



DEPARTMENT OF FISH AND GAME

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August 31, 2005

Dr. Donald O. Mclsaac, Executive Director
Pacific Fishery Management Council
7700 NE Ambassador Place, Suite 200
Portland, Oregon 97220-1384

Re: 2004 Exempted Fishing Permit Report for Selective Flatfish Trawl Study

Dear Dr. Mclsaac:

Enclosed for the September briefing book is a copy of our final 2004 Exempted Fishing Permit (EFP) report. The report summarizes our study to test a selective flatfish trawl designed by the Oregon Department of Fish and Wildlife, and a modified Scottish seine to catch shelf flatfish while avoiding rockfish in the coastal waters of central California, south of 40° 10' N latitude. The report also provides recommendations concerning use of these gears which the Council may want to consider.

If you have any questions about the attached EFP report, please contact Mr. Steve Wertz, Associate Biologist in the Department's Marine Region, by telephone at 562.342.7184 or by email at swertz@dfg.ca.gov.

Sincerely,

A handwritten signature in cursive script that reads "Marija Vojkovich".

Marija Vojkovich
Offshore Ecosystem Coordinator

Enclosure(s)

cc: See Page 2

Dr. Donald O. McIsaac
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2004

**California Department of Fish and Game
Exempted Fishing Permit Study**



**Prepared By
Marine Region
California Department of Fish and Game
September 7, 2005**

Summary

The California Department of Fish and Game (CDFG) conducted an Exempted Fishing Permit (EFP) study during 2004 to observe and collect data on the rate at which unintended species, particularly overfished rockfish, are taken by commercial trawl fishermen targeting shelf flatfish (Table 3) in all depths of federal waters adjacent to California south of 40° 10' N latitude. Two gear types were used during this EFP study: an experimental selective flatfish trawl net designed by the Oregon Department of Fish and Wildlife (ODFW), and a modified Scottish seine. The trawl net designed by ODFW is more selective in the harvest of shelf flatfish species while excluding rockfish species than trawl net configurations currently used in the fishery. Two vessels participated, with 100% observer coverage from October 18 to December 29, 2004, resulting in 34 trips and 116 tows. The study results are as follows:

- The participating vessels caught 237,043 lbs of groundfish;
- The targeted flatfish species accounted for 80% by weight of the retained catch and 65% by weight of the total groundfish catch;
- Weights of overfished rockfish were: canary (7 lbs), darkblotched (8 lbs), cowcod (132 lbs), and bocaccio (5,436 lbs);
- No widow or yelloweye rockfish were observed; and
- Total bycatch rate estimates for overfished rockfish per pound target species were: canary (0.0001), darkblotched (0.0001), cowcod (0.0028), and bocaccio (0.0473).

Introduction

Shelf flatfish (Dover sole, English sole, petrale sole, and “other flatfish”: rex sole, rock sole, sanddabs spp., sand sole, starry flounder, turbot spp.) are an extremely important group of groundfish in the California seafood industry. These stocks are believed to be healthy, and California fishermen and fish processors have worked aggressively to develop strong markets for these species, especially on the central California coast. A component of California’s trawl fleet and processors are heavily dependent upon these flatfish.

On July 1, 2002, the US Secretary of Commerce closed the eastern Pacific continental shelf south of 40° 10' N latitude to retention of shelf groundfish species, based on an inseason recommendation from the Pacific Fishery Management Council (PFMC) to protect bocaccio, canary, cowcod, darkblotched, widow, and yelloweye rockfish, which were declared overfished by the National Marine Fisheries Service (NMFS). By 2003, this became a depth-bounded area closure based on the primary depth distribution of overfished species, designated the Trawl Rockfish Conservation Area (RCA). This action precluded trawl fishing access to healthy flatfish stocks that occur on the shelf floor in the RCA.

Fishermen using small footrope trawl gear to catch shelf flatfish testified before the PFMC that they could pursue this fishery inside the Trawl RCA with minimal or no bycatch of overfished rockfish. To test this assertion, NMFS issued an EFP to CDFG in

the fall of 2002 to allow for normal trawl fishing operations for shelf flatfish within the Trawl RCA to estimate the bycatch of overfished rockfish. Six vessels participated in the study. Fishing operations were conducted in Pacific Ocean waters adjacent to California to a maximum water depth of 70 fm, south of 40° 10' N latitude from port groups San Francisco to Monterey. Results from the 2002 EFP showed that the total bycatch rate of bocaccio, canary, cowcod, and widow rockfish was nominal (≤ 0.0003); no yelloweye or darkblotched rockfish was observed (CDFG 2004a).

The CDFG received an EFP in 2003, to conduct a study with up to six vessels using an experimental selective flatfish trawl, on the central California coast to a maximum water depth of 100 fm. The selective flatfish trawl was previously designed and tested by the ODFW. Their study results showed this gear was effective in minimizing the bycatch of overfished shelf rockfish north of 40° 10' N latitude to a depth of 100 fm (Parker et al. 2004). The goal of the 2003 CDFG study was to:

- 1) document the rate at which non-target species (particularly overfished shelf rockfish such as bocaccio, canary, cowcod, darkblotched, widow, and yelloweye) are taken by commercial fishers targeting shelf flatfish while using an experimental selective flatfish trawl developed by ODFW;
- 2) estimate discard and total bycatch rates for target and non-target groundfish species caught in an experimental selective flatfish trawl and modified Scottish seine;
- 3) collect biological data that are otherwise not available from the landed catch; and
- 4) document the at-sea catch data for rockfish to evaluate the full retention of rockfish in the trawl fishery as a management tool.

One vessel participated in the study, and deployed a Scottish seine modified to meet the specifications of the experimental selective flatfish trawl designed by ODFW. Since this gear was unique and not previously tested, the 2003 EFP bycatch estimates could not be expanded as representational of the small footrope trawl fleet south of 40° 10' N latitude (CDFG 2004b).

The goals of the 2004 EFP were the same as the 2003 study. The CDFG and PFMC can use the information from this study when considering management decisions about the future use of this gear south of 40° 10' N latitude.

Elements of the Study

Vessel Selection Process

The CDFG developed qualification criteria based on recent historical participation in the targeted shelf flatfish fishery in the coastal waters of central California. Vessels were required to have landed at least 10,000 pounds of shelf flatfish (Dover sole, English sole, petrale sole, and "other flatfish") taken by small footrope trawl and Scottish seine gears in at least two of six years from 1998 to 2003 in California ports, and the vessel operator was required to hold a current valid California commercial fishing license. The Code of Federal Regulations (CFR) includes Scottish seine gear within its definition of bottom trawl gear (50CFR660.302). Initially, 56 vessels were identified and the owners were contacted about participating in the study; however, 13 of the qualified vessel

owners opted to participate in the federal fishing capacity reduction program of 2003, reducing the final eligibility list to 43 vessels. The CDFG received three applications of interest and two vessels were selected for the study. The selected vessels operated out of port groups San Francisco and Monterey.

Net Design

As part of the permit agreement, the participating vessel operators were required to fish a small footrope trawl as defined in the CFR (50CFR660.302), except that modifications of the net were required to meet the selective flatfish trawl specifications developed and tested by ODFW. The selective flatfish trawl net configuration requirements were:

- 1) two seamed net with a breastline no longer than 3 ft in length;
- 2) headrope to footrope ratio of at least 1.30 (i.e., 30% longer headrope);
- 3) no floats permitted along the middle 50% of the headrope, except for Scottish seine, for which no floats permitted along the middle 25% of the headrope;
- 4) center of the headrope with a rise of not more than 5 ft above the footrope;
- 5) a wing tip height of not more than 30 meshes; and
- 6) a footrope not longer than 105 ft, except for Scottish seine, with a footrope not longer than 130 ft in length.

Study Area

Fishing activity took place south of 40° 10' N latitude between port groups San Francisco and Monterey in Pacific Ocean waters adjacent to California to bottom depths accessible to small footrope trawl gear. Participants were not restricted from fishing within the Trawl RCA.

Observers

The participating vessels operators were required to carry a federal observer when fishing for shelf flatfish under the terms of the EFP. Observers were trained according to the NOAA Fisheries West Coast Groundfish Observer Program (WCGOP) (NWFSC 2004). Portside samplers, contracted by CDFG from the Pacific States Marine Fisheries Commission intercepted the EFP vessels when they returned to port to collect biological measurements from the catch including fish length, sex, maturity, and aging structures (otoliths).

Bycatch Thresholds

As part of the permit agreement with the participating vessel owners, monthly bycatch thresholds (i.e., catch caps) were established to limit fishing mortality of overfished rockfish (bocaccio, canary, cowcod, and yelloweye rockfish) and lingcod that can co-occur with the healthy shelf flatfish species. Attainment of any threshold would result in termination of fishing under the EFP. Each vessel was limited to no more than 50 pounds each of canary, cowcod, or yelloweye rockfish and no more than 1,000 pounds of bocaccio rockfish per fishing month. If either threshold was reached, the vessel was prohibited from any further EFP fishing for the remainder of the month, but could resume the following month. A cumulative bycatch threshold for lingcod was set at 44,100 pounds for the entire EFP period.

Rockfish Retention Provisions

The permit required retention of all rockfish species (*Sebastes spp.* and *Sebastolobus spp.*) caught during a trip; hence, provisions were drafted to allow retention of rockfish in excess of published trip limits in the Federal Register for the participating vessels. This requirement was expected to provide information to evaluate a future broader scale retention program for the groundfish trawl. Proceeds from the sale of rockfish landed in excess of the published trip limits were forfeited to the CDFG Preservation Fund.

Trip Limit Provisions

The participating vessels were required to stay within the routine flatfish trip limit provisions published in the Federal Register for trawl vessels deploying small footrope gear south of 40° 10' N latitude. Landing provisions allowed up to 120,000 pounds per 2-month cumulative period for shelf flatfish, no more than 20,000 pounds of which could be petrale sole during (September-October); and of which no more than 100,000 pounds may be petrale sole during (November-December). The permit required that landings be made at designated processing plants.

Analytical Methods

Catch Documentation

Three independent data sources were integrated to accurately measure total bycatch and discard rates:

- 1) CDFG landing receipt data entered into Pacific Fisheries Information Network (PacFIN) landing receipt database;
- 2) Coastwide Trawl Log database; and
- 3) at-sea observer data.

1. PacFIN database: used for documenting the landed catch for observed trips. Landing receipt data were assumed to be accurate due to the legal requirement to document actual weights, not estimated weights. All trawl logs were matched to landing receipts and the species weights for each tow were estimated from landing receipts. The following steps were used to estimate tow-level weights reported in the logs:

- (i) If a landed species was listed on both the trawl log and landing receipt and the summed log and receipt pounds were not equal:
 - a. Calculate the ratio between the total landing receipt pounds and the total trawl log pounds for that species;
 - b. Multiply the trawl log species pounds by the ratio for every tow that had the species to create the final landing receipt pounds for the tow.
- (ii) If a landed species was recorded on the trawl log but not on the landing receipt, receipt pounds were assumed to be zero; haul pounds were unchanged.
- (iii) If the landed species was recorded on the landing receipt but not on the trawl log, receipt pounds were added to each tow of the trip trawl logbook data base. The total pounds were divided equally between all tows within the acceptable depth range for the landed species.

2. Trawl log database: provided fishing location and effort information at the tow-level.
3. Observer database: provided for at-sea catch information and discard weight estimates.

Discard and Bycatch Analyses

Analyses for this report attempt to parallel the methodologies described in the Northwest Fisheries Science Center's WCGOP report (NWFSC 2003) for estimating discard and total bycatch rates for the west coast groundfish fleet when possible and appropriate. For this report, "groundfish" are those species found in the federal Pacific Coast Groundfish Fishery Management Plan (PCGFMP), and the designation "group" represents a market category.

PacFIN receipt, trawl log, and observer databases were merged to allow for tow-level analyses of discard and total bycatch during the EFP. Three different measurements were used to calculate ratio estimators for discard:

- 1) discard pounds per hour towed;
- 2) discard pounds per pound of retained target species; and
- 3) discard pounds per pound of retained groundfish.

The target species denominator consisted of all marketable shelf flatfish species retained per tow, while the groundfish denominator consisted of all federally managed groundfish retained per tow. Total bycatch estimates were also derived using the same ratio estimators; however, the denominators included retained plus discarded catch weights. These estimates were stratified by 2-month landing limit periods: September/October and November/December.

Results

Spatial and Temporal Distribution of Observations

Under the terms of the EFP, two vessels conducted normal fishing operations for shelf flatfish with 100% at-sea observer coverage over two 2-month landing limit periods from October 18 to December 29, 2004. One vessel fished a selective flatfish trawl and a second vessel fished a modified Scottish seine. Observers went on a total of 34 EFP trips, documented fishing activity and catch, and collected biological samples from 116 tows. Fishing effort occurred south of 40° 10' N latitude in the vicinity of port groups Monterey and San Francisco. The port of origin was unique for each vessel; the trawl vessel's port of origin was Monterey and the Scottish seine vessel's port of origin was San Francisco. The number of observed trips by port of origin and gear are summed by 2-month landing limit periods (Table 1).

Table 1. Number of observed at-sea trips by port of origin and gear fished per 2-month landing limit for the study period.

Port /Gear	Observed Trips by Port of Origin and Gear					
	September - October		November - December		Total for Permit Period	
	Number	Percent	Number	Percent	Number	Percent
Monterey/Trawl	4	57%	23	85%	27	79%
San Francisco/Seine	3	43%	4	15%	7	21%
Total	7		27		34	

During the EFP, trawl log data indicated fishing effort ranged in depth from 18 fm to 200 fm over the ocean bottom between Point Año Nuevo and Point Sur (Figure 1). Table 2 shows the total number of tows, tow hours, tow depths per 2-month landing limit periods for the study.

Table 2. Number of observed at-sea tows, total hours towed, and summary of tow depth profiles by gear and fishing period.

Trawl Trip Period	Tow		Tow Start Depth			Tow End Depth		
	Number	Hours	Min.	Max.	Avg.	Min.	Max.	Avg.
Sep.-Oct.	12	28	57	146	122	57	187	135
Nov.-Dec.	61	148	18	187	65	16	200	64
Total	73	176						

Seine Trip Period	Tow		Tow Start Depth			Tow End Depth		
	Number	Hours	Min.	Max.	Avg.	Min.	Max.	Avg.
Sep.-Oct.	27	54	75	110	91	75	110	91
Nov.-Dec.	16	32	75	110	92	75	110	92
Total	43	86						

Catch, Discard and Bycatch Estimates

A list of all the target and non-target groundfish species caught by both gears during the study is shown in Table 3. Amounts of discard, retained, and total catch for 40 groundfish species/market categories are summed for the selective flatfish trawl and modified Scottish seine gears in Tables 4 and 5, respectively. Rockfish are presented first in each table, followed by thornyheads, flatfish, roundfish, sharks, skates, and ratfish species.

Selective Flatfish Trawl

A total of 207,896 pounds of groundfish was caught from October 21 to December 29, 2004 by the trawl vessel. Eighty-one percent of the total catch was retained and 19% was discarded at-sea. The target species (shelf flatfish) comprised a majority (78%) of the retained catch weight, followed by rockfish (17%), roundfish (4%), and all other groundfish species (<1%). The total bycatch weight of overfished groundfish totaled 11,815 pounds: canary (6 lbs), darkblotched (8 lb), cowcod (130 lbs), bocaccio (5,416

lbs), and lingcod (6,255 lbs). No yelloweye or widow rockfish were caught (Tables 3 and 4). The monthly 1,000 lbs bycatch threshold for bocaccio was reached on October 28 and again on November 12, resulting in termination of EFP fishing for the remainder of each of those months. The October threshold was reached following 12 tows that ranged from 16 pounds to 133 pounds of bocaccio per tow. However, the November bycatch threshold was reached after eight tows that ranged from 6 pounds to 2,134 pounds of bocaccio per tow. The relatively high catch of 2,134 pounds occurred at a reported depth range of 169 fm to 179 fm. Overall, 74% (4,014 lbs) of the bocaccio caught during the study occurred in tows averaging more than 100 fm in depth.

Estimates of discards (by pounds per hour towed, by pound of target species, and by pound of groundfish) were calculated for 21 groundfish species/market category (Table 6). All three discard estimators showed that ratfish and skates, followed by English sole and sanddabs, had the highest discard rates in both the September/October and November/December landing limit periods. The full retention of all rockfish eliminated discard estimates for these species. One exception occurred when 14 pounds of greenstriped rockfish was discarded at-sea accidentally. The primary reasons noted for all discards were: no market demand, fish size, and prohibited species.

Estimates of total bycatch were calculated for 30 non-target groundfish species/market categories (Table 8). Overall, the estimates were variable and ranged from zero to 0.1863 for the market category group rose rockfish. Estimates for overfished groundfish ranged from a low ratio (zero to 0.0028) for canary, cowcod, and darkblotched rockfish to a higher ratio (0.0473 to 0.1025) for bocaccio and lingcod.

Modified Scottish Seine

A total of 29,147 pounds of groundfish was caught from October 18 to November 10, 2004 by the Scottish seine vessel. Eighty-seven percent of the total catch was retained and 13% was discarded at-sea. The target strategy species comprised a majority (91%) of the retained catch weight, followed by skates (5%), rockfish (3%), and roundfish (1%). The total bycatch weight of overfished groundfish totaled 182 pounds: canary (1 lb), cowcod (3 lbs), bocaccio (20 lbs), and lingcod (158 lbs) pounds. No darkblotched, yelloweye, or widow rockfish were caught (Tables 3 and 5). The Scottish seine vessel elected to not participate in the EFP after November 10 in order to focus on the Dungeness crab fishery.

Estimates of discards (by pounds per hour towed, by pound of target species, and by pound of groundfish) were calculated for 21 groundfish species/market categories (Table 7). All three estimators showed that longnose skate and ratfish had the highest discard ratios for the September/October landing limit period. In November/December management period showed that English sole, California skate, and sanddabs replaced longnose skate and ratfish as the species with the highest discard ratios in the catch.

Estimates of bycatch for 30 non-target groundfish species are shown in (Table 9). Overall, the estimates were variable and ranged from zero to 0.0734 for skates.

Estimates for overfished groundfish were nominal ranging from zero to 0.0018 for bocaccio, canary, and cowcod rockfish, and 0.0039 to 0.0071 for lingcod.

Biological Samples

More than 2,550 biological measurements and samples from 16 different species of groundfish were collected during the study by portside samplers. In addition, at-sea observers collected measurements from lingcod prior to their being released alive (Table 10). The portside data are maintained at the NMFS's Southwest Science Center, Santa Cruz Laboratory, California.

Conclusion

The 2004 EFP study provided the CDFG with its first opportunity to document discard and total bycatch for target and non-target groundfish species caught in an experimental selective flatfish trawl. Overall, the results are promising for reducing bycatch of overfished rockfish in the shelf flatfish fishery south of 40° 10' N latitude and appear similar to ODFW's (Parker et al. 2004) findings. However, due to the limited number of participants and trips in this study, caution should be exercised when comparing the findings of the two studies. Table 11 shows bycatch estimates for overfished rockfish caught in CDFG's 2004 study and those reported in ODFW's study (Parker et al. 2004). Due to the latitudinal distribution of species there is some variability in bycatch rates between the two studies. The most notable difference occurred in the bycatch of bocaccio; no bocaccio was observed in the ODFW study. The bycatch of bocaccio in the central California study was variable from tow to tow, averaging 45 lb/hr. The average pounds per hour towed was influenced by a relatively high catch of more than 2,000 pounds of bocaccio that occurred in one tow between depths of 169 fm and 179 fm of water.

Bycatch estimates of bocaccio caught in the modified Scottish seine was nominal (<1lb/hr). Unfortunately, there can be no direct comparison between this relatively passive gear when compared to traditional trawl gear for predicting bycatch of bocaccio or other overfished rockfish in the flatfish trawl fishery. However, the Scottish seine vessel has participated in each of CDFG's selective flatfish EFPs over the past three years (CDFG 2004a and 2004b), resulting in total bycatch estimates of no more than 0.0002 for any one of the nine groundfish species declared overfished by NMFS, for both the modified and unmodified versions of this gear fished to a maximum depth of 100 fm.

Management Recommendations

1) Before considering implementing regulations for use of selective flatfish trawl gear south of 40° 10' N, additional at-sea bycatch data are needed. The CDFG does not plan to continue this study in 2006 due to an overall lack of interest by industry to replace their small footrope trawl with a selective flatfish trawl. However, bycatch data collected by the WCGOP for vessels using this gear north of 40° 10' N could be used to make inferences about its potential success south of 40° 10' N.

- 2) In the interim, to encourage fishermen to convert their small footrope trawl gear to the selective flatfish trawl configuration designed by ODFW, an increase in the September/October and November/December trip limits for Dover sole, petrale sole, and “other flatfish” is warranted based on the bycatch rates reported in this report.
- 3) Scottish seine gear should be removed from the federal definition of bottom trawl gear and should have its own definition (50CFR660.302). The most unique difference between this gear and bottom trawl gear is the lack of trawl doors and no roller gear on the footrope. And, it is not actively towed across the ocean bottom. Table 12 shows the gear differences between a Scottish seine and a bottom trawl.

References

California Department of Fish and Game. 2004a. Estimates of discard and bycatch in the central California shelf flatfish fishery for small footrope trawl gear (including Scottish seine) under a federal exempted fishing permit in 2002, November (supplemental Report E.3.a), Pacific Fishery Management Council, Portland.

California Department of Fish and Game. 2004b. Estimates of discard and bycatch for modified Scottish seine gear in the central California shelf flatfish fishery for small footrope trawl gear (including Scottish seine) under a federal exempted fishing permit in 2003, November (supplemental Report E.3.b), Pacific Fishery Management Council, Portland.

Parker, S.J., Saalen, M.R., Kupillas, S.A., Hannah, R.W. 2004. Using an exempted fishing permit for a large-scale test of a selective flatfish trawl in the continental shelf flatfish fishery. Oregon Department of Fish and Wildlife. Newport, OR, 22pp.

Northwest Fisheries Science Center (NWFSC). 2004. Northwest Fisheries Science Center West Coast Groundfish Observer Data Analyses Data Report and Summary Analyses. NWFSC, 2725 Montlake Boulevard East, Seattle, Washington, 98112.

Northwest Fisheries Science Center (NWFSC). 2004. West Coast Groundfish Observer Manual. NWFSC, 2725 Montlake Boulevard East, Seattle, Washington, 98112.

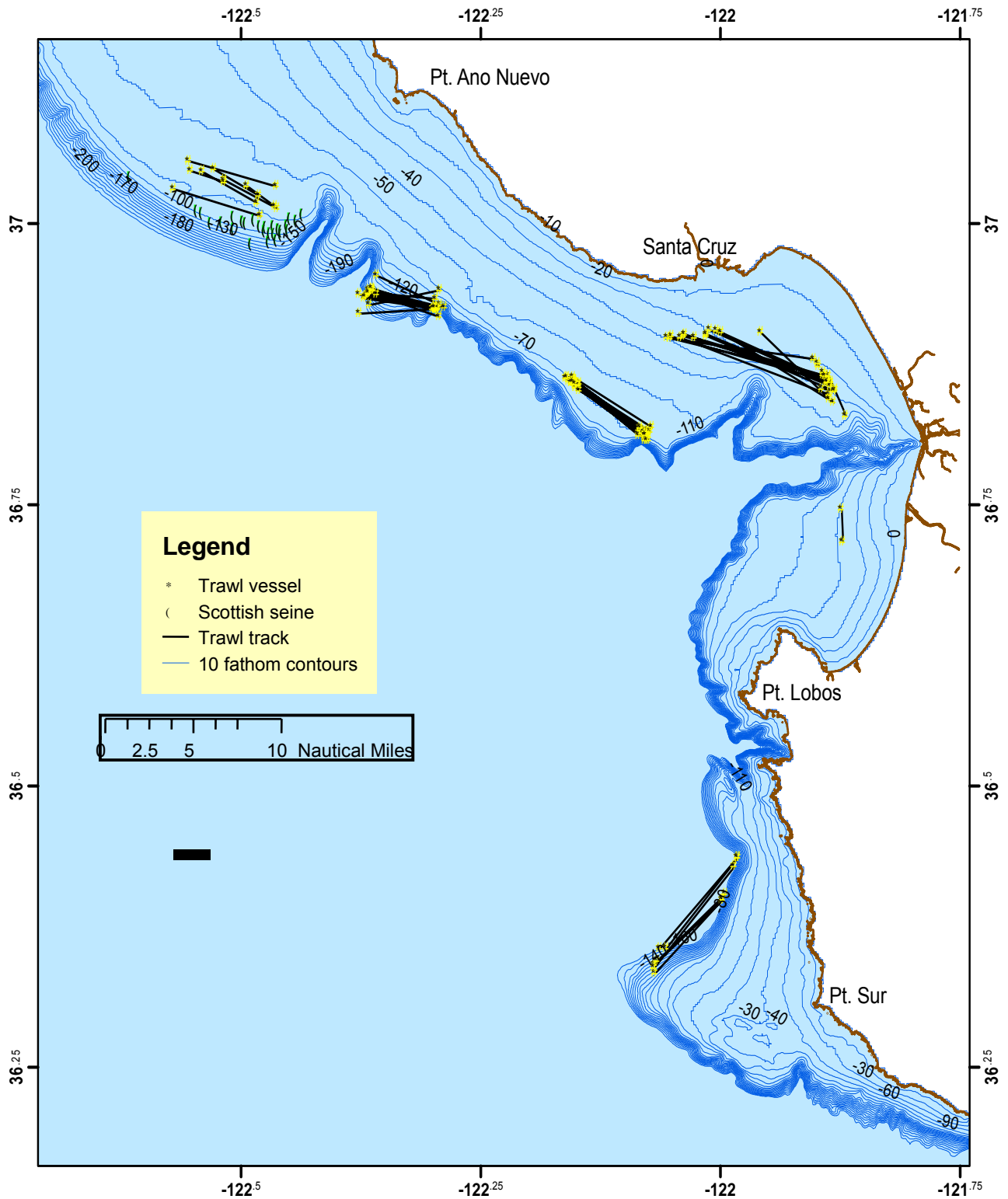


Figure 1. Tow locations for the two vessels that participated in the selective flatfish trawl study from October 18 to December 29, 2004.

Table 3. List of all 40 of the groundfish species/market category caught in the selective flatfish trawl and modified Scottish seine gears during the exempted fishing permit study from October 18 to December 29, 2004.

Target Species	Gears		Non-Groundfish Species	Gears	
	Trawl	Seine		Trawl	Seine
Flatfish			Rockfish		
Dover Sole	x	x	Bank Rockfish	x	
English Sole	x	x	Blackgill Rockfish	x	
Sanddab spp.	x	x	Bocaccio Rockfish	x	x
Petrals Sole	x	x	Canary Rockfish	x	x
Rock Sole	x	x	Chilipepper Rockfish	x	x
Rex Sole	x	x	Copper Rockfish	x	
Sand Sole	x	x	Cowcod Rockfish	x	x
Starry Flounder	x		Darkblotched Rockfish	x	
Curlfin Turbot	x		Flag Rockfish	x	
Turbot spp.	x	x	Greenblotched Rockfish	x	
			Greenspotted Rockfish	x	
			Greenstriped Rockfish	x	x
			Pink Rockfish	x	
			Redbanded Rockfish	x	
			Shortbelly Rockfish	x	
			Splitnose Rockfish	x	
			Striptail Rockfish	x	
			Group Rose Rockfish	x	
			Thornyheads		
			Longspine Thornyhead	x	
			Shortspine Thornyhead	x	
			Roundfish		
			Lingcod	x	x
			Sablefish	x	x
			Pacific Hake	x	x
			Sharks		
			Leopard Shark	x	
			Spiny Dogfish	x	x
			Skates and Ratfish		
			Big Skate	x	x
			California Skate	x	x
			Longnose Skate	x	x
			Skate spp.	x	x
			Ratfish	x	x

Table 4. Summary of discarded, retained, and total catch (pounds) for 40 groundfish species/market category caught in a selective trawl net during the exempted fishing permit study from October 21 to December 29, 2004.

Species	Disposition	Pounds	Percent
Rockfish			
Bank Rockfish	Discarded	0	0%
	Retained	4	100%
	Total Catch	4	
Blackgill Rockfish	Discarded	0	0%
	Retained	118	100%
	Total Catch	118	
Bocaccio Rockfish	Discarded	0	0%
	Retained	5,416	100%
	Total Catch	5,416	
Canary Rockfish	Discarded	0	0%
	Retained	6	100%
	Total Catch	6	
Chilipepper Rockfish	Discarded	0	0%
	Retained	5,654	100%
	Total Catch	5,654	
Copper Rockfish	Discarded	0	0%
	Retained	10	100%
	Total Catch	10	
Cowcod Rockfish	Discarded	0	0%
	Retained	130	100%
	Total Catch	130	
Darkblotched Rockfish	Discarded	0	0%
	Retained	8	100%
	Total Catch	8	
Flag Rockfish	Discarded	0	0%
	Retained	8	100%
	Total Catch	8	
Greenblotched Rockfish	Discarded	0	0%
	Retained	14	100%
	Total Catch	14	
Greenspotted Rockfish	Discarded	0	0%
	Retained	176	100%
	Total Catch	176	
Greenstriped Rockfish	Discarded	2	1%
	Retained	184	99%
	Total Catch	186	
Pink Rockfish	Discarded	0	0%
	Retained	6	100%
	Total Catch	6	
Redbanded Rockfish	Discarded	0	0%
	Retained	6	100%
	Total Catch	6	

Table 4. Summary of discarded, retained, and total catch (pounds) for 40 groundfish species/market category caught in a selective trawl net during the exempted fishing permit study from October 21 to December 29, 2004.

Species	Disposition	Pounds	Percent
Shortbelly Rockfish	Discarded	0	0%
	Retained	145	100%
	Total Catch	145	
Splitnose Rockfish	Discarded	0	0%
	Retained	1,350	100%
	Total Catch	1,350	
Stripetail Rockfish	Discarded	0	0%
	Retained	494	100%
	Total Catch	494	
Group Rose Rockfish	Discarded	0	0%
	Retained	15,570	100%
	Total Catch	15,570	
Thornyheads			
Longspine Thornyhead	Discarded	0	0%
	Retained	16	100%
	Total Catch	16	
Shortspine Thornyhead	Discarded	0	0%
	Retained	10	100%
	Total Catch	10	
Flatfish			
Dover Sole	Discarded	98	23%
	Retained	320	77%
	Total Catch	418	
English Sole	Discarded	5,624	18%
	Retained	26,415	82%
	Total Catch	32,039	
Sanddab spp.	Discarded	4,490	8%
	Retained	52,008	92%
	Total Catch	56,498	
Petrale Sole	Discarded	28	0%
	Retained	49,024	100%
	Total Catch	49,052	
Rock Sole	Discarded	0	0%
	Retained	760	100%
	Total Catch	760	
Rex Sole	Discarded	132	24%
	Retained	412	76%
	Total Catch	544	
Sand Sole	Discarded	1	0%
	Retained	611	100%
	Total Catch	612	

Table 4. Summary of discarded, retained, and total catch (pounds) for 40 groundfish species/market category caught in a selective trawl net during the exempted fishing permit study from October 21 to December 29, 2004.

Species	Disposition	Pounds	Percent
Starry Flounder	Discarded	336	28%
	Retained	869	72%
	Total Catch	1,205	
Curlfin Turbot	Discarded	310	100%
	Retained	0	0%
	Total Catch	310	
Turbot spp.	Discarded	0	0%
	Retained	727	100%
	Total Catch	727	
Roundfish			
Lingcod	Discarded	2,443	39%
	Retained	3,812	61%
	Total Catch	6,255	
Sablefish	Discarded	49	2%
	Retained	2,414	98%
	Total Catch	2,463	
Pacific Hake	Discarded	279	100%
	Retained	0	0%
	Total Catch	279	
Sharks			
Leopard Shark	Discarded	0	0%
	Retained	100	100%
	Total Catch	100	
Spiny Dogfish	Discarded	3,113	100%
	Retained	0	0%
	Total Catch	3,113	
Skates and Ratfish			
Big Skate	Discarded	3,934	100%
	Retained	0	0%
	Total Catch	3,934	
California Skate	Discarded	1,827	100%
	Retained	0	0%
	Total Catch	1,827	
Longnose Skate	Discarded	7,619	100%
	Retained	0	0%
	Total Catch	7,619	
Skate spp.	Discarded	0	0%
	Retained	1,091	100%
	Total Catch	1,091	
Ratfish	Discarded	9,722	100%
	Retained	0	0%
	Total Catch	9,722	

Table 5. Summary of discarded, retained, and total catch (pounds) for 40 groundfish species/market category caught in a modified Scottish seine during the exempted fishing permit study from October 18 to November 10, 2004.

Species	Disposition	Pounds	Percent
Rockfish			
Bank Rockfish	Discarded	0	0%
	Retained	0	0%
	Total Catch	0	
Blackgill Rockfish	Discarded	0	0%
	Retained	0	0%
	Total Catch	0	
Bocaccio Rockfish	Discarded	0	0%
	Retained	20	100%
	Total Catch	20	
Canary Rockfish	Discarded	0	0%
	Retained	1	100%
	Total Catch	1	
Chilipepper Rockfish	Discarded	0	0%
	Retained	609	100%
	Total Catch	609	
Copper Rockfish	Discarded	0	0%
	Retained	0	0%
	Total Catch	0	
Cowcod Rockfish	Discarded	0	0%
	Retained	2	100%
	Total Catch	2	
Darkblotched Rockfish	Discarded	0	0%
	Retained	0	100%
	Total Catch	0	
Flag Rockfish	Discarded	0	0%
	Retained	0	0%
	Total Catch	0	
Greenblotched Rockfish	Discarded	0	0%
	Retained	0	0%
	Total Catch	0	
Greenspotted Rockfish	Discarded	0	0%
	Retained	0	0%
	Total Catch	0	
Greenstriped Rockfish	Discarded	14	15%
	Retained	80	85%
	Total Catch	94	
Pink Rockfish	Discarded	0	0%
	Retained	0	0%
	Total Catch	0	
Redbanded Rockfish	Discarded	0	0%
	Retained	0	0%
	Total Catch	0	

Table 5. Summary of discarded, retained, and total catch (pounds) for 40 groundfish species/market category caught in a modified Scottish seine during the exempted fishing permit study from October 18 to November 10, 2004.

Species	Disposition	Pounds	Percent
Shortbelly Rockfish	Discarded	0	0%
	Retained	0	0%
	Total Catch	0	
Splitnose Rockfish	Discarded	0	0%
	Retained	0	0%
	Total Catch	0	
Stripetail Rockfish	Discarded	0	0%
	Retained	0	0%
	Total Catch	0	
Group Rose Rockfish	Discarded	0	0%
	Retained	0	0%
	Total Catch	0	
Thornyheads			
Longspine Thornyhead	Discarded	0	0%
	Retained	0	0%
	Total Catch	0	
Shortspine Thornyhead	Discarded	0	0%
	Retained	0	0%
	Total Catch	0	
Flatfish			
Dover Sole	Discarded	5	100%
	Retained	0	0%
	Total Catch	5	
English Sole	Discarded	665	16%
	Retained	3,563	84%
	Total Catch	4,228	
Sanddab spp.	Discarded	757	19%
	Retained	3,127	81%
	Total Catch	3,884	
Petale Sole	Discarded	310	2%
	Retained	16,332	98%
	Total Catch	16,642	
Rock Sole	Discarded	7	100%
	Retained	0	0%
	Total Catch	7	
Rex Sole	Discarded	5	50%
	Retained	5	50%
	Total Catch	10	
Sand Sole	Discarded	0	0%
	Retained	0	0%
	Total Catch	0	

Table 5. Summary of discarded, retained, and total catch (pounds) for 40 groundfish species/market category caught in a modified Scottish seine during the exempted fishing permit study from October 18 to November 10, 2004.

Species	Disposition	Pounds	Percent
Starry Flounder	Discarded	0	0%
	Retained	0	0%
	Total Catch	0	
Turbot spp.	Discarded	0	0%
	Retained	0	0%
	Total Catch	0	
Curlfin Turbot	Discarded	71	100%
	Retained	0	0%
	Total Catch	71	
Roundfish			
Lingcod	Discarded	147	93%
	Retained	11	7%
	Total Catch	158	
Pacific Hake	Discarded	69	100%
	Retained	0	0%
	Total Catch	69	
Sablefish	Discarded	27	10%
	Retained	245	90%
	Total Catch	272	
Sharks			
Leopard Shark	Discarded	0	0%
	Retained	0	0%
	Total Catch	0	
Spiny Dogfish	Discarded	4	100%
	Retained	0	0%
	Total Catch	4	
Skates and Ratfish			
Big Skate	Discarded	4	100%
	Retained	0	0%
	Total Catch	4	
California Skate	Discarded	749	100%
	Retained	0	0%
	Total Catch	749	
Longnose Skate	Discarded	638	100%
	Retained	0	0%
	Total Catch	638	
Skate ssp.	Discarded	0	0%
	Retained	1,225	100%
	Total Catch	1,225	
Ratfish	Discarded	455	100%
	Retained	0	0%
	Total Catch	455	

Table 6. Ratio estimates of discard for 21 groundfish species caught in a selective flatfish trawl net during the exempted fishing permit study from October 21 to December 29, 2004.

Species	Period	Number of Tows	Discarded lb-per-hr (lb/hr)	Discarded lb-per-lb Target	Discarded lb-per-lb Groundfish
Flatfish					
Dover Sole	Sep.-Oct.	12	0.97	0.0007	0.0005
	Nov.-Dec.	61	0.49	0.0007	0.0006
Curlfin Turbot	Sep.-Oct.	12	0.47	0.0004	0.0002
	Nov.-Dec.	61	2.00	0.0031	0.0026
Turbot spp.	Sep.-Oct.	12	0.00	0.0000	0.0000
	Nov.-Dec.	61	0.00	0.0000	0.0000
English Sole	Sep.-Oct.	12	41.70	0.0322	0.0218
	Nov.-Dec.	61	30.15	0.0469	0.0389
Petrale Sole	Sep.-Oct.	12	0.57	0.0004	0.0003
	Nov.-Dec.	61	0.08	0.0001	0.0001
Rex Sole	Sep.-Oct.	12	1.83	0.0014	0.0010
	Nov.-Dec.	61	0.55	0.0009	0.0007
Rock Sole	Sep.-Oct.	12	0.00	0.0000	0.0000
	Nov.-Dec.	61	0.00	0.0000	0.0000
Sanddab spp.	Sep.-Oct.	12	15.88	0.0123	0.0083
	Nov.-Dec.	61	27.35	0.0413	0.0344
Sand Sole	Sep.-Oct.	12	0.00	0.0000	0.0000
	Nov.-Dec.	61	0.00	0.0000	0.0000
Starry Flounder	Sep.-Oct.	12	0.00	0.0000	0.0000
	Nov.-Dec.	61	2.27	0.0034	0.0029
Thornyheads					
Longspine Thornyhead	Sep.-Oct.	12	0.00	0.0000	0.0000
	Nov.-Dec.	61	0.00	0.0000	0.0000
Roundfish					
Lingcod	Sep.-Oct.	12	38.87	0.0300	0.0204
	Nov.-Dec.	61	9.18	0.0143	0.0119
Pacific Hake	Sep.-Oct.	12	0.25	0.0002	0.0001
	Nov.-Dec.	61	1.84	0.0029	0.0024
Sablefish	Sep.-Oct.	12	0.00	0.0000	0.0000
	Nov.-Dec.	61	0.33	0.0005	0.0004
Sharks					
Leopard Shark	Sep.-Oct.	12	0.00	0.0000	0.0000
	Nov.-Dec.	61	0.00	0.0000	0.0000
Spiny Dogfish	Sep.-Oct.	12	0.36	0.0003	0.0002
	Nov.-Dec.	61	20.97	0.0326	0.0271
Skates and Ratfish					
Big Skate	Sep.-Oct.	12	0.43	0.0003	0.0002
	Nov.-Dec.	61	26.51	0.0413	0.0342
California Skate	Sep.-Oct.	12	4.23	0.0033	0.0022
	Nov.-Dec.	61	11.55	0.0180	0.0149

Table 6. Ratio estimates of discard for 21 groundfish species caught in a selective flatfish trawl net during the exempted fishing permit study from October 21 to December 29, 2004.

Species	Period	Number of Tows	Discarded lb-per-hr (lb/hr)	Discarded lb-per-lb Target	Discarded lb-per-lb Groundfish
Longnose Skate	Sep.-Oct.	12	60.56	0.0468	0.0317
	Nov.-Dec.	61	40.08	0.0624	0.0517
Skate spp.	Sep.-Oct.	12	0.00	0.0000	0.0000
	Nov.-Dec.	61	0.00	0.0000	0.0000
Ratfish	Sep.-Oct.	12	80.75	0.0624	0.0423
	Nov.-Dec.	61	50.49	0.0786	0.0652

Table 7. Ratio estimates of discard for 21 groundfish species caught in a modified Scottish seine during the exempted fishing permit study from October 18 to November 10, 2004.

Species	Period	Number of Tows	Discarded lb-per-hr (lb/hr)	Discarded lb-per-lb Target	Discarded lb-per-lb Groundfish
Flatfish					
Dover Sole	Sep.-Oct.	27	0.02	0.0001	0.0001
	Nov.-Dec.	16	0.13	0.0003	0.0002
Curlfin Turbot	Sep.-Oct.	27	0.37	0.0027	0.0024
	Nov.-Dec.	16	1.59	0.0033	0.0030
Turbot spp.	Sep.-Oct.	27	0.00	0.0000	0.0000
	Nov.-Dec.	16	0.00	0.0000	0.0000
English Sole	Sep.-Oct.	27	2.30	0.0164	0.0146
	Nov.-Dec.	16	16.91	0.0349	0.0323
Petrale Sole	Sep.-Oct.	27	0.04	0.0003	0.0002
	Nov.-Dec.	16	9.63	0.0199	0.0184
Rex Sole	Sep.-Oct.	27	0.07	0.0005	0.0005
	Nov.-Dec.	16	0.03	0.0001	0.0001
Rock Sole	Sep.-Oct.	27	0.00	0.0000	0.0000
	Nov.-Dec.	16	0.22	0.0005	0.0004
Sanddab spp.	Sep.-Oct.	27	12.70	0.0910	0.0808
	Nov.-Dec.	16	2.22	0.0046	0.0042
Sand Sole	Sep.-Oct.	27	0.00	0.0000	0.0000
	Nov.-Dec.	16	0.00	0.0000	0.0000
Starry Flounder	Sep.-Oct.	27	0.00	0.0000	0.0000
	Nov.-Dec.	16	0.00	0.0000	0.0000
Thornyhead					
Longspine Thornyhead	Sep.-Oct.	27	0.00	0.0000	0.0000
	Nov.-Dec.	16	0.00	0.0000	0.0000
Roundfish					
Lingcod	Sep.-Oct.	27	0.56	0.0040	0.0035
	Nov.-Dec.	16	3.66	0.0076	0.0070
Pacific Hake	Sep.-Oct.	27	1.07	0.0077	0.0068
	Nov.-Dec.	16	0.34	0.0007	0.0007
Sablefish	Sep.-Oct.	27	0.00	0.0000	0.0000
	Nov.-Dec.	16	0.84	0.0017	0.0016
Sharks					
Leopard Shark	Sep.-Oct.	27	0.00	0.0000	0.0000
	Nov.-Dec.	16	0.00	0.0000	0.0000
Spiny Dogfish	Sep.-Oct.	27	0.06	0.0004	0.0004
	Nov.-Dec.	16	0.03	0.0001	0.0001
Skates and Ratfish					
Big Skate	Sep.-Oct.	27	0.07	0.0005	0.0005
	Nov.-Dec.	16	0.00	0.0000	0.0000
California Skate	Sep.-Oct.	27	4.91	0.0352	0.0312
	Nov.-Dec.	16	15.13	0.0642	0.0289

Table 7. Ratio estimates of discard for 21 groundfish species caught in a modified Scottish seine during the exempted fishing permit study from October 18 to November 10, 2004.

Species	Period	Number of Tows	Discarded lb-per-hr (lb/hr)	Discarded lb-per-lb Target	Discarded lb-per-lb Groundfish
Longnose Skate	Sep.-Oct.	27	7.46	0.0535	0.0475
	Nov.-Dec.	16	7.38	0.0152	0.0141
Skate spp.	Sep.-Oct.	27	0.00	0.0000	0.0000
	Nov.-Dec.	16	0.00	0.0000	0.0000
Ratfish	Sep.-Oct.	27	8.37	0.0600	0.0532
	Nov.-Dec.	16	0.09	0.0002	0.0002

Table 8. Ratio estimates of the total bycatch for 30 species of non-target groundfish/market categories including overfished rockfish caught in a selective flatfish trawl net during the exempted fishing permit study from October 21 to December 29, 2004.

Species	Period	Number of Tows	Bycatch lb-per-hr (lb/hr)	Bycatch lb-per-lb Target	Bycatch lb-per-lb Groundfish
Rockfish					
Bank Rockfish	Sep.-Oct.	12	0.00	0.0000	0.0000
	Nov.-Dec.	61	0.03	0.0000	0.0000
Blackgill Rockfish	Sep.-Oct.	12	3.51	0.0026	0.0016
	Nov.-Dec.	61	0.14	0.0002	0.0001
Bocaccio Rockfish	Sep.-Oct.	12	64.11	0.0473	0.0297
	Nov.-Dec.	61	24.52	0.0348	0.0246
Canary Rockfish	Sep.-Oct.	12	0.11	0.0001	0.0000
	Nov.-Dec.	61	0.02	0.0000	0.0000
Chilipepper Rockfish	Sep.-Oct.	12	46.11	0.0340	0.0214
	Nov.-Dec.	61	29.52	0.0419	0.0296
Copper Rockfish	Sep.-Oct.	12	0.00	0.0000	0.0000
	Nov.-Dec.	61	0.07	0.0001	0.0001
Cowcod Rockfish	Sep.-Oct.	12	3.80	0.0028	0.0018
	Nov.-Dec.	61	0.16	0.0002	0.0002
Darkblotched Rockfish	Sep.-Oct.	12	0.00	0.0000	0.0000
	Nov.-Dec.	61	0.05	0.0001	0.0001
Flag Rockfish	Sep.-Oct.	12	0.00	0.0000	0.0000
	Nov.-Dec.	61	0.05	0.0001	0.0001
Greenblotched Rockfish	Sep.-Oct.	12	0.50	0.0004	0.0002
	Nov.-Dec.	61	0.00	0.0000	0.0000
Greenspotted Rockfish	Sep.-Oct.	12	4.88	0.0036	0.0023
	Nov.-Dec.	61	0.27	0.0004	0.0003
Greenstriped Rockfish	Sep.-Oct.	12	2.80	0.0022	0.0013
	Nov.-Dec.	61	0.73	0.0011	0.0007
Pink Rockfish	Sep.-Oct.	12	0.22	0.0002	0.0001
	Nov.-Dec.	61	0.00	0.0000	0.0000
Redbanded Rockfish	Sep.-Oct.	12	0.00	0.0000	0.0000
	Nov.-Dec.	61	0.04	0.0001	0.0001
Shortbelly Rockfish	Sep.-Oct.	12	1.29	0.0010	0.0006
	Nov.-Dec.	61	0.74	0.0010	0.0007
Splitnose Rockfish	Sep.-Oct.	12	48.40	0.0357	0.0225
	Nov.-Dec.	61	0.00	0.0000	0.0000
Sriptail Rockfish	Sep.-Oct.	12	17.35	0.0128	0.0080
	Nov.-Dec.	61	0.07	0.0001	0.0001
Group Rose Rockfish	Sep.-Oct.	12	241.09	0.1779	0.1263
	Nov.-Dec.	61	59.79	0.0848	0.0599
Thornyheads					
Longspine Thornyhead	Sep.-Oct.	12	0.00	0.0000	0.0000
	Nov.-Dec.	61	0.11	0.0002	0.0001

Table 8. Ratio estimates of the total bycatch for 30 species of non-target groundfish/market categories including overfished rockfish caught in a selective flatfish trawl net during the exempted fishing permit study from October 21 to December 29, 2004.

Species	Period	Number of Tows	Bycatch lb-per-hr (lb/hr)	Bycatch lb-per-lb Target	Bycatch lb-per-lb Groundfish
Shortspine Thornyhead	Sep.-Oct.	12	0.00	0.0000	0.0000
	Nov.-Dec.	61	0.07	0.0001	0.0001
Roundfish					
Lingcod	Sep.-Oct.	12	138.97	0.1025	0.0645
	Nov.-Dec.	61	16.08	0.0228	0.0161
Pacific Hake	Sep.-Oct.	12	0.25	0.0002	0.0001
	Nov.-Dec.	61	1.84	0.0026	0.0018
Sablefish	Sep.-Oct.	12	62.24	0.0459	0.0289
	Nov.-Dec.	61	4.91	0.0076	0.0049
Sharks					
Leopard Shark	Sep.-Oct.	12	0.00	0.0000	0.0000
	Nov.-Dec.	61	0.68	0.0010	0.0007
Spiny Dogfish	Sep.-Oct.	12	0.36	0.0003	0.0002
	Nov.-Dec.	61	20.97	0.0326	0.0210
Skates and Ratfish					
Big Skate	Sep.-Oct.	12	0.43	0.0003	0.0002
	Nov.-Dec.	61	26.51	0.0400	0.0333
California Skate	Sep.-Oct.	12	4.23	0.0033	0.0022
	Nov.-Dec.	61	11.55	0.0174	0.0145
Longnose Skate	Sep.-Oct.	12	60.56	0.0447	0.0281
	Nov.-Dec.	61	40.08	0.0624	0.0401
Skate spp.	Sep.-Oct.	12	18.64	0.0138	0.0086
	Nov.-Dec.	61	3.86	0.0055	0.0039
Ratfish	Sep.-Oct.	12	80.75	0.0596	0.0375
	Nov.-Dec.	61	50.49	0.0786	0.0506

Table 9. Ratio estimates of the total bycatch for 30 species of non-target groundfish/market category including overfished rockfish caught in a modified Scottish seine during the exempted fishing permit study from October 18 to November 10, 2004.

Species	Period	Number of Tows	Bycatch lb-per-hr (lb/hr)	Bycatch lb-per-lb Target	Bycatch lb-per-lb Groundfish
Rockfish					
Bank Rockfish	Sep.-Oct.	27	0.00	0.0000	0.0000
	Nov.-Dec.	16	0.00	0.0000	0.0000
Blackgill Rockfish	Sep.-Oct.	27	0.00	0.0000	0.0000
	Nov.-Dec.	16	0.00	0.0000	0.0000
Bocaccio Rockfish	Sep.-Oct.	27	0.28	0.0018	0.0014
	Nov.-Dec.	16	0.16	0.0003	0.0003
Canary Rockfish	Sep.-Oct.	27	0.02	0.0001	0.0001
	Nov.-Dec.	16	0.00	0.0000	0.0000
Chilipepper Rockfish	Sep.-Oct.	27	3.70	0.0239	0.0189
	Nov.-Dec.	16	12.78	0.0248	0.0220
Copper Rockfish	Sep.-Oct.	27	0.00	0.0000	0.0000
	Nov.-Dec.	16	0.00	0.0000	0.0000
Cowcod Rockfish	Sep.-Oct.	27	0.00	0.0000	0.0000
	Nov.-Dec.	16	0.06	0.0001	0.0001
Darkblotched Rockfish	Sep.-Oct.	27	0.00	0.0000	0.0000
	Nov.-Dec.	16	0.00	0.0000	0.0000
Flag Rockfish	Sep.-Oct.	27	0.00	0.0000	0.0000
	Nov.-Dec.	16	0.00	0.0000	0.0000
Greenblotched Rockfish	Sep.-Oct.	27	0.00	0.0000	0.0000
	Nov.-Dec.	16	0.00	0.0000	0.0000
Greenspotted Rockfish	Sep.-Oct.	27	0.00	0.0000	0.0000
	Nov.-Dec.	16	0.00	0.0000	0.0000
Greenstriped Rockfish	Sep.-Oct.	27	0.78	0.0050	0.0040
	Nov.-Dec.	16	1.63	0.0032	0.0028
Pink Rockfish	Sep.-Oct.	27	0.00	0.0000	0.0000
	Nov.-Dec.	16	0.00	0.0000	0.0000
Redbanded Rockfish	Sep.-Oct.	27	0.00	0.0000	0.0000
	Nov.-Dec.	16	0.00	0.0000	0.0000
Shortbelly Rockfish	Sep.-Oct.	27	0.00	0.0000	0.0000
	Nov.-Dec.	16	0.00	0.0000	0.0000
Splitnose Rockfish	Sep.-Oct.	27	0.00	0.0000	0.0000
	Nov.-Dec.	16	0.00	0.0000	0.0000
Striptail Rockfish	Sep.-Oct.	27	0.00	0.0000	0.0000
	Nov.-Dec.	16	0.00	0.0000	0.0000
Group Rose Rockfish	Sep.-Oct.	27	0.00	0.0000	0.0000
	Nov.-Dec.	16	0.00	0.0000	0.0000
Thornyheads					
Longspine Thornyhead	Sep.-Oct.	27	0.00	0.0000	0.0000
	Nov.-Dec.	16	0.00	0.0000	0.0000

Table 9. Ratio estimates of the total bycatch for 30 species of non-target groundfish/market category including overfished rockfish caught in a modified Scottish seine during the exempted fishing permit study from October 18 to November 10, 2004.

Species	Period	Number of Tows	Bycatch lb-per-hr (lb/hr)	Bycatch lb-per-lb Target	Bycatch lb-per-lb Groundfish
Shortspine Thornyhead	Sep.-Oct.	27	0.00	0.0000	0.0000
	Nov.-Dec.	16	0.00	0.0000	0.0000
Roundfish					
Lingcod	Sep.-Oct.	27	0.76	0.0049	0.0039
	Nov.-Dec.	16	3.66	0.0071	0.0063
Sablefish	Sep.-Oct.	27	1.52	0.0098	0.0078
	Nov.-Dec.	16	5.94	0.0115	0.0102
Pacific Hake	Sep.-Oct.	27	1.07	0.0069	0.0055
	Nov.-Dec.	16	0.34	0.0007	0.0006
Sharks					
Leopard Shark	Sep.-Oct.	27	0.00	0.0000	0.0000
	Nov.-Dec.	16	0.00	0.0000	0.0000
Spiny Dogfish	Sep.-Oct.	27	0.06	0.0004	0.0003
	Nov.-Dec.	16	0.03	0.0001	0.0001
Skates and Ratfish					
California Skate	Sep.-Oct.	27	4.91	0.0316	0.0251
	Nov.-Dec.	16	15.13	0.0294	0.0260
Big Skate	Sep.-Oct.	27	0.07	0.0005	0.0004
	Nov.-Dec.	16	0.00	0.0000	0.0000
Longnose Skate	Sep.-Oct.	27	7.46	0.0481	0.0382
	Nov.-Dec.	16	7.34	0.0143	0.0127
Skate spp.	Sep.-Oct.	27	11.39	0.0734	0.0583
	Nov.-Dec.	16	19.06	0.0370	0.0328
Ratfish	Sep.-Oct.	27	8.37	0.0540	0.0428
	Nov.-Dec.	16	0.09	0.0002	0.0002

Table 10. Number of biological measurements and samples collected from fish caught in the selective flatfish trawl and modified Scottish seine gears during the exempted fishing permit study from October 18 to December 29, 2004.

Species	Number of Length Samples		Number of Sex Samples		Number of Maturity Samples		Aging Structures Harvested	
	Trawl	Seine	Trawl	Seine	Trawl	Seine	Trawl	Seine
Rockfish								
Bocaccio Rockfish	73	11	78	3	78	3	x	x
Chilipepper Rockfish	228	173	228	16	228	16	x	x
Canary Rockfish	1		1		1		x	
Cowcod Rockfish	24	7	24	3	24	3	x	x
Darkblotched Rockfish	1		1		1			
Greenblotched Rockfish	5		5		5			
Greenspotted Rockfish	20		20		20		x	
Greenstriped Rockfish	5	211	5	31	5	31		
Halfbanded Rockfish	3	9	3	9	3	9		x
Pink Rockfish	1		1		1		x	
Shortbelly Rockfish	7	10	7	7	7	9		x
Striptail Rockfish	1	9	1	9	1			x
Flatfish								
English Sole	59		59		59			
Petrale Sole	90		90		57		x	
Rock Sole	1		1			7		
Roundfish								
Lingcod	102	25	99	3	99	3	x	
¹ Lingcod	20	86						
Total	641	541	623	81	589	81		

¹-Length measurements for lingcod discarded at sea.

Table 11. Bycatch rates for each overfished rockfish caught during the Oregon Department of Fish and Wildlife's 2003 and the California Department of Fish and Game's 2004 selective flatfish trawl (including Scottish seine) exempted fishing permit studies per 2-month landing limit period. Oregon did not observer tows during the months of November and December 2003.

Overfished Species	Period	Bycatch lb/lb Target			Bycatch lb/lb Groundfish		
		Oregon ¹ trawl	California trawl	seine	Oregon ¹ trawl	California trawl	seine
Rockfish							
Bocaccio Rockfish	Sep.-Oct.	0.0000	0.0495	0.0020	0.0000	0.0336	0.0018
	Nov.-Dec.	-	0.0370	0.0003	-	0.0308	0.0003
Canary Rockfish	Sep.-Oct.	0.0012	0.0001	0.0001	0.0012	0.0001	0.0001
	Nov.-Dec.	-	0.0000	0.0000	-	0.0000	0.0000
Cowcod Rockfish	Sep.-Oct.	0.0000	0.0029	0.0000	0.0000	0.0020	0.0000
	Nov.-Dec.	-	0.0002	0.0001	-	0.0002	0.0001
Darkblotched Rockfish	Sep.-Oct.	0.0130	0.0000	0.0000	0.0070	0.0000	0.0000
	Nov.-Dec.	-	0.0001	0.0000	-	0.0001	0.0000
Pacific Ocean Perch	Sep.-Oct.	0.0006	0.0000	0.0000	0.0011	0.0000	0.0000
	Nov.-Dec.	-	0.0000	0.0000	-	0.0000	0.0000
Widow Rockfish	Sep.-Oct.	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	Nov.-Dec.	-	0.0000	0.0000	-	0.0000	0.0000
Yelloweye Rockfish	Sep.-Oct.	0.0002	0.0000	0.0000	0.0004	0.0000	0.0000
	Nov.-Dec.	-	0.0000	0.0000	-	0.0000	0.0000
Roundfish							
Lingcod	Sep.-Oct.	0.0255	0.1074	0.0054	0.0469	0.0728	0.0048
	Nov.-Dec.	-	0.0243	0.0076	-	0.0202	0.0070

1-bycatch estimates taken from Oregon's mixed-shelf flatfish strategy (Parker et al. 2004).

Table 12. Comparison of Scottish seine and bottom trawl gear attributes.

Gear Attribute	Scottish Seine	Bottom Trawl
door	none	yes
footrope (leadline)	2" iron ringlets	8" rollers
headrope (floatline)	longer than footrope	shorter than footrope
warps	rope; length ~1 mile @	steel; length ~ 150' @
tow speed	½ knot/hour	~ 3.0 knot/hour
tow substrait	soft bottom: sand and mud	variable: sand, mud, and cobble