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ANNUAL PROGRESS REPORT

INVESTIGATION OF THE ABUNDANCE AND RECRUITMENT
OF BOTTOMFISH OFF OREGON, WITH EMPHASIS ON DOVER SOLE

July 1, 1967-June 30, 1968

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ABSTRACT

The market sampling program for Dover, English and petrale sole and Pacific ocean perch continued. Bottomfish landings were sampled at Astoria and Coos Bay.

Dover sole research cruises were made in August 1967 and February 1968. Results on juvenile distribution are discussed. A tagging cruise for Dover sole was completed in April 1968. A short cruise was made for Pacific ocean perch.

Aquaria experiments on Dover sole age and scale growth were started.

REPORTS AND PUBLICATIONS

Five cruise reports were written. Reports of cruises 67-7 (August 1967) and 68-2 (February 1968) concerned juvenile Dover sole. Reports of cruises 67-12 (November 1967) and 68-4 (April 1968) were the Dover sole tagging cruise, and report of cruise 67-9 concerned Pacific ocean perch.

Three quarterly progress reports were submitted. These were for the following periods: July 1, 1967-September 30, 1967; October 1, 1967-December 31, 1967; and January 1, 1968-March 31, 1968.

A data report, Investigational Report No. 7, "Age-length-frequency distributions of Dover sole (Microstomas pacificus) landed in Oregon in 1948 and 1951-65 from PMFC area 2D," was published by the State of Oregon Fish Commission in February 1968.

The paper, "A scale aging method for Dover sole (Microstomas pacificus)" began the first rounds of editing.

A paper on the distribution of juvenile Dover sole and other juvenile flatfishes is being written.

PHASE PROGRESS

Activities during fiscal year 1967-68 were in three main areas:

(1) market sampling, (2) research cruises, and (3) aquaria experiments.

MARKET SAMPLING

Market sampling continued on a year-around basis at Astoria and during the summer of 1967 at Coos Bay and Winchester Bay. The numbers of fish sampled for age and size composition are shown in Table 1. All Dover and English samples have been aged and compiled into summaries. About one-third of the petrale otoliths have been aged. Otoliths of Pacific ocean perch have not been aged because suitable techniques have not been developed.

Port sampling will again be conducted in the Coos Bay-Winchester Bay area in the summer of 1968. Also for the first time consistent sampling of bottomfish and shrimp landings will be conducted at Newport.

Table 1. Numbers of fish sampled, July 1967-June 14, 1968

Port	Dover	English	Petrале	Pacific ocean perch	Total
Astoria	2,697	1,698	1,726	1,577	7,698
Coos- Winchester Bays	<u>1,883</u>	<u>451</u>	<u>664</u>	<u>-</u>	<u>2,998</u>
Total	4,580	2,149	2,390	1,577	10,696

RESEARCH CRUISES

There were four cruises during the report period. Two of these, August 1967 and February 1968, dealt with juvenile Dover sole distribution. The third cruise was for tagging Dover sole for scale and aging studies and the fourth cruise dealt with collection of catch-per-effort data on Pacific ocean perch.

Distribution studies

Since July 1966 there have been four cruises aimed specifically at distribution of juvenile Dover sole. There have also been three shrimp cruises that provided additional information on distribution of juvenile Dover sole. In addition to Dover sole, attention was also paid to distribution of juveniles of Pacific sand dab, slender sole, English sole and rex sole on three of the four Dover sole cruises.

To present as complete a seasonal picture of distribution as possible this report will utilize data collected prior to July 1, 1967. Dover sole data are arranged by season into the following periods: February, May, July-August, and October-November. Data on the other species is arranged by February, May, and August. Size composition is shown by length-frequency histograms based on the catch per average 15-minute trawl by 20 fathom depth intervals.

Dover sole--In general the depth distribution of small juvenile Dover sole (≤ 15 cm) is as follows. During the winter months most fish of the incoming year class are found at greater depths than other times. By spring they have moved toward shallower waters and by summer have made their furthest inshore penetration. By fall there is a shift to deeper water approaching a distribution pattern similar to the winter months.

In February small Dover sole were found between 40 and 99 fathoms (Figure 1). All fish caught were immature and small juveniles were most abundant between 60 and 99 fathoms. Between 80 and 99 fathoms only age 0 fish were caught. The lack of larger sized fish was nearly complete, but not unusual since spawning, a winter activity, usually takes place at depths greater than 100 fathoms.

In May small juveniles were found only between 20 and 79 fathoms. Most were caught between 20 and 39 fathoms.

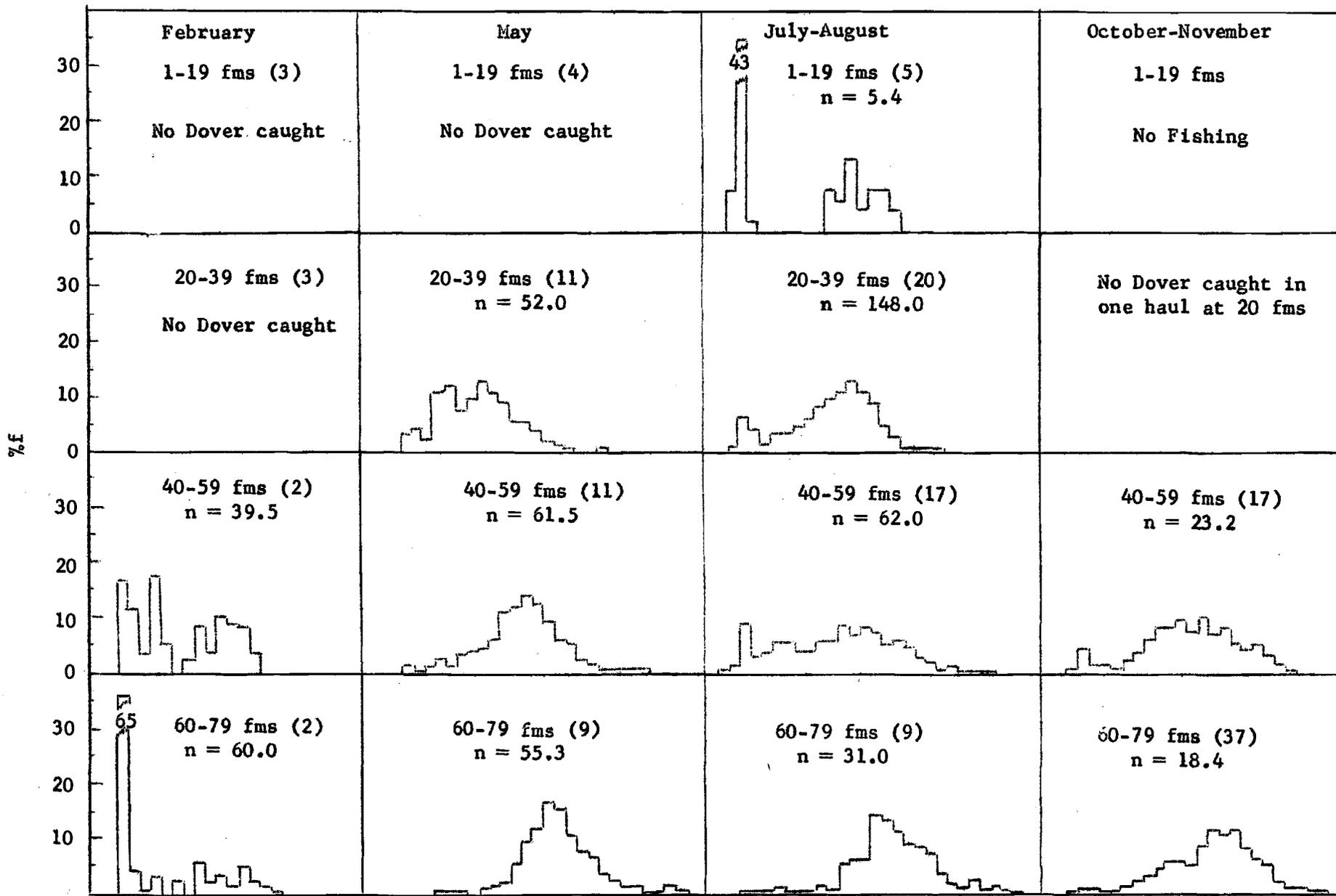


Figure 1. Length-frequency distributions of Dover sole caught per average 15 minute haul. Number in parenthesis is number of hauls per strata; n = average number caught per haul per strata

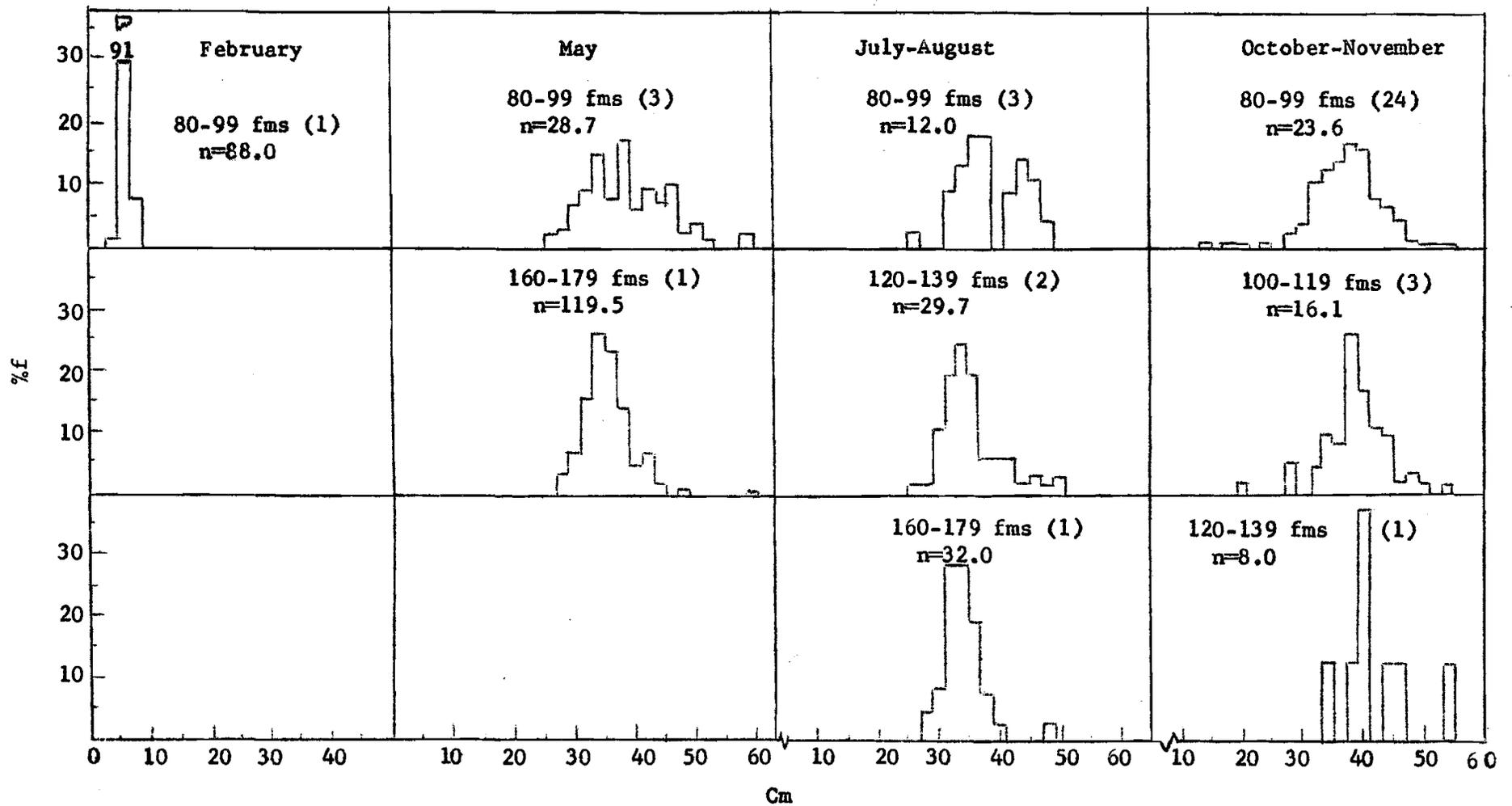


Figure 1. (cont'd)

By July-August small Dover enjoyed their widest distribution being found at depths less than 20 fathoms out to depths of 79 fathoms. They were most abundant between 20 and 59 fathoms.

In October-November there was a shift to deeper water. Small juveniles were present between 40 and 99 fathoms. Most were caught in the 40-59 fathom interval.

English sole--Small, juvenile English sole (≤ 20 cm) show a pronounced restricted depth distribution. No juveniles were found deeper than the 40-59 fathom interval (Figure 2). In February they were found only between 20 and 59 fathoms. In May they were found at depths less than 20 fathoms but not beyond 59 fathoms. In August they were found only inshore from 39 fathoms.^{1/}

Slender sole--Small, juvenile slender sole (≤ 15 cm) were found in nearly all depth strata sampled regardless of season (Figure 3). Slender sole were caught at depths greater than 100 fathoms in May and August, but were not sampled. Also, size composition is remarkably uniform with respect to depth. In August small juveniles made their furthest inshore penetration. They were not found at any time at depths less than 20 fathoms.

Rex sole--Rex sole juveniles (≤ 15 cm) exhibit a wide distribution with respect to depth. They were found at nearly all depths sampled (Figure 4). In February they were most abundant between 40 and 74 fathoms. In May and August they occurred out to 80-99 fathoms and 120-139 fathoms, respectively. The inshore penetration was to the 20-39 fathom interval for both months, but a few adult fish were found at depths less than 20 fathoms in August.

^{1/} Observations in a sea water aquarium suggest that, if given a choice, age 0 and age 1 English sole will bury themselves in sand. Thus their range may be limited to sandy inshore nursery areas.

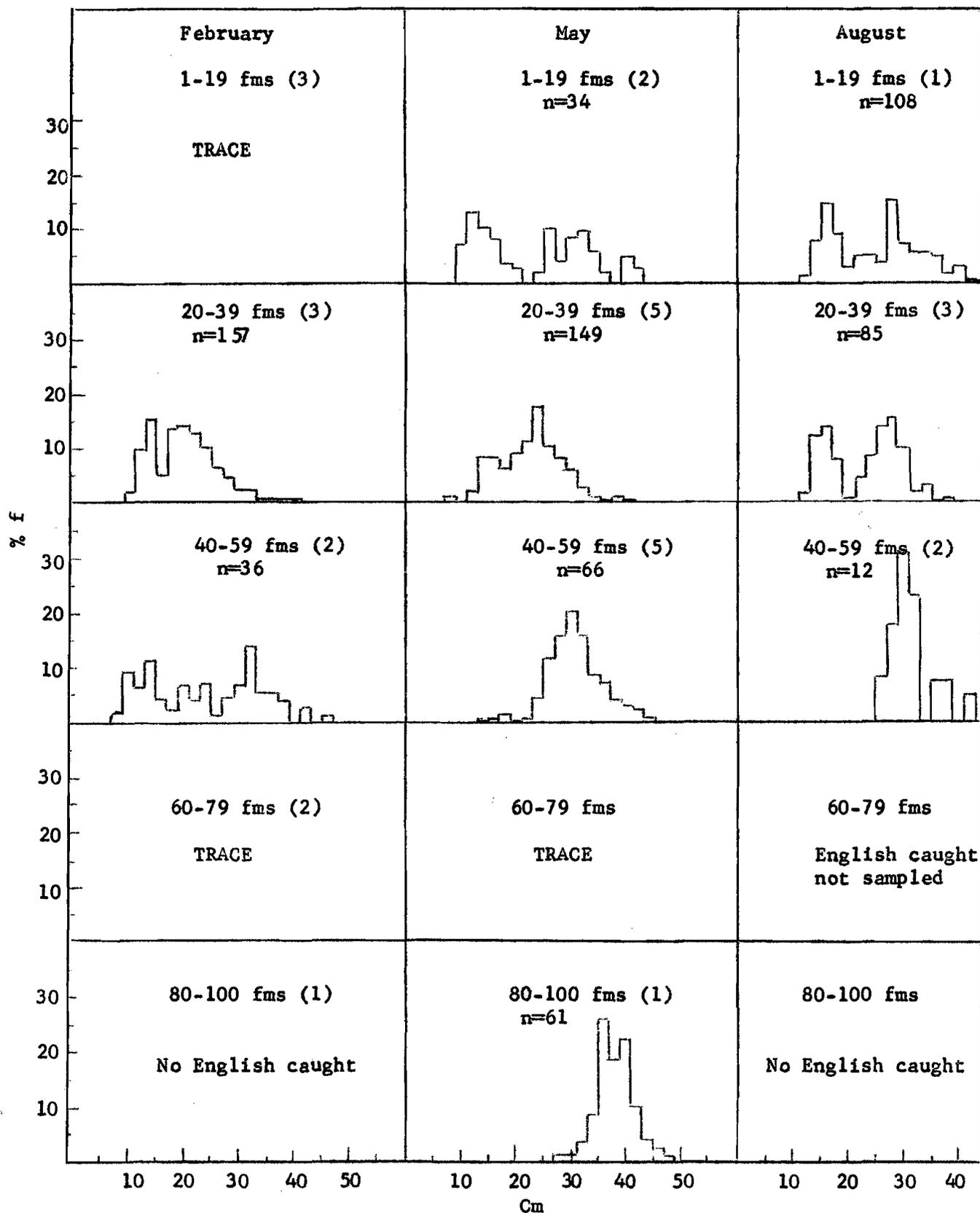


Figure 2. Length-frequency distribution of English sole caught per average 15-minute haul. Numbers in parentheses are number of hauls. n = average catch per haul per strata.

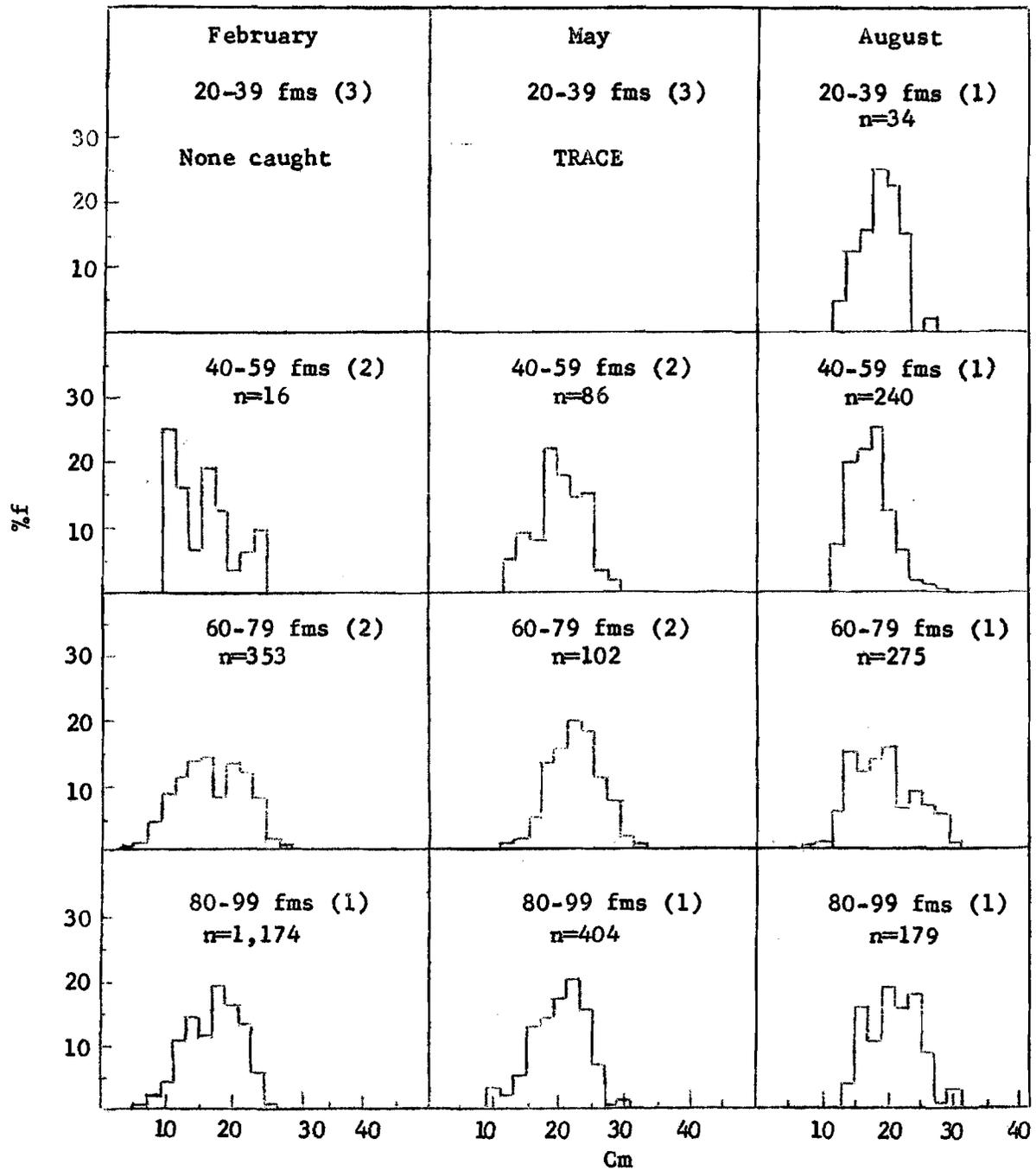


Figure 3. Length-frequency distribution of slender sole caught per average 15-minute haul. Numbers in parentheses are number of hauls; n = average catch per haul per strata.

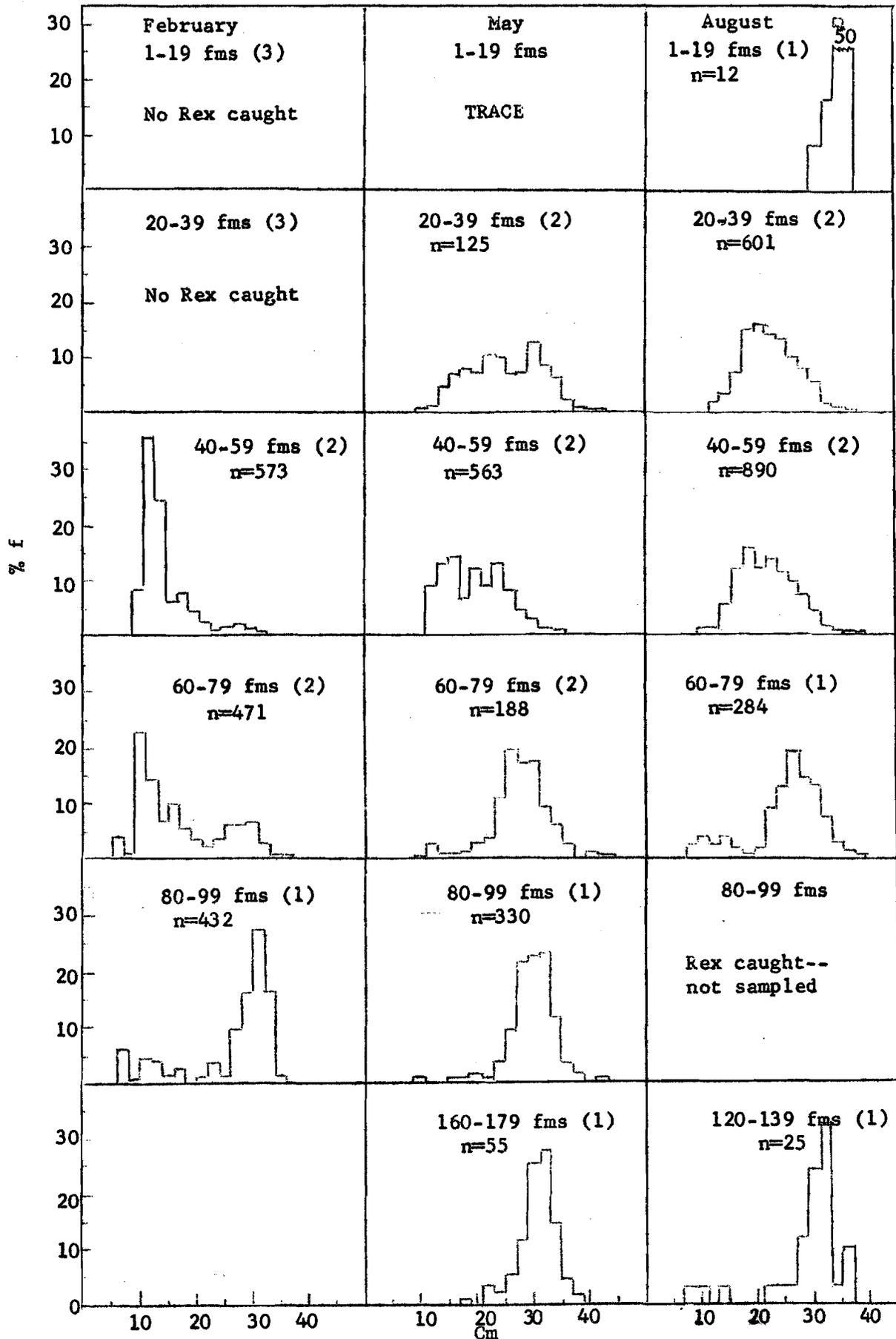


Figure 4. Length-frequency distribution of Røx sole caught per average 15-minute haul. Numbers in parentheses are number of hauls; n = average catch per haul per strata

Pacific sand dab--Sand dab juveniles show a marked and restricted depth range (Figure 5). The exception was in February when they occurred at the maximum depth sampled, 91 fathoms. They were most abundant at 20-39 fathoms. In May small juveniles made up nearly the entire catch at depths less than 20 fathoms; however, they were most abundant at the 20-39 fathom interval. In August only juveniles were found at depths less than 20 fathoms. They occurred out to the 40-59 fathom interval, but were most abundant at the 20-39 fathom interval. No sand dabs were caught at depths greater than 59 fathoms.

Tagging studies

In November 1967 a Dover sole tagging study was begun for the purpose of making direct comparisons of scales at tagging and at recapture. Because of the paucity of fish, tagging was postponed until April 1968. Two types of tags were used: FD-67 anchor tags (Floy Tag and Mfg. Co., Seattle, Washington) and Petersen discs.

A total of 1,494 fish were tagged: 727 with anchor tags only, 272 with anchor tags and Petersen discs (to get some measure of tag loss), and 495 with Petersen discs only. Scales were taken at the time of tagging.

Of the fish tagged with anchor tags or anchor tags and Petersen discs 75% were of sublegal size (< 28 cm). Of the fish tagged with Petersen discs only 32% were of sublegal size. Size of fish tagged ranged from 16 to 58 cm and averaged 27.3 cm.

Pacific ocean perch

One cruise, 67-9, was made in September 1967 for the purpose of gathering catch per effort data on grounds fished by American trawlers prior to Russian fishing in 1966. Tow locations were preassigned to areas that had previously produced good quantities of perch. A total of 10 tows

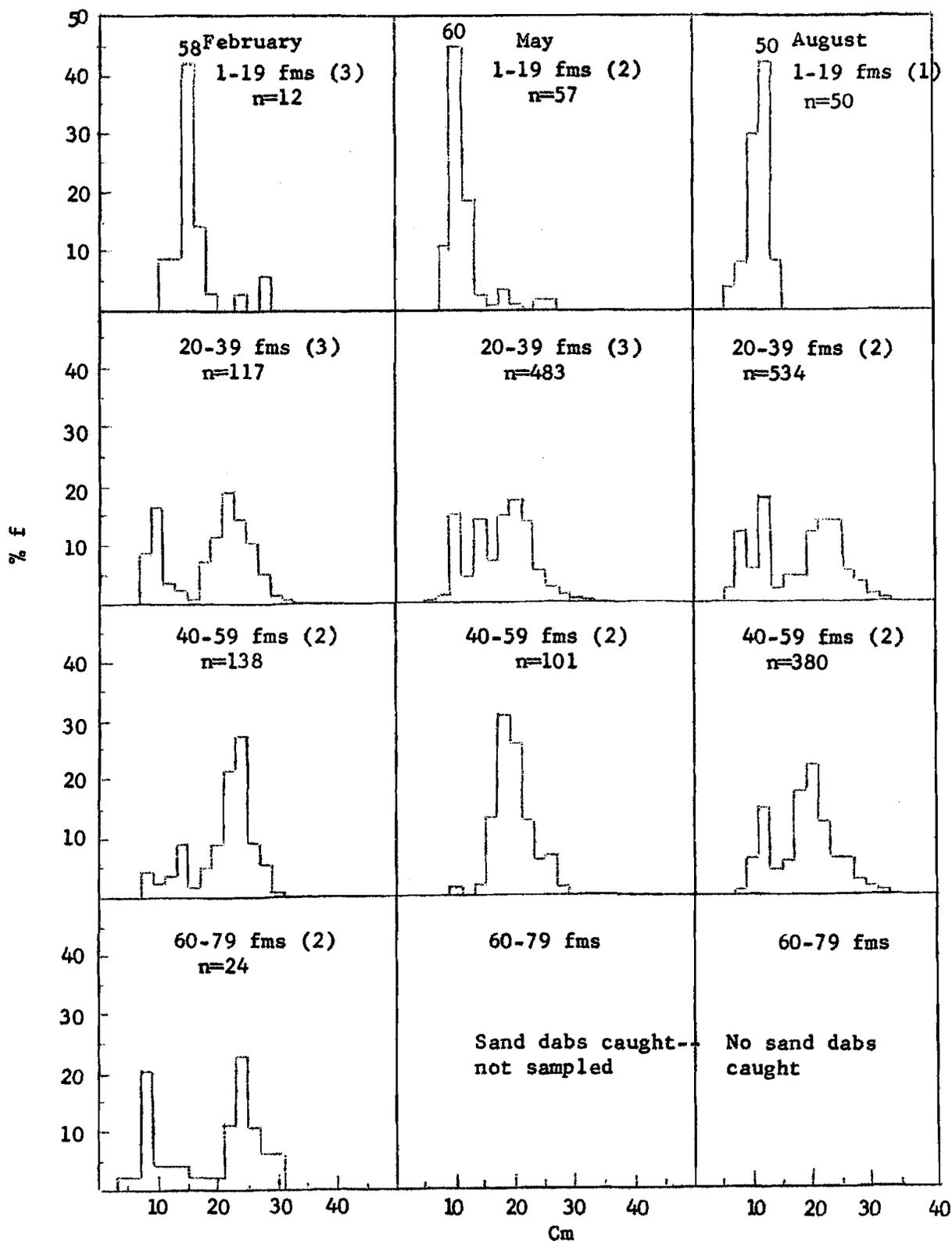


Figure 5. Length-frequency distribution of Pacific sand dabs caught per average 15-minute haul. Numbers in parentheses are number of hauls; n = average catch per haul per strata

was made in Loran blocks 2H4 2500 and 2H4 2600 (west of Depoe Bay). The average catch of Pacific ocean perch was 158 pounds per hour. The catch of rockfish other than Pacific ocean perch averaged 1,628 pounds per hour. The catch of perch ranged from 0 to 720 pounds per hour. For rockfish other than perch the catch ranged from 20 to 11,000 pounds per hour.

AQUARIUM EXPERIMENT

An artificial sea water aquarium of 150 gallon capacity with temperature control was received late in 1967 and tested in January 1968. The unit was purchased so that a comprehensive study of Dover sole scales could be undertaken. Objectives of the experiment are to study annulus formation and scale growth with the avowed purpose of answering questions of interpretation of some Dover scale patterns. This study is supplemental to the tagging study completed in April 1968.

The first fish, 9 age 1 Dover, were introduced on February 8, 1968. There was one survivor after 24 hours. Subsequent introductions were made on February 16, April 23 and 29, and May 30, 1968. In all 51 Dover sole were introduced. Most mortalities occurred within 48 hours. At present there are three Dover from the February 16 introduction and 12 from the May 30 introduction. Scales are taken monthly. Age composition is as follows: age II, 2; age III, 5; age IV, 7; and age VI, 1.

The fish are fed every other day on minced razor clams. Live clams are kept 4 or 5 at a time in the aquarium until needed as food.