

MARINE ENVIRONMENTAL QUALITY COMMITTEE

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B. I. Dybern

1983

BELGIUM

(W. Vyncke)



1. The effects of dumping industrial wastes off the Belgian coast on the fish and shrimp stocks and invertebrates were studied further.

A monitoring programme was carried out every three months at two dumping areas for industrial wastes derived from titanium dioxide production, one area for wastes from the production of thiocarbamates and an area for an industrial waste containing 1.5 % phenol.

A biological and physico-chemical survey was carried out.

2. The biological and physico-chemical monitoring of the Kwinte Bank, Buiten Ratel, Oostdyckbank where sand extractions are taking place was continued.
3. The monitoring programmes on heavy metals and organochlorines in fish and shellfish were continued. Samples of cod, flounder, brown shrimps and mussels from the Southern North Sea were analyzed. The study on the evolution of mercury in Solea solea in the North Sea and the Irish Sea was continued.
4. Petroleum hydrocarbons were analysed in sea water, sediments and biota samples taken off the Belgian coast.
5. The radioactivity of sediments and samples of fish and shellfish from Belgian coastal waters was measured.
6. Studies on fish pathology were continued in Belgian coastal waters, especially in dumping areas.
7. The regular monthly survey to assess the general state of the marine environment was carried out further. Samples were taken in a 28 station grid. Automatic profiling of general oceanography parameters were included in the routine.

Heavy metals (Zn, Cd, Pb, Cu, Hg) and PCB were also determined in dissolved and suspended matter.

Tritium, gamma radioactivity and K40 were added to the regular survey.

8. Other surveys or specific campaigns :

- 8.1. The survey of the benthic fauna (39 stations) was continued. There is a link with other activities (COST 47) and programmes (influence of sand and gravel extraction, see item 2).
- 8.2. Each week from March to June, ichthyoplankton was surveyed on a 6 station profile using an undulating high-speed sampler. Zooplankton biomass, chlorophyll and hydrographical parameters were simultaneously surveyed.
- 8.3. Two special cruises were organized to improve the knowledge of the distribution, speciation, and transformation rates of organic matter present in the marine environments (stocks of small organic substrates ; uptake by bacteria ; exoenzymatic processes ; phytoplankton production ; and excretion, grazing, etc.).

Furthermore, attention was paid 1° to a comparison between Atlantic ocean and North Sea water and the geographical structure of water bodies

2° to terrigenous inputs (4 specific campaigns).

- 8.4. The fluxes of heavy metals through the food web (phyto-zoo) and in the environment (water-sediment) were investigated during the above mentioned campaigns and during the regular survey campaigns
- 8.5. Air-Sea interface exchanges of metals were investigated during two of the above mentioned cruises.
- 8.6. Geomorphological surveys (bathymetry, sedimentology, seismic cartography) of two areas in front of the Belgian coast were performed, in relation to sand banks investigations.
- 8.7. The monitoring program for the pollutants discharged from channels and sewage outfalls was continued. Samples were taken simultaneously from the points of input and offshore. Four campaigns were devoted to this exercise.
- 8.8. Two campaigns were devoted to the study of the physical characteristics of silt from the Belgian shelf compared to the Dutch coastal area and the Western Scheldt. A sub-bottom sampler (ORE) and a Reinek box corer were used.
- 8.9. Two campaigns were devoted to the detection of trace elements in the plankton of the Belgian coastal zone.

9. Survey of Western Scheldt :

- 9.1. The monitoring programme on the Scheldt was continued. Four surveys were made at 36 stations to provide longitudinal profiles of physico-chemical parameters (salinity, temperature, dissolved oxygen, redox potential, pH, turbidity).
- 9.2. Regular surveys of heavy metals (Cd and Hg) and PCB have been done at five stations, in the framework of the Joint Monitoring programme of the Oslo and Paris Conventions. Some radio-activity measurements were also performed during these surveys.
- 9.3. Heavy metals transport processes and accumulation in the sediments have been studied (1 campaign and 9 sampling stations). Localisation of sedimentation and erosion sites was made using a "sub bottom" sample.

Canada  
(J. Uthe)

A more comprehensive approach to the study of metals has been taken by combining studies of sedimentary and aqueous transport components. The primary area of interest in these studies continues to be the St. Lawrence estuary but significant effort has been devoted to the Tamar estuary in southwest England as part of a collaborative study with the Institute of Marine Environmental Sciences, Plymouth, U.K. Particular effort has been devoted to procedures for the analysis of suspended particulate matter in both these studies and a more comprehensive and detailed picture of estuarine trace metal behaviour, particularly in respect to transitions between dissolved and particulate phases is emerging from this work. Following the completion of studies of metals in the St. Lawrence River, which were used to determine the fluxes of metals into the St. Lawrence estuary through runoff, attention is currently being paid to the flux of metals to the coastal zone through atmospheric deposition. There exists considerable evidence that atmospheric deposition is important in the supply of metals to coastal areas and efforts are being made to develop reliable measurement techniques to enable such influxes to be quantified. There exist very severe problems of contamination to be overcome before measurements of the spatial distribution of metal fluxes in atmospheric deposition can be made. (BIO).

Considerable success has been achieved with regard to the study of the sedimentary record in the Saguenay Fjord. This unique sedimentary environment has provided a medium for the examination, in considerable detail, the record of radionuclide transport in the entire Saguenay drainage basin during the last several decades. As a result, a remarkable precise simulation of the transport of natural and artificial radionuclides introduced to the drainage basin through atmospheric deposition has been achieved. This model has been and is being, applied to other chemical components. (BIO).

Investigations of the geochronology of some west coast fjords are continuing in an effort to determine the extent to which temperate fjord lead-210 geochronologies can be characterized in situations where a major portion of the internal sediment is glacially-derived. (BIO).

The study of the distribution of organic material in sediments of the Scotian Shelf and the adjacent continental slope has continued. These investigations are being used to examine a hypothesis that significant accumulation (and removal from the marine biosphere) of incompletely-oxidized organic material is occurring on the upper continental slopes of the world ocean. Such a mechanism, if found to exist, would constitute an important avenue of removal and accumulation of marine organic material produced in a climate of augmented atmospheric carbon dioxide. It appears that no significant accumulation of organic material occurs on the upper Scotian Slope. (BIO).

Studies of petroleum hydrocarbon degradation in beach environments continued. The purpose of these studies is to determine the rates of stranded oil weathering and the susceptibility of the degradation products to retention or mobilization. This type of study holds considerable promise of better characterizing the degradability of oils in beach environments and of better determining the nature of the predominant degradation products and the extent to which these are disseminated or retained near to the site of their production. (BIO).

Studies of nutrient regeneration processes and the carbonate-alkalinity system in Baffin Bay have continued through 1983 in collaboration with scientists from the Chalmers University of Gothenburg, Sweden. The results of work in Baffin Bay have been used to construct a model for the stoichiometric composition of regenerating biogenic material which appears to differ in Baffin Bay from other areas of the ocean that have been studied. This model should have application to the assessment of the consequences of increased carbon dioxide assimilation by the ocean resulting from the build-up of atmospheric carbon dioxide from fossil fuel combustion. During 1983, better quality carbonate measurements were obtained from Baffin Bay. (BIO).

The major activity related to petroleum hydrocarbon surveys that was carried out during 1983 was the field work associated with the assessment of baseline conditions on the Labrador Shelf. The collection of samples and data from this cruise essentially completes all field work designed to provide basic coverage for the baseline levels of petroleum hydrocarbons in Canadian east coast and eastern arctic waters although there still exists a great deal of analytical and interpretative work to be completed for this and other such surveys. (BIO).

The experimental results of the pre-operational phase of the Point Lepreau Environmental Monitoring Program (PLEMP) have been summarized and published. The pre-operational work has enabled various terrigenous, marine and atmospheric materials to be characterized for their radionuclide content under baseline conditions. It has also enabled us to identify some environmental matrices that give high signal-to-noise ratios for the detection of atmospherically-derived nuclides with the detection procedures having been tested using products of recent Chinese atmospheric weapons tests. With the commissioning of the Point Lepreau CANDU reactor in October 1982, the PLEMP program has now moved into its operational phase. A subsequent marine survey was carried out in April 1983 and cores were obtained from the Quoddy region for study of plutonium and other nuclide distributions in the sediments of this depositional area. Detailed physical oceanographic observations were made in both April and October 1983 in the vicinity of the cooling water outfall to determine the extent of the thermal plume from the plant. (BIO).

Collaboration with Federal German Institutions on metal exchanges in the intertidal zone continued through 1983. A further experiment on cadmium uptake by particulate and biogenic phases in experimental caissons was conducted in the East Freisan Islands. This experiment and its predecessors, that have been conducted in collaboration with the University of Heidelberg, are yielding valuable information on the speed and nature of particulate/dissolved metal exchanges and phases from which biological uptake occurs, the sites of accumulation of metals in coastal sedimentary organisms. Studies of metal-rich particle dispersion from a lead-zinc mine in western Greenland have been continued at the request of the Greenland Geological Survey. These investigations are providing some insights into potential consequences of the exploitation of northern Canadian ores and assessments of the phase-associations and bio-availability of metals in mine tailings that are useful to determining the resultant effects on marine organisms. (BIO).

A report titled "The Health of the Northwest Atlantic" has just been completed by an interdepartmental committee of scientists led by the Environmental Protection Service. Despite high levels of contaminants in some estuaries and coastal areas, the open ocean waters off our coast remain relatively clean. (EPS).

A series of reports evaluating environmental quality in areas such as Sydney, Nova Scotia; St. John, New Brunswick; and the Baie des Chaleurs in northeastern New Brunswick have recently been completed. Particularly in the areas of St. John and the Baie des Chaleurs, a significant improvement in the quality of the environment has taken place over the past 10 years as indicated by reductions in contaminant levels in biota, improvements in the treatment of municipal and industrial wastes, reductions of heavy metals in air emissions, and better control of sulfur dioxide levels. (EPS).

The intercomparative study of the determination of polycyclic aromatic hydrocarbons in lobster hepatopancreas acetone powder and the extracted lipid is underway. A preliminary report should be ready for the next meeting of the Marine Chemistry Working Group. (HFX).

A summary report on the Fifth Intercomparative Exercise on the Determination of Organochlorines in Marine Biota was presented at the 1983 Statutory Meeting. Analysts are still having considerable difficulty in achieving a satisfactory degree of interlaboratory comparability. (HFX).

Analysis of the fifth year sample of Atlantic cod (Gadus morhua) for contaminants has been completed. Work continues on the development of appropriate statistical and sampling models for estimating time trends in contaminant levels in biota. (HFX).

A four-year study of the stability of polychlorinated biphenyl residues in herring oil has shown that little change in the levels of polychlorinated biphenyl has occurred over this period. This suggests that such an oil would prove to be a satisfactory reference material. (HFX).

Studies on Atlantic salmon (Salmo salar) held in an acidified stream showed reproductive impairment and steroid hormone metabolic alterations compared with salmon held in a less acidified stream. Although the caged fish were fed at regular intervals the animals held in the acidified stream demonstrated markedly reduced growth compared to the control group. (HFX).

Experts in the field of marine organism and organochlorine pollutants have gone from one extreme to another in ascribing organochlorine contamination of marine organisms first to food-chain transfer, and more recently to direct partitioning between seawater and the lipid pool of the organism. Scientists in the Marine Ecology Laboratory are emphasizing the importance of parent-offspring transfer and the food route. (MEL).

Phytoplanktonic uptake and recycling of selenite and selenate is being investigated. Selenate does not appear to enter into the phytoplankton. A budget of selenite flux for several planktonic species is being developed. (MEL).

The analytical work has been completed on describing distribution and sequestration of petroleum hydrocarbons in coastal sediments following the AMOCO CADIZ spill. The environments studied include sandy beaches, saltmarshes and a tidal river. A model for hydrocarbon persistence in coastal marine sediments depends on sediment porosity as a main forcing factor. (MEL).

Effect of humic acid on the toxicity of aluminum to salmon parr was determined under laboratory and field conditions at pH 5.0 and 5.5. Lethal thresholds in laboratory experiments at pH 5.0 were 179 and 245 ug Al/L with 5 ppm and without humic acid, respectively. The corresponding values at pH 5.5 were 188 and 169 ug Al/L. The values under field conditions using hatchery water containing 8-10 ppm humate material were 550 and 800 ug Al/L, respectively, at pH 5.5 and 550 and 400 ug Al/L, respectively, at pH 5.0. (St. A.).

Cd concentrations in bottom-dwelling organisms were related to the concentrations in the sediment, which in turn were related to the concentrations of the element leached into the water. Adsorption-desorption process in the sediment - seawater system is controlled by cation exchange capacity and organic carbon content of the sediments. (St. A.).

Cu, Zn, Cd, and Pb are leached by seawater from zinc ore concentrates and from sediment contaminated by the concentrates. The degree of leaching is lowered by the amount of sediment present, organic matter content of the sediments, and increase in salinity. *Crangon septimona* and *Neries virens* exposed to contaminated sediments in the laboratory experiments accumulated only Pb and Zn. (St. A.).

Cu, Zn, Cd, Pb, Fe, and Mn concentrations in sediment and suspended particulate matter of the Miramichi estuary varied within wide limits prior to and during dredging and were attributed to physicochemical environment of the estuary. There was no detectable change due to dredging. (St. A.).

Alevins reared at 2.0 ppb Cd grew more slowly than controls and those reared at 0.2 ppb Cd. The size reduction was primarily due to reduction in yolk-conversion efficiency during the latter half of yolk absorption. Growth of fry surviving 2.0 ppb Cd for one month was severely retarded. There was no adverse effect from 0.2 ppb Cd. (St. A.).

Study of filtration rates of mussels was initiated to investigate relationships between contaminant level in water, filtration rate and uptake of the contaminant by mussels. To date the effects of copper, cadmium, dieldrin and endosulfan on filtration rate have been measured. Filtration rate is reduced by about 50% with copper at 0.99 ppm, cadmium at about 3 ppm and with endosulfan at 1 ppm. Dieldrin had no effect at the highest concentration tested, 3 ppm. Filtration is inhibited with copper at 0.2 ppm, cadmium at 8 ppm and endosulfan at 1.25 ppm. The effect of reduced filtration rate on uptake of the contaminants is being studied. (St. A.).

The relationship between concentrations of contaminants in organisms and effects of contaminants on the organisms is not known. Consequently it is difficult to assess the degree of impact exerted by a particular contaminant based on measurement of contaminant level in animals sampled in nature. To investigate this relationship, shrimp were exposed to cadmium at 0.06 to 2 ppm for periods of 18 to 3.3 days respectively. Except for Cd at 0.06 ppm with no mortality, the exposure times were close to those where 50% mortality occurred. The body burden of Cd when 50% mortality occurred increases with the higher levels of Cd, and consequently decreased with longer exposure times. For environmental assessment purposes, information about the body burden of a contaminant for exposure to levels just below the lethal threshold is needed. (St. A.).

Gill ATPase activity and liver energy were evaluated as indicators of sublethal effects caused by eight phenols in juvenile Atlantic salmon. This is the first experiment in a project to screen a large number of potential pollutants for sublethal effects on energy metabolism processes. Exposure of salmon to 4-methylphenol caused a decrease in gill Na, K-ATPase activity, whereas chloro- and p-nonylphenol caused an increase in residual ATPase activity. None of the other phenols tested had any significant effect on the ATPases. There were no significant differences in indicators of energy metabolism (AEC, phosphorylation potential, glucose glycogen, and creatine phosphate) in the livers of salmon exposed to phenols for 96 h compared to those of controls. However there was a trend towards decreased levels of glycogen, glucose, and creatine phosphate in livers of treated salmon compared to 0 h controls. Some of these effects could be attributed to effects of starvation. The results of this study support the view that the determination of sublethal effects caused by xenobiotics will require the development of a series of "clinical tests" rather than a single all encompassing biochemical parameter. (St. A.).

The role of anaerobic metabolism in the tolerance of polychaete worm, Nereis virens, was investigated by exposing the worms to sublethal levels of dieldrin, DDT or endosulfan under hypoxic and normoxic conditions. The worms accumulated more DDT and endosulfan under normoxic conditions than under hypoxic conditions. There was no difference in the accumulation of dieldrin by the worms under the two conditions. Of the parameters of intermediary energy metabolism (AEC, phosphorylation potential, glucose, glycogen, creatine phosphate) measured only creatine phosphate (CP) levels were altered. In all treatments CP levels were lower in control worms held under hypoxic conditions than those of worms under normoxic conditions. The levels of CP were even lower in worms exposed to the organochlorines and hypoxia than those exposed to just hypoxia. The organochlorines had no effect on CP levels of those worms exposed under normoxic conditions. If switching to mechanisms of anaerobic metabolism plays a role in the tolerance of these worms to organochlorines it does not appear to be associated with inhibition of membrane transport processes. However the decreased levels of immediate energy reserves (CP) does implicate an increased utilization of energy upon exposure to hypoxia and organochlorines. (St. A.).

Denmark (Greenland)

(P. Johansen)

1. Monitoring studies continued in a fiord system in NW Greenland affected by heavy metal pollution from tailings discharged into the sea from a lead zinc mine and mill. Lead, zinc, cadmium, and copper are monitored in sea water, sediments and marine organisms including brown algae, mussels, shrimp, fish and seals.
2. In 1982 a baseline study on the level of heavy metals in seawater, seaweed, and the blue mussel was carried out at a cryolite mine which has been operating for more than 100 years. This study continued in 1983 including marine fish, shrimp and sediments.
3. As reference to the studies mentioned above, baseline studies on heavy metals in seawater, sediments, seaweed, blue mussels, shrimp and fish were carried out in two fiords and at one station in the open sea, unaffected by local inputs of pollutants.

FINLAND

(Terttu Melvasalo and Paavo Tulkki)

1. The monitoring programmes coordinated with the Helsinki Commission, the Finnish-Swedish Committee for the Protection of the Gulf of Bothnia, and the Finnish-Soviet WG for the Protection of the Gulf of Finland have been continued, as well as the national programmes for coastal water monitoring including monitoring of harmful substances in fish and other species (see Second Swedish-Finnish Seminar on the Gulf of Bothnia, SNV PM 1618, 1983). A Finnish-Swedish compilation of the pollution load of the Gulf of Bothnia was also completed (National Environment Protection Board, Sweden and National Board of Waters, Finland: The Gulf of Bothnia - discharges from land and air).
2. A comprehensive research in the Bothnian Sea area was completed in order to study the effects of a titanium dioxide industry Meri (12, 1983). The study consisted of chemical, biological and sedimentological works. Also studies on biology of Baltic herring and fisheries were included, because the herring catches have been considerably diminished (C. Res. 1978/5:3, C. Res. 1978/2:29, C. Res. 1979/4:21, C. Res. 1981/2:16).
3. Data for evaluation of airborne pollution load were collected from a research vessel and coastal stations. The material consists of wet deposition samples of nutrients, sulfuric compounds and some heavy metals.
4. Contents of harmful substances in seals of the Gulf of Finland have been studied. Previous studies of this kind have been conducted mainly from the Gulf of Bothnia and now the intention is to cover also the Gulf of Finland (Perttilä, M., Stenman, O., Pyysalo, H. and Wickström, K.: Heavy metals and organochlorine compounds in seals of the Gulf of Finland. Submitted for printing). This study is a contribution to the work of the ICES WG on the Seals in the Baltic and it is also in accordance with C. Res. 1982/2:2 (ii) and C. Res. 1979/4:19.
5. Sedimentological studies of the first phase of the Pilot Study of the Baltic Sea Sediments have been conducted according to the programme developed in the ICES Marine Chemistry WG and ICES/SCOR WG on the Study of

the Pollution of the Baltic (cf. C. Res. 1981/2:16 and C. Res. 1982/3:1). In this research a close cooperation with the scientists and research vessels of the GDR has taken place.

6. The transport of nutrients, heavy metals and organic matter off two rivers (Kymijoki and Kyrönjoki) has been studied in order to study the sedimentation of substances in the coastal zone. The transport of nutrients, metals and organic matter are measured on a routine basis in the lower courses of all major rivers (C. Res. 1979/5:3 and C. Res. 1978/5:3).
7. Effects of fish cultures on the marine environment have been studied in the Archipelago Sea area. Especially chemistry of water, effects on periphyton production and the ability of Baltic herring to avoid waters affected by fish cultures have been studied (C. Res. 1982/5:1).
8. Studies related to marine gravel extraction have been made in the Gulf of Finland. Effects on fish fauna, benthos and fisheries as well as on chemical properties of water have been the main topics. Extended studies in the same area were planned for the year 1984.
9. In relation to the eutrophication phenomena observed in the Baltic coastal waters, the decline of Fucus vesiculosus has been studied. This study includes studies on age classes, population biology, recolonization, and chemical defense against herbivores by Fucus, as well as the succession of Fucus-community and grazing effects by Idotea-species. The question was elucidated by the Finnish biologists in the Baltic Marine Biologist's 8th Symposium in 1983 (C. Res. 1981/2:16, iii).

Netherlands

(S.J. de Groot)

In the framework of the development aid a literature study has been performed about the aquaculture and the fishery in the inshore lakes of Egypt.

The effects of fishing-gears, dredging, dumping of spoil, gathering of bottom materials and the construction of pipe-lines and telephone cables on the bottom fauna has been evaluated.

Contrasted to 1982, in which a poor phytoplankton population was present in July and August, an enormous diatom abundance, consisting of *Rhizosolenia* and *Chaetoceros* species, has been observed in the same months of 1983. The potential toxic *Dinophysis acuminata* was only present in very low numbers and diarrhetic shellfish poisoning did not occur in 1983.

Regular control of the shellfish culturing areas showed a waterquality in accordance with the EEC requirements for shellfish water.

For the parasitocological and pathological research the recordings of diseases in fish stocks were continued with some routine assessment surveys of the RV "Tridens". Attention was also paid to the possible effects of pollution on the existence and prevalence of fish diseases by means of special long-term studies in the Westerschelde area (with eel) and along the Dutch coast (with flounder).

The pathological shellfish research was mainly pointed to the status of the oyster disease (*Bonamia ostreae*) in the Dutch oyster growing area of the Oosterschelde (Yerseke Bank). The results of the control experiments have shown that 1983 is the first year of total absence of the disease since 1980. These results have also pointed out that the control measures by eradication of oysters in the infected area were probably adequate.

In the rivers Rhine and Meuse and their estuaries the PCB residues in eel still exceeded the Dutch tolerance level of 5 mg/kg. (total-PCB). It became clear, that the extremely high PCB residues in eel in parts of the Rhine/Meuse estuaries in the past must have been caused by illegal dumpings in the period 1978-1980. In the eel-cleaning experiment 50 to 100% of the less accumulating compounds (e.g. HCB) have been eliminated in two years, while the body burdens of the strong accumulating compounds (e.g. higher chlorinated PCB) had not changed at all. As female eels have a 50% lower lipid content as males and as the accumulation of PCBs depends on the lipid content, the contamination levels in the female eels are much lower than those in the male eels.

In eels caught near to a former dumping site relatively high dieldrin (0,81 mg/kg) and endrin (0,15 mg/kg) residues have been detected.

The cause of a fish-kill in the eastern part of the Netherlands could be held back by HPLC-analyses. The active compound, the herbicide dinoterb, was detected in the gills of the fish, but could not be detected in the muscle tissue.

Analysis of individual pike-perch confirmed that the mercury content in this fishspecies increases with increasing length or age in a linear relationship. Differences in the rate of mercury accumulation into the fish was highly related to the pollution levels of the sampling areas.

Within the Ministry of Transport and Public Works the Governmental Institute for Sewage and Wastewater Treatment (RIZA) is involved in the following investigations in the marine environment:

1. The regular two-weekly monitoring survey (since 1975), to assess the general state and the development of the marine environment, has been continued (in an optimised and more simple way) in 1983. In this survey general oceanographic parameters, chemical composition, nutrients, chlorophyll and some pollutants are measured. A Netherlands waterquality assessment report has been prepared in 1983 (considering the period 1975-1982) and will be available early 1984. An English version is in preparation.
2. The monitoring in the compartments water, sediments and organisms in the framework of the Oslo and Paris Conventions (Joint Monitoring Programme) was continued in 1983. A new programme has been set up, following the new objectives and guidelines of JMG, which will start in 1984.
3. The effects of the dumping of industrial wastes and harbour dredge spoils were studied further. Attention has been paid to the dumping site of acid wastes from the TiO<sub>2</sub>-industry and special attention to the geo-chemical behaviour of metals in suspended matter during transport in the coastal zone.
4. A study has been started to investigate the occurrence of fish diseases on several locations in Netherlands coastal waters influenced by the main sources of pollution (particularly the rivers Rhine and Meuse) compared with less or non-polluted locations.
5. A study on the bathing water quality along the beaches of the province of South-Holland was started. Attention is paid to the main sources and the transport of bacteriological polluted water.

Norway

(P.T. Hognestad and K. Palmork)

1. Field programmes

- 1.1 Investigations on the environmental qualities in the Skagerrak area in one section (Torungen-Hirtshals) between Norway and Denmark were carried out with 11 surveys throughout the year. Measurements were made of temperature, salinity, oxygen, nutrients and phytoplankton. (Flødevigen Biological Station).
- 1.2 Experiments have been conducted in plastic enclosures in Lindåspollene, western Norway, designed to measure the effect of oil on biological processes and in the species composition of pelagic communities. (Institute of Marine Biology, University of Bergen).
- 1.3 Surveys have been made of hydrography, hydrochemistry, chemistry of sedimenting particles and macrobenthic fauna of various fjord areas in the vicinity of Bergen subject to actual and potential sewage pollution. (Institute of Marine Biology, University of Bergen).
- 1.4 Studies on effect of Ekofisk and Statfjord crude oils on the growth rate and photosynthetic capacity of marine diatoms in outdoor dialysis cultures have been carried out. (Trondhjem Biological Station and Institute of Marine Biochemistry, University of Trondheim).
- 1.5 Monitoring of phytoplankton has been started at 12 selected aquaculture sites along the Norwegian coast to see if the occurrence of certain dinoflagellates may be related to outbreaks of the fish-killing "Hitra" disease. (Trondhjem Biological Station and Institute of Marine Biochemistry, University of Trondheim).
- 1.6 Within the framework of the State Pollution Monitoring Programme, sponsored by the Ministry of Environment, baseline and monitoring studies have been carried out in about 15 polluted coastal areas. The investigations have focused on surface water quality (phytoplankton biomass measured as chlorophyll a), structure of shallow water and soft bottom communities and the occurrence of metals, polycyclic aromatic hydrocarbons and other pollutants in biota and sediments. Other field studies include the evaluation of existing or planned effluents from industry and municipalities. Most of the studies include standard hydrography and measurements of plant nutrients. (Norwegian Institute of Water Research).

- 1.7 As a part of the Joint Monitoring Programme (JMP) required by the Oslo- and Paris conventions, mercury, cadmium and PCBs are monitored in fish, mussels and seawater from the outer part of the Oslofjord. (Norwegian Institute of Water Research).
- 1.8 Experiments have been made on drill mud and cuttings mixtures from offshore oil well drilling, transplanted to nearshore seabottom at Bergen, western Norway, with the aim to measure rate of leakage of contaminants from the cuttings to the water and to investigate the suitability of the cuttings as substrate for a benthic community. (Norwegian Institute of Water Research).
- 1.9 In the Arendal area 4 surveys were carried out at 4 stations to investigate the amount of hydrocarbons and their fluctuations during the year in the surface microlayer. (Flødevigen Biological Station).
- 1.10 To investigate the influence of sewage outlet in Tvedestrandfjord, 4 surveys were carried out in 1983 at 4 stations with measuring temperature, salinity, oxygen, nutrients and phytoplankton. In addition current meters worked continuously at 2 stations for registration of the water circulation. (Flødevigen Biological Station).
- 1.11 Monitoring of the environmental qualities of selected Norwegian fjords from Stavanger to Varangerfjord were carried out. The fjords were selected to represent different types of environmental stress conditions; i.e. industrial and domestic loads. Measurements, oxygen and turbidity. (Institute of Marine Research, Bergen).
- 1.12 Environmental quality of coastal sea water. This programme continued for the eighth season. The organic load of the Baltic current is being investigated from the Øresund through the Skagerrak and Kattegat and along the western Norwegian coast. Recordings are made of particulate matter, nutrients and temperature, whereas primary production indices are measured at intervals. (Institute of Marine Research, Bergen).
- 1.13 Population interactions within the microbial ecosystem connected with increased primary productivity at a receding ice-edge. Project within the Norwegian PRO MARE program. Bacterial heterotrophic activity, bacteria grazing by microflagellates, competition between phytoplankton and bacteria for inorganic nutrients. Mathematical modelling, laboratory experimentation (continuous cultures of model populations) and field experiments in connection with receding ice edges. (Inst. of Microbiol. and Plant physiology, University of Bergen).
- 1.14 Bacterial degradation of male gonad material released during spawning activity of natural and aquaculture fish populations. Preferential growth of bacterial populations specifically efficient in degrading gonad material. Immunofluorescence studies of selected bacteria in their natural environment. Statistical studies of populations from natural waters with and without spawning activity. Laboratory work with pure bacterial strains, field work with natural populations during spawning season in Lofoten and in an aquaculture facility. (Inst. of Microbiol. and Plant physiology, University of Bergen).

## 2. Laboratory assays

- 2.1 Behaviour of cod in water with gradients of the soluble fractions of Ekofisk crude oil was studied in special constructed aquariums. (Flødevigen Biological Station).
- 2.2 Studies of effects of water with soluble fractions of crude oil was carried out on diluted natural populations of phytoplankton and in cultures of single species. (Flødevigen Biological Station).
- 2.3 Physiology and taxonomy of potentially pathogenic micro-organisms, (Lobster pathogen *Aerococcus viridans*, and a salmon smolt pathogen *Exophiala* sp.). (Inst. of Microbiol. and Plant physiology, University of Bergen).
- 2.4 Influence of C/N/P relationship of media on bacterial biomass. Influence of C/N/P relationship of bacterial biomass on mineralization rates for C, N and P during grazing activity on bacteria. (Inst. of Microbiol. and Plant physiology, University of Bergen).
- 2.5 The fate of  $^{14}\text{C}$ -labelled phenanthrene and octachlorostyrene in spiny lobsters (*Palinurus argus*) and lindane and phthalate esters in corals (*Diploria strigosa*) and mussels (*Arca zebra*) have been investigated. (Institute of Marine Research, Bergen).
- 2.6 Assays on the effects of aromatic hydrocarbons on the heart of cod (*Gadus morhua*). (Institute of Marine Research, Bergen).
- 2.7 Enzyme studies (Mixed function Oxidase) using flounders (*Platichthys flesus*) has been performed. (Institute of Marine Research, Bergen).
- 2.8 A 4-year long study of the effect of nutrient supply, temperature, light intensity and day length on the growth rate and chemical composition of *Skeletonema costatum* has been concluded. (Trondhjem Biological Station & Inst. of Marine Biochemistry, University of Trondheim).
- 2.9 A project on how environmental factors (light and nutrients) affect the growth rate of toxic dinoflagellates has been started. (Trondhjem Biological Station & Inst. of Marine Biochemistry, University of Trondheim).
- 2.10 Embryological material from sea urchins and marine fishes is used to study the effect of Ekofisk oil, photooxidized oil, aromatic hydrocarbons, oil dispersants and drilling fluids. (Inst. of Biology and Geology, University of Tromsø).

PORTUGAL

(C. Lima)

- 1 - The environmental study of the Tejo Estuary was continued:
  - 1.1 Water quality studies: surveys were carried out monthly at six sampling stations with different salinities (0 to normal salinity)
  - 1.2 Baseline study of hydrocarbons in bivalves
  - 1.3 Benthic nutrients fluxes including  $N_2 O$
  - 1.4 Surveys in oyster banks were carried out; growth, mortality and sexual cycle were studied
  - 1.5 Quantitative studies of benthic microalgae pigment and primary productivity
  - 1.6 Air-water transference of heavy-metals: a network of five sampling stations all around the estuary, equipped with high volume sampler, and sampling every 24 hours.
- 2 - The monitoring programme on heavy metals and organochlorine in water, sediments and organisms was continued. Samples of flounder, brown shrimp and mussels from several locations were analysed in the frame of the Joint Monitoring Programme of the Oslo and Paris Commission.
- 3 - The study of the evolution of mercury in Aphanopus carbo in the Madeira waters and continental waters was continued.
- 4 - Study of chlorinated pesticides and PCB's in some fish: Merluccius merluccius and Aphanopus carbo.
- 5 - Base line studies of mercury levels in fish and shellfish with commercial interest, along the Portuguese coast were continued.
- 6 - Mussels as metal pollution indicators: a study of a new indice of reference (K concentration in soft parts)
- 7 - A special survey of Ria de Aveiro in order to establish the impact of a chloralkali plant and other industries upon mercury levels in fisheries.
- 8 - Fish disease in relation to pollution: occurrence and abundance of fish and shellfish (bivalves) disease were investigated along the Portuguese coast.
- 9 - Radioactivity studies of deep water fish from Madeira waters and continental waters were continued.

- 10 - In the behalf of the Project COST 47 EEG, investigations of variation of dynamics and productivity of macro-zoobenthos populations (Patella depressa, P. vulgata, P. aspera) were done monthly along the Portuguese coast (north, center, south).
- 11 - Monitoring studies in an area of discharge of a submarine outfall (urban and industrial wastes) located at Sines, have continued. Monthly biological and physico-chemical surveys were carried out to assess the water quality of the coastal zone.
- 12 - Environmental conditions in coastal sea water around Madeira in connection with fish stock assessment were studied.  $T^a$ , salinity, oxygen, nutrients and pigments were measured.
- 13 - Special surveys were carried out to monitor the development of red tides in the outer Tejo Estuary (Cascais - Guincho) and in the south coast - Algarve. Temperature, salinity, oxygen, pH, nutrients, suspended particulate matter, BOD, pigments, primary productivity, phytoplankton and zooplankton (respiration and excretion) were measured.
- 14 - Petroleum hydrocarbons were analysed in effluents from petroleum refineries and in the surrounding coastal waters. (Leixões, Aveiro, Lisboa, Sines (also sediments) and Faro.
- 15 - Physical Oceanography  
Oceanography Group, Physics Department, Geophysical Centre. University of Lisbon.
  - 15.1 - Physical oceanography of the Portuguese coast upwelling (hydrology, current measurements, remote sensing)
  - 15.2 - Dynamics of mesoscale fronts in the Azores area (hydrology, drifting buoys, remote sensing) (with the support of INIP)
  - 15.3 - Estuarine hydrodynamics (hydrology, current measurement, numerical modelling)
- 16 - Geological survey of Portugal
  - 16.1 - Study of erosion versus deposition on the continental shelf north of Nazaré Submarine Canyon.
  - 16.2 - Study of the upwelling sediment facies in bottom sediments from southeast platform submarine.
  - 16.3 - Geological map of the southwest Portuguese Continental shelf between Sines and Albufeira. 1/200.000, sheet 7.

17 - Sediments

17.1 - Mobility of some elements as a result of anoxic/oxic conditions in sediments.

17.2 - Tentative of geochemical mass balance in estuaries.

17.3 - Studies about the bioavailability of trace metals in sediments.

17.4 - Transfer of metals from sediments to the living organisms.

18 - Portugal has participated in several intercalibration exercises:

18.1 - ICES Fifth Round Intercalibration on Trace Metals in Sea Water.

18.2 - ICES Seventh Trace Metal in Biological Tissues.

18.3 - Intercalibration exercise on analyses of trace Metals in Marine sediments with Dr. Loring as Coordinator.

Sweden

(B.I. Dybern and L. Thcrell)

1. Monitoring of the marine environment

Regular cruises in Swedish and international waters 4 times a year (2 times in the Gulf of Bothnia). Hydrographical, chemical and biological factors are measured. The programme is part of a programme for monitoring the total Swedish environment. Incl. patchiness studies.

2. Special research in the Skagerrak and the Kattegat

- 2.1. The dynamics of biological nitrogen transformation in the water and sediments of the Kattegat.
- 2.2. Radionuclide concentration in marine algae, invertebrates and fish.
- 2.3. General survey on the influence on fish and shellfish stocks by pollution.

3. Special research in the Sound

Joint programme between Sweden and Denmark regarding the pollution status of the Sound and the effects of pollutants.

4. Special investigations in the Baltic (incl. The Gulf of Bothnia)

- 4.1. General survey on the influence on pollution factors on commercial fish stocks.
- 4.2. Survey on the influence on Bothnian coastal stocks of freshwater fish by pollution.
- 4.3. Studies of environmental factors influencing herring spawning.

5. Project on fish diseases in the marine environment

Includes a survey of the general distribution of fish diseases and fish parasites in commercial species on the west coast of Sweden and on the east coast of the Baltic proper. The survey forms the basis for comparison between unpolluted and polluted areas as to the kinds and frequencies of diseases and parasites.

6. Project Environment/Cellulose - effects of effluents from pulp industries

By means of a number of sub-projects the extent of biological effects by wastes from paper and pulp plants are studied. Special concentration is given to wastes from bleaching processes and to persistent and biologically active toxic compounds from other processes. Most of the investigations are concentrated to the sea area outside the factory of Norrsundet, southern part of the Gulf of Bothnia.

7. Project "ESTHER" - systems for testing and hazard evaluation of chemicals in the marine and freshwater environment

This project is a very comprehensive work to :

- build up and develop competence for testing and interpretation of test results and to establish a scientific basis for routine activities,
- study, develop and evaluate methods for hazard assessments based on experimental data, and
- to reinforce the capability of Swedish scientists to contribute to an international cooperation in the above fields and to make proper use of results produced within such a cooperation.

Immediate objectives:

- to elaborate and publish a manual, describing the procedures to be used for an Initial Hazard Ranking of chemicals,
- to elaborate and present recommendations and procedures for an advanced Final Hazard Assessment, related to the aquatic environment, of such preselected chemicals or chemical mixtures that are expected to be released or transferred to the aquatic environment in larger amounts, and
- to collect information and produce adequate knowledge needed to carry out an advanced Hazard Assessment of three model compounds, thereby checking the practical utility of the procedures developed under the second abovementioned objective. The compounds selected are arsenic, 4,5,6-trichloro guaiacol and triaryl phosphates (a mixture of three phosphate ester).

8. Eutrophication in the marine environment

The overall objective of this project is the assessment of the impact on the marine environment of cultural eutrophication. The project will start during the second half year of 1984 and consist of a number of sub-projects. Especially items are supported which may provide basis for decisions by the authorities on:

- Swedish national policy aimed at protecting the coastal areas of the country and
- Swedish international policy aimed at protecting the marine environment as such.

The sub-projects comprise, e.g., studies of dose/response relations, organic load carried out into selected sea areas and the turnover of nutrients.

9. Other investigations

There are also some few smaller projects on marine pollution carried out by Swedish scientists, e.g.

- Dynamics of Modularia blooms in the Baltic
- The Tsesis oil spill, effects after some years
- Transport of persistent substances from sediment to air via the surface microlayer
- Influence of metals on eggs and larvae of fish
- Sublethal physiological effects of heavy metals on fish
- Stress tolerance of Baltic and North Sea hard bottom ecosystems

United Kingdom (Scotland)

(A.D. McIntyre)

In accordance with the Council's request that Administrative Reports should focus on the national implementation of Council resolutions, the relevant resolutions are listed below with appropriate comments.

- C.Res.1976/4:13 Drilling muds. Work has continued on oil-based drilling muds and has included studies of the effects on benthos round oil production platforms using oil-based muds in the northern North Sea. It has been possible to recognise zones of decreasing effect extending out from the platform. This work has been reported to ICES. Experimental studies are also underway.
- C.Res.1979/4:14 Sewage sludge dumping. Dumping grounds off the east coast of Scotland have been studied and it has been shown that the effects are minimal when the load is divided between two disposal grounds in such a way that each ground is rested for a six-month period every year. An assessment has been made of the bioavailability of metals on these grounds and the results reported to ICES.
- C.Res.1981/4:6 Monitoring biological effects. Various pathological conditions and parasites were examined during a cruise on the research vessel EXPLORER in May-June 1983 when 47 trawl hauls were made. Haddock, cod, whiting, plaice, common dab, long rough dab and lemon sole were studied for pathological skin conditions, pseudobranch and vertebral anomalies and for parasites.
- C.Res.1982/10 Regional assessments. The guidelines laid down by ICES for the production of regional assessments were used to bring together data on the Firth of Forth and an assessment of the area is being prepared.
- C.Res.1982/7 Gross riverine inputs. Information relevant to this topic is still being produced in Scotland and will be appropriately synthesised.
- C.Res.1982/4:2 Baseline survey. Preparations for the 1985 geographical baseline survey are continuing in Scotland with the identification of appropriate sampling areas and agreement on species.
- C.Res.1982/4:6
- C.Res.1982/4:8

United States of America  
(J. Pearce and C. Oviatt)

The following information has been arranged according to ICES resolutions which pertain to MEQC during 1983-1978. For certain resolutions, no information was received.

C.Res. 1983/2:24

Marine sediments and pollution. University of Delaware, College of Marine Studies: Dr. Robert B. Biggs studies trace element geochemistry of estuarine bottom and suspended sediments, quantifies the sources and sinks of suspended organic and inorganic matter in estuarine waters, and determines environmental effects of dredging and dredge spoil disposal.

Scripps Institution of Oceanography: Studies on wave climatology and near shore sediment transport is carried out by the Nearshore Research Group under the direction of Dr. Richard Seymour.

National Oceanic and Atmospheric Administration (NOAA), National Marine Fisheries Service (NMFS), Northeast Fisheries Center (NEC): Monitoring of marine sediments for trace metals and organic contaminants has continued with values obtained for most of the Water Management Units (WMU) between Cape Hatteras and the Canadian Border.

Very little change was measured in sediment samples taken between 1975 and 1980 in the New York Bight. NOAA and the NMFS are planning the continuation of the Northeast Monitoring Program (NEMP); additional sediment sampling and analyses will be accomplished via augmentation with NOAA funds for its national Status and Trend Program (S&T).

Dr. Peter F. Larsen and colleagues at the Bigelow Laboratory for Ocean Sciences have collaborated with Donald F. Gadbois and Vincent Zdanowicz of the Northeast Fisheries Center (Northeast Monitoring Program) in the establishment of baselines for PAHs, PCBs and trace metals in Casco and Penobscot Bays (ME). Bigelow personnel also have established benthic community baselines in Casco, Penobscot and Massachusetts Bays. In addition, benthic and sediment samples for establishment of baselines for the above mentioned environmental components in the Gulf of Maine proper have been taken in anticipation of funding becoming available for analysis.

Preliminary results from a PCB monitoring program, instituted in Casco Bay, Maine, suggested that PCB levels may be increasing in the relatively unindustrialized Portland Harbor region. These results are presently being rigorously confirmed and interpreted.

A major cruise was conducted by Dr. Paul Boehm and Dr. Peter Larsen to census the sediments of Boston Harbor and Massachusetts Bay. The former has been found to be heavily polluted. Reports will be made to the 1984 Statutory Meetings.

C.Res. 1983/2:25

Baselines, biological effects and trend monitoring: Woods Hole Oceanographic Institution: Dr. Judith Capuzzo evaluated how exposure to environmental pollutants effected developmental processes in marine crustaceans. Exposure of larval lobsters to petroleum hydrocarbons resulted in decreased rate of lipid synthesis and utilization, and inhibition of the molting process.

Bermuda Biological Station: Personnel studied tar balls, impact of petroleum hydrocarbons on reefs, impacts of dispersants, deep sea oil pollution and fates of oil.

University of Delaware, College of Marine Studies: Dr. Ronald J. Gibbs studied the partitioning of toxic metals and organic substances during flocculation process in estuaries and deltas.

Bigelow Laboratory, Boothbay Harbor (ME): Lobsters from the inshore Gulf of Maine have been provided by the Bigelow Laboratory to personnel of the Northeast Fisheries Center for preliminary determination of pollutant body burdens. As part of proposed 1984 work, Dr. Peter F. Larsen, Bigelow Laboratory, intends to provide larger samples from regions of the northern Gulf of Maine where elevated levels of pollutants have been found in surficial sediments. New information now exists on fish/sediment contaminant concentration ratios for organic compounds (Connor, M.S. 1984, Env. Sci. & Technol., 18:31).

Northeast Fisheries Center: The Ocean Pulse and Northeast Monitoring Programs continued trend and biological effects monitoring activities in the northeast (see C.Res. 1981/2:15, 1980/4:8).

C.Res. 1983/2:38

Mariculture and Genetics: University of Delaware, College of Marine Studies: Dr. Ellis T. Bolton does research in immunology, bacteriology, genetics, molecular biology, and the cultivation of oysters. Currently he is studying the principals and applications of intensive, controlled-environment mariculture.

C.Res. 1982/1:6

Working within the Ocean Pulse Program of the Northeast Fisheries Center (NEFC), personnel of the University of Rhode Island (URI) and Old Dominion University (ODU) are identifying phytoplankton species associated with contaminated and uncontaminated coastal waters. Personnel at URI have developed an illustrated plankton key which complements the ICES phytoplankton identification sets.

C.Res. 1982/2:1

Personnel of the NEC are developing papers for participation in the ICES meeting on causes, dynamics and effects of exceptional plankton blooms, October 1984. They have continued to monitor and model the development of eutrophication and hypoxia (low D.O.) in estuaries off the northeast states.

Woods Hole Oceanographic Institution: Dr. Don Anderson studied cyst formation by marine dinoflagellates and the distribution and diversity of cysts in various sedimentary environments. His research objective is to understand the subtle factors that regulate growth and distribution of marine dinoflagellates, including red tide species. Dr. Clarice Yentsch, Bigelow Laboratory (ME), worked with the NEC to document the distribution of Gonyaulux (PSP) cysts in bottom sediments along the United States coastline from Block Island to Delaware Bay.

University of Delaware, College of Marine Studies: Dr. Mary A. Tyler is studying the mechanisms of red tide formation in estuaries and coastal waters. Her research deals with the physiological adaptation of phytoplankton to low light levels, triggers for cyst formation and interactions of physical circulation patterns and behavioral responses of algae in determining spatial distributions.

C.Res. 1982/2:10

Bermuda Biological Station: In 1977, the UNESCO Intergovernmental Oceanographic Commission (IOC) approved a Bermuda based international intercalibration exercise. In January 1980, 38 marine chemists gathered in Bermuda. A second exercise was scheduled for Bermuda in 1983. Among the pollutants selected to be measured were chlorinated hydrocarbons, i.e. PCBs. Dr. John Farrington organized and conducted a petroleum hydrocarbon intercalibration (see C.Res. 1981/4:3).

NOAA organized a series of meeting and workshops on Quality Assurance (QA). Reviews were made of current government and academic techniques and Quality Assurance programs for organic, trace metals, biological rate (Carbon 14, etc.), and nutrient measurements. Information and documents from ICES intercalibration programs provided a "corner-stone" for the NOAA effort.

National Marine Fisheries Service, Northeast Fisheries Center (NEC) personnel and contractors to NEC participated in the intercomparison study on PAHs. Dr. J. Uthe, Coordinator.

C.Res. 1982/2:13

Pathology and Immunological Responses Virginia Institute of Marine Science, School of Marine Sciences, College of William and Mary: Experimental exposure of spot to creosote contaminated sediments obtained from the Elizabeth River resulted in high mortalities and integumental fin, gill and pancreatic lesions. Spot exposed to uncontaminated sediments exhibited none of these symptoms.

Investigations were initiated to evaluate the effects of environmental stressors on the cellular immune response of three species of finfish. Fish from nonpolluted waters exposed to Elizabeth River sediments in the laboratory exhibited suppressed phagocytic function. It is thought that a reduction in immunological activity may predispose fish to microbial and parasitic disease.

Dr. Joanne Stolen, Drew University/ New Jersey Marine Science Consortium and National Marine Fisheries Service, Sandy Hook Laboratory, is using immune responses to demonstrate how fish populations have responded to contaminants

in the Middle Atlantic Bight. Significantly greater responses are seen in heavily polluted areas such as the New York Bight apex. She is also investigating how contaminants effect the immune repsonse system.

C.Res. 1982/2:15

Methods of Studying the Benthos: Virginia Institute of Marine Science, School of Marine Science, College of William and Mary: A study of the dynamics of benthic boundary layers was launced in FY 1982-1983. It is aimed at studying the associated processes of sediment resuspension, transport and animal-sediment interaction in coastal and estuarine environments.

Texas A & M University, College of GeoSciences: Research involves the following:

- (1) The effects of drilling fluids and turbidity on coral metabolism;
- (2) The effects of hydrogen sulfide on benthic community structure;
- (3) Metabolic adaptations of thiobiotic organisms to low oxygen hydrogen sulfide; and
- (4) The processes by which death assemblages form and the taxonomic processes modifying death assemblages over time.

C.Res. 1981/2:15

Research activities at the National Marine Fisheries Service, Milford Laboratory (CT), related to interests of the MEQC, include research on pollutant effects on marine animals and biological monitoring as part of the Northeast Monitoring Program (NEMP). This monitoring effort includes physiological and biochemical studies as well as bacteriological monitoring.

We continued to add several types of hematology data to our baseline collection of flounder blood measurements from Cape Hatteras to the Gulf of Maine and have identified areas where these data indicate that flounder populations are under stress. These include Long Island Sound, where we have made a variety of flounder blood measurements on a monthly schedule along a pollutant gradient. We have now completed three years of this study and have determined both seasonal and pollutant-related trends. We have also used several metabolic tests to evaluate the condition of blue mussels held at dumpsites in the New York Bight. We completed a major study at a dredge disposal site in Long Island Sound where caged mussels and lobsters were held near heavily contaminated spoils site. Flounder living in the area were also studied. The lobster "cough response" proved a good test for contaminant stress.

In 1983 we also challenged oyster and other bivalve larvae with contaminated waters collected from the polluted Hudson-Raritan estuary. The waters were analyzed for a wide spectra of organic an inorganic contaminants to provide a benchmark. A range of responses were seen and we are presently exposing organisms to filtered and unfiltered water.

As in past years of the National Marine Fisheries Service scallop biochemical monitoring, most offshore Northeast Monitoring Program stations from which sea scallops were collected appear to be relatively unstressed, as measured by biochemical stress parameters for scallop tissues. Exceptions

remain the Block Island Midshelf area, near the Mud Patch, and the outer Hudson Valley, where scallops frequently have low cellular energy in the muscle, low biosynthetic activity in the kidney, and low glycogen reserves. Sporadic collections of scallops with similar biochemistry, although to a lesser extent, have been made at a site in southcentral Georges Bank and one off upper mid-Cape Cod.

We are relating our scallop data to resource assessment data for these bivalves; we want to determine if stressed biochemical systems can indicate reduced reproduction, recruitment, and survival.

We have initiated a study with Dr. Angela Cristini, Ramapo College (NJ) to investigate the effects of polluted marine and estuarine systems on several bivalve species (including Mya arenaria) using the adenylate energy charge (AEC) technique. Results from the first year's efforts in Raritan Bay show that there is daily variation in the AEC values due to tidal and other "natural" environmental fluctuations. The research does indicate that the AEC is sensitive to contaminant loading of water and sediments and can be used in biological effects monitoring.

The pollutant oriented research at the National Marine Fisheries Service, Southeast Fisheries Center, Beaufort Laboratory (NC) is investigating the biological and chemical processes that control the availability and toxicity of trace metals to fishery organisms. The research program, funded by NOAA's Oceans Assessment Division, is being conducted cooperatively with NOAA's Atlantic Oceanographic and Meteorological Laboratories. It involves both chemical and biological measurements of trace metal dynamics at sea in the northern Gulf of Mexico and in the National Marine Fisheries Service, Beaufort Laboratory. The research is oriented towards demonstrating the chemical and biological mechanisms which control partitioning and toxicity of trace metals to food chain organisms supporting the survival and growth of larval fish. We have demonstrated that the free metal ion activity, not the total dissolved metal concentration, controls bioavailability and toxicity of cadmium, copper, and zinc to marine organisms. In the Gulf of Mexico, it was shown that small changes in available copper, zinc and manganese can alter species composition and productivity of marine food webs. It was demonstrated that manganese concentrations in seawater can control the toxicity of zinc and copper to marine phytoplankton and that organic matter produced by phytoplankton influences manganese availability through photoreduction of manganese oxides. Information from our laboratory-based experimentation on food chain transfer efficiencies of trace metals, in conjunction with field measurements, allows us to assess better the possible impacts of trace metals, at both natural and elevated levels, on fish production in coastal and oceanic environments.

Physiological and biochemical research on the mechanisms of trace metal detoxification on marine organisms is being conducted by the Beaufort Laboratory in conjunction with the Duke University Marine Laboratory/Biomedical Center. We demonstrated the presence of cadmium, copper, and zinc-binding proteins in marine finfish and shellfish, and have attempted to relate their presence to normal physiological processes and to the toxic effects of trace metals. Of particular interest is the use of trace metal ratios and the presence of various metal-binding proteins in marine organisms to indicate conditions where trace metal stress may occur.

Studies by the National Marine Fisheries Service of the effects of environmental variability, both natural and anthropogenic on the survival, growth and condition of the early life history stages of fish are continuing at the Narragansett (RI) Laboratory. Field collections for RNA-DNA ratio analysis were expanded to include additional species and larger juvenile fishes. A general model for the relation between temperature, RNA-DNA ratio and growth of temperate marine fish larvae was expanded and verified. A study of the effects of Hudson-Raritan Estuary water quality on early development of fish was initiated. As part of this study, changes in the concentration of selected pollutants including trace elements and petroleum and chlorinated hydrocarbons will be determined during storage of water for up to one month. Preliminary results of studies of nucleotide profiles in larval fish using HPLC indicate that nucleotide levels are relatively insensitive to stress.

Research activities at the National Marine Fisheries Service, Sandy Hook Laboratory related to MECQ and supported under the Northeast Monitoring Program, have included behavioral studies on the responses of different benthic organisms to oil-contaminated sediment. Bivalve molluscs, sand lance and selected polychaetes have shown changes in burial behavior when exposed to sublethal levels of crude oil mixed with the sediment. These changes, in each instance, while not directly lethal can lead to decreased survival through disruption of normal predator-prey interactions.

C.Res. 1981/4:3

With funding from the National Marine Fisheries Service (NMFS), National Oceanic and Atmospheric Administration (NOAA), Dr. J. Farrington (Woods Hole Oceanographic Institution) developed standard samples for distribution to laboratories participating in the second intercalibration exercises on petroleum hydrocarbons. The samples were distributed during 1983 and early 1984. A report to ICES will be available in 1984.

C.Res. 1981/4:6

Members of the Northeast Fisheries Center and university personnel, working under contract with the Ocean Pulse Program, are continuing biological effects monitoring using biochemistry, physiology, and pathology as indicators of the effects of contaminants. Research was reviewed at the Annual Meeting of the WG on Marine Pollution Baseline and Monitoring. The efficacy of various North American and European techniques was evaluated.

C.Res. 1980/4:7

Investigators within the NEFC, as well as persons working under contract with NMFS, continue to use the mussel, Mytilus edulis, as a histopathological indicator species of pollution. Others are conducting biochemical and physiological experiments using M. edulis, the NOAA, Ocean Assessment Division (OAD) is developing a Status and Trends Program which will use a mussel watch approach in addition to monitoring of sediments, fish tissues, and water for contaminant levels.

C.Res. 1980/4:8

Personnel working with the NEFC Ocean Pulse and Marine Resources Monitoring, Assessment, and Prediction (MARMAP) Programs in 1983 conducted analyses of nutrients and relating these to standing stocks of chlorophyll and primary production. Intercomparisons of nutrient analyses are being done with other investigators working within the area of interest. These measurements are being related to the development of hypoxia (low D.O.) in the Middle Atlantic Bight.

C.Res. 1979/4:14

Research within the NEFC has continued on the biological effects of marine dumping of dredged material, sewage sludge and other wastes. The NEFC has been involved with ongoing studies of the efficacy of capping of contaminated dredged materials with clean sediments. Studies done prior to and after dumping of the contaminated dredged materials indicate that capped sediments remain in place in spite of strong storms, etc. Disposal of dredged materials in Long Island Sound caused sublethal effects to lobsters.

C.Res. 1979/4:21

Personnel of the NEFC continue to investigate patent disease in marine finfish and shellfish to develop an understanding between causative organisms and the expression of disease, and the effects of disease on populations.

C.Res. 1978/4:2

Northeast Fisheries Center, Sandy Hook Laboratory continued to monitor phytoplankton productivity, standing stocks of chlorophyll and nutrients in areas of interest to ICES. Monitoring in 1983 was done throughout an area extending from the Canadian border to Cape Hatteras.

C.Res. 1978/4:14

The Cooperative Research Report No. 107 continues to be requested through the Northeast Fisheries Center. During the past 36 months, over 100 copies have been distributed to persons interested in responding to oil pollution and toxic waste disposal incidents.

USSR

(N.P. Morozov)

Biogeochemical studies in 1983 included those of biotic and abiotic components of the ecosystem of the Antarctic seas. These studies allowed us to reveal relations and relationships of their microelement composition. The obtained data made it possible to find mean microelement levels of transition and heavy metals in sea water, suspended material, bottom sediments and most abundant plankton organisms, nekton and benthos of the region in question. Principal features of the formation of the microelement composition of krill and commercial ichthyofauna were studied.

Studies in toxicology were orientated towards the development of sensitive and rapid bioassays for sewage water control, also for several pollutants discharged at sea. Methods for the evaluation of anthropogenic contamination of fishing bodies affecting fisheries        drafted.

Appendix 1 includes those returns received from member nations in regard to amounts of sand and gravel extraced during the calendar year 1983.

Reports were received from the following countries :

Belgium  
Finland  
Iceland  
Sweden

The Report of Activities from the United Kingdom (Scotland) indicated that the quantities extracted are so small that "nil" return is appropriate.

MARINE ENVIRONMENTAL QUALITY COMMITTEE

Report on Marine Aggregate Production for the Year .....1983.....

Country .....BELGIUM.....

Issuing Authority .....Ministry of Economic Affairs.....

Reporting period (if different from above) .....

Type of Material	Size Range*	Total Production		Localities
		million m <sup>3</sup>	million tonnes	
SANDS	0.063-2.0 mm	0.580	0.870	Kwinte Bank
GRAVELS	2.0 mm-6.4 cm			
PEBBLES, COBBLES	>6.4 cm			
CALCAREOUS Shell Lithothamnion Other (specify)	All sizes			

\*The size ranges shown here are idealized, and are merely intended as a guide to the type of categorisation required.

MARINE ENVIRONMENTAL QUALITY COMMITTEE

Report on Marine Aggregate Production for the Year .....1983

Country .....FINLAND.....

Issuing Authority .....Ministry of Environment.....

Reporting period (if different from above) .....

Type of Material	Size Range*	Total Production		Localities
		million m <sup>3</sup>	million tonnes	
SANDS	0.063-2.0 mm	1		Gulf of Finland
GRAVELS	2.0mm - 6.4 cm			
PEBBLES, COBBLES	>6.4 cm			
CALCAREOUS Shell Lithothamnion Other (specify)	All sizes			

\*The size ranges shown here are idealized, and are merely intended as a guide to the type of categorisation required.

MARINE ENVIRONMENTAL QUALITY COMMITTEE

Report on Marine Aggregate Production for the Year .....1983.....

Country .....ICELAND.....

Issuing Authority .....Marine Research Institute.....

Reporting period (if different from above) .....

Type of Material	Size Range*	Total Production		Localities
		million m <sup>3</sup>	million tonnes	
SANDS	0.063 - 2.0 ,,	0.368		Faxa Bay
GRAVELS	2.0 mm - 6.4 cm	0.245		Faxa Bay
PEBBLES, COBBLES	>6.4 cm			
CALCAREOUS Shell Lithothamnion Other (specify)	All sizes	0.107		Faxa Bay

\*The size ranges shown here are idealized, and are merely intended as a guide to the type of categorisation required.

MARINE ENVIRONMENTAL QUALITY COMMITTEE

Report on Marine Aggregate Production for the Year .....1983

Country .....Sweden.....

Issuing Authority .....

Reporting period (if different from above) .....

Type of Material	Size Range*	Total Production		Localities
		million m <sup>3</sup>	million tonnes	
SANDS	0.063 mm-2.0 mm	0.1		The Sound
GRAVELS	2.0mm-6.4cm			
PEBBLES, COBBLES	>6.4 cm			
CALCAREOUS Shell Lithothamnion Other (specify)	All sizes			

\*The size ranges shown here are idealized, and are merely intended as a guide to the type of categorisation required.