

MEMORANDUM

OREGON DEPARTMENT OF FISH AND WILDLIFE

DATE: July 11, 2003

TO: Mark Saelens, Patty Burke

FROM: Bob Hannah, Steve Parker

SUBJ: Flatfish Trawl EFP Bycatch Data for May-June Period

This is a summary of the bycatch rate estimates generated from the selective flatfish trawl EFP to date. The time period covered is the complete May-June trawl period. In the May-June period, 34 EFP trips (5 large footrope trips outside 200 fathoms were excluded) were completed by 8 vessels landing into 3 ports. Of the 34 trips, 32 were observed. The EFP incorporates two fishing strategies, with somewhat different limits and rules. Five of the vessels are in the "Mixed Shelf Flatfish" (MSF) strategy and 3 are in the "Beach" (B) strategy. Of the 34 trips, 22 (20 observed) were in the MSF strategy and 12 (all observed) were in the B strategy. The B strategy is confined to inside of 100 fathoms, while the MSF strategy is confined to within 150 fathoms (generally 50 to 150 fathoms; all logbooks have not been collected yet).

In compiling this summary, we have excluded fishing trips targeting longspine thornyheads outside 200 fathoms and the 2 unobserved trips. We have utilized primarily fish ticket data to generate the table, however, for the total catch of the 4 overfished rockfish species, observer weights were used, not ticket weights. The denominator, "All Target", includes all non-overfished species landed (including lingcod). The second column (Shelf Flatfish) uses the sum of petrale sole, English sole, Dover sole and other flatfish (essentially all flatfish except arrowtooth flounder) in the denominator.

The market categories included in "All Target" were Dover sole, English sole, petrale sole, arrowtooth flounder, skates, lingcod, yellowtail rockfish, Pacific cod, sand sole, sanddabs, Bellingham sole, curlfin sole, starry flounder, rex sole, shortspine thornyhead, shelf rockfish, slope rockfish, longspine thornyhead and nearshore rockfish.

Strategy	Overfished Species	Bycatch Rate All Target	Bycatch Rate Shelf Flatfish
Mixed Shelf Flatfish	Canary Rockfish	0.001352	0.002710
	Darkblotched Rockfish	0.003660	0.007338
	Yelloweye Rockfish	0.000037	0.000075
	Widow Rockfish	0.000000	0.000000
Beach	Canary Rockfish	0.000031	0.000045
	Darkblotched Rockfish	0.000044	0.000065
	Yelloweye Rockfish	0.000000	0.000000
	Widow Rockfish	0.000000	0.000000

ODFW Selective Flatfish Trawl

Concept

- Develop a bottom trawl that could more efficiently harvest bottom-tending flatfish while excluding “roundfishes” that tend to rise as they encounter the trawl.

Experimental Design

- Aimed at shelf flatfish fishery in depth range of 50 – 180 ftm – Figure 1.
- Randomized block, alternate haul design, 64 pairs of tows.
- Half field work conducted in 2001, half in 2002.
- Field work was designed to occur where flatfish occur, but also where rockfish bycatch may be higher to discern any selection effect.
- Compared catch, catch rates, and fish length to vessel’s normal small footrope flatfish trawl.

	Net Design Comparison	
	Control	Experimental
Trawl type	4-seam WA 4A (400)	2-seam Eastern 400
Footrope Length (m)	20	31.2
Headrope Length (m)	17.3	40.3
Spread (m)	14.6	20.1
Rise (m)	2.4 – 2.7	1.2 – 1.5
Headrope cutback (m)	+5.2	-6.4

Experimental Results

- Catch table – Table 1
 - In general:
 - Flatfish catch increases because of wider spread and herding.
 - Mobile fish which have good swimming abilities are able to rise above the headrope and escape capture (*e.g.* hake).
 - We categorized *a priori* some rockfishes into large (>10”) and small categories to test for a size effect.
 - Data for some species limited by sample size (*e.g.* large darkblotched and yelloweye rockfish).
- Catch rates – Table 2
 - In general:
 - For species encountered often, significant reductions in rate were observed.
 - Sample size too low for large darkblotched and yelloweye rockfishes, likely no effect with small darkblotched.
- Size Selectivity – Table 3
 - Generally, experimental net catches:
 - Smaller Dover
 - Smaller halibut
 - Smaller sablefish

- Hint at Darkblotched effect

Fishery-level Test – Disaster Relief

- Create an EFP authorized fishery to allow several vessels to try the net in the shelf summer flatfish fishery coastwide.
- Data collection would occur through a federal observer requirement.
- Gear is currently “legal” gear, but would need an incentive for fishermen to either switch gear or buy a new net.
- EFP Development
 - Test should provide coastwide information on bycatch in this fishery, should be at federal level.
 - ODFW does not have funds or staff necessary for this coastwide program. It would be necessary for NMFS to administer the EFP.
 - Must be desirable for fishermen. We plan to sponsor a meeting with industry to develop a framework for the EFP.
 - Include in EFP development meeting in August (piggyback on port meetings?)
 - Summer flatfish fishermen
 - GMT representative(s)
 - State managers
 - WOC
 - Technical advisors-ODFW
 - NMFS
 - Technical advisors-Craig Rose
 - Observer coordinator
 - EFP Administration
 - Identify entity responsible for proposal development
 - Generate a proposal for discussion at the September PFMC meeting.
- Action Items
 - ID GMT Rep(s) to attend industry planning meeting.
 - Confirm GMT willingness to provide additional harvest as incentive to participate in EFP fishery.

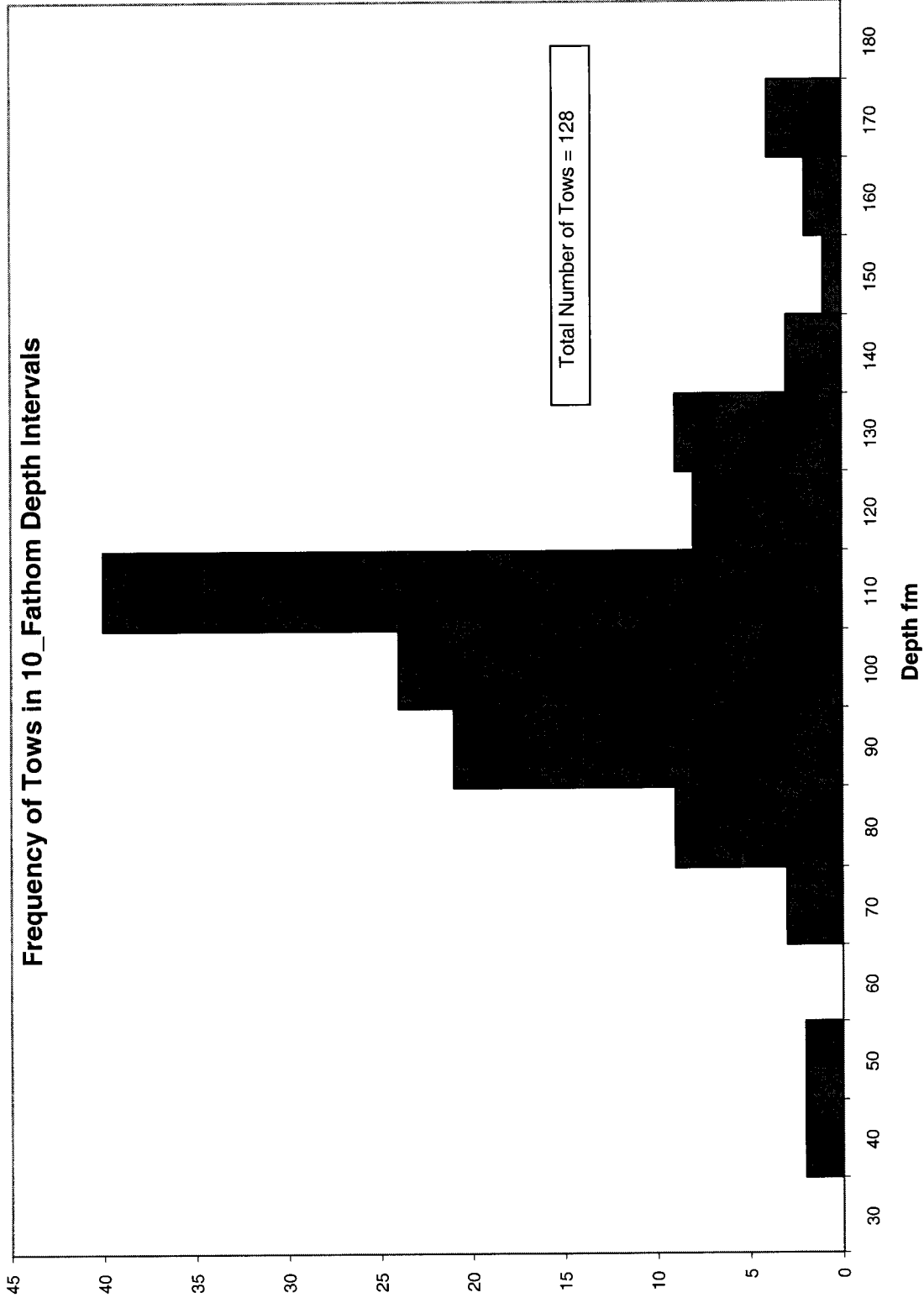


Figure 1. Frequency distribution of depths trawled in the selective flatfish trawl experiment.

Table 1. Comparison of catch data for control and experimental trawls.

Species Name	Mean Control Catch	Mean Experimental Catch	Mean % Reduction (ratio of geometric means)	p-value (2-factor ANOVA)	p-value (Wilcoxon signed-pair test)	n
Arrowtooth Flounder	128.79	190.09	-(16)%	0.2996	0.6964	64
Canary Rockfish - Large	6.77	1.65	61%	0.0233	0.0454	32
Darkblotch Rockfish – Large	0.64	1.24	-(28)%	0.6017	0.4321	12
Darkblotch Rockfish – Small	0.78	0.47	-(25)%	0.4910	0.3788	32
Dover Sole	86.82	137.90	-(66)%	0.0001	<0.0001	64
English Sole	3.37	4.58	-(33)%	0.0263	0.0387	37
Flathead Sole	12.76	10.91	17%	0.0177	0.0132	32
Greenstripe Rockfish - Large	22.29	24.61	-(16)%	0.3827	0.3970	52
Greenstripe Rockfish – Small	6.80	5.36	-(13)%	0.4661	0.2580	46
Pacific Halibut	41.26	29.27	44%	0.0972	0.0585	29
Ling Cod	70.01	122.06	-(24)%	0.2811	0.3010	60
Longnose Skate	75.96	157.32	-(132)%	0.0001	<0.0001	61
Pacific Cod	2.61	1.57	11%	0.7476	0.7532	13
Pacific Hake	156.53	3.92	88%	0.0001	<0.0001	50
Petrale Sole	15.19	23.33	-(54)%	0.0055	0.0196	34
Ratfish	20.33	18.59	-(69)%	0.0092	0.0316	48
Redbanded Rockfish – Large	0.99	1.24	-(40)%	0.2704	0.5943	23
Redbanded Rockfish – Small	0.18	0.28	-(46)%	0.3102	0.4457	18
Redstripe Rockfish - Large	7.63	1.10	63%	0.0272	0.0052	13
Rex Sole	8.54	10.70	-(38)%	0.0033	0.0463	64
Rosethorn Rockfish – Large	0.35	0.13	-(64)%	0.3211	0.6151	14
Rosethorn Rockfish - Small	0.48	1.21	-(79)%	0.0405	0.0331	17
Sablefish	118.13	129.34	-(29)%	0.0648	0.0178	63
Sandpaper Skate	1.43	3.45	-(147)%	0.0001	0.0001	52
Sharpchin Rockfish – Large	2.55	1.34	27%	0.3457	0.4348	17
Sharpchin Rockfish - Small	2.13	1.41	-(18)%	0.5148	0.8647	15
Shortspine Thornyhead - Large	6.13	4.07	22%	0.0940	0.0230	17

Shortspine Thornyhead – Small	1.43	1.93	8%	0.6079	0.6888	11
Slender Sole	1.06	6.69	-(304)%	0.0001	<0.0001	34
Spiny Dogfish	4.52	3.28	31%	0.1027	0.2089	34
Splitnose Rockfish - Small	0.50	0.34	29%	0.2850	0.5406	10
Stripetail Rockfish - Large	2.04	3.38	1%	0.9734	0.3627	14
Stripetail Rockfish - Small	0.82	1.77	-(15)%	0.5579	0.6357	17
Threadfin Sculpin	3.48	5.52	-(37)%	0.0161	0.0840	34
Yelloweye Rockfish – Large	0.73	0.95	-(89)%	0.3402	0.6121	7
Yellowtail Rockfish - Large	0.60	0.49	3%	0.9461	0.8125	9

The n column refers to the number of blocks in which the species was caught.

Table 2. Comparison of bycatch rates for overfished species and species of concern in the control and experimental trawls.

Species	Control Mean Bycatch Rate ¹ (Ratio of Means)	Experimental Mean Bycatch Rate (Ratio of Means)	Mean % Reduction	p-value (Wilcoxon Signed- Rank Test)	² n
Canary Rockfish	0.066697	0.010408	84.4%	0.0225	32
Darkblotch Rockfish Lg.	0.006328	0.007806	-23.4%	0.8139	12
Darkblotch Rockfish Sm.	0.007667	0.002986	61.1%	0.7364	32
Ling Cod	0.689885	0.769931	-11.6%	0.2302	60
Pacific Hake	1.542433	0.024698	98.4%	<0.0001	50
Pacific Halibut	0.406559	0.184615	54.6%	0.0004	30
Shortspine Thornyhead Lg.	0.060431	0.025674	57.5%	0.0552	17
Shortspine Thornyhead Sm.	0.014072	0.012142	13.7%	0.9292	11
Yelloweye Rockfish	0.007236	0.005992	17.2%	0.6121	7
Yelloweye (Excl. block 37)	0.007236	0.002769	61.7%	0.9165	6

¹ The ratio of means was employed for calculating bycatch rate. The mean bycatch rate is defined as follows: $\mu = \sum_{i=1}^n b_i / \sum_{i=1}^n f_i$

where b_i = bycatch catch (lb) and f_i = Dover Sole + Petrale Sole + English Sole catch (lb)

² n refers to the number of paired tows (blocks) in which the species was caught.

Table 3. Comparison of mean length of fish captured in the control and experimental trawl.

Species Name	Mean Control Length (cm)	Mean Experimental Length (cm)	p-value (Kolmogorov-Smirnov Test)	n
Arrowtooth Flounder	36.4	36.6	<0.0001	1639
Canary Rockfish	43.7	43.6	0.6964	114
Darkblotch Rockfish	21.9	20.8	0.0494	232
Dover Sole	40.4	38.5	<0.0001	1073
English Sole	31.7	32.4	0.0124	580
Flathead Sole	26.8	26.8	>0.9999	1254
Greenstripe Rockfish	27.3	27.5	0.1954	3216
Halibut	91.3	81.8	0.0394	69
Pacific Hake	46.5	47.3	0.5499	147
Petrale Sole	34.9	34.6	0.5938	929
POP Rockfish	30.5	25.3	0.1623	25
Redbanded Rockfish	27.0	26.9	0.4182	153
Redstripe Rockfish	31.7	31.0	0.5883	636
Rex Sole	27.9	27.2	0.0041	1161
Rosethorn Rockfish	23.2	23.2	0.8110	302
Rougheye Rockfish	34.8	34.0	0.3900	31
Sablefish	47.8	49.2	0.0152	1544
Sharpchin Rockfish	24.8	24.5	0.8128	695
Shortspine Thornyhead	27.0	27.1	0.7340	444
Slender Sole	20.0	19.8	0.7994	490
Stripetail Rockfish	24.9	24.3	0.0838	867
Yelloweye Rockfish	39.3	42.0	0.9828	19
Yellowtail Rockfish	45.2	42.2	>0.9999	14