

Report of the Meeting of the ad hoc Group for the Study of
the European Lobster (*Homarus gammarus*)

Dublin, 12-14 March 1974

The attendance was as follows:

Dr J Audouin	France
Dr P Jatzke	Germany
Dr F A Gibson	Ireland
Mr K M Bhatnagar	Ireland
Dr K Gundersen	Norway
Dr E Edwards	United Kingdom: England and Wales
Dr D Bennett	United Kingdom: England and Wales
Dr H J Thomas	United Kingdom: Scotland
Dr P S Watson	United Kingdom: N. Ireland

Dr F A Gibson (Ireland) was elected to the Chair, and Dr J P Hillis (Ireland) acted as Rapporteur.

The Group was welcomed to Ireland by the Parliamentary Secretary in charge of fisheries, Mr M P Murphy. The proposed Agenda was discussed and the following amended version was adopted:

1. Welcome to participants
2. Election of Chairman
3. Adoption of Agenda
4. Statement, by country, of present state of the lobster fishery and discussion.
5. Legal provisions, by country, for the regulation of lobster fisheries and discussion
6. Mechanics of the protection systems applied to lobster fisheries
7. Biology
8. The role of hatcheries and sanctuaries
9. Biological and statistical measures of lobster abundance
10. The role of the part-time lobster fisherman
11. Statement by meeting for submission to the Shellfish and Benthos Committee of ICES at its 1974 meeting in Copenhagen
12. Any other Business.

x) General Secretary
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Under Item 4 of the Agenda, the following statements concerning the present state of national lobster landings were made:

Sweden The following information concerning Sweden was provided by Dr B I Dybern, who was unable to attend but had forwarded written information including a diagram showing the development of the Swedish lobster fishery as seen from the landing figures in the commercial fishery since last century. The decline from about 1950 onwards was clearly seen but did not show the whole truth about the lobster stock. An enclosed table showed that there was no big difference in the catches by skilled fishermen from 1950 onwards. Unskilled fishermen, on the other hand, seem to get less catches and have often given up their fishery.

The lobster stock has decreased, but how much? How much lobster are taken by summer guests and by other occasional fishermen, who do not give any information to the statisticians? Such occasional fishery has very much increased since 1950.

The minimum size has been increased from 21 cm to 22 cm total length in 1973, with a transitional period until 30 June 1974: 21.5 cm. It is now (1973) prohibited to catch lobsters by means of diving.

The statistics are rather bad, but new fishery statistics will be introduced in the next few months.

Pollution is the cause of decreased catches in some local inshore waters.

There are two protection periods: northern west coast: 15 June to 1 October; southern west coast: 15 July to 15 September.

The number of commercial fishermen and the number of fishing gears (mainly creels etc.) have greatly decreased from 1950 onwards.

Dr Dybern suggested that ICES might set up a regular working group on the lobster problem, and that the Dublin meeting could perhaps make some definite recommendations regarding which items are the most urgent. If such a working group is set up, he would be glad to invite it to Sweden for its first meeting.

France (J Audouin)

The catch decreased in the period 1965-68 from 403 to 389 tonnes; in 1972 it recovered to 420 tonnes. These changes are very small and could be due to natural fluctuations. One looks forward to an increased production; the creation of sanctuaries looks promising to date. There are two hatcheries: Isle d'Houat and Isle d'Yeu (opened 1971 and 1972). Work has also been done on pathology with promising results on captive lobsters and some cases of subsequent recovery in diseased lobsters treated, tagged and released.

Germany (P Jatzke)

Since 1967, 1 500 hours of diving have yielded 63 lobsters. These were large, over $\frac{1}{2}$ lb, with the largest $10\frac{1}{2}$ lb. In the fishery, 10-20 fishermen catch 500-1 000 lobsters per annum compared with a peak of 50 000 or so after World War II. 37 lobsters were tagged, yielding 1 recapture (not a lengthy journey).

Pingers have been attached for monitoring but staffing difficulties prevent monitoring by boat for more than one day.

In the underwater laboratory, the "trichterkreisel" larval container has been used, allowing larvae to feed naturally on plankton. It is hoped to build larger underwater cages to rear larvae beyond the stages 4-5, because at those stages they are still subject to predation.

Ireland (F A Gibson)

Landings (nos) per annum:

1887-1892	300 000
1893-1929	800 000 approx.
1932-1959	400 000 "
1962-1971	438 000 "

In 1968, it was thought that the decrease was due to the introduction of a mixed crawfish/lobster technique, but a closer look at the statistics has shown a fall in catch/effort values regardless of the above effect.

In 1970, 1971, and 1972 the catch stayed approximately constant, with a great increase in effort. In 1973, when many fishermen turned to salmon fishing, the lobster season began later, and the catch/effort rose slightly. The data, however, are contributed voluntarily and hence may be biased in favour of the more successful fishermen.

Norway (K Gundersen)

Landings:	1932	1 300 tonnes
	1973	150 tonnes

The fishery is worked by small boats during a short autumn season.

Every year, a decrease in catch/effort has taken place:

1946	0.28 lobsters per tray-day
1960	0.18 " " " "
1973	0.10 " " " "

In 1968-73 the decrease occurred despite enlargement of the area fished. A small-boat fisherman needs 2 kg per day to be economic.

This information is valid for the Skagerak coast.

England and Wales (E Edwards)

Lobsters are the most important shellfish; 430 tonnes were landed in 1972. Catches in the north-east, formerly an important area, have declined sharply. The English channel and west coast catches have increased, the former due to discovery of new offshore grounds. Investigations suggest declining stocks in most traditional fishing areas.

Scotland (H J Thomas)

In 1892, 500 tonnes were landed. There are three areas: west, east and Orkney/Shetland. Pre-1939 little change; post-1945 there was an increase in the east and in Orkney/Shetland. The highest-ever levels were reached in 1948-49. Since 1949 there has been a substantial drop, despite temporary recovery (comparable with USA and Canada) in 1961. On the west coast, larger boats have been introduced at Mallaig.

Size composition:-

mean, Stornoway, Oban, Shetland:	10.4, 10.2, 11.2 cm resp.
mean, Mallaig, Orkney, South/East:	9.6, 9.5, 8.8 cm resp.

Catch/effort has dropped everywhere, severely so in the southeast Orkney and to some extent Mallaig. Lobster/crab mixed effort has started in Orkney partly due to the lobster scarcity.

Northern Ireland (P Watson)

The lobster fishery is small, and lobsters are taken in boats of 8-9 m or less, mostly during the period June-October. Mean landings: 1954-73: 17 tonnes (best, 1959, 28 tonnes). Catch/effort fell in 1965-1973 from 13 kg per 100 trap lifts to 7 kg per 100 trap lifts. Greatly increased landings in 1972/73 might be due to the effect of increasing the minimum size from 8" to 9" in 1966.

The discussion which followed these statements centred around general questions, answers to which might reveal some of the causes for the generally stated decline in the lobster catches over the past decade in particular.

1. Possible effects of temperature

Winter and spring sea temperatures have been somewhat above average in recent years. This might provide more natural food and thus reduce catches in traps. However, this in itself should result in conservation, but the evidence does not suggest that any natural conservation is taking place. It was also pointed out that mild temperatures early in the year can give rise to early moulting, perhaps in April, and this in turn can be followed by a second moult in late summer. This could lead to increased catchability. There was general agreement that whatever other factors may be involved, the level of fishing plays an important part in the decline of the fishery.

2. Effects of fishery limits

It was generally agreed that the lobster fishery is for each country a national affair, and that the amount of lobster trapping carried out by one nation in the coastal waters of another is so small that the fishery limits play no role in the decline of lobster fisheries.

3. Effects of heavy fishing

Excessively heavy fishing can lead to a number of undesirable and long-term effects.

(a) Lobster areas, the populations of which have become very reduced, may be invaded by other species, for example crab, making recolonization by the lobster quite difficult. This is particularly true in those coastal areas where the ground, though productive, is of limited extent. These kinds of grounds have been the areas of highest production in the recent past, e.g. the east coasts of England and Scotland, where the present decline is most noticeable.

(b) Some members reported exceedingly heavy fishing in the immediate post-1945 period, particularly from 1946 to 1949. In Scotland, for example, the catch level reached 1 000 tonnes during this period. This must have led inevitably to reduced stocks, and was followed by a natural decrease in the stocks during the late 1950's and during the early 1960's.

(c) Topographical effects

In the case of the "British Isles", it may be said in general that the eastern coasts present very different habitats for lobsters compared with the western coasts. Lobster-bearing substrates on the eastern coasts tend to be narrow and confined, thus limiting the extent of the ground, and often the depth at which lobsters are located. Conversely, the continuation of land masses on western coasts well to seawards presents lobsters with more area for colonization and at a much greater range of depth. Because of these factors, eastern lobster fisheries may not be capable of as rapid recruitment of lobsters as western areas, which because of their size must include unfished stocks which act as a reservoir for the continued high density of lobsters. A further factor

apparently associated with high lobster density is strong current movements, which tend to be more massive on western coasts. One member of the Group suggested that the present improvement in lobster catches in the Brittany and Cornwall areas might be due to an enriched water supply moving northwards from the southern mid-Atlantic, which as yet may not have moved further north so that its effects have not been noticed. However, the Norwegian experience does not fit into these arguments, because here on the exposed western areas where lobster-bearing ground is extensive, the evidence points to a massive decline in total landings from 1 300 tonnes in 1932 to 150 tonnes in 1973.

(d) General comments

- (a) All parties agreed that the noted reduction in lobster catch levels does not mean that a state of equilibrium has been reached.
- (b) All parties noted a reduction in catch per unit effort, especially noticeable in recent years.
- (c) All parties noted a reduction in the mean size of lobsters landed, which in itself is taken to indicate excessive fishing.
- (d) Reference was made to adverse environmental factors, such as warming of eastern Atlantic waters, eutrophication and industrial pollutants, particularly during larval stages. Because so little is known about environmental factors, the members could do little beyond recognising that they exist and may play a role in stock fecundity. However, some members felt that a combination of (c) and (d) are the chief causes of the present problem. One country in particular pointed to the fantastic growth in recent years in the number of sport or leisure-time fishermen, who do not declare their catches and who may rarely observe the management regulations in lobster fisheries, such as size limits or fishing seasons. Scandinavian members, in particular, felt that the impact of the sport or leisure part-time fishermen in recent years upon lobster stocks had been especially adverse.

4. Existing legislation for management

France - no new legal measures for management have been introduced in recent years. The following measures are in force:

- (a) minimum total length of 23 cm;
- (b) a 4 cm spacing between the laths of lobster traps;
- (c) the establishment of lobster sanctuaries (where public fishing is forbidden) comprising some 10% of the fishable area of the coast;

There is no prohibition on the landing of ovigerous females, nor is there a fishing season.

- Germany
- (a) minimum legal size, 9 cm carapace length;
 - (b) only Helgoland fishermen may catch lobsters, and these in a confined area of the island;
 - (c) there is a close season from mid-July to September 1st.
 - (d) there is a minimum legal space between laths of 4 cm.

Ireland

- (a) minimum legal size of 83 mm carapace length;
- (b) no closed season, no prohibition on the landings of ovigerous females, no regulation concerned with lath spacing;
- (c) before 1964, the legal size limit was 23 cm in total length;

Norway

- (a) From 1849 to 1963 the minimum legal total length was 21 cm and there was a closed season from 15 July to 30 September.
- (b) Since 1964, the minimum legal size limit has been 22 cm, and a closed season from 1 June to 1 October from the border with Sweden to Møre, and from 1 May to 1 October from Møre to the northern part of Norway.
- (c) In Hvaler community, Østfold county, it is not allowed to use crab pots or other equipment with bait for crab fishing in the closed season for lobster.

On the coast from Åna Sira to the Swedish border leisure fishermen are not allowed to set or haul lobster pots on Sundays or holidays.

On the coast from Tønsberg Tønne to Varnes lighthouse, Lista, it is forbidden in the closed lobster season to set pots or other equipment (with or without bait) to catch crabs in water shallower than 25 m.

U.K. (England)

- (a) A total legal size limit of 9" or 23 cm.
- (b) From 1951 to 1966, ovigerous females were protected, but this measure was rescinded in 1967.
- (c) An Order in Council is now being negotiated to replace total length by carapace length.

U.K. (Scotland)

As for England.

U.K. (Northern Ireland)

Minimum legal size limit of 9" or 23 cm since 1966. Prior to 1966 the legal limit was 8" or 20.3 cm.

General Comment

- (a) The meeting was of the opinion that in the case of those countries which had a prohibition on the landing of ovigerous females, the proportions of females in the catch changed neither at the time of introducing the measure nor after the regulation was abolished, which seems to be a clear indication that the measure was being evaded.
- (b) The meeting, noting that when the legal size was increased from 20.3 cm to 23.0 cm, there followed a rapid increase in the catch per trap haul, felt that a further increase in the minimum legal size limit is desirable.

- (c) The meeting noted that there can be wholesale disregard by fishermen of legal size limit, because there are so many ways of not declaring these in the landed catches, and of holding them at sea (safe from detection) against a favourable opportunity of selling them directly to hotels, restaurants, and tourists. (One participant demurred from this).

5. Methods for the management and control of lobster fishing

- (a) The meeting noted that as in other fisheries, a complete understanding of lobster populations will not be possible until such time as reliable catch/effort statistics are available from the industry, and the meeting felt that the most effective means of obtaining such vital information is by the licencing of lobster fishermen. The meeting also considered the compulsory registration of boats in all lobster fisheries to be an essential aid to the collection of catch and effort statistics, and recognised that it had no authority to suggest any more stringent measures at this point in time.
- (b) The meeting agreed that it is essential that individual countries must have a precise measure of the size of lobster at first capture in their various fisheries, and be in a position to relate this to the various topographical features of particular fisheries.
- (c) The meeting proposed that serious consideration should at some future date be given to the control of fishing effort by controlling the number of traps per boat, times of year when fishing can be permitted as related to biological information on sex ratios, etc.

General Comments

At present, a licence scheme is in operation only in France and Germany. However, France admitted that experience with its form of licencing was not encouraging.

6. The role of hatcheries and sanctuaries

The meeting noted that only in France and in recent years have these been afforded the attention which they seem to deserve. In France the sanctuary areas, which are regularly stocked by ovigerous females, form some 10% of the fishable coastal area. However, it is as yet too early to assess the value of these sanctuaries to the whole fishery. In recent years France has also made major advances in rearing techniques, and the meeting was of the opinion that both sanctuaries and hatcheries are to be encouraged and that all countries should take special note of these French experiments. The French delegate invited experts from member countries to visit the hatchery and sanctuary areas operated by I.S.T.P.M.

General Comment

The meeting agreed that the protection of ovigerous females serves no useful purpose where the intention is that fishermen shall not land and sell them to the public, for the following reasons:-

- (a) it can be evaded by scrubbing off the eggs which renders it a bad law and unenforceable;
- (b) it is negligibly effective for conservation in terms of recruitment to the stock by an increase in larvae in the sea. The potential gain to the marketable stock will not offset the immediate loss of the ovigerous females.

Well-stocked sanctuaries situated in areas where larval survival is high could become reservoirs of adults, capable - in time - of repopulating much larger areas in a manner which may already be the norm amongst most lobster stocks. Lobsters are fully

recruited to a fishery at a much later stage of life than many other commercial species. Whilst much is known about their larval life, and also their post-recruit life, very little is known about their habits and habitats during the 3-4 years of life in between. The recruitment mechanisms are totally unknown, for which reason these mechanisms should form the most important part of any future studies.

7. Future studies

The following lines of research were regarded by the meeting as an essential part of future programmes:-

- (a) Fecundity studies - More attention should be given to the studies of viable egg production, by lobster size and habitat.
- (b) Habitat requirements - Too little information is available as to what substrata are the most acceptable for lobster colonization. More observations over wider areas are required, and the inclusion of substrata other than those of permanent rock outcrops. Within these areas, more attention should be paid to the type of food selected by lobsters, because this problem is axiomatic to an understanding of the post-larval and pre-recruit period of lobster life.
- (c) The size at first maturity - More information is required about the size (and age) at first maturity by area. This will necessitate increased observations of the commercial catch, and where possible, the examination of sub-legal-sized lobsters. It was pointed out by various members that apparently the size at which 50% of lobsters mature for the first time varies; on the east coast of England, for example, it takes place between 83 and 85 mm whilst on the Welsh coast the size is somewhat smaller. Other members referred to a habit of small lobsters of burying themselves at various times of the year; smaller ones do so in Scottish waters in September, but as they grow older the habit tends to occur later in the season.
- (d) Population dynamics - The meeting, whilst recognising that a very great amount of population material is available, was of the opinion that considerably more information must be gathered, particularly with reference to:-
 - (i) growth
 - (ii) recruitment
 - (iii) fishing and natural mortality (especially diseases)
 - (iv) migration
 - (v) the problems posed by a yield assessment.

All members therefore urged an intensification of the collection of catch and effort data coupled with increased basic sampling of onshore and offshore populations. The question of recruitment and the difficulties of understanding its mechanisms have already been referred to. The members agreed that a very great amount of valuable information on growth is already available, but this needs to be substantially augmented by coordinated annual growth data. After due consideration of tagging methods, members came to the conclusion that the most efficient is the use of high temperature branding irons. The Norwegian member pointed out that branding irons may be used on board ship by a suitable arrangement of electrical output. All agreed that measurements of annual growth from branding should be made from open-sea liberations and, for this purpose, it would be necessary to select small discrete fisheries rather than large diffuse ones. The Norwegian member informed the meeting that he had gathered very considerable moult and growth data from lobsters liberated at sea over a long period, and this material could be examined critically for growth determinations. It seems clear that in each country there exists much valuable material on growth, mortality and migrations, and some on recruitment, which would be a valuable contribution to the parameters of a yield assessment.

8. Further research

The U.K. members informed the meeting that they could continue to monitor offshore fisheries, to increase the amount of catch and effort data, and to study the fecundity of ovigerous females, especially off the Welsh coast. Another problem which the U.K. members felt it may be possible to study, is the effects of pollutants upon lobster larvae. They also intimated the possibility of correlating trap eye diameter with the size composition of the catch.

The German member stated that a sanctuary has been created off Helgoland and proposed to institute a pilot scheme by importing European lobsters from other parts of Europe. It was hoped to establish a hatchery with a view to restoring the lobster stocks off Helgoland.

The French delegate stated that his Government's policy is to promote the sanctuary experiment and the establishment of lobster hatcheries, and said that work on population dynamics and mortalities, including tagging by branding, would be intensified.

The Norwegian member, reiterating that the most dramatic drop in lobster fishing in Europe had taken place in his country, undertook to collate all his moulting (growth in the sea) material, together with the extensive tagging and recapture data at his disposal, which provides much information on growth.

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