22	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14-Apr	14-Apr	4	5	0	0	0	0	0	0	2	0	2	0	0	0	0	0
15-Apr	15-Apr	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16-Apr	16-Apr	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17-Apr	20-Apr	3	6	3	0	0	0	0	0	3	0	3	0	0	0	0	0
21-Apr	21-Apr	2	3	0	0	0	0	0	0	2	0	2	0	0	0	0	0
22-Apr	22-Apr	22	54	8	0	0	0	0	0	16	8	5	3	0	0	0	0
23-Apr	23-Apr	9	17	3	0	0	0	0	0	9	0	9	0	0	0	0	0
24-Apr	27-Apr	10	17	0	0	0	0	0	0	0	0	0	0	0	0	0	0
28-Apr	28-Apr	10	16	2	0	0	0	0	0	7	2	3	2	0	0	0	0
29-Apr	29-Apr	10	25	0	0	0	0	0	0	2	2	0	0	0	0	0	0
30-Apr	30-Apr	5	7	0	0	0	0	0	0	4	2	0	2	0	0	0	0
TOTAL		165	329	21	0	0	0	0	0	67	19	27	21	0	0	0	0
Statistics for Grand Total Estimates:																	
Standard Error		24	55	7						10	6	7	4				
CV		14.41%	16.79%	33.17%						14.93%	31.98%	25.24%	19.42%				
Upper 95% CI		212	438	36						87	32	41	30				
Lower 95% CI		118	220	6						47	6	13	12				

Table 4. Total Area 8-1 Recreational Fishery In-season Catch Estimates (Extrapolated Numbers), Based on Dockside Angler Interviews, October 1 2005 through April 30 2006.

Month	Dates	Est. Effort		Est. Retained Catch						Est. Releases											
				Chinook		Coho		Chum	Pink	Chinook				Coho			Chum	Pink	Unk. Salmon		
		Mark	Unmark	Mark	Unmark	Total	Mark			Unmark	Unk.	Total	Mark	Unmark	Unk.						
OCT	Oct 1 - Oct 30	637	1,154	41	0	24	31	7	0	305	130	88	87	0	0	0	0	0	0	0	8
NOV	Oct 31 - Dec 1	200	350	44	0	0	0	0	0	100	26	49	25	0	0	0	0	0	0	0	0
DEC	Dec 2 - Dec 31	236	427	49	0	0	0	0	0	169	65	68	36	0	0	0	0	0	0	0	0
JAN	Jan 1 - Jan 29	161	295	37	0	0	0	0	0	122	39	24	59	0	0	0	0	0	0	0	0
FEB	Jan 30 - Feb 26	347	640	118	3	0	3	0	0	238	44	122	72	3	0	1	2	0	0	0	0
MAR	Feb 27 - Mar 31	433	749	38	0	0	0	0	0	134	19	51	64	4	0	0	4	0	0	0	0
APR	April 1 - April 30	165	329	21	0	0	0	0	0	67	19	27	21	0	0	0	0	0	0	0	0
TOTAL Oct-April		2,179	3,944	348	3	24	34	7	0	1,135	342	429	364	7	0	1	6	0	0	0	8
Statistics for Grand Total Estimates:																					
Standard Error		228	405	52	3	15	18	6		111	73	57	59	4		1	4				8
CV		10.47%	10.28%	14.93%	90.42%	61.01%	52.46%	85.67%		9.74%	21.45%	13.39%	16.34%	53.77%		57.65%	61.99%				94.04%
Upper 95% CI		2,626	4,739	450	37	54	70	22		1,352	486	542	481	17		8	16				26
Lower 95% CI		1,732	3,149	246	1	4	7	1		918	198	316	247	3		1	2				1

Table 5. Preliminary Area 8-2 Recreational Fishery In-season Catch Estimate (Extrapolated Numbers), Based on Dockside Angler Interviews, April 1 through April 30, 2006.

Start Date	End Date	Est. Effort		Est. Retained Catch						Est. Releases										
		Boats	Anglers	Chinook		Coho		Chum	Pink	Chinook				Coho				Chum	Pink	Unk. Salmon
				Marked	Unmark	Marked	Unmark			Total	Mark	Unmark	Unk.	Total	Mark	Unmark	Unk.			
1-Apr	1-Apr	18	44	4	0	0	0	0	0	4	0	1	3	0	0	0	0	0	0	0
2-Apr	2-Apr	33	68	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	0
3-Apr	6-Apr	37	69	19	0	0	0	0	0	27	10	12	5	0	0	0	0	0	0	0
7-Apr	7-Apr	25	44	7	0	0	0	0	0	2	0	2	0	0	0	0	0	0	0	0
8-Apr	8-Apr	26	52	5	0	0	0	0	0	11	0	0	11	0	0	0	0	0	0	0
9-Apr	9-Apr	19	38	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10-Apr	13-Apr	60	135	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14-Apr	14-Apr	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15-Apr	15-Apr	17	41	0	0	0	0	0	0	4	0	2	2	0	0	0	0	0	0	0
16-Apr	16-Apr	11	19	0	0	0	0	0	0	2	2	0	0	0	0	0	0	0	0	0
17-Apr	20-Apr	28	46	5	0	0	0	0	0	27	6	2	19	0	0	0	0	0	0	0
21-Apr	21-Apr	10	14	0	0	0	0	0	0	4	0	4	0	0	0	0	0	0	0	0
22-Apr	22-Apr	68	129	11	0	0	0	0	0	27	7	15	5	0	0	0	0	0	0	0
23-Apr	23-Apr	93	187	10	0	0	4	0	0	28	8	18	2	2	0	2	0	0	0	0
24-Apr	27-Apr	85	162	27	0	0	0	0	0	21	0	0	21	0	0	0	0	0	0	0
28-Apr	28-Apr	38	58	4	2	0	0	0	0	24	0	8	16	6	0	0	6	0	0	0
29-Apr	29-Apr	60	117	19	3	0	0	0	0	24	12	7	5	0	0	0	0	0	0	0
30-Apr	30-Apr	71	133	6	2	0	0	0	0	30	2	6	22	0	0	0	0	0	0	0
TOTAL		700	1,358	129	7	0	4	0	0	237	47	77	113	8	0	2	6	0	0	0
Statistics for Grand Total Estimates:																				
Standard Error		38	97	15	1			0		24	14	6	19	0		0	0			
CV		5.42%	7.13%	11.59%	18.34%			0.00%		10.27%	29.94%	8.33%	16.63%	0.00%		0.00%	0.00%			
Upper 95% CI		774	1,548	159	10			4		285	75	90	150	8		2	6			
Lower 95% CI		626	1,168	99	4			4		189	19	64	76	8		2	6			

Table 6. Total Area 8-2 Recreational Fishery In-season Catch Estimates (Extrapolated Numbers), Based on Dockside Angler Interviews, October 1 2005 through April 30 2006.

Month	Dates	Est. Effort		Est. Retained Catch						Est. Releases											
		Boats	Anglers	Chinook		Coho		Chum	Pink	Chinook				Coho				Chum	Pink	Unk. Salmon	
				Marked	Unmark	Marked	Unmark			Total	Mark	Unmark	Unk.	Total	Mark	Unmark	Unk.				
OCT	Oct 1 - Oct 30	1,486	2,911	27	2	104	299	7	1	330	15	17	298	141	4	14	123	2	1	144	
NOV	Oct 31 - Dec 1	187	343	21	2	0	0	1	0	63	0	14	49	0	0	0	0	2	0	4	
DEC	Dec 2 - Dec 31	249	461	90	4	1	0	0	0	246	26	76	144	1	0	0	1	0	0	0	
JAN	Jan 1 - Jan 29	306	575	137	5	0	0	0	0	430	88	183	159	2	0	0	2	0	0	0	
FEB	Jan 30 - Feb 26	657	1,280	205	11	0	0	0	0	578	150	201	227	5	1	2	2	0	0	0	
MAR	Feb 27 - Mar 31	710	1,403	88	6	0	0	0	0	313	73	131	109	0	0	0	0	0	0	7	
APR	Apr 1 - Apr 30	700	1,358	129	7	0	4	0	0	237	47	77	113	8	0	2	6	0	0	0	
Total Oct-April		4,295	8,331	697	37	105	303	8	1	2,197	399	699	1,099	157	5	18	134	4	1	155	
Statistics for Grand Total Estimates																					
Standard Error		157	322	44	7	16	27	2	0.43	96	31	50	76	17	2	4	16	1	0.43	25	
CV		3.66%	3.86%	6.36%	19.03%	15.11%	8.92%	22.22%	42.74%	4.35%	7.80%	7.11%	6.87%	10.76%	34.79%	19.67%	12.26%	27.80%	42.74%	16.31%	
Upper 95% CI		4,603	8,962	784	51	136	356	12	6	2,384	460	797	1,247	190	11	26	166	9	6	205	
Lower 95% CI		3,987	7,700	610	23	74	250	4	1	2,010	338	601	951	124	2	10	102	2	1	105	

Table 7. Total Chinook Encounters Estimated for Kicker Vessels in Areas 8-1 and 8-2, and Censused from Charter Vessels in Area 8-2, October 1 2005 through April 30 2006.

Area	Month	Fishing Method ^{1/}	Angler Trips	CHINOOK ENCOUNTERS						Total Encounters (Retained + Released)
				Retained		Released				
				Marked	Unmark	Total	Mark	Unmark	Unk.	
8-2	OCT	Kicker	2,911	27	2	330	15	17	298	359
		Charter	56	14	0	11	2	9	0	25
	Total Oct.		2,967	41	2	341	17	26	298	384
	NOV	Kicker	343	21	2	63	0	14	49	86
		Charter	19	8	0	17	12	5	0	25
	Total Nov.		362	29	2	80	12	19	49	111
	DEC	Kicker	461	90	4	246	26	76	144	340
		Charter	22	16	0	42	22	20	0	58
	Total Dec.		483	106	4	288	48	96	144	398
	JAN	Kicker	575	137	5	430	88	183	159	572
		Charter	15	21	0	27	14	13	0	48
	Total Jan.		590	158	5	457	102	196	159	620
	FEB	Kicker	1,280	205	11	578	150	201	227	794
		Charter	11	2	0	8	7	1	0	10
Total Feb.		1,291	207	11	586	157	202	227	804	
MAR	Kicker	1,403	88	6	313	73	131	109	407	
	Charter	11	2	0	23	16	7	0	25	
Total March		1,414	90	6	336	89	138	109	432	
APR	Kicker	1,358	129	7	237	47	77	113	373	
	Charter	75	14	0	25	15	10	0	39	
Total April		1,433	143	7	262	62	87	113	412	
Area 8-2 Total Oct-April		8,540	774	37	2,350	487	764	1,099	3,161	
8-1	OCT	Kicker	1,154	41	0	305	130	88	87	346
		Charter	0	0	0	0	0	0	0	0
	Total Oct.		1,154	41	0	305	130	88	87	346
	NOV	Kicker	350	44	0	100	26	49	25	144
		Charter	0	0	0	0	0	0	0	0
	Total Nov.		350	44	0	100	26	49	25	144
	DEC	Kicker	427	49	0	169	65	68	36	218
		Charter	0	0	0	0	0	0	0	0
	Total Dec.		427	49	0	169	65	68	36	218
	JAN	Kicker	295	37	0	122	39	24	59	159
		Charter	2	0	0	6	2	4	0	6
	Total Jan.		297	37	0	128	41	28	59	165
	FEB	Kicker	640	118	3	238	44	122	72	359
		Charter	0	0	0	0	0	0	0	0
Total Feb.		640	118	3	238	44	122	72	359	
MAR	Kicker	749	38	0	134	19	51	64	172	
	Charter	0	0	0	0	0	0	0	0	
Total March		749	38	0	134	19	51	64	172	
APR	Kicker	329	21	0	67	19	27	21	88	
	Charter	0	0	0	0	0	0	0	0	
Total April		329	21	0	67	19	27	21	88	
Area 8-1 Total Oct-April		3,946	348	3	1,141	344	433	364	1,492	
GRAND TOTAL (Areas 8-1 & 8-2)		12,486	1,122	40	3,491	831	1,197	1,463	4,653	

^{1/}We applied the Murthy estimator method to estimate total salmon encounters for kicker boats in Area 8-2, while a complete census approach was used for charter boats.

Table 8. Observed unmarked chinook mortalities in the Areas 8-1 and 8-2 selective chinook fishery, based on preliminary estimates of chinook encounters from creel surveys, versus impacts predicted from the FRAM model, by month for Areas 8-1 and 8-2 combined.

Month	Proportion of Effort	Estimated Mortalities: Unmarked Chinook Encounters			
		Modeled Impacts	Modeled Cumulative	Observed ^{a b} Impacts	Observed Cumulative
October	0.1898	495	495	68	68
November	0.1181	308	803	25	93
December	0.1397	364	1,167	60	152
January	0.1189	310	1,477	76	228
February	0.1983	517	1,995	115	343
March	0.1204	314	2,309	66	409
April	0.1148	299	2,608	45	454

^a For this preliminary analysis we did not separate out legal versus sub-legal sizes of chinook to estimate mortalities; we applied the mortality rate of 20% (assumed rate for sub-legal chinook) for all released fish. Therefore, the estimated observed impacts are considered a high estimate.

^b Total unmarked released chinook estimated as: (% unmarked) * (number unknown marks) + (number unmarked).

6. Dockside Fishing Method Question

Methods

During dockside interviews, samplers recorded the predominant (based on time) angling method employed by the boat being interviewed, for the boats that actually encountered chinook. Responses were recorded on the sampling form according to the following five fishing method categories:

1. Weight & Bait (W): Mooching or slow trolling with lead and herring/anchovy.
2. Downrigger Trolling (DR): Using either hardware or bait or any combination.
3. Jigging (J): Drifting, jerking pole up and down; for example using Buzz Bombs, Point Wilson Darts, or Crippled Herring.
4. Diver Trolling (DV): For example trolling with a Deep Six or a Pink Lady, using either hardware or bait or any combination.
5. Other (O): For example fly fishing, or trolling bucktails with or without weight.

The sampling supervisor summarized the above information for anglers encountering chinook and instructed test boat samplers on which method to employ in order to adequately represent the fishing methods used by the recreational fleet. We assigned proportions of time that the test boat should spend on the different fishing methods on weekly basis, based on the dockside fishing method summary from the previous statistical week. Fishing methods employed by the test boat were also scheduled in a way that made sense as far as the tides, what was happening in the fishery, and other environmental variables.

The test boat samplers recorded the fishing method that they implemented on their sampling form. At the end of a test fishing day, the test boat crew summarized the amount of time they spent on fishing each method (see section 6 below, "Test Fishing").

Results

As in previous months of the fishery, downriggers were the predominant fishing method employed by anglers in Areas 8-1 and 8-2 during April. In Area 8-1, out of 35 interviews with anglers that successfully encountered chinook, all 35 boats used downriggers as their predominant fishing method. In Area 8-2, out of 124 interviews with anglers that successfully encountered chinook, 123 (99.2%) boats employed downriggers as their predominant fishing method, while one boat (0.8%) used an “other” method (trolling without downriggers). Thus, for Areas 8-1 and 8-2 combined, 99.4% of the boats that successfully encountered chinook used downriggers as their predominant fishing method.

For the months of October through April combined, we recorded a total of 1,501 responses to the fishing method question for anglers that successfully encountered chinook (462 boats in Area 8-1 and 1,039 boats in Area 8-2). Of these, 1,495 boats (99.6%) used downriggers as the predominant fishing method, while 4 boats (0.3%) employed the weight and bait method, one boat (0.07%) used the jigging method, and one boat (0.07%) used an “other” method (trolling without downriggers).

6. Test Fishing

Methods

We operated two test boats, one in Area 8-1 and the other in Area 8-2. The crew on each boat consisted of two WDFW technicians per boat. These test boats fished approximately five days per week (Monday through Friday) on average throughout April (weather permitting). If adverse weather conditions precluded test fishing on a scheduled fishing day, the sampling supervisors rescheduled test fishing to an alternate day on the weekend, or the crew worked on boat maintenance and other duties.

For each hook-up, the encounter number, time sampled, species, mark status, and DNA vial number (if applicable) was recorded. Care was taken to handle all fish as gently as possible. Chinook were brought on board in a cotton mesh net and measured while still in the net. Samplers collected three scales for each chinook brought on board. In addition, samplers recorded the fork length, total length, and mark status for each chinook on the scale card (legal size chinook were 22 inches and larger, while sub-legal size chinook were less than 22 inches total length). Samplers also used scissors to remove a 1 cm² piece of the caudal fin for DNA analysis. All fish were released carefully and as soon as possible.

The test boat samplers recorded the fishing method that they implemented on their sampling form. At the end of a test fishing day, the test boat crew summarized the amount of time they spent on fishing each method.

Results

The test boat in Area 8-1 encountered a total of 24 chinook (14 legal and 10 sub-legal) during April, and the test boat in Area 8-2 encountered a total of 29 chinook (12 legal and 17 sub-legal) (Table 9). Samplers collected DNA samples from each of these fish, as well as scale samples, fork lengths, and total lengths.

Both of the test boats fished with downriggers 100% of the time during April (125 hours in Area 8-1 and 100 hours in Area 8-2). The test boats fished five days per week during the month, except in Area 8-2 during the third week of April, when the test boat fished for three days instead of five due to adverse conditions on the water.

For the months of October through April combined, the test boat in Area 8-1 encountered a total of 450 chinook (138 legal and 312 sub-legal), while the test boat in Area 8-2 encountered a total of 289 chinook (120 legal and 169 sub-legal) (Table 9).

Based on the combined test fishing data for October through April, the adipose mark rate in Area 8-1 was 62% for legal-sized chinook and 57% for sub-legal chinook. In Area 8-2, the adipose mark rate was 57% for legal-sized chinook and 65% for sub-legal chinook (Table 9).

Literature Cited

Cochran, W.G. 1977. Sampling Techniques. John Wiley.

Table 9. Total weekly chinook encounters and number of DNA samples collected in the Areas 8-1 and 8-2 test fishery from October 1 2005 through April 30 2006 (statistical weeks 41 through 18), by mark status (M=marked; UM=unmarked) and legal or sub-legal size^{1/}.

Month	Statistical Week	AREA 8-1						AREA 8-2					
		LEGAL ^{1/}			SUB-LEGAL ^{1/}			LEGAL ^{1/}			SUB-LEGAL ^{1/}		
		M	UM	Total	M	UM	Total	M	UM	Total	M	UM	Total
OCT	41	2	0	2	10	6	16	0	0	0	1	0	1
	42	0	0	0	5	2	7	0	1	1	4	3	7
	43	2	0	2	5	2	7	0	2	2	14	5	19
	44	0	0	0	8	4	12	1	0	1	5	6	11
OCT TOTAL		4	0	4	28	14	42	1	3	4	24	14	38
Percent		100%	0%		67%	33%		25%	75%		63%	37%	
NOV	45	0	0	0	2	2	4	0	1	1	3	1	4
	46	1	1	2	2	2	4	1	0	1	6	2	8
	47	2	6	8	8	5	13	2	0	2	5	3	8
	48	4	2	6	4	2	6	4	3	7	5	1	6
	49	4	3	7	11	8	19	1	4	5	3	3	6
NOV TOTAL		11	12	23	27	19	46	8	8	16	22	10	32
Percent		48%	52%		59%	41%		50%	50%		69%	31%	
DEC	50	4	0	4	4	10	14	4	5	9	1	4	5
	51	2	1	3	3	4	7	3	2	5	0	1	1
	52	0	0	0	1	2	3	1	0	1	2	2	4
	53-1	3	3	6	1	1	2	6	2	8	2	2	4
DEC TOTAL		9	4	13	9	17	26	14	9	23	5	9	14
Percent		69%	31%		35%	65%		61%	39%		36%	64%	
JAN	2	2	1	3	2	5	7	0	0	0	0	0	0
	3	1	4	5	12	10	22	0	0	0	0	0	0
	4	7	11	18	9	7	16	11	7	18	8	3	11
	5	7	2	9	20	15	35	4	2	6	2	2	4
JAN TOTAL		17	18	35	43	37	80	15	9	24	10	5	15
Percent		49%	51%		54%	46%		63%	38%		67%	33%	
FEB	6	8	0	9	8	5	13	5	6	11	5	1	6
	7	10	3	13	9	4	13	6	4	10	6	4	10
	8	1	2	3	4	4	8	1	0	1	2	0	2
	9	4	2	6	4	3	7	2	1	3	6	1	7
FEB TOTAL		23	7	30	25	16	41	14	11	25	19	6	25
Percent		77%	23%		61%	39%		56%	44%		76%	24%	
MAR	10	2	1	3	22	16	38	0	0	0	1	1	2
	11	3	0	3	5	5	10	1	1	2	6	5	11
	12	3	2	5	4	1	5	0	3	3	0	3	3
	13	6	1	7	7	3	10	4	3	7	3	1	4
	14	0	1	1	2	2	4	3	1	4	7	1	8
MAR TOTAL		14	5	19	40	27	67	8	8	16	17	11	28
Percent		74%	26%		60%	40%		50%	50%		61%	39%	
APR	15	0	1	1	1	3	4	2	0	2	3	0	3
	16	0	1	1	2	1	3	1	1	2	2	4	6
	17	6	4	10	2	1	3	4	3	7	8	0	8
	18	1	1	2	0	0	0	1	0	1	0	0	0
APR TOTAL		7	7	14	5	5	10	8	4	12	13	4	17
Percent		50%	50%		50%	50%		67%	33%		76%	24%	
GRAND TOTAL		85	53	138	177	135	312	68	52	120	110	59	169
Percent		62%	38%		57%	43%		57%	43%		65%	35%	

^{1/} Legal size chinook were 22 inches and larger in total length, while sub-legal size chinook were less than 22 inches total length.