Shoreside Whiting Observation Program: 1999

prepared by

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INTRODUCTION

The Pacific Whiting Shoreside Observation Program was established in 1992 to provide information for evaluating bycatch in the directed Pacific whiting fishery and for evaluating conservation measures adopted to protect salmon and other prohibited species. The program has been continued annually in order to account for all catch in targeted whiting trip landings, potential discards, and accommodate the landing of non-sorted catch from these trips. In 1995, the program's emphasis was changed from a high target rate of observation (50% of landings), to a lower target rate (10% of landings) and increased collection of biological information (*e.g.*, otoliths, length, weight, sex, and maturity) from Pacific whiting and selected bycatch species (yellowtail and widow rockfish, sablefish, Pacific mackerel, and jack mackerel). Focus has shifted yet again due to 1997 changes in the allocation of yellowtail rockfish and increases in yellowtail bycatch rates. Since then, yellowtail bycatch in the shoreside whiting fishery has been 8-16% of the total yellowtail allocation.

The observation program is a cooperative effort between the fishing industry and management agencies to observe and collect information on directed Pacific whiting landings at shoreside processing plants. Participating vessels apply for and carry exempted fishing permits (EFPs) issued by the National Marine Fisheries Service (NMFS). Permit terms require vessels to land unsorted whiting at designated shoreside processing plants. Permitted vessels are not penalized for landing prohibited species (*e.g.*, Pacific salmon, Pacific halibut, Dungeness crab), nor are they held liable for overages of groundfish trip limits. In 1999, written agreements were made with designated processors to provide a better understanding of the roles and responsibilities of the processors and agencies involved. Participants are mid-water trawlers carrying EFPs, designated shoreside processing plants in California, Oregon, and Washington, the Pacific

Fishery Management Council (PFMC), NMFS, the Pacific States Marine Fisheries Commission (PSMFC), the Oregon Department of Fish and Wildlife (ODFW), the California Department of Fish and Game (CDFG), and the Washington Department of Fish and Wildlife (WDFW).

1999 WHITING FISHERY

The PFMC's optimum yield (OY) and catch allocation among processing sectors underwent minor changes from 1998 levels and have been relatively stable since 1996 (Table 1). The total OY remained the same at 232,000 metric tons (mt), but the tribal fishery was allocated 32,500 mt, leaving 199,500 mt for the commercial fishery. Commercial fishery allocations were 42% to vessels landing at shoreside processing plants (83,800 mt), 34% to catcher/processors (67,800 mt), and 24% to catcher vessels delivering to motherships (47,900 mt). The 1999 directed shoreside whiting fishery began on 01 April 1999 off California (south of 42^{o} N), and on 15 June 1999 off Oregon and Washington (north of 42^{o} N). To avoid pre-empting more northerly segments of the fishery, the southern component of the whiting fishery is limited to 5% of the total shoreside allocation until the northern component of the shoreside fishery begins. The directed season for at-sea processors (north of 42^{o} N) began on 01 May 1999 for catcher/processors and on 15 May for motherships.

The mothership fishery closed on 02 June with a total catch of 47,580 mt of whiting (0.7% below the allocated amount) and the catcher-processor fishery closed on 21 July with a total harvest of 67,679 mt of whiting (0.2% under the allocated amount) (NMFS, 1999). The tribal fishery harvested 25,844 mt of as of 09 November (20.5% below its allocation) (NMFS, 1999). The shoreside directed fishery closed on 13 September with landings of 83,388 mt (0.5% under the allocated amount) (Table 2). The 91 day shoreside season was an average season length (range 68-136) (Table 1). The total commercial catch was 0.4% below the allocation and the total harvest (224,453 mt) was 0.3% below the OY.

Thirty-six midwater trawlers and 11 processors participated in the program in 1999 and unsorted Pacific whiting landings were observed at processing plants in Crescent City (1), Eureka (2), Charleston (1), Newport (2), Astoria (3), Ilwaco (1), and Westport (1) (Table 1). There were only 42 Non-EFP whiting deliveries in 1999, so most of the midwater trawlers targeting whiting and delivering shoreside, and most onshore processing plants receiving whiting participated in the observation program. Overall, 21% of Pacific whiting landings at shoreside processors were observed in 1999, exceeding the 10% program goal (Table 3). The percentage of trips observed varied with state and port, with a low of 9% in Washington, and a high of 32% in Newport/Charleston. Only 115.66 mt of whiting was delivered in the Non-EFP fishery. Whiting was landed at a fairly constant pace throughout much of the season, but slowed at the end of August. The vast majority of Pacific whiting (about 87.6%) was landed in Oregon; Washington landings represented

10.9% of the total, and California landings represented about 1.6% (Tables 4, 5 and 6). Within Oregon, a slightly greater percentage of the whiting was delivered to Astoria compared to Newport.

BYCATCH

Rockfish

In 1999 the major issue in the whiting fishery was bycatch of yellowtail rockfish (see Hutton and Parker, 1999 for review). The bycatch rate was the highest it has ever been (this was true for the at-sea fishery also) (Table 1, Figure 1 and 2). The high yellowtail bycatch rate of 1998 was almost exactly matched in 1999 by the shoreside fleet. The at-sea portion of the fishery also had a large increase in the yellowtail bycatch rate for 1999, so much so, that the whiting fishery took 50% of the total yellowtail allocation, causing reductions in yellowtail trip limits for the last period of 1999 (Figure3).

Widow rockfish showed a 20% decline in bycatch rate compared to 1998 (Figure 2). Their abundance has been the most variable over time and may be confounded by changes in whiting tow or landing locations since widow bycatch rates increase to the south.

Miscellaneous rockfish were a relatively minor component of the bycatch, totaling 24,739 kg in 1999. The trend in miscellaneous rockfish bycatch appears to show some annual variability, but has been relatively stable since 1994 (Figure 2).

The largest quantities of rockfish, reflecting the magnitude of whiting landings, were landed in Oregon. Bycatch rates of yellowtail rockfish were highest in Washington and lowest in California in 1999, as they have been since 1996 (Table 7, Figure 4). There appears to be a trend however, with levels decreasing over time in Newport, but increasing in Ilwaco and Astoria. Widow rockfish bycatch rates showed the opposite trend – highest in California and lowest in Washington (Tables 4, 5, and 6). Weekly bycatch of yellowtail rockfish showed considerable variability through the course of the season, but rates tended to be highest during July and August.

Sablefish

Sablefish bycatch dropped by almost six fold compared to 1998, and almost nine fold since 1997 (Figure 2). Sablefish bycatch abundance has been declining steadily since 1995. No obvious shift in fleet distribution or other whiting fishery-dependent factor is attributed to this drop in relative abundance. Although other bycatch species show annual changes in abundance, sablefish is the only one with this consistent trend.

Mackerel

Mackerel bycatch information combines chub (Pacific) mackerel and jack mackerel, which are taxonomically distinct. Observer data indicates that the mackerel bycatch was comprised of approximately 80% jack mackerel. Overall mackerel bycatch dropped

almost 20% compared to 1998. It appears as if a large age class has moved through the fishery and bycatch rates are returning to pre-1997 levels (Figure 2).

Miscellaneous fish
The amount of bycatch classified as miscellaneous is substantial, and totaled 148,459 kg in 1999. The trend in this category had shown annually increasing levels to a high in 1998, but dropped approximately 20% in 1999, paralleling the catch of widow and miscellaneous rockfish (Figure 2).

Salmon
A total of 1,712 salmon (1,696 chinook, 5 coho, and 11 pink salmon) were taken as bycatch in the 1999 shoreside whiting fishery and were turned over to state agencies by processors: 1,238 in Oregon, 465 in Washington, and 9 in California. This compares with 1,713 salmon provided to state agencies by processors in 1998. Overall, this represents an incidental catch rate of 0.021 salmon per metric ton of whiting for the entire EFP fishery (Table 8). Observers at shoreside plants noted 234 salmon incidentally taken in 261 observed landings of 16,748 mt whiting, which results in an observed rate of 0.014 salmon/mt whiting. These 234 fish are included in the total of 1,712 turned over to state agencies. The highest weekly bycatch rates in 1999 were in late July (Table 8). Overall, the bycatch rate was fairly constant in 1999 compared to the past few years.

Halibut
Thirty-five Pacific halibut were landed in the three states by the 1999 whiting shoreside fishery; 8 in Astoria, 26 in Newport, and 1 in California. Though a small number and patchy in distribution, it is more than twice the 16 caught in 1998. These fish were also provided to hunger relief agencies.

Other
A substantial increase in crab was also noted. Fifty-five Dungeness crabs were reported as incidental catch in Newport and turned over to ODFW. Any that were alive were distributed to Lincoln County Food Share.

PROGRAM COSTS

In 1999, the cost of the Oregon-Washington portion of the shoreside observation program was approximately $65,883 (approximately $33,339 for coordination and data processing costs, and an estimated $32,544 for observers). This has been essentially unchanged since 1995. Since 1995, most program funding has been provided by industry. Government costs were relatively minor, as in previous years, and are not included in the above summary. Oregon shoreside processing plants hired four observers to make observations at six processors. The WDFW and the CDFG provided shoreside landing observations with existing staff.

BIOLOGICAL SAMPLING

In addition to documenting bycatch composition and rates, shoreside observers collected a variety of biological information and samples which are used in stock assessment analyses. In particular, observers in Newport and Astoria measured about 3,700 Pacific whiting for length-frequency information, and collected over 1,600 Pacific whiting otolith samples. This information and samples have been provided to Martin Dorn of the NMFS Alaska Fisheries Science Center for incorporation into subsequent whiting stock assessments.

Similarly, yellowtail rockfish otoliths and length-frequency information (approximately 26 samples of 30 fish) have been provided to the WDFW for future stock assessments on this species.

Biological samples of chub (Pacific) mackerel are provided to the CDFG for their stock assessment work on this species.

Biological samples of widow rockfish, sablefish and jack mackerel are also taken; these have been retained at ODFW and are available for future assessment efforts.

AREAS FOR IMPROVEMENT IN 2000

The 1999 season went along with very few problems, and those that came up were relatively minor. We list some of the issues that need to be addressed in 2000, to keep the whiting fishery monitoring accurate and efficient.

- We will address issues of what the EFP requires whiting vessels to do in order to be in compliance, such as targeting only whiting, no sorting, delivering only to permitted processors, etc…

- PSMFC has not been receiving payments on time from whiting processors to cover their payments for coordination of the fishery. This must be addressed to assure continued information transfer that everyone (fishers, processors, and agencies) relies on.

- We will work to develop mechanisms to get fish tickets quickly so information updates are more real-time. We will also post this whiting report and whiting fishery updates on the Internet with links from the ODFW Marine Resources Program webpage.

- The trend of increasing yellowtail bycatch could pose problems for the whiting fishery in 2000 since the total yellowtail OY has not been increased. Proposals to minimize and possibly regulate the yellowtail bycatch are under consideration and will

likely result in some action by the PFMC in the spring and apply to the whiting fishery in 2000.

- Another area of emphasis will be to continue to encourage accurate recording and the timely provision of logbook information. Information from fishing logs is particularly important to the use of biological samples in stock assessments. These assessments are stratified by fishing area, and knowledge of where a particular sample was taken is an essential element to incorporating information from a biological sample into a stock assessment.

References

Hutton, L. and S.J. Parker. 1999. Bycatch of yellowtail rockfish in the Pacific whiting fishery (1996-1999): Analysis and solutions. Oregon Department of Fish and Wildlife, Newport. 14 p.

Table 1. Summary of the EFP shoreside component of the US Whiting fishery through 1999. Weights are in metric tons and bycatch rates are in kg/mt whiting.

Year	US OY	Whiting landed	Yellow-tail bycatch	Yellowtail bycatch rate	Participating vessels	Participating Processors	Season Length (days)
1992	208,800	56,127	59.37	1.05	**	**	**
1993	142,000	41,926	137.89	3.29	**	**	**
1994	260,000	72,367	255.50	3.53	33	14	118
1995	178,400	73,937	273.82	3.70	35	13	136
1996	212,000	84,986	521.62	6.13	37	13	87
1997	232,000	85,810	233.02	2.71	38	12	68
1998	232,000	87,387	501.06	5.73	35	12	121
1999	232,000	83,272	481.39	5.78	36	11	91

Table 2. Weekly EFP Pacific whiting landings and bycatch for Washington, Oregon and California, 04/01/1999-09/13/1999. Data from fish tickets, except salmon totals from observations.

Fishing week	Week ending date	Number of whiting landings	Whiting landed (mt)	Cumulative whiting landed (mt)	Percentage of whiting quota landed	Number of landings observed	Whiting observed (mt)	Number of salmon observed	Yellowtail landed (mt)	Widow Landed (mt)	Sablefish landed (mt)	Mackerel landed (mt)	Miscellaneous Rockfish landed (mt)	Miscellaneous fish landed (mt)
14	04/03/99	0	0.00			0	0.00	0	0.00	0.00	0.00	0.00	0.00	0.00
15	04/10/99	0	0.00	0.00	0.00	0	0.00	0	0.00	0.00	0.00	0.00	0.00	0.00
16	04/17/99	0	0.00	0.00	0.00	0	0.00	0	0.00	0.00	0.00	0.00	0.00	0.00
17	04/24/99	0	0.00	0.00	0.00	0	0.00	0	0.00	0.00	0.00	0.00	0.00	0.00
18	05/01/99	0	0.00	0.00	0.00	0	0.00	0	0.00	0.00	0.00	0.00	0.00	0.00
19	05/08/99	2	77.44	77.44	0.09	1	58.33	1	0.00	0.01	0.00	0.00	0.00	0.00
20	05/15/99	0	0.00	77.44	0.09	0	0.00	0	0.00	0.00	0.00	0.00	0.00	0.00
21	05/22/99	0	0.00	77.44	0.09	0	0.00	0	0.00	0.00	0.00	0.00	0.00	0.00
22	05/29/99	0	0.00	77.44	0.09	0	0.00	0	0.00	0.00	0.00	0.00	0.00	0.00
23	06/05/99	0	0.00	77.44	0.09	0	0.00	0	0.00	0.00	0.00	0.00	0.00	0.00
24	06/12/99	0	0.00	77.44	0.09	0	0.00	0	0.00	0.00	0.00	0.00	0.00	0.00
25	06/19/99	67	4,524.29	4,601.73	5.49	13	883.82	3	33.59	10.95	0.22	9.70	0.55	0.96
26	06/26/99	111	7,410.77	12,012.49	14.33	25	1,559.23	19	39.13	36.85	0.83	7.84	2.63	3.35
27	07/03/99	118	6,870.48	18,882.98	22.53	27	1,572.67	19	43.30	19.09	0.28	16.18	8.52	22.63
28	07/10/99	77	4,416.68	23,299.66	27.80	17	725.36	8	32.52	11.77	0.13	15.35	1.26	12.38
29	07/17/99	85	5,664.76	28,964.41	34.56	27	1,820.07	45	35.84	13.14	0.48	19.82	2.67	20.00
30	07/24/99	97	6,952.44	35,916.85	42.86	19	1,252.49	55	31.26	8.19	0.47	26.68	0.29	16.28
31	07/31/99	115	8,742.63	44,659.49	53.29	31	2,265.61	11	59.28	16.02	0.14	121.79	0.83	14.05
32	08/07/99	122	8,618.53	53,278.02	63.58	39	2,384.04	13	43.26	20.39	0.08	50.17	0.72	20.30
33	08/14/99	108	7,873.32	61,151.34	72.97	30	2,087.15	23	29.24	15.19	0.43	89.21	1.49	14.89
34	08/21/99	99	6,664.41	67,815.75	80.93	11	784.06	5	28.21	8.42	0.28	120.07	1.81	4.54
35	08/28/99	87	6,392.63	74,208.38	88.55	10	650.16	21	21.94	14.18	0.07	136.59	0.63	2.62
36	09/04/99	86	6,144.87	80,353.24	95.89	10	618.63	8	47.92	5.06	0.33	163.84	2.48	13.27
37	09/11/99	36	2,483.75	82,836.99	98.85	1	85.98	3	25.50	3.77	0.02	65.03	0.82	2.50
38	09/13/99	6	435.04	83,272.03	99.37	0	0.00	0	10.40	8.71	0.00	6.64	0.04	0.68
EFP total		1216	83,272.03			261	16,747.60	234	481.39	191.74	3.76	848.92	24.74	148.46
Non-EFP total		42	115.66											
Fishery total		1258	83,387.69		99.51									

Table 3. 1999 Cumulative shoreside whiting fishery report for Washington, Oregon and California.

Cumulative Whiting Report
WASHINGTON, OREGON and CALIFORNIA Shoreside Fishery, Midwater Trawl Only
(Best Available Data as of 12/13/1999)

***All Ports and Plants Cumulative Whiting Report through fishery closure**

	Observed total	EFP fishery total	NON-EFP fishery total	Fishery total	
Whiting harvest (mt)	16,748	83,272	116	83,388	***
Number of deliveries	261	1,216	42	1,258	***
Salmon catch (no)	234	1,675		1,712	
Miscellaneous rockfish (kg)	5,782	24,739		24,739	
Yellowtail rockfish (kg)	61,116	481,390		481,390	
Widow rockfish (kg)	33,895	191,741		191,741	
Sablefish (kg)	1,180	3,762		3,762	
Mackerel (kg)	108,836	848,925		848,925	
Miscellaneous fish (kg)	22,084	148,459		148,459	
Salmon rate (no/mt)	0.014				
Rockfish rate (kg/mt)	0.345	0.297		0.297	**
Yellowtail rate (kg/mt)	3.649	5.781		5.781	
Widow rate (kg/mt)	2.024	2.303		2.303	
Sablefish rate (kg/mt)	0.070	0.045		0.045	
Mackerel rate (kg/mt)	6.498	10.195		10.195	
Miscellaneous fish rate (kg/mt)	1.319	1.783		1.783	
Percent of deliveries observed		21			

* Includes all trips with whiting lbs>0
** All rates are calculated using only EFP totals
*** Fishery Total includes NON-EFP trips

Table 4. 1999 Cumulative shoreside whiting fishery report for Washington.

Cumulative Whiting Report
WASHINGTON Shoreside Fishery, Midwater Trawl Only
(Best Available Data as of 12/13/1999)

***All Ports and Plants Cumulative Whiting Report through fishery closure**

	Observed total	EFP fishery total	NON-EFP fishery total	Fishery total	
Whiting harvest (mt)	927	9,020	50	9,070	***
Number of deliveries	13	140	2	142	***
Salmon catch (no)	37	465		465	
Miscellaneous rockfish (kg)	48	1,880		1,880	
Yellowtail rockfish (kg)	17,191	109,329		109,329	
Widow rockfish (kg)	114	14,932		14,932	
Sablefish (kg)	85	137		137	
Mackerel (kg)	4,067	104,365		104,365	
Miscellaneous fish (kg)	6,301	31,251		31,251	
Salmon rate (no/mt)	0.040				
Rockfish rate (kg/mt)	0.052	0.208		0.208	**
Yellowtail rate (kg/mt)	18.545	12.121		12.121	
Widow rate (kg/mt)	0.123	1.655		1.655	
Sablefish rate (kg/mt)	0.092	0.015		0.015	
Mackerel rate (kg/mt)	4.387	11.570		11.570	
Miscellaneous fish rate (kg/mt)	6.797	3.465		3.465	
Percent of deliveries observed		9			

* Includes all trips with whiting lbs>0
** All rates are calculated using only EFP totals
*** Fishery Total includes NON-EFP trips

Table 5. 1999 Cumulative shoreside whiting fishery report for Oregon.

Cumulative Whiting Report
OREGON Shoreside Fishery, Midwater Trawl Only
(Best Available Data as of 12/13/1999)

***All Ports and Plants Cumulative Whiting Report through 9/13/1999**

	Astoria observed total	Newport & Charleston observed	Astoria fishery total	Newport & Charleston fishery total	Fishery total	
Whiting harvest (mt)	5,498	10,036	38,291	34,688	73,011	***
Number of deliveries	72	171	518	538	1,073	***
Salmon catch (no)	146	44	1,016	222	1,238	
Miscellaneous rockfish (kg)	725	1,454	7,090	7,123	14,213	
Yellowtail rockfish (kg)	34,138	9,784	335,239	36,821	372,060	
Widow rockfish (kg)	11,620	21,621	77,347	86,801	164,148	
Sablefish (kg)	165	929	848	2,767	3,616	
Mackerel (kg)	39,924	64,182	437,468	306,388	743,856	
Miscellaneous fish (kg)	14,240	1,501	104,489	12,621	117,110	
Salmon rate (no/mt)	0.027	0.004				
Rockfish rate (kg/mt)	0.132	0.145	0.185	0.205	0.195	**
Yellowtail rate (kg/mt)	6.209	0.975	8.755	1.061	5.098	
Widow rate (kg/mt)	2.113	2.154	2.020	2.502	2.249	
Sablefish rate (kg/mt)	0.030	0.093	0.022	0.080	0.050	
Mackerel rate (kg/mt)	7.262	6.395	11.425	8.833	10.193	
Miscellaneous fish rate (kg/mt)	2.590	0.150	2.729	0.364	1.605	
Percent of deliveries observed			14	32	23	

* Includes all trips with whiting lbs>0
** All rates are calculated using only EFP totals
*** Fishery Total includes NON-EFP trips

Table 6. 1999 Cumulative shoreside whiting fishery report for California

Cumulative Whiting Report
CALIFORNIA Shoreside Fishery, Midwater Trawl Only
(Best Available Data as of 12/13/1999)

***All Ports and Plants Cumulative Whiting Report through fishery closure**

	Observed total	EFP fishery total	NON-EFP fishery total	Fishery total	
Whiting harvest (mt)	288	1,273	33	1,306	***
Number of deliveries	5	20	23	43	***
Salmon catch (no)	7	9		9	
Miscellaneous rockfish (kg)	3,554	8,645		8,645	
Yellowtail rockfish (kg)	3	1		1	
Widow rockfish (kg)	541	12,661		12,661	
Sablefish (kg)	2	10		10	
Mackerel (kg)	663	705		705	
Miscellaneous fish (kg)	43	98		98	
Salmon rate (no/mt)	0.024				
Rockfish rate (kg/mt)	12.340	6.791		6.791	**
Yellowtail rate (kg/mt)	0.010	0.001		0.001	
Widow rate (kg/mt)	1.878	9.946		9.946	
Sablefish rate (kg/mt)	0.007	0.008		0.008	
Mackerel rate (kg/mt)	2.302	0.554		0.554	
Miscellaneous fish rate (kg/mt)	0.149	0.077		0.077	
Percent of deliveries observed		25			

* Includes all trips with whiting lbs>0
** All rates are calculated using only EFP totals
*** Fishery Total includes NON-EFP trips

Table 7. Annual yellowtail bycatch rates by port and vessel for 1999. Rates are kg/mt whiting. Rank is overall rank in the fishery. The vessels with the top five bycatch rates are in bold.

1999 (36 Vessels)

Major Port	Vessel Name	Total	Rank
Westport	**Blue Horizon**	**24.20**	**1**
	Aleutian Challenger	**17.16**	**4**
	Jamie Marie	6.51	16
	Chellissa	6.31	17
Westport Total		*9.74*	
Ilwaco	**Muir Milach**	**22.37**	**2**
Ilwaco Total		*22.37*	
Astoria	**Nicole**	**18.55**	**3**
	Betty A	**15.48**	**5**
	Ocean Leader	15.23	6
	Messiah	14.89	7
	George Allen	12.71	8
	Persistence	11.25	9
	Sea Clipper	9.93	10
	Pacific Future	9.92	11
	Grumpy J	9.65	12
	Perseverance	8.43	13
	American Beauty	8.01	14
	Blue Fox	6.83	15
	Raven	4.92	18
	Seeker	4.67	19
Astoria Total		*10.63*	
Newport	Pegasus	3.39	20
	Last Straw	3.36	21
	Pacific Ram	2.32	22
	Cape Kiwanda	1.73	23
	Pioneer	1.27	24
	Pacific	0.86	25
	Miss Berdie	0.83	26
	Miss Sarah	0.82	27
	Miss Sue	0.81	28
	Lisa Melinda	0.68	29
	Excalibur I	0.38	31
	Sea Storm	0.33	32
	Neahkahnie	0.01	35
Newport Total		*1.31*	
Charleston	Morning Star	0.42	30
	Cape Foulweather	0.09	33
Charleston Total		*0.34*	
Crescent City	Predator	0.02	34
Crescent City Total		*0.02*	
Eureka	Fish Wish	0.00	36
Eureka Total		*0.00*	
Grand Total		*6.69*	

Table 8. Weekly bycatch rate of salmon (# of salmon/mt of whiting) in the shorebased whiting fishery, 1992-1999. Rates for 1992-1994 are based on observations. Rates for 1995-1999 are based on salmon turned over to state agencies by processors.

Month	1992*	1993	1994	1995	1996	1997	1998	1999
April		0.088	0.042	0.069	0.000		0.000	
		0.076	0.074	0.398	0.003	0.000	0.054	
		0.019	0.052	0.422	0.000	0.000	0.000	
		0.135	0.031	0.018	0.000	0.000	0.000	
		0.038	0.015	0.041	0.000	0.000	0.000	
May	0.019	0.034	0.002	0.040	0.000	0.001	0.049	0.013
	0.097	0.054	0.004	0.019	0.029	0.010	0.101	0.000
	0.056	0.014	0.003	0.011	0.136	0.003	0.205	0.000
	0.028	0.019	0.000	0.004	0.024	0.000	0.053	0.000
June	0.015	0.021	0.017	0.008	0.007	0.000	0.041	0.000
	0.004	0.000	0.007	0.032	0.007	0.000	0.028	0.000
	0.001	0.001	0.007	0.013	0.000	0.011	0.006	0.002
	0.000	0.001	0.001	0.035	0.001	0.005	0.005	0.005
July	0.000	0.011	0.001	0.024	0.000	0.010	0.001	0.013
	0.002	0.010	0.003	0.011	0.004	0.016	0.002	0.007
	0.003	0.004	0.001		0.003	0.025	0.011	0.053
	0.008	0.002	0.001		0.002	0.034	0.050	0.064
August	0.002	0.003	0.003		0.001	0.012	0.013	0.017
	0.004	0.008	0.002		0.001	0.025	0.033	0.029
	0.005	0.003	0.001		0.000	0.014	0.014	0.021
	0.014	0.003	0.000		0.000	0.022	0.014	0.020
	0.015		0.002		0.000		0.010	0.009
September	0.002		0.004		0.000		0.028	0.004
	0.009		0.008		0.000		0.069	0.003
	0.017		0.001				0.094	0.011
	0.005		0.003				0.025	
October	0.016		0.010				0.003	
	0.012		0.000				0.005	
	0.001		0.002				0.008	
	0.003		0.039					
	0.014							
Total rate (#/mt)	0.010	0.010	0.008	0.032	0.008	0.017	0.020	0.021
Total number of salmon landed	491	419	585	2972	651	1484	1713	1712

*Oregon Only

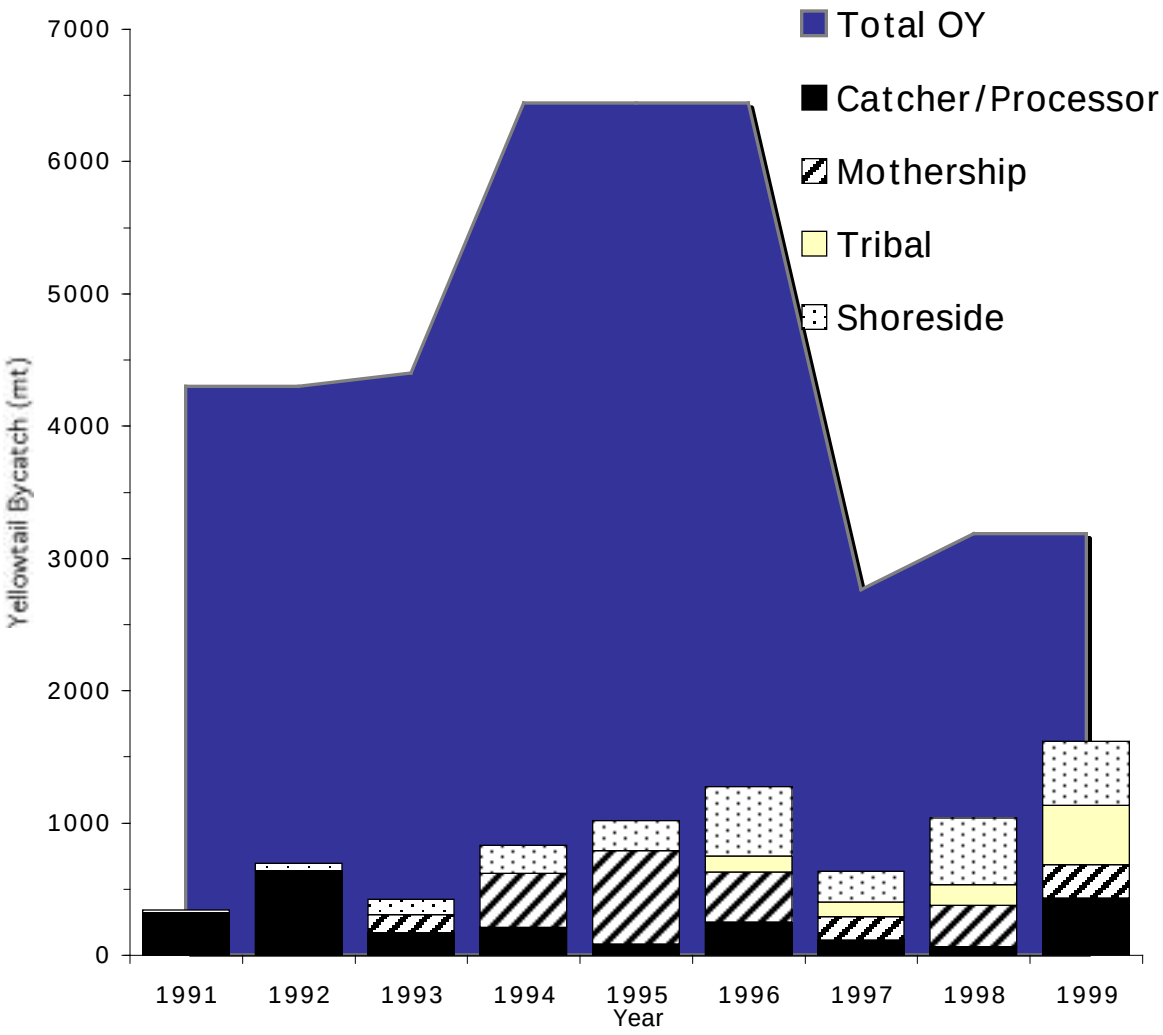


Figure 1. Total yellowtail bycatch and total yellowtail OY, 1991-1999. 1999 data is preliminary.

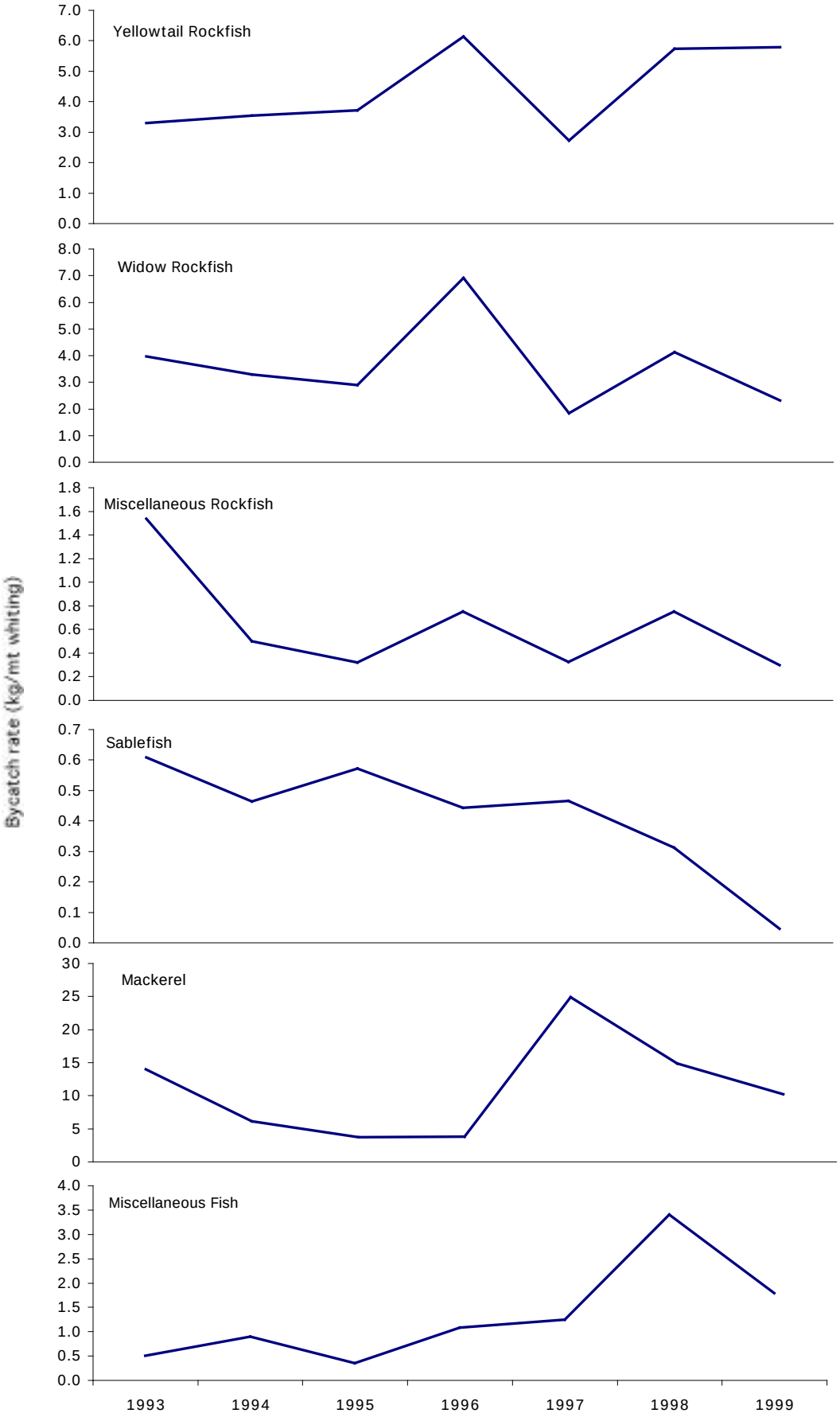
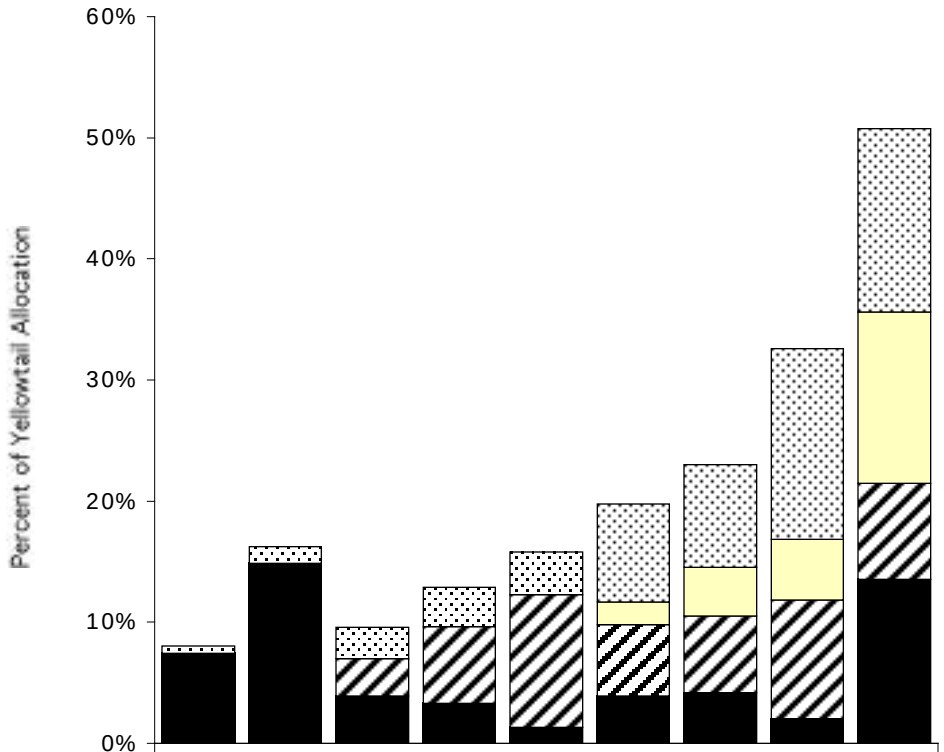


Figure 2. Bycatch rates for components of the shoreside whiting fishery catch, 1993-1999.



	1991	1992	1993	1994	1995	1996	1997	1998	1999
Shoreside	1%	1%	3%	3%	3%	8%	8%	16%	15%
Tribal	0%	0%	0%	0%	0%	2%	4%	5%	14%
Mothership	0%	0%	3%	6%	11%	6%	6%	10%	8%
Catcher/ Processor	7%	15%	4%	3%	1%	4%	4%	2%	14%

Figure 3. Percentage of the total yellowtail OY taken as bycatch in the whiting fishery, 1991-1999. 1999 data is preliminary.

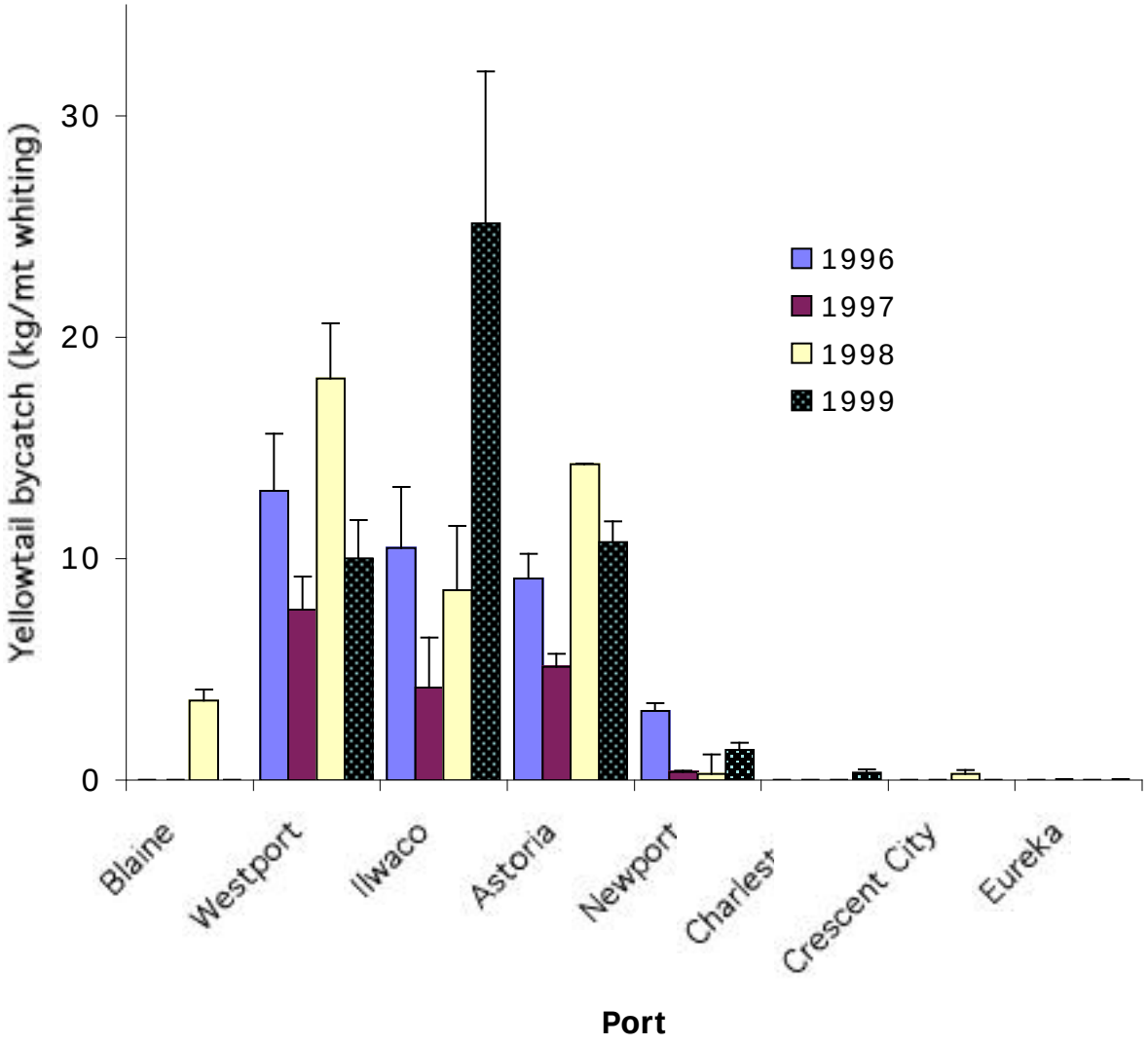


Figure 4. Yellowtail bycatch rate (kg/mt of whiting) grouped by port for 1996-1999. Values are ±SE.