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Occurrence of 0-age English Sole, *Parophrys vetulus*, along the Oregon Coast: An Open Coast Nursery Area?

Abstract

Estuaries are known to be important as nursery areas for English sole, *Parophrys vetulus*, during a portion of their first year of life. This study collected 0-age *P. vetulus* in the ocean off Moolach Beach, Oregon, during 1974. Seasonal occurrence, depth distribution, and length-frequency data for 719 *P. vetulus*, 23 to 324 mm long, collected at depths of 15 to 52 m are presented. We suggest that, in addition to estuaries, unprotected nearshore areas along the Oregon coast are used by 0-age *P. vetulus*. Low density or localized utilization of these areas could be an important factor determining total *P. vetulus* production off Oregon.

Prior to this paper, 0-age English sole, *Parophrys vetulus*, have been reported to occur in estuaries (Westrheim, 1955; Smith and Nitsos, 1969; Misitano, 1970; Olsen and Pratt, 1973; Percy and Myers, 1974) and shallow protected inland coastal areas (Ketchen, 1956; Kendall, 1966; Van Cleve and El-Sayed, 1969). Olsen and Pratt (1973) suggested that estuaries may be the exclusive nursery areas for English sole along the Oregon coast, based on the incidence of a parasite infestation thought only to be acquired in estuaries. This paper is the first documentation of 0-age *P. vetulus* occurrence in the ocean off Oregon. Data are presented on seasonality, depth distribution, and length frequencies of 719 *P. vetulus*, 23-324 mm long, collected at depths of 15-52 m off Moolach Beach, Oregon, during 1974.

Moolach Beach is approximately 6.7 km of unprotected sandy beach on the central Oregon coast between Yaquina Head, to the south, and Cape Foulweather, to the north. Yaquina Head and Cape Foulweather are rocky headlands which separate the area sampled from the nearest estuaries: Yaquina Bay, 10 km to the south, and Siletz Bay, 26 km to the north. All specimens were collected in a 4.88 m, headrope length, semi-balloon box trawl having 3.81 cm body mesh, 3.18 cm cod end, and 1.27 cm cod end liner mesh (stretched measurements). All trawls began at latitude 44°42.5'N and were made on a heading of 0° true at approximately 3.7 km h (2 knots). Tows were 10 minutes long, timed from trawl reaching bottom to beginning of retrieval. Three lines were sampled: Line A—beginning 1.2 km from shore, 15 m depth; Line B—beginning 2.4 km from shore, 27 m depth; and Line C—beginning 4.8 km from shore, 52 m depth. Samples were collected twice monthly between June and October, and once in February and November, 1974. All fish were preserved in the field with 10 percent formalin; in the laboratory they were transferred to 40 percent isopropanol, identified, and measured. Lengths reported are standard lengths measured to the nearest millimeter.

Total lengths of 719 *P. vetulus* were also measured and regressed on standard length

producing the equation $[Y=0.57+1.19X$ where Y = total length in mm and X = standard length in mm ($R=0.999$)]. This equation was then used to convert total length measurements reported by other workers to standard length for comparative purposes. For the purpose of this paper, we assumed that all *P. vetulus* <117 mm were 0-age. This limit is somewhat arbitrary but is based on age-growth studies by Westrheim (1955), Kendall (1966), Smith and Nitsos (1969), Van Cleve and El-Sayed (1969), and Olsen and Pratt (1973). This limit probably does not include all 0-age fish taken.

Two distinct size groups of 0-age *P. vetulus* were collected from the study area throughout 1974 (Fig. 1). The smaller size group was composed of fish <80 mm; the larger size group was of 80-117 mm fish. The frequency of occurrence of each size group varied with water depth. *Parophrys vetulus* <80 mm were taken in every tow on Line A (15 m depth) between 3 June and 22 October 1974, except one tow made on 20 June. These small fish were the only size collected at this shallowest station, except for two specimens >250 mm taken in August. On Line B (27 m depth), *P. vetulus* <80 mm were the most regularly captured group, occurring most commonly during August and September. On 24 September no fish <80 mm were taken, but fish 80-117 mm were taken along with some larger fish. Only a few *P. vetulus* <80 mm were taken on Line C (52 m depth), and those were captured during October and November. Juveniles 80-117 mm were present on this line throughout the sampling period except on 5 November. Larger fish occurred on this line in relatively large numbers throughout the year.

The low numbers of 0-age English sole taken at our shallowest lines on 22 October and 5 November may indicate a fall movement offshore. Other workers (Westrheim,

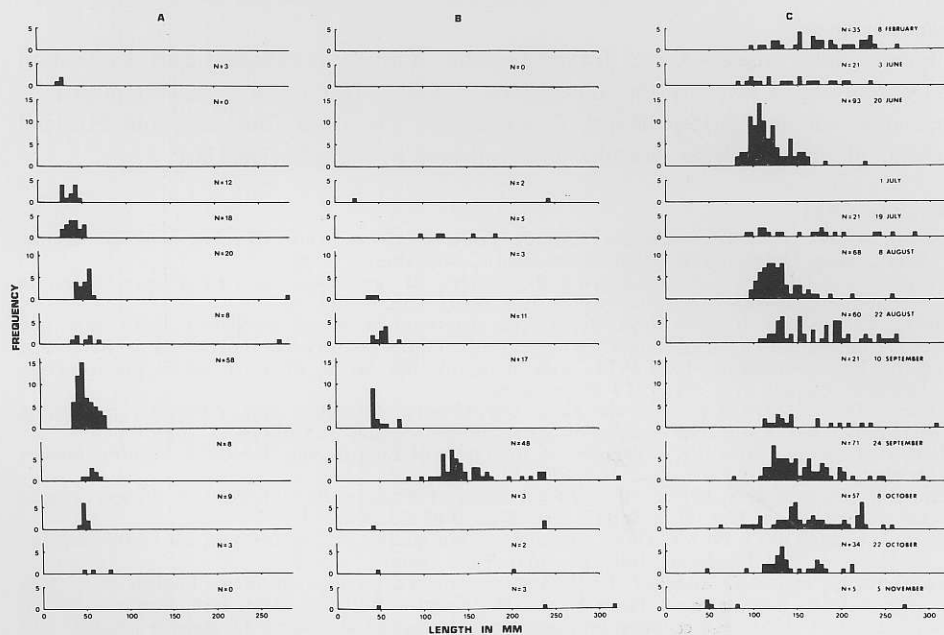


Figure 1. Length frequency of *Parophrys vetulus* captured on Line A=1.2 km (15 m depth), B=2.4 km (27m depth), and C=4.8 km (52 m depth) off Moolach Beach, Oregon, during 1974 (N=number of fish captured; when N is absent, sampling was not attempted).

1955; Olsen and Pratt, 1973) have reported fall emigration of juvenile *P. vetulus* from Yaquina Bay to offshore areas. The presence of two size groups of 0-age *P. vetulus* in our samples is probably a result of spawning peaks during the fall of 1973 and winter-spring of 1974. A detailed discussion of variations in time of English sole spawning is presented by Laroche and Richardson (in press).

Abundances of 0-age *P. vetulus* off Moolach Beach in 1974 appeared considerably lower than those found in Yaquina Bay by Westrheim (1955) and Olsen and Pratt (1973). However, comparisons were difficult to make due to differences in sampling gear, tow length, and tow speed. Ketchen (1956) took 0-age *P. vetulus* in greatest numbers from waters shallower than our shallowest line (15 m depth). This fact suggests that greater abundances may have existed in shallower waters adjacent to our study area.

There have been no adequate studies of juvenile flatfish occurrence in nearshore areas of the open coast off Oregon. The presence of 0-age *P. vetulus* in the study area off Moolach Beach suggests that at least some portion of this age-group may spend its first year in shallow open coastal areas instead of exclusively in estuaries as suggested by Olsen and Pratt (1973). Separation of the study area from the relatively distant estuaries by rocky headlands makes it unlikely that the 0-age specimens collected were actively moving to or from an estuary.

Considering the vast amount of shallow, sand bottomed, unprotected nearshore area and relatively small estuarine area along the Oregon coast, it seems possible that even low density or localized utilization of this area by 0-age *Parophrys* could be an important factor determining total *P. vetulus* production within Oregon waters.

Acknowledgments

We thank John Stephen Davis, Joanne Laroche, William Percy, and Sally Richardson of Oregon State University for constructive criticism. This research was supported by Eugene Water and Electric Board, Pacific Power and Light Company, and Portland General Electric Company. Samples were collected by Douglas De Hart.

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Received September 8, 1977

Accepted for publication December 9, 1977