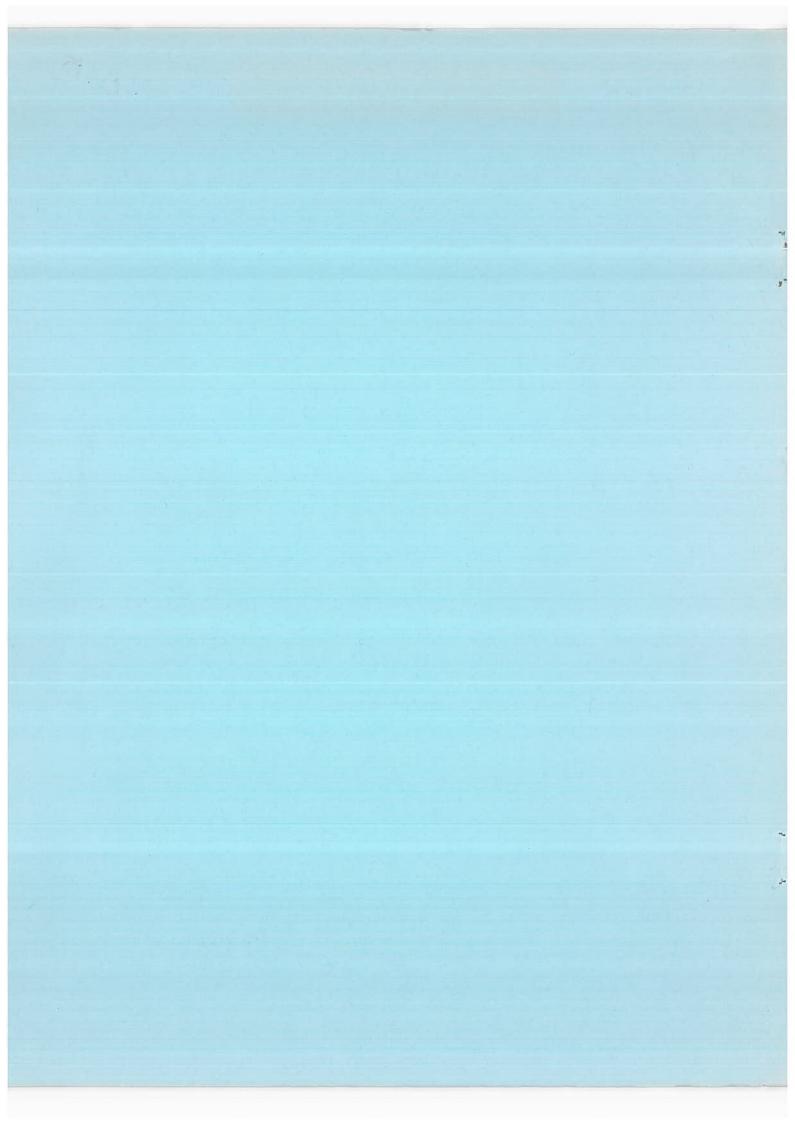
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AN OTTER TRAWL SURVEY OFF THE PALOS VERDES PENINSULA AND SANTA CATALINA ISLAND, MAY-JUNE 1972

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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

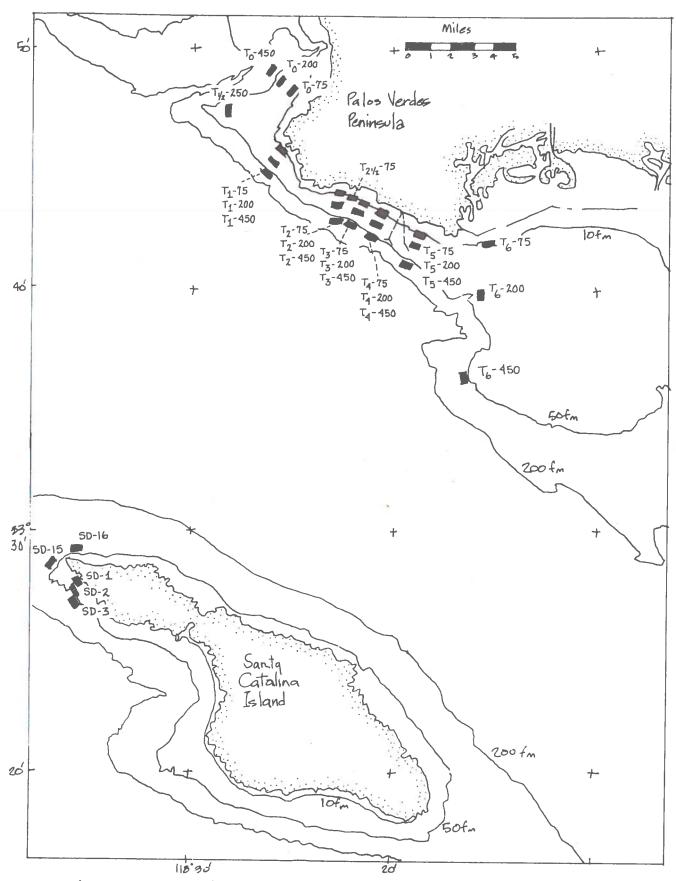


Figure 1. Stations trawled, Polos Verdes and Catalina survey, May-June 1972.

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
T1 -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 -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
1.0				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
7			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

								Shanı	non-
		No.						Wear	/er
	No.	of	Total	Median	Total	Speci	ies/	Dive	sity/
	of	Sam-	No. of	Catch/	No. of	Haı	11	Hat	11
Area	Sta.	ples	Indiv.	Haul	Species	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 T3-200 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

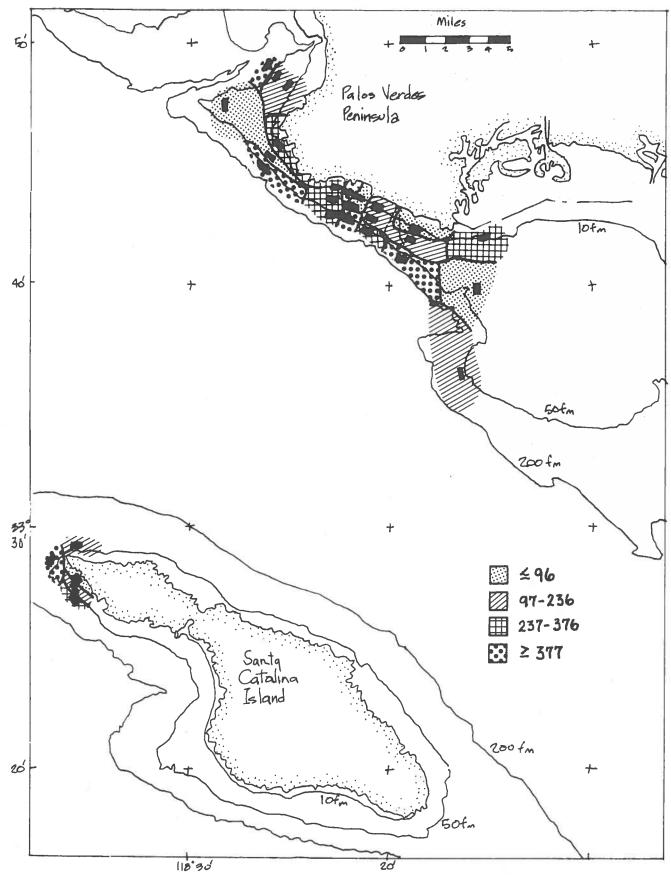


Figure 2. Catch per haul, Palos Verdes and Catalina survey, May-June 1972.

Table 3

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

Scylliorhinidae Cephaloscyllium ventriosum Carcharhinidae Mustelus californicus Squalidae Squalus acanthias Rajidae Raja inornata Raja rhina Chimaeridae Hydrolagus colliei Batrachoididae Porichthys myriaster Porichthys myriaster Porichthys motatus Ophidiidae Otophidium taylori Coarcidae Apnodon cortezianus Lycodopeis pacifica Seranidae Faralabrax clathratus Branchiostegidae Caulolatilus princeps Sciaenidae Genyonemus lineatus Seriphus politus Kyphosidae Girella nigricans Embiotocidae Cymatogaster aggregata Phamerodon furcatus Bathymasteridae Rathbunella sp. Gobiidae Coruphopterus nicholsi Sebastes chorosticus Sebastes diploproa Sebastes doptinsi Sebastes doptinsi Sebastes soodei Sebastes soodei Sebastes goodei Sebastes pordani Sebastes pordani Sebastes pordani Seporperus prockfish Sebastes pordani Sebastes pordani Sentriped rockfish Sebastes pordani Seporperus prockfish Seporperus prockfish Sebastes prodani	Species	Common Name
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Sebastes hopkinsi Squarespot rockfish		Pink rockfish
	Sebastes goodei	Chilipepper
Sebastes jordani Shortbelly rockfish		Squarespot rockfish
	Sebastes jordani	Shortbelly rockfish

Species

Common Name

Sebastes levis
Sebastes miniatus
Sebastes mystinus
Sebastes paucispinis
Sebastes rosenblatti
Sebastes rubrivinctus
Sebastes saxicola
Sebastes semicinctus
Sebastes serranoides
Sebastolobus alascanus

Anoplopomatidae
Anoplopoma fimbria

Hexagrammidae

Zaniolepis frenata Zaniolepis latipinnis

Cottidae

Chitonotus pugetensis Icelinus cavifrons Icelinus filamentosus Icelinus quadriseriatus Icelinus tenuis

Leptocottus armatus

Agonidae

Agonopsis sterletus Odontopyxis trispinosa Xeneretmus latifrons Xeneretmus triacanthus

Bothidae

Citharichthys sordidus Citharichthys stigmaeus Citharichthys xanthostigma Hippoglossina stomata Paralichthys californicus

Xystreurys liolepis

Pleuronectidae

Eopsetta jordani
Glyptocephalus zachirus
Lyopsetta exilis
Microstomus pacificus
Parophrys vetulus
Pleuronichthys coenosus
Pleuronichthys decurrens
Pleuronichthys verticalis

Cynoglossidae

Symphurus atricauda

Cow rockfish
Vermilion rockfish
Blue rockfish
Bocaccio
Greenblotched rockfish
Flag rockfish
Stripetail rockfish
Halfbanded rockfish
Olive rockfish
Shortspine thornyhead

Sablefish

Shortspine combfish Longspine combfish

Roughback sculpin
Pit-head sculpin
Threadfin sculpin
Yellowchin sculpin
Spotfin sculpin
Pacific staghorn sculpin

Southern spearnose poacher Pygmy poacher Blacktip poacher Bluespotted poacher

Pacific sanddab Speckled sanddab Longfin sanddab Bigmouth sole California halibut Fantail sole

Petrale sole
Rex sole
Slender sole
Dover sole
English sole
C-O sole
Curlfin sole
Hornyhead turbot

California tonguefish

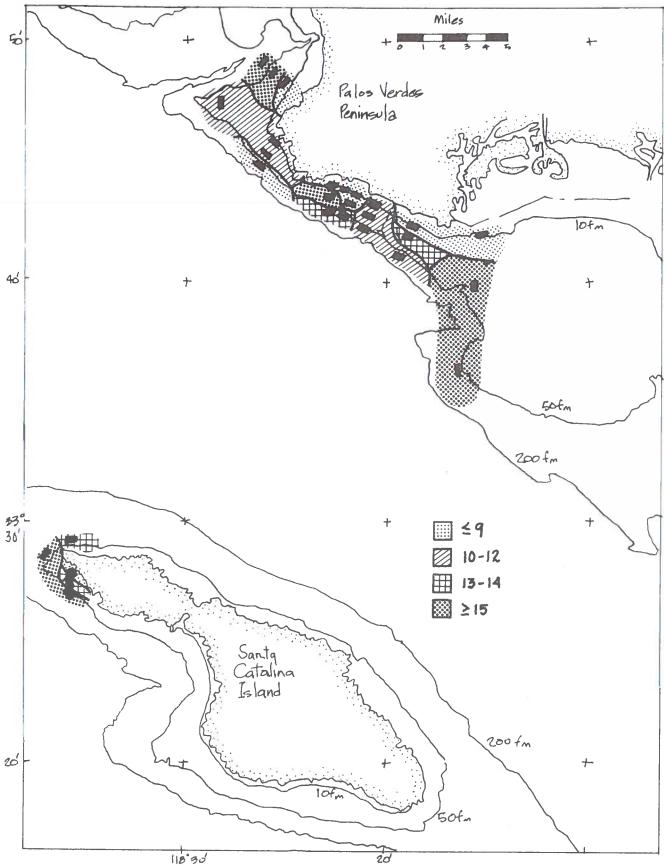


Figure 3. Species per haul, Palos Verdes and Catalina survey, May-June 1972.

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

 Species	Abundance
Overall Survey (28 Stations, 31 Samples)	19
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 Occur (Number of Sam	
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	

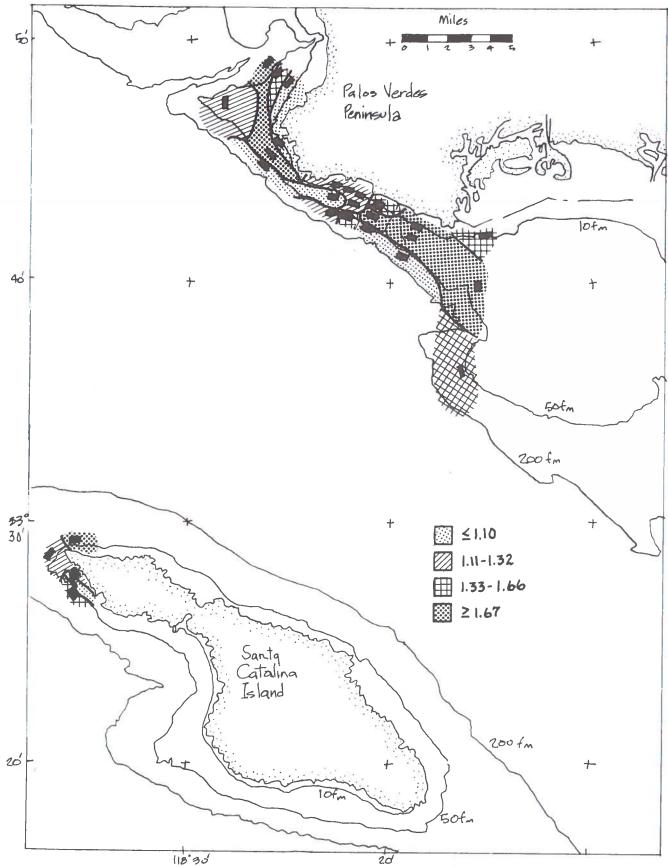


Figure 4. Shannon-Weaver diversity per haul, Palos Verdes and Catalina survey, May-June 1972.

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. Table 6.

	- I I						-					Palo	Palos Verdes Peninsula	des Pe	eninau	_ I	-	E	6-		1 F	_ I _ I	E	_ I				Santa	Santa Catalina Island	fna I	100	and	and
Species	75 26	200 40	450 25	¹ , ¹ , 250 75		200 450	¹ 1 ¹ 2 450 75		200 45	450 75		75 Haul Haul		200	T3 T4	7.4 200 200	Haul	T ₄ 450	2 5 T	T ₅	450	75	Te 200	16 450	Subtotal*	SD 1	8 2	SD 3 Hau1 1	SD 3 Haul	SD 115		3D 16	SD Subtotal*
White croaker Queenfish White seaperch													-		,,,	58						16			17(2)								(0)0
Speckled sanddab California tonguefish Hornyhead turbot English sole	169	12		9	212	2	1 10	106	1 1	1 19	193	2 6	17			ry S		-		10 10		108	8 6 4 4		919(15) 8(3) 35(9) 23(14)	52							65(1) 0(0) 0(0) 0(0)
Curlfin sole	12	2	2	7	107	2	14	141	38	1 294		- E	53	m	=	111 1	11		=	19		36			916(17)	-	17			-			19(3)
Yellowchin sculpin Longspine combfish		20 60			Ш	w m			14						-								2		10 (2)								0(0)
Pvgmy poacher		-							-										Α.	4					5(2)								0(0)
Pacific sanddab Dover solo Plainfin midshipman Pink seaperch Shortspine combfish	~	123 36	362	1 01	11 11 11	17 31	311	19 2	27 193 11	113 102 3	3 2 2			114 3	375	N 9	25 46 31 5	154		2 70 17 17 10	780	133	14 2 6	15 15 80	213(15) 2869(21) 22(8) 49(8) 89(6)	<u> </u>	173 2 1 1 24	122 10 2 3 31	235 15 1 46	429 9 1 1 59 14	29 5	6 1	991(6) 41(5) 5(4) 162(5) 37(4)
Stripetail rockfish		30	68			12 5	52		1 18	187				-	198		221	61		• *	7 220		2		1080(12)			17	31	- 61	22	1-	72(4)
Slender sole Rex sole	ű		113	r,		_ vi	53			5 3					14		- 1	27			33			3 71	136 (7)		10	62	17.	17	1 2	25.4	151(4)
Blackbelly eelpout Blacktir poacher			14				23														2				14(1)			-	9				7(2)
Swell shark Gray amoothbound Spiny dogish California skate Lomgonse skate Ratifal Becklein midshipman Specklein midshipman Specklein midshipman Grotted cusk-eel Ratifal Grotted cusk-eel Grotse whitefish Ghalyer Shince perch			1 2		м н							4 7 7	erd .	pril .			<u>ب</u>			•	ry .	4			0 (0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0			-	5/ N	et et pt			1(1) 3(2) 0(0) 0(0) 13(3) 13(3) 0(0) 0(0) 0(0) 0(0)

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

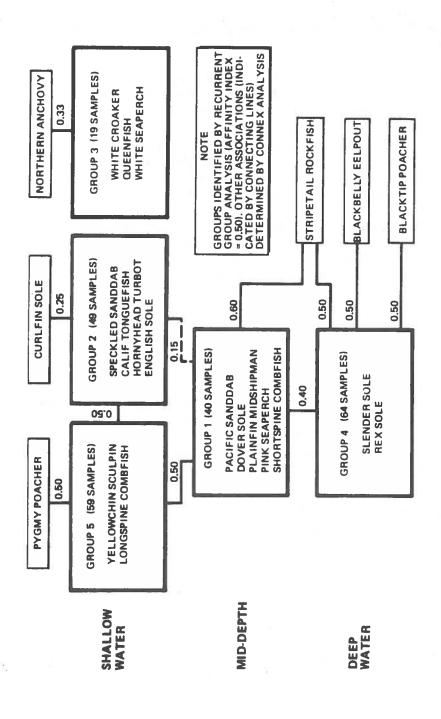


Figure 5. Species associations of southern California nearshore demersal fishes, 1969-72.

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. 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 T₀-200 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

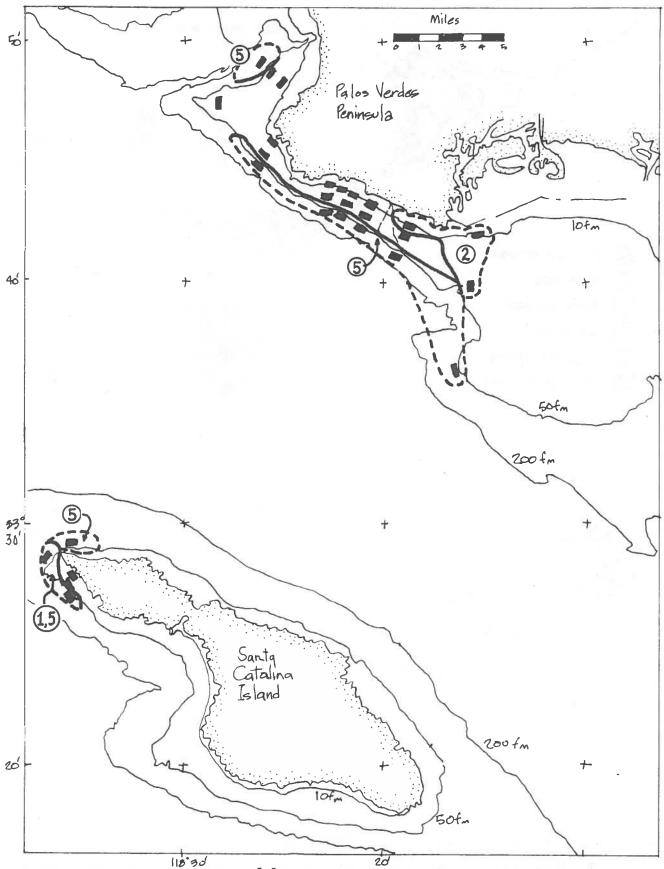


Figure 6. Recurrent groups of fishes present off Palos Verdes and Catalina, May-June 1972. Group members are given in Figure 5.

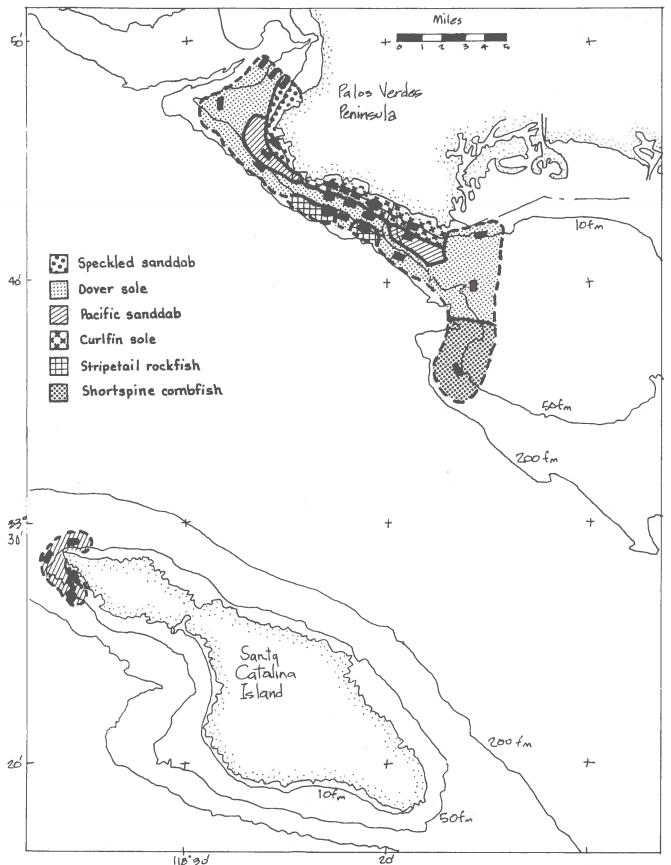


Figure 7. Dominance in abundance, Palos Verdes and Catalina survey, May June 1972.

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

	Palo	os Verdes		Catal	ina Isla	nd
	No. of	Fin E	rosion	No. of	Fin Er	osion
Species	Indiv.	No.	ક્ષ	Indiv.	No.	g.
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	41	6.7	0	-	ū
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

	No. of	Fin 1	Erosion	Tu	mors
Station	No. of Indiv.	No.	8	No.	8
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 ₂₁ -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				

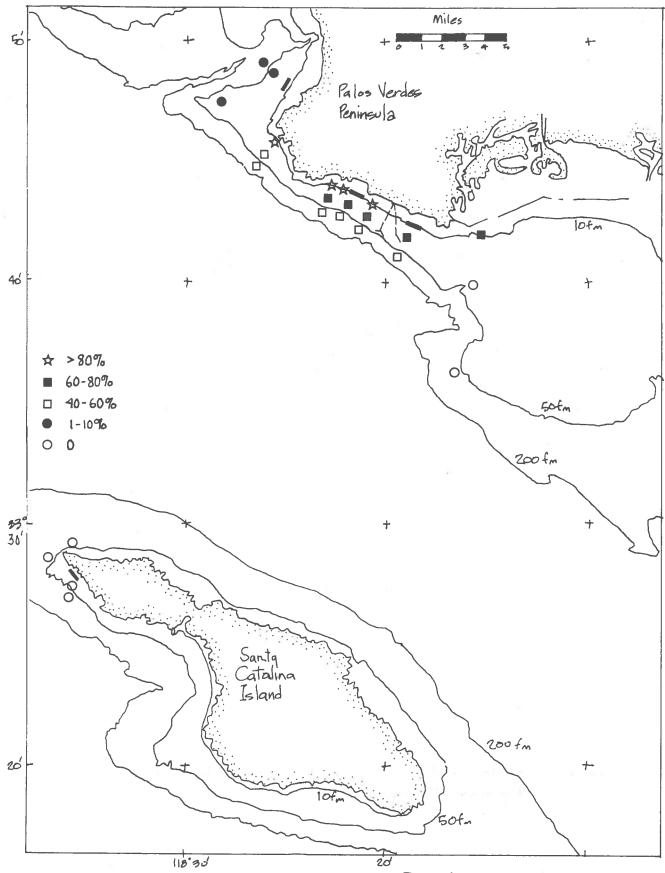


Figure 8. Incidence of fin erosion in Dover sole, Palos Verdes and Catalina survey, May-June 1972.

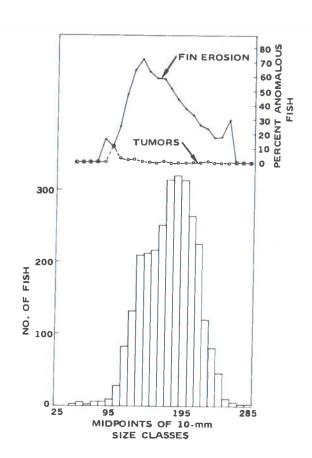


Figure 9. Incidence of disease in Dover sole taken off Palos Verdes, May-June 1972 survey.

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

	Pa	los Verd	es	Catali	na Islan	d
		Tu	mors		Tumo	rs
Species	No. of Indiv.	No.	8	No. of Indiv.	No.	ş
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.

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