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**RECATCHES OF MARKED LOBSTERS, Homarus gammarus,
RELEASED IN 1988.**

by

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ABSTRACT

A pilot scale release of juvenile lobsters, *Homarus gammarus*, was conducted at Austevoll, western Norway in August 1988. One and two year old lobsters were marked with a brand on either the carapace or the tail. The two year classes were marked differently. The lobsters were released immediately after arrival from the hatchery, with divers and by dropping the lobsters through tubes in shallow water. Sea temperature was 15 degree C. The lobsters was either apathetic or made convulsive swimming action, resulting in a loss to predatory fishes of at least 15% within the first hour. Still, in 1990, marked lobsters began to appear in the lobster catches. In two of the release spots, these lobsters contributed to 50 % to 85% of the lobsters of caught. Weight gain had been about 26 times the weight in 1988 and carapace length was about 40% larger than at release. Bottom observations found the lobsters spaced out with no less than 3 m between each.

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INTRODUCTION

The lobster population on the Norwegian coast has been declining fast in the last 40 years. From catches ranging from 300 to 1000 tons per year in 1930 to 1950, the catches are now less than 30 tons per year.

In several countries, enhancement of populations by releasing stage VII or older lobster juveniles was initiated. Lobster juveniles probably have better survival chance than the planktonic larvae. The results from enhancement projects with marked lobsters in Great Britain confirm that released lobsters do survive and grow in the sea (Bannister & Howard 1989, Burton 1990). The lobster hatchery at Kyrksæterøra, Norway, managed by the Institute of Marine Research since 1989, has released one year old lobster juveniles from 1979 and marked juveniles since 1988. In a release of branded lobster juveniles at the Austevoll Aquaculture Station in August 1988, Norway, the losses due to predatory fishes were much too high. More than 15 % of the lobsters were eaten within the first 30 min after release, and lobsters were found in the stomach content of fishes also in the following days. In 1989 and 1990, investigations were taken to find and recatch surviving lobsters, to measure growth and impact on the natural lobster population.

MATERIALS AND METHODS

The lobster juveniles were produced from wild caught broodstock at the Kyrksæterøra hatchery, northwestern Norway, in 1986 and 1987. The production method is described in Grimsen *et al* 1987. The lobsters were fed first with frozen *Artemia salinas* and later with compounded wet feed.

The lobsters were marked by branding a spot central on the carapace of the 1.250 1986 lobsters and on the first joint of the tail of the 8.550 1987 lobsters. The marking was done within two weeks in July 1988.

On 12 August 1988, the 9.800 lobsters were sent by airliner to the release sites at Austevoll. The lobsters were packed between wet wooden chavings and newspapers in cooled thermal boxes and brought by boats directly to the release sites. The

lobsters were released close to the shoreline on 10 and 3 m depth by divers and through tubes down to the bottom from an anchored boat. The bottom substrata was varying from sand with boulders and rocky slopes to rocky bottom with cracks and seaweed.

From June to September in 1989 and June to December in 1990, lobster fishing in the areas were conducted with crails and traps. Caught lobsters were marked again and released after measuring. Both years divers were used for bottom research, mapping the lobsters individual location. Total and carapace length together with weight were measured in all caught lobsters.

RESULTS

Release.

The lobsters arrived at Austevoll about 12 hours after packing at Kyrksæterøra. Size and weight measurements are given in table I. Mortality during transportation was less than 5 %. The lobsters were released on four release stations (Fig 1): An isolated lagoon (Station 1), two bays along a larger island, one isolated (Station 2) and one exposed (Station 3) and finally a small, isolated scerry (Station 4). Numbers of released lobsters at each spot are given in table II.

Divers brought half of the lobsters down to 10 m before release. The other half were released through tubes to 3 m, observed by divers. The lobsters showed abnormal behavioural patterns (Meeren 1991), and were very conspicuous for predators. More than 15 % of the lobsters were probably eaten by wrasses (*Labridae* sp) within one hour.

Recatches and observations

1989.

No lobsters were caught in 1989. A diver observed one individual with two scissor shaped chelea in the sheltered lagoon in August. He estimated the size to be about 12 cm, total length.

1990.

By November 44 catches were registered on two of the release locations, constituting of 38 individuals. Scar from branding were found on 29 of these. The commercial fishermen delivered only marked lobsters, so more lobsters than the 38 were probably caught in the area. In the scientific catches, 27 out of the 37 catches were of released lobsters (22 individuals). In the lagoon, 81% of the catches were from the released group. At the island 60 % were released lobsters.

Mean size of all recaught lobsters are shown in table I. The lobsters had increased about 40% in carapace length and the weight had increased about 26.5 times. It was no significant difference in size found between station 1 and 2 or between the two age classes (Table III).

Diver registrations at night observed lobsters in all four release stations and lobsters with scissor shaped chelea in three of the four places. All the lobsters were situated within 100 m from the release spot. No lobsters were seen with less than three m distance from the next. In two cases, the lobsters were seen catching squat lobsters *Galathea strigosa*. Most thorough investigations were done in the lagoon, ending with a transect search in August, covering the whole actual shore (300 m long, 5-6 m deep) within one hour by six divers. 18 lobsters were observed, three for the second time that year. The divers estimated the length of the lobsters to be from 12 to 20 cm, but were unable to take measurements or see the faint scar from the branding. One was estimated to be larger than 20 cm, but this had differensiated chelea and was probably from the natural population.

DISCUSSION

The transportation method and time of release are discussed in Meeren *et.al.* (1990) and Meeren (1991). Acclimated lobsters are now released in late winter and early spring in Norway. Still, this project show that even with high mortality at release, the released lobsters make a considerable effect on the local lobster population. The incidence of recatches of the same individuals in one season suggest that the released lobsters are stationary and utilize a specific area over a long period of time, as known in wild lobsters (Cooper & Uzmann 1977). Also the observation of predatory behaviour show that the surviving lobsters from the release are well fit to a free life. With this knowledge and as long as we know little about population genetics in European lobsters, we must in the future be careful when releasing lobsters. Because of the impact the released lobsters might have on local populations, the broodstock should be selected from the local stock in the release area.

The growth of the released lobsters seems to be less than for the lobsters of the same age in England (Bannister *et.al.* 1990), either due to colder water or differences between the populations in the two countries. The growth of the Austevoll lobsters is comparable to the growth of lobsters released at the southernmost part of Norway, measured by S. Tveite (Flødevigen Biological Station, Norway).

The uniform size of both year classes, being differently sized at release, can be an artifact caused by avoidance of exposed areas (Cooper & Uzmann 1977) or escape from the fishing gear by smaller individuals.

In two stations no recatches were done, although divers did observe lobsters in the area. These stations were reckognised by dense seaweed growth, large underwater boulders and exposition to waves and wind. These factors made creel setting difficult. Because of this, the catches in late summer and autumn were concentrated to the two stations where lobsters were caught regularly.

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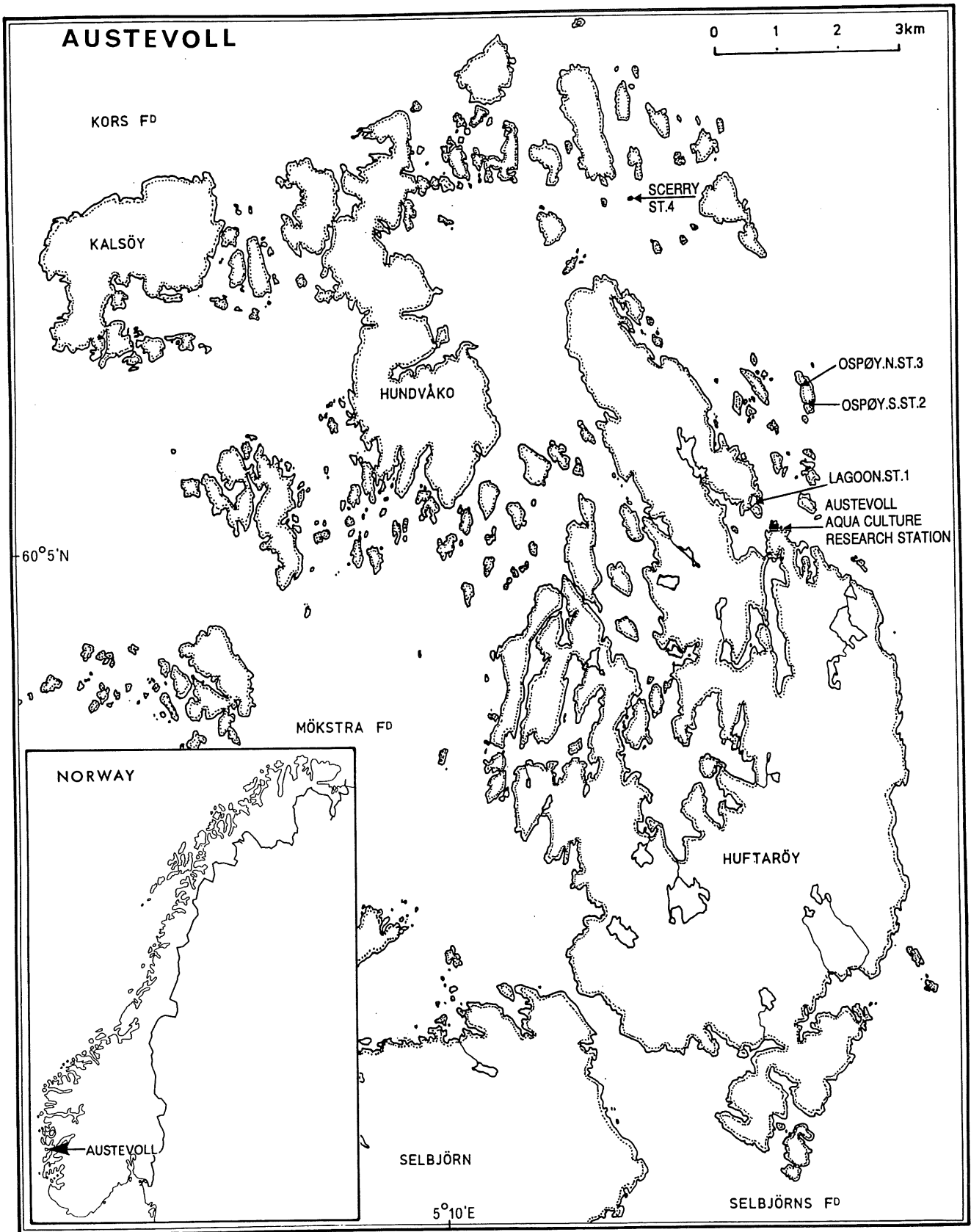


Fig.1. Map of the release stations for lobster in Austevoll in 1988.

Table I.

Mean length (total and carapace) and weight of the lobsters at release and when caught in 1990.

Year class	Release, 1988		Recatch, 1990	
	1986	1987	1986	1987
Total length (mm)	70	45	178	169
Carapace length (mm)	32	22	64	61
Weight (g)	6	3	150	115

Table II.

Numbers of lobsters of each year class, released on the different stations in 1988.

Year class	1986	1987
Station 1 (Lagoon)	400	400
Station 2 (Sheltered bay)	1 000	3 400
Station 3 (Exposed bay)	1 000	3 400
Station 4 (Scerry)	500	500

Table III.

Table over length (total length: TL and carapace length: CL) in mm and weight (W) in g of the largest, smallest and mean of all the released lobsters caught on station 1 and 2 during the field work in 1990.

Year class	Station 1			Station 2		
	TL	CL	W	TL	CL	W
1986	N=9			N=4		
Largest	199	74	225	191	71	190
Smallest	155	57	112	150	53	105
Mean	178	65	161	171.5	62.5	152.5
SD	15	6.5	43.5	18	8	41.5
1987	N=10			N=1		
Largest	199	73	215	159	60	120
Smallest	151	52	92			
Mean	149.5	61	123.5			
SD	45	6.5	59			