An analysis of yellowtail flounder, Limanda ferruginea, length at maturity east and west of 72°00' longitude for 1975-1980

by

W. Morse and A. Morris

U. S. Department of Commerce
National Oceanic and Atmospheric Administration
National Marine Fisheries Service
Northeast Fisheries Center
Sandy Hook Laboratory
Highlands, New Jersey 07732

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INTRODUCTION

The northwest Atlantic yellowtail flounder, Limanda ferruginea, population is composed of a number of subpopulations or groups. Three groups were identified in New England waters by Royce et al. (1959) and Lux (1963). They are, in general, distributed as follows: 1) off eastern Long Island; 2) on Georges Bank; and 3) off the tip of Cape Cod northward along the Massachusetts coast. Additional population studies were made by Scott (1954) off Nova Scotia where water temperatures appeared to contribute to subpopulation differences. A comparison of yellowtail flounder off Nova Scotia to more southern subpopulations showed differences in growth rate, spawning season, sexual maturity, and various meristic counts (Scott, 1954). This study investigates length at maturity of yellowtail flounder occurring west and south of the Long Island group and its relationship to the other three groups.

MATERIALS AND METHODS

Approximately 7,500 yellowtail flounders were examined for sexual maturity from 1975-1980. All specimens were research-vessel trawl caught and most were examined fresh aboard ship as soon as possible after capture. Some fish were frozen whole during 1975-1976 and returned to the laboratory for more detailed study. Each fish was measured (cm TL) and classified as male or female and as either immature or as one of several maturity stages indicating a mature fish.

The data set was divided into east and west of 72°00' longitude and an analysis of length at maturity was made for each data set. The length frequency of immature and mature males and females within the length interval

between the smallest mature and largest immature was analyzed using probit analysis (Finney, 1971).

RESULTS AND DISCUSSION

Table 1 summarizes the results of length at maturity (L_{50} = length at which 50% of the fish are mature) analysis for east and west. The L_{50} for the western group was 23.7 cm TL for males and 24.5 cm TL for females. These values are the mean L_{50} for samples collected from 1975-1980 when all samples (seasonal and annual) are combined. It was necessary to combine to increase sample size for analysis. The L_{50} for the eastern group was 24.2 cm TL for males and 27.3 cm TL for females. The eastern group includes samples from 1977-1980. Sample size was not a problem with the eastern data set but all samples were combined for comparative purposes.

The females for east and west are statistically different in L_{50} as indicated by no overlap in the 95% confidence intervals. The onset of maturity occurred between 17-18 cm for females and between 18 and 20 cm for males in both groups. The largest immature in the west was 32 cm and 38 cm in the east. This difference is attributable to the ten-fold difference in sample size between east and west.

Apparent latitudinal differences in L_{50} are shown below:

Area	L_{50} females	Source
Nova Scotia	40 cm	Scott (1954)
Cape Cod	32 cm	Royce et al. (1959)
Southern New England	28 cm	Howell and Kesler (1977)
West of 72°	27 cm	This study

The L_{50} values listed cover nearly 40 years and may be affected by temporal changes in L_{50} resulting from population density, exploitation, changes in growth rate, etc. In order to assess the affects of biotic and abiotic factors on L_{50} it will be necessary to continuously monitor the biology of the yellowtail flounder population to determine cause and effect relationships.

REFERENCES

Finney, D. J.

1971. Probit Analysis. Cambridge Univ. Press, Cambridge, 333 p.

Howell, W. H. and D. A. Kesler.

1977. Fecundity of the southern New England stock of yellowtail flounder, Limanda ferruginea. Fish. Bull., U. S. 75: 877-880.

Lux, F. E.

1963. Identification of New England yellowtail flounder groups. Fish. Bull., U. S. 63: 1-10.

Royce, W. F., R. J. Bulles and E. D. Premetz.

1959. Decline of the yellowtail flounder, Limanda ferruginea, off New England. Fish. Bull., U. S. 59: 169-267.

Scott, D. M.

1954. A comparative study of the yellowtail flounder from three Atlantic fishing areas. J. Fish. Res. Board Canada 11: 171-197.

Table 1. Length at maturity of yellowtail flounder, Limanda ferruginea, east and west of 72°00' longitude, 1975-1980.

Total Length (cm)	Males # of Obs.	Males % Mature	Females # of Obs.	Females % Mature	Males # of Obs.	Males % Mature	Females # of Obs.	Females % Mature
16							7	0.0
17			1	0.0	5	0.0	10	20.0
18			3	33.3	7	14.3	11	9.1
19	6	0.0	5	20.0	13	7.7	18	22.2
20	12	8.3	8	12.5	15	6.7	32	9.4
21	15	20.0	10	60.0	37	24.3	34	0.0
22	12	58.3	9	11.1	29	37.9	51	13.7
23	9	22.2	10	10.0	54	31.5	43	30.2
24	15	46.7	15	60.0	83	33.7	75	12.0
25	20	60.0	18	38.9	68	58.8	69	37.7
26	16	81.3	18	44.4	123	69.9	99	30.3
27	27	85.2	15	66.7	133	75.9	94	37.2
28	21	90.5	28	78.6	178	79.8	112	42.0
29	17	82.4	21	76.2	132	86.4	118	46.6
30	23	95.7	16	75.0	169	89.3	124	66.1
31	33	100.0	24	87.5	129	91.5	142	83.8
32	42	97.6	25	96.0	155	92.9	133	87.2
33	29	100.0	19	100.0	174	92.5	124	86.3
34					199	97.0	151	94.0
35					185	97.3	188	96.8
36					163	98.8	184	97.3
37					135	99.3	149	99.3
38					125	98.4	128	100.0
39					93	100.0		
Total	297		245		3404		2096	
Length at 50% Mature	23.7		24.5		24.2		27.3	
95% Confid. Interval	23.0-24.3		23.1-25.6		23.8-24.6		25.8-28.5	