

SHELLFISH COMMITTEE

by

James Mason

1982

MOLLUSCA

Belgium

(Reporting only on Crustacea)

Canada

(G P Ennis)

Illex illecebrosus

A series of joint squid research surveys with Japan, the USSR, and USA were conducted (January to April, 1982) to investigate seasonal distribution and migration patterns of larval and juvenile Illex. The program combined oceanographic survey with plankton and trawl fishing on the Shelf edge and off the Shelf to the Gulf Stream and Sargasso Sea.

Ongoing July and October groundfish research cruises and special squid research cruises provided information on abundance, distribution and biology of squid as well as on hydrographic conditions on the Scotian Shelf (May to June).

A special squid cruise was also conducted on the Grand Banks and in the Gulf Stream south of the Grand banks from late May to mid June to provide information on abundance, biology, and distribution in relation to hydrographic conditions.

A one-month (August-September) survey was conducted jointly with France to investigate mid-season abundance, distribution, and biology of squid on the Scotian Shelf.

In inshore areas tagging studies were conducted to elucidate migration patterns. Field and laboratory studies into various aspects of squid biology and ecology, including food and feeding, life cycle, growth and maturation, reproduction, egg and larval stages and parasites were carried out as well.

Placopecten magellanicus

Scallop research surveys were conducted in the northern part of Georges Bank, on the Scotian Shelf, in the Bay of Fundy near Digby, and near Grand Manan. Throughout these surveys, age-specific abundance, density, growth, and yield characteristics were collected from selected depths and locations.

Geographical and seasonal variation in scallop meat and gonad yield continued to be monitored.

Simultaneous sampling using the Brutiv towed camera system and benthic collecting gear was completed in areas of high productivity on Georges Bank in an attempt to more precisely describe distribution.

The scallop fishery on St Pierre Bank is prosecuted exclusively by Maritime-based vessels which make intermittent, opportunistic excursions to buffer declining catches elsewhere on the Atlantic seaboard, particularly Georges Bank. An unprecedented diversion of effort into St Pierre Bank in 1982 resulted in record removals approximating 800 mt meats.

#### Chlamys islandica

A systematic line survey was conducted on Iceland scallop stocks in the northeastern Gulf of St Lawrence. A detailed assessment of the fishery was undertaken. In the fourth year of its second pulse, the fishery has enjoyed relatively stable CPUEs over the period and assessment points to its continued short- to medium-term stability.

#### Arctica islandica, Spisula polynyma, Cyrtodaria siliqua

All of the more promising inshore areas from St Mary's Bay to St Margaret's Bay, Nova Scotia were surveyed for populations of ocean quahaugs (Arctica islandica) and other potentially valuable deep-water molluscs. During the ten-week survey, information on general distribution and abundance, substrate type, and biological and population characteristics was collected.

A major offshore survey was completed on all of the major banks and some of the smaller banks of the Scotian Shelf from Western Bank east, with additional sampling conducted on Georges Bank. Data on distribution, abundance, substrate type, and biological and population characteristics were collected for target species (Arctica islandica, Spisula polynyma, and Cyrtodaria siliqua).

#### Denmark

(Reporting only on Crustacea)

France

(M J Dardignac)

Pecten maximus

Des observations régulières sur les principaux stocks de coquilles St Jacques ont continué d'être réalisées à partir de bateaux de pêche ou des navires océanographiques de l'ISTPM.

L'année 1982 se caractérise sur le littoral atlantique et en Manche par une amélioration du recrutement (coquilles de 2 ans), ce qui s'est traduit par une augmentation des rendements et entraînera un accroissement des captures lors de la campagne 1982-83.

Les prérecrues sont également plus abondantes que les années passées, particulièrement en baie de St Brieuc. Dans ce secteur, le plus important de la façade ouest de la France, la production, qui était tombée à 4 000t/an, devrait s'améliorer en 83.

En baie de Seine, le stock avant l'ouverture de la campagne 1982-83 était parmi les plus importants de ces dernières années avec une prévision de production entre 5 000 et 6 000 tonnes. Toutefois, la répartition est très hétérogène. En ce qui concerne le recrutement il fait totalement défaut depuis 2 ans dans la partie est mais se situe au dessus de la moyenne dans la partie ouest. Les prérecrues semblent par contre moins abondantes.

Chlamys varia

Le seul gisement important encore en exploitation est celui de la Rade de Brest, avec une production de 300 à 400 tonnes. Un effort tout particulier est mené depuis quelques années pour capter du naissain afin de repeupler le gisement (travaux CNEXO/COB - CLPM - Brest).

Mytilus edulis

L'ISTPM et le Comité local des Pêches de St Vaast La Hougue ont poursuivi l'étude entreprise sur les moulières du Cotentin qui a pour but d'acquérir les données nécessaires à la gestion de cette ressource.

Les travaux réalisés en 1982 ont concerné :

- les limites géographiques des gisements qui jusqu'à présent étaient mal précisées ;
- le recrutement, qui a été bon, contrairement à celui des moules d'élevage sur la côte atlantique ;
- l'importance des stocks de moules de taille marchande ;
- l'effort de pêche et les rendements.

Il semble que l'on puisse prévoir en 1983 une production entre 10 000 et 15 000 tonnes.

Ostrea edulis

La persistance de Marteilia refringens sur le gisement naturel de Pénérif et du Golfe du Morbihan a conduit à effectuer un nettoyage de ces bancs.

Crassostrea gigas

En Gironde, la captage régulier de ces dernières années et une diminution de l'effort de pêche en 1982 ont permis aux gisements de retrouver une certaine prospérité.

O. edulis et C. gigas

Une étude de la caractérisation génétique des populations naturelles a été programmée en juin 1982. Elle a débuté par le captage de naissains issus de gisements naturels choisis en fonctions de leurs caractéristiques.

Par ailleurs, une étude du polymorphisme biochimique de trois populations naturelles d'O. edulis a été entreprise.

Crepidula fornicata

Une étude sur les crépidules a été effectuée dans le bassin de Marennes-Oléron (Charente Maritime) où ce mollusque crée une gêne importante pour les élevages d'huîtres. Des estimations de biomasses ont été faites ainsi qu'une étude de la croissance, de la reproduction, de la mortalité et de l'impact des rejets (fèces et pseudofèces) sur l'exhaussement des sols conchylicoles.

Federal Republic of Germany

(K Tiews)

Mytilus edulis

Monitoring of mussel beds along the German North Sea coast and in the Flensburg Fjord has been continued by the Institut für Küsten- und Binnenfischerei. The work is continuing in 1983.

Cardium (= Cerastoderma) edule

Cockle beds along the German Wadden coast of Niedersachsen and Schleswig-Holstein were again surveyed by the Institut für Küsten- und Binnenfischerei. The work is continuing in 1983.

Iceland

(U Skúladóttir and H Eiríksson)

Chlamys islandica

Three Iceland scallop surveys were conducted on the major fishing grounds at West and Northwest Iceland. The first survey included underwater photography transects on a small scallop bed for density and dredge efficiency experiments.

Scallop landings rose to approximately 11 500 tonnes in 1982 as compared with the previous high of some 10 200 tonnes in 1981. This was accompanied by only a very marginal drop in average cpue.

At least two scallop surveys are planned for 1983 with the main emphasis on stock density, gear efficiency and locating new beds.

Ireland

(J P Hillis)

Ostrea edulis

Relatively small spatfalls were observed in 1982, and catches of adult oysters continued to decline because of the lack of good spatfalls since 1976. The laying of mussel-shell cultch in Tralee, Galway and Clew Bays was continued. The gill damage first reported in 1980 continued in some areas of some of the bays on the west and south coasts between Clew Bay and Cork Harbour. Continued pathological examination failed to find any disease. A series of field trials in an area of Clew Bay gave results which strongly suggest that the damage is caused by a small predator.

Mytilus edulis

Surveys were conducted of mussel beds in Lough Foyle (jointly with staff of the Department of Agriculture for Northern Ireland) and Lough Swilly, indicating a stock of up to 12 000 tonnes in Lough Foyle and a large though as yet unquantified stock with very strong spat settlement in Lough Swilly. Elsewhere, the Wexford Harbour and Cromane (Kerry) fisheries yielded up to 4 000 and 1 000 tonnes respectively; however the species is still believed to be underexploited overall.

Pecten maximus

A survey was carried out on Streamstown and Kingstown Bays (Co. Galway) to assess the present population density and suitability for reseeded areas which supported a fishery prior to the frosts of 1963. Very few Pecten were present. The substrate in the small bays off the Streamstown narrows, and the head of the Bay where the current velocity is low were considered suitable for reseeded. However the abundance and size distribution of predators such as Carcinus, Liocarcinus depurator and L. corrugatus were considered likely to result in a high natural mortality of reseeded scallops. Rays were commonly seen at the head of the Bay and may also prey on scallops.

None of these bays were considered suitable for reseeded unless an effective method of controlling the crab population could be evolved; Sacculina was noted as abundant on crabs in some areas, and shrimp traps appeared to have some potential for crab population control.

Of the Saltee Islands (Co. Wexford) a survey showed the 1976 year class still to be dominant, percentage frequencies of year classes (N = 1653) being as follows:-

Year	1980	1979	1978	1977	1976	1975	1974	1973	1972	1971	1970
%	1	20	17	15	34	3	3	3	2	1	1

First ring measurements on 1979 year class scallops provide evidence of only a single settlement during this year. The most dominant starfish in hauls were *Asterias*. The substrate in this area consists of pebbles broken shell sand and some fine sediments.

#### Netherlands

(A C Drinkwaard)

#### Ostrea edulis L.

Oyster research surveys were carried out in the Oosterschelde and Lake Grevelingen. To assess the population growth, data were collected on the density - depth relationship, age - specific abundance, condition, spawning and spatfall of the Pacific oyster, *Crassostrea gigas* Thunberg and the European oyster, *Ostrea edulis* L. respectively.

The population of the Zeeland type flat oyster in the Lake Grevelingen was estimated this year at about 80 million oysters of two years and older, after the dredge efficiency has been checked up by divers. One year old oysters of the 1981 spatfall were estimated at 25 - 30 million. An elementary bottom chart has been made of the several oyster layings on 3 350 km<sup>2</sup> or one third of the total surface of this enclosed sea-arm.

Especially clean shells of died off mussels collected a lot of spat in the wild during the last few years. This year 6 000 m<sup>3</sup> of mussel shells from the canneries were added to the hired out private plots for spat collecting. However, a considerable natural mortality occurred in the spat below a depth of 5 metres, due to a settlement of tunicates.

The definitive introduction of the Pacific or Japanese oyster became a matter of fact by a new natural larval outburst in July. In August, spatfall set in again, especially in the intertidal areas. The Pacific oyster larvae concentration in the Oosterschelde amounted to at most 50 per 100 litres. Several oyster growers started the commercialising of this new non-indigenous species.

The European oyster larvae concentration amounted to only 5 per 100 litres at the most in the Oosterschelde and to 200 per litre in Lake Grevelingen. The oyster plots of the Yerseke Bank are cleaned as much as possible and no sowing of flat oysters is allowed till the *Bonamia ostreae* disease has disappeared. This management policy will be continued for 1983.

The traffic of Atlantic flat oysters to European countries through Yerseke amounted to about 8 million oysters. A part of the oyster pots at Yerseke has been modernised. Special attention has been given to the aspects of the keeping quality of stored oysters, related to sea water quality, handling operations and origin of the oysters.

### Mytilus edulis L.

Blue mussel ecological surveys were conducted only in the Western part of the Oosterschelde to characterise the mussel culture plots, like the mussel rewatering places last year. Thorough information is necessary in anticipation of the hydrographic transformations which will be caused by the storm-surge-barrier across the mouth of this estuary in 1986.

The total landings of mussels increased to 150 000 tons during the season 1932 - 1933. The quantity of 100 000 tons was reached at the end of November, two months earlier than in the previous year. Conditioning and growth were satisfactory.

### Cerastoderma edule (L.)

Effort in the cockle fishery with hydraulic dredges in the Oosterschelde and the Wadden Sea was reduced to less than half that of the previous year. This was caused by marketing stagnation of shucked meat in Spain. However, at the end of the year the upswing was remarkable.

In the Oosterschelde hand-raking of cockles for the fresh market increased to 700 tons. Although exploitation of the stocks gave no problems, the hydrographic base-line studies of the environmental conditions and the characterisation of areas with high and low settlement has been continued.

### Environmental conditions

In close cooperation with the Delta Department within the Rijkswaterstaat (the Ministry of Transport and Public Works) continued attention was paid to the future changes in the ecology of the south-western part of The Netherlands due to the execution of the Delta Works and in relation to mollusc culture, rewatering and storage. These base-line studies concern among others soil research and the transport of seston and nutrients in the Oosterschelde.

When it is actually known how the environmental factors could be affected, it will be possible to determine how certain areas will have to be managed so as to guarantee a type of environment which will satisfy the already acknowledged values. In 1933 an International Symposium will be held in Rotterdam on Integration of Ecological Aspects in Coastal Engineering Projects. The Delta Project will be one of the selected cases.

### Diseases and pests

The 1931 measures to control the Bonamia oyster disease in the infected Oosterschelde oyster culture area were continued for 1932. This meant that no oyster culture activities were carried out on the Yerseke Bank.

Field studies set up in 1931 were continued for the period April till November 1932 on six locations of the Yerseke Bank, using a new series of oysters originated from Lake Grevelingen. The results of the monthly sampled oyster locations showed that the Bonamia disease was still present in only one location with low level incidence. The other five locations remained free from the disease.

Compared with the 1931 results showing the disease present in all six locations the activity of this disease agent has decreased. It is clear that the situation in the Oosterschelde has been improved by the stringent control measures. The enclosed sea-arm Lake Grevelingen has not been infected.

#### Molluscan shellfish toxicity and sanitary control

A weekly monitoring programme on phytoplankton toxins in mussels from the culture plots was carried out from May till October. Although present, the concentration of Dinophysis acuminata in the Dutch coastal water appeared to be too low in order to cause diarrhetic mussel poisoning as determined by the rat-bio-assay.

The sanitary quality of water and molluscs from the growing and rewatering areas in the Wadden Sea and Oosterschelde has been good.

#### Norway

(No report received)

#### Poland

(J Porebski)

No research activity on cephalopods to report in 1982.

#### Portugal

(Aura Cascalho and Maria José de Figueiredo)

#### Oysters

Trials were undertaken on the settlement of an oyster bed in an experimental plant in Tavira (South coast).

Studies were made about Crassostrea angulata in Tejo estuary (Colab. INIP/Comissao Nacional do Ambiente/Laboratório Nacional de Guia).

#### Mussels

Settlement of mussels larvae on rafts in Ria de Aveiro, and studies on their further growth were made.

Maturation periods of mussels have been studied.

#### Cephalopoda

The sampling programme carried out at some fishing ports was continued. This programme concerns length distributions of the most commercially important species. Studies about distribution and abundance were made on the same species, based on research cruises results on board RV "Noruega".

Biological studies were made on Loligo vulgaris, Loligo forbesi and Illex coindetii.

Reading of growth rings was continued.

Studies about the fishery and biology of Octopus vulgaris from South of Portugal were continued (Colab. INIP/Univ. Lisboa).

Studies about the biology of Sepia officinalis from Sado estuary, were continued.

#### Sweden

(H Hallbäck)

The control and biological studies of cultures of Mytilus edulis continued. At the end of 1982 there were about 25 cultures of Mytilus along the Swedish west coast.

#### Spain

(No report received)

United Kingdom

1. England and Wales

(R C A Bannister)

Responsibility for resource work on shellfish in England and Wales has now passed from Burnham-on-Crouch to the Fisheries Laboratory, Lowestoft, where the Shellfish Resource Group is now located.

Surveys

The major molluscan species were surveyed to estimate either absolute or relative abundance as listed in Table 1. These were used as the basis for management advice. No additional molluscan project work was undertaken in 1982.

Bonamia ostreae

Following reports of mortality on beds of Ostrea edulis in the River Fal, Cornwall, the oyster parasite Bonamia ostreae was positively identified in October and November at two sites on the River Fal, one site on the River Helford, Cornwall, and at three sites near West Mersea in Essex to which Cornish oysters had been moved for relaying. At the time of going to press a further site was identified at Walton on the Naze, Essex. Movements of Ostrea edulis are being controlled by a change in the licences issued under the Molluscan Shellfish (Control of Deposit) Order 1974, and movement restrictions will remain for the foreseeable future. Follow up sampling and research is planned for 1983 to examine the seasonal and spatial progression of the disease in the infected areas. European oyster workers have been alerted.

TABLE 1      Summary of molluscan surveys carried out by MAFF in England and Wales, 1982

Species	ICES Area	Fishery	Month	Survey type
<u>Pecten maximus</u>	VIIe	South West	May	Research vessel dredge survey
<u>Ostrea edulis</u>	VIId	Solent	July	Small boat dredge survey
	VIIe	River Fal	September	Small boat dredge survey
<u>Cardium edule</u>	VIIIf	Burry Inlet	November	Percentage cover and sub-sample counts

## 2. Scotland

(J Mason)

### Pecten maximus and Chlamys opercularis

Monitoring of the fisheries and assessment of the state of, and effects of fishing on, the principal stocks were maintained. Comparisons of the 4ft (1.2m) and the new 2½ft (0.76m) spring-toothed dredges were made. Preliminary analysis of the results suggest that the new dredge is more efficient in catching Pecten.

Movements of adult scallops (Pecten) were studied by divers, who observed 750 tagged adult scallops placed in a marked position on the sea bed in Loch Creran. After a year about 75% were still alive and within 30m of the release point.

Studies of the settlement and early growth of both species continued. Spat collectors put out in many areas of the west coast in July yielded up to 1000 Pecten and many more Chlamys per collector when hauled in October.

Culture of spat of both species was undertaken in various conditions. No significant link between growth and density has yet been shown. Scallop survival was better in depths of less than 2.5m than in deeper water. Experimental seeding of the sea bed with Pecten seed continued. The work is continuing in 1983.

### Loligo forbesi and Todarodes sagittatus

Landings of both species were monitored, and the study of the biology and distribution of T. sagittatus in Scottish waters was continued.

### Pests and diseases of molluscs

Samples of molluscs imported or exported for relaying were examined for pests and diseases prior to licensing or certification.

USA

(Stephen H Clark and Michael Castagna)

General

This report summarises research activities on commercially important mollusk and crustacean species during 1982 by U.S. federal and state agencies and academic institutions.

The Northeast Fisheries Center (NEFC) of the National Marine Fisheries Service (NMFS) conducted three inshore-offshore bottom trawl surveys and one gear comparison survey totalling 156 vessel-days at sea which provided data for shellfish species. Specialised surveys were conducted for sea scallops (Placopecten magellanicus), surf clams (Spisula solidissima), and ocean quahogs (Arctica islandica), totalling 71 vessel-days at sea. The NEFC also collaborated with several state agencies in the design and testing of a new shrimp research trawl and participated in a cooperative surf clam and ocean quahog survey with Canada. The Massachusetts Division of Marine Fisheries (DMF) and the Rhode Island Department of Environmental Management (DEM) conducted inshore bottom trawl surveys. Several state agencies conducted resource inventory work and participated in the collection of statistical data and/or biological samples. NEFC personnel also collected a total of 836 commercial samples at dockside and performed 1632 age determinations on sea scallops, surf clams, and ocean quahogs.

NEFC and Southeast Fisheries Center (SEFC) personnel prepared stock assessment reports for major shellfish resources and completed other reports and manuscripts dealing with biology and distribution. The NEFC also continued monitoring of key shellfish species in oil and gas drilling lease areas on Georges Bank and in adjacent submarine canyons. Studies on a variety of pathogens and parasites continued at the NEFC's Oxford Laboratory.

Several state agencies continued stock assessment work and related research. The Maine Department of Marine Resources (DMR) initiated surveys to determine types and sources of pollutants affecting shellfish resources, shellfish production potential in affected areas, and level of abatement required to restore such areas to full production. The New York Department of Environmental Conservation (DEC) developed an intensive shellfish transplanting program including introduction of spawning stock and transplanting of artificially-cultured juveniles to natural growout areas.

The Massachusetts DMF continued to provide information on management, culture, and harvesting through its Shellfish Technical Assistance Program. The Maryland Department of Natural Resources (DNR) and the Delaware DNR continued studies to determine distribution and intensity of shellfish diseases in Chesapeake Bay. Attempts to develop immunofluorescent tests for specific pathogens continued at Battelle Institute, and development of techniques for identification of bivalve larvae continued at Rutgers University. Researchers at the University of California worked on biochemical engineering techniques for controlling spawning and metamorphosis.

American oyster (Crassostrea virginica)  
Japanese oyster (C. gigas)

Researchers at Rutgers University and the Virginia Institute of Marine Science (VIMS) continued surveys to determine prevalence and intensity of

Minchinia nelsoni (MSX) disease in Delaware Bay and research on factors contributing to MSX incidence. Attempts to develop more rapidly growing disease resistant strains of C. virginica continued at VIMS and the University of Maryland. Investigations of oyster diseases and modes of transmission were continued by several agencies including NEFC, the Delaware DNR and Cornell University. Attempts to chemically characterize algal toxins causing mortality to C. gigas larvae and to develop more genetically resistant strains continued at the University of Washington.

Sea scallop (Placopecten magellanicus)

NEFC personnel continued research vessel surveys, biological studies, and stock assessment work. Considerable time was devoted to evaluation of biological characteristics of offshore Gulf of Maine populations. Maine DMR personnel continued biological studies and collection of fishery statistics. Studies of virus-induced mortality and potential oil spill impacts continued at the University of Rhode Island.

Bay scallop (Argopecten irradians)

The NEFC, the Rhode Island DEM, the Woods Hole Oceanographic Institution (WHOI), and Boston University studied the effects of physical, biological, and chemical characteristics of estuarine areas in relation to maturation, growth, and survival of hatchery-reared scallops. Several townships in Massachusetts continued research on laboratory culture and seeding. Studies on growth continued at the University of Connecticut.

Hard clam (Mercenaria mercenaria)

The New York DEC continued assessment-related studies including development of a population index. The New Jersey DNR and the Delaware DNR continued studies of recruitment potential by monitoring spatfall. The State University of New York (SUNY) continued work on biology and ecology. Genetic research to develop fast-growing strains continued at VIMS and the University of South Carolina. The South Carolina Wildlife and Marine Resources Department (WMRD) conducted research on controlled nursery systems and field growout techniques and evaluated growth rates, predation, and impacts of hydraulic harvesting gear.

Ocean quahog (Arctica islandica)

NEFC personnel continued stock assessment work and growth and maturation studies. Cooperative research efforts on growth and reproductive biology continued at VIMS, Rutgers University, WHOI, and the University of Maine.

Surf clam (Spisula solidissima)

NEFC personnel continued stock assessment work and ageing studies in collaboration with researchers at the University of Maryland (Eastern Shore).

Short-finned squid (Illex illecebrosus)  
Long-finned squid (Loligo pealei)

NEFC personnel continued biological research and stock assessment studies and performed joint research with Canadian and Japanese scientists on spawning and distribution of Illex.

USSR

(S A Studenetsky)

The arrival of squids in coastal areas of the Barents Sea was observed by two seine boats in October-November. To study the distribution and stocks of squids in the south Barents Sea and north-eastern Norwegian Sea a hydro-acoustic survey and catching with jiggers were conducted by RV "Poisk".

CRUSTACEA

Belgium

(F Redant)

Crangon crangon

Quarterly sampling of the shrimp stock and its predators off the Belgian coast was continued in 1982 in order to obtain a continuous set of data on egg production, natality, recruitment, production and mortality. The study of long term population dynamics of the shrimp stock and of competitive and predatory interactions with epibenthic and demersal species was also continued. In vitro experiments revealed that swimming crabs, Macropipus holsatus, only sporadically prey on live shrimps.

The regular samplings on other epibenthic species were continued to evaluate long term changes in epibenthos species composition and in the abundance and biomass of dominant species. A review of the data, collected since 1973, was recently started.

The comparative experiments, started in 1980, in order to define the efficiency of the sampling gear for epibenthic species, were continued in 1982. Up to now almost 100 parallel hauls have been performed, using a standard beam trawl on the one side and a beam trawl rigged with tickler chains on the other. Preliminary results of these experiments showed a dramatic increase of the catches of eg Macropipus, Macropodia, Asterias and Ophiura in the tickler chain trawl.

Nephrops norvegicus

The sampling of commercial Norway lobster landings was continued in order to monitor possible long term changes in the catch composition. A study on Norway lobster biometrics, especially in view of management measures, was finished. These investigations included measurements of total length, carapace length and width, tail length and width, total weight and tail weight.

Canada

(G P Ennis)

Homarus americanus

Analyses of data from a 4-year study of lobsters in the Bay of Fundy, including port and at-sea sampling of commercial catches and tagging of lobsters, are continuing. Field work continued on a study designed to assess the impact of a nemertean (*Pseudocarcinonemertes homari*) egg predator in the Grand Manan area. Sampling (by SCUBA diving) of juvenile lobsters off Shelburne, N.S. on a bi-monthly basis took place in an attempt to determine changes with time in population density, size frequencies, and growth. Lobsters were tagged as a long-term study of exploitation rates of lobsters in southwestern Nova Scotia and to determine growth and seasonal movement on Nova Scotia's eastern shore.

An experimental site in Halifax Harbour, N.S. is being monitored to study the direct and indirect effects of ocean dumping on juvenile lobster habitat. An investigation into the natural diet of juvenile lobsters and Cancer crabs, by stomach content analyses, is progressing.

A study was initiated to assess the seasonal distribution of lobster larvae in a large coastal bay. Weekly tows were made at 21 stations and 253 larvae were observed; stage III larvae were not captured.

A study was carried out to assess the usefulness of aerial photography in quantifying lobster fishing effort. Buoys of various colors were accurately located from 900 m using Kodak #2448 colour positive film.

A large scale study of offshore lobsters designed to yield data on size frequencies, seasonal distribution, growth rate, and molt frequency was initiated. Four thousand lobsters were tagged.

Long-term monitoring of the lobster fishery and studies of various aspects of lobster population biology and dynamics were continued in five localities around the coast of Newfoundland. This included commercial catch sampling, obtaining logs from individual fishermen, collecting tags from previous year's tagging operations, carrying out additional tagging and shell condition sampling. Studies of larval distribution and ecology in a near-shore area were continued. A tag-recapture study of an unfished lobster population around a small island continued.

Pandalus borealis

Monitoring of the Scotia-Fundy shrimp fishery and processing logbooks continued. Also, three research cruises surveys were carried out to determine distribution and abundance. Fishing activity was quite low this past year with only a fraction of TAC being caught.

Data on the shrimp fishery off Labrador were obtained through the continuation of the observer program and from vessel logbooks. A research survey was carried out in NAFO Divisions 2HJ during July.

Pandalus montagui

Estimates of fishable biomass and biological characteristics were obtained from a research cruise in the Ungava Bay-Eastern Hudson Strait area during September. There was no commercial fishing in these areas in 1982.

Chionoecetes opilio

Port and at-sea sampling of the snow crab fishery around the Atlantic coast of Cape Breton Island continued to provide information on catch size-frequency and shell-stage. Assessments of the 1982 fishery, based on commercial samples, fishermen's logbooks and tag returns, indicate low stock levels and support the hypothesis that Cape Breton's Atlantic coast is a marginal system for snow crab. Work is continuing on groundfish natural diet and snow crab population dynamics in research into crab/groundfish interactions.

In the Newfoundland fishery sampling of commercial catches at sea and at processing plants continued. Catch and CPUE data for the various management areas were analyzed and biomass estimates based on 1981 data derived. Tagging studies to determine movement and fishing mortality continued and analyses of data from previous studies were carried out. Additional methods of population estimation are being tried including random stratified trapping surveys and the use of CPUE with area fished/trap and area of fishing grounds.

Denmark

Denmark

(Dan M. Carlsson)

Crangon crangon

Trawl surveys were performed off the Danish west coast for abundance estimates.

Greenland

Pandalus borealis

Research on the West Greenland offshore stocks was continued. Catch-effort data based on logbook information were obtained from the commercial fishery, and a random stratified trawl survey was conducted as a pilot study. Biological samples were collected from both commercial and research fishery. Bottom photography was carried out from a research vessel in July-August on the offshore shrimp grounds to assess the density of shrimps. Density data have been collected since 1975 and are used to adjust a model on the relationship between density of shrimp and latitude, longitude, depth, bottom temperature and year.

Catch-effort data were obtained from the commercial shrimp fishery in the offshore East Greenland area.

France  
(A Charvau)

Homarus gammarus

Les études concernant le homard ont porté en premier lieu sur la croissance, la fécondité et la maturité sexuelle dans la division VIIe. L'échantillonnage des captures (5000 individus) a été poursuivi, ces données ont été utilisées dans des modèles de rendement par recrue et serviront de base à des proportions d'aménagement.

La production de larves et de juvéniles par les écloséries des îles d'Yeu, Sein et Houat a permis l'immersion de 265 000 post-larves (stades IV, V et VI) et de 16 120 juvéniles d'un an. La recherche des meilleurs sites d'immersion en fonction du substrat a été effectuée. Des études ont porté sur l'intérêt des récifs artificiels. Des pêches expérimentales ont été réalisées sur des zones de réimmersion interdites à la pêche. Les rendements y étaient très supérieurs à ceux de la pêcherie commerciale avoisinante : 2 fois à l'île d'Yeu, 3 à 4 fois au large du Croisic.

Un bilan sur l'activité des écloséries en matière de repeuplement et d'élevage a été dressé, il a permis de définir un programme dont l'objectif est d'apporter, en 5 années, la démonstration de l'opportunité de ces opérations.

Nephrops norvegicus

Les pêcheries de langoustine de Mer Celtique et du Golfe de Gascogne ont fait l'objet d'études avec, pour perspective, une exploitation optimale de la ressource en relation avec les pêcheries adjacentes de poisson. Les travaux ont porté sur la biologie de l'espèce. Une hypothèse préliminaire de croissance a été formulée pour la Mer Celtique et le taux instantané de mortalité naturelle évalué. 3000 marquages ont eu lieu sur le banc Labadie. Ils devraient permettre une meilleure appréciation de l'accroissement à la mue et du rythme des mues. Des études portant sur l'amélioration de la sélectivité à l'aide des sacs de renforcement ont permis de modifier l'ogive de sélection des fonds de chalut français. Ces divers paramètres ont servi de base à la détermination de l'influence des changements de maillage sur le rendement par recrue.

Pour le Golfe de Gascogne, le travail a été essentiellement orienté vers l'échantillonnage dans la partie nord de la pêcherie. Dans tous les cas, nous avons essayé d'évaluer la capture accessoire de poissons démersaux.

Cancer pagurus

Une étude biologique complète du tourteau a été effectuée dans le Golfe de Gascogne. Des marquages ont permis de suivre ses déplacements et d'appréhender sa croissance sur cette pêcherie.

Ensemble des grands crustacés

Une étude d'ensemble a été réalisée sur les grands crustacés : Homarus gammarus, Cancer pagurus, Maia squinado. Il s'agit d'un recueil sur l'évolution des flottilles, de la production, de l'effort et des rendements au cours des dernières années sur toutes les pêcheries exploitées à partir des ports bretons. Ce bilan pourra servir de base à la gestion de ces crustacés.

Federal Republic of Germany

(K Tiews)

Crangon crangon

Long-term investigations by the Institut für Küsten- und Binnenfischerei to assess the shares of undersized protected fish species in the catch of the German brown shrimp fishery were continued. This research work also takes into account the fluctuations in the abundance of fish species found on the shrimp fishing grounds. In 1982 a scientific analysis of the data series 1954-1981 was carried out and a comprehensive publication is in preparation. Analyses of brown shrimp catch samples by species and length will continue.

Assessment work on the dynamics of brown shrimp populations along the German North Sea coast went on, as well as a study on the predator-prey relationship in the Crangon fishery.

Cooperative young fish and brown shrimp surveys in the Wadden areas of Belgium, the Netherlands and the Federal Republic of Germany were continued and will go on in 1983.

Iceland

(U Skutadottir and H Eiriksson)

Nephrops norvegicus

Two research vessel surveys were conducted during the Nephrops season (May-July). The work included multi-purpose sampling of both male and female Nephrops and amount of by-catch by species.

Landings of Nephrops increased from 2 520 tonnes in 1981 to approximately 2 650 tonnes in 1982, while catch per effort remained the same or 52 kg/hour. In accordance with VPA stock abundance estimates the proportion of Nephrops in the larger size categories continued to rise as it had done in 1980 and 1981. On the other hand recruitment continued below average in the smallest Nephrops. It is feared that this may bring about lesser catch rates already in 1983.

Stock assessment and survey work will continue along similar lines in 1983. Moreover some gear comparisons are planned.

Pandalus borealis

Research was similar to previous years. Research vessel surveys were carried out for sampling and information on bycatch. Bycatch of young cod and haddock was under allowable limits in all areas as estimated in our research surveys. Larval collection was continued in the Northwest of Iceland.

Tagging was continued in seacages using both the vinyl streamer tags (home made) and the Tiews wire tags made of enamel copper wire and vinyl flags. About twice as many shrimps died from the streamer tags as compared to the copper wire tags. The streamer tags were however more conspicuous. As before catch and effort data were collected from the fishermen for stock evaluations. Quotas were decided for all inshore areas. On the offshore areas there were no catch restrictions.

In 1983 research will be carried out along similar lines with an emphasis on improving the methods of division into year-classes. Tagging on a small scale is planned in one or two fiords.

Ireland  
(J P Hillis)

Nephrops norvegicus

Sampling of the commercial catch continued in Division VIIa only and consisted as far as possible of the taking of samples in three parts, representing respectively unsorted catch, landings and discards. Samples were classified by sex, and in the case of females by ovary colour/presence of attached eggs, which clearly distinguished mature from immature individuals at a glance during most of the summer.

Biometric studies on males were continued on a small scale, and an examination on the effect of claw loss during sampling on recorded weight was undertaken. Numbers sampled were as follows:

Season	No. of samples	Sex	Catch	NUMBERS SAMPLED		Total
				Landings	Discards	
1	1	M	271	310	110	691
		F	97	61	54	212
		Total	368	371	164	903
2	2	M	146	246	380	772
		F	93	121	482	696
		Total	239	367	862	1468
3	1	M	-	104	-	104
		F	-	141	-	141
		Total	-	245	-	245
4	1	M	516	318	236	1070
		F	399	123	266	793
		Total	915	446	502	1863
Total	5	M	933	978	726	2637
		F	589	451	802	1842
		Total	1522	1800	1528	4479

In conjunction with the Fisheries Laboratory, Lowestoft, a Nephrops larval survey was conducted between April and June in the northwest Irish Sea. The UK conducted five cruises and Ireland two. Analysis is not yet complete but the distribution of stage I larvae, both geographically and with time, seems to have been adequately sampled.

Homarus gammarus

No work to report in 1982.

Portugal

(Aura Cascalho and Maria Jose de Figueiredo)

Nephrops norvegicus

The sampling programme carried out at the fishing ports of Olhao (South coast) and Cascais (West coast) was continued as in previous years. Samples were taken weekly from two trawlers randomly selected in each port.

Besides length distribution, sex and berried condition in females are recorded. Samples are raised to total landed weight and grouped by month.

Information on biology and distribution of Nephrops was also obtained during three cruises by the RVs "Mestre Costeiro" and "Noruega" in February-March, July and September 1982.

Parapenaeus longirostris and Aristeus antennatus

The sampling programme started in April 1981 in Olhao was continued. Random samples were taken weekly and raised to total monthly landings. Sex and length composition were recorded.

Other biological data have been obtained from a short research cruise in September 1982 by the RV "Mestre Costeiro".

Spain

(No report received)

Sweden

(H Hallbäck)

Nephrops norvegicus

During 1982 trawling experiments started especially in Kattegat concerning biological data and by-catches.

Pandalus borealis

Collection of daily reports on catches continued.

Homarus vulgaris

Tagging and trials with escape openings continued together with collection on catch data.

Cancer pagurus

Collection of catch data continued.

Netherlands

(R Boddeke)

Crangon crangon

Biological cycle

From April till August research was carried out on the settlement of brown shrimps along the coast of Holland directly after the larval stage. This work demonstrated a large direct production of shrimps in this coastal zone (between Hook of Holland and Den Helder). It will continue in 1983.

Stock assessment

The relation between the production of ripe eggs and recruitment (catch of consumption shrimps four months later) was calculated for 1981 in the four shrimp populations that can be distinguished along the Netherlands and Belgian coast.

The results suggested a below average recruitment of brown shrimp eggs that hatched in March-June.

Penaeus sp.

The continuous work on natural diets and food preference of Penaeid shrimps, resulted in a general publication on survival strategies of Penaeid shrimps.

Norway

(No report received)

Poland

(Only reported on Crustacea)

United Kingdom

1. England and Wales

(R C A Bannister and D B Bennett)

Sampling

Length measurements from landings of the three main crustacean species, Homarus gammarus, Cancer pagurus (L.) and Maia squinado were obtained as listed in Table 2.

Lobster Stock Assessment

For Homarus gammarus, cohort analysis updates have been completed for the years 1973 to 1930. A re-assessment of the immediate losses and predicted equilibrium long-term gains to be expected from a change in carapace length, from 80-85mm, does not show any major divergence from previous calculations.

Lobster Stock Enhancement

The site of the 1981 trial release of juvenile Homarus gammarus in Bridlington Bay, Yorkshire, was revisited in late July. Very poor diving conditions severely hampered the planned follow-up on the release areas. However, the release technique was repeated successfully, and plans are well advanced for two large releases, each of 5 000 juveniles, in the same area in May and October 1983.

Nephrops norvegicus (L.)

The work on Nephrops has been transferred to the Irish Sea research team, with D B Bennett, but will continue to be reported here.

Market sampling continued at North Shields (area IVb) and at a low level at Fleetwood (area VIIa). Biometric data were collected for VIIa to investigate the problem of implementing a minimum landing size using tail length. During a series of research vessel cruises in 1982 larval abundance was estimated as a basis for estimating stock abundance. Study of predators prey relationships by examination of fish stomachs was continued. A preliminary estimate of the quantity of Nephrops consumed annually by cod was about 40% of the area VIIa landings.

TABLE 2 SUMMARY OF CRUSTACEAN LENGTH DISTRIBUTION DATA COLLECTED BY MAFF IN ENGLAND AND WALES, 1982

Species	ICES Area	English Coastal Fishery	Season	No. of measurements	
				Market	Total Pot Content
<u>Homarus gammarus</u>	IVb	Northumberland	Apr-Nov	3498	1426
	IVb	Yorkshire	Apr-Oct	4258	443
	IVc	Norfolk	Jul-Aug	253	580
	VIIId	South Coast	May-Aug	1339	161
	VIIe	South West	May-Sep	535	0
	VIIg	South Wales	Jun-Aug	122	0
	VIIa	Cardigan Bay	Jun-Aug	872	343
	VIIa	North Wales	May-Sep	655	2

TABLE 2 (contd).

Species	ICES Area	English Coastal Fishery	Season	No. of measurements Market	Total Pot Content
<u>Cancer pagurus</u>	IVb	Northumberland	Apr-Nov	2801	593
	IVc	Yorkshire	Apr-Sep	2633	70
	IVc	Norfolk	-	0	0
	VIId	South Coast	Jun-Aug	55	629
	VIId	South West	Mar-Nov	341	289
	VIIg	South Wales	-	0	0
	VIIa	Cardigan Bay	June	0	253
	VIIa	North Wales	June	0	4
<u>Maia squinado</u>	VIId	South Coast	Jun-Aug	0	403
	VIIe	South West	Jun-Aug	70	92

## 2. Scotland

(J Mason)

### Nephrops norvegicus

Sampling of commercial trawl and creel landings was undertaken in most fishing areas on a regular basis. The measurement taken was that of the width of the second abdominal segment. Biometric measurements were made on Nephrops in all major fishing areas.

Further tag returns at yearly intervals gave information on moulting frequencies. Males 30-34mm C.L. moulted twice per year; from 35 to 39mm C.L. about half moulted once and half moulted twice per year; from 40 to 54mm most males moulted once per year. With increasing size some males did not moult annually and above 65mm C.L. the moulting frequency was once per two years. Mature females below 40mm C.L. moulted once per year. With increasing size a proportion of females did not moult annually and no females above 60mm C.L. had moulted.

A comparison of Nephrops populations in two areas suggested that growth rate was retarded in a high density population found in the Sound of Jura compared with a low density population in the Clyde.

Fecundity studies and surveys of larval abundance were continued in Loch Torridon. These suggested that there may be a second peak of larval production in late summer.

Work with TV and photographic cameras was carried out in the Irish Sea in conjunction with MAFF cruises in May, June 1982.

Homarus gammarus

Commercial landings of lobsters were sampled at all the main fishing areas. Catch and fishing effort data supplied by selected skippers were maintained and further expanded to cover a larger area. Tagging experiments were continued in the East Fife fishery. Returns so far from the capture-recapture tagging experiment have indicated a higher natural mortality than would be expected.

Tag loss and tag-induced mortality assessments using toggle tags are in progress in the laboratory. The use of pleopod staging to check approaching moults is also being tested.

Further studies of lobster larvae using the enclosed ecosystem bags indicated no specific diurnal rhythm in any of the larval stages. All stages up to V stayed within the top 3m, predominantly in the top 1m. Stage V larvae were found to use floating debris, mainly weed, as shelter.

Cancer pagurus

Commercial landings were sampled in the main fisheries. Catch and effort data were supplied by selected skippers.

Macropipus puber

Commercial landings were sampled whenever possible. Fecundity and maturity studies have begun.

Pandalus borealis

Monitoring the North Sea fishery continued. The relationship between P. borealis and the sea anemone Bolocera tuediae was investigated.

Crangon crangon

Monitoring the Solway Firth fishery continued. A study of the by-catch was instituted.

USA

(Stephen H Clark and Michael Castagna)

General

This report summarizes research activities on commercially important mollusk and crustacean species during 1982 by U.S. federal and state agencies and academic institutions.

The Northeast Fisheries Center (NEFC) of the National Marine Fisheries Service (NMFS) conducted three inshore-offshore bottom trawl surveys and one gear comparison survey totalling 156 vessel-days at sea which provided data for shellfish species. Specialized surveys were conducted for sea scallops (Placopecten magellanicus), surf clams (Spisula solidissima), and ocean quahogs (Arctica islandica), totalling 71 vessel-days at sea. The NEFC also collaborated with several state agencies in the design and testing of a new shrimp research trawl and participated in a cooperative surf clam and ocean quahog survey with Canada. The Massachusetts Division of Marine Fisheries (DMF) and the Rhode Island Department of Environmental Management (DEM) conducted inshore bottom trawl surveys. Several state agencies conducted resource inventory work and participated in the collection of statistical data and/or biological samples. NEFC personnel also collected a total of 835 commercial samples at dockside and performed 1632 age determinations on sea scallops, surf clams, and ocean quahogs.

NEFC and Southeast Fisheries Center (SEFC) personnel prepared stock assessment reports for major shellfish resources and completed other reports and manuscripts dealing with biology and distribution. The NEFC also continued monitoring of key shellfish species in oil and gas drilling lease areas on Georges Bank and in adjacent submarine canyons. Studies on a variety of pathogens and parasites continued at the NEFC's Oxford Laboratory.

Several state agencies continued stock assessment work and related research. The Maine Department of Marine Resources (DMR) initiated surveys to determine types and sources of pollutants affecting shellfish resources, shellfish production potential in affected areas, and level of abatement required to restore such areas to full production. The New York Department of Environmental Conservation (DEC) developed an intensive shellfish transplanting program including introduction of spawning stock and transplanting of artificially-cultured juveniles to natural growout areas.

The Massachusetts DMF continued to provide information on management, culture, and harvesting through its Shellfish Technical Assistance Program. The Maryland Department of Natural Resources (DNR) and the Delaware DNR continued studies to determine distribution and intensity of shellfish diseases in Chesapeake Bay. Attempts to develop immunofluorescent tests for specific pathogens continued at Batte Institute, and development of techniques for identification of bivalve larvae continued at Rutgers University. Researchers at the University of California worked on biochemical engineering techniques for controlling spawning and metamorphosis.

Northern shrimp (Pandalus borealis)

The Northern Shrimp Technical Committee<sup>1</sup> continued stock assessment work and developed and tested improved sampling gear. The Marine DMR and the

Massachusetts DMF continued collection of commercial fishery statistics and biological studies.

Brown shrimp (*Penaeus aztecus*)  
White shrimp (*P. setiferus*)  
Pink shrimp (*P. duorarum*)

SEFC personnel prepared stock assessments, conducted research vessel survey work and mark-recapture studies, and continued evaluation of the effects of brine disposal on offshore populations. SEFC researchers also studied the ecology and population dynamics of pre-recruit shrimp in estuarine areas and evaluated seasonal trends in landings and ex-vessel value. Several state agencies in the South Atlantic-Gulf of Mexico region continued resource monitoring programs. The South Carolina WMRD studies migration and distribution, and the Georgia DNR continued delineation of estuarine nursery areas, monitoring of trends in abundance, mark-recapture studies and development of predictive harvesting models.

American lobster (*Homarus americanus*)

The Maine DMR continued surveys of the commercial fishery, stock assessment, distribution studies and evaluation of biological parameters. Simulation modeling with age/growth data continued at the University of Massachusetts. Connecticut Department of Environmental Protection (DEP) personnel initiated fecundity and larval distribution studies. The New York DEC continued studies on movements, growth, and mortality. NEFC personnel performed larval sampling, evaluated growth and mortality rates and conducted assessment work for offshore populations. The New England Fishery Management Council completed development of a draft Fishery Management Plan.

Blue crab (*Callinectes sapidus*)

Several state and academic institutions in the Mid-Atlantic and South Atlantic regions continued recruitment monitoring programs. Researchers at VIMS evaluated environmental factors affecting blue crab abundance and analyzed morphometric data to delineate stock boundaries. Work on seasonal occurrence, distribution, and dispersal of blue crab larvae continued at the University of Delaware, Old Dominion University, and the University of Maryland (the latter institution also conducted genetic studies). The South Carolina WMRD continued studies of population distribution, size, and sex composition, and the Georgia DNR continued sampling to delineate estuarine nursery areas and to assess seasonal and geographic distribution patterns. A series of special symposia on biology, fisheries and related subjects was held at the June, 1982 meeting of the National Shellfisheries Association in Baltimore, Maryland.

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<sup>1</sup> The Northern Shrimp Technical Committee is a joint organization of state and federal scientists responsible for research and assessment work on the Gulf of Maine stock.

USSR

(S A Studenetsky)

In May-June the Polar Research Institute of Marine Fisheries and Oceanography (PINRO) carried out a trawl survey with underwater photography on board RV "Menzelinsk" to study deep-water prawn stocks. The Barents Sea and Bear Island-Spitsbergen areas were investigated.

To determine year-to-year variations of larvae abundance in plankton and peculiarities of their transportation by the current the distribution of prawn larvae in the south Barents Sea was studied by RV "Alaid" in April-June.



