

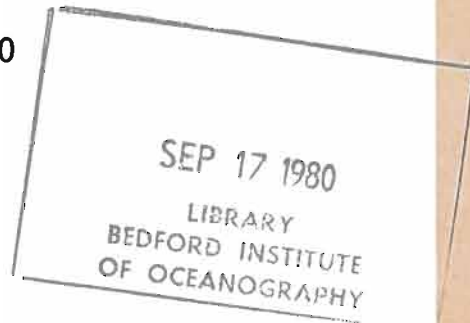
Length and Age Composition of Rock Sole (*Lepidopsetta bilineata*) from Commercial Landings from the Butterworth-Warrior area of Hecate Strait, 1973-78

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LENGTH AND AGE COMPOSITION OF ROCK SOLE
(Lepidopsetta bilineata) FROM COMMERCIAL LANDINGS
FROM THE BUTTERWORTH-WARRIOR AREA OF HECATE STRAIT, 1973-78

by

D. E. Chilton, M. Stocker, and J. Fargo

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ABSTRACT

Chilton, D. E., M. Stocker, and J. Fargo. 1979. Length and age composition of rock sole (Lepidopsetta bilineata) from commercial landings from the Butterworth-Warrior area of Hecate Strait, 1973-78. Can. Data Rep. Fish. Aquat. Sci. 177: 17 p.

Length and age composition data are summarized from commercial landing samples of rock sole for the years 1973-78 from northern Hecate Strait. Tables provide summaries of length and age composition by sex based on a number of samples collected throughout each fishing season.

RÉSUMÉ

Chilton, D. E., M. Stocker, and J. Fargo. 1979. Length and age composition of rock sole (Lepidopsetta bilineata) from commercial landings from the Butterworth-Warrior area of Hecate Strait, 1973-78. Can. Data Rep. Fish. Aquat. Sci. 177: 17 p.

Le rapport présente sous forme résumée des données sur la longueur et la répartition par âge d'échantillons de débarquements commerciaux de sole du Pacifique provenant du nord du détroit d'Hécate, couvrant la période 1973-1978. Des tableaux résumant les données sur la longueur et la répartition par âge selon le sexe, à partir d'un certain nombre d'échantillons recueillis au cours de chaque saison de pêche.

INTRODUCTION

Sampling of commercial landings of rock sole (Lepidopsetta bilineata) has been carried on since 1944 by Fisheries personnel of the Canadian Government. The most important stock of rock sole on the coast of British Columbia inhabits northern Hecate Strait (Fig. 1). The stock is fished almost exclusively by Canadian vessels during the months of May to October, and for many years has been the principal source of rock sole landings in the province.

Rock sole landed in British Columbia are sampled for length, sex, and age (from otoliths). The sampling is conducted on randomly selected frames or carcasses (occasionally, round fish) from plant fillet lines and is continued, while fish are available, until three consecutive centimeter intervals in the length frequency contain 20 fish each, or one centimeter interval contains 30 fish. All fish are measured to the nearest centimeter.

The present report summarizes the size and age composition of commercial landings of rock sole landed from the Butterworth-Warrior region of northern Hecate Strait during the period 1973-78. No samples were collected from the 1972 rock sole fishery in northern Hecate Strait. Rock sole age composition data covering the years 1945-63 and 1964-71 from this area have been reported previously (Forrester 1966; Chilton and Smith 1972). Age composition for rock sole in Queen Charlotte Sound (Area 5A) has been summarized for the years 1959-69 (Chilton and Smith 1971).

The ages of rock sole are determined by interpreting the surface annuli of whole otoliths. Recently, sectioning of older or more difficult otoliths has been established on a routine basis in this laboratory as an age check and as a means of determining an age of a fish when the surface of the whole otolith has become opaque.

Comparisons of ages are being made between the surface and the sections of otoliths. The preliminary results indicate that ages determined from sections may be older for the older fish in some cases. In one instance, the surface was aged as 13 years and the section aged 17 years. This was a 51 cm female caught in July 1977 in the Butterworth Rocks area (5D). Previously the oldest recorded age for a female was a 16-year-old, 43 cm fish from Bristol Bay Alaska (Forrester 1969).

It will be noted that in 1973 there was a strong influx of 3-year-old fish into the Butterworth-Warrior fishery with a average length of 32.8 cm and 31.7 cm for females and males, respectively. This phenomenon has not been noticed since the mid-1940s.

The accompanying tables provide, for each year, a summary of length and age composition by sex, based on a number of samples collected throughout the fishing season. On the right-hand side of each table, the seasonal length frequency is expressed in numbers and percentage of individuals in each centimeter (cm) length group. The average length and average age in the sample as a whole appears just below the table heading.

Across the bottom of each table the number (NO) and percentage (PC) of individuals in each age group, the average length of fish at each age (AC), and its standard deviation (SD) are given.

The information provided in this data report is used for assessing the rock sole fishery in northern Hecate Strait by employing sequential population analysis. This technique enables estimation of population at age, instantaneous rates of fishing mortalities, and recruitment.

REFERENCES

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KEY TO ABBREVIATIONS IN THE FOLLOWING TABLES

YC = year class

AG = age in completed years

CM = column headings of centimeter length groups

NO = number

PC = percent frequency

AL = average length in centimeters

TABLE 1. ROCK SOLE, AREA 5D, BUTTERWORTH, 1973.

YC	FEMALES 1973 SAMPLE AV LENGTH 37.3 CM SAMPLE AV AGE 5.0 YRS													NO.	PC	
	1971	1970	1969	1968	1967	1966	1965	1964	1963	1962	1961	1960	1959			
AG CM	2	3	4	5	6	7	8	9	10	11	12	13	14	15+		
28																
29		2													2	0.7
30		4	1												5	1.7
31		14	7												21	7.1
32		33	4												37	12.5
33		40	9												49	16.5
34		17	7		2										26	8.8
35		8	7												15	5.1
36		6	1	3											10	3.4
37			5	1											6	2.0
38				4	1	1		1							7	2.4
39		1	3	4		3									11	3.7
40			1	7	5	2			1	2	1				19	6.4
41			1	6	5	1		1	1		1				16	5.4
42				2	3	2	2				1				10	3.4
43				1	2	6	3								12	4.0
44					1	2	3	2							8	2.7
45				1	2	3	2	1	1			1			11	3.7
46						2	2	2	1	2					9	3.0
47						2	3		1	1	1				8	2.7
48						1	4	2	1						8	2.7
49							2	1	1	1					5	1.7
50								2							2	0.7
NO		125	46	29	21	25	21	12	7	7	4				297	
PC		42.1	15.5	9.8	7.1	8.4	7.1	4.0	2.4	2.4	1.3					100.0
AL		32.8	34.2	39.7	40.8	43.0	45.6	45.8	45.1	44.3	43.3					
SD		1.53	2.66	2.09	2.86	2.78	2.31									

1
4
1

TABLE 2. ROCK SOLE, AREA 5D, BUTTERWORTH, 1973.

YC	MALES													NO.	PC	
	1971	1970	1969	1968	1967	1966	1965	1964	1963	1962	1961	1960	1959			
AG	2	3	4	5	6	7	8	9	10	11	12	13	14	15+		
CM																
28		1													1	0.6
29		1			1										2	1.1
30		8	2												10	5.7
31		35	1												36	20.7
32		19	5												24	13.8
33		17	8	1											26	14.9
34		6	9	2											17	9.8
35		2	5	6	2	2									17	9.8
36			3	9	5										17	9.8
37			3	4	1	2									10	5.7
38				3	3	1	1	1							9	5.2
39				1	2										3	1.7
40						1									1	0.6
41																
42					1										1	0.6
43																
44																
45																
46																
47																
48																
49																
50																
NO		89	36	26	15	6	1	1							174	
PC		51.1	20.7	14.9	8.6	3.4	0.6	0.6								100.0
AL		31.7	33.8	36.0	36.7	37.0	38.0	38.0								
SD		1.28	1.78	1.39	2.82											

TABLE 3. ROCK SOLE, AREA 5D, BUTTERWORTH, 1974.

YC	FEMALES 1974 SAMPLE AV LENGTH 37.9 CM											SAMPLE AV AGE 4.8 YRS			NO.	PC
	1972	1971	1970	1969	1968	1967	1966	1965	1964	1963	1962	1961	1960	15+		
AG CM	2	3	4	5	6	7	8	9	10	11	12	13	14	15+		
31			2												2	1.6
32			2												2	1.6
33			8												8	6.3
34			2	2											4	3.1
35			2	4											6	4.7
36			2	9											11	8.6
37			8	14											22	17.2
38			16	9											25	19.5
39			8	13	1										22	17.2
40			3	9	1										13	10.2
41				2	2										4	3.1
42				1											1	0.8
43																
44					1	1		1							3	2.3
45									1						1	0.8
46				1											1	0.8
47														1	1	0.8
48																
49								1							1	0.8
50																
51																
52									1						1	0.8
NO			53	64	5	1		2	2	1					128	
PC			41.4	50.0	3.9	0.8		1.6	1.6	0.8						100.0
AL			36.5	38.0	41.0	44.0		46.5	48.5	47.0						
SD			2.56	2.05												

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TABLE 4. ROCK SOLE, AREA 5D, BUTTERWORTH, 1974.

YC	MALES													NO.	PC	
	1972	1971	1970	1969	1974	1968	1967	1966	1965	1964	1963	1962	1961			1960
AG	2	3	4	5	6	7	8	9	10	11	12	13	14	15+		
CM																
31		1														1 2.3
32		1	5			1										7 16.3
33			10	5												15 34.9
34			2	1												3 7.0
35			5	7	1											13 30.2
36			1	1												2 4.7
37																
38				2												2 4.7
39																
40																
41																
42																
43																
44																
45																
46																
47																
48																
49																
50																
51																
52																
NO		2	23	16	2											43
PC		4.7	53.5	37.2	4.7											100.0
AL		31.5	33.4	34.8	33.5											
SD			1.20	1.61												

TABLE 5. ROCK SOLE, AREA 5D, BUTTERWORTH, 1975.

YC	FEMALES 1975														NO.	PC	
	1973	1972	1971	1970	1969	1968	1967	1966	1965	1964	1963	1962	1961	15+			
AG	2	3	4	5	6	7	8	9	10	11	12	13	14	15+			
CM																	
26		1														1	0.3
27																	
28																	
29																	
30			1													1	0.3
31					1											1	0.3
32				2	5											7	2.0
33			1	1	6											8	2.3
34		1	2	4	4	2										13	3.8
35			2	5	13	7	1									28	8.2
36			3	7	11	9	2									32	9.3
37				4	19	19	8	2								52	15.2
38				3	10	15	9	2								39	11.4
39				2	5	13	11	5								36	10.5
40					7	7	9	9		1						33	9.6
41					3	8	6	7	1	1	1					27	7.9
42					1	6	10	4	2							23	6.7
43							6	6	2	1						15	4.4
44						1	3	2	5							11	3.2
45					1				2							3	0.9
46						1			3	2	1					7	2.0
47								1					2			3	0.9
48												1	1	1		3	0.9
NO		2	9	28	86	88	65	37	16	5	2	1	3	1		343	
PC		0.6	2.6	8.2	25.1	25.7	19.0	10.8	4.7	1.5	0.6	0.3	0.9	0.3			100.0
AL		30.0	34.3	35.7	36.6	38.3	39.8	40.7	44.1	43.2	43.5	48.0	47.3	48.0			
SD				1.86	2.59	2.28	2.24	1.84	1.67								

TABLE 6. ROCK SOLE, AREA 5D, BUTTERWORTH, 1975.

YC	MALES															NO.	PC
	1973	1972	1971	1970	1969	1968	1967	1966	1965	1964	1963	1962	1961	15+			
AG	2	3	4	5	6	7	8	9	10	11	12	13	14	15+			
CM																	
26																	
27																	
28		1														1	1.2
29						1										1	1.2
30								1								1	1.2
31			1		1	1										3	3.5
32				5	6	2										13	15.3
33			2	4	1	2	1									10	11.8
34				3	5	3			1							12	14.1
35				6	8	1				1						16	18.8
36				2	6	3	2	1								14	16.5
37				3	1	2										6	7.1
38				1	1											2	2.4
39					4		2									6	7.1
40																	
41																	
42																	
43																	
44																	
45																	
46																	
47																	
48																	
NO		1	3	24	34	14	6	2	1								85
PC		1.2	3.5	28.2	40.0	16.5	7.1	2.4	1.2								100.0
AL		28.0	32.3	34.4	34.8	34.3	35.5	35.0	35.0								
SD				1.84	2.44												

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TABLE 7. ROCK SOLE, AREA 5D, BUTTERWORTH, 1976.

YC	FEMALES 1976											SAMPLE AV AGE 5.6 YRS				NO.	PC
	1974	1973	1972	1971	1970	1969	1968	1967	1966	1965	1964	1963	1962	15+			
AG CM	2	3	4	5	6	7	8	9	10	11	12	13	14	15+			
31																	
32																	
33			1												1	0.5	
34		1	3	2											6	2.9	
35		2	7	1											10	4.8	
36			4	2											6	2.9	
37		2	4	2	1										9	4.3	
38			3	9	3										15	7.2	
39		1	2	4	1	1									9	4.3	
40			3	4	3	1	1								12	5.8	
41			2	7	9	2									20	9.7	
42			1	3	16	3	1								24	11.6	
43				8	22	5									35	16.9	
44				3	16	2	2								23	11.1	
45				3	10	3	1								17	8.2	
46				1	3	5									9	4.3	
47					1	2	2	1							6	2.9	
48							1	1							2	1.0	
49							1								1	0.5	
50								1							1	0.5	
51								1							1	0.5	
NO		6	30	49	85	24	9	4							207		
PC		2.9	14.5	23.7	41.1	11.6	4.3	1.9								100.0	
AL		36.2	36.9	40.3	42.8	43.7	45.1	49.0									
SD			2.42	3.00	1.89	2.24											

TABLE 8. ROCK SOLE, AREA 5D, BUTTERWORTH, 1976.

YC	MALES															NO.	PC
	1974	1973	1972	1971	1970	1969	1968	1967	1966	1965	1964	1963	1962	15+			
AG	2	3	4	5	6	7	8	9	10	11	12	13	14	15+			
CM																	
31		1														1	0.4
32		1														1	0.4
33		5	4	2												11	4.5
34		1	5	6	1											13	5.3
35		2	15	11	3											31	12.7
36			5	21	13	3										42	17.1
37			1	27	17		2									47	19.2
38		1	2	24	20	2	2	1								52	21.2
39				2	6	4	2	3								17	6.9
40				1	4	6	1			1	1					14	5.7
41						3	1	3	2							9	3.7
42						1	2	1	1							5	2.0
43								1								1	0.4
44							1									1	0.4
45																	
46																	
47																	
48																	
49																	
50																	
51																	
NO		11	32	94	64	19	11	9	3	1	1					245	
PC		4.5	13.1	38.4	26.1	7.8	4.5	3.7	1.2	0.4	0.4						
AL		33.6	35.0	36.6	37.3	39.2	39.7	40.3	41.3	40.0	40.0						
SD			1.24	1.38	1.30	1.75											

TABLE 9. ROCK SOLE, AREA 50, BUTTERWORTH, 1977.

YC	FEMALES 1977										SAMPLE AV LENGTH 37.7 CM					SAMPLE AV AGE 5.6 YRS					NO.	PC
	1975	1974	1973	1972	1971	1970	1969	1968	1967	1966	1965	1964	1963	15+								
AG	2	3	4	5	6	7	8	9	10	11	12	13	14	15+	NO.	PC						
CM																						
29																						
30		2													2	0.3						
31		3	3												6	0.9						
32		5	6	14											25	3.8						
33		6	16	32	4										58	8.8						
34		17	35	31	13	2									98	14.9						
35		3	26	48	8										85	12.9						
36			12	35	10	4									61	9.3						
37		1	3	14	18	7									43	6.5						
38			3	6	14	5									28	4.3						
39			3	4	17	6	1	1						1	33	5.0						
40				11	20	9	1								41	6.2						
41				9	13	10	2								34	5.2						
42				7	7	12	4	2	2						34	5.2						
43				4	11	12	2	2							31	4.7						
44					5	11	4	1							21	3.2						
45					4	11	4	1	1	1	1				23	3.5						
46						9	2	3	1	3	1				19	2.9						
47						4	2								6	0.9						
48					1	2	2	1	1						7	1.1						
49														1	1	0.2						
50																						
51														1	1	0.2						
NO		37	107	215	145	104	24	11	5	4	4			1	657							
PC		5.6	16.3	32.7	22.1	15.8	3.7	1.7	0.8	0.6	0.6			0.2		100.0						
AL		33.3	34.5	35.7	38.8	41.9	43.9	44.0	44.6	45.8	44.8			51.0								
SD		1.47	1.59	2.72	3.15	3.26	2.46															

TABLE 10. ROCK SOLE, AREA 5D, BUTTERWORTH, 1977.

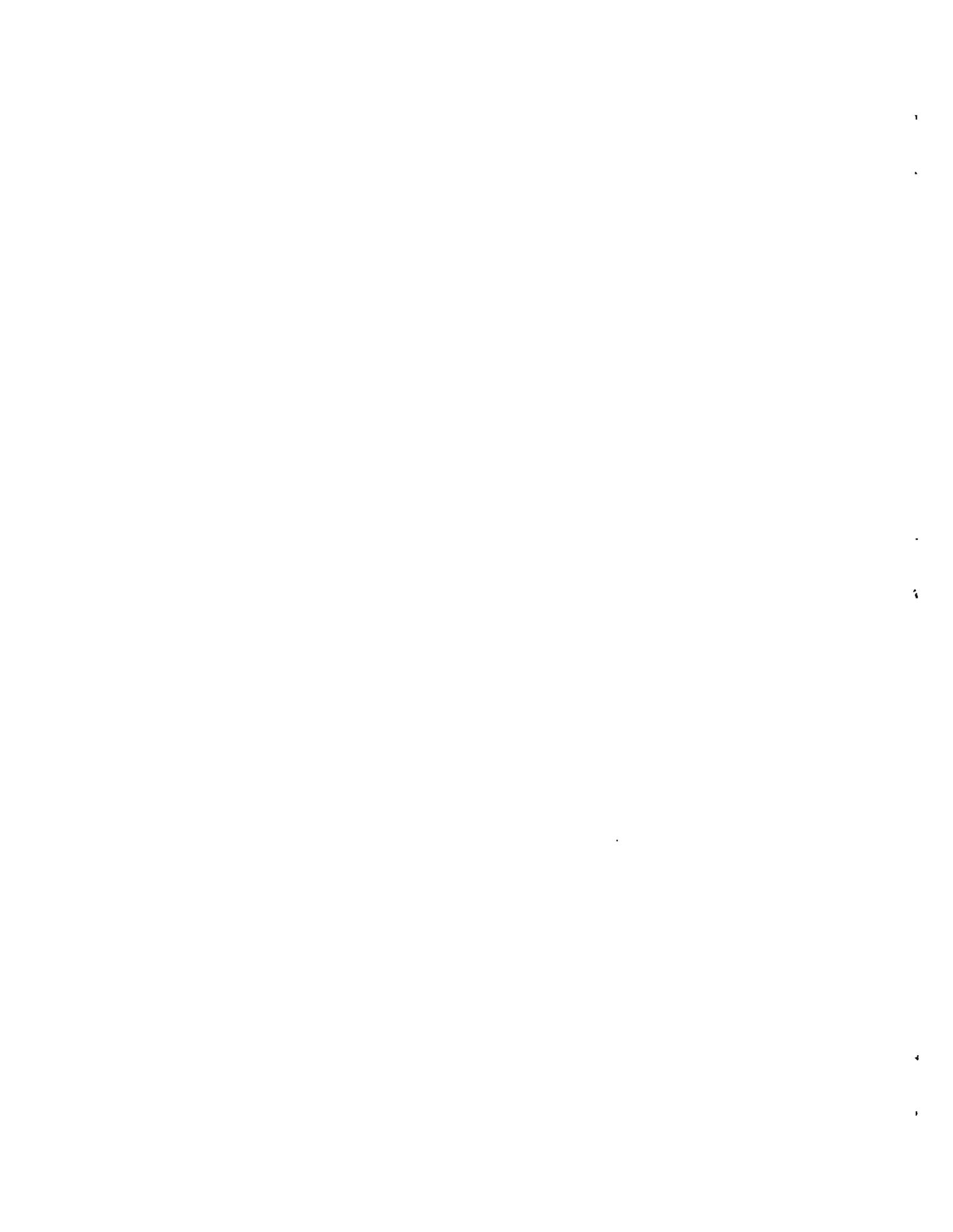
YC	MALES															NO.	PC
	1975	1974	1973	1972	1971	1970	1969	1968	1967	1966	1965	1964	1963	15+			
AG	2	3	4	5	6	7	8	9	10	11	12	13	14	15+			
CM																	
29		1														1	0.2
30		4	1													5	1.1
31		4	22													26	5.5
32		6	28	14												48	10.2
33		4	45	49	8											106	22.6
34		4	24	30	14	2	1									75	16.0
35			8	29	21	4		1								63	13.4
36			1	13	15	13	3									45	9.6
37				5	18	11	4	1								39	8.3
38				3	11	8	3	1								26	5.5
39				2	4	5	3	1	2	1						18	3.8
40					2			1	2	1	1					7	1.5
41						3	1									4	0.9
42						1	1									2	0.4
43					1		1									2	0.4
44						1										1	0.2
45							1									1	0.2
46																	
47																	
48																	
49																	
NO		23	129	145	94	48	18	5	4	2	1					469	
PC		4.9	27.5	30.9	20.0	10.2	3.8	1.1	0.9	0.4	0.2						100.0
AL		31.9	32.8	34.1	35.9	37.3	38.4	37.8	39.5	39.5	40.0						
SD		1.49	1.19	1.51	1.88	2.02	2.77										

TABLE 11. ROCK SOLE, AREA 5D, BUTTERWORTH, 1978.

YC	FEMALES 1978					SAMPLE AV LENGTH 38.1 CM					SAMPLE AV AGE 6.5 YRS				NO.	PC
	1976	1975	1974	1973	1972	1971	1970	1969	1968	1967	1966	1965	1964	15+		
AG	2	3	4	5	6	7	8	9	10	11	12	13	14	15+		
CM																
27				1											1	0.1
28																
29			3	4											7	0.9
30	2		6	2	1										11	1.4
31	3		33	15	2	1									54	6.9
32	2		35	27	3	2									69	8.8
33	2		46	32	4		1								85	10.9
34			34	27	10	2	1	1					1		76	9.7
35			13	14	11	6	1		1						46	5.9
36			6	10	15	6	3	1							41	5.3
37				2	6	6	3	4	1						22	2.8
38				9	9	11	5	5	2						41	5.3
39				7	10	5	6	3	3					1	35	4.5
40				3	8	5	5	5	1	1					28	3.6
41					4	8	4		1	1					19	2.4
42					2	8	4	3	3			2			22	2.8
43				1	11	6		8	5	1	2				34	4.4
44					10	9	10	1	5		2	1		1	39	5.0
45					6	9	9	2	4	3		2			35	4.5
46					3	9	7	7	4	1	2	1			34	4.4
47						5	8	3	6	3	2	1			28	3.6
48						4	2	2	3	4	2	3			20	2.6
49							3	3	7	2	1	2	2		20	2.6
50								1					1		2	0.3
51										2	1	1	1		5	0.6
52							1				1	1			4	0.5
53											1			1	2	0.3
NO	9	176	154	115	102	74	48	46	20	16	14	4	2		780	
PC	1.2	22.6	19.7	14.7	13.1	9.5	6.2	5.9	2.6	2.1	1.8	0.5	0.3			100.0
AL	31.4	32.7	33.8	38.5	41.1	42.8	42.4	44.3	47.2	45.1	46.9	49.8	48.5			
SD		1.50	2.60	4.08	4.23	4.23	4.01	3.68	3.39	4.56						

TABLE 12. ROCK SOLE, AREA 5D, BUTTERWORTH, 1978.

YC	MALES														NO.	PC	
	1976	1975	1974	1973	1972	1971	1970	1969	1968	1967	1966	1965	1964	15+			
AG	2	3	4	5	6	7	8	9	10	11	12	13	14	15+			
CM																	
27		2	1	1												4	1.8
28				1												1	0.5
29			2	1												3	1.4
30			7	5	1											13	5.9
31	1	15	8	3	1											28	12.7
32		31	14	3												48	21.7
33	3	26	14	3	3	1										50	22.6
34		10	10	3		2	1									26	11.8
35	1	4	1	1												7	3.2
36			2	1				1	1					1		6	2.7
37				5				1	1	2						9	4.1
38			2	3	4	1										10	4.5
39			1	1	1	1	4			1		2	1			12	5.4
40				1	1	1										3	1.4
41																	
42																	
43												1				1	0.5
44																	
45																	
46																	
47																	
48																	
49																	
50																	
51																	
52																	
53																	
NO	7	96	60	25	10	6	6	2	4		3	1	1			221	
PC	3.2	43.4	27.1	11.3	4.5	2.7	2.7	0.9	1.8		1.4	0.5	0.5			100.0	
AL	31.3	32.2	32.6	34.8	36.1	36.3	37.8	36.5	37.3		40.3	39.0	36.0				
SD		1.39	2.16	2.91													



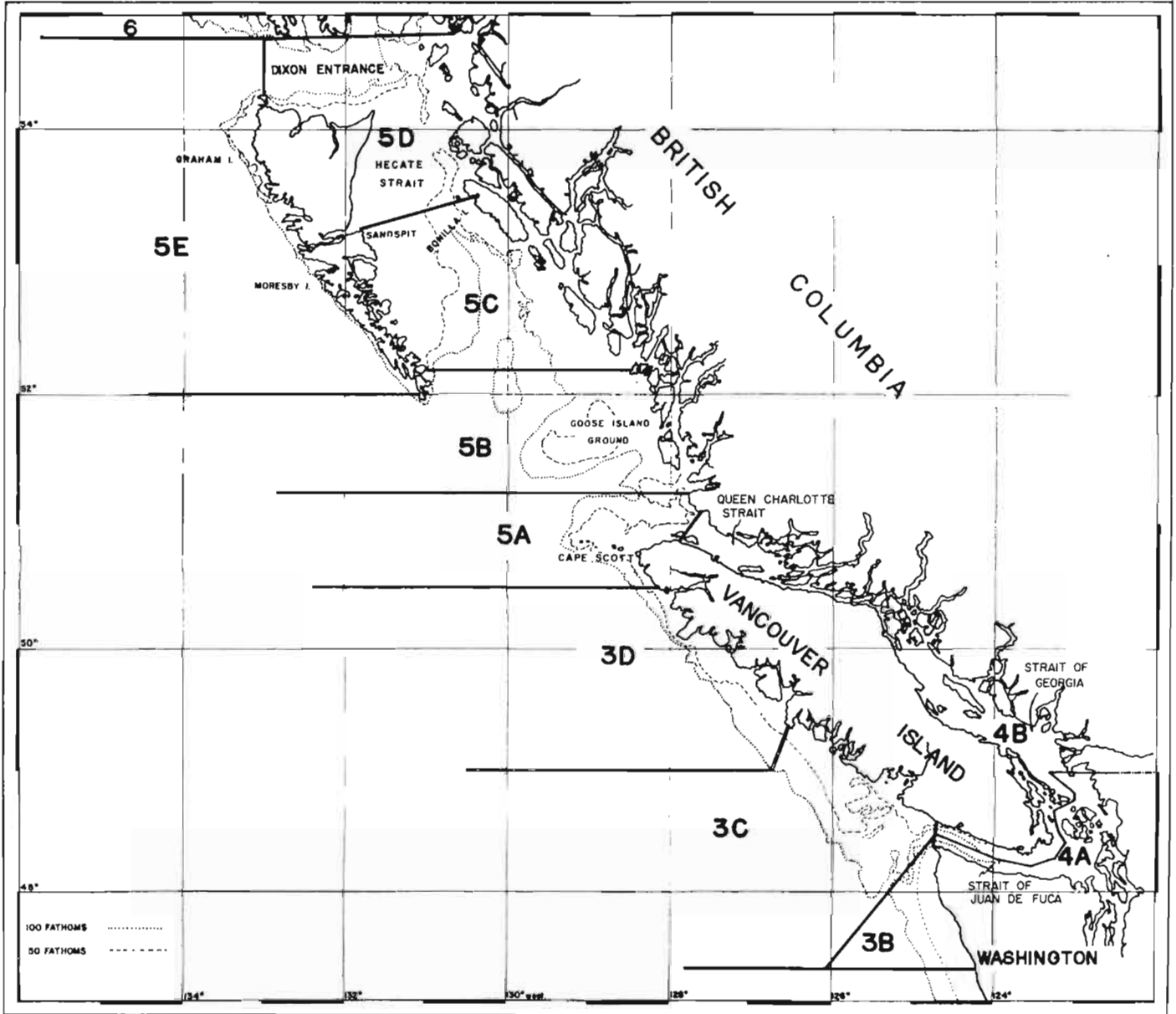


Fig. 1. International (Pacific Marine Fisheries Commission) Statistical Areas along the British Columbia coast.