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THE NEWPORT DORY FISHERY

The setline fishery off Newport was established in 1891 and persists to this day at the same location. The fish are sold on the beach and to local wholesalers and restaurants. It is one of the few traditional dory fisheries remaining on the West Coast.

The fishermen are flexible; they target species for which they have a market, and the target species change during the year. The slope fishes are the mainstay of most of the dory fleet from fall through spring. The fewest boats fish the slope from late spring to fall when the fishermen are targeting surface fish, especially those that move into the area with the warm water (e.g., bonito shark (*Isurus oxyrinchus*), Pacific mackerel (*Scomber japonicus*), Pacific bonito (*Sarda chiliensis*), yellowtail (*Seriola dorsalis*) and shelf species with increased catch rates (e.g., spotted scorpionfish (*Scorpaena guttata*) and various rockfish (*Sebastes spp.*)). Many other commercial, passenger-carrying, and private boats fish the shelf and the surface waters, but few other boats fish the slope.

The objectives of this study were to determine the areas fished and the composition and seasonal variation of the catch prior to sludge discharge. During the period of study (June 1983–June 1984), fishing on the slope was concentrated between 380 and 580 m. The catch was dominated by sablefish (*Anoplopoma fimbria*), shortspine thornyhead (*Sebastolobus alascanus*), and several species of rockfish (primarily *Sebastes mealanostomus*, *S. aurora*, and *S. diploproa*). There was no discernible seasonal pattern in the amount of fish caught or in the composition of the catch. The coefficient of variation for the catch per line and for the total catch ranged from 40 to 60%.

METHODS

Fishermen's setlines were made up of two to five separate lines (three was most common) of no. 72 twisted cord tied end-to-end. Each line of the setline was approximately 650 m long. Hooks (generally 4/0 and 5/0 rockcod hooks) were tied on a 20-cm leader of lighter material and spaced about 1 m apart. Anchovies (*Engraulis mordax*), and to a lesser extent Pacific mackerel (*Scomber japonicus*), were used as bait. Various arrangements of bricks and soda bottles were tied to the setline to keep sections of it on or off the bottom. The lines were usually fished overnight.

The lines were set from dories that were launched and returned through the surf from the fishermen's base at Newport Pier. On each trip, the catch of each line of the setline was recorded on waterproof paper. Fish were laid on the paper and the total length was marked. A subsample of the catch was weighed to the nearest 0.1 kg. The data were transcribed in the laboratory. Weight-length regressions were calculated for each species to predict the weights of the fish not weighed; thus, the total weight of the catch was reconstructed.

Concentrations of selected chlorinated hydrocarbons (total DDT and total PCB) and trace metals (Ag, Cd, Cr, Cu, Ni, Pb, and Zn) were measured in samples of liver and muscle from the dominant edible species. The fish were bought from the fishermen after they had returned to the beach; i.e., the samples were not dissected or frozen immediately after capture. Chlorinated hydrocarbons were measured according to the methods in Gossett et al. (this volume). Trace metals were measured by inductive coupled argon plasma emission spectrometry at the Laboratory of Biomedical and Environmental Science (UCLA) under the direction of George Alexander.

RESULTS

Between June 1983 and June 1984, SCCWRP personnel made 55 trips with the fishermen. Nine of the trips either were not successful due to loss of gear, or ranged beyond the area of immediate interest and were not included in the following analyses. As many as 15 boats were fishing at one time or another during the study period, although fewer than 10 fished on the slope (300-600 m). The remaining boats fished on the shelf (100-200 m). The number of boats fishing at the same time on the slope ranged from one to eight.

Most lines were set within about 20 km of Newport Pier (Figure 1),

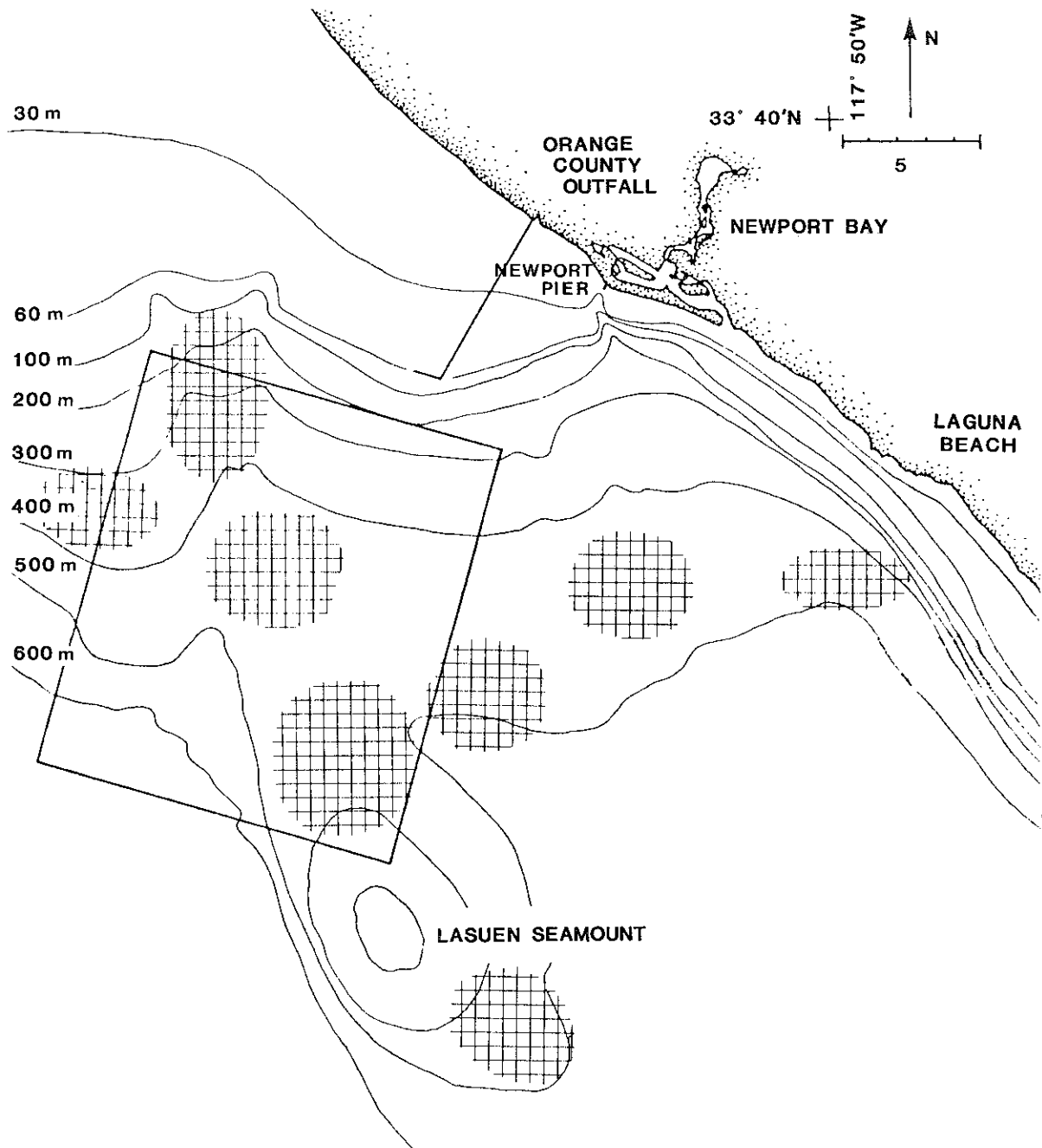


Figure 1. Map of the study area showing locations frequented by the dory fishermen (cross-hatched). Large rectangle is the study area described in Thompson et al. (this volume).

although trips to 50 km were not unusual for some fishermen. Fishing on the slope was concentrated between 380 and 580 m, with a mode at 430 m (Figure 2). The catch was dominated by sablefish, shortspine thornyhead, and several species of rockfish (Figure 3). Smaller quantities of Pacific whiting (*Merluccius productus*), longspine

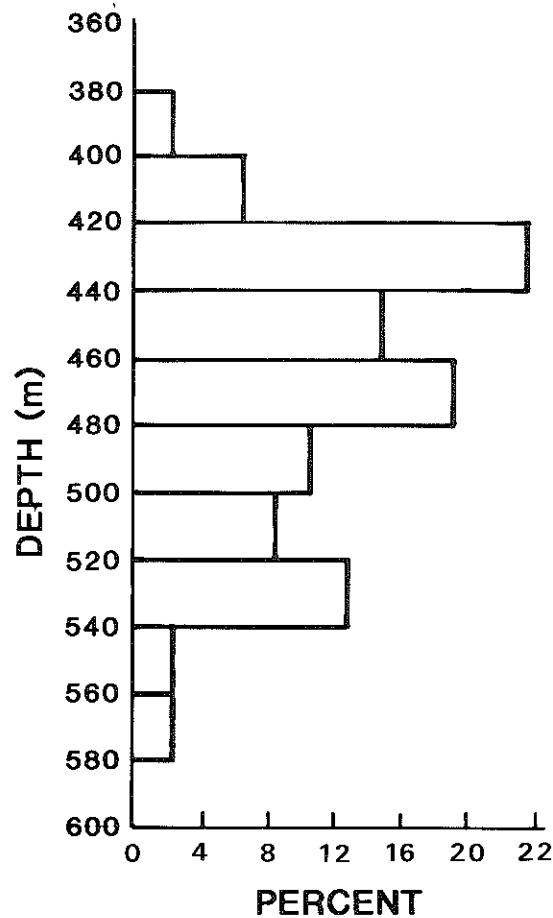


Figure 2. Distribution of setlines by depth during the study period (n = 46).

thornyhead (*Sebastobus altivelis*), and Dover sole (*Microstomus pacificus*) were also landed. A small proportion of each catch (generally less than 10% by weight) was not edible and was discarded at sea. Dominant among these species were black hagfish (*Eptatretus deani*), Pacific hagfish (*E. stoutii*), spiny dogfish (*Squalus acanthias*), brown catshark (*Apristurus brunneus*), filetail catshark (*Paramaturus xaniurus*), spotted ratfish (*Hydrolagus colliei*), California rattail (*Nezumia stelgidolepis*), and individuals of the edible species mentioned above that were consumed by hagfish or sharks while on the line.

The mean catch per line varied throughout the year without a discernable seasonal pattern (Figure 4). Total catch also varied throughout the year (Figure 5).

The fishermen recognized two habitats on the slope within the study area: hard-bottom banks and the surrounding, relatively featureless (on a fathometer) mud bottom. The catch per line and total catch were not significantly different between these habitats (Table 1); however, the

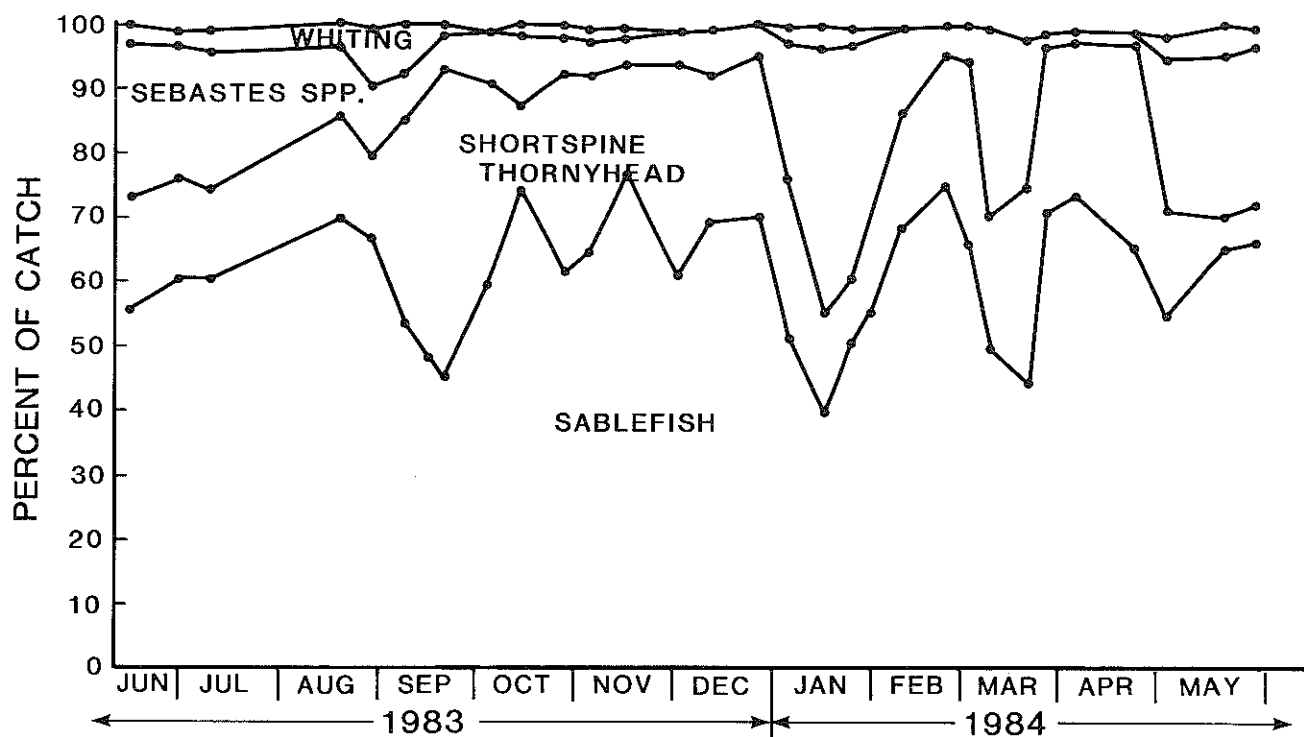


Figure 3. Mean composition of the catch during the study period. Data were smoothed by a running average of 3's.

composition of the catch was different (Table 2). Sablefish comprised a similar proportion of the catch and occurred at similar frequencies in both habitats. Shortspine thornyhead comprised a larger proportion of the catch on mud bottom but occurred at similar frequencies in both habitats. Blackgill and splitnose rockfish comprised a greater proportion of the catch and occurred more frequently on the banks.

To increase our knowledge of baseline conditions in the area of proposed sludge discharge, contaminant concentrations were measured in the dominant species of edible fish; these results are presented in Tables 3 and 4.

DISCUSSION

Only two of the dominant species in the setline catch, the shortspine thornyhead and splitnose rockfish, were also dominant in samples collected by trawl for a study of biological assemblages on the slopes off Newport (see Thompson et al., this volume). Sablefish, aurora rockfish, and Pacific whiting were underrepresented in the trawl catch undoubtedly because their large size and visual acuity allowed the

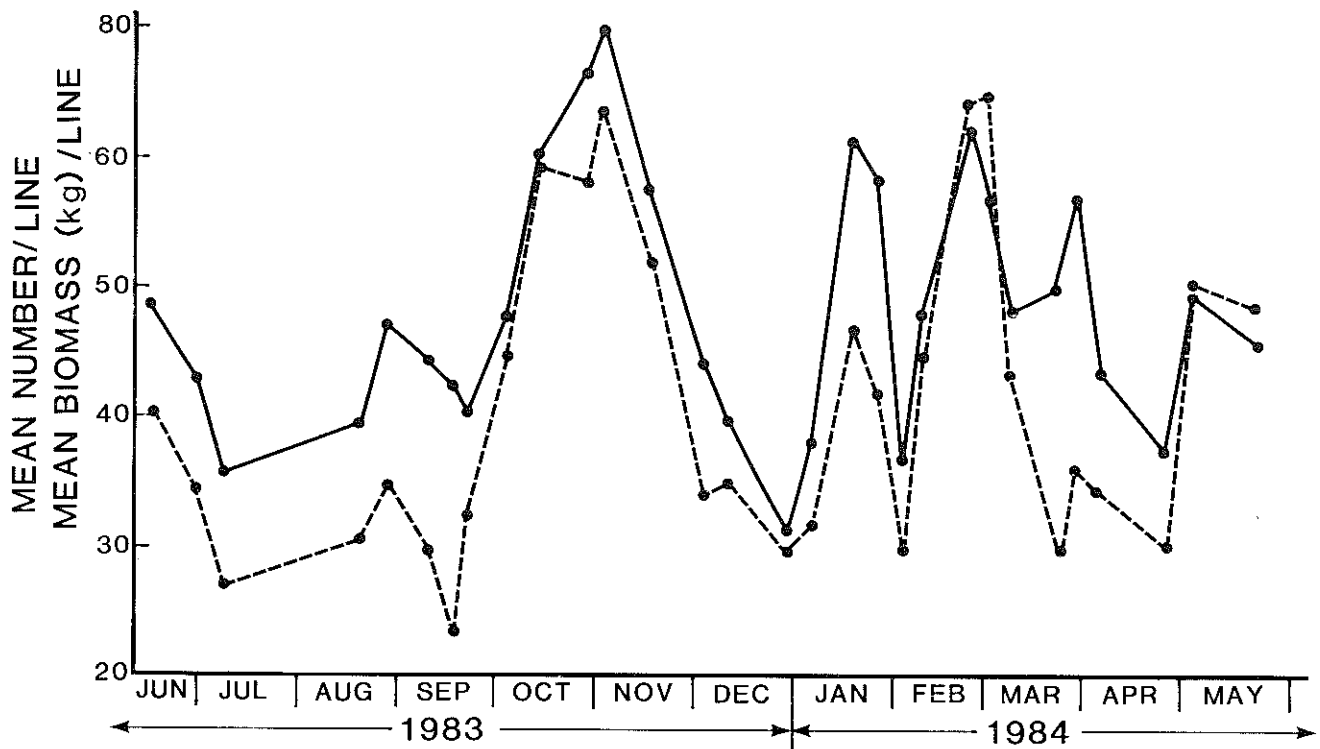


Figure 4. Mean number (solid line) and mean biomass (dashed line) of fish caught per line during the study period.

larger individuals to avoid the slow-moving trawl. Blackgill rockfish were not collected in the trawls probably because the bank habitat was not sampled.

The catch per line varied considerably during the year in both the mud and bank habitats. The lack of a seasonal pattern in the amount of fish caught and in the composition of the catch was somewhat surprising. This may be why the slope fishes are the mainstay of the dory fishery throughout the year.

The Newport dory fishery meets the criteria of a small-scale fishery as defined by Panayotou (1982): the fishermen have a limited fishing range, they are confined to a narrow strip of land and sea around their community, they are faced with a limited set of options, and they are dependent on local resources. Small-scale fisheries use about 20% as much capital and 20-25% as much fuel per ton of fish landed and create 100 times more jobs per dollar invested than large-scale fisheries (Thomson 1980). Worldwide, small-scale fisheries employ more than 90% of all fishermen and contribute more than 50% of the edible catch (Panayotou 1982).

Table 1. Summary of setline catches. Note that two to five lines comprise one setline (\bar{X} = mean, SD = 1 standard deviation, n = sample size, CV = coefficient of variation).

		All Habitats	Mud Bottom	Banks
Number of fish per line	\bar{X}	47.8	46.1	51.4
	SD	19.7	18.5	21.9
	n	128	88	40
	CV(%)	41.2	40.1	42.6
Biomass (kg) of fish per line	\bar{X}	40.7	37.5	47.8
	SD	20.6	19.2	22.1
	n	128	88	40
	CV(%)	50.6	51.2	46.2
Total biomass (kg) per setline	\bar{X}	161.7	152.7	180.3
	SD	87.8	90.9	80.8
	n	46	31	15
	CV(%)	54.3	59.5	44.8

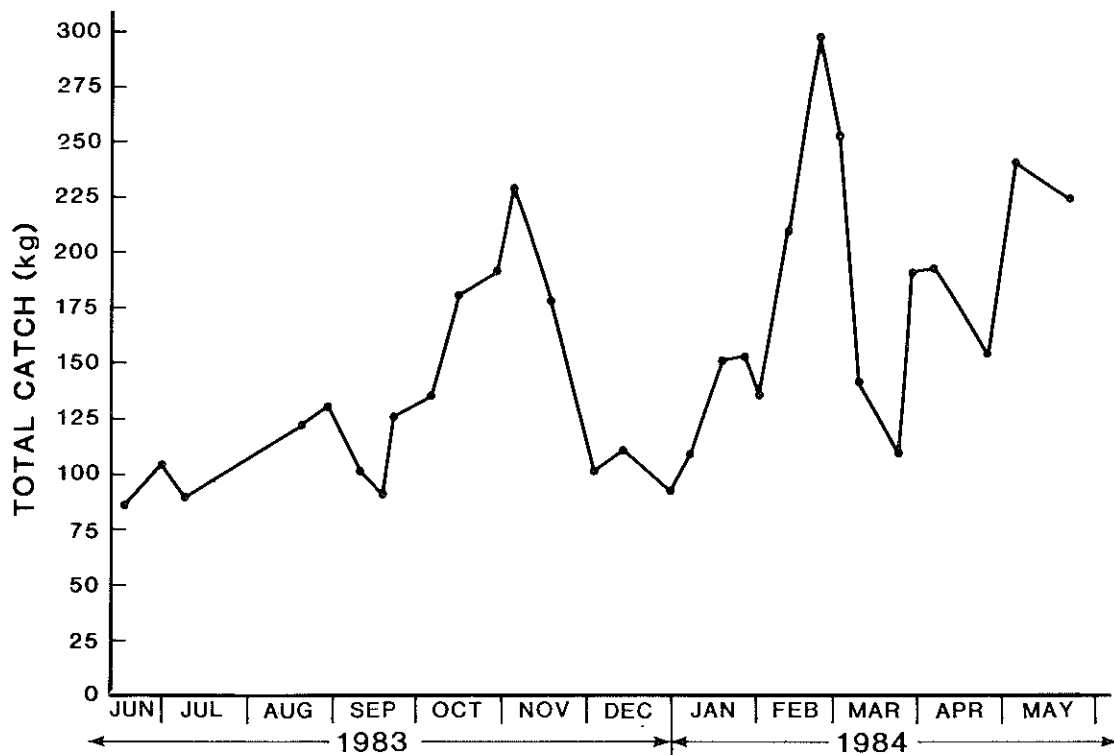


Figure 5. Total catch per setline by weight during the study period. Data were smoothed by a running average of 3's.

Table 2. Composition of the catch per line by percent of biomass (kg). (\bar{X} = mean, CV = coefficient of variation, PO = percent occurrence, n = sample size).

		Mud Bottom (n = 88)	Banks (n = 40)
Sablefish	\bar{X} (%)	62.4	61.0
	CV(%)	31.6	32.3
	PO(%)	98.9	100.0
Pacific Whiting	\bar{X} (%)	1.6	2.5
	CV(%)	268.8	140.0
	PO(%)	23.9	52.5
Shortspine thornyhead	\bar{X} (%)	28.5	7.2
	CV(%)	69.5	95.8
	PO(%)	97.7	97.5
Blackgill rockfish	\bar{X} (%)	1.7	22.6
	CV(%)	194.1	73.9
	PO(%)	27.3	95.0
Aurora rockfish	\bar{X} (%)	3.5	3.7
	CV(%)	122.9	105.4
	PO(%)	65.9	85.0
Splitnose rockfish	\bar{X} (%)	0.2	3.5
	CV(%)	500.0	202.9
	PO(%)	4.5	27.5

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Table 3. Concentrations (ppm wet weight) of total DDT (DDE + DDD + DDT) and total PCB (Aroclor 1242 + Aroclor 1254) in liver and muscle tissue of the dominant species (n = sample size; \bar{X} = mean; SD = 1 standard deviation).

		n	DDT		PCB	
			\bar{X}	SD	\bar{X}	SD
Pacific whiting	Liver	5	1.28	0.66	0.186	0.053
	Muscle	4	0.012	0.005	0.002	0.001
Shortspine thornyhead	Liver	4	11.73	2.53	0.341	0.052
	Muscle	5	0.039	0.011	0.001	0.001
Blackgill rockfish	Liver	7	2.06	2.04	0.041	0.031
	Muscle	7	0.003	0.005	0.002	0.003
Aurora rockfish	Liver	5	4.34	1.23	0.189	0.181
	Muscle	5	0.063	0.087	0.001	0.001
Sablefish	Liver	5	1.64	2.11	0.067	0.087
	Muscle	4	0.320	0.341	0.008	0.012

Table 4. Concentrations (ppm wet weight) of trace metals in liver and muscle tissue of the dominant edible species (n = sample size; \bar{X} = mean; SD = 1 standard deviation). All nickel samples were <0.30 and all lead samples were <0.50 ppm; both were at or near detection limit.

		n	Silver		Cadmium		Chromium		Copper		Zinc	
			\bar{X}	SD	\bar{X}	SD	\bar{X}	SD	\bar{X}	SD	\bar{X}	SD
Pacific whiting	Liver	5	0.17	0.08	0.59	0.32	0.08	0.05	53	19	33	7
	Muscle	5	<0.01 ^a		<0.01 ^a		<0.05 ^a		6.5	8.2	1.8	0.1
Shortspine thornyhead	Liver	5	0.18	0.09	2.96 ^a	0.73	0.18	0.10	8.3	7.9	17	5
	Muscle	5	0.08	0.06	<0.01 ^a		0.09	0.04	2.0	1.3	1.4	0.2
Blackgill rockfish	Liver	5	0.25	0.20	3.50	4.78	0.12	0.05	9.9	4.5	32	8
	Muscle	5	<0.01 ^a		<0.01 ^a		<0.05 ^a		3.7	3.4	1.8	0.1
Aurora rockfish	Liver	5	0.33	0.33	4.90	1.68	0.27	0.22	7.9	3.5	31	8
	Muscle	4	0.07	0.06	<0.01 ^a		0.11	0.02	3.3	5.9	1.6	0.3
Sablefish	Liver	6	0.15	0.11	4.20	2.69	0.15	0.07	9.9	14.3	20	3
	Muscle	6	0.13	0.12	<0.01 ^a		0.17	0.13	13.1	21.1	1.2	0.2

^a At or near detection limit.

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