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Preliminary results of field tagging experiments on
lobster (*Homarus vulgaris*) in Norwegian waters

by

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INTRODUCTION

The lobster fishery in Norway is at present regulated by closed seasons and size limits. Further regulations e. g. protection of berried lobsters, has been under consideration for many years, but so far regulations of this kind have not been introduced.

An experiment was started in 1965 in order to study the effect of protecting berried lobsters. It was felt that the experiment had to be carried out within an area where the eggs could hatch and the larvae settle, and besides a natural stock of lobsters must be present. Several land-locked fjords on the west coast of Norway seemed to provide suitable experimental areas. However, closer investigations of some of these fjords revealed that the O_2 content in the deeper layers was very low and H_2S occurred near the bottom in the deepest part.

The lobster stock in these fjords consisted of a small number of old individuals only. Probably these lobsters were hatched outside the entrance to the fjord and had later migrated into the fjord along the shore trough the inlet.

The search for areas which combined all the above mentioned conditions was difficult, but at least two small bays probably suitable for the experiments were selected. The experiments on the feasibility of liberating berried lobsters provided an excellent opportunity to test, in the field, the suture tagging method on lobster, (Gundersen 1964.)

MATERIAL AND METHODS

The two bays used for the experiments are located near Bergen. Busepollen (Figure 1) is a rather irregular bay, with a maximum depth of 61 m. There are three inlets to this bay, Ringarsund, Nissasund and through Drønspollen. In older time Drønspollen had no outlet to the north and was known as a good pond for oysters, but in later years a canal for smaller boats has been made. The threshold depths are about 3 m at Ringarsund and Nissasund and 1 m at Drønspollen.

Most of the shoreline is steep and rocky and some places are good hiding-places for lobster.

The other bay Kvernhusosen (Figure 2) is much smaller with two inlets, the biggest to the east to the Hjeltefjord, and a canal to the west to the outer skerries. This canal was originally very shallow and was dry at ebb-tide but is now about 3 m. Only about half of the shoreline is rocky and will offer the lobster good hiding-places. The maximum depth is about 35 m.

The lobsters used for the tagging were taken from a lobster pond at

Glesvær south of Bergen and consisted of lobster taken in baited traps in the spring season.

Three tagging methods were used:

- A: Suture method.
 - B: Burning method.
 - C: A combination of the two methods.
- A: A toggle-tag of plastic is inserted through the soft skin between carapace and abdomen and fastened to the muscles. (Gundersen 1964)
- B: On the segments of the abdomen small marks are burned with an electric soldering bolt. The marks are burned in a special system, giving each lobster a individual number. (Dybern 1965)

RESULTS

In Busepollen (Table 1) 85 berried females and 28 males were tagged in June 1965 using the suture method. Of these 12 females and males were recaptured in the autumn the same year.

On two females taken in the last days of August 1965 all the eggs were hatched but the lobsters had not moulted. Each and all of 6 females and 2 males caught later in the autumn had signs of moulting.

In October-November 1966 13 females and 3 males were recaptured. Of the females 11 were examined; all had moulted and 6 were berried.

The increments in total length of the 3 males were 5, 5-6 cm. . This indicates at least 2 moults since June 1965.

In December 1967 one female was recaptured and the increment in total length (4, 0 cm) indicated 2 moults.

During 1968 one tag was remitted in June without details, but a female taken in October was examined and the total length increment was 2, 4 cm, indicating at least one moult.

At the same locality (Table 2) 70 tagged lobsters were liberated in the beginning of June 1966. Of these, 36 were tagged with the burning method. On the remaining 34 this and the suture method were used in combination.

Of the 36 lobsters in the first category 7 females and 6 males were taken in the summer and autumn.

All the females taken in October had hatched their eggs and moulted. Of the males one recaptured in the middle of July had not moulted. The rest, however caught in October had all moulted.

In December 1967 two females were recaptured, both had moulted and were berried.

At the last days of July 1968 two recaptured females showed one moult since the liberation, one taken in October according to the increasing in total length (4, 4 cm) had moulted at least twice.

Of the 34 lobsters tagged by the combined method 14 females and 3 males were recaptured in October the same year. 10 of the females and 2 of the males were examined by the author. The females had hatched their eggs and all of them both females and males had moulted.

In 1967 3 females and 2 males were taken in the autumn. 2 of the females and both of the males were examined, all of them had moulted, one male had increased 5 cm in total length indicating two moults.

During 1968 one female and two males were recaptured, and all had moulted at least once.

At Kvernhusosen (Table 3) 73 berried females and 19 males were tagged with the burning method and liberated in the beginning of July 1965.

In September the same year 5 females were recaptured by the author. All of these had hatched their eggs but not moulted.

During 1966 7 females and 1 male were taken by the author and one female by a fisherman. All of these had moulted and one female caught in December was berried.

In the middle of June 1966(Table 4) 49 berried females and 19 males were tagged and released in the same area. Of this quantity 36 were tagged both with the suture and burning method and 32 with the burning only.

Of the first category 8 females and 3 males, and of the second 3 females and 2 males were recaptured during the autumn the same year. Only 3 females and 1 male of these were examined but all had moulted during the time in liberation.

In the autumn 1967 3 females double tagged and 1 female and 3 males tagged with the burning method were recaptured. All of the females had moulted and 3 of them were berried. The increasing in total length of the males ranging from 4, 5 to 5, 4 cm indicated 2 moults since the liberation.

In the autumn 1968 3 of the double and one of the burned tagged females were recaptured. Unfortunately, only one of these was examined and this one had moulted twice.

DISCUSSION

At present it is too early to expect any results of the main purpose with the experiment on protecting berried lobsters. On the other hand one has got some results of the different tagging technics, some informations of the moult frequensis, increments in length during moult etc.

During the first experiments in 1965 no special information was given to the fishermen about liberation of tagged lobsters in order to observe their reaction. Moreover a publication of the tagging areas would lead to an increased influx of fishermen that are not fishing there normally.

In Kvernhusosen where only the burning method was used in 1965 no recaptures were remitted from fishermen, while the author caught 5 lobsters. In later talk with the local fishermen they told that they had observed some lobsters in their catch with peculiar spots on the abdomen but observed it to be something natural.

Next year when both methods were used the fishermen observed the tagged lobsters of both categories.

In the first experiment in Busepollen 1965 the suture method was used and this resulted in recaptures from the fishermen in the autumn the same year. During 1966 when both methods were used, together or separately, both were observed by the fishermen.

Table 5 and 6 shows number of recaptures on both localities from 1965 to 1968 of suture and burned tagged lobsters. In both cases the suture method seems to give higher percent of recaptures than the burning. This probably depend on the easy visibility of the suture tag.

The tables also shows a higher percent of recaptures from the 1966 experiment than in 1965 on both localities and methods. As mentioned before the lobsters for these experiments were taken from commercially lobster ponds. It is an experience that the condition of stored lobster will decrease during the storage. The lobsters for the experiments in 1965 had stayed for a longer time in ponds than those in 1965.

Another cause may be the experience in the tagging technic. The experiments in aquaria suggested that the insertion of the internal tag caused less mortality and shedding when it was placed in the muscles on one side of the medial line, and this has been taken into consideration during the tagging in 1965.

There is a rather great difference in percent of recaptures from the two localities. Any possible explanation of this variability can not be given at this time.

The recaptures of tagged lobsters in these experiments gives some informations of the biology of the lobster on the west coast of Norway.

Up to this date all recaptures of females released berried in June-July shows that hatching will take place in the summer.

Moulting and mating occure in the autumn and they become berried next summer. The roe is kept during the winter and spawning takes place next summer.

In other words it is likely as if a mature female lobster has a two yearly moulting period in this area.

The number of tagged males is rather small compared with the females, but recaptures seems to indicate yearly moulting within a length rate from 22-25 cm.

All recaptures except one up to this date are taken inside the ponds confirming once more that lobsters are local.

REFERENCES

- Dybern, Bernt I., 1965. Hummerfångst och hummerundersökningar. Svenska Vestkustfiskaren 17. 1965.
- Gundersen, Kaare R., 1964. Tagging Experiments on Lobster (*Homarus vulgaris* L.) in Norway. ICES CM 1964, Shellfish Committee, Doc. No. 152. 10 pp.

Table 2

Recaptures of tagged lobsters released in Busepollen
June 1966.

Tagging method: Suture and Burning Number of tagged females:51 Males:19
TL = Total length cm CL = Carapace length cm B = Berried

	Released 1966		1966 Increase cm			1967 Increase cm				1968 Increase cm			
	TL	CL	Date	TL	CL	Date	TL	CL	B	Date	TL	CL	B
♀	35,5	13,2	26.10	0,6	0,3	1.12							
	34,5	12,5	Oct.	1,1	1,0								
	33,8	12,4	Oct.	0,8	0,5								
	33,7	11,9	Oct.	1,9	1,1								
	33,2	11,8	Oct.										
	33,2	12,2	15.11	1,3	0,3								
	32,2	11,7	Oct.	0,7	0,5								
	30,7	10,9	Oct.	1,6	0,7								
	30,2	10,6	Oct.	2,7	0,9								
	29,7	10,4	Oct.	1,9	0,7								
	29,5	10,4	Oct.	0,3	0,2								
	28,2	10,0	Oct.	2,4	0,8								
	27,6	10,6	Oct.	1,2	0,2								
	27,5	9,3	Oct.	2,0	1,0								
	26,8	9,5	26.10	1,8	0,6								
	26,5	9,5	Oct.										
	26,6	9,3	15.11	1,8	0,8								
	25,6	8,6	15.11	2,9	1,5								
	25,6	9,1	Oct.										
	25,5	8,7	Oct.	2,4	0,9								
	23,5	8,1	Oct.										
	32,4	11,8					1.12	0,9	0,4	x			
	32,3	11,4					1.10	1,5	0,7				
	29,6	10,1					1,10	2,4	1,1				
	34,2	12,4									28.7	1,1	0,5
	33,0	11,7									28.7	0,8	0,3
29,0	9,9									28.7	1,0	0,7	
25,0	8,8									8.10	4,4	1,3	
♂	28,0	10,4	14,7										
	26,8	9,8	Oct.	2,3	0,8								
	25,8	9,3	Oct.	1,8	0,8								
	25,5	9,2	Oct.	2,3	0,9								
	25,4	9,1	Oct.										
	25,4	8,9	Oct.	1,7	1,1								
	24,8	8,8	Oct.	2,4	1,0								
	24,7	8,7	Oct.	2,3	0,9								
	21,5	7,5	28.10	2,0	0,9								
	23,0	8,1					1.12	2,7	1,0		10.10	2,7	0,3
	24,3	8,6									5.10	2,7	0,9

Table 3

Recaptures of tagged lobsters released in Kvernhusosen

July 1965

Tagging method: Burning Number of females: 73 Males: 19

TL = Total length cm CL = Carapace length cm B = Berried

	Released 1965		1965			1966			B
	TL	CL	Date	TL	CL	Date	TL	CL	
♀	32,4	11,1	8.9						
	30,9	10,8	10.9			4.11	1,3	0,6	
	28,9	10,2	9.9			11.11	1,0	0,4	x
	28,0	10,1	8.9						
	26,1	9,1	10.9						
	32,6	11,7				21.6	1,2	0,5	
	26,5	9,0				5.12	2,6	0,8	
	25,8	9,1				3.6	1,2	0,3	
	25,8	8,9				22,6	1,7	0,7	
	25,3	8,9				21.6	1,7	0,4	
	23,0	7,8				2.11	1,0	0,5	
♂	29,5	10,8				1.11	3,1	1,3	
	23,4	8,2				2.11	2,2	0,8	

Table 4

Recaptures of tagged lobsters released in Kvernhusosen

June 1966.

Tagging method: Suture and Burning Number of females:49 Males:19

TL = Total length CL = Carapace length cm B = Berried

	Released 1966		1966 Increase cm			1967 Increase cm				1968 Increase cm			
	TL	CL	Date	TL	CL	Date	TL	CL	B	Date	TL	CL	B
♀	29,3	10,6	5.12										
	28,9	10,1	5.12	1,6	0,5								
	27,0	9,5	2.11	1,5	0,5								
	26,8	10,4	5.12										
	26,0	9,4	5.10										
	25,9	9,0	Oct.							Oct.	4,1	1,8	
	25,9	8,9	5.12										
	25,8	9,1	5.12										
	24,8	8,7	5.12										
	24,8	8,6	15.10										
	24,6	8,7	4.11	2,0	0,6								
	21,7	7,4	5.12										
	30,2	10,7				27.10	1,6	0,7					
	28,8	10,3				27.10	1,0	1,0	x	Dec.			
	26,0	8,9				27.10	1,5	0,5	x				
	22,9	7,8				27.10	2,1	0,7	x				
	26,7	9,6								6.10	1,3	0,2	
	25,0	8,5								Dec.			
♂	28,6	10,2	Dec.										
	26,0	9,3	5.12										
	25,0	9,1	5.12	2,5	1,0								
	24,5	8,7	2.11										
	25,0	8,8				27.10	4,5	1,9					
	23,8	8,3				27.10	5,4	2,0					
	23,6	8,1				27.10	4,6	1,9					

Table 5
 Number and percent of recaptures in Busepollen 1965 - 68.

Tagging date, number and method	1965	1966	1967	1968	Total
30.6-1965 N- 108 Suture	n = 15 13,9%	n = 16 14,8%	n = 1 0,9%	n = 2 1,85%	n = 34 31,5%
8.6-1966 N 36 Burning		n = 13 36,1%	n = 2 5,5%	n = 3 8,3%	n = 18 50,0%
8.6-1966 N 34 Suture + Burning		n = 17 50,0%	n = 5 14,7%	n = 3 8,8%	n = 25 73,5%

Table 6
 Number and percent of recaptures in Kvernhusosen 1965 - 68.

Tagging date, number and method	1965	1966	1967	1968	Total
1.7-1965 N 92 Burning	n = 5 5,4%	n = 9 9,8%			n = 14 17,0%
16.6-1966 N 32 Burning		n = 5 15,6%	n = 4 12,5%	n = 1 3,1%	n = 10 31,2%
16.6-1966 N 36 Burning + Suture		n = 10 27,8%	n = 3 8,4%	n = 3 8,4%	n = 16 44,5%

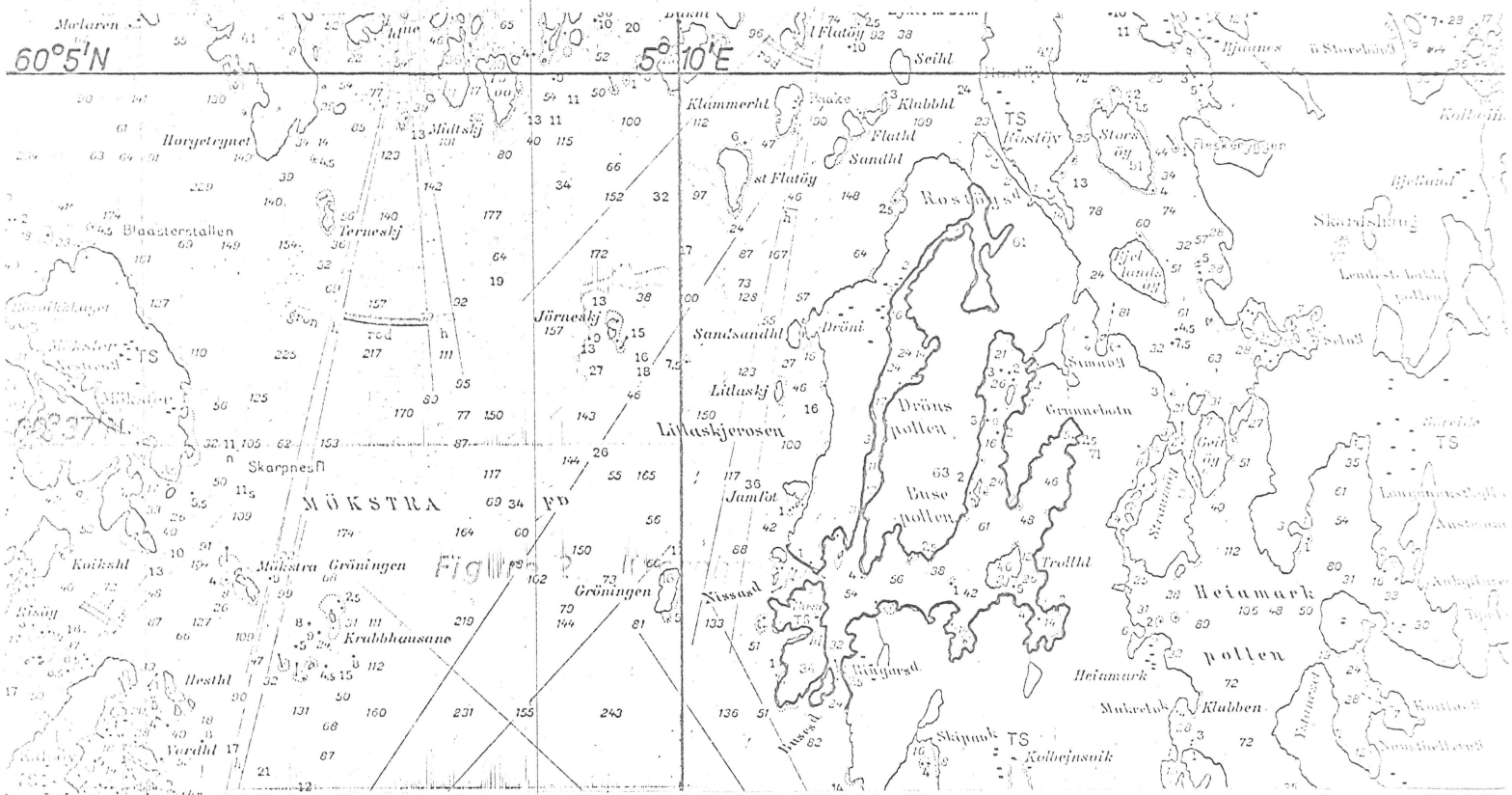


Figure 1. Busepollen 1:100000

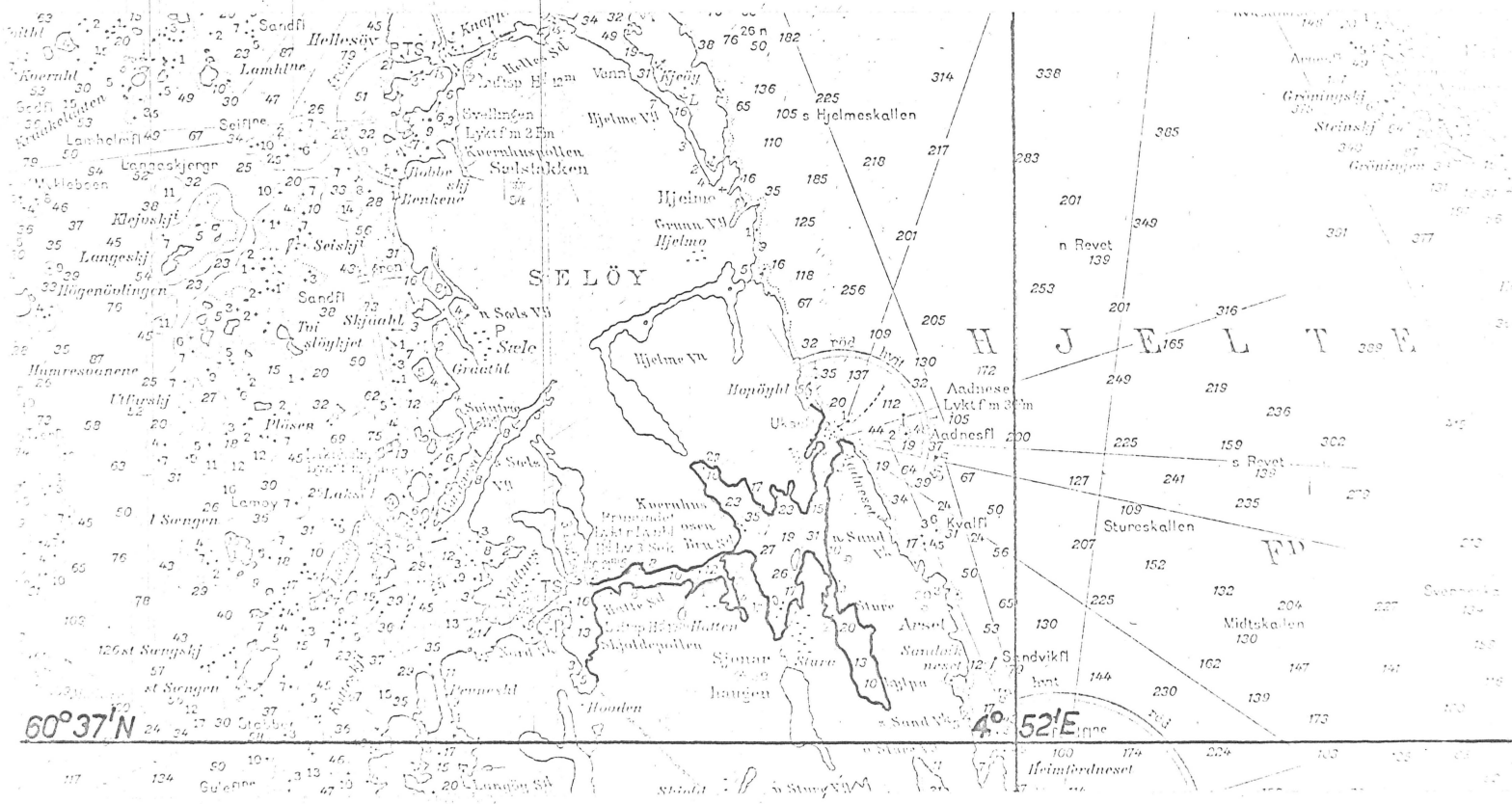


Figure 2. Kvernhusosen 1:100000