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AN OTTER TRAWL SURVEY OFF THE PALOS VERDES PENINSULA AND SANTA CATALINA ISLAND, MAY-JUNE 1972

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INTRODUCTION

The Los Angeles County Sanitation Districts and the Southern California Coastal Water Research Project jointly conducted a demersal fish survey off the Palos Verdes Peninsula on 12 May through 15 June 1972 and off Santa Catalina Island on 14 June 1972. The objectives of the survey were to determine (1) the pesticide and trace metal concentrations, (2) the frequency of diseases, and (3) the population and community characteristics of fishes from both areas. The pesticide and metal data appear in the Coastal Water Project's 3-year report (1973); this memorandum summarizes data on the latter two objectives.

METHODS

All fish samples were taken by otter trawl aboard the "Sea-S-Dee," the County's ocean monitoring research vessel. The vessel speed during trawling was approximately 2.7 knots. The net was a 40-ft (headrope length) otter trawl with a 1-7/8-in. stretch mesh bag and a 1-3/8-in. stretch mesh cod end.

Twenty-eight stations, ranging in depth from 23 to 167 meters, were sampled; the station numbers and locations are shown in Figure 1. Haul duration at each station was 10 minutes from the time that the net reached bottom.

The fishes from each collection were identified, counted, and measured on board ship. The standard length of specimens in small catches was determined to the nearest millimeter; specimens in large catches were measured to the nearest centimeter. All specimens were examined for external signs of disease as they were measured.

RESULTS

Community and Population Parameters

A total of 31 hauls were made at the 28 stations. Haul and station characteristics are given in Table 1 and summarized in Table 2.

Data on catch per haul is summarized in Figure 2. The highest catch per haul in the survey (1,096 fish) was taken at Station T_5-450; Station T_3-200 had the lowest catch (35 fish). Both

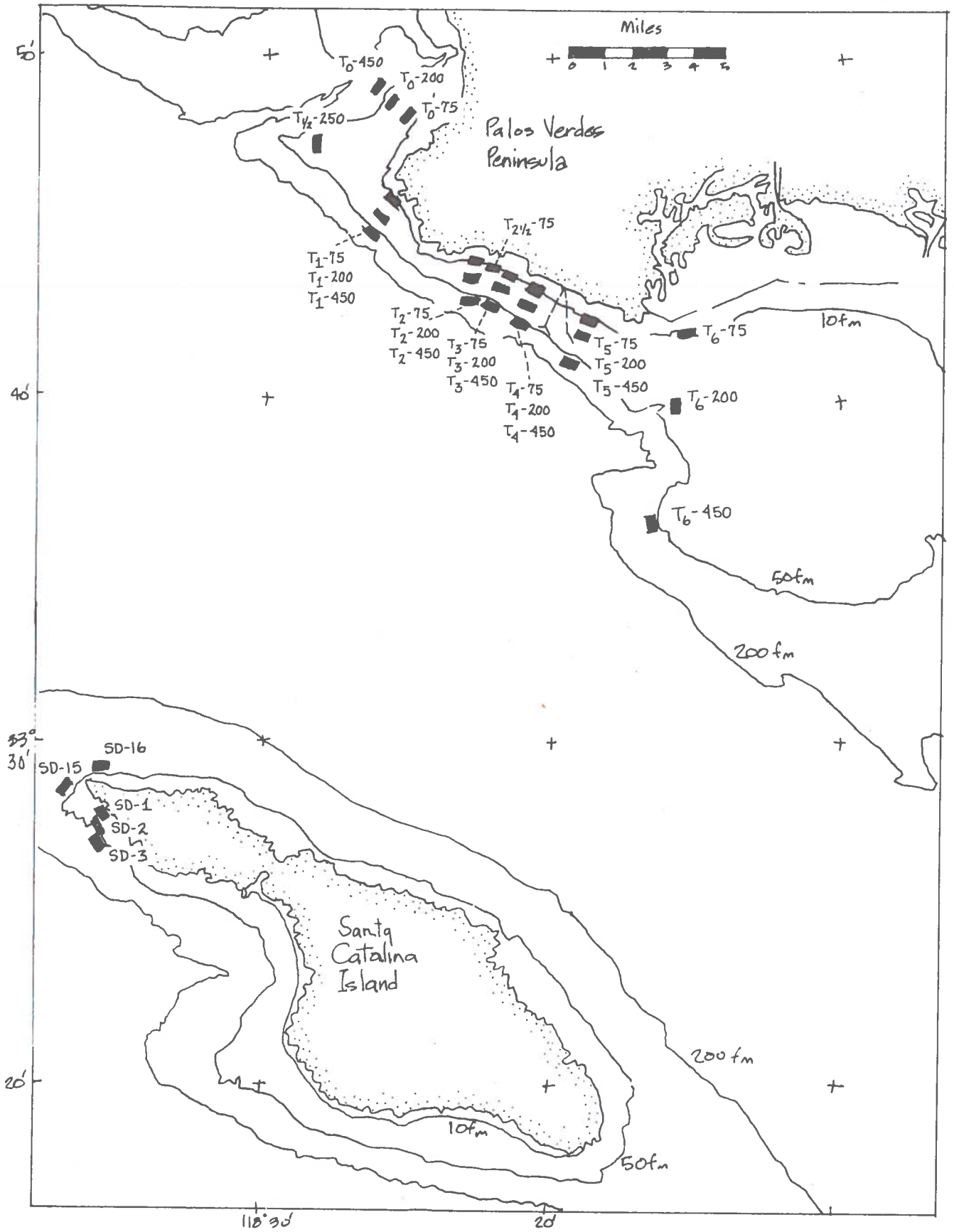

Figure 1. Stations trawled, Palos Verdes and Catalina survey, May-June 1972.

Table 1. Haul and station characteristics, Palos Verdes and Santa Catalina Island survey, May-June 1972.

Station	Latitude	Longitude	Depth (m)	Date	Time	Direction of Haul	No. of Indiv.	No. of Species	Shannon-Weaver Diversity
T_0-75	33° 48' 30"	118° 25' 00"	23	6-09-72	0945	-	204	7	0.68
T_0-200	33° 48' 35"	118° 25' 40"	61	5-16-72	Day	-	205	19	1.57
T_0-450	33° 49' 00"	118° 26' 00"	137	6-09-72	1130	-	953	18	1.74
$T_{\frac{1}{2}}$-250	33° 47' 20"	118° 28' 30"	76	6-09-72	1330	-	88	10	1.20
T_1-75	33° 46' 00"	118° 25' 40"	23	5-18-72	0905	N	345	12	1.00
T_1-200	33° 45' 30"	118° 26' 00"	61	5-18-72	1000	N	66	12	2.03
T_1-450	33° 45' 00"	118° 27' 25"	137	5-18-72	1255	N	464	9	1.10
T_2-75	33° 44' 05"	118° 22' 30"	23	5-24-72	1040	-	304	9	1.23
T_2-200	33° 43' 45"	118° 23' 00"	61	5-24-72	0945	-	274	15	1.06
T_2-450	33° 43' 00"	118° 23' 00"	137	5-18-72	1610	N	376	13	1.19
$T_{2\frac{1}{2}}$-75	33° 43' 45"	118° 22' 10"	23	5-12-72	Day	-	641	8	1.32
T_3-75	33° 43' 40"	118° 21' 40"	23	5-24-72	1400	-	52	11	1.50
				5-24-72	1600	-	86	7	1.15
T_3-200	33° 43' 20"	118° 21' 55"	61	5-16-72	Day	-	35	5	1.20
T_3-450	33° 42' 35"	118° 22' 00"	143	5-24-72	1130	-	802	14	1.43
T_4-75	33° 43' 10"	118° 20' 30"	23	6-02-72	1405	-	214	10	1.34
T_4-200	33° 42' 45"	118° 21' 00"	61	5-16-72	Day	-	112	10	1.68
T_4-450	33° 42' 05"	118° 21' 10"	128	5-26-72	1200	-	293	9	0.89
			107-167	5-26-72	1030	-	266	12	1.24
T_5-75	33° 42' 25"	118° 19' 00"	23	6-02-72	1310	-	36	9	1.93
T_5-200	33° 42' 00"	118° 19' 00"	61	6-02-72	1230	-	193	13	1.68
T_5-450	33° 40' 50"	118° 19' 30"	137	6-02-72	0900	-	1096	12	0.90
T_6-75	33° 42' 00"	118° 15' 00"	23	5-16-72	Day	-	337	15	1.65
T_6-200	33° 39' 40"	118° 15' 35"	61	6-15-72	1115	-	57	18	2.51
T_6-450	33° 36' 30"	118° 16' 30"	137	6-15-72	1215	-	207	15	1.62
SD-1	33° 27' 50"	118° 35' 30"	23	6-14-72	0945	NW	96	9	1.24
SD-2	33° 27' 30"	118° 35' 35"	73	6-14-72	1030	-	236	14	1.06
SD-3	33° 27' 00"	118° 35' 35"	137	6-14-72	1105	-	283	18	1.83
				6-14-72	~1400	-	426	15	1.49
SD-15	33° 28' 30"	118° 37' 00"	137	6-14-72	~1200	-	592	21	1.21
SD-16	33° 29' 05"	118° 35' 40"	146	6-14-72	~1300	-	97	13	1.99

Table 2

Summary of catch statistics, Palos Verdes and Catalina Island survey, May-June 1972

Area	No. of Sta.	No. of Samples	Total No. of Indiv.	Median Catch/ Haul	Total No. of Species	Species/ Haul		Shannon-Weaver Diversity/ Haul	
						Mean	SE	Mean	SE
Palos Verdes	23	25	7,706	214.0	61	11.7	0.7	1.39	0.08
Catalina	5	6	1,730	259.5	39	15.0	1.7	1.47	0.15
Total	28	31	9,436	236.0	70	12.3	0.7	1.40	0.07

stations are off Palos Verdes. Off Santa Catalina Island, Station SD-15 had the highest catch (592 fish) and Station SD-1 had the lowest (96 fish).

A total of 70 species, representing 23 families, were taken in the survey (Table 3). The number of species per haul ranged from 5 at Station T_3-200 off Palos Verdes to 21 at Station SD-15 off Santa Catalina Island (Table 1; Figure 3). Of the Palos Verdes stations, Station T_0-200 had the most species per haul (19); Station SD-1 had the least species per haul (9) of the Catalina stations.

The species most abundant and most frequently occurring in the catches are listed in Tables 4 and 5, respectively.

Ten species taken in the survey had not been previously noted in the County's otter trawl surveys. These were:

Gray smoothhound (Mustelus californicus)
California skate (Raja inornata)
Longnose skate (Raja rhina)
Bigfin eelpout (Aprodon cortezianus)
Kelp bass (Paralabrax clathratus)
Opaleye (Girella nigricans)
Pile perch (Rhacochilus vacca)
Blackeye goby (Coryphopterus nicholsi)
Pit-head sculpin (Icelinus cavifrons)
Longfin sanddab (Citharichthys xanthostigma)

Shannon-Weaver diversities (Table 1, Figure 4) ranged from 2.51 at Station T_6-200 to 0.68 at Station T_0-75. Both of these stations are off Palos Verdes Peninsula. Off Santa Catalina Island, diversities ranged from 1.99 at Station SD-16 to 1.06 at Station SD-2.

Table 6 shows the species caught at each station in the May-June 1972 survey. Figure 5 shows the recurrent groups of fishes identified in the data from other surveys of the southern California

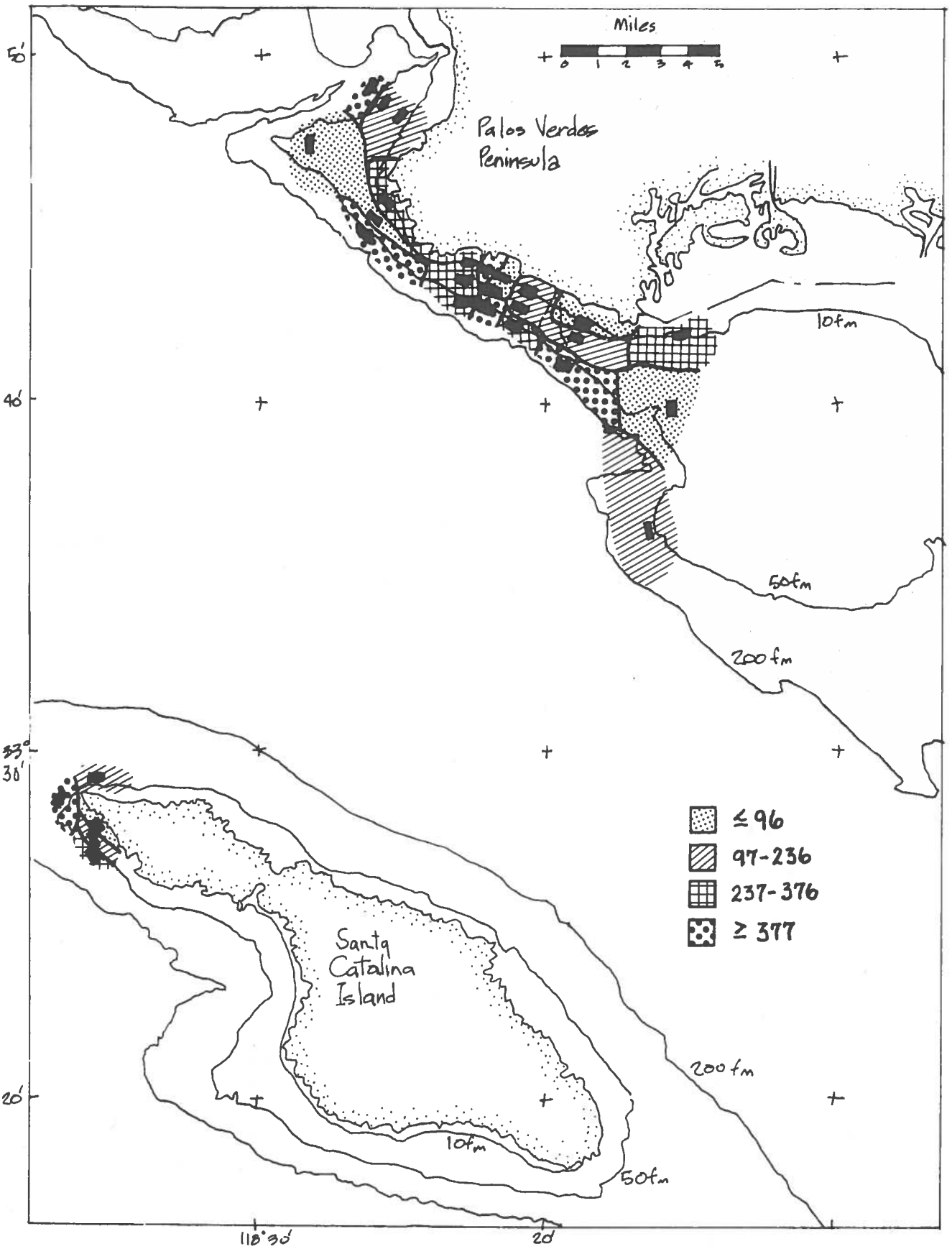

Figure 2. Catch per haul, Palos Verdes and Catalina survey, May-June 1972.

Table 3

Fishes taken by otter trawl off Palos Verdes Peninsula and Catalina Island, May-June 1972.

Species	Common Name
Scylliorhinidae	
Cephaloscyllium ventriosum	Swell shark
Carcharhinidae	
Mustelus californicus	Gray smoothhound
Squalidae	
Squalus acanthias	Spiny dogfish
Rajidae	
Raja inornata	California skate
Raja rhina	Longnose skate
Chimaeridae	
Hydrolagus colliei	Ratfish
Batrachoididae	
Porichthys myriaster	Specklefin midshipman
Porichthys notatus	Plainfin midshipman
Ophidiidae	
Otophidium taylori	Spotted cusk-eel
Zoarcidae	
Aprodon cortezianus	Bigfin eelpout
Lycodopsis pacifica	Blackbelly eelpout
Serranidae	
Paralabrax clathratus	Kelp bass
Branchiostegidae	
Caulolatilus princeps	Ocean whitefish
Sciaenidae	
Genyonemus lineatus	White croaker
Seriphus politus	Queenfish
Kyphosidae	
Girella nigricans	Opaleye
Embiotocidae	
Cymatogaster aggregata	Shiner perch
Phanerodon furcatus	White seaperch
Rhacochilus vacca	Pile perch
Zalembius rosaceus	Pink seaperch
Bathymasteridae	
Rathbunella sp.	
Gobiidae	
Coryphopterus nicholsi	Blackeye goby
Scorpaenidae	
Scorpaena guttata	California scorpionfish
Sebastes chlorostictus	Greenspotted rockfish
Sebastes crameri	Darkblotched rockfish
Sebastes dalli	Calico rockfish
Sebastes diploproa	Splitnose rockfish
Sebastes elongatus	Greenstriped rockfish
Sebastes eos	Pink rockfish
Sebastes goodei	Chilipepper
Sebastes hopkinsi	Squarespot rockfish
Sebastes jordani	Shortbelly rockfish

Table 3 (Cont)

Species	Common Name
Sebastes levis	Cow rockfish
Sebastes miniatus	Vermilion rockfish
Sebastes mystinus	Blue rockfish
Sebastes paucispinis	Bocaccio
Sebastes rosenblatti	Greenblotched rockfish
Sebastes rubrivinctus	Flag rockfish
Sebastes saxicola	Stripetail rockfish
Sebastes semicinctus	Halfbanded rockfish
Sebastes serranoides	Olive rockfish
Sebastolobus alascanus	Shortspine thornyhead
Anoplopomatidae	
Anoplopoma fimbria	Sablefish
Hexagrammidae	
Zaniolepis frenata	Shortspine combfish
Zaniolepis latipinnis	Longspine combfish
Cottidae	
Chitonotus pugetensis	Roughback sculpin
Icelinus cavifrons	Pit-head sculpin
Icelinus filamentosus	Threadfin sculpin
Icelinus quadriseriatus	Yellowchin sculpin
Icelinus tenuis	Spotfin sculpin
Leptocottus armatus	Pacific staghorn sculpin
Agonidae	
Agonopsis sterletus	Southern spearnose poacher
Odontopyxis trispinosa	Pygmy poacher
Xeneretmus latifrons	Blacktip poacher
Xeneretmus triacanthus	Bluespotted poacher
Bothidae	
Citharichthys sordidus	Pacific sanddab
Citharichthys stigmaeus	Speckled sanddab
Citharichthys xanthostigma	Longfin sanddab
Hippoglossina stomata	Bigmouth sole
Paralichthys californicus	California halibut
Xystreurys liolepis	Fantail sole
Pleuronectidae	
Eopsetta jordani	Petrale sole
Glyptocephalus zachirus	Rex sole
Lyopsetta exilis	Slender sole
Microstomus pacificus	Dover sole
Parophrys vetulus	English sole
Pleuronichthys coenosus	C-O sole
Pleuronichthys decurrens	Curlfin sole
Pleuronichthys verticalis	Hornyhead turbot
Cynoglossidae	
Symphurus atricauda	California tonguefish

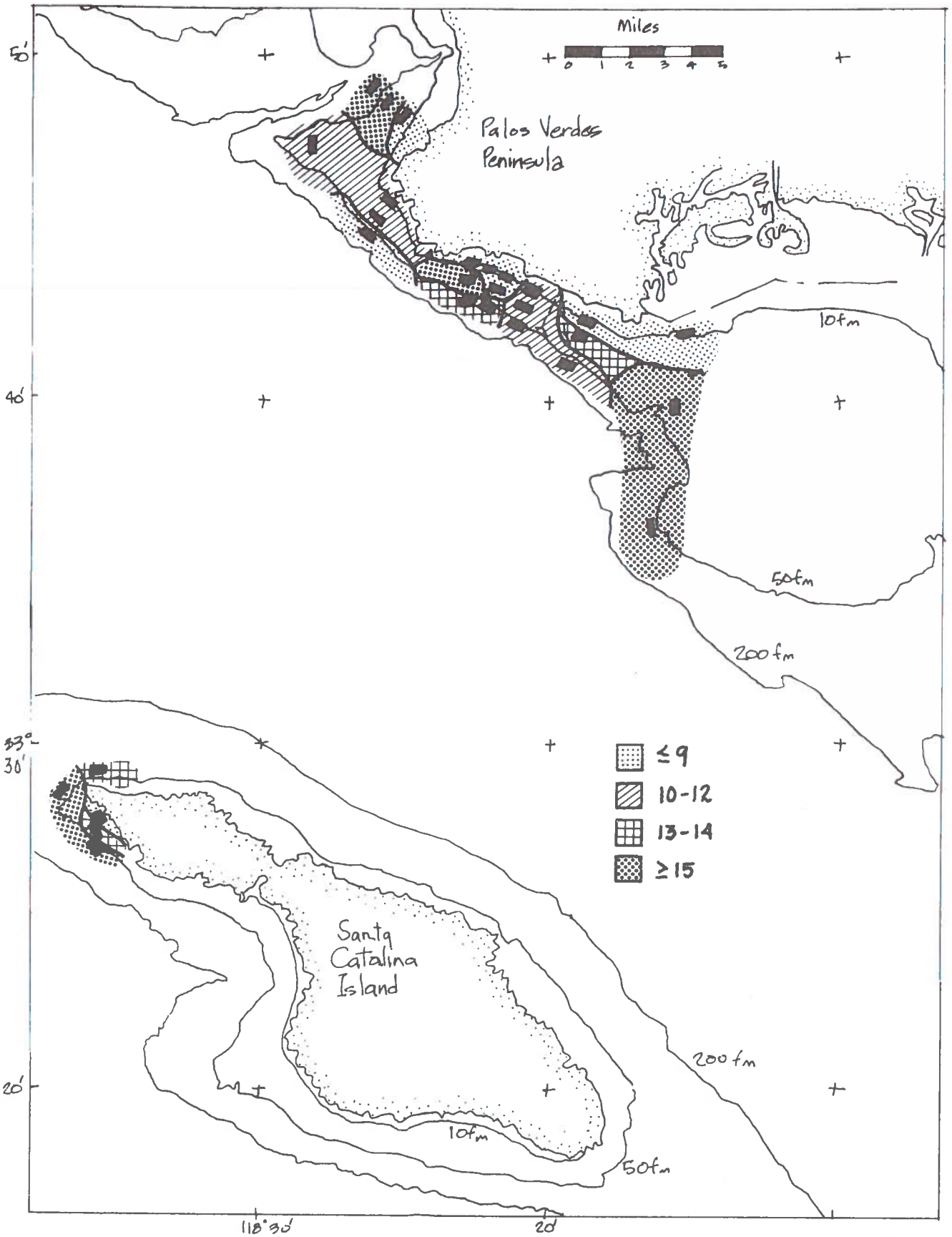

Figure 3. Species per haul, Palos Verdes and Catalina survey, May-June 1972.

Table 4. Species most abundant off Palos Verdes and Catalina Island, May-June 1972

Species	Abundance
Overall Survey (28 Stations, 31 Samples)	
Dover sole	2,910
Pacific sanddab	1,204
Stripetail rockfish	1,152
Speckled sanddab	984
Curlfin sole	935
Splitnose rockfish	452
Rex sole	417
Slender sole	287
Pink seaperch	211
Shortspine combfish	126
Palos Verdes (23 Stations, 25 Samples)	
Dover sole	2,869
Stripetail rockfish	1,080
Speckled sanddab	919
Catalina Island (5 Stations, 6 Samples)	
Pacific sanddab	991
Pink seaperch	162
Slender sole	151

Table 5. Species most frequently taken off Palos Verdes and Catalina Island, May-June 1972

Species	Freq. of Occurrence (Number of Samples)
Overall Survey (28 Stations, 31 Samples)	
Dover sole	27
Pacific sanddab	21
Curlfin sole	20
Speckled sanddab	16
Stripetail rockfish	16
California scorpionfish	15
English sole	14
Rex sole	13
Pink seaperch	13
Plainfin midshipman	12
Palos Verdes (23 Stations, 25 Samples)	
Dover sole	21
Curlfin sole	17
Pacific sanddab	15
Speckled sanddab	15
Catalina Island (5 Stations, 6 Samples)	
Pacific sanddab	6
Bigmouth sole	5
Dover sole	5
Pink seaperch	5

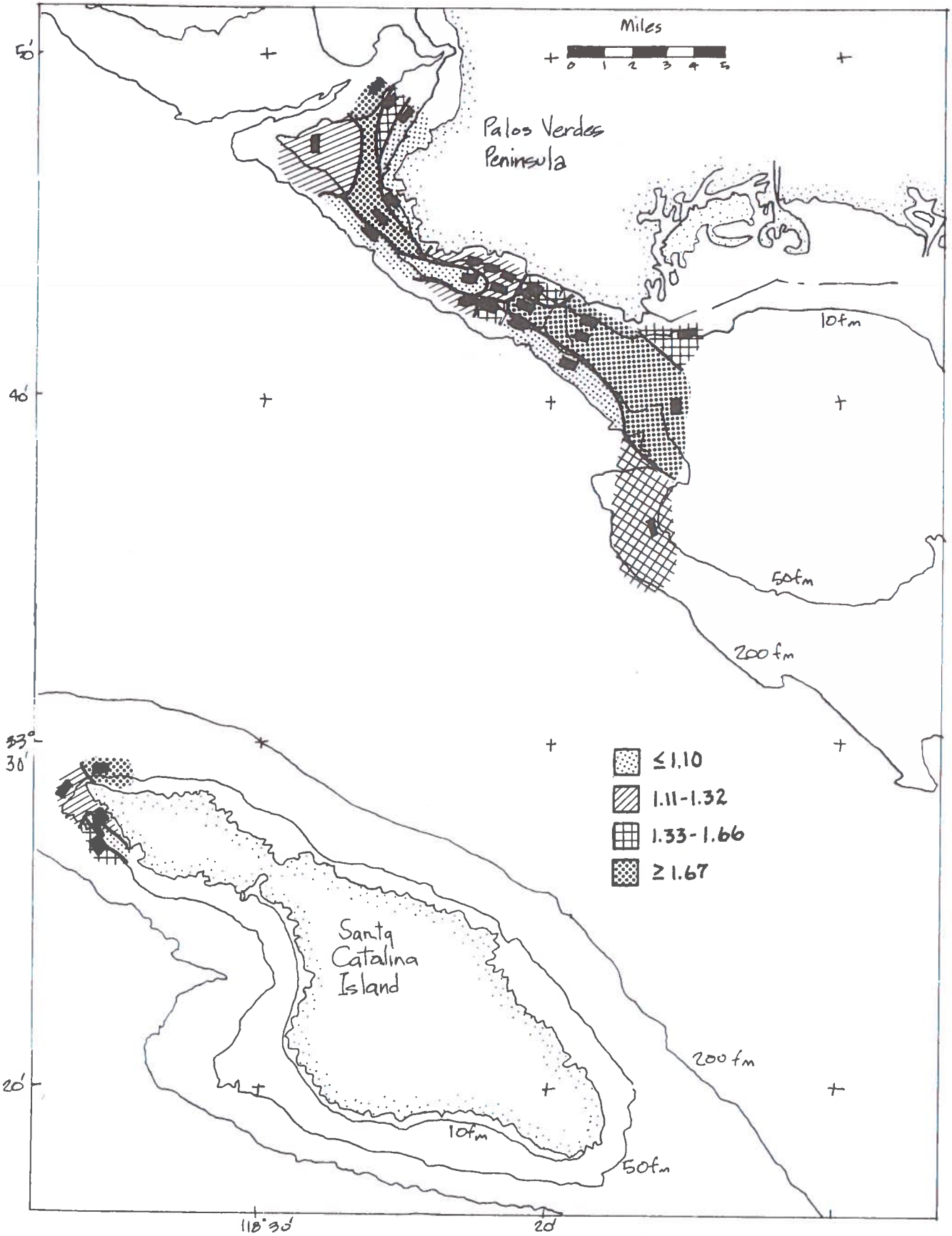

Figure 4. Shannon-Weaver diversity per haul, Palos Verdes and Catalina survey, May-June 1972.

Table 6. Catch per species per haul, Palos Verdes and Santa Catalina Island survey, May-June 1972. Species are listed according to the recurrent groups in Figure 5; boxes mark the presence of all group members in a single collection.

Species	Palos Verdes Peninsula																								Santa Catalina Island							Total*
	T_0 75	T_0 200	T_0 450	T_4 250	T_1 75	T_1 200	T_1 450	T_2 75	T_2 200	T_2 450	T_{24} 75	T_3 75 Haul 1	T_3 75 Haul 2	T_3 200	T_3 450	T_4 75	T_4 200	T_4 450 Haul 1	T_4 450 Haul 2	T_5 75	T_5 200	T_5 450	T_6 75	T_6 200	T_6 450	Subtotal*	SD 1	SD 2	SD 3 Haul 1	SD 3 Haul 2	SD 15	SD 16	Subtotal*	
White croaker									1														16			17(2)							0(0)	17(2)
Queenfish												1	1			28							1			1(1)							0(0)	1(1)
White seaperch																										30(3)							0(0)	30(3)
Speckled sanddab	169	12		6	212	1		106	1		193	6	17			55				6	19		108	8		919(15)	65						65(1)	984(16)
California tonguefish																				2			3	3		8(3)							0(0)	8(3)
Hornyhead turbot	15	1			1			5			7						1			1			3	1		35(9)							0(0)	35(0)
English sole		1				2	1	6	1	1		2	1		1		1		1	3			1	1		23(14)							0(0)	23(14)
Curlfin sole	12	2	2		107	2		141	38	1	294	31	53	3		111	11			11	61		36			916(17)	1	17			1		19(3)	935(20)
Yellowchin sculpin		5				5																				10(2)							0(0)	10(2)
Longspine combfish		3				3			2															2		10(4)		7					7(1)	17(5)
Pygmy poacher									1											4						5(2)							0(0)	5(2)
Pacific sanddab		2	4	1	11	17		2	27		28			14		2	25			2	70		3		5	213(15)	3	173	122	235	429	29	991(6)	1204(21)
Dover sole		123	362	61	1	16	311	1	193	113	102			15	375	6	46	31	154		17	780	133	14	15	2869(21)		2	10	15	9	5	41(5)	2910(27)
Plainfin midshipman		2									3			2				1	3		1		4	6		22(8)		1	2	1	1		5(4)	27(12)
Pink seaperch		8							3								5		1		10		12	2	8	49(8)		24	31	46	59	2	162(5)	211(13)
Shortspine combfish				1						2								1	1					4	80	89(6)			7	3	14	13	37(4)	126(10)
Stripetail rockfish		30	89			12	52		1	187					198			221	61		7	220		2		1080(12)			17	31	2	22	72(4)	1152(16)
Slender sole			113				1			3					14			1				1			3	136(7)			62	71	17	1	151(4)	287(11)
Rex sole			172	2			53			2					32			11	27			33			71	403(9)			3	3	6	2	14(4)	417(13)
Blackbelly eelpout			14																							14(1)			1	6			7(2)	21(3)
Blacktip poacher							23															2				25(2)				1			1(1)	26(3)
Swell shark																										0(0)					1		1(1)	1(1)
Gray smoothhound																										0(0)				2	1		3(2)	3(2)
Spiny dogfish																							1			1(1)							0(0)	1(1)
California skate																									1	1(1)							0(0)	1(1)
Longnose skate																										0(0)					1		1(1)	1(1)
Ratfish			2									1	1													4(3)			1	5	7		13(3)	17(6)
Specklefin midshipman					3																					3(1)							0(0)	3(1)
Spotted cusk-eel			1																							1(1)							0(0)	1(1)
Bigfin eelpout							1																			1(1)							0(0)	1(1)
Kelp bass																										0(0)	1						1(1)	1(1)
Ocean whitefish					1											1										2(2)							0(0)	2(2)
Opaleye												1				1										2(2)							0(0)	2(2)
Shiner perch									1					1			15		1		2		4			24(6)							0(0)	24(6)
Pile perch												1														1(1)							0(0)	1(1)

*Number in parentheses is number of hauls in which species was taken (frequency of occurrence).

Table 6 (continued)

Species	Palos Verdes Peninsula																										Santa Catalina Island							
	T_0 75	T_0 200	T_0 450	T_4 250	T_1 75	T_1 200	T_1 450	T_2 75	T_2 200	T_2 450	T_{24} 75	T_3 75 Haul 1	T_3 75 Haul 2	T_3 200	T_3 450	T_4 75	T_4 200	T_4 450 Haul 1	T_4 450 Haul 2	T_5 75	T_5 200	T_5 450	T_6 75	T_6 200	T_6 450	Subtotal*	SD 1	SD 2	SD 3 Haul 1	SD 3 Haul 2	SD 15	SD 16	Subtotal*	Total*
Ratnbunella sp.																										0(0)		1					1(1)	1(1)
Blackeye goby		1																								1(1)							0(0)	1(1)
California scorpionfish		1			2			41	1		12	4	9			3				6	1	1	11	4	2	98(14)	3						3(1)	101(15)
Greenspotted rockfish			1							1														1	1	4(4)			2		4	1	7(3)	11(7)
Darkblotched rockfish				1											4			1	1			4				10(4)			11				11(1)	21(5)
Calico rockfish																						2				3(2)							0(0)	3(2)
Splitnose rockfish			162				21			58					141			24				46				452(6)							0(0)	452(6)
Greenstriped rockfish				3						4					4				1						16	28(5)				4	16	12	32(3)	60(8)
Pink rockfish																			1							1(1)							0(0)	1(1)
Chilipepper						2			2						1											5(3)			2				2(1)	7(4)
Squarespot rockfish				4		1																				5(2)			1				1(1)	6(3)
Shortbelly rockfish			4						1						1		1				1	1				9(6)							0(0)	9(6)
Cow rockfish		3	10							1								2						2		18(5)			1				1(1)	19(6)
Vermilion rockfish		2			1				1						1		4				1				1	11(7)							0(0)	11(7)
Blue rockfish												1														1(1)							0(0)	1(1)
Bocaccio			4												1											5(2)							0(0)	5(2)
Sebastes rosenblatti			8							2															1	11(3)			6	2	2	1	11(4)	22(7)
Flag rockfish		1		1		2									1									3	1	9(6)					2		2(1)	11(7)
Halfbanded rockfish		3		8		3															1					15(4)							0(0)	15(4)
Olive rockfish												1														1(1)							0(0)	1(1)
Shortspine thornyhead			1																							1(1)							0(0)	1(1)
Sablefish			3				1			1					28	5	3		14			3		1	1	60(10)							0(0)	60(10)
Roughback sculpin	1	1			1			1																1		5(5)		5					5(1)	10(6)
Pit-head sculpin																										0(0)		1					1(1)	1(1)
Threadfin sculpin																										0(0)			2		8	5	15(3)	15(3)
Spotfin sculpin																										0(0)					1		1(1)	1(1)
Pacific staghorn sculpin																								1		1(1)							0(0)	1(1)
Southern spearnose poacher																									1	1(1)		1					1(1)	2(2)
Bluespotted poacher																									1	1(1)			1	2	1		4(3)	5(4)
Longfin sanddab																										0(0)		1					1(1)	1(1)
Bigmouth sole		4	1					1								2					2					10(5)	3	1	2		9	3	18(5)	28(10)
California halibut	1																									1(1)	5						5(1)	6(2)
Fantail sole	1				2																					3(2)	7						7(1)	10(3)
Petrale sole																								1	1	1(1)							0(0)	1(1)
C-O sole	5				3						2	3	4							1			1			19(7)	8	1					9(2)	28(9)

*Number in parentheses is number of hauls in which species was taken (frequency of occurrence).

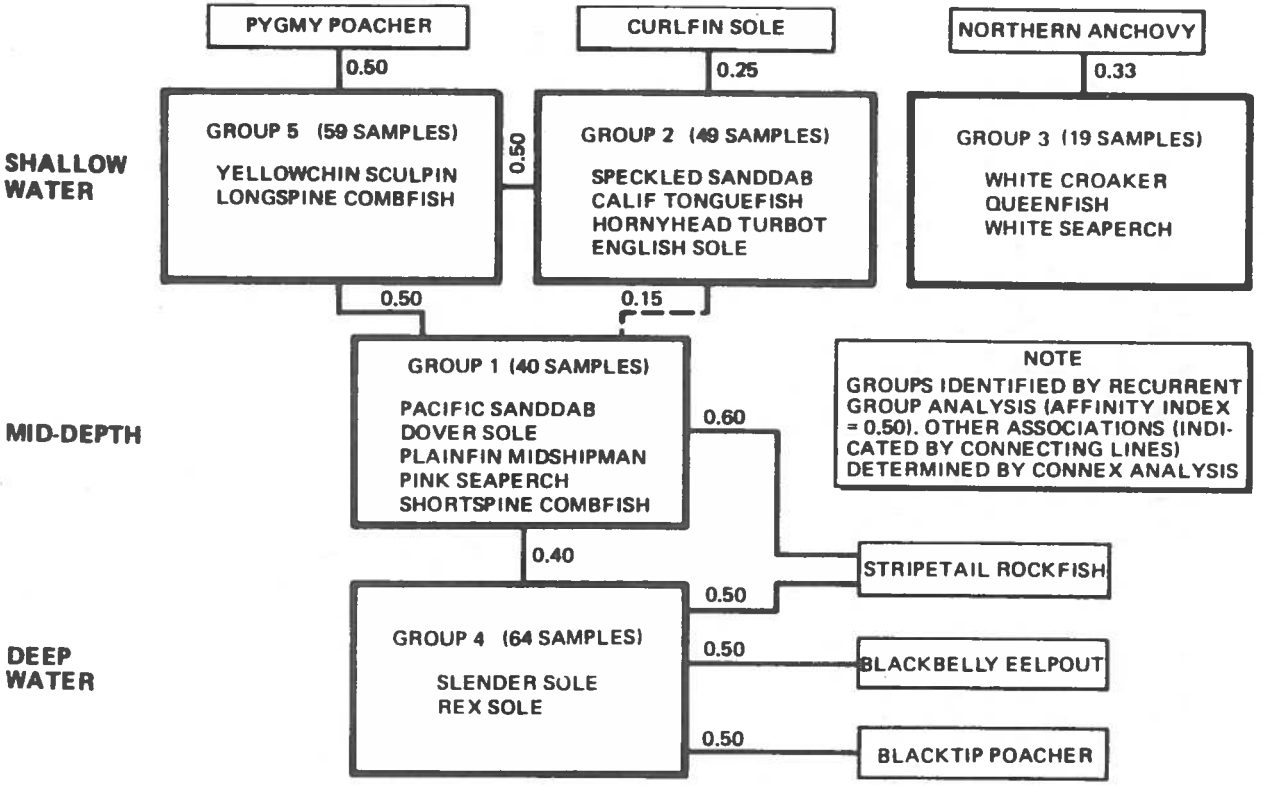

Figure 5. Species associations of southern California nearshore demersal fishes, 1969-72.

area (303 otter trawl samples collected in 1969-72 surveys between Port Hueneme and Newport Beach; Southern California Coastal Water Research Project 1973). To facilitate the identification of recurrent groups in the data from the survey described here, the species in Table 6 are arranged according to the previously identified groups.

All of the members of four of the five groups were noted in this survey. Although all members of Group 3 (white croaker, queenfish, and white seaperch) were present in the survey, there was no sample in which all three species occurred together. The most frequently occurring group was Group 4, which is composed of the slender sole and rex sole; this group was noted at 10 stations (Figure 6). Group 2 was present at three stations near the eastern edge of the Palos Verdes Peninsula. Group 1, composed of the Pacific sanddab, Dover sole, plainfin midshipman, pink seaperch, and shortspine combfish, was noted at Stations SD-3 and SD-15 off Santa Catalina Island. All members of this group except the shortspine combfish were present at Stations T_0-200 and SD-2; the longspine combfish, a shallow water species closely related to the shortspine combfish, was also present at these stations. It is quite possible that the longspine combfish occupies a position in the shallow water community similar to the position occupied by the shortspine combfish in deeper water.

Figure 7 shows the species numerically dominant in the catch at each station. The Dover sole was dominant at 11 stations off Palos Verdes Peninsula, mostly between 61 and 137 meters. The Pacific sanddab was dominant at six stations at mid-depths in both areas. The curlfin sole was dominant at five inshore stations off Palos Verdes.

Diseased and Anomalous Fishes

In the May-June 1972 survey off Palos Verdes and Catalina, 14 species of demersal fishes with at least one specimen bearing eroded fins were noted (Table 7). All affected specimens were captured off Palos Verdes; 8 of the 14 were flatfishes, and 4 were rockfishes. The Dover sole was the most frequently affected, with an overall recorded incidence of 46 percent.

Dover sole were generally in greatest abundance at the deeper stations (Table 8) but the incidence of fin erosion in this species was greatest at the 75- and 200-ft stations (Figure 8). Almost all size classes contained diseased individuals; incidence was greatest in specimens 120 to 150 mm, standard length (Figure 9).

Tumors and growths were noted in individuals from five species during the survey (Table 9); the species with the greatest number of affected individuals was the Dover sole (0.56 percent): The

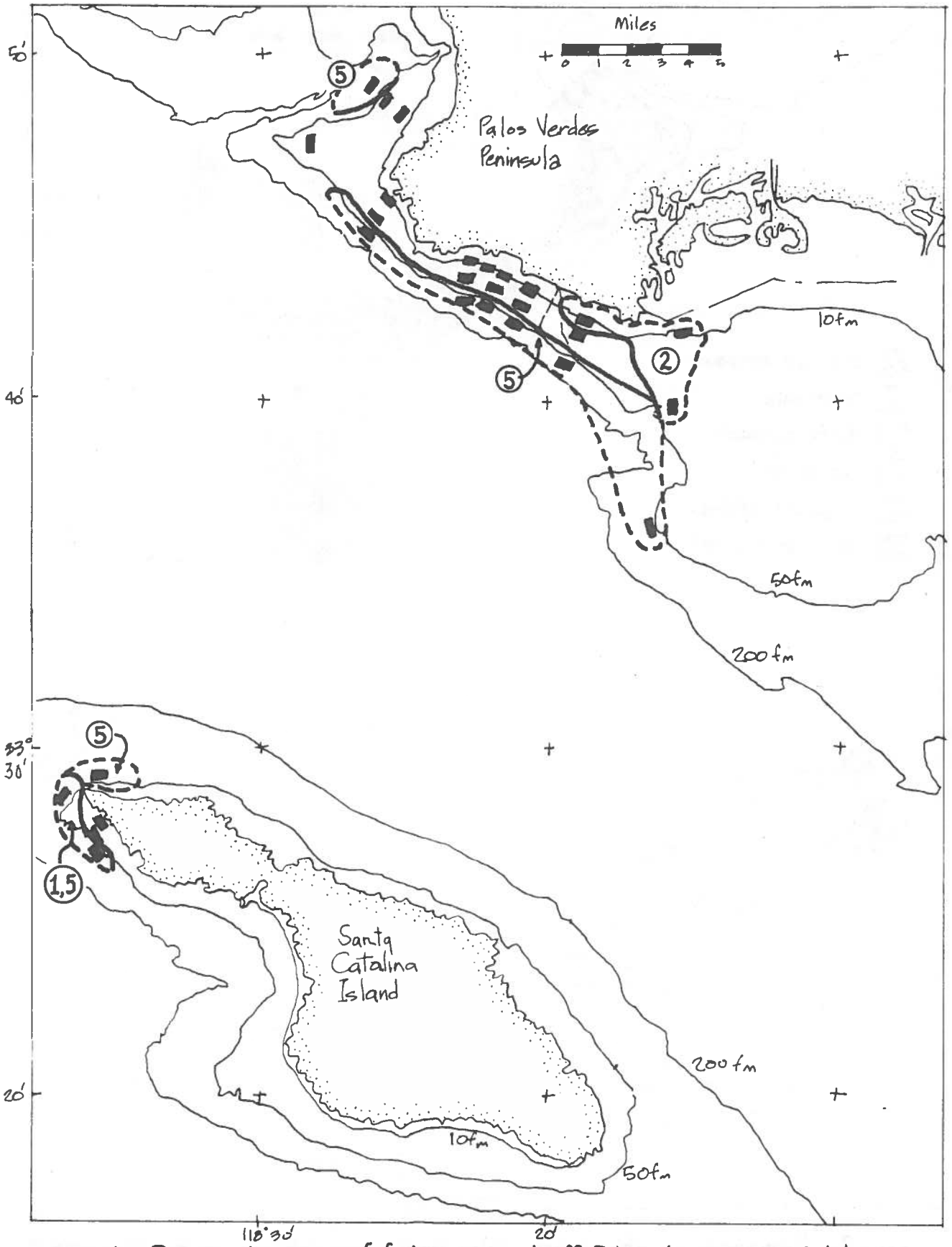

Figure 6. Recurrent groups of fishes present off Palos Verdes and Catalina, May-June 1972. Group members are given in Figure 5.

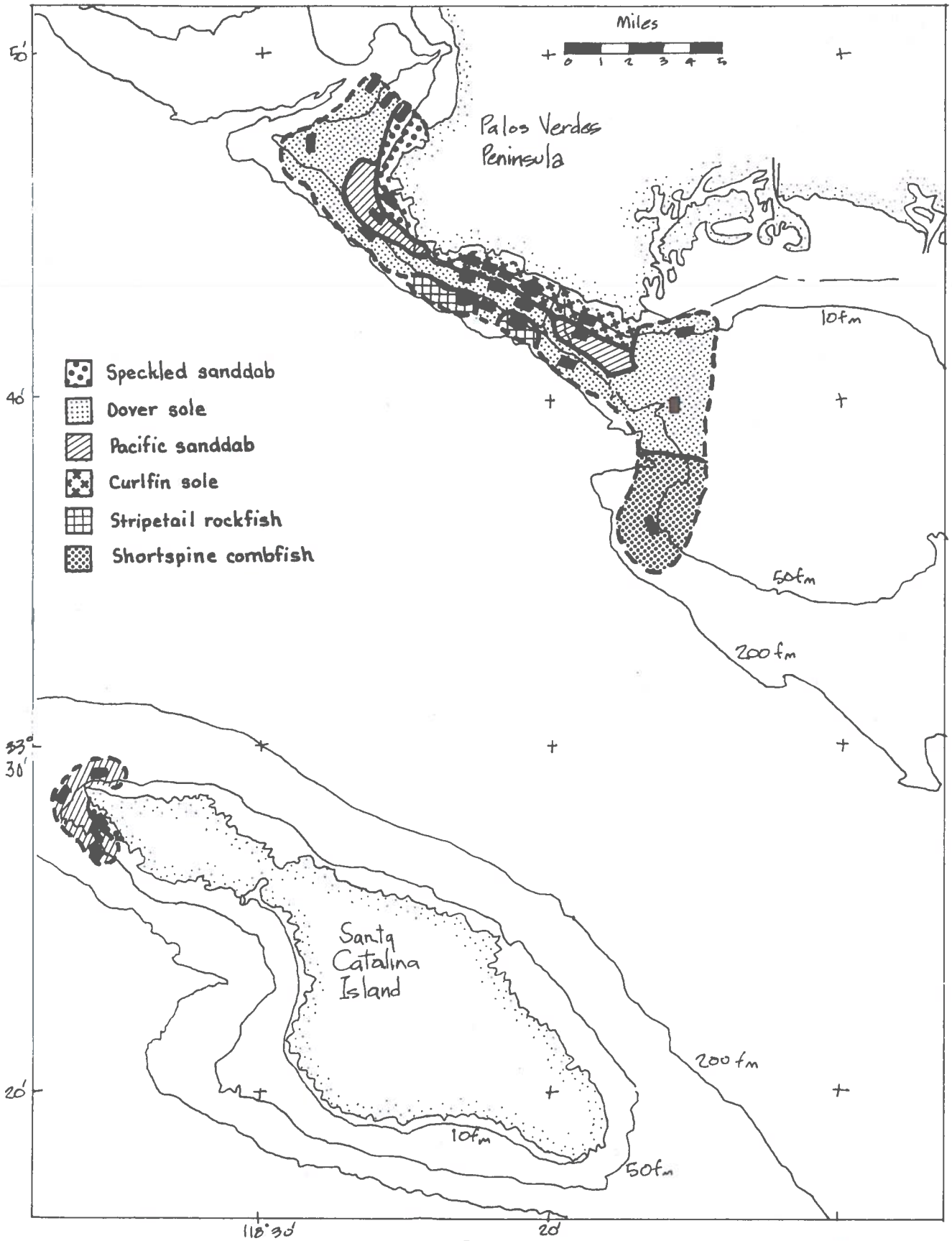

Figure 7. Dominance in abundance, Palos Verdes and Catalina survey, May-June 1972.

Table 7. Incidence of fin erosion, Palos Verdes Peninsula and Catalina Island survey, May-June 1972.

Species	Palos Verdes			Catalina Island		
	No. of Indiv.	Fin Erosion		No. of Indiv.	Fin Erosion	
		No.	%		No.	%
Dover sole	2869	1326	46	41	0	0
Rex sole	403	54	13	14	0	0
Slender sole	136	37	27	151	0	0
Vermilion rockfish	11	5	45	0		
Curlfin sole	916	4	0.44	19	0	0
Pacific sanddab	213	3	1.4	991	0	0
Hornyhead turbot	35	3	8.6	0		
Greenstriped rockfish	28	3	11	32	0	0
White croaker	17	2	12	0		
Bigmouth sole	10	2	20	18	0	0
California tonguefish	8	1	12	0		
Flag rockfish	9	1	11	2	0	0
Half-banded rockfish	15	1	6.7	0		
Black-tipped poacher	25	1	4.0	1	0	0

Table 8. Prevalence of disease in Dover sole taken off Palos Verdes, May-June 1972

Station	No. of Indiv.	Fin Erosion		Tumors	
		No.	%	No.	%
T_0-75	0				
T_0-200	123	9	7.3	1	0.81
T_0-450	362	4	1.1		
$T_{\frac{1}{2}}$-250	61	3	4.9		
T_1-75	1	1	100		
T_1-200	16	8	50	1	6.2
T_1-450	311	140	45		
T_2-75	1	1	100		
T_2-200	193	137	71	1	0.52
T_2-450	113	55	49	1	0.88
$T_{2\frac{1}{2}}$-75	102	93	91		
T_3-75	0				
	0				
T_3-200	15	11	73		
T_3-450	375	224	60	1	0.27
T_4-75	6	5	83		
T_4-200	46	34	74		
T_4-450	31	13	42	2	1.3
	154	79	51		
T_5-75	0				
T_5-200	17	13	76		
T_5-450	780	402	52	6	0.77
T_6-75	133	94	71	3	2.2
T_6-200	15				
T_6-450	15				

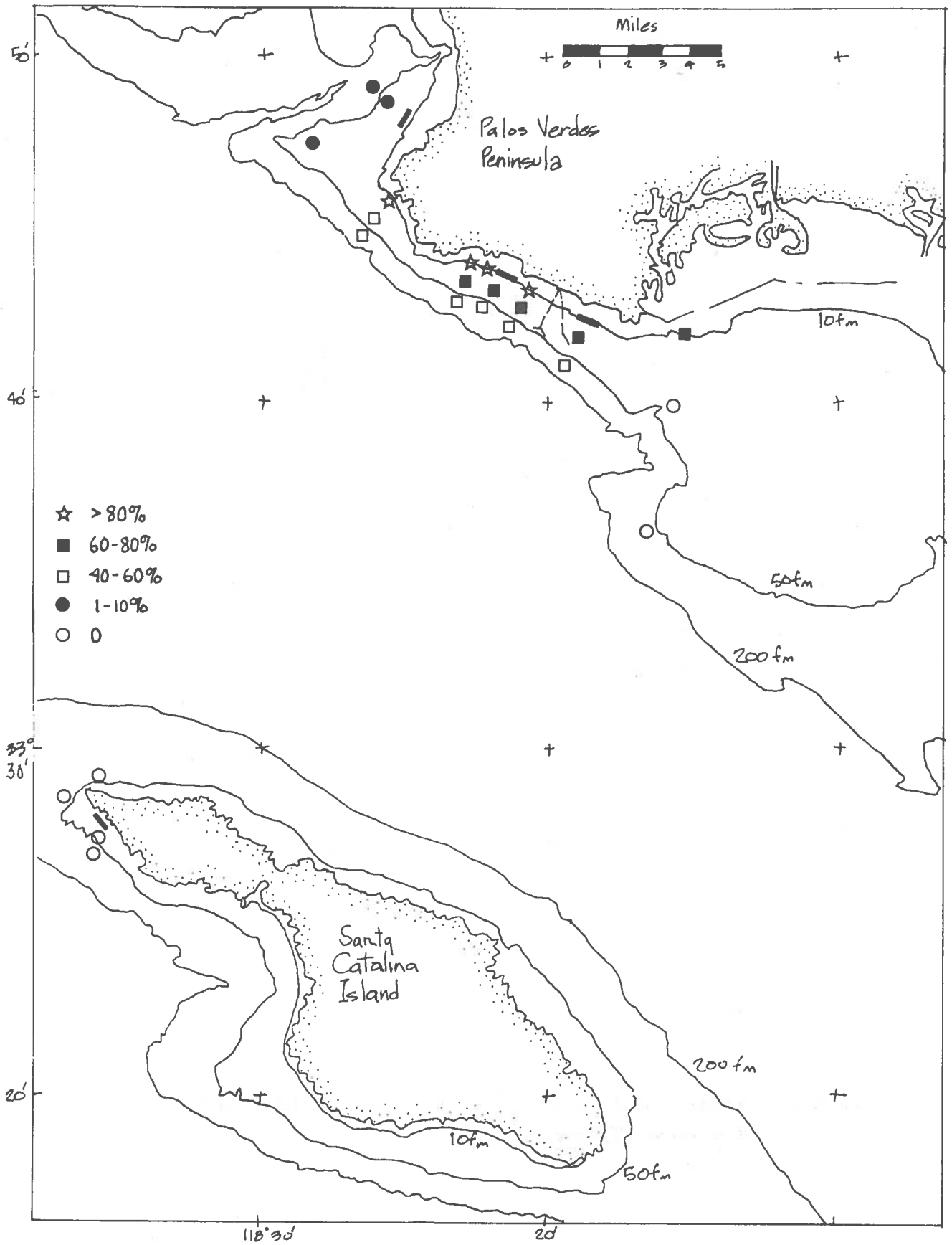

Figure 8. Incidence of fin erosion in Dover sole, Palos Verdes and Catalina survey, May-June 1972.

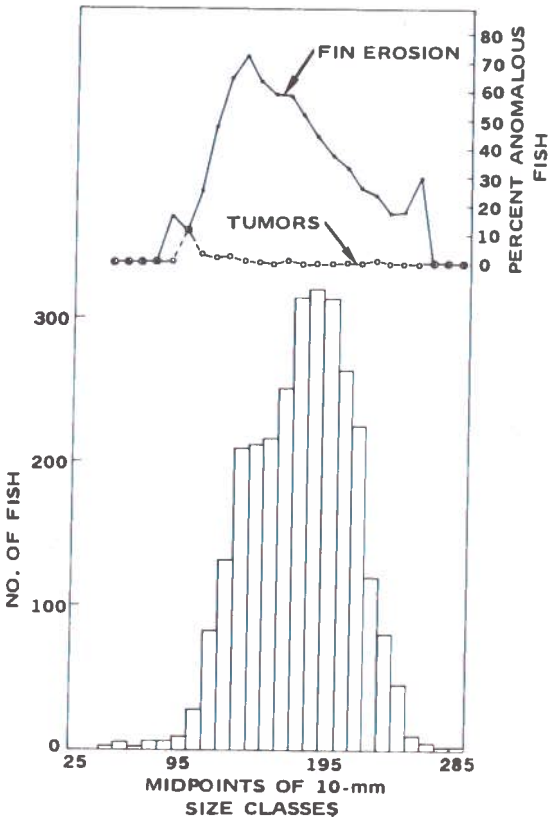

Figure 9. Incidence of disease in Dover sole taken off Palos Verdes, May-June 1972 survey.

Table 9. Prevalence of tumors and growths in demersal fishes caught off the Palos Verdes Peninsula and Catalina Island, May-June 1972

Species	Palos Verdes			Catalina Island		
	No. of Indiv.	Tumors		No. of Indiv.	Tumors	
		No.	%		No.	%
Dover sole	2869	16	0.56	41	0	0
Speckled sanddab	919	1	0.11	65	0	0
White croaker	17	1	5.9	0		
Calico rockfish	3	1	33	0		
Cow rockfish	18	1	5.6	1	0	0

smaller individuals (90 to 130 mm, standard length) were most heavily affected (Figure 9). Only the white croaker and the Dover sole were represented in both disease syndromes. Histological examinations of the tumor-bearing specimens are described in another Coastal Water Project memorandum (Klontz and Bendele 1973).

REFERENCES

Klontz, G. W., and R. A. Bendele. 1973. Histopathological analysis of fin erosion in southern California marine fishes. TM203, So. Calif. Coastal Water Res. Proj., El Segundo, Calif.

Southern California Coastal Water Research Project. 1973. The ecology of the Southern California Bight: Implications for water quality management. TR104, So. Calif. Coastal Water Res. Proj., El Segundo, Calif.