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SURVEYS OF JUVENILE SABLEFISH IN ALASKAN WATERS, 1995-1997

by

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ABSTRACT

This report summarizes the results of the 1995-97 National Marine Fisheries Service juvenile sablefish surveys of the Gulf of Alaska and eastern Aleutian Islands. The survey area in the Gulf of Alaska extends from Islands of Four Mountains (170° W long.) eastward to Dixon Entrance (133° 25' W long.) and covers the upper continental slope and selected gullies. The survey area in the eastern Aleutian Islands extended from Amchitka Pass (178° 58' W long.) to the west end of Umnak Island (170° 12' W long.). A variable mesh size floating gillnet was fished at night. Sablefish was the principal target species but other species such as juvenile Pacific salmon (*Oncorhynchus* sp.), Pacific saury (*Coloabis saira*) and juvenile rock greenling (*Hexagrammos decagrammus*) also were abundant. Catch rates of young-of-the-year sablefish were highest during 1995 and 1997 and after mid-July. Mean lengths of young-of-the-year sablefish ranged from 10 cm to 19 cm with the largest fish caught during late August and early September.

INTRODUCTION

Sablefish, (*Anoplopoma fimbria*), is a slow growing, long-lived demersal fish of the continental slope of the North Pacific (McFarlane and Beamish, 1983). Sablefish spawn in deep off-shore waters and the larvae make their way to the surface maturing to juvenile sablefish that are epipelagic and migrate shoreward, where they mature into adults and migrate back to deep water recruiting to the commercial fishery around age 4 (Kendall and Matarese, 1987). Recruitment is characterized by large variations in year-class strength, with catches being dominated by one year class for 5 or more years (Kendall and Matarese, 1987). A better understanding of physical and biological determinants of juvenile growth and survival may contribute to recruitment forecasts 3 to 5 years before a year class enters the fishery (Kendall and Matarese, 1987).

During 1995, Scientists from the National Marine Fisheries Service (NMFS), Auke Bay Laboratory initiated a feasibility study of sampling for juvenile sablefish, especially young-of-the-year (yoy), with the goal of collecting biological information on yoy sablefish and possibly predicting future year-class strength of sablefish. The juvenile sablefish survey is conducted from a platform of opportunity, the sablefish longline survey vessel. The sablefish longline survey has been conducted annually since 1979 to assess relative abundance of adult sablefish. The survey vessel provides a platform to study the biology of yoy sablefish and other epipelagic fish. By fishing floating gillnets, information on the distribution and abundance of yoy sablefish in the Gulf of Alaska, Aleutian Islands, and eastern Bering Sea can be obtained. Age and growth and food-habit studies are being completed to supply information that may help explain why some year classes are stronger than others. This report presents the results of the gillnet sampling conducted during the 1995-97 juvenile sablefish surveys. More detailed results will be reported in a subsequent technical document.

MATERIALS AND METHODS

Survey Area and Operations

The survey area of the NMFS Juvenile Sablefish Survey in the Gulf of Alaska extends from Islands of Four Mountains (170° W long.) eastward to Dixon Entrance (133° 25' W long.) (Fig. 1) and covers the upper continental slope and selected gullies. The survey area in the eastern Aleutian Islands extended from Amchitka Pass (178° 58' W long.) to the west end of Umnak Island (170° 12' W long.). Beginning in 1996, the eastern Aleutian Islands were surveyed. During future years the eastern Aleutian Islands and eastern Bering Sea will be surveyed on alternating years along with the Gulf of Alaska. During 1995, gillnet sampling was conducted in only the eastern Gulf of Alaska to determine the feasibility of the sampling. After the 1995 survey it was determined that gillnets could be used and sampling was expanded to cover the entire survey area during subsequent years.

Sampling Young-of-the-Year Sablefish

VESSELS AND GEAR

The chartered fishing vessel *Ocean Prowler* (47 m) was used for the 1995 and 1997 surveys, and the chartered fishing vessel *Alaskan Leader* (46 m) was used for the 1996 survey.

1995 Survey

A 300 m variable mesh gillnet was fished at seven different stations during the 1995 Sablefish Longline Survey of the Gulf of Alaska between August 15 and September 5. The net was generally fished between midnight and 0100 Alaska Daylight Time (ADT) until about 0500 ADT. The net drifted freely with the tide while being monitored by vessel personnel. The net was retrieved and fish were picked from the net after retrieval. All fish were counted and measured and a sample of 50 juvenile sablefish was frozen for subsequent age determination and food habit analysis. All salmon were counted and frozen for subsequent identification to species, age determination, and food habit analysis. Size of mesh that fish were caught in was also recorded. The net was 300 m long, 3 m deep, and made from the following materials.

- 1.) 0.12 mm diameter, 25 mm (1") stretched mesh, 150 meshes deep x 150 m stretched
- 2.) 0.15 mm diameter, 31 mm (1.25") stretched mesh, 125 meshes deep x 150 m stretched
- 3.) 0.20 mm diameter, 38 mm (1.5") stretched mesh, 100 meshes deep x 150 m stretched
- 4.) 300 m 30 lb/100 fm lead core line
- 5.) 300 m 19 mm foam core line of a highly visible color

All netting is nylon monofilament, double knot, depth stretched, double selvage on both sides, dyed green and hung in a 2:1 ratio.

1996 and 1997 Surveys

During 1996 and 1997 a floating gillnet 200 m long and 3 m deep with variable mesh sizes increasing .25" (6 mm) every 50 m from 0.75" (19 mm) to 1.5" (38 mm) was used. Two nets were tied together to make a 400 m net. If large numbers of fish were expected to be caught only one 200 m net was used. The net was generally fished between midnight and 0100 ADT (Alaska Daylight Time), until about 0500 ADT. All fish were counted by species. A random subsample of 30 fish per mesh size of each species was measured for length. A further subsample of 30 sablefish and 30 salmon were frozen for subsequent age determination and food habit analysis.

Juvenile sablefish gillnet specifications. The net was 200 m long and 3 m deep and made from the following materials.

- 1.) 0.12 mm diameter, 19 mm (3/4") stretched mesh, 200 meshes deep x 100 m stretched
- 2.) 0.12 mm diameter, 25 mm (1") stretched mesh, 150 meshes deep x 100 m stretched
- 3.) 0.15 mm diameter, 31 mm (1.25") stretched mesh, 125 meshes deep x 100 m stretched
- 4.) 0.20 mm diameter, 38 mm (1.5") stretched mesh, 100 meshes deep x 100 m stretched
- 5.) 200 m 30 lb/100 fm lead core line
- 5.) 200 m 19 mm foam core line of a highly visible color

All netting is nylon monofilament, double knot, depth stretched, double selvage on both sides, dyed green and hung in a 2:1 ratio.

RESULTS

1995

Catch Rates

Seven gillnet sets were made during 1995 (Table 1). Pacific saury, juvenile sablefish, and chum salmon (*Oncorhynchus keta*) were the most abundant species caught during 1995 (Table 2a). A total of 742 juvenile sablefish were caught (all young-of-the-year) in the 7 gillnet sets during 1995. Only the eastern Gulf of Alaska was sampled during 1995.

Sablefish Length Compositions

During 1995 the sablefish caught had mean lengths from 15 cm to 19 cm; the largest fish were caught during late August and early September (Fig. 4).

1996

Catch Rates

Thirty four gillnet sets were made during 1996 (Table 1). Juvenile sablefish, adult and juvenile pink salmon (*Oncorhynchus gorbuscha*), and unidentified juvenile Pacific salmon were the three most abundant species caught during 1996 (Table 2b). A total of 391 juvenile sablefish (mostly young-of-the-year) were caught from 18 different gillnet sets (Table 2b). Juvenile sablefish catch rates were highest during July (Fig. 2) and in the eastern Gulf of Alaska (Fig. 3). The catch rates of juvenile sablefish during 1996 were the lowest observed during the three survey years (Fig 2).

Sablefish Length Compositions

During 1996 the sablefish caught had mean lengths ranging from 10 cm to 22 cm. The largest (20 cm-22 cm) fish were age 1+ fish caught in the Aleutian Islands region during May (Figs. 4 and 5).

1997

Catch Rates

Thirty-five gillnet sets were completed during 1997 (Table 1). Juvenile sablefish, Pacific saury, and rock greenling were the three most abundant fishes caught (Table 2c). A total of 801 juvenile sablefish (all young-of-the-year) were caught from 13 different gillnet sets (table 2c). Juvenile sablefish catch rates were highest during July (Fig. 2) and in the eastern Gulf of Alaska (Fig 3).

Sablefish Length Compositions

The sablefish caught during the 1997 survey had mean lengths ranging from 10 cm to 16 cm (Fig. 4). The largest fish (16 cm) were caught during late July and early August (Fig. 4) in the eastern Gulf of Alaska (Fig 5).

REFERENCES

- Kendall, A. W., Jr., and A. C. Matarese 1987. Biology of eggs, larvae, and epipelagic juveniles of sablefish, *Anoplopoma fimbria*, in relation to their potential use in management. Mar. Fish. Rev. 49(1): 1-13.
- McFarlane, G. and R.J. Beamish 1983. Biology of adult sablefish (*Anoplopoma fimbria*) in waters off western Canada. In Proceedings of the Second Lowell Wakefield Fisheries, Symposium, Anchorage Alaska, p 59-80. Alaska Sea Grant Rep. 83-3.

Table 1.-- Station number, and starting and ending positions for the NMFS juvenile sablefish survey of the Eastern Aleutians and Gulf of Alaska, 1995-1997.

Station no.	Start latitude (ddmm.m)	Start longitude (dddmm.m)	End latitude (ddmm.m)	End longitude (dddmm.m)	Date (m/d/y)
35	5841.1	14038.4	5842.7	14035.34	8/15/95
37	5808.1	13844.5	5810.4	13842.7	8/16/95
38	5752.97	13844.5	5751.84	13726.81	8/19/95
39	5737.17	13631.43	5736.5	13730.91	8/21/95
53	5555.83	13453.68	5554.1	13450.57	8/29/95
47	5426.97	13355.88	5425.86	13356.67	9/2/95
46	5453.96	13417.22	5452.38	13422.86	9/4/95
58	5153.25	17508.85	5152.54	17510.16	5/24/96
55	5135.63	17737.09	5135.15	17737.84	5/26/96
53	5124.18	17836.27	5124.56	17833.12	5/27/96
42	5146.42	17857.43	5146.96	17859.21	5/28/96
39	5208.22	17537.66	5210.89	17534.41	5/31/96
38	5215.11	17450.77	5215.69	17452.98	6/1/96
8	5418.73	16103.36	5418.31	16006.51	6/13/96
9	5421.63	16013.77	5420.48	16006.51	6/14/96
10	5430.52	15915.71	5428.41	15923.24	6/15/96
15	5546.16	15508.19	5545.37	15510.97	6/23/96
17	5555.69	15401.58	5556.71	15405.57	6/29/96
18	5618.34	15304.39	5616.87	15302.08	6/30/96
20	5707.12	15113.36	5708.39	15112.63	7/2/96
21	5724.13	15033.95	5724.13	15038.98	7/3/96
23	5758.36	14909.88	5758.74	14909.5	7/12/96
87	5905	14924	5903.62	14923.21	7/15/96
26	5907.32	14838.4	5908.04	14834.78	7/17/96
27	5909.21	14736.31	5905.6	14737.9	7/18/96
88	5937.08	14657.97	5939.77	14658.08	7/19/96
28	5915.89	14651.24	5919.69	14653.18	7/20/96
29	5930.36	14532.64	5928.13	14540	7/21/96
31	5933.29	14339.22	5932.7	14339.22	7/23/96
62	5940.22	14323.35	5941	14326.48	7/24/96
32	5932.98	14233.98	5932.25	14240.37	7/25/96
33	5923.1	14209.63	5923.94	14214.75	7/26/96
78	5929.7	14215.84	5929.41	14221.02	7/27/96
63	5925.11	14056.38	5923.5	14058.03	7/28/96
35	5841.23	14038.41	5841.08	14040.4	7/30/96
36	5828.26	13927.94	5827.03	13926.85	7/31/96

37	5808.55	13844.27	5808.56	13844.27	8/1/96
38	5752.51	13722.62	5752.51	13722.64	8/2/96

Table 1.- continued

Station	Start Latitude	Start Longitude	End Latitude	End Longitude	Date
60	5754.94	13700.82	5755.98	13702.22	8/3/96
81	5620.3	13536.4			8/10/96
47	5427.75	13355.5	5428.51	13357.35	8/14/96
9	5422.05	16014.6	5423.76	16016.86	5/23/97
8	5419.34	16140.03	5419.65	16103.01	5/24/97
6	5357.66	16316.53	5358.5	16220.5	5/27/97
5	5344.22	16428.02	5442.06	16430.65	5/28/97
4	5535.1	16541			5/28/97
11	5438.44	15835.16	5435.35	15839.41	6/22/97
12	5450.69	15744.71	5446.38	15755.15	6/23/97
14	5588.9	15550.1	5543.74	15559.02	6/25/97
49	5548.01	15603.91	5553.01	15609.9	6/25/97
48	5659.99	15511.03	5658.99	15509.5	6/27/97
15	5545.06	15508.81	5544.52	15507.36	6/30/97
16	5603.63	15432.9	5602.26	15432.39	6/30/97
19	5629.59	15212.05	5628.06	15216.88	7/4/97
21	5723.92	15034.42	5723.22	15037.42	7/5/97
22	5737.82	14956.68	5740.52	14959.02	7/6/97
23	5758	14910.39	5757.88	14913.42	7/11/97
24	5817.45	14837.34	5815.37	14838.96	7/13/97
87	5905.12	14923.85	5903.62	14929.29	7/14/97
26	5907.71	14838.87	5907.89	14837.96	7/15/97
30	5931.41	14443.38	5929.98	14451.59	7/21/97
31	5933.35	14337.13	5933.83	14340.32	7/22/97
62	5940.61	14322.18	5939.77	14325.33	7/23/97
32	5933.33	14234.4	5934.79	14238.31	7/24/97
33	5923.19	14210.15	5925.07	14216.54	7/25/97
34	5902.62	14119.82	5902.59	14119.73	7/27/97
63	5925.3	14056.22	5926.04	14100.04	7/27/97
36	5828.45	13927.73	5829.32	13928.12	7/31/97
37	5808.81	13843.33	5809.71	13844.83	8/1/97
60	5759.37	13718.03	5801.28	13721.17	8/2/97
39	5737.48	13632.33	5740.13	13632.7	8/3/97
40	5736.42	13613.19	5711.89	13616.94	8/5/97
41	5652.48	13548.4	5652.48	13558.4	8/5/97
45	5521.1	13443.9	5523.67	13447.13	8/26/97
46	5453.93	13416.98	5453.18	13418.15	8/27/97
47	5427.64	13355	5426.31	13353.76	8/28/97

Table 2a . --Catch in number by species for the 1995 NMFS juvenile sablefish survey of the Gulf of Alaska, June 22- September 9. BS = blue shark, JSF = juvenile sablefish, PS = pink salmon, CHS = chum salmon, SRY = Pacific saury.

Station	BS	JSF	PS	CHS	SRY
35	0	21	0	0	0
37	0	130	62	2	0
38	0	140	23	6	0
39	0	3	59	5	0
46	1	399	26	4	0
47	3	11	0	0	2,672
53	0	38	0	0	0
Total	4	742	170	17	2,672

Table 2b . --Catch in number by species for the 1996 NMFS juvenile sablefish survey of the Eastern Aleutians and the Gulf of Alaska, May 20 - August 19. SD= Spiny Dogfish, ATF = arrowtooth flounder, JSF =juvenile sablefish, PH=Pacific herring, WP=walleye pollock, AM=Atka mackerel, EU=eulachon, UJS = unidentified juvenile salmon, COS=coho salmon, PS=pink salmon, CHS =chum salmon, SS= ockeye salmon, BRF = black rockfish.

Station	SD	ATF	JSF	PH	WP	AM	EU	UJS	COS	PS	CHS	SS	BRF
9	0	0	0	0	0	0	0	0	0	0	0	1	0
10	0	0	0	0	0	0	0	0	0	0	0	2	0
15	0	1	0	0	19	0	0	0	0	0	0	0	0
17	0	0	0	0	0	0	0	0	0	0	0	1	0
18	0	1	0	0	0	0	0	0	0	0	0	0	0
20	0	0	0	0	0	0	0	0	0	1	1	1	0
21	0	0	0	0	0	0	0	0	0	2	0	1	0
23	0	0	1	0	0	0	0	0	0	10	6	1	0
26	1	0	1	0	0	0	6	0	0	12	0	0	0
27	0	0	0	0	0	0	0	0	0	4	0	0	0
28	4	0	7	0	0	0	0	1	2	0	3	0	0
29	0	0	5	0	0	0	2	4	1	1	0	0	0
31	0	0	24	0	0	0	0	0	0	0	0	10	0
32	0	0	23	0	0	0	0	25	2	0	1	0	0
33	0	0	2	0	0	0	0	0	0	1	0	0	0
35	0	0	0	0	0	0	0	8	1	0	0	0	0
36	0	0	1	0	0	0	0	1	0	5	0	0	0
37	0	0	8	0	0	0	0	0	1	2	4	0	0
38	0	0	0	0	0	0	0	0	1	8	0	1	0
42	0	0	0	0	0	1	0	0	0	0	0	0	0
47	0	0	9	0	0	0	0	0	0	2	1	0	0
55	0	0	3	0	0	0	0	0	0	0	0	0	0
58	0	0	4	0	0	0	0	0	0	0	0	0	0
60	0	0	5	0	0	0	0	13	1	9	0	33	0
62	0	0	34	0	0	0	0	0	0	0	1	1	0
63	0	0	237	1	0	0	0	0	0	1	5	9	0
78	0	0	15	0	0	0	0	0	1	3	7	0	0
81	0	0	6	0	0	0	0	13	0	21	0	0	1
87	0	0	0	0	0	0	8	2	0	3	1	3	0
88	0	0	6	2	0	0	10	0	0	8	4	0	0
Total	5	2	391	3	19	1	26	67	10	93	34	64	1

Table 2c. --Catch in number by species for the 1997 NMFS juvenile sablefish survey of the Eastern Aleutians and the Gulf of Alaska, May 20 - August 19. SD = Spiny Dogfish, BS = Blue Shark, JSF = juvenile sablefish, PP = Pacific pomfret, PH = Pacific herring, GG = Giant grenadier, PC = Pacific rock greenling, EU=eulachon, UJS = unidentified juvenile salmon, COS=coho salmon, PS = pink salmon, CHS = chum salmon, SS = sockeye salmon, SRY = Pacific saury, RS = red squid.

Station	SD	BS	JSF	PP	PH	GG	PC	RG	EU	UJS	COS	PS	CHS	SS	SRY	RS
5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12	0	0	0	0	0	0	0	4	0	0	2	9	0	0	0	0
14	0	0	0	0	0	0	13	4	8	0	0	4	0	0	0	0
15	0	0	0	0	0	0	0	15	0	0	0	2	3	0	0	0
16	0	0	0	0	0	0	17	2	0	0	0	1	2	0	0	0
19	0	0	0	0	0	0	0	7	0	0	0	1	0	0	0	0
21	0	0	0	0	0	0	1	45	0	0	0	2	0	0	0	0
22	0	0	0	0	0	4	0	2	0	0	0	0	0	0	0	0
23	0	0	20	0	0	0	0	1	0	0	0	2	0	0	0	0
26	1	0	79	0	0	0	0	0	0	0	0	0	0	0	0	0
30	0	0	25	0	0	0	0	0	0	12	0	0	3	0	0	0
31	0	0	5	1	0	0	0	0	0	1	0	14	0	0	0	0
32	0	0	37	0	0	0	0	0	0	0	0	4	1	0	0	0
33	0	0	150	9	0	0	0	0	0	0	0	0	1	0	0	0
34	0	0	49	2	0	0	0	0	0	0	0	0	0	0	0	0
36	0	0	0	0	0	0	0	0	0	0	0	0	0	0	19	0
37	0	0	1	0	0	0	0	0	0	0	0	0	5	0	0	0
39	0	0	3	0	0	0	0	0	0	0	0	0	0	0	16	0
40	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0
41	0	0	0	1	0	0	0	0	0	0	0	1	0	0	1	0
45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	13	1
46	0	1	0	0	0	0	0	0	0	0	0	0	0	0	13	0
47	0	0	0	0	0	0	0	0	0	0	0	0	0	0	140	0
48	0	0	0	0	1	0	5	0	0	0	0	0	0	0	0	0
49	0	0	0	0	0	0	10	6	0	0	0	0	0	0	0	0
60	0	0	33	0	0	0	0	0	0	0	0	2	0	0	1	0
62	0	0	398	2	0	0	0	0	0	10	0	11	0	0	0	0
87	0	0	1	0	0	0	1	0	0	1	1	0	0	0	0	0
Total	1	1	802	15	1	4	47	86	8	24	4	60	17	3	204	1



Figure 1.--Stations sampled during the NMFS young-of-the year sablefish survey of the Eastern Aleutians and Gulf of Alaska, 1995-1997

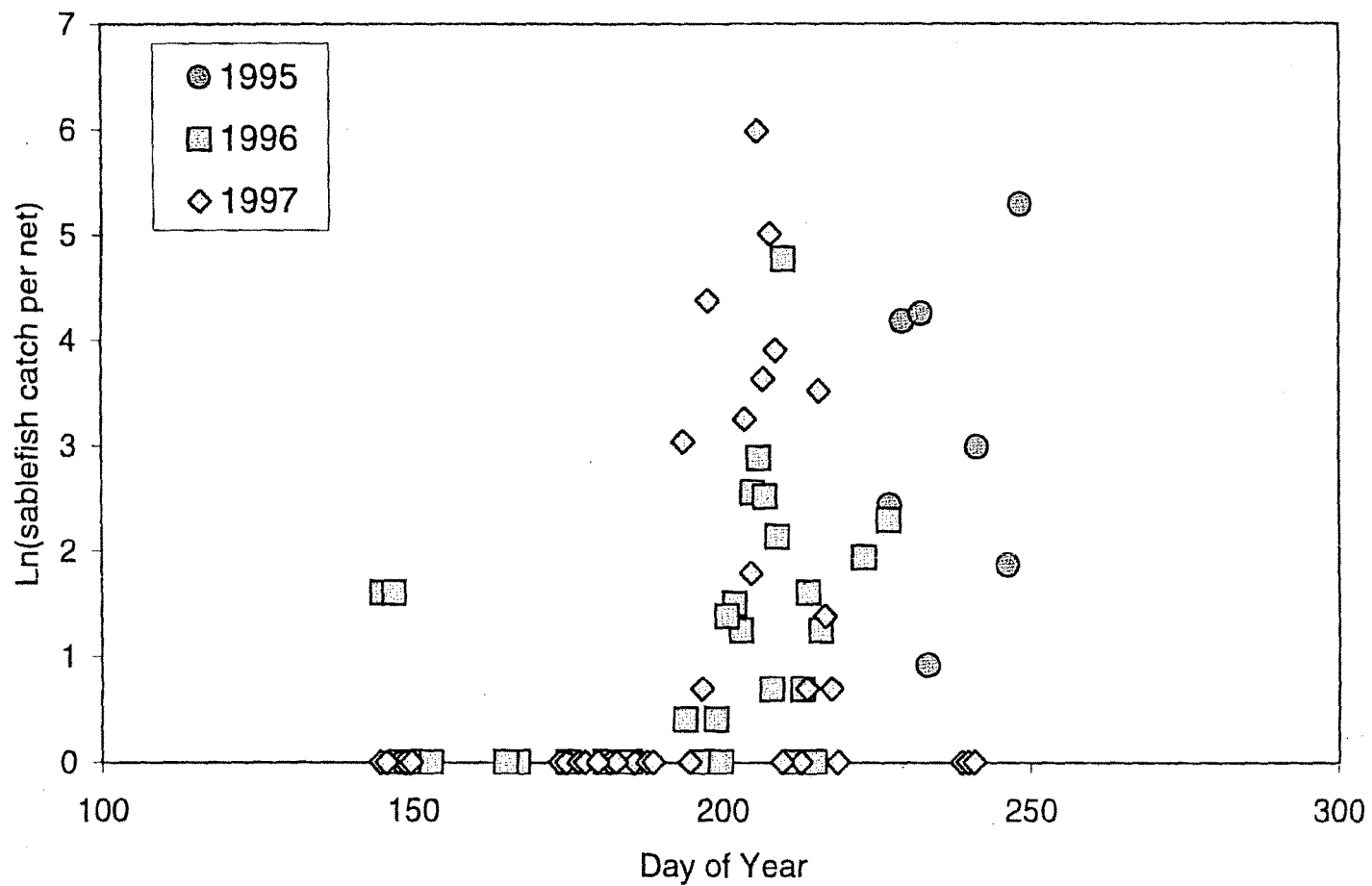


Figure. 2 –Log transformed sablefish catch (number + 1) per net by day of year, from the surface gillnet survey of the Gulf of Alaska and Aleutian Island region 1995-1997.

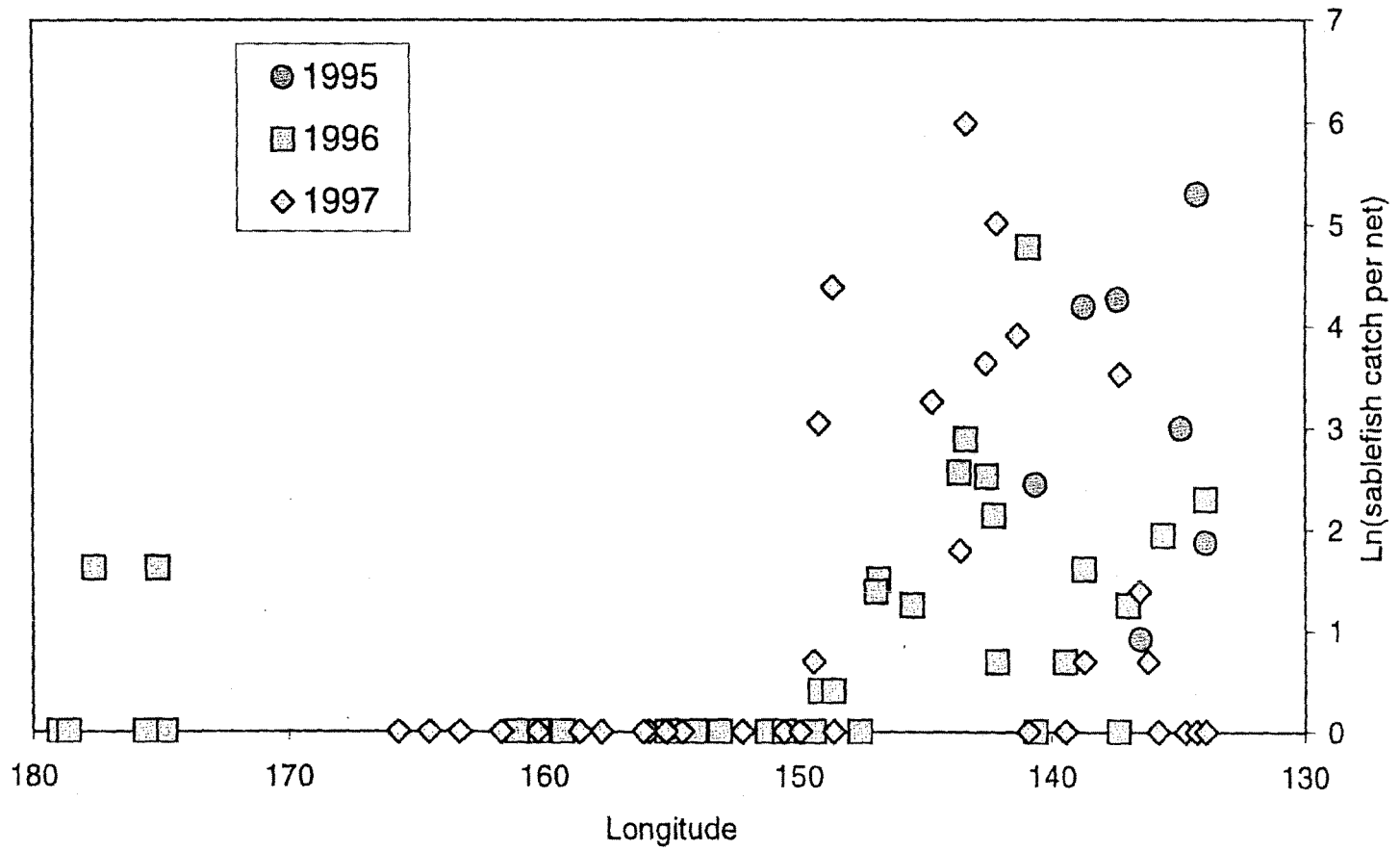


Figure 3. --Log transformed sablefish catch (number + 1) per net by longitude 1995-1997.

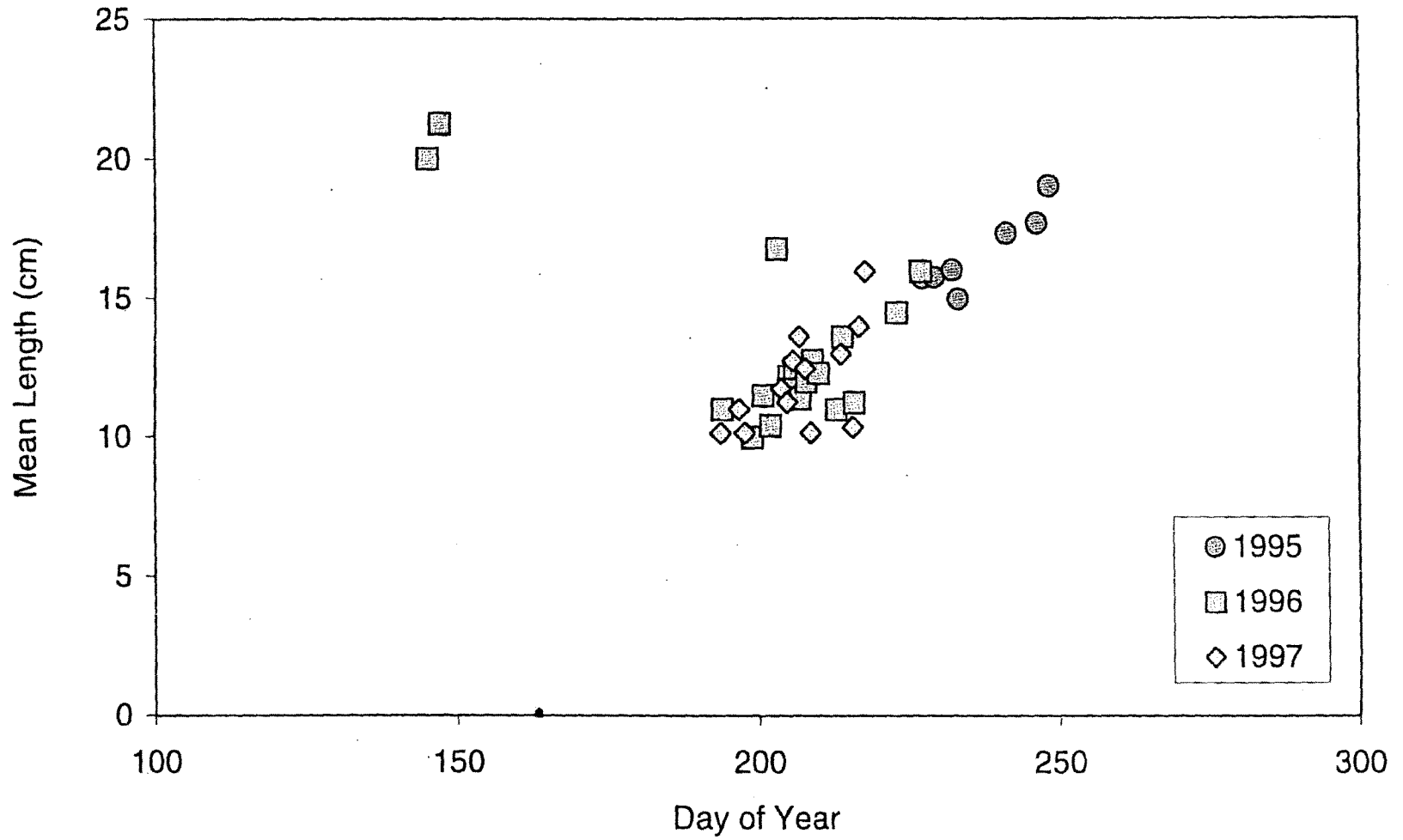


Figure 4. --Mean length (cm) of sablefish by day of year 1995-1997.

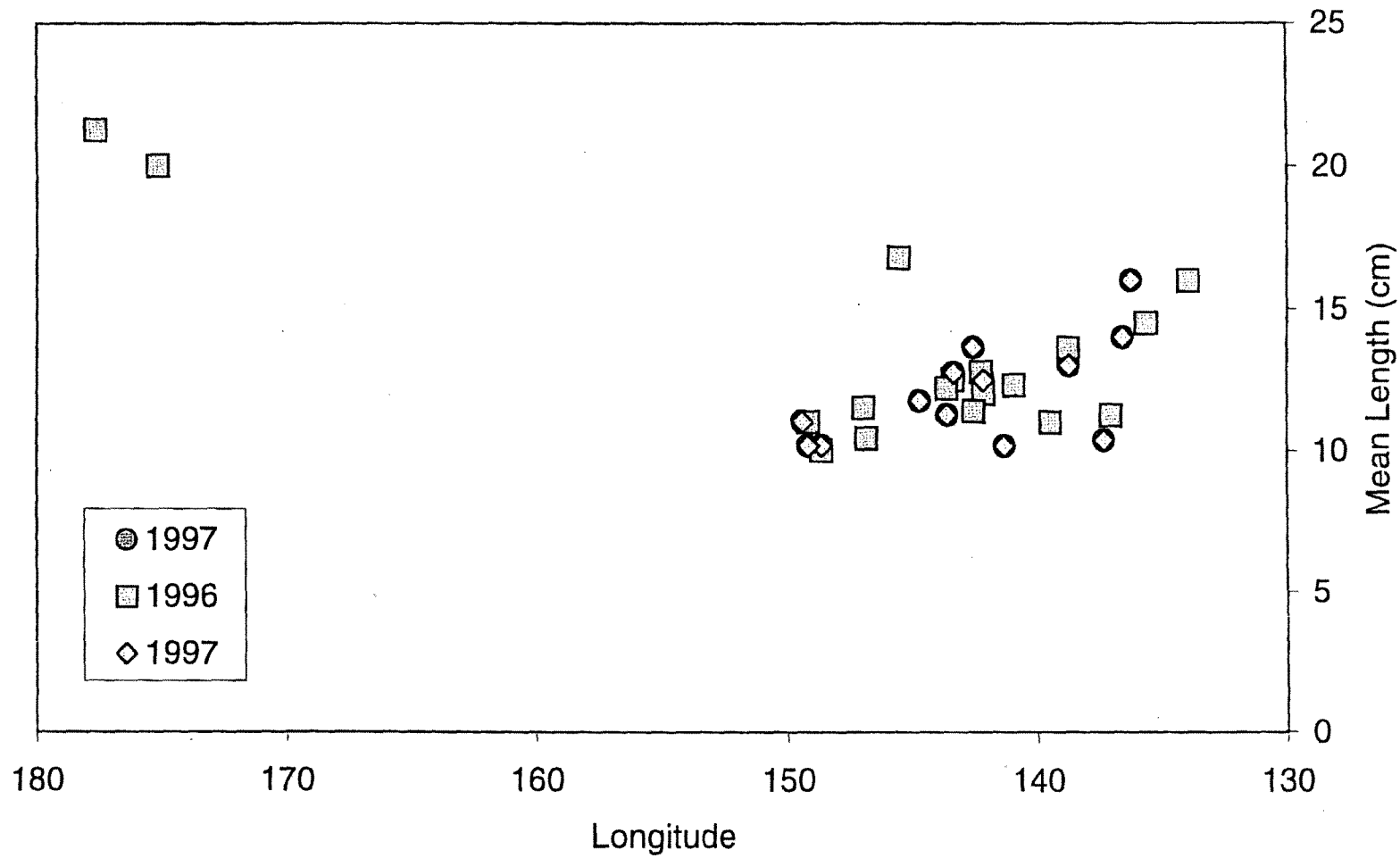


Figure 5. --Mean length (cm) of sablefish by longitude 1995-1997.