

LENGTH-FREQUENCY AND AGE-LENGTH-FREQUENCY DISTRIBUTIONS FOR
DOVER SOLE, ENGLISH SOLE, PETRALE SOLE, AND PACIFIC OCEAN
PERCH LANDED IN OREGON, 1948-65

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TABLE OF CONTENTS

	<u>Page No.</u>
INTRODUCTION.....	1
ACKNOWLEDGMENTS.....	2
LITERATURE CITED.....	2

LIST OF FIGURES

<u>Figure No.</u>		<u>Page No.</u>
1	Pacific Marine Fisheries Commission statistical catch areas for the trawl fishery.....	3

LIST OF TABLES

<u>Table No.</u>		<u>Page No.</u>
1	Dover sole length-frequency distributions, 1948.....	4
2	Dover sole length-frequency distributions, 1949.....	5
3	Dover sole length-frequency distributions, 1950.....	6
4	Dover sole length-frequency distributions, 1951.....	7
5	Dover sole length-frequency distributions, 1952.....	8
6	Dover sole length-frequency distributions, 1953.....	9
7	Dover sole length-frequency distributions, 1954.....	10
8	Dover sole length-frequency distributions, 1955.....	11
9	Dover sole length-frequency distributions, 1956.....	12
10	Dover sole length-frequency distributions, 1957.....	13
11	Dover sole length-frequency distributions, 1958.....	14
12	Dover sole length-frequency distributions, 1959.....	15
13	Dover sole length-frequency distributions, 1960.....	16
14	Dover sole length-frequency distributions, 1961.....	17
15	Dover sole length-frequency distributions, 1962.....	18
16	Dover sole length-frequency distributions, 1963.....	19
17	Dover sole length-frequency distributions, 1964.....	20
18	Dover sole length-frequency distributions, 1965.....	21
19	English sole age-length-frequency distributions, males, PMFC area 2D, 1948.....	22
20	English sole age-length-frequency distributions, females, PMFC, area 2D, 1948.....	23
21	English sole age-length-frequency distributions, females, PMFC area 3A, 1948.....	24
22	English sole age-length-frequency distributions, males, PMFC area 2D, 1949.....	25

LIST OF TABLES (Cont.)

<u>Table No.</u>		<u>Page No.</u>
23	English sole age-length-frequency distributions, females, PMFC area 2D, 1949.....	26
24	English sole length-frequency distributions, 1949.....	27
25	English sole length-frequency distributions, 1950.....	28
26	English sole length-frequency distributions, 1951.....	29
27	English sole length-frequency distributions, 1959.....	30
28	English sole length-frequency distributions, 1960.....	31
29	English sole length-frequency distributions, 1961.....	32
30	English sole length-frequency distributions, 1963.....	33
31	English sole length-frequency distributions, 1964.....	34
32	English sole length-frequency distributions, 1965.....	35
33	Petrале sole age-length-frequency distributions, males, PMFC area 2C, 1948.....	36
34	Petrале sole age-length-frequency distributions, females, PMFC area 2C, 1948.....	37
35	Petrале sole age-length-frequency distributions, males, PMFC area 2D, 1948.....	38
36	Petrале sole age-length-frequency distributions, females, PMFC area 2D, 1948.....	39
37	Petrале sole age-length-frequency distributions, males, PMFC area 2D, 1949.....	40
38	Petrале sole age-length-frequency distributions, females, PMFC area 2D, 1949.....	41
39	Petrале sole length-frequency distributions, 1949.....	42
40	Petrале sole length-frequency distributions, 1950.....	43
41	Petrале sole length-frequency distributions, 1951.....	44
42	Petrале sole length-frequency distributions, 1960.....	45

LIST OF TABLES (Cont.)

<u>Table No.</u>		<u>Page No.</u>
43	Petrale sole length-frequency distributions, 1963.....	46
44	Petrale sole length-frequency distributions, 1964.....	47
45	Petrale sole length-frequency distributions, 1965.....	48
46	Pacific ocean perch age-length-frequency distributions, males, PMFC area 2C and 2D, 1951-52.....	49
47	Pacific ocean perch age-length-frequency distributions, females, PMFC area 2C and 2D, 1951-52.....	50
48	Pacific ocean perch length-frequency distributions, 1963.....	51
49	Pacific ocean perch length-frequency distributions, 1964.....	52
50	Pacific ocean perch length-frequency distributions, 1965.....	53

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INTRODUCTION

A market sampling program was started in 1948 by the Oregon Fish Commission to collect biological data from certain bottomfish species. Dover sole (Microstomus pacificus), English sole (Parophrys vetulus), and petrale sole (Eopsetta jordani) were selected because of their importance in bottomfish landings. In late 1950 a similar program was undertaken on Pacific ocean perch (Sebastes alutus).

Market samples were collected routinely, usually weekly, as time and manpower permitted. Most sampling occurred during summer months when fishing activity was greatest. Fish were usually measured to the nearest lower centimeter and sexed. In cases where fish were measured to the millimeter or half-centimeter, data were tabulated to the nearest lower centimeter.

These data were collected in order to develop a rational management program. Harry (1956), with the initial work in 1948-49, provided data on age, time of spawning, and length at maturity for Dover sole, English sole, and petrale sole. Westrheim (1958) supplied similar information on Pacific ocean perch.

Bottomfish landed in Oregon are caught on the continental shelf and upper continental slope in waters adjacent to Oregon and Washington. In some years bottomfish caught off the northern coast of Washington and British Columbia have been landed, but these landings have not been sampled. Trawl-caught fish are landed at four major ports in Oregon--Astoria, Newport, Winchester Bay, and Coos Bay. Lesser amounts are landed at Brookings, and before 1959, some were landed at Tillamook Bay.

Pacific Marine Fisheries Commission area 2D (Figure 1) was sampled most heavily because Astoria is the center of the bottomfish industry and the location of research personnel.

The following tables show, by PMFC area, length-frequency and, in some cases, age-length-frequency distributions for English sole and petrale sole and Pacific ocean perch. Length-frequency distributions only are presented for Dover sole. Age-length frequency of Dover sole will be presented under separate cover when the aging technique (scale method) is perfected.

Tables 1-18 show Dover sole length-frequency distributions by sex and area of catch for the years 1948-65. Tables 19-23 show age-length frequencies for English sole for the years 1948-49 and Tables 24-32 length frequencies for years 1949-51, 1959-61, and 1963-65. Tables 33-38 show age-length frequencies for petrale sole for the years 1948-49 and Tables 39-45 show length frequencies for years 1949-51, 1960, and 1963-65. Tables 46-47 show age-length frequencies for Pacific ocean perch for years 1951-52 and Tables 48-50 length frequencies for 1963-65.

ACKNOWLEDGMENTS

Age determinations (otoliths) of English and petrale sole were made by Dr. George Y. Harry, Jr. and age determinations (scales) of Pacific ocean perch were made by Mr. Sigurd J. Westrheim.

Tabulation and publication of this data was made possible through funds supplied by the Commercial Fisheries Research and Development Act of 1964 (PL 88-309), Bureau of Commercial Fisheries Contracts 14-17-0007-314 and 14-17-0007-478.

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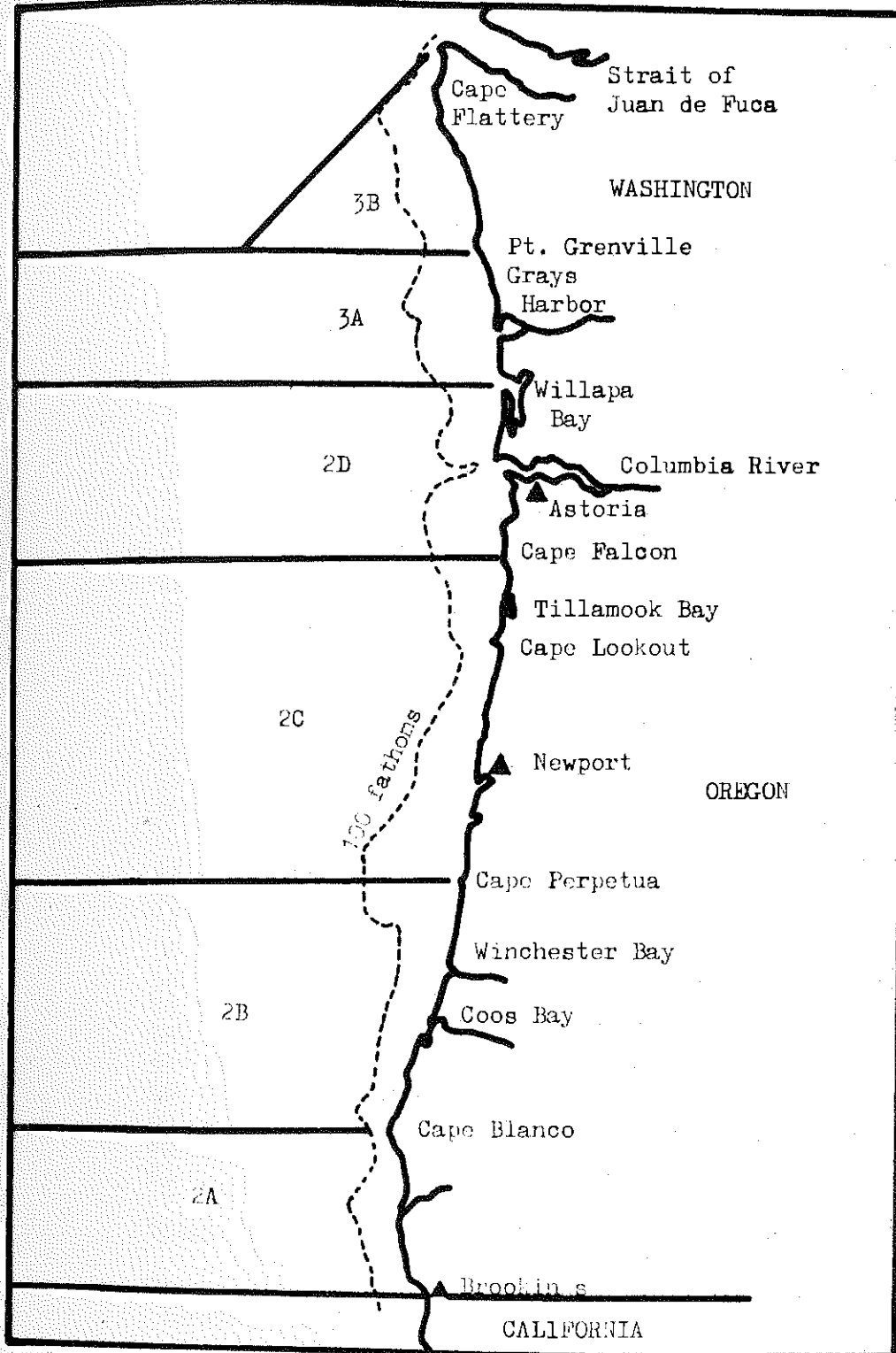


Figure 1. Pacific Marine Fisheries Commission statistical catch areas for the trawl fishery.

Table 1. Dover sole length-frequency distributions, 1948.

Length (cm)	PMFC area			
	2C		2D	
	Males	Females	Males	Females
29				2
30				1
31			5	4
32			2	8
33			15	19
34		2	25	12
35		2	43	23
36	2	5	51	40
37	6	2	56	51
38	3		47	43
39	1	3	57	58
40		2	52	40
41	2	3	37	47
42	3	3	45	61
43	3	1	38	40
44	2		35	48
45	2	4	39	27
46	2	2	30	37
47	2	2	27	26
48	2	1	11	25
49	1	2	16	23
50	2		10	26
51	1	1	4	11
52	3	1		18
53		1	1	19
54			2	12
55			5	18
56				17
57				19
58		2		10
59			2	6
60	1	4		1
61				5
62				1
63		<u>1</u>		
Total	38	44	655	798
Mean length	43.7	44.7	40.6	43.6

Table 2. Dover sole length-frequency distributions, 1949.

Length (cm)	PMFC area			
	2C		2D	
	Males	Females	Males	Females
29			1	1
30			3	1
31			5	
32		1	5	1
33		1	13	12
34			56	17
35			94	32
36			156	86
37			188	122
38		2	203	169
39	2	3	205	187
40	4	4	169	203
41	2	12	140	221
42	5	5	115	195
43	4	23	123	209
44	4	14	134	202
45		15	93	157
46	4	10	98	146
47	3	15	70	97
48	1	10	46	93
49		9	35	88
50		7	23	85
51		11	13	78
52		5	5	82
53		7	4	66
54		6	3	78
55		2	2	52
56	1	3		42
57		1		46
58		3		34
59				26
60				13
61				11
62				14
63				5
64				2
65				
66		1		
Total	30	170	2,002	2,873
Mean length	43.6	46.6	40.6	44.6

Table 3. Dover sole length-frequency distributions, 1950.

Length (cm)	PMFC area					
	2B		2C		2D	
	Males	Females	Males	Females	Males	Females
26						1
27						
28						
29						1
30					4	4
31	1				10	8
32			1		29	15
33			5	1	56	39
34	1	1	3	6	128	58
35	6		18	5	197	87
36	4		21	8	240	133
37	9	5	32	10	265	161
38	14	15	36	17	237	174
39	15	31	46	15	241	197
40	24	38	35	21	201	227
41	21	37	41	42	151	178
42	23	46	40	29	112	201
43	21	46	35	34	117	181
44	9	52	17	29	103	195
45	10	36	13	29	85	138
46	8	37	4	32	60	112
47	3	36	3	36	55	109
48	3	33	6	29	49	86
49	1	35	5	23	19	98
50	1	29	2	22	10	78
51		16		18	4	81
52		17		9	6	62
53		5		8	1	50
54		3		5	2	63
55		4		5	2	56
56		2			1	37
57		3		1		34
58				1		14
59						12
60						9
61				1		7
62						4
63						1
64						3
65						
66						
67						
68						
69						1
Total	174	527	363	436	2,385	2,915
Mean length	41.1	44.8	40.2	44.6	39.2	43.3

Table 4. Dover sole length-frequency distributions, 1951.

Length (cm)	2B		2C		PMFC area 2D		3A		3B	
	Males	Females	Males	Females	Males	Females	Males	Females	Males	Females
27					1					
28					1	1	1			
29					3	2				1
30					2	7		1	1	1
31	2	1			16	14	1		3	
32	1		1	2	44	17	2	1	6	1
33	5	1		7	80	54	2	4	3	
34	7	3	3	12	127	81	12	5	7	4
35	13	5	1	10	200	109	9	11	9	4
36	15	4		15	253	141	22	17	10	3
37	21	8		11	277	180	43	19	13	12
38	16	13		12	275	185	38	22	21	3
39	11	12		3	278	205	59	18	19	10
40	14	18		5	207	209	68	34	18	6
41	13	23		7	205	244	66	46	19	21
42	5	18		1	143	239	45	53	14	14
43	11	15		4	117	247	33	56	13	19
44	12	20		1	105	177	21	56	15	10
45	4	16		2	106	200	43	52	7	11
46	2	20		1	68	167	30	47	3	15
47	2	21			63	149	15	43	3	14
48	2	8		1	24	109	14	26	4	16
49		17		1	11	127	2	20	2	11
50		8			13	93	4	16	1	8
51		7			6	61	3	18	2	4
52		3			4	61		17	1	4
53		2			4	52		17		1
54		1			1	67		19		3
55						35		19		3
56						35		13		
57						27		9		
58						22		6		2
59						10		3		2
60						11		2		
61						9		2		1
62						2				
63						3				2
64						2				
65										
66						1				
Total	156	244	5	95	2,634	3,355	533	672	195	205
Mean length	38.9	43.5	33.8	37.4	39.1	43.1	41.0	45.1	39.8	44.4

Table 5. Dover sole length-frequency distributions, 1952.

Length (cm)	3B		PMFC area					
	Males	Females	2B		2C		2D	
			Males	Females	Males	Females	Males	Females
28							3	3
29							2	2
30	1		1	1	1		13	3
31	1				1	2	27	19
32	3		6	2	8	4	53	45
33	6		3	1	9	6	98	77
34	3		8	2	19	14	178	157
35	7		34	12	35	13	287	192
36	9		26	9	36	17	322	264
37	10		24	15	44	28	349	304
38	13		30	16	54	28	401	285
39	21		17	18	43	36	417	284
40	19		20	23	33	33	371	280
41	18		13	18	35	40	274	268
42	19		19	9	23	31	227	301
43	14		19	15	13	27	147	250
44	13		5	17	16	25	123	270
45	15		5	9	8	20	141	247
46	7		4	5	4	13	113	222
47	3		2	11	3	18	73	178
48	3		1	5	1	11	34	180
49	4			5	1	8	28	172
50	2			7	2	18	22	130
51	1			7		11	3	117
52	2			4		10	4	109
53	1			2		7	4	102
54				3		9		83
55				2		4		79
56						4		62
57						2		45
58						5	1	46
59						1		35
60				1				14
61				1				6
62						1		6
63						2		4
64								
65								1
Total			237	220	389	448	3,717	4,842
Mean length	195		38.5	42.2	38.6	42.8	39.2	43.1
	39.8							

Table 6. Dover sole length-frequency distributions, 1953.

Length (cm)	PMFC area 2D	
	Males	Females
28	1	
29	1	3
30	14	3
31	32	11
32	61	23
33	100	50
34	164	91
35	263	138
36	300	203
37	369	242
38	376	246
39	364	277
40	350	291
41	296	282
42	231	274
43	213	270
44	152	257
45	109	223
46	77	243
47	76	221
48	42	200
49	24	173
50	12	146
51	4	136
52	6	105
53	2	100
54	2	98
55		83
56		65
57		64
58		36
59		20
60		7
61		7
62		9
63		7
64		2
65		1
66		
67		1
Total	3,641	4,608
Mean length	39.2	43.9

Table 7. Dover sole length-frequency distributions, 1954.

Length (cm)	PMFC area			
	2D		3A	
	Males	Females	Males	Females
27		1		
28	3	3	1	
29	4	3	4	2
30	7	5		
31	16	17	1	3
32	35	22	5	1
33	46	37	11	6
34	81	49	27	8
35	118	85	30	12
36	132	107	50	13
37	166	154	61	19
38	145	183	49	32
39	145	207	74	22
40	142	242	86	25
41	142	216	81	28
42	94	211	68	33
43	87	245	54	38
44	71	173	39	39
45	54	227	29	39
46	63	174	20	31
47	45	176	14	43
48	29	169	15	45
49	27	155	7	39
50	15	147	5	37
51	6	87	1	35
52	3	74	1	23
53	2	71		18
54		63		15
55	2	51		8
56		41		20
57	1	38		5
58		22		7
59		11		
60		13		2
61		4		2
62		4		
Total	1,681	3,487	733	650
Mean length	39.5	43.9	40.1	45.5

Table 8. Dover sole length-frequency distributions, 1955.

Length (cm)	PMFC area 2D	
	Males	Females
28		
29	1	
30	3	
31	4	2
32	12	5
33	26	16
34	41	24
35	104	41
36	169	89
37	202	131
38	202	197
39	244	226
40	229	257
41	196	283
42	162	274
43	132	246
44	112	249
45	81	241
46	71	236
47	43	179
48	34	155
49	15	169
50	13	103
51	9	93
52	4	64
53		59
54	2	54
55		45
56		40
57		26
58		26
59		14
60		20
61		11
62		8
63		3
64		2
65		2
66		
67		
68		1
Total	2,111	3,591
Mean length	40.1	44.2

Table 9. Dover sole length-frequency distributions, 1956.

Length (cm)	PMFC area 2D	
	Males	Females
27	1	1
28		
29	1	3
30	3	3
31	6	1
32	19	9
33	26	13
34	39	31
35	94	52
36	149	84
37	173	116
38	213	148
39	186	132
40	223	149
41	191	142
42	136	159
43	118	153
44	85	127
45	58	121
46	38	122
47	29	92
48	23	83
49	8	72
50	9	48
51	4	63
52	1	55
53		49
54	2	51
55		36
56		26
57		23
58		14
59		11
60		4
61		5
62		4
63		2
Total	1,835	2,204
Mean length	39.7	43.7

Table 10. Dover sole length-frequency distributions, 1957.

Length (cm)	PMFC area 2D	
	Males	Females
28	1	1
29	2	1
30	2	2
31	2	3
32	6	4
33	10	11
34	33	34
35	71	43
36	102	79
37	197	108
38	179	126
39	166	125
40	171	204
41	135	181
42	111	185
43	81	152
44	59	147
45	41	123
46	33	131
47	20	112
48	17	105
49	13	76
50	6	73
51	6	60
52	1	34
53		34
54	2	38
55	2	34
56		21
57		25
58		19
59		17
60		13
61		5
62		2
63		1
64		1
65		1
Total	1,469	2,331
Mean length	39.7	43.8

Table 11. Dover sole length-frequency distributions, 1958.

Length (cm)	PMFC area			
	2D		3A	
	Males	Females	Males	Females
27	1			
28				
29				
30	2	2		
31	2	4		
32	3	12	1	
33	14	18		
34	21	29	3	
35	40	43	7	3
36	95	74	9	5
37	137	105	14	6
38	139	131	21	17
39	129	169	21	24
40	94	163	11	14
41	83	164	16	23
42	75	137	13	21
43	41	114	10	12
44	24	89	7	8
45	17	74	2	21
46	10	69	2	16
47	13	66	1	10
48	9	73	2	8
49	8	52	2	13
50	2	40	1	7
51	2	33	1	8
52		43		8
53		21		7
54		28		6
55		14		2
56		14		7
57		11		3
58		9		3
59		3		
60		2		3
61				1
62		3		
63		2		
Total	961	1,811	144	256
Mean length	39.1	42.6	39.9	44.8

Table 12. Dover sole length-frequency distributions, 1959.

Length (cm)	PMFC area 2D	
	Males	Females
29	1	1
30	2	
31	1	1
32	5	1
33	18	13
34	22	31
35	52	53
36	83	83
37	141	128
38	136	182
39	158	180
40	142	194
41	138	225
42	95	172
43	71	147
44	61	129
45	40	122
46	22	110
47	12	102
48	11	81
49	14	58
50	8	55
51	2	42
52	1	50
53		43
54		35
55		27
56		29
57		24
58		15
59		14
60		8
61		4
62		1
63		1
64		3
Total	1,236	2,364
Mean length	39.8	43.3

Table 13. Dover sole length-frequency distributions, 1960.

Length (cm)	PMFC area 2D	
	Males	Females
27	1	1
28		
29	1	1
30	1	
31	8	7
32	5	7
33	22	20
34	41	29
35	69	69
36	90	85
37	153	116
38	179	146
39	187	171
40	175	198
41	137	176
42	124	182
43	95	199
44	61	185
45	45	175
46	27	171
47	17	135
48	22	126
49	11	114
50	4	103
51	1	84
52	1	83
53		73
54		67
55		44
56		47
57		36
58		33
59		19
60		9
61		7
62		2
63		2
64		1
Total	1,477	2,923
Mean length	39.7	44.5

Table 14. Dover sole length-frequency distributions, 1961.

Length (cm)	PMFC area 2D	
	Males	Females
29	1	1
30		3
31	5	3
32	11	7
33	21	21
34	53	30
35	71	53
36	115	73
37	142	117
38	168	157
39	156	206
40	150	184
41	148	195
42	108	167
43	71	169
44	44	140
45	32	105
46	19	104
47	15	68
48	11	91
49	5	63
50	5	60
51	2	41
52		41
53	1	33
54		38
55		17
56		14
57		16
58		12
59		6
60		6
61		2
62		
63		2
64		1
Total	1,354	2,246
Mean length	39.3	42.9

Table 15. Dover sole length-frequency distributions, 1962.

Length (cm)	PMFC area			
	2C		2D	
	Males	Females	Males	Females
30			1	1
31		1	2	5
32	2	3	5	8
33	1	1	22	32
34	3	9	35	64
35	4	13	67	93
36	9	16	82	157
37	6	17	127	200
38	10	20	137	207
39	10	31	129	199
40	8	21	112	168
41	9	43	104	190
42	3	34	82	146
43	4	30	52	139
44		12	35	123
45	1	18	26	135
46		8	24	123
47		12	18	104
48		6	11	92
49	1	9	6	83
50		4	1	82
51		3	2	52
52		4	1	51
53		2		44
54		3		36
55		2		45
56		1		20
57		5		17
58				15
59				13
60				7
61				4
62		1		2
63				3
64				
65				
66				
67				
68				1
Total	71	329	1,081	2,661
Mean length	38.5	41.8	39.3	42.7

Table 16. Dover sole length-frequency distributions, 1963.

Length (cm)	PMFC areas					
	2B		2C		2D	
	Males	Females	Males	Females	Males	Females
28					1	
29						
30					1	2
31					3	1
32					11	7
33		1	1	1	7	6
34				1	18	15
35	5	1	1	3	37	34
36	4	3	3	7	40	45
37	8	8	5	15	60	88
38	10	3	3	6	58	92
39	3	2	2	11	56	89
40	7	3		6	54	113
41	7	2	1	9	41	94
42	3	5		2	26	63
43	3	3		8	25	64
44	1	3		6	21	54
45		3		4	14	53
46	1	3		1	14	50
47					9	43
48		1		1	3	38
49				1	5	24
50		2			2	25
51		2		1	2	19
52		1			2	35
53						21
54		2			2	16
55				1		14
56						10
57						12
58						3
59					1	5
60						5
61						2
62						
63						1
Total	52	48	16	84	513	1,143
Mean length	38.9	42.1	37.1	40.1	39.3	42.8

Table 17. Dover sole length-frequency distributions, 1964.

Females	Length (cm)	PMFC areas					
		2B		2C		2D	
		Males	Females	Males	Females	Males	Females
	26						2
	27						1
2	28					3	1
1	29					5	2
7	30	1				5	3
6	31			1	1	15	10
15	32	1				34	27
34	33	4			1	57	47
45	34	7	2		4	93	70
88	35	6	1	2	4	89	94
92	36	10	3	3	6	139	103
89	37	11	3	5	2	122	138
113	38	5	2	8	4	138	124
94	39	5	2	7	6	109	137
63	40	6	2	6	11	88	129
64	41	5	3	6	6	93	115
54	42	1		2	4	79	100
53	43		3		1	64	94
50	44		1		1	36	73
43	45		1		2	31	61
38	46	1	1			17	55
24	47	1	3		1	10	47
25	48					6	44
19	49		2		1	5	41
35	50	1			1	4	28
21	51		3			1	25
16	52		1				17
14	53				1		16
10	54		2				18
12	55					1	17
3	56				2		9
5	57		1				7
5	58					1	6
2	59						9
	60						
	61						
<u>1</u>	62						3
1,143	63						3
	64						
42.8	65						<u>1</u>
	Total	65	36	44	56	1,245	1,677
	Mean length	37.3	43.1	38.2	40.2	38.3	41.1

Table 18. Dover sole length-frequency distributions, 1965.

Length (cm)	PMFC area					
	2B		2C		2D	
	Males	Females	Males	Females	Males	Females
27					1	1
28						
29						1
30					7	3
31			1		10	10
32	2				24	25
33	5		2		55	43
34	5		3	2	103	59
35	8	1		6	145	76
36	6	4	4	5	146	133
37	3	7	4	8	147	161
38	2	6	8	6	145	145
39		12	3	10	121	141
40	1	13	2	6	107	135
41		5		4	87	122
42		4	1	5	65	115
43	1	3	1	4	58	93
44		4		2	41	89
45		2		2	26	87
46		2		1	11	75
47		1		2	12	56
48		3		4	7	44
49					3	55
50				3	2	41
51					2	31
52						32
53						19
54				1		16
55						10
56					1	12
57						13
58						7
59						8
60						3
61						2
62						
63						1
Total	33	67	29	71	1,326	1,864
Mean length	35.3	40.4	37.1	40.5	38.1	41.5

Table 19. English sole age-length-frequency distributions, PMFC area 2D, 1948.

Males

1

1,864

41.5

D
Females

1
1
3
10
25
43
59
76
133
161
145
141
135
122
115
93
89
87
75
56
44
55
41
31
32
19
16
10
12
13
7
8
3
2
1

Age	Males						No	
	3	4	5	6	7	8		9
28		1						
29								
30		3	3	3	3			
31	1	3	5	1	1			
32	1	2	1	4	1	1		1
33		2	3	1	1	1		
34				1	1	1		
35				1	1	1	1	
36				1			1	
37					1			
38								
39							1	
40							1	
41							1	
42							1	
43							1	
44							1	
45							1	
46							1	
47							1	
48							1	
49							1	
50							1	
51							1	
52							1	
53							1	
54							1	
55							1	
56							1	
57							1	
58							1	
59							1	
60							1	
61							1	
62							1	
63							1	
64							1	
65							1	
66							1	
67							1	
68							1	
69							1	
70							1	
71							1	
72							1	
73							1	
74							1	
75							1	
76							1	
77							1	
78							1	
79							1	
80							1	
81							1	
82							1	
83							1	
84							1	
85							1	
86							1	
87							1	
88							1	
89							1	
90							1	
91							1	
92							1	
93							1	
94							1	
95							1	
96							1	
97							1	
98							1	
99							1	
100							1	

mean length 31.5

average age of sample = 6.0 years

Table 20. English sole age-length-frequency distributions, PMFC area 2D, 1948.

Age h	Females													No.
	3	4	5	6	7	8	9	10	11	12	13			
1	1													1
1	1													1
4	3													2
4	5													9
3	16													12
5	5													27
3	11													16
1	11													30
	8													47
	2													39
	7													37
	1													50
														44
														34
														27
														26
														33
														22
														25
														8
														3
														2

22	72	86	94	104	55	37	1	1	1	1	2			2
4.4	14.5	17.3	18.9	20.9	11.1	7.4	14	9	3	1	497			
30.8	33.0	34.7	37.0	39.0	39.8	41.9	43.9	42.9	44.7	42.0	37.2			

average age of sample = 6.3 years

Table 21. English sole age-length-frequency distributions, PMFC area 3A, 1948.

Age	3	4	5	6	7	8	9	10	No.			
22	4.4	14.5	17.3	18.9	20.9	11.1	7.4	2.8	1.8	0.6	0.2	99.9
30.8	33.0	34.7	37.0	39.0	39.8	41.9	43.9	42.9	44.7	42.0	37.2	497

Table 21. English sole age-length-frequency distributions, PMFC area 3A, 1948.

Age	Females										No.	
	3	4	5	6	7	8	9	10				
1			1									1
		1	1		1		1		1			1
			1									2
						1						1
												2
												1
												1
												2
	1	1	3	3	3	7	4	2	2	1	1	22
4.5	4.5	4.5	13.6	13.6	13.6	31.8	18.2	9.1	9.1	4.5	4.5	99
an length	33.0	34.0	34.7	39.3	37.7	41.5	35.5	36.0	37			37

average age of sample = 6.8 years

NO. 23

Table 22. English sole age-length-frequency distributions, PMFC area 2D, 1949.

Age h	<u>Males</u>										No.	
	3	4	5	6	7	8	9	10				
1												1
		1	1	1	1	1						1
		3	2	6	1		1					3
			5	4	4	1						8
			4	2	4	5						11
			1	6	8	7			1			18
			1	4	2	3			3			24
				1	4	1			1			16
					1	2			1			7
					1	1			1			3
												1
												1

1	10	27	20	11	5	1	102
1.0	9.8	26.5	19.6	10.9	4.9	1.0	100.
length	31.0	31.6	32.9	33.8	34.4	34.0	32.
ge age of sample = 6.1 years							

Table 23. English sole age-length-frequency distributions, PMFC area 2D, 1949.

Table 24. English sole length-frequency distributions, 1949.

Length (cm)	PMFC area			
	2C		3A	
	Males	Females	Males	Females
25				
26				
27				
28				
29				
30			2	5
31		3	5	5
32		5	6	5
33		18	11	5
34		22	8	12
35		45	4	6
36		40	3	9
37		37		15
38		28		9
39		22		13
40		22		19
41		25		10
42		7		7
43		4		13
44		5		10
45		2		8
46		2		5
47		1		3
48				1
49				
50				2
Total	0	288	39	162
Mean length		37.2	33.1	39.0

s, 1949.

Table 25. English sole length-frequency distributions, 1950.

Length (cm)	PMFC area					
	2B		2C		2D	
emales	Males	Females	Males	Females	Males	Females
					1	
25						
26					1	4
27	2				8	3
28	1	1	1	2	25	16
29	2	1	11	4	90	40
5	2	8	11	16	126	84
5	8	31	16	24	121	155
5	9	42	23	52	130	188
5	10	51	10	88	80	273
12	3	83	4	111	50	313
6	2	92	5	112	15	315
9	1	102		150	6	277
15		88	2	130		263
9		80	1	95	4	246
13	1	65		74		195
19		52		59	3	155
10		31		25	1	104
7		13		14		94
13		12		10		74
10		5		7		44
8		1		2		33
5		1		1		9
3		1		2		9
1		1				1
2						
Total	41	761	84	978	661	2,895
Mean length	32.0	36.3	31.7	36.1	32.2	37.1

162

39.0

Table 26. English sole length-frequency distributions, 1951.

Length (cm)	PMFC area			
	2D		3B	
	Males	Females	Males	Females
26		2		
27		2		
28	7	4		
29	8	12		
30	9	22	1	
31	53	42	2	
32	82	78	19	2
33	90	126	33	7
34	106	139	42	11
35	67	161	38	9
36	21	158	28	18
37	7	187	14	37
38	7	188	4	36
39		182	1	47
40	2	158	1	42
41	1	136		48
42	1	87		42
43		64		34
44		39		25
45		31		21
46		17		16
47		10		14
48		4		4
49		3		3
50				1
Total	461	1,852	183	417
Mean length	33.2	37.5	34.4	40.5

Table 27. English sole length-frequency distributions, 1959.

Length (cm)	PMFC area 2D	
	Males	Females
30	1	
31	1	
32	1	
33	6	
34	1	
35	2	
36		1
37		
38		2
39	1	1
40		12
41		32
42		53
43		120
44		178
45		161
46		133
47		114
48		86
49		90
50		71
51		41
52		35
53		25
54		19
55		5
56		2
57		2
58		1
59		2
Total	13	1,186
Mean length	33.4	36.3

Table 28. English sole length-frequency distributions, 1960.

Length (cm)	PMFC areas			
	2D		3A	
	Males	Females	Males	Females
26		1		
27		2		
28		9		
29		22		
30		46		1
31		79		5
32		129		11
33		161		34
34		161		61
35		127		67
36		90		75
37		71		50
38		58		18
39		36		21
40		22		12
41		12		15
42		11		6
43		9		10
44		6		6
45				6
46		1		5
47				1
48		1		2
49		2		1
Total	0	1,056	0	407
Mean length		34.4		36.5

Table 29. English sole length-frequency distribution, 1961.

Length (cm)	PMFC area			
	2D		3B	
	Males	Females	Males	Females
27		1		
28				
29				2
30		5		2
31		20		11
32		47		21
33		137		46
34		193		30
35		163		50
36		155		62
37		137		66
38		100		63
39		49		39
40		32		24
41		37		19
42		25		12
43		16		14
44		15		6
45		9		4
46		4		2
47		3		2
48		3		1
49		2		
50				1
Total	0	1,153	0	477
Mean length		36.1		36.9

Table 30. English sole length-frequency distributions, 1963.

Length (cm)	PMFC area			
	2C		2D	
	Males	Females	Males	Females
30		4	3	1
31		3	9	7
32		16	12	42
33		12	12	60
34		11	8	44
35		9	9	47
36		14	2	39
37		17	2	31
38		4		31
39		3		32
40		4		27
41			1	20
42			1	23
43		1		5
44				17
45		1		10
46				3
47				1
48				
49	—	—	—	<u>1</u>
Total	0	99	59	441
Mean length		34.9	33.3	36.7

Table 31. English sole length-frequency distributions, 1964.

Length (cm)	PMFC area					
	2C		2D		3A	
	Males	Females	Males	Females	Males	Females
26			2			
27			3	1		
28			21	4	1	
29			39	9		
30			92	42	7	4
31			97	102	15	11
32	1	5	106	203	13	17
33	4	12	78	234	7	17
34	7	15	77	294	7	11
35	4	18	38	229	2	17
36	1	10	21	247	4	12
37	2	10	7	213		18
38		7	6	143		14
39	1	1	5	124		6
40		1	1	86		12
41		1		78		1
42			1	39		3
43		1		34		3
44				14		2
45				12		4
46				3		
47				2		
48				3		
49						
50				1		
Total	20	81	594	2,117	56	152
Mean length	34.6	35.2	32.1	35.6	32.2	35.8

Table 32. English sole length-frequency distributions, 1965.

Length (cm)	PMFC area					
	2B		2D		3B	
	Males	Females	Males	Females	Males	Females
25			1			
26			4			
27			7			
28			22	3		
29			40	16		
30			65	73		1
31			83	178	3	2
32	1	1	85	293	10	9
33	1	6	73	364	16	16
34	1	10	35	344	2	8
35	1	11	17	287	1	6
36	1	14	13	262	1	4
37		12	1	169	1	3
38		12		125		6
39	1	9		93	1	3
40		11		78		2
41		2		59		1
42		5		33		
43				26		2
44	1			17		2
45				13		
46				3		
47				8		
48				2		
Total	7	93	446	2,446	35	65
Mean length	36.1	37.0	31.5	34.9	33.0	35.2

Table 33. Petrale sole age-length-frequency distributions, PMFC area 2C, 1948.

Age	Length	Males
5	6	
	7	

Table 33. Petrale sole age-length-frequency distributions, PMFC area 2C, 1948.

Age length (m)	Males							No.
	5	6	8	9				
8		1					1	1
9				1				1
0								
1	1							1
0.	1	1		1			3	3
mean length	33.3	33.3		33.3			33.3	99.9
average age of sample = 6.7 years	41.0	38.0		39.0			39.0	39.3

Table 34. Petrale sole age-length-frequency distributions, PMFC area 2C, 1948.

Age length	Females							No.
	5	6	7	8	9	10		
		1						1
		1		1				1
	1				1			1
					1	1		2
			2		1		1	3
	1	2	2	3	1	2	11	11
mean length	9.1	18.2	18.2	27.3	9.1	18.2	100.1	100.1
average age of sample = 7.6 years	45.0	42.0	48.0	46.0	46.0	48.0	45.9	45.9

Table 35. Petrale sole age-length-frequency distributions, PMFC area 2D, 1948.

Age	3	4	5	6	7	8	Males			12	13	14	No.
							9	10	11				
		1		1									1
		1	1										1
			1	1	1	1							1
			4	3	3	1							3
			1	3	4	1	1						8
	1	1	2	4	2	1	1						5
	1	2	1	3	3	2	10						10
		1	1	6	7	8	10						10
		1	2	4	7	1	20						15
		1	1	3	4	1	15						8
		1	1	2	3	1	13						13
		2	1	2	3	2	10		1				10
				1	3	2	7		1				7
				3	3	1	6		1				6
				1	1	2	5		1				5
													1
	2	11	15	36	31	18	7	4	1	0	1	1	125
	1.6	8.8	12.0	28.8	24.8	14.4	5.6	3.2	0.0	0.0	0.8	0.8	100.0
mean length	35.5	36.8	35.5	37.4	38.6	38.7	39.9	42.6	0.0	0.0	49.0	49.0	38.0

average age of sample = 6.6 years

Table 36. Petrale sole age-length-frequency distributions, PMFC area 2D, 1948.

age	Females														No.
	3	4	5	6	7	8	9	10	11	12	13	14	15		
1														1	
		2		1										3	
						1								6	
						1								7	
	1		4	4		1								5	
		4	4	4	1	1								10	
		1	1	4	1	2		1						11	
			2	3	3	4								9	
			1	3	2	4		1						17	
				2	5	4								14	
			1	3	5	3								13	
				1	3	8								16	
					2	2		1						22	
					6	6		3						16	
					3	6		1						16	
					3	3		1						12	
						3		2						6	
						3		4						10	
						1		2						10	
						1		2					1	20	
						3		5						5	
						6		2					2	5	
								1						5	
								1						4	
								1						4	
								1					1	2	
1	1	14	45	34	51	34	25	17	15	15	4	3	1	244	
0.4	5.7	18.4	13.9	20.9	20.9	13.9	10.2	7.0	6.1	6.1	1.6	1.2	0.4	99.9	
length	34.0	35.9	36.2	40.1	42.4	43.3	46.4	46.6	49.1	49.1	51.3	49.3	54.0	42.0	

age age of sample = 7.3 years

Table 38. Petrale sole age-length-frequency distributions, PMFC area 2D, 1949.

Age	Females													No.
	4	5	6	7	8	9	10	11	12	13				
1														1
1														1
		3												3
		1												1
		1												1
		3												4
1		3												3
2		3												7
		2												7
		2												6
		2												6
2		2												11
		2												9
														4
														6
														2
														4
														2
														4
														3
														3
														5
														1
														2
														3
														3
7	20	11	17	18	12	2	5	2	1	2	1	1	95	
7.4	21.1	11.6	17.9	18.9	12.6	2.1	5.3	2.1	1.1	2.1	1.1	100.1		
length	35.7	37.2	39.4	41.5	43.3	44.9	50.5	51.0	52.5	53.0	53.0	41.9		

age age of sample = 7.1 years

Table 39. Petrale sole length-frequency distributions, 1949.
(except January for area 2D)

Length (cm)	PMFC area					
	2B		2C		2D	
	Males	Females	Males	Females	Males	Females
26					2	
27	1				1	
28			2		5	2
29		1	3	1	6	6
30			1		11	10
31			2	5	25	12
32		1	4	8	45	24
33	2		4	10	69	28
34	4	1	6	10	58	23
35	3		9	8	122	41
36	2	6	11	15	116	52
37	6	4	16	17	161	44
38	3	6	19	14	157	55
39	6	4	25	18	150	45
40	4	2	20	20	99	55
41	3	9	12	25	72	80
42		5	8	25	50	76
43		4	3	22	29	63
44	2	4	1	33	22	42
45		1	1	30	4	47
46		6		27	2	38
47		4	1	36		38
48		3	3	24	1	22
49		2		31		20
50				21		8
51		1		13		6
52				9		5
53		1		10		1
54				2		2
55						2
56				3		
57						
58						
59						1
Total	36	65	151	437	1,207	848
Mean length	37.4	41.6	38.0	43.5	37.2	40.5

Table 40. Petrale sole length-frequency distributions, 1950.

Length (cm)	PMFC area					
	2B		2C		2D	
	Males	Females	Males	Females	Males	Females
26						1
27						2
28					4	2
29	2				9	9
30	7	8			11	15
31	15	13	1		30	30
32	20	19	4		29	23
33	22	16	1	1	47	46
34	38	18	2	2	70	47
35	29	37	2	6	79	59
36	31	34	3	7	88	48
37	46	24	7	4	110	56
38	39	36	9	6	159	64
39	35	51	8	4	135	69
40	22	45	3	14	127	121
41	14	35	5	11	87	114
42	12	54	2	3	79	133
43	5	41		7	53	118
44	4	53	1	13	24	124
45	2	48		16	12	124
46		50		9	5	127
47		59		14	4	89
48		47		12		77
49		34		7		67
50		20		5		56
51		10		1		35
52		5		5		25
53		4		4		6
54		1		1		10
55						5
56		1				3
57						
58						1
Total	343	763	48	152	1,162	1,706
Mean length	36.5	41.9	37.6	43.7	37.9	42.2

Table 41. Petrale sole length-frequency distributions, 1951.

Length (cm)	PMFC area			
	2D		2C	
	Males	Females	Males	Females
29	6	4	2	2
30	16	8	2	1
31	20	15	2	3
32	34	25	3	2
33	44	26	5	4
34	49	32	4	4
35	62	39	7	3
36	90	48	5	7
37	81	39	13	4
38	82	42	6	7
39	78	42	6	3
40	89	38	3	5
41	78	38	3	12
42	50	39	3	6
43	22	52	1	1
44	17	50	2	10
45	8	53		8
46	5	55	1	11
47	1	52		8
48	4	60		6
49		46		13
50		28		5
51		31		3
52		23		1
53		25		2
54		10		
55		6		
56		2		
Total	836	928	68	131
Mean length	37.6	42.5	36.6	42.4

Table 42. Petrale sole length-frequency distributions, 1960.

Length (cm)	PMFC area 2B	
	Males	Females
28	1	
29	3	
30	2	
31	8	
32	10	2
33	12	4
34	11	4
35	14	7
36	14	11
37	6	10
38	9	8
39	4	5
40	6	7
41	4	9
42	2	4
43		8
44		3
45		3
46		3
47		2
48		1
49		1
50		1
51		1
Total	106	94
Mean length	35.0	39.4

Table 43. Petrale sole length-frequency distributions, 1963.

Length (cm)	PMFC area			
	2C		2D	
	Males	Females	Males	Females
30				1
31				2
32			2	4
33		1		13
34			2	8
35	3	3	4	10
36	1	2	5	14
37	5	3	1	23
38	7	2	4	15
39		1	3	16
40	5	4	9	11
41		3	3	12
42	4	3	3	12
43	4	5	1	5
44	2	2		3
45		8	1	2
46	4	3		3
47	2	2		2
48	3	4		2
49	3	2	1	
50	2	2		1
51	2			2
52	<u>1</u>	<u>2</u>	—	—
Total	48	52	39	161
Mean length	42.6	43.0	38.6	38.3

Table 44. Petrale sole length-frequency distributions, 1964.

Length (cm)	PMFC area			
	2B		2D	
	Males	Females	Males	Females
28			1	
29			1	1
30			6	4
31			12	10
32	3		26	12
33	2		43	18
34	6		78	21
35	5		91	34
36	4		115	33
37	2		111	49
38	2	2	103	71
39		2	94	72
40		1	72	86
41		4	45	120
42		6	28	98
43		5	19	111
44		6	9	91
45		3	10	80
46	1	1	6	60
47		2	3	48
48		4	2	38
49		1	1	36
50		3		25
51		3		14
52				12
53				13
54				4
55				3
57				2
58	—	<u>1</u>	—	<u>1</u>
Total	25	44	876	1,167
Mean length	35.2	44.7	37.3	42.1

Table 45. Petrale sole length-frequency distributions, 1965.

Length (cm)	PMFC area					
	2C		2D		3A	
	Males	Females	Males	Females	Males	Females
27			1		1	
28			3			
29			1	3		1
30	4	5	19	8	7	2
31	14	2	31	17	11	9
32	23	17	43	16	13	8
33	18	11	57	26	12	11
34	27	13	75	40	13	12
35	24	11	66	35	18	9
36	10	14	82	34	10	13
37	34	7	88	51	16	6
38	30	10	95	51	14	11
39	15	14	70	52	20	8
40	8	13	37	74	16	11
41	5	12	24	81	7	20
42	3	11	9	80	9	19
43	2	10	5	79	4	16
44	2	10	3	103	1	15
45	2	4	2	76	1	14
46	1	2	2	79	1	6
47		7		45	1	9
48		3	1	36		11
49		1		23		4
50				33		2
51				9		3
52		1		9		1
53				8		
54				2		
55				1		2
56				4		1
57				1		1
Total	222	178	714	1,076	175	225
Mean length	35.8	38.3	36.1	41.8	36.5	40.5

Table 46. Pacific ocean perch age-length-frequency distributions, PMFC area 2C and 2D, 1951-52.

Age	Males																		
	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	No.

1

1

	1								1										1	2	
					1			1												1	1
					2	1		3												4	4
					1	2		2												10	10
					1	3		5												9	9
					1	2		7		1										18	18
						1		2		2										23	23
								2		6										20	20
								1		9										31	31
								6		9					1					41	41
								5		9					1					31	31
								5		2					2					19	19
								2		6					6					12	12
								2		3					1					3	3
								2		1					1					3	3
								2		1					1					1	1
								2		1					1					1	1
								2		1					1					1	1

	1	0	1	1	6	10	19	39	41	34	24	24	12	9	4	3	0	1	229
0.4	0.0	0.4	0.4	2.6	4.4	8.3	17.0	17.9	14.8	10.5	10.5	5.2	3.9	1.8	1.3	0.0	0.4	99.8	
18.0	0.0	28.0	30.0	31.2	32.8	34.2	34.9	35.3	36.5	37.3	38.1	38.8	38.6	37.3	39.7	0.0	42.0	35.9	

age age = 10.7 years

Table 47. Pacific ocean perch age-length-frequency distributions, PMFC area 2C and 2D, 1951-52.

Table 48. Pacific ocean perch length-frequency distributions, 1963.
(unsexed)

Length (cm)	PMFC area	
	2C	2D
29	1	1
30	4	3
31	9	
32	15	1
33	29	1
34	54	6
35	62	13
36	55	16
37	48	15
38	36	23
39	65	32
40	104	20
41	70	13
42	56	19
43	40	16
44	22	13
45	5	3
46	8	4
47	9	1
48		
49	2	
50		
51	<u>6</u>	<u>—</u>
Total	700	200
Mean length	38.6	39.3

Table 49. Pacific ocean perch length-frequency distributions, 1964.
(unsexed)

Length (cm)	PMFC area			
	<u>2B</u>	<u>2C</u>	<u>2D</u>	<u>3A</u>
24			1	
25				
26				
27			6	
28			11	
29		1	10	
30	4	7	31	
31	3	13	30	1
32	3	22	47	
33	1	52	60	2
34	1	77	104	4
35	1	124	93	5
36	6	136	143	12
37	10	162	165	19
38	12	211	134	30
39	15	223	129	31
40	15	278	141	35
41	13	209	105	30
42	12	179	89	14
43	12	120	60	10
44	2	57	37	4
45	3	21	15	4
46		21	3	4
47	1	8		
48	2	5		1
49	1			
50	<u>1</u>			
Total	118	1,926	1,414	206
Mean length	39.5	39.0	37.5	39.5

Table 50. Pacific ocean perch length-frequency distributions, 1965.
(unsexed)

Length (cm)	PMFC area		
	<u>2C</u>	<u>2D</u>	<u>3A</u>
21	1		
22			
23			
24	1	1	
25	2	1	
26	1	1	
27	6	1	1
28	9	4	
29	6	2	
30	7	9	1
31	12	10	4
32	30	15	8
33	53	24	11
34	77	60	17
35	113	62	29
36	179	95	37
37	218	95	38
38	254	104	35
39	301	106	40
40	421	91	49
41	352	86	32
42	242	58	33
43	110	33	26
44	30	17	28
45	22	12	8
46	15	1	3
47	22	1	
48	14		
49	3		
50	1		
51	1		
Total	2,503	889	400
Mean length	39.0	38.0	38.8