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Changes in Relative Abundance and Size Composition of Sablefish in the Coastal Waters of Southeast Alaska 1978-1980

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COMPOSITION OF SABLEFISH IN THE COASTAL
WATERS OF SOUTHEAST ALASKA,
1978-80

by

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INTRODUCTION

The sablefish (Anoplopoma fimbria) stock(s) off Alaska, Washington, Oregon, and California are one of the most geographically extensive and highly valued groundfish resources of the United States. This resource was most intensively harvested by foreign fisheries (primarily those of Japan) prior to 1977. In that year the U.S. Fishery Conservation and Management Act (FCMA) of 1976 went into effect and provided the means for U.S. management of foreign fisheries conducted within the U.S. 200-mile zone.

During the 1960's and 70's prior to enactment of the FCMA, U.S. scientists monitored sablefish catch records and, with evidence of declining stock condition during the late 1960's, negotiated for reduced foreign catches. However, catches of sablefish by foreign fisheries in the northeastern Pacific Ocean, Bering Sea, and Aleutian Islands area increased from about 38,000 metric tons (t) in 1968 to over 57,000 t in 1972 and ranged from 36,000 to 48,000 t between 1973 and 1976 (Hughes 1979). Detailed analysis of data on sablefish catch and fishing effort indicated that the most severe reduction of sablefish stock abundance had occurred in the southeast Alaska area (Low 1977). Consequently, after FCMA was enacted the North Pacific Fishery Management Council (established by the Act) halted foreign fisheries from longlining for sablefish off southeast Alaska on 2 July 1978. This action was taken to rebuild the resource and enhance the smaller but viable-small vessel U.S. fishery operating in that area.

With the exclusion of foreign longline fishing in southeast Alaska, the status of sablefish stock conditions could no longer be determined from the catch and effort data of the foreign fisheries. Thus, in order to monitor changes in the abundance and biological condition of the sablefish resource off southeast Alaska, the NMFS Northwest and Alaska Fisheries Center initiated a survey of sablefish abundance in that area during June-July 1978 and repeated it in 1979

and 1980. This report is a summary of the results of those surveys and provides information on annual changes in sablefish stock conditions in coastal southeast Alaska.

LANDINGS BACKGROUND

The general history of southeast Alaska sablefish catches during 1966-77 and associated Japanese longline catch and effort data which were previously used to monitor changes in that area's sablefish resource are summarized in Table 1.

In order to correlate recent harvest levels to changes in sablefish abundance as determined by the 1970, 1979, and 1980 abundance index surveys described within, 1977-80 southeast Alaska landings have been compiled for smaller geographic areas by 12 month periods between each year's assessment survey (Table 2). Landings from fishing grounds in the northern half of coastal southeast Alaska included areas where the Cape Cross and Cape Ommaney abundance index surveys were conducted. Landings from fishing grounds in the southern half of coastal southeast Alaska include areas where the Cape Addington and Cape Muzon abundance index surveys were conducted (Figure 1). Landings are also presented from the northern and southern management districts within inside waters of southeast Alaska where no abundance index sites were surveyed. While the abundance index studies reported here apply specifically to coastal southeast Alaska waters, associated sablefish tagging studies involving over 14,000 fish from coastal waters and over 17,000 fish from inside waters indicated that considerable exchange of fish occurs between these areas. Thus, there is reason to believe that changes monitored in the coastal resource may also be indicative of changes which have occurred in the inside waters of southeast Alaska.

Table 1. Summary of southeast Alaska sablefish catches 1966-77 and Japanese longline catch and effort data previously used by U.S. scientists to monitor annual changes in sablefish abundance (Low et al. 1980) .

Year	Total catch (t)	Japanese longline catch (t)	Japanese Longline effort (10 hachi units)	Japanese CPUE (t/10 hachi units)
1966	19	-	-	-
1967	862	217	720	0.301
1968	7,224	6,364	25,958	0.245
1969	7,064	6,169	26,835	0.230
1970	7,888	6,805	29,681	0.229
1971	8,695	7,737	37,980	0.204
1972	11,012	9,311	44,844	0.208
1973	6,527	5,949	29,327	0.203
1974	7,377	6,574	33,653	0.195
1975	6,358	5,604	30,417	0.184
1976	6,648	5,489	28,717	0.191
1977	3,730	3,586	25,749	0.139

Table 2.--Sablefish landings, both domestic and foreign, taken from the coastal and inside waters of southeast Alaska from June 1977 through May 1980.1/

<u>June 1977 - May 1978</u>	<u>Catch</u>	
	<u>Weight (t)</u>	<u>Percentage</u>
<u>Domestic</u> ^{2/}		
(a) Coastal waters, Cape Spencer to Cape Ommaney	864.6	26
(b) Coastal waters, Cape Ommaney to Cape Muzon	76.6	2
(c) Inside waters, northern management region	353.6	10
(d) Inside waters, southern management region	58.2	2
Foreign (all coastal waters, all gear)	<u>2,040.7</u>	<u>60</u>
Total	3,393.7	100
<u>June 1978 - May 1979</u>		
<u>Domestic</u> ^{2/}		
(a) Coastal waters, Cape Spencer to Cape Ommaney	1,069.4	59
(b) Coastal waters, Cape Ommaney to Cape Muzon	70.7	4
(c) Inside waters, northern management region	521.1	29
(d) Inside waters, southern management region	129.6	7
Foreign (all coastal waters, all gear)	<u>21.4</u>	<u>1</u>
Total	1,812.2	100
<u>June 1979 - May 1980</u>		
<u>Domestic</u> ^{2/}		
(a) Coastal waters, Cape Spencer to Cape Ommaney	1,139.6	44
(b) Coastal waters, Cape Ommaney to Cape Muzon	501.0	19
(c) Inside waters, northern management region	737.4	29
(d) Inside waters, southern management region	106.8	4
Foreign (all coastal waters, trawl)	<u>97.6</u>	<u>4</u>
Total	2,582.4	100

1/ Data provided by the Alaska Department of Fish and Game, Juneau.

2/ Estimated by conversion of dressed weight to round weight.
Dressed weight was considered to be 70% of round weight.

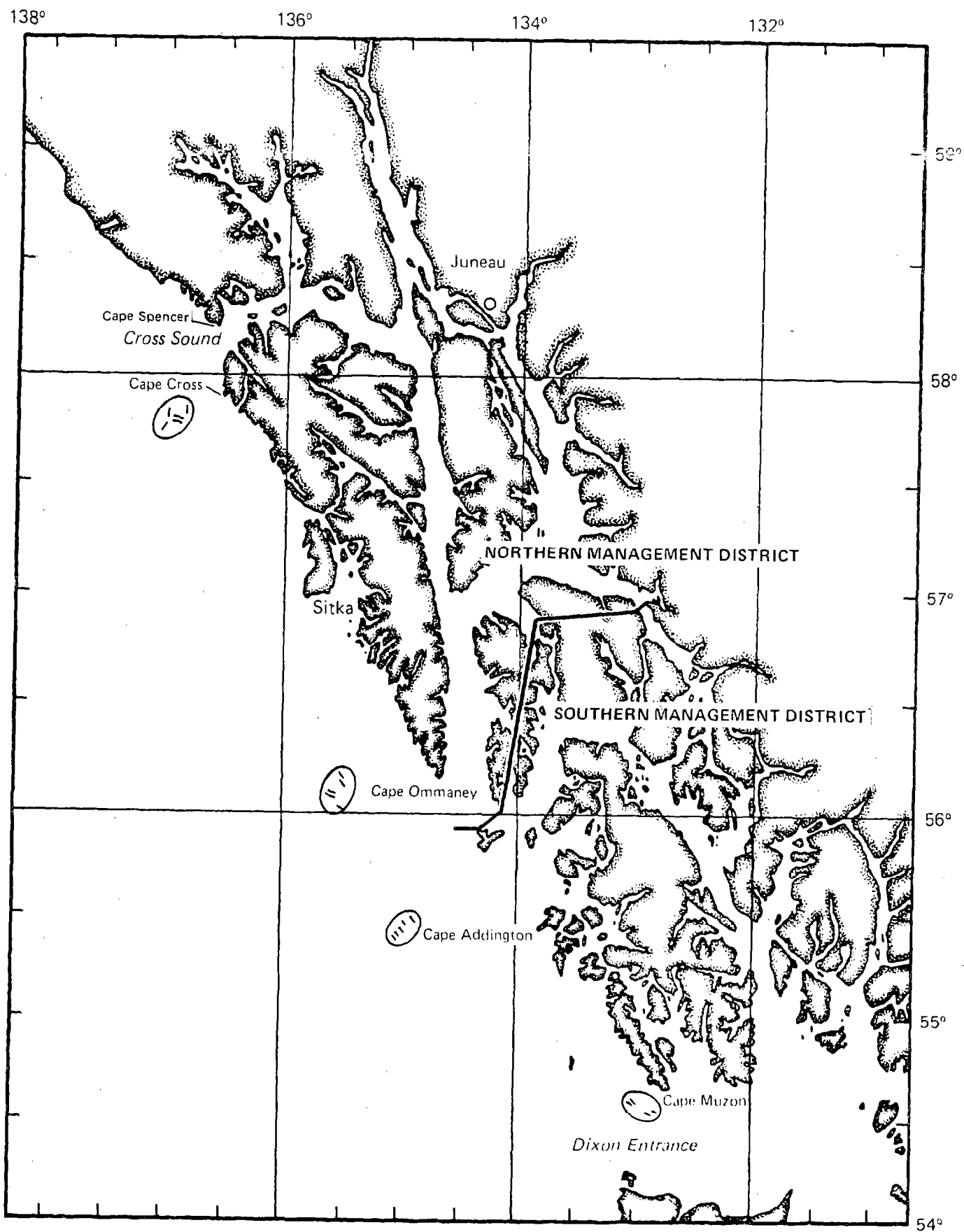


Fig. 1.--Locations of sablefish abundance index sites surveyed off south-east Alaska during 1978, 1979 and 1980.

SURVEY METHODS AND GEAR

The fishery assessment technique employed in this study is known as "abundance indexing." Using standardized fishing procedures and sablefish trap gear, annual changes in relative abundance and size composition of sablefish are monitored at specific sites located within extensive fishing grounds. Since traps are a passive fishing gear, their sphere of influence while on bottom is unknown. Absolute fish abundance or biomass cannot be calculated from trap catches as with the "area swept" technique applied to trawl catch data. The basic premise of this abundance index technique is that changes in the absolute number and the sizes of sablefish in the survey area are reflected directly by changes in annual trap catches.

In general, changes in fishable stock abundance are due primarily to loss by harvest and natural mortality and to increases from recruitment of juveniles onto the fishing grounds. The abundance index can be applied to reflect changes in the marketable-size and premarketable-size portions of the stock. This not only allows us to assess changes that fishing and natural mortalities have caused to older fish, but also helps us to anticipate the relative magnitude of prerecruit year classes as they grow through their pre-marketable years on the fishing grounds.

Adjustments to harvest levels can be made as trends in the abundance index, the annual percentage change in survey catch levels, become apparent. As an example, if the surveys indicated a 20% increase in the abundance of marketable-size fish between the 1979 and 1980 surveys, and prerecruits were of equal strength for both years, harvest levels set for 1901 might be increased 20% above the harvest taken between the 1979 and 1980 surveys. This would maintain the 1979 to 1980 level of abundance. Where stock recovery is desirable, a lesser increase in harvest may be advisable.

At present, four fishing sites on the southeast Alaska coastal fishing grounds near Cape Cross, Cape Ommaney, Cape Addington, and Cape Muzon are surveyed annually (Figure 1). Three years of survey data in a series from 1978-80 are available for the first three sites. Data are complete for the 1979 and 1980 surveys at the fourth site near Cape Muzon. All research was conducted from the NOAA research vessel John N. Cobb during the period May 25 to July 15.

Sampling gear consisted of five strings of sablefish traps (Figure 2). Each string held 10 identical metal frame rectangular, collapsible traps measuring 34 in x 34 in x 8 ft. Traps were covered with 3-1/2 in mesh white nylon web and equipped with a single entrance tunnel constructed of green 2-1/2 in mesh green nylon web. Each trap was baited with 2 pounds of chopped Pacific herring held in perforated plastic jars.

Previous studies have indicated that catch rates of sablefish traps decrease with increasing soak time (Hughes et al. 1970). Therefore, fishing time was standardized by use of corrodible magnesium timed-release devices which were calibrated to close trap entrances via a noose arrangement after a 24 + 1 hour period (Figure 3). Thus, when gear could not be hauled on schedule due to weather or operational problems, effective trap fishing time was standardized. Standardization is critical in determining annual changes in resource condition. While most southeast Alaskan commercial sablefish fishermen prefer longline gear for its versatility for varying seabed conditions, for research purposes, longline effort is difficult to standardize. Variations in catch rates can occur due to bait loss from hooks, incidental catches which occupy hooks, and the general problem of hauling gear after a standardized fishing period. Because the effective fishing time of these traps can be easily standardized and because they are very selective in capturing sablefish, they were used as the sampling tool rather than longline gear.

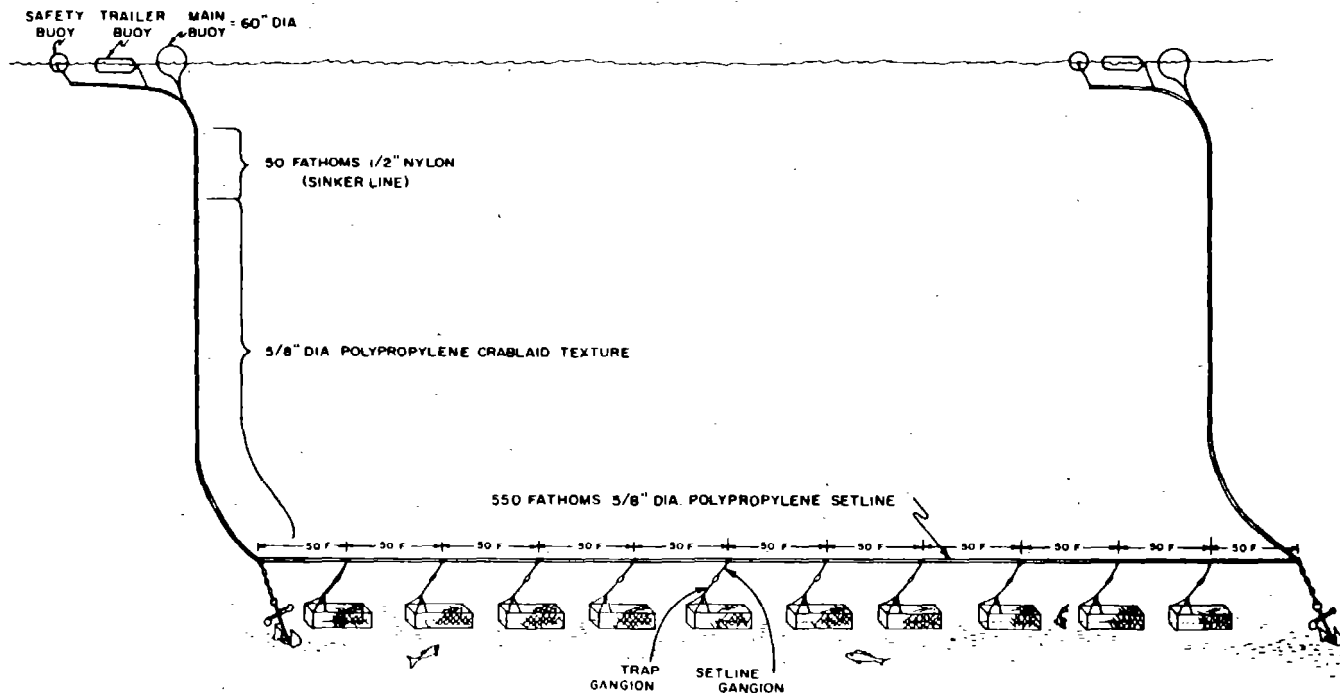
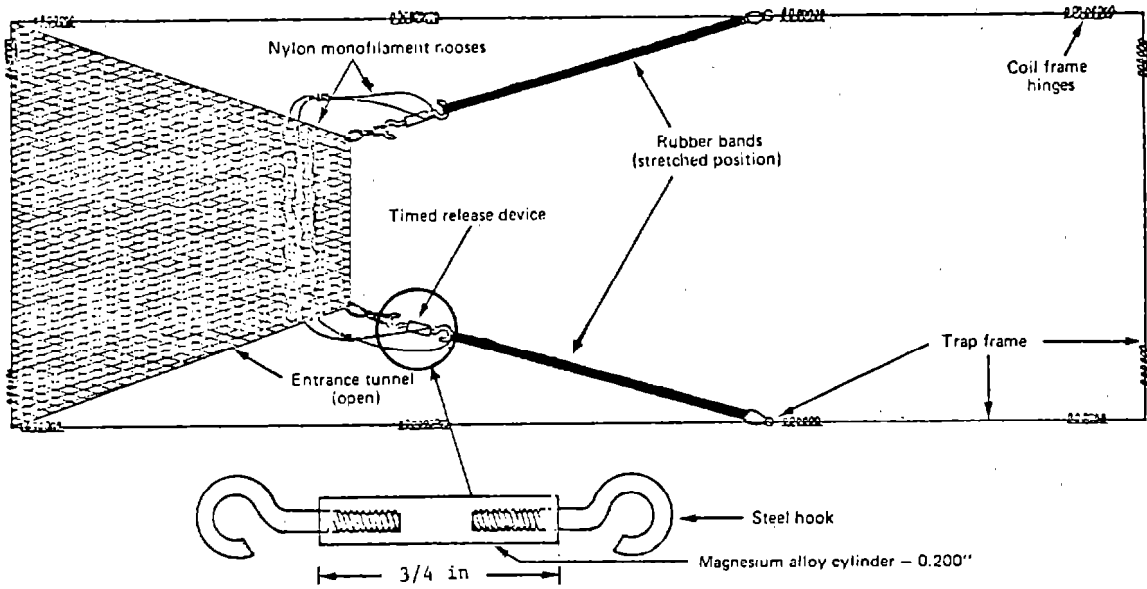


Fig. 2.--A pictorial view of a string of trap gear used in the sablefish abundance index studies.

Schematic sablefish trap tunnel open and armed with timed release devices (top view)



Schematic sablefish trap tunnel in closed position after timed release devices have disintegrated (top view)

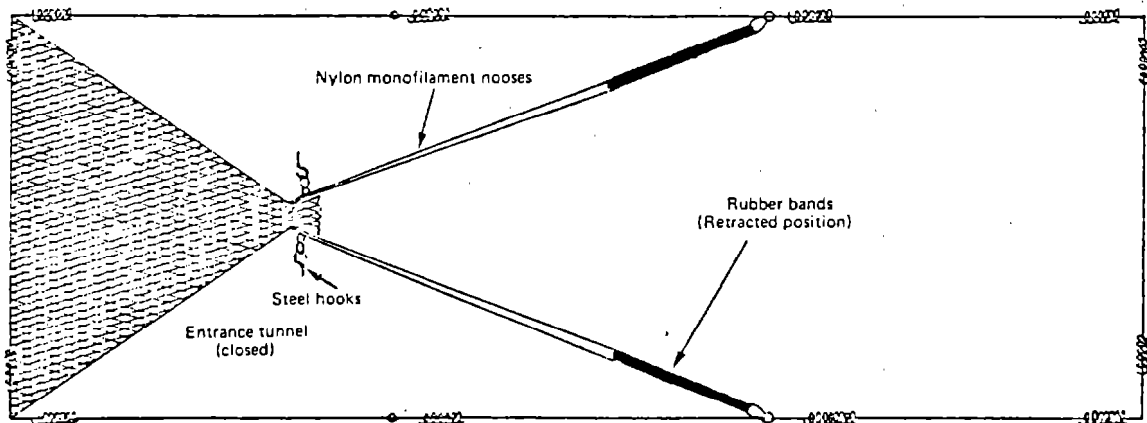


Fig. I.--Diagrams of sablefish trap tunnels, open and armed with timed release devices, and closed with the nooses pulled tight.

During each year's survey, fishing strategy remained the same. At the Cape Cross, Cape Ommaney, and Cape Addington sites., a lo-trap string of gear was located near depths of 150, 225, 300, 375, and 450 fathom (fm). Each string was set and hauled five times resulting in 250 trap lifts per site. Although sampling at depths of 150-450 fm is desirable as it encompasses most of the depth range where the resource and fishery occurs, topography and sea-bed conditions at Cape Muzon limited that site's depth coverage to 205-231 fm. At Cape Muzon, four strings of gear were set and hauled four times for a total effort of 160 trap lifts. Locations of strings of gear were duplicated as nearly as possible employing Loran-C, radar, and depth sounder as navigational aids.

Data collected during the 3 years of research included:

1. Number of sablefish captured in each trap;
2. Number and estimated weight of other species captured in each trap;
3. Fork lengths of all sablefish;
4. Biological data to support life history studies which include length-weight relationships, age indicators, sex ratio, and sexual maturity;
5. Tissue samples for stock identification studies;
6. Sablefish not required for biological samples were tagged and released in support of on-going coastwide migration studies.

Survey catch data has been prepared in tables which summarize the numbers of sablefish caught per 10 trap string by replicate set and depth at each site during the 1978 versus 1979 surveys and the 1979 versus 1980 surveys. Also indicated is the percentage change in abundance between years sampled. Annual changes in the length composition of the marketable-size and prerecruit-size (premarketable-size) sablefish captured at each site are shown in figures. Because all sablefish were measured each year at each site, the length compositions are a direct reflection of changes in abundance by fish size.

RESULTS

Table 3 summarizes the percentage changes in coastal southeast Alaska sablefish abundance determined by catches at the abundance index sites during the 1978, 1979, and 1980 survey periods. Numbers of fish caught annually at each site and the annual percentage changes in abundance are presented for total sablefish (all sizes), marketable-size sablefish, and prerecruit-size sablefish 1/

The survey data from the combined Cape Cross, Cape Ommaney, and Cape Addington sites indicate substantial improvement in sablefish stock abundance between 1978 and 1979; total sablefish increased 38%, marketable-sized sablefish increased 30%, and prerecruits increased 85%. However, between 1979 and 1980 at these same three sites, the total sablefish abundance increased only 5%, which was caused by almost equal increases in marketable and in prerecruit fish. Data from the four sites combined indicated the total sablefish abundance increased 6% between 1979 and 1980. That increase was due to a 24% increase in prerecruit abundance and a 3% increase in the number of marketable-size fish.

The reduced abundance of the marketable-size, portion of the coastal sablefish population in the northern management district results from 13% and 21% decreases in marketable-size sablefish at the Cape Cross site in 1978-79 and 1979-80, respectively, and a 26% decrease at the Cape Ommaney site during 1979-80. As noted in the landings background presented in Table 2, 88% (May 1978-June 1979) and 73% (May 1979-June 1980) of the total southeast Alaskan

1/ The southeast Alaska fishing industry regards marketable-sized sablefish as being 3 lbs or heavier dressed weight. This coincides with a fork length measurement of 57 cm or greater. Those fish measuring less than 57 cm are classified as prerecruits which have not entered the fishery.

Table 3.--Numbers of total, marketable-size and prerecruit-size sablefish captured at S.E. Alaska abundance index sites during the 1978, 1979, 1980 surveys. Percent change in numbers of sablefish between 1978 and 1979, 1979 and 1980, and the overall percentage change between 1978 and 1980 are indicated by site and size category.

Site/year	Total sablefish			Marketable-size			Prerecruit-size		
	Number	Annual change (%)	1978-80 change (%)	Number	Annual change (%)	1978-80 change (%)	Number	Annual change (%)	1978-80 change (%)
Cape Cross									
1978	513	- 8 } + 7 }	- 1	459	- 13 } - 21 }	- 31	54	+ 37 } +158 }	+248
1979	473			399			74		
1980	506			315			191		
Cape Ommaney									
1978	475	+ 80 } - 18 }	+ 48	417	+ 91 } - 26 }	+ 42	58	+ 5 } + 84 }	+ 93
1979	857			796			61		
1980	703			591			112		
Cape Addington									
1978	540	+ 45 } + 29 }	+ 87	421	+ 17 } + 70 }	+ 99	119	+146 } - 41 }	+ 45
1979	785			492			293		
1980	1,011			838			173		
Cape Muzon									
1979	754	+ 10	no data	692	+ 1	no data	62	+113	no data
1980	832			700			132		
Cape Cross Cape Ommaney Cape Addington									
1978	1,528	+ 38 } + 5 }	+ 45	1,297	+ 30 } + 3 }	+34	231	+ 85 } + 11 }	+106
1979	2,115			1,687			428		
1980	2,220			1,744			476		
Cape Cross Cape Ommaney Cape Addington Cape Muzon									
1979	2,869	+ 6	no data	2,379	+ 3	no data	490	+ 24	no data
1980	3,052			2,444			608		

domestic landings resulted from catches in the Cape Spencer-Cape Ommaney area (northern management district) which includes the Cape Cross and Cape Ommaney abundance index site areas.

While the Table 3 survey data indicates recent increases in southeast Alaska's marketable-size coastal sablefish population, the coastal prerecruit population has increased markedly since 1978. This increased abundance of prerecruit fish was first detected in the 1979 survey and from aging studies is believed to be the 1975 and particularly the 1976 year classes. Figure 4 compares the size composition of the coastal sablefish population obtained from the combined Cape Cross, Cape Ommaney, and Cape Addington site catches in 1978 and 1979. The strong presence of prerecruit fish with a modal length of 46 cm noted in 1979 was again detected during the 1980 survey at these sites as prerecruit fish with a modal length of 50 cm (Figure 5). Aging studies conducted from the prerecruit fish sampled in 1980 at these sites indicate that the 1976 year class appears to represent much of the increased prerecruit strength noted as 45-52 cm fish.

The abundance of the 1975 and 1976 year classes noted in the 1979 and 1980 surveys as 40-53 cm fish greatly exceeded the abundance of similar-size prerecruit fish noted in the 1978 survey. Size composition data from the combined four coastal sites (Figure 6) indicated that the low abundance of 53-61 cm fish noted in 1980 probably resulted from moderately weak 1973 and weak 1974 year classes of fish. This indicated that relatively few sablefish would grow into the marketable-sized population during 1980 and 1981 and that the more abundant 1975 and 1976 year classes would not grow to marketable size until late 1981 or 1982.

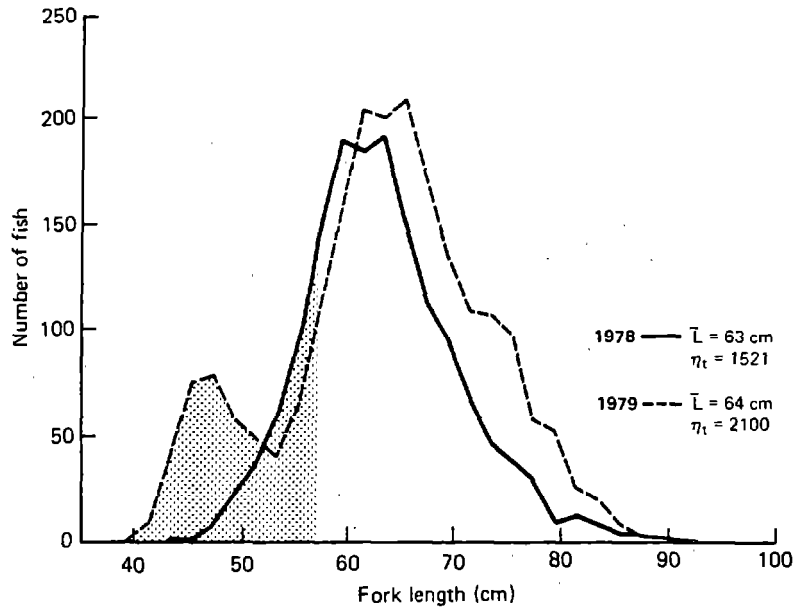


Figure 4.--length compositions of sablefish captured at the Cape Cross, Cape Ommaney and Cape Addington abundance index sites, 1978-79. Prerecruits (47 cm) are represented by the shaded area.

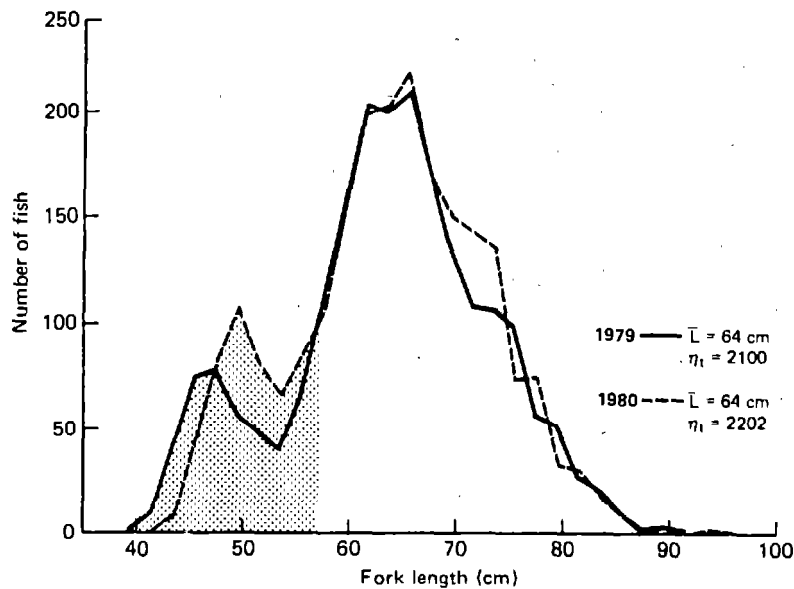


Figure 5.--Length compositions of sablefish captured at the Cape Cross, Cape Ommaney and Cape Addington abundance index sites, 1979-80. Prerecruits (<57 cm) are represented by the shaded area.

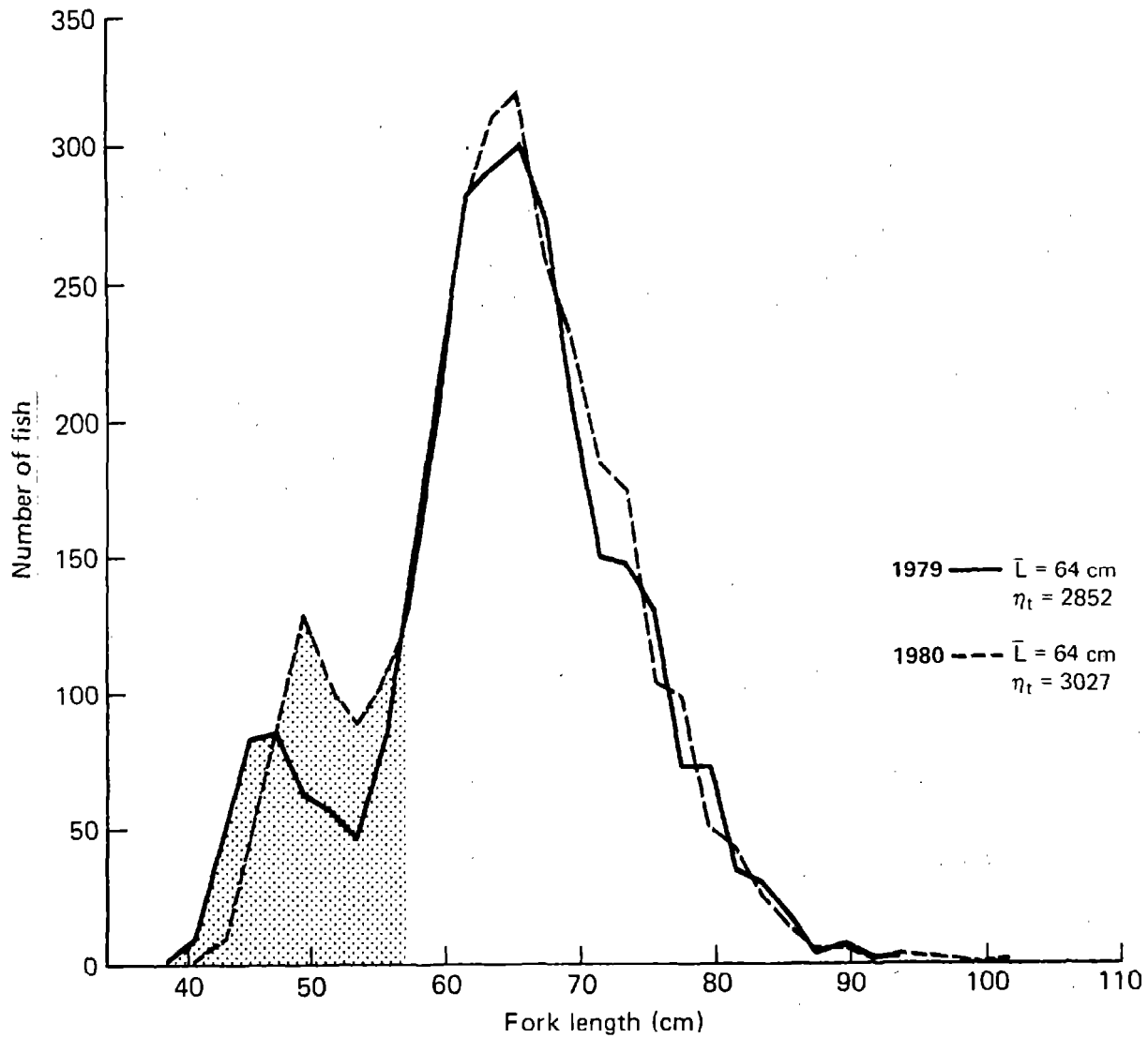


Figure 6. --Length compositions of sablefish captured at the Cape Cross, Cape Ommaney, Cape Addington and Cape Muzon abundance index sites, 1979-80. Prerecruits (<57 cm) are represented by the shaded area.

Coastal southeast Alaska sablefish survey catch and size composition data previously summarized in Table 3 and Figures 4-6 are presented in detail for each of the four abundance index sites in Tables 4-7 and Figures 7-13.

DISCUSSION

In 1977 when the U.S. Fishery Conservation and Management Act of 1976 became effective, sablefish resources in the Bering Sea, Gulf of Alaska, including southeast Alaska and the Pacific west coast, were regarded as being in a state of low and declining abundance due primarily to excessive foreign fishing (mostly Japanese) during 1968-77 (Low 1977 and Hughes 1979). In the Gulf of Alaska region, which includes coastal southeast Alaska, Low (1977) determined that the sablefish catch per boat-day by Japanese longliners steadily decreased from 10,800 kg in 1971 to 3,660 kg in 1977. He also determined that in coastal southeast Alaska the average Japanese longline catch per unit of effort steadily decreased from 0.301 t per 10 hachi of longline gear in 1967 to 0.139 t per 10 hachi of longline gear in 1977 (Table 1). Thus, it appears well established that the sablefish abundance index studies reported here have been conducted on a population whose abundance declined substantially during the 1966-77 period.

Results of the 1978-80 sablefish abundance index surveys indicate that the decreasing stock condition in coastal southeast Alaska noted from the Japanese catch and effort data from 1966-77 had been halted, and stock abundance (all sizes of fish) had increased 450 between 1978 and 1980. While this percentage increase in abundance is substantial, it occurred from a low base level of abundance relative to pre-1966 conditions. Furthermore, 380 of the increased abundance (all sizes of fish) occurred between 1978 and 1979 survey periods when the coastal harvest totaled 1,161 t of sablefish.

Table 4.--Numbers of total sablefish and marketable-size sablefish (in parenthesis) captured by depth and set at the Cape Cross site during the 1978, 79, and 80 abundance index surveys. Each catch was obtained from one string of 10 sablefish traps fished for 24 hours.

Year and set	Depth (fathom)					Total catch
	150	225	300	375	450	
1978	----- Number of fish -----					
1	0 (0)	22 (14)	23 (20)	8 (7)	15 (12)	68 (53)
2	3 (1)	4 (3)	28 (24)	30 (27)	16 (16)	81 (71)
3	0 (0)	11 (10)	36 (33)	38 (35)	55 (52)	140 (130)
4	1 (1)	12 (11)	34 (31)	35 (32)	31 (31)	113 (106)
5	0 (0)	7 (7)	15 (13)	33 (29)	56 (50)	111 (99)
TOTAL	4 (2)	56 (45)	136 (121)	144 (130)	173 (161)	513 (459)
MEAN	1 (<1)	11 (9)	27 (24)	29 (26)	35 (32)	103 (92)
1979						
1	4 (0)	8 (7)	36 (28)	26 (25)	26 (24)	100 (84)
2	3 (1)	20 (9)	31 (26)	37 (33)	14 (14)	105 (83)
3	4 (2)	10 (9)	37 (28)	32 (28)	23 (21)	106 (88)
4	4 (3)	16 (10)	18 (15)	29 (27)	25 (25)	92 (80)
5	5 (3)	11 (10)	17 (15)	17 (16)	20 (20)	70 (64)
TOTAL	20 (9)	65 (45)	139 (112)	141 (129)	108 (104)	473 (399)
MEAN	4 (2)	13 (9)	28 (22)	28 (26)	22 (21)	95 (80)
1980						
1	30 (16)	5 (4)	20 (11)	20 (15)	13 (12)	88 (58)
2	13 (6)	4 (2)	34 (22)	14 (11)	19 (19)	84 (60)
3	33 (2)	24 (12)	32 (14)	22 (18)	17 (17)	128 (63)
4	16 (1)	13 (8)	34 (19)	24 (22)	25 (22)	112 (72)
5	11 (0)	9 (4)	31 (19)	19 (16)	24 (23)	94 (62)
TOTAL	103 (25)	55 (30)	151 (85)	99 (82)	98 (93)	506 (315)
MEAN	21 (5)	11 (6)	30 (17)	20 (16)	20 (19)	101 (63)

Table 5.--Numbers of total sablefish and marketable-size sablefish (in parenthesis) captured by depth and set at the Cape Ommaney site during 1978, 79, and 80 abundance index surveys. Each catch was obtained from one string of 10 sablefish traps fished for 24 hours.

Year and set	Depth (fathom)					Total catch
	150	225	300	375	450	
----- Number of fish -----						
1978						
1	3 (2)	6 (5)	12 (10)	42 (40)	24 (19)	87 (76)
2	6 (6)	8 (8)	22 (19)	32 (23)	35 (32)	103 (88)
3	6 (6)	9 (9)	27 (24)	26 (19)	47 (41)	115 (99)
4	3 (3)	15 (15)	15 (13)	34 (29)	35 (28)	102 (88)
5	9 (9)	4 (4)	20 (20)	25 (25)	10 (8)	68 (66)
TOTAL	27 (26)	42 (41)	96 (86)	159 (136)	151 (128)	475 (417)
MEAN	5 (5)	8 (8)	19 (17)	32 (27)	30 (27)	95 (83)
1979						
1	9 (4)	36 (36)	44 (40)	37 (34)	61 (59)	187 (173)
2	6 (2)	41 (41)	30 (27)	45 (44)	55 (51)	177 (165)
3	8 (4)	36 (36)	21 (20)	48 (44)	25 (24)	138 (128)
4	6 (0)	24 (24)	27 (24)	66 (63)	44 (42)	167 (153)
5	3 (1)	34 (33)	42 (39)	39 (37)	70 (67)	188 (177)
TOTAL	32 (11)	171 (170)	164 (150)	235 (222)	255 (243)	857 (796)
MEAN	6 (2)	34 (34)	33 (30)	47 (44)	51 (49)	171 (159)
1980						
1	8 (2)	26 (26)	38 (23)	66 (49)	71 (67)	209 (167)
2	6 (3)	14 (13)	33 (23)	35 (33)	51 (46)	139 (118)
3	5 (0)	22 (22)	36 (26)	33 (32)	34 (33)	130 (113)
4	3 (1)	10 (9)	41 (33)	36 (33)	32 (31)	122 (107)
5	16 (10)	11 (11)	34 (27)	18 (18)	24 (20)	103 (86)
TOTAL	38 (16)	83 (81)	182 (132)	188 (165)	212 (197)	703 (591)
MEAN	8 (3)	17 (16)	36 (26)	38 (33)	42 (39)	141 (118)

Table 6.--Numbers of total sablefish and marketable-size sablefish (in parenthesis) captured by depth and set at the Cape Addington site during the 1978, 79, and 80 abundance index surveys. Each catch was obtained from one string of 10 sablefish traps fished for 24 hours.

Year and set	Depth (fathom)					Total catch
	150	225	300	375	450	
1978	----- Number of fish -----					
1	1 (0)	10 (8)	25 (20)	25 (15)	15 (14)	76 (57)
2	6 (4)	9 (8)	20 (17)	21 (17)	24 (19)	80 (65)
3	3 (0)	6 (2)	21 (12)	40 (26)	12 (10)	82 (50)
4	13 (10)	28 (27)	38 (24)	49 (45)	39 (37)	167 (143)
5	8 (4)	21 (19)	51 (36)	34 (28)	21 (19)	135 (106)
TOTAL	31 (18)	74 (64)	155 (109)	169 (131)	111 (99)	540 (421)
MEAN	6 (4)	15 (13)	31 (22)	34 (26)	22 (20)	108 (84)
1979						
1	9 (3)	89 (88)	32 (6)	43 (25)	42 (40)	215 (162)
2	9 (0)	35 (35)	36 (13)	82 (34)	38 (36)	200 (118)
3	28 (6)	14 (12)	25 (14)	33 (12)	31 (27)	131 (71)
4	7 (1)	33 (32)	28 (18)	47 (11)	24 (23)	139 (85)
5	7 (0)	32 (30)	26 (9)	25 (7)	10 (10)	100 (56)
TOTAL	60 (10)	203 (197)	147 (60)	230 (89)	145 (136)	785 (492)
MEAN	12 (2)	41 (39)	29 (12)	46 (18)	29 (27)	157 (98)
1980						
1	36 (32)	54 (54)	86 (65)	48 (40)	34 (31)	258 (222)
2	29 (20)	30 (28)	61 (44)	11 (10)	23 (23)	154 (125)
3	12 (7)	59 (53)	98 (67)	45 (42)	41 (40)	255 (209)
4	19 (11)	59 (56)	91 (61)	40 (28)	42 (42)	251 (198)
5	17 (14)	35 (35)	16 (11)	8 (7)	17 (17)	93 (84)
TOTAL	113 (84)	237 (226)	352 (248)	152 (127)	157 (153)	1,011 (838)
MEAN	23 (17)	47 (45)	70 (50)	30 (25)	31 (31)	202 (168)

Table 7.--Numbers of total sablefish and marketable-sized sablefish (in parenthesis) captured by string and set at the Cape Muzon site during the 1979 and 1980 abundance index surveys. Each catch was obtained from one string of 10 sablefish traps fished for 24 hours.

Year and set	String				Total catch
	1	2	3	4	
1979	----- Number of fish -----				
1	24 (24)	75 (71)	75 (66)	43 (40)	217 (201)
2	49 (47)	42 (38)	23 (20)	79 (72)	193 (177)
3	21 (21)	40 (38)	49 (36)	47 (44)	157 (139)
4	25 (24)	47 (42)	43 (39)	72 (70)	187 (175)
TOTAL	119 (116)	204 (189)	190 (161)	241 (226)	754 (692)
MEAN	30 (29)	51 (47)	48 (40)	60 (56)	188 (173)
1980					
1	37 (3)	62 (56)	81 (76)	95 (81)	275 (219)
2	36 (33)	38 (34)	61 (54)	62 (51)	197 (172)
3	24 (18)	58 (54)	62 (54)	33 (25)	177 (151)
4	35 (31)	39 (31)	58 (54)	51 (42)	183 (158)
TOTAL	132 (85)	197 (175)	262 (238)	241 (199)	832 (700)
MEAN	33 (21)	49 (44)	66 (60)	60 (50)	208 (175)

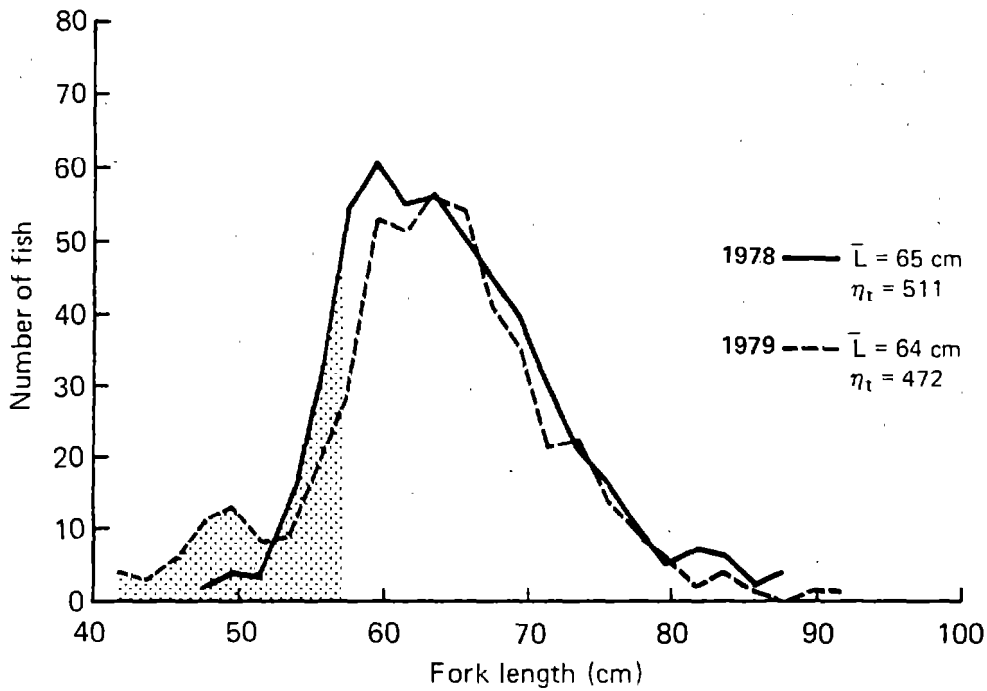


Figure 7. --Length compositions of sablefish captured at the Cape Cross abundance index site, 1978-79. Prerecruits (<57 cm) are represented by the shaded area.

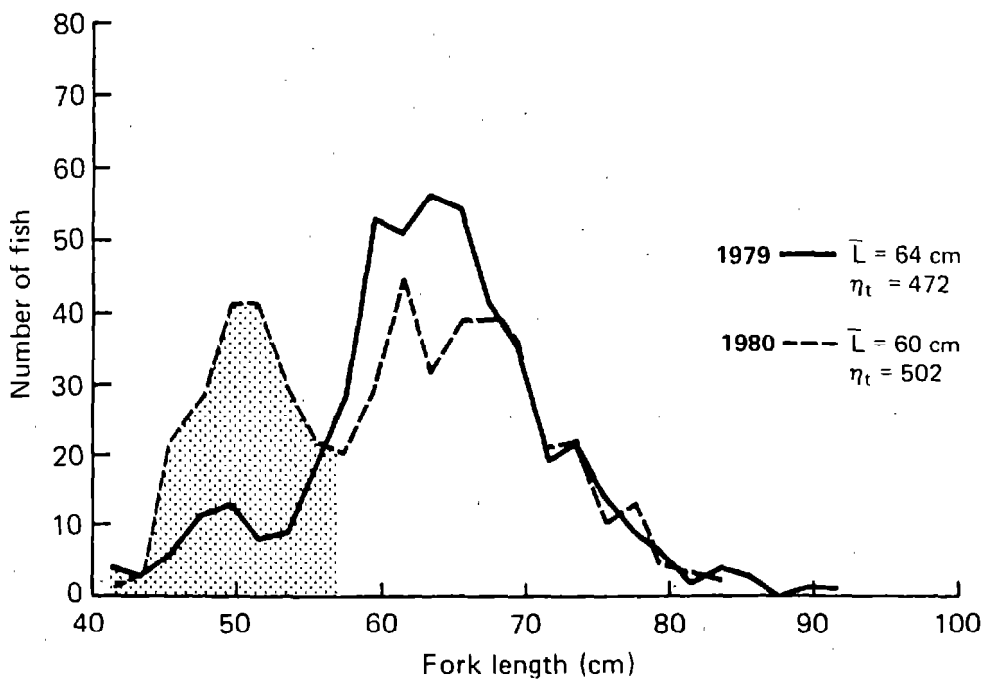


Figure 8. --Length compositions of sablefish captured at the Cape Cross abundance index site, 1979-80. Prerecruits (<57 cm) are represented by the shaded area.

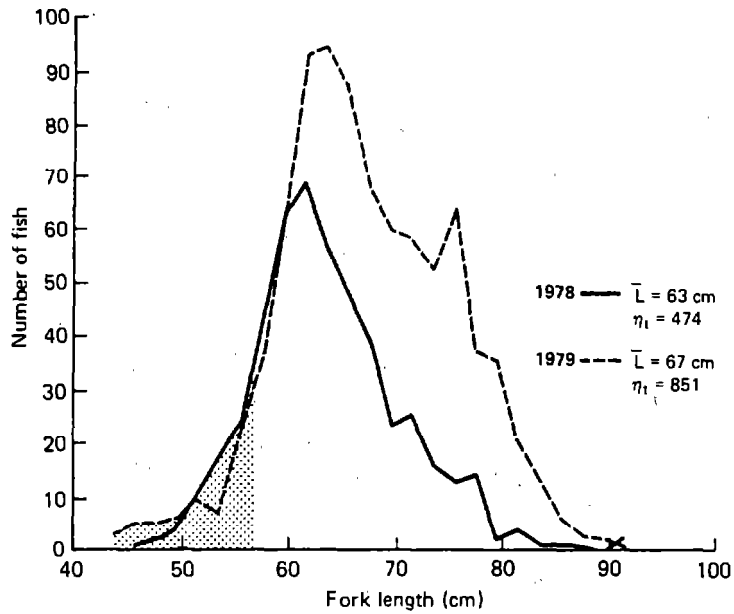


Figure 9.--Length compositions of sablefish captured at the Cape Ommaney abundance index site, 1976-79. Prerecruits (<57 cm) are represented by the shaded area.

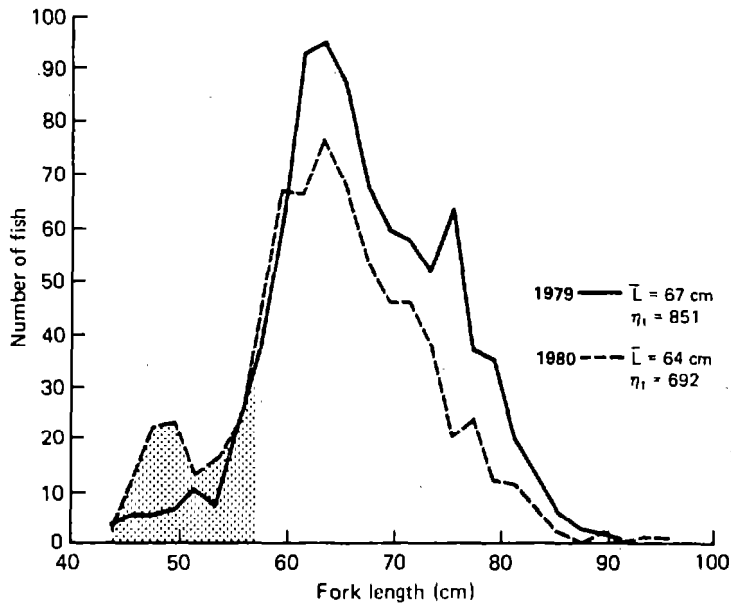


Figure 10.--Length compositions of sablefish captured at the Cape Ommaney abundance index site, 1979-80. Prerecruits (<57 cm) are represented by the shaded area.

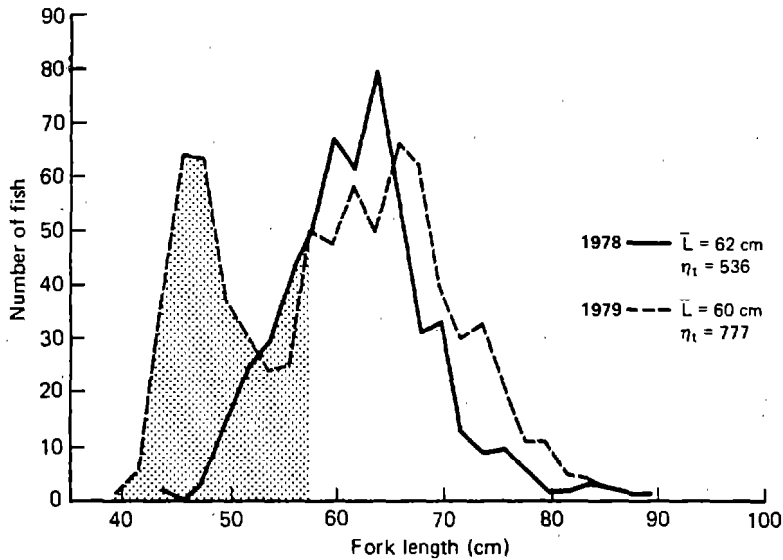


Figure 11.--Length compositions of sablefish captured at the Cape Addington abundance index site, 1978-79. Prerecruits (<57 cm) are represented by the shaded area.

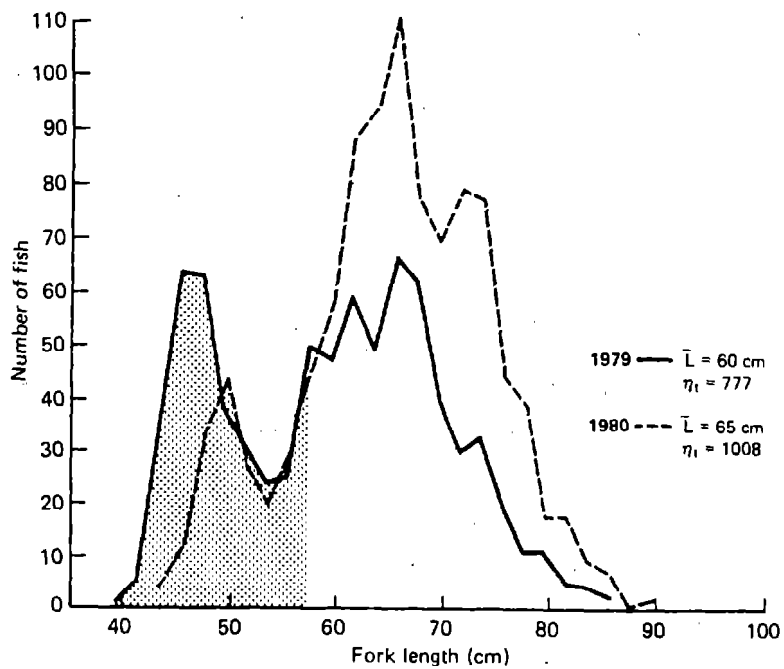


Figure 12 --Length compositions of sablefish captured at the Cape Addington abundance index site, 1979-80. Prerecruits (<57 cm) are represented by the shaded area.

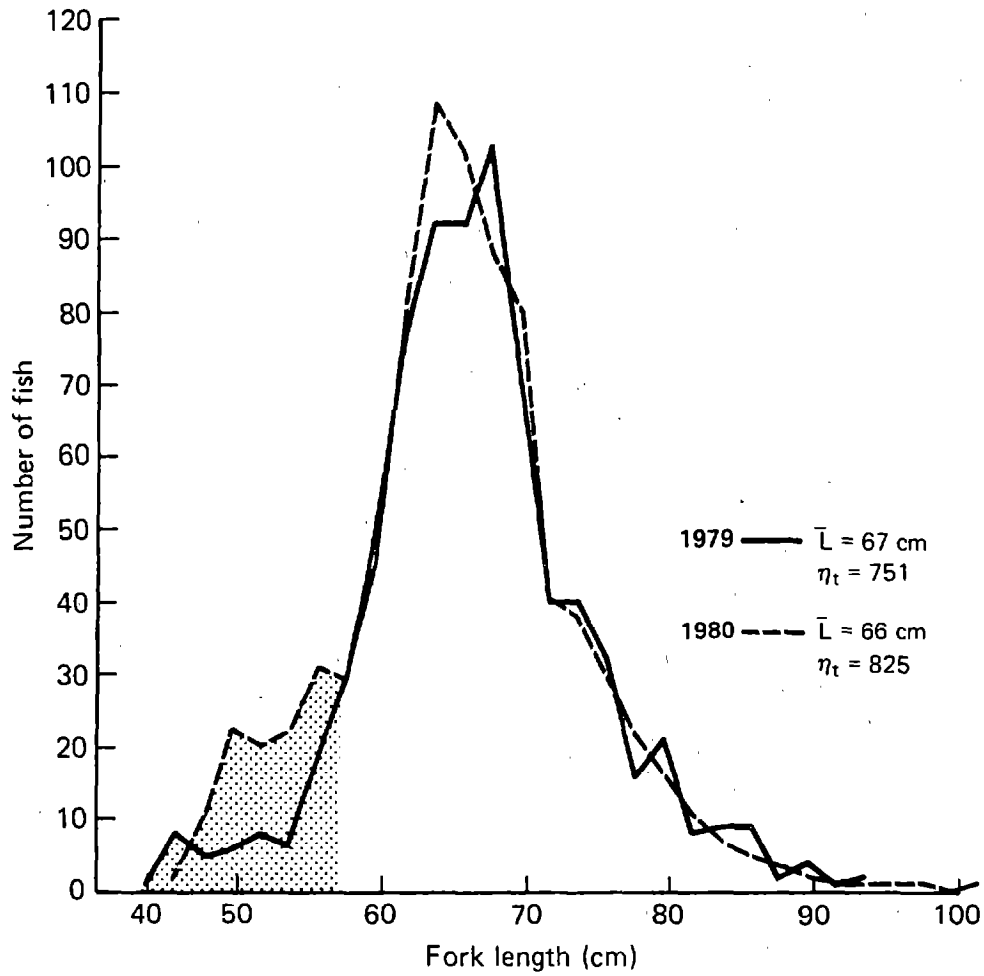


Figure 13.--Length compositions of sablefish captured at the Cape Muzon abundance index site, 1979-80. Prerecruits (<57 cm) are represented by the shaded area.

Between 1979 and 1980 survey periods when coastal landings totaled 1,730 t, sablefish abundance (all sizes of fish) increased only 6% and that increase was due to slightly increased abundance of both marketable-size and pre-recruit sablefish. The abundance of the coastal marketable-size population increased by only 3% between 1979 and 1980 as a result of a 21% and 26% decrease in the abundance of marketable-size fish in the more heavily harvested Cape Cross and Cape Ommaney areas and increased abundance in the Cape Addington and Cape Muzon areas-

The size composition and age information obtained during the surveys strongly indicates that the abundance of 53-61 cm fish in 1980, aged as 6 and 7 year-olds from the 1973 and 1974 year classes, is low. Fish from these 2 year classes will provide weak recruitment into the marketable-size population in 1980 and 1981.

If it is assumed that changes we have detected in the coastal sablefish stock conditions are also reflected in the inside waters, it can be concluded that the total southeast Alaska marketable-size stock abundance increased 30% between June 1978 and May 1979 when 1,812 t of sablefish were harvested. Furthermore, the marketable-size stock abundance increased only 3% between June 1979 and May 1980 when southeast Alaska landings totaled 2,582 t. These factors, coupled with expected weak recruitment of the 1973 and 1974 year classes into the fishery in 1980-81, suggest that the June 1980-May 1981 allowable biological catch in southeast Alaska should not exceed the catch obtained between the June 1979-May 1980 period. Further, little improvement in the abundance of marketable-size sablefish may be anticipated during the June 1981-May 1982 period since the relatively large 1975 and 1976 year classes indicated in the index study will only begin to be recruited to the fishery in 1982.

SUMMARY AND CONCLUSIONS

Between 1978 and 1980 most of the coastal southeast Alaska domestic sablefish catch has been obtained from the Cape Spencer-Cape Ommaney area. It is within this northern portion of southeast Alaska that marketable-size sablefish abundance has recently decreased as evidenced by monitoring surveys of the Cape Cross site during 1978-80 and the Cape Ommaney site during 1979-80.

Coastal southeast Alaska abundance index studies indicated that the abundance of marketable-size sablefish increased only 3% between June 1979 and May 1980 when 2,582 t of sablefish were harvested in all southeast Alaska waters. In addition, the prospectus for the immediate future includes two weak year classes which should contribute relatively small numbers of fish to the marketable-size segment of the population during the 12-month period following the 1980 abundance index survey. This indicates that the June 1980-May 1981 allowable biological catch (ABC) should not exceed the June 1979-May 1980 harvest.

Looking further into the future, it is probable that the June 1981-May 1982 southeast Alaska allowable biological catch could increase slightly as the more abundant 1975 and 1976 year classes begins to reach marketable size.

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