

THE BEHAVIOUR OF NORWAY LOBSTER TOWARDS BAITED CREELS AND SIZE SELECTIVITY OF CREELS AND TRAWL *

By

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ABSTRACT

BJORDAL, Å. 1986. The behaviour of Norway lobster towards baited creels and size selectivity of creels and trawl. *FiskDir. Skr. Ser. HavUnders.*, 18: 131-137.

The behaviour of Norway lobster (*Nephrops norvegicus* L.) towards baited creels was studied by underwater television at three different localities. A typical nocturnal activity pattern was observed. Most of the individuals approached the creel up current. The general behaviour in the vicinity of creels and lobster burrows is shortly described. The creels were found to have a fairly low catch rate, being less than ten per cent of the observed individuals. Catches of Norway lobster by creels and trawl have distinctly different length distributions. The possible reasons for this are discussed.

INTRODUCTION

The Norway lobster (*Nephrops norvegicus* L.) lives mainly on or in muddy bottoms. During non-active periods, it lives in burrows in the bottom substrate (DYBERN and HØISETER 1965).

The European catch of Norway lobster is mainly taken by trawl. During the last 15 years, however, a fishery based on baited creels has been developed in Scotland (BJORDAL 1979), Faroe Islands (BJORDAL 1978) and Norway. The present behaviour studies are intended to assist development of this creel fishery in Norway.

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MATERIALS AND METHODS

The behaviour studies were conducted at three different field localities along the coast of Norway over a two year period, from May 1978 to May 1980 (Table 1).

Field observations were accomplished by underwater television. The camera was mounted above a baited creel, facing down, with square field of view 2.5 m on the side, as shown in Fig. 1. The technical specifications are given in Table 2.

Table 1. Field observation localities.

Date	Locality	Depth (m)
12-16 May 1978	Lysefjorden	115
04-21 July 1978	Lysefjorden	115
13-15 Feb 1980	Nyleia	86
20-23 May 1980	Narøyfjorden	62

An artificial light source fitted with a red filter was used. According to previous investigations (LOEW 1976), the Norway lobster is not able to detect light of wave length greater than 500 nm, nor does it show behaviour effects at such long wavelengths (CHAPMAN and HOWARD 1979).

Table 2. Specification of observation equipment.

UTV-camera	Hydro Products, TC-125-Sit-W
Control unit/monitor	Hydro Products, SC 303
Video recorder	Sony AV-3420 CE
Light source	Effect, 0-500 Watt
Filter (red)	Kodak Wratten no. 29 (min. wave length: 605 nm)

Since the field of view was rather narrow, there was a risk of overestimating the number of Norway lobsters, as the same individual could enter and leave the area several times. To minimize this effect, an individual was regarded as «new» if the time interval between leaving and entering exceeded one minute, or if the individual that entered was distinctly different.

A strip of plastic, 1 cm × 20 cm, was mounted at the top of the creel to indicate the direction of the current. Entering and leaving directions of the individuals relative to the current direction, time spent in field of view, and observations of other species were recorded. Observations of special interest were recorded on videotape.

RESULTS

DIURNAL ACTIVITY PATTERN

The diurnal activity, expressed as the average number of individuals observed per hour, is shown in Fig. 2. During 214.5 hours of observation a total of 246

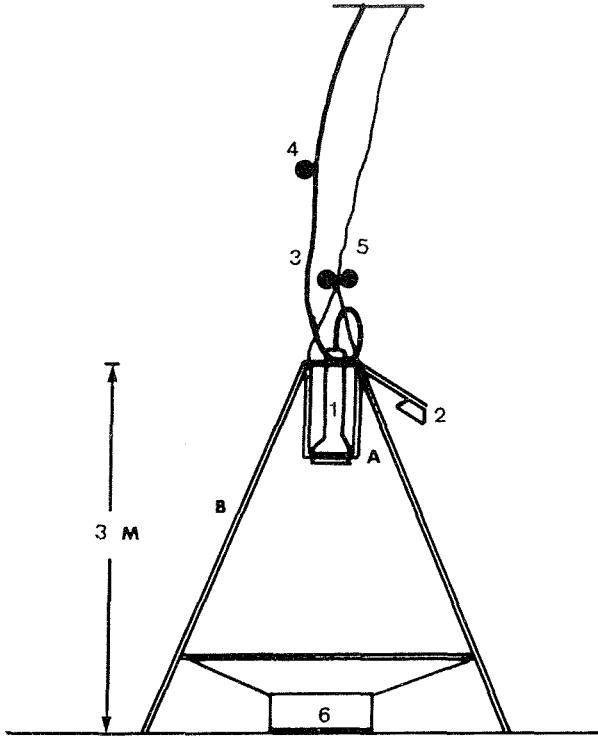


Fig. 1. Observation arrangement. A : camera frame, B : tripod, 1 : UTV-camera, 2 : light, 3 : cable, 4 : float, 5 : surface security line, 6 : creel.

Norway lobsters were seen, the majority of these in the period between dusk and dawn, with peak numbers observed between 2200–2300 hours and between 0100–0200 hours. Of these, a total of 15 individuals were caught in the creel, nine before and six after midnight.

ATTRACTION TO BAITED CREEL VERSUS CURRENT DIRECTION

Fig 3 shows the distribution of the approach-direction of the Norway lobsters relative to the direction of the current. The figure is based on 79 individuals from the Lysefjord observations. Most of the Norway lobsters approached the creel up current, in a sector 30° to either side of the current direction, while only one individual approached the creel down current.

BEHAVIOUR IN VICINITY OF BAITED CREEL

Norway lobsters that entered the field of observation generally approached the creel and searched around it. The duration of the search period varied from 1 to

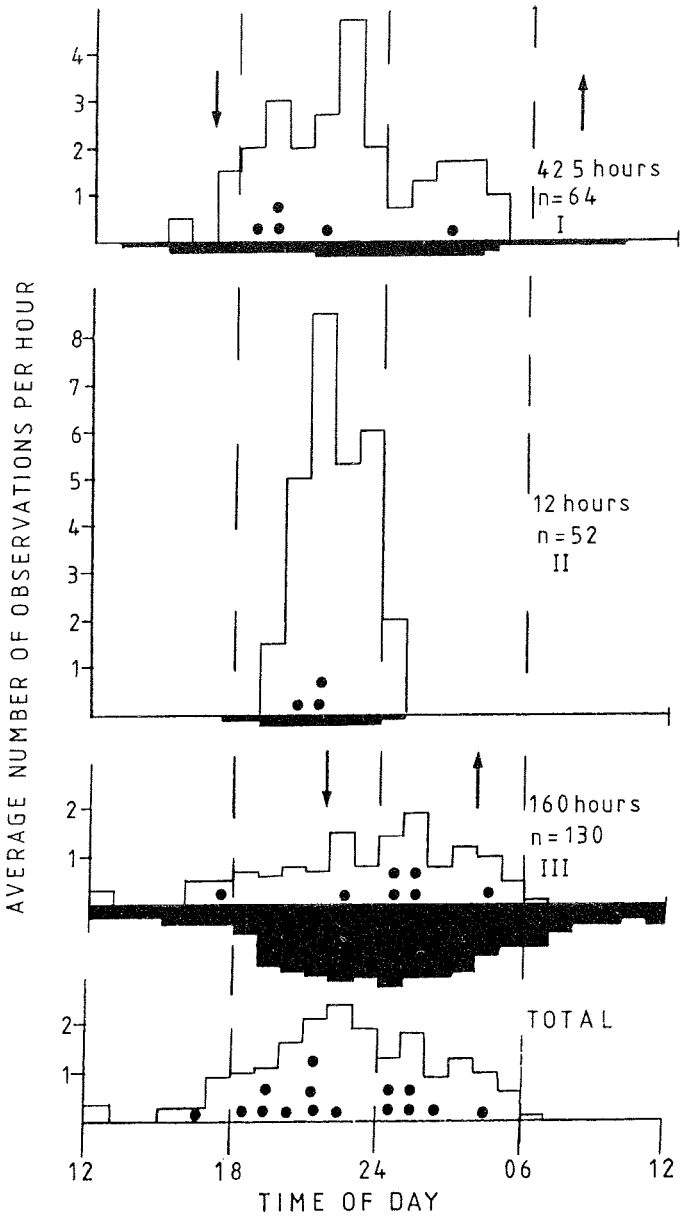
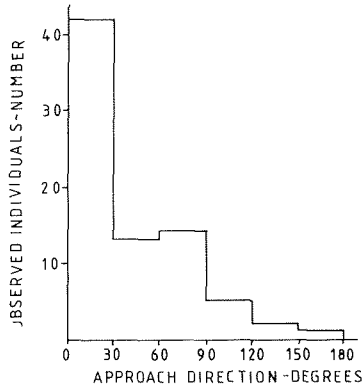


Fig. 2. Diurnal activity pattern. Number of Norway lobster observed per hour of observation at three different localities. I : Nyleia, II : Nærøysfjorden, III : Lysefjorden. Filled circles : catch of Norway lobster. Arrows indicate time of sunset and sunrise. Black area under the x-axis gives number of hours of observation (min.: 1 hr., max.: 17 hrs.).

40 minutes, when the individual either left the field of observation or entered the creel entrance. Only 65% of the observed individuals were in actual physical contact with the creel, while the rest either circled around it or passed at a distance. The catch rate, or proportion of observed animals that were captured was low, averaging 6.1 per cent.



OBSERVATION OF NORWAY LOBSTER IN AND CLOSE TO BURROWS

Occasionally the observation rig was positioned close to one or several burrows inhabited by relatively small Norway lobsters. These were observed to spend most of their time sitting in the burrow entrance, leaving only for short periods, and usually retreating to the burrow when other conspecifics or fish approached. Burrow systems with three different entrances were observed, and the Norway lobster could use these alternately.

LENGTH DISTRIBUTION OF NORWAY LOBSTER CAUGHT BY TRAWL AND CREELS

Fig. 4 gives the length distribution of Norway lobster caught by trawl and creels at a fishing ground, Sundene, in the Faroe Islands, and by creels at different fjord localities in Norway. Although the Faroese creel and trawl catches are taken at different times of the year, the length distributions should be representative of the distinct size difference of catches taken by the two types of gear. Trawl and creels seem to exploit the Norway lobster population over the same size range. The trawl catches contain a very high proportion of small individuals, whereas the creel catches show a more even length distribution.

DISCUSSION

This study has shown that the catch rates of Norway lobster can be low compared to the number of individuals attracted to the baited creel. This seems to be caused by following reasons:

Fig. 3. Approach direction of Norway lobster versus current direction (current direction : 0 degrees).

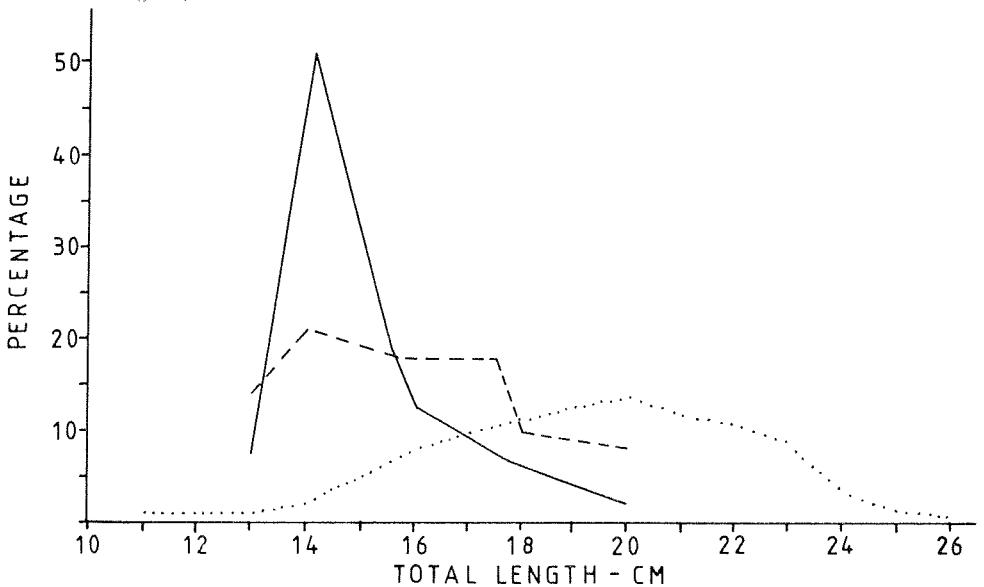


Fig. 4. Length distribution of Norway lobster, fished by:

- Trawl, Faroe Islands, (whole line). June and July 1977, n = 144 681.
- Creel, Faroe Islands, (broken line). January-June and October 1978, n = 90 231.
- Creel, three fjord localities, Norway, (dotted line). May-August 1977, n = 226.

The lengths in the Faroe Islands catches are recalculated from tailweights, and the size groups less than 13 cm and more than 20 cm are included in the 13 cm and 20 cm groups, respectively.

- The Norway lobster periodically shows low motivation for food search, especially towards dawn.
- The Norway lobster often seems to have difficulties in locating the creel entrance or entrances, even after extended search periods. A typical creel usually has two entrances, which occupy 10–15 per cent of the total circumference of the creel floor. Finding the entrance seems to depend on trial and error.
- Aggressive behaviour is frequent. Small individuals are usually chased off by bigger ones, thus having a negative impact on the catch possibility.
- The creel is an unnatural environmental factor, which might cause some degree of gear repulsion. This is supported by the observations, as one third of the observed individuals had no physical contact with the creel.

Furthermore, the creel catches are composed of a relatively high proportion of large individuals as compared to those of trawl catches. This seems to be caused by a difference in the selection process between the two types of gear.

Catching Norway lobster by creels can be divided into two stages: the attraction stage, which involves long-distance attraction by olfactory stimuli, and the gear stage, which operates in the proximity of the creel.

The selection process seems to start already in the attraction stage. CHAPMAN and HOWARD (1979) suggest that the bait stimulus does not induce the Norway lobster to leave its burrow, and that attraction only occurs when the animals are stimulated during a feeding excursion. The duration of the feeding excursion is positively correlated with the size of the animal.

Consequently, a small Norway lobster with a fairly restricted feeding range should have a low possibility of reaching the creel compared to that of a large individual. Thus, we can assume that even before the Norway lobster is in contact with the gear, there is a selection process exposing a relatively high proportion of large individuals to the gear stage.

In the gear stage, the critical factor is location of the creel entrance. Since this seems to depend on trial and error, the possibility of entering is somehow proportional to the search time. Small individuals were observed to be easily scared or disturbed during the gear stage, while larger individuals seemed to have a higher threshold for disturbances like gear repulsion and the appearance of conspecifics or other species. Thus, small Norway lobsters will spend less time searching for the entrance and make no or few trials to enter the creel, while larger individuals may make numerous trials.

The relatively high proportion of large individuals in the creel catches thus seems to be caused by a two-step behaviour-dependent selection process in the attraction and gear stages.

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