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SPECIES COMPOSITION AND CATCH PER UNIT OF EFFORT OF  
MONTEREY BAY SURF, PIER, AND SKIFF ANGLERS IN 1979

by

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ABSTRACT

In 1979, Monterey Bay sport anglers were sampled for species composition of the catch and catch per unit of effort. A total of 4150 surf, pier, and skiff anglers was interviewed. Catch per hour was 0.71, 0.58, and 1.25 for surf, pier, and skiff anglers, respectively. Barred surfperch, *Amphistichus argenteus*, totaled 76% of the surf catch. The species composition of the pier catch was dominated by juvenile bocaccio, *Sebastes paucispinis*; white croaker, *Genyonemus lineatus*; and walleye surfperch, *Hyperprosopon argenteum*. The skiff fishery was dominated by sanddabs, *Citharichthys* spp., and blue rockfish, *Sebastes mystinus*. The best surf fishing area was between Palm Beach and Sand Dollar Beach in northern Monterey Bay, while Monterey Wharf No. 2 was the best public fishing pier. However, a small privately operated pier inside Moss Landing Harbor had the best catch rate (2.44 fish per h) of all piers sampled.

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## INTRODUCTION

In 1979 the California Department of Fish and Game conducted a 1-yr survey of sport fishing areas between the cities of Monterey and Santa Cruz. All piers and surf fishing areas including jetties were sampled, but skiff anglers were sampled only at Monterey. The purpose of the study was to determine the species composition, size range of major species, and angler catch rates at fishing locations. This study is not intended to estimate total catch or effort; rather, the sampled catch and catch per hour is presented by area as an index of the status of these fisheries in 1979.

In 1966, Miller and Odemar (1968) conducted a similar survey in which they estimated total catch and effort of ocean sport fisheries in central California. Data in this report will give some insight into changes in these fisheries over the past 13 yr.

## SAMPLING AREAS

All major angler access points on Monterey Bay between Monterey Wharf No. 2 and Santa Cruz Pier were sampled (Figure 1), except for launching ramps at Moss Landing and Santa Cruz. Capitola Pier was closed until July and Moss Landing Pier was open only from January to July.

## METHODS

### Surf and Pier Sampling

Surf and pier surveys were conducted the same day by teams of samplers who traveled from site to site. Surf anglers were interviewed first between 0700 and 1100 h and pier anglers were interviewed in the afternoon. Samplers attempted to interview every angler present at each site, and the total number of anglers present including those not interviewed was recorded.

Data obtained during the interviews included hours spent fishing to the nearest half hour, number of each species caught, and measurements (mm TL) of all surfperch, rockfish, and other more important species. Nearly all data are from incomplete fishing trips and total catch and effort are not available.

Sampling days were selected by consulting tide tables. Surf-angler surveys were twice monthly on days when rising tides occurred in the early morning hours. These were the best days and times for surf fishing which enabled samplers to interview more anglers with the best possible catches.

#### Skiff Sampling

Skiff anglers were interviewed at the Monterey Coast Guard launch ramp and the Monterey Marina ramp. Sampling days were either weekends or holidays. Interviews were conducted between 1030 and 1630 h and the data recorded was the same as that taken from surf and pier anglers.

#### RESULTS

The results presented in this report are not expanded to estimate total catch or effort, because each fishing site was sampled no more than twice per month. This level of sampling is inadequate to estimate annual catches. However, 67 species were identified in the catch (Table 1), and catch per hour may be used as an index to the status of Monterey Bay sport fisheries in 1979.

#### Surf Fishing

A total of 18 beaches was sampled between Del Monte Beach in the south and Capitola Beach in the north (Figure 1). Individual beaches were sampled from 16 to 22 times during the year, 697 anglers were present on sampling days,

and 655 (94%) were interviewed (Table 2). A total of 1176 fish was caught at a rate of 0.71 fish per h from all beaches combined (Table 2).

In 1966, the catch per h of Monterey Bay surf anglers from incomplete trips was 0.44 fish per h (Miller & Odemar, 1968), and from 1958 to 1960, it was 0.63 fish per h for all surf anglers combined (Miller & Gotshall, 1965). My sampling was conducted to contact surf anglers at the best possible surf fishing times and this may account for the higher catch rates observed in 1979.

The best surf fishing areas in 1979 were Monterey Bay Academy, Sand Dollar, Zills Road, Marina, and Palm beaches (Table 2). The species composition of the surf anglers' catch in 1979 was dominated by surfperch which comprised 92% of the catch; barred surfperch, *Amphistichus argenteus*, alone accounted for 76% of the total catch (Table 3). Silver, *Hyperprosopon ellipticum*, and walleye surfperch, *Hyperprosopon argenteum*, the next two species in order of abundance, combined for only 10% of the catch. Monthly catch rates indicate that the best surf fishing was in the spring and fall, while the poorest fishing was during the summer months.

Miller and Gotshall (1965) and Miller and Odemar (1968) also indicate that surfperch was the major species taken by shore anglers in 1960 and 1966. Their data were combined for larger areas than just sandy beaches in Monterey Bay and direct comparisons were not possible.

#### Pier and Jetty Fishing

Six piers in Monterey Bay and both jetties at Moss Landing were sampled in 1979. Moss Landing Pier, Moss Landing partyboat pier, and Capitola Pier were closed part of the year, but were sampled when they were open. All

other piers and jetties were sampled at least 18 times during the year (Table 4). A total of 3237 anglers was present on sampling days and 3044 (94%) were interviewed. The total catch sampled at piers and jetties was 4477 fish, with an overall catch rate of 0.58 fish per h (Table 4).

The best fishing pier was the Moss Landing partyboat pier where the catch rate was 2.44 fish per h. This pier is a private pier where a fee is charged to fish and is only open during the summer and fall when fishing is at its best; this accounts for the higher catch rates. The public piers and jetties had much lower catch rates. Monterey Wharf No. 2 (1.55 fish per h) was the best public pier; all others were under 1.0 fish per h. Santa Cruz was the poorest fishing pier with a catch rate of 0.32 fish per h (Table 4). Miller and Odemar (1968) reported that Santa Cruz was the best fishing pier in 1965 (1.25 fish per h) and that Monterey Wharf No. 2 was one of the poorer fishing piers (0.50 fish per h).

The combined catch rate of 0.58 fish per h in 1979 is down slightly from 0.66 fish per h in 1966 (Miller & Odemar, 1968). However, this decline may be due to the limited sampling in 1979. Pier fishing is subject to brief periods of good fishing that can raise annual catch figures; if sampling misses any of these periods of good fishing the annual catch will be underestimated.

In 1979 the species composition of the Monterey Bay pier and jetty catch was dominated by juvenile bocaccio, *Sebastes paucispinis*, which accounted for 32% of the total catch sampled (Table 5). Other species ranked in order of occurrence in the catch were white croaker, *Genyonemus lineatus*; walleye surfperch; sanddabs, *Citharichthys* spp.; and sand sole, *Psettichthys melanostictus*. In 1966 the order of occurrence was bocaccio; shiner perch, *Cymatogaster aggregata*; white croaker; and jacksmelt, *Atherinopsis Californiensis*,

(Miller & Odemar, 1968). The top seven species in the 1979 catch are presented by pier (Table 6) for comparative purposes.

### Skiff Fishing

The Monterey Coast Guard launch ramp was sampled 15 times and the Monterey marina ramp was sampled 8 times in 1979. A total of 451 skiff anglers was interviewed and 2404 fish were caught (Table 7). The combined catch rate of 1.25 fish per h (Table 7) is within the lower range of values reported by Miller and Odemar (1968) and indicates that 1979 was not a good year for the Monterey skiff fishery. In 1979 sanddabs spp. comprised 52% of the catch, blue rockfish, *Sebastes mystinus*, was second at 11%, and lingcod, *Ophiodon elongatus*, was third with 4.6% of the catch (Table 8). There were 49 species sampled in the Monterey skiff fishery, but sanddabs spp. and rockfishes spp. composed 85% of the catch. From 1959 to 1971 sanddabs spp. and blue rockfish were also the most common species taken in the Monterey skiff fishery (Miller and Geibel, 1973).

### Length Frequencies of Major Species

Few species were sampled in sufficient numbers to generate length frequencies; those that were are presented.

#### Barred Surfperch

Samplers measured 880 and 94 barred surfperch from Monterey Bay surf and pier fisheries respectively in 1979. The surf catch averaged 6 cm (2.4 in.) larger than the pier catch (Figure 2). Six modes are evident from the shore catch that indicate ages. The second, or peak mode (20 cm TL), represents 3-yr-old barred surfperch (Carlisle, Schott and Abramson, 1960).



### Walleye Surfperch

Walleye surfperch was the most common surfperch taken by pier anglers in 1979, and a total of 539 was measured. Only 57 walleye surfperch were measured from the surf anglers' catch, but the surf catch averaged 4 cm (1.6 in.) larger than the pier catch (Figure 2).

### Silver Surfperch

Samplers measured 59 and 44 silver surfperch from Monterey Bay surf and pier fisheries respectively in 1979. The average length of the surf catch was 3 cm (1.2 in.) larger than the pier catch; this same size distribution was evident for barred and walleye surfperch (Figure 2).

### White Surfperch

A total of 131 white surfperch, *Phanerodon furcatus*, was measured from the Monterey Bay pier anglers catch in 1979; they averaged 23 cm TL (9.1 in.) (Figure 2).

### Bocaccio

Nearly one-third of the observed pier catch was bocaccio. Samplers measured 9% of the observed catch; all of these were juveniles averaging 15 cm TL (5.9 in.) (Figure 2).

### Blue Rockfish

A total of 213 blue rockfish was measured from the Monterey skiff fishery in 1979. The average length was 27 cm TL (10.6 in.) (Figure 3) which corresponds to 6- or 7-yr-old blue rockfish (Miller & Geibel, 1973).

### Gopher Rockfish

A total of 99 gopher rockfish, *Sebastes carnatus*, was measured from the Monterey skiff fishery in 1979. The average length was 29.5 cm TL (11.6 in.) (Figure 3).

Lingcod

A total of 95 lingcod was measured from the Monterey skiff fishery in 1979. The average length was 56 cm TL (22.0 in.) (Figure 3) which corresponds to 3- or 4-yr-old lingcod (Miller & Geibel, 1973).

DISCUSSION

The data in this report suggest that there has been very little change in the overall species composition and catch rates of surf, pier, and skiff fisheries in Monterey Bay from the 1960's until the late 1970's. Sampling during 1979 was minimal, but most results agree with earlier studies.

The only change found during the study was the decline in catch rates at Santa Cruz, which was the best fishing pier in the 1960's. The catch rates at Monterey Wharf No. 2 improved to the point where it is now the best public pier in Monterey Bay. However, the best fishing pier is a small private pier in Moss Landing Harbor that was not sampled in earlier studies.

No attempt was made to estimate total catch or total effort, but it is probable that both catch and effort increased during the 1970's. At any rate, the bay's sport fisheries have responded well to fishing pressure this decade.

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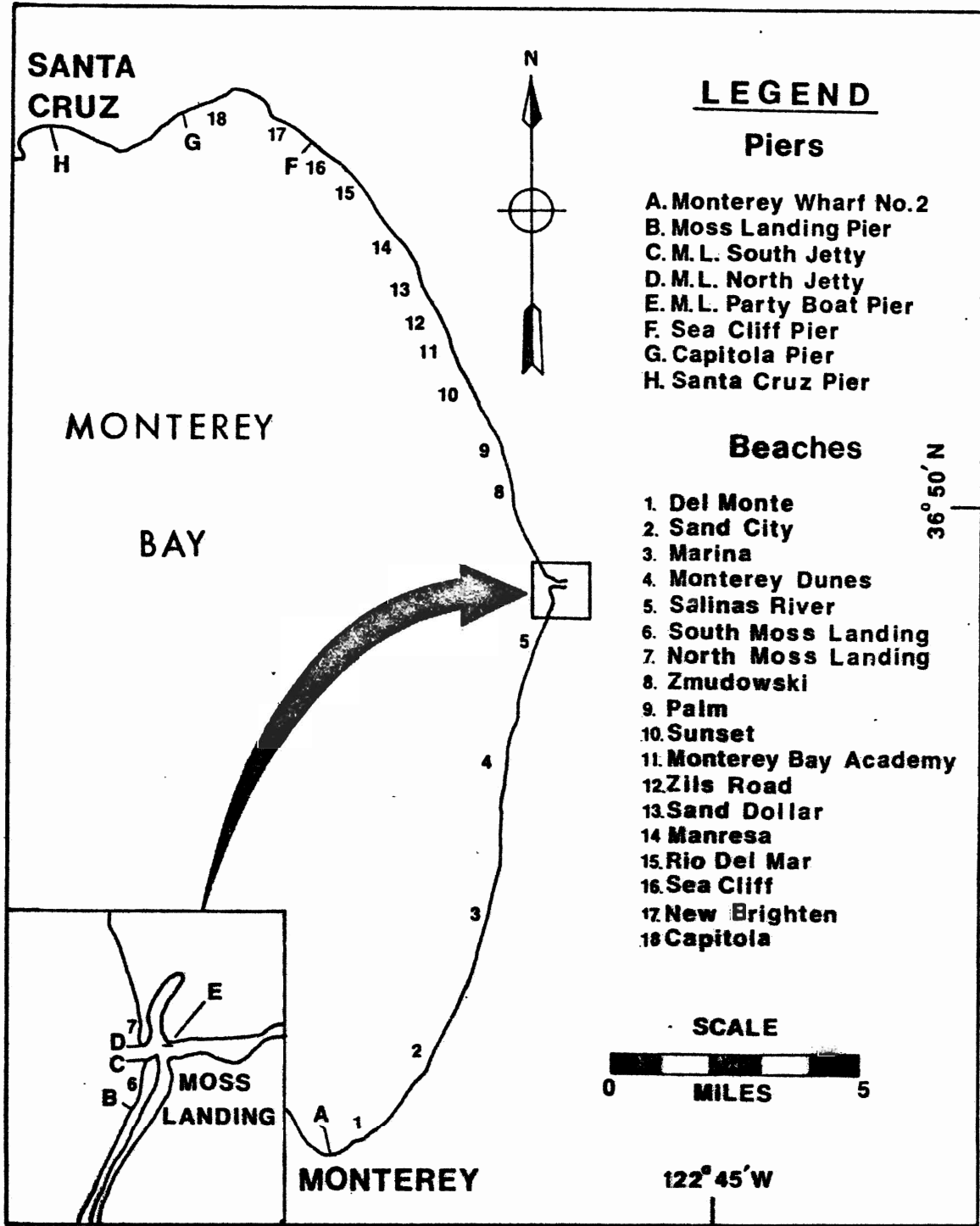


FIGURE 1. Sampling sites on Monterey Bay between Monterey and Santa Cruz.

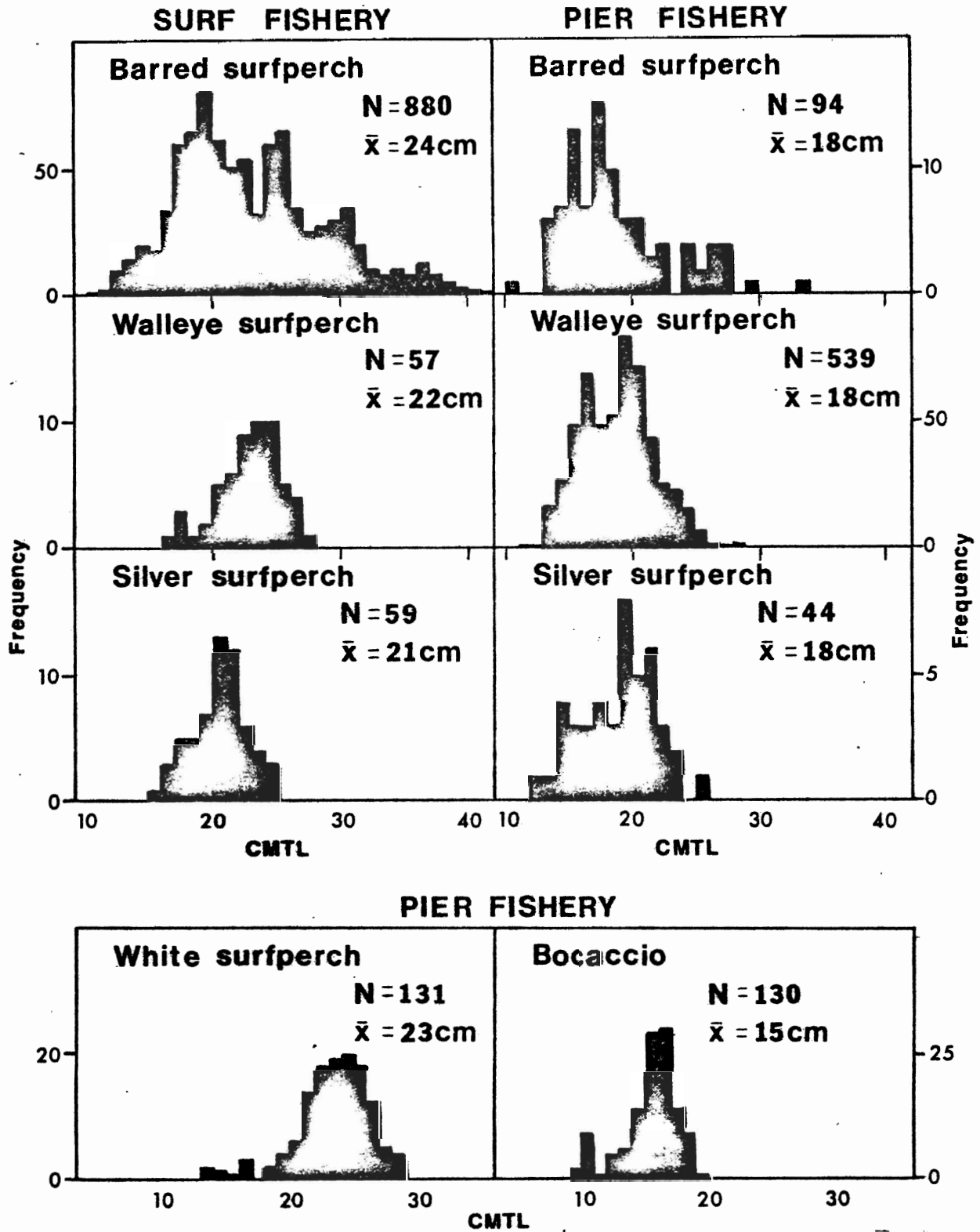


FIGURE 2. Length frequency histograms of major species sampled from Monterey Bay surf and pier fishing in 1979.

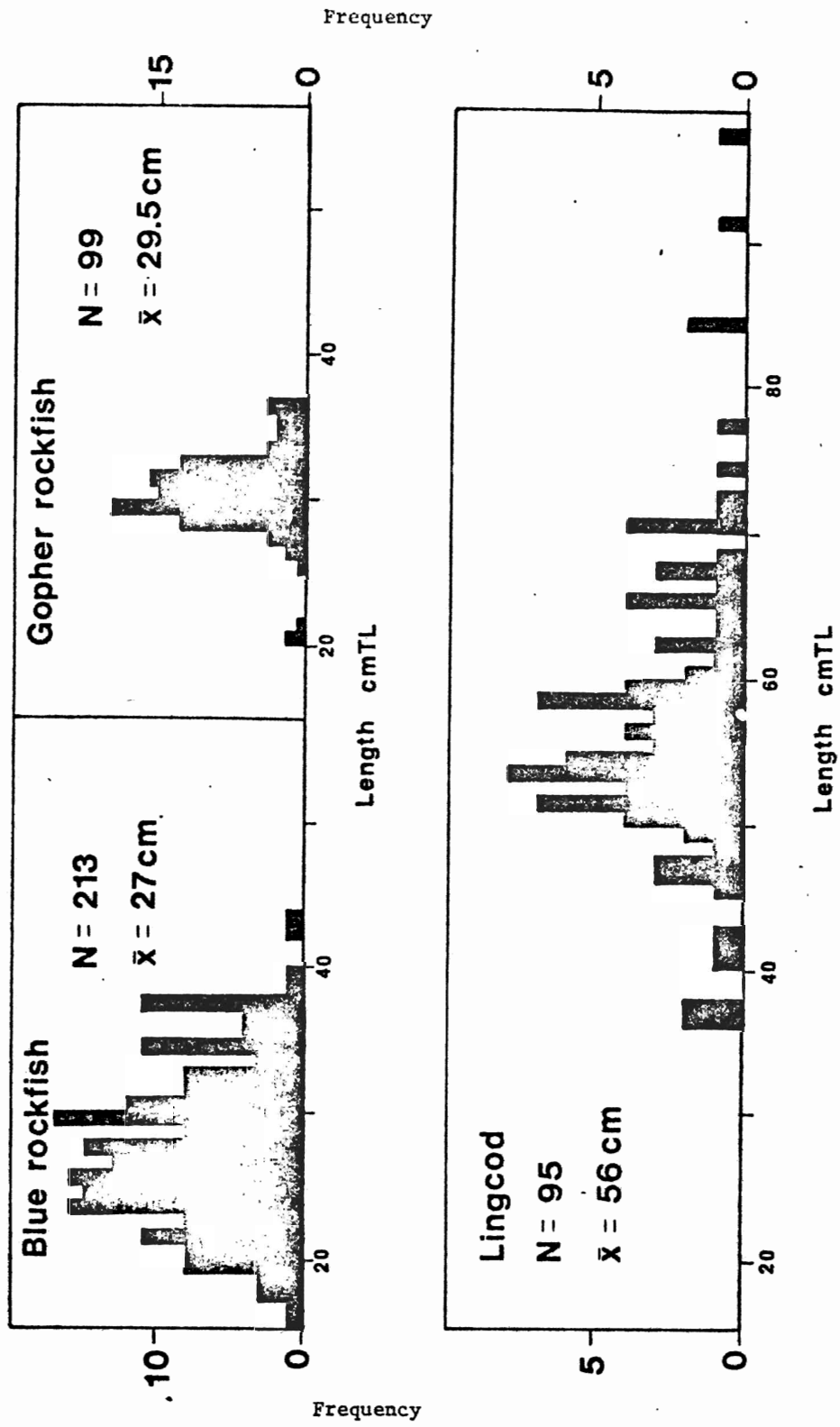


FIGURE 3. Length frequency histograms of major species sampled from the Monterey skiff fishery in 1979.

TABLE 1. List of Species Sampled from Monterey Bay Surf, Pier, and Skiff Anglers in 1979.

Scientific name	Common name	No. sampled
<i>Amphistichus argenteus</i>	barred surfperch	997
<i>A. koelzi</i>	calico surfperch	30
<i>A. rhodoterus</i>	redtail surfperch	31
<i>Anarrhichthys ocellatus</i>	wolf-eel	1
<i>Anoplopoma fimbria</i>	sablefish	3
<i>Atherinopsis californiensis</i>	jacksmelt	190
<i>Cymatogaster aggregata</i>	shiner perch	205
<i>Embiotoca jacksoni</i>	black surfperch	9
<i>E. lateralis</i>	striped surfperch	10
<i>Engraulis mordax</i>	northern anchovy	12
<i>Eopsetta jordani</i>	petrale sole	3
<i>Genyonemus lineatus</i>	white croaker	847
<i>Hexagrammos decagrammus</i>	kelp greenling	34
<i>Hyperprosopon argenteum</i>	walleye surfperch	626
<i>H. ellipticum</i>	silver surfperch	104
<i>Hypsurus caryi</i>	rainbow surfperch	19
<i>Lepidopsetta bilineata</i>	rock sole	5
<i>Leptocottus armatus</i>	staghorn sculpin	73
<i>Merluccius productus</i>	Pacific whiting	10
<i>Microgadus proximus</i>	Pacific tom cod	2
<i>Mola mola</i>	common mola	2
<i>Morone saxatilis</i>	striped bass	1
<i>Myliobatis californica</i>	bat ray	1
<i>Neoclinus uvinotatus</i>	one-spot fringehead	7
<i>Oncorhynchus tshawytscha</i>	king salmon	7
<i>Ophiodon elongatus</i>	lingcod	114
<i>Oxyjulis californica</i>	señorita	1
<i>Paralichthys californicus</i>	California halibut	2
<i>Parophrys vetulus</i>	English sole	9
<i>Peprilus simillimus</i>	Pacific butterfish	2
<i>Phanerodon atripes</i>	sharpnose surfperch	18
<i>P. furcatus</i>	white surfperch	132
<i>Platichthys stellatus</i>	starry flounder	27
<i>Pleuronichthys decurrens</i>	curlfin turbot	1
<i>Prionace glauca</i>	blue shark	2
<i>Psettichthys melanostictus</i>	sand sole	251
<i>Rhacochilus toxotes</i>	rubberlip surfperch	5
<i>R. vacca</i>	pile surfperch	19
<i>Salmo gairdneri</i>	steelhead trout	5
<i>Scomber japonicus</i>	Pacific mackerel	31
<i>Scorpaenichthys marmoratus</i>	cabezon	40
<i>Sebastes atrovirens</i>	kelp rockfish	40
<i>S. auriculatus</i>	brown rockfish	30
<i>S. carnatus</i>	gopher rockfish	103
<i>S. caurinus</i>	copper rockfish	32

Table 1 (continued).

Scientific name	Common name	No. sampled
<i>Sebastes chlorostictus</i>	greenspotted rockfish	4
<i>S. chrysomelas</i>	black and yellow rockfish	15
<i>S. constellatus</i>	starry rockfish	20
<i>S. elongatus</i>	greenstripe rockfish	1
<i>S. entomelas</i>	widow rockfish	15
<i>S. flavidus</i>	yellowtail rockfish	38
<i>S. goodei</i>	chilipepper rockfish	3
<i>S. levis</i>	cowcod	3
<i>S. melanops</i>	black rockfish	5
<i>S. miniatus</i>	vermilion rockfish	7
<i>S. mystinus</i>	blue rockfish	280
<i>S. nebulosus</i>	China rockfish	4
<i>S. paucispinis</i>	bocaccio rockfish	1465
<i>S. pinniger</i>	canary rockfish	56
<i>S. rastrelliger</i>	grass rockfish	7
<i>S. rosaceus</i>	rosy rockfish	28
<i>S. ruberrimus</i>	yelloweye rockfish	2
<i>S. serranoides</i>	olive rockfish	43
<i>Squalis acanthias</i>	spiny dogfish	30
<i>Synodus lucioceps</i>	California lizardfish	2
<i>Trachurus symmetricus</i>	jack mackerel	22
<i>Triakis semifasciata</i>	leopard shark	4
<i>Citharichthys</i> spp.	unidentified sanddab	1626
Cottidae	unidentified sculpin	11
Embiotocidae	unidentified surfperch	16
Osmeridae	unidentified smelt	1
Scorpaenidae	unidentified rockfish	190
Syngnathidae	unidentified pipefish	1
	unidentified fish	65
<b>Total</b>		<b>8057</b>



TABLE 2. Number of Days Sampled, Anglers Interviewed, and Catch per Hour  
Monterey Bay Beaches in 1979.

Beach	Number of days sampled	Total number of anglers present	Number anglers interviewed	Total hours fishing effort completed	Total fish caught	Catch per h
Del Monte	22	22	22	54	24	0.44
Sand City	22	73	73	153	58	0.38
Marina	22	62	57	112	158	1.41
Monterey Dunes	19	81	79	284	129	0.45
Salinas River	21	65	64	153	102	0.67
South Moss Landing	20	54	49	127	42	0.33
North Moss Landing	20	15	14	28	17	0.61
Zmudowski	18	33	33	88	55	0.62
Palm	21	70	68	165	229	1.39
Sunset	20	53	48	128	152	1.19
Monterey Bay Academy	17	5	5	9	27	3.00
Zils Road	17	17	16	24	38	1.58
Sand Dollar	17	4	2	5	9	1.80
Manresa	21	27	24	27	16	0.59
Rio Del Mar	21	79	66	179	100	0.55
Sea Cliff	19	24	22	37	16	0.43
New Brighton	16	13	13	14	4	0.28
Capitola	20	0	0	0	0	0
<b>Total</b>		697	655	1587	1176	0.71

TABLE 3. Species Composition of the Catch from 655 Monterey Bay Surf Anglers in 1979.

Species	Number caught
Anchovy, northern	1
Bass, striped	1
Croaker, white	57
Flounder, starry	3
Jacksmelt	17
Rockfish, grass	2
Sculpin, staghorn	1
Shark, leopard	1
Sole, sand	13
Surfperches:	
barred	898
calico	29
pile	5
redtail	27
silver	60
walleye	58
white	1
unidentified	2
<b>Total</b>	<b>1176</b>

TABLE 4. Number of Days Sampled, Anglers Interviewed, and Catch per Hour at Monterey Bay Piers and Jetties in 1979.

Pier	Number of days sampled	Total number of anglers present	Number anglers interviewed	Total hours fishing effort completed	Total fish caught	Catch per h
Monterey Wharf No. 2	18	351	339	777	1204	1.55
Moss Landing Pier	11	71	71	251	248	0.99
Moss Landing Partyboat Pier	8	36	36	105	256	2.44
Moss Landing South Jetty	22	118	116	207	162	0.78
Moss Landing North Jetty	22	282	266	575	274	0.48
Sea Cliff Pier	20	848	766	1880	1057	0.56
Capitola Pier	9	24	24	46	39	0.85
Santa Cruz Pier	23	1507	1426	3892	1237	0.32
<b>Total</b>		3237	3044	7733	4477	0.58

TABLE 5. Species Composition of the Catch of 3044 Anglers Interviewed at Monterey Bay Piers and Jetties in 1979.

Species	Number caught	Species	Number caught
Anchovy, northern	11	Señorita	1
Bat ray	1	Shark, leopard	3
Butterfish, Pacific	2	Smelt, true	1
Cabazon	16	Sole, English	9
Croaker, white	783	Sole, petrale	1
Dogfish, spiny	1	Sole, sand	237
Eel, wolf	1	Surfperches:	
Flounder, starry	23	barred	99
Fringehead, one-spot	7	black	7
Greenling, kelp	1	calico	1
Halibut, California	1	pile	13
Jacksmelt	168	rainbow	18
Lingcod	2	redtail	4
Lizardfish, California	2	rubberlip	5
Mackerel, jack	6	sharpnose	18
Mola mola	1	shiner	205
Rockfishes:		silver	44
blue	21	striped	8
black	2	walleye	568
bocaccio	1455	white	131
brown	28	unidentified	14
grass	4	Tom cod, Pacific	2
kelp	12	Trout, steelhead	5
copper	2	Turbot, curlfin	1
yellowtail	1	Unidentified:	
unidentified	75	sculpin	11
Sanddab	371	pipefish	1
Sculpin, staghorn	72	fish	1
		<b>Total</b>	<b>4477</b>

TABLE 6. Rank of Top Seven Species Sampled at Monterey Bay Piers and Jetties in 1979.

Monterey Wharf No. 2		%	Moss Landing Pier		%
1.	White croaker	40	1.	Bocaccio	44
2.	Sanddabs spp.	23	2.	Walleye surfperch	16
3.	Bocaccio	15	3.	Silver Surfperch	10
4.	Sand sole	8	4.	Sanddabs spp.	9
5.	Jacksmelt	6	5.	Barred surfperch	6
6.	Walleye surfperch	3	6.	White croaker	4
7.	Sharpnose surfperch	1	7.	Jacksmelt	1
Moss Landing Partyboat Pier		%	Moss Landing South Jetty		%
1.	Walleye surfperch	38	1.	Walleye surfperch	42
2.	Jacksmelt	20	2.	White croaker	13
3.	Bocaccio	18	3.	Jacksmelt	12
4.	Brown rockfish	8	4.	White surfperch	11
5.	Shiner surfperch	5	5.	Sand sole	7
6.	White surfperch	3	6.	Striped surfperch	4
7.	Staghorn sculpin	2	7.	Pile surfperch	3
Moss Landing North Jetty		%	Sea Cliff Pier		%
1.	Rockfish spp.	27	1.	Bocaccio	59
2.	Bocaccio	21	2.	Walleye surfperch	15
3.	Staghorn sculpin	12	3.	Barred surfperch	5
4.	White surfperch	9	4.	White croaker	5
5.	Sand sole	7	5.	Shiner surfperch	4
6.	Sanddabs spp.	5	6.	Sand sole	3
7.	Walleye surfperch	3	7.	Staghorn sculpin	2
Capitola Pier		%	Santa Cruz Pier		%
1.	Bocaccio	36	1.	Bocaccio	34
2.	White croaker	23	2.	White croaker	17
3.	Barred surfperch	18	3.	Walleye surfperch	13
4.	Walleye surfperch	13	4.	Shiner surfperch	11
			5.	Sand sole	6
			6.	White surfperch	4
			7.	Sanddabs spp.	3

TABLE 7. Number of Days Sampled, Anglers Interviewed and Catch per Hour by Monterey Skiff Anglers in 1979.

Beach	Sampled	Number anglers interviewed	Hours fishing effort sampled	Total catch	Catch per h
Monterey Coast Guard Ramp	15	364	1529	2104	1.38
Monterey Marina Ramp	8	87	386	300	0.78
Total		451	1915	2404	1.25

TABLE 8. Species Composition of the Catch from 451 Monterey Bay Skiff Anglers in 1979.

Species	Number	Species	Number
Cabazon	24	rosy	28
Croaker, white	7	starry	20
Dogfish, spiny	29	vermilion	7
Flounder, starry	1	widow	15
Greenling, kelp	33	yelloweye	2
Halibut, California	1	yellowtail	37
Jacksmelt	5	unidentified	115
Lingcod	112	Sablefish	3
Mackerel, jack	16	Salmon, king	7
Mackerel, Pacific	31	Sanddab spp.	1255
Mola mola	1	Shark, blue	2
Rockfishes:		Sole, petrale	2
blue	259	Sole, rock	5
black	3	Sole, sand	1
black & yellow	15	Surfperches:	
bocaccio	10	black	2
brown	2	pile	1
canary	56	rainbow	1
chilipepper	3	striped	2
China	4	Whiting, Pacific	10
copper	30	Unidentified:	
cowcod	3	flatfish	4
gopher	103	shark	9
grass	1	fish	51
greenspot	4		
greenstripe	1		
kelp	28		
olive	43		
		<b>Total</b>	<b>2404</b>