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REPORT OF THE WORKING GROUP ON THE EFFECTS ON FISHERIES OF MARINE AGGREGATE EXTRACTION

Rijksstation voor Zeevisserij, Oostende, Belgie
Station de Pêche Maritime, Ostend, Belgium
27-29 May 1986

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1. OPENING OF MEETING

1.1 The meeting was opened by Dr P Hovart, Director of the Rijksstation voor Zeevisserij, who welcomed the members and expressed his best wishes for an effective meeting. The Chairman, Dr S J De Groot (Netherlands), thanked Dr Hovart and opened the business of the meeting.

2. INTRODUCTION OF MEMBERS

2.1 The attendance list is attached as Annex I. The Chairman reported that he had received apologies for non-attendance from the German and Spanish delegates.

3. APPOINTMENT OF A RAPPORTEUR

3.1 On the proposal of the Chairman, the Working Group appointed Dr M M Parker as Rapporteur.

4. TERMS OF REFERENCE

4.1 The terms of reference of the Working Group are laid out in Council Resolution 1985/2:25 (Annex II). The Chairman briefly summarized the history and activities of the WG, referring to his paper to the last Statutory Meeting (ICES C.M. 1985/E:5).

5. ADOPTION OF AGENDA

5.1 The agenda as adopted is at Annex III. It was agreed that a brief report on EC Project COST 647 Coastal Benthic Ecology) should be given by Dr Heip under item 7. Papers submitted for discussion are listed in Annex IV and other reports referred to or on display during the meeting are listed in Annex V.

6. PRESENT STATE OF MARINE SEDIMENT EXTRACTION (1979-PRESENT) IN ICES MEMBER COUNTRIES

6.1 The Chairman circulated a table drawn from ICES statistics and other sources summarizing extraction activity in member countries. In discussion it was noted that some of the figures required amendment by members and that the basis for calculation of these figures differed between countries; some included channel deepening and maintenance dredging as well as aggregate exploitation for use on land or in beach replenishment. (The table, amended by members, is provided as Annex VI.)

6.2 Belgium: Dredging occurs in three zones off the Belgian coast, on the Zeeland Banks, the Flemish Banks and around the Zeebrugge

approach channel; in the latter area, dredging is both for channel maintenance and deepening (leading to the dumping of ca. 30 Mt pa of mud at sea), and also for sand for harbour extension and beach replenishment. Extraction of sand on the Flemish and Zeeland Banks is carried out both by private industry and by the Ministry of Public Work, though most of the private industry activity is in the latter zone. Recovery has varied from year to year depending on new projects in construction etc. on shore.

6.3 Canada: Offshore aggregate mining in Canada is limited to dredging in the Beaufort Sea where the material is used to construct artificial islands for exploration drilling for oil and gas. (There exists the likelihood that these islands affect migratory routes/pathways of whale species, e.g. Beluga.) Elsewhere, there have been sporadic, small-scale operations that are not active at the present time.

There is considerable private sector interest in obtaining mineral rights for aggregates, silica sands and gold placers, particularly off Atlantic Canada. It is expected that exploration could lead to commercial operations within the next few years.

6.4 Denmark: Between 3 and 7 Mt per year of sand is taken from Danish waters mostly from the Belt Sea area. A small amount of gravel is taken from a bank in the North Sea and a shelly deposit is exploited in north Sjaelland. A small amount of approach channel dredging occurs in the Belt Sea area and at Esbjerg, and consideration is being given to a deep-water route to the west of Sjaelland that might require significant dredging. About 1 Mt per year of sand is used for beach replenishment in Jutland.

6.5 Finland: Current extraction activity occurs in the east of the Gulf of Finland, in two areas of the Gulf of Bothnia and at the Åland Islands. Altogether, nearly 30 Mm^3 of sand have been landed since 1968 and demand for marine sand is rising as eskers on land are becoming exhausted.

6.6 France: Extraction of sand and gravel has been at a constant level over the last five years, mostly local to coastal industrial developments, in particular nuclear power stations along the Channel coast. In the Dunkirk and Cherbourg areas, local resources have been augmented by importation of aggregate from the Thames (1 Mt pa) and Isle of Wight (0.2 Mt pa) areas of Britain. In Brittany, extraction is on a very small local scale, with many small vessels operating in estuaries, taking less than 100 m^3 each. Larger-scale extraction occurs in the Loire estuary (~ 4 Mm^3/year) and some extraction occurs at the La Rochelle and in the Gironde estuary. Outside Metropolitan France, it was noted that a very small extraction operation occurs at St Pierre-et-Miquelon, as well as in several other French territories, outside the ICES area.

A small amount of maerl is extracted in Brittany for use as a fertilizer in 'organic' farming.

6.7 Ireland: Apart from occasional, local and very small-scale extraction of aggregate for the building industry, no commercial extraction occurs at present. A licence for extraction of maerl off County Galway has been under consideration for some time.

6.8 The Netherlands: Dredging activities in the areas North Sea, Scheldt estuary, Waddensea (Ems estuary included).

North Sea (1985): 4285 Mm^3 of sand was allocated for use on land but only 2724 Mm^3 was actually dredged. Deepening of the approach channel to Ijmuiden harbour led to the dredging and dumping of 5026 Mm^3 of sand, while in Rotterdam 103 km^3 was removed in 1985. Maintenance dredging at Ijmuiden and Rotterdam led to the removal and dumping of 60 km^3 and 2484 Mm^3 respectively.

Scheldt estuary: Sand for building purposes, land-fill, sea defences approximately 3.5-4.5 Mm^3/year. Maintenance dredging approximately 12.4 Mm^3/year.

Waddensea: Allocated yearly amounts 4.5 Mm^3 of sand and 140 000 m^3 of calcareous material (40% recent shell, 60% fossil shell). Harbour approaches Delfzijl (Ems estuary) 1.5 Mm^3. Also German dredging activities in same area, port of Emden ca. 15 Mm^3.

In total, sand supply accounts for 12 Mm^3 per year; deepening sea channels for 5.2 Mm^3; maintenance dredging, 6.5 Mm^3; calcareous material, 140 000 m^3. Not included are data on beach replenishments, e.g. at Goeree, Scheveningen, Callantsoog, Texel, which are carried out in 3-7 year cycles.

A complete picture on dredging activities is difficult to obtain as several Rijkswaterstaat authorities are responsible, e.g. North Sea Directorate - North Sea, Directorate Friesland - Wadden Sea area, Directorate Groningen - Ems estuary, Directorate North-Holland - Ymuiden area, Directorate Lower Rivers - Rotterdam area, Directorate Zeeland - Scheldt estuary.

Along the seashore no dredging is allowed within the 20 m depth-line (or 20 km from the shore) in order to protect the shoreline; the figures are for practical purposes and have no scientific basis.

6.9 Sweden: Currently dredging takes place in three areas within the Oresund, one of which is for maintenance of a shipping channel (Vastra Haken). From this area and from a shallower area at Sandflyten, quartz-rich sands are recovered for the glass industry. From the third area, Disken, sand is taken only for fill. Consideration is being given to licensing a further quartz-rich sand area to the north of the island of Gotland.

6.10 United Kingdom: Extraction has been fairly constant around 17.5 Mt pa over the last five years, mainly of sand/gravel mixtures for the construction industry, but also including around 1-1.5 Mt pa of sand for reclamation and beach replenishment. There have been few new licences issued since 1976, but several new areas are currently under consideration. One small operation in the Fal estuary in Cornwall extracts around 700 t pa of maerl for use as a fertilizer. Licences have been given to extract waste coal from the sea off the north-east coast and from the Bristol Channel; the coal will be extracted by cycloning on the vessels. Consideration is also being given to extraction of tin-bearing ores in the south-west; however, the viability of their proposal must be questioned in the current conditions of the tin market.

6.11 Other countries: The Working Group noted the summaries of activity in the Chairman's paper 'Report on specific terms of reference for a new Working Group on the Effects of Sand and Gravel Extraction' (ICES C.M. 1985/E:5 and supplement).

6.12 Discussion and conclusions

6.12.1 It was noted that in almost all countries, a greater emphasis is being placed on the winning of marine aggregates because of exhaustion or planning restrictions on the use of land resources. In addition, in several countries, large-scale coastal engineering projects including land reclamation or building of new land, beach replenishment, artificial island construction and capital dredging projects were in progress or planned; maintenance dredging now included not only the removal of accumulated silts from harbours but also the continual deepening of approach channels, often for considerable distances (up to 150 km) at sea, to accommodate larger vessels.

6.12.2 In considering the collection of statistics on these activities it was agreed that the current reporting format needed amendment and Dr Scarratt undertook to circulate draft proposals for comment by correspondence and final agreement at the 1986 Statutory Meeting. It was agreed that overlap with the collection of statistics on dredge spoil disposal activities under the Oslo and London Dumping Conventions should be avoided; Dr Parker undertook to circulate relevant information from the Conventions including a recent annual report on quantities dumped.

7. OVERVIEW OF NATIONAL RESEARCH PROGRAMMES ON THE EFFECTS OF EXTRACTION OPERATIONS ON THE MARINE ENVIRONMENT

7.1 Belgium: Papers by Dr Maertens and Professor de Moor were presented (see Annex IV), and verbal presentations were made of the extensive physical and biological studies carried out in the three dredging zones. Work is being carried out by both the Ministry of Public Works and the University of Ghent, and has included morphological and seismic studies of the sandbanks to assess their stability, and studies on macrobenthos and interstitial fauna. The sandbanks are largely self-replenishing; the physical effects of dredging disappear rapidly. It was noted that sand is being lost from the channels between the banks in one area, though it is not known whether this has anything to do with the dredging on the banks. The banks support a diverse interstitial fauna which recovers rapidly from the effects of dredging; macrobenthic diversity also appears unaffected despite the fact that a large proportion (> 70%) of organisms taken into the dredger are killed or severely damaged even if they are returned to the sea bed in the outwash. Only in the areas around the Zeebrugge approach channels has a significant change been noted; here mud is being translocated from a currently muddy area to the south of the channel to a sandier area to the north of it, leading to changes in benthos community composition and fisheries.

7.2 Canada

7.2.1 Insofar as there is no active ocean mining on the Canadian east coast, there is no current research into ecological effects. There is however some work in progress related to channel dredging

and spoil dumping stimulated by recent claims that high levels of suspended sediment near dump sites have adversely affected a mussel culture site. The study will consider effects of suspended sediment on mussel growth and survival.

Earlier work related to claims by gaspereau fishermen that reduced catches were caused by dredging and dumping in the Miramichi River, focussed on behaviour of smelt (Osmerus mordax) which changes at suspended sediment levels in excess of 12-20 ppm.

7.2.2 Prior to exploitation, efforts are being made to take full advantage of the experience of other countries and to identify effects that have given rise to environmental and fisheries concerns.

A study of UK experience and management practice has been concluded and will be used as a basis for formulating research programmes and resource mapping exercises that address environmental and fisheries concerns and aid resource development planning.

7.3 Denmark: No research is in progress. The last published work was that of Kiørboe and Møhlenberg (1982) - see Annex V, item 16.

7.4 Finland

7.4.1 The effects of marine sand extraction on marine environment have been studied in Eckerö, western Åland in 1976-77 (Storberg and Helminen, 1978) and off the coast of Pyhtää in the eastern part of the Gulf of Finland since 1983.

7.4.2 In Eckerö, 134 000 m^3 sand was taken from the bottom in 1976. The main direct effects were a strong increase in turbidity in the water, extinction of bottom fauna in the resulting pit and disturbance of fishery. After sand removal, the oxygen conditions have changed, resulting in disturbances in recolonization by bottom fauna. The sand on the beach nearby has changed in composition. The finest particles have washed away to the bottom of the pit.

7.4.3 The investigations in the sea area off Pyhtää were started in 1983. The studies have been focussed on Baltic herring spawning and bottom fauna in the area of dredging and its surroundings. Information has also been collected from the commercial fishery in the study area. The effects of dredging on water quality and on currents have also been investigated. During 1983-84 a baseline study was carried out; the work was continued by the same methods in 1985 when the sand (100 000 m^3) was extracted. The study will be continued for some years in order to follow the restoration of the sea area to its former condition.

7.4.4 According to preliminary results extraction has not had direct effects on Baltic herring spawning. The bottom fauna has disappeared from the dredging area and reduced densities of individuals could be noted ca 400 m from the dredging site. The turbidity of the water did not markedly increase due to the purity of the sand extracted: no mud was found on the surface of the sand. The studies on the effects of the extraction on the fishery are not yet completed.

7.4.5 Although the sand extraction in this study seemed not to have an influence on Baltic herring spawning, one should not generalize

the results. At the time when the main spawning of the Baltic herring occurred, the dredging had continued for only about two weeks. The final effects of the sand extraction on Baltic herring spawning will be seen in this year's studies. Furthermore, it should be noted that the dredging site itself was not a Baltic herring spawning ground; the nearest spawning area is situated approximately 1.5 km south-east of the area. The sea bed is not similar to Baltic herring spawning grounds in the eastern part of the Gulf of Finland because of the lack of macrophytes, which Baltic herring favours as its spawning substrate. Towards the west in the Gulf of Finland where the salinity of the water is increasing the shallow sand bottoms are often covered by meadows of eelgrass (Zostera marina), which have been noted to be important spawning ground of Baltic herring.

7.4.6 The effects of dredging on the marine environment have also been studied in Finland on a smaller scale in connection with some sea channel constructions. The construction of sea channels has been noted to decrease the trap-net catches of Baltic herring off the coast of Rauma, Inkoo and probably off the coast of Vaasa, too (Karlsson, 1983).

7.5 France: The Baie de Seine project of 12 years ago had yielded equivocal results concerning effects on fisheries as it was not based in a good fishing area. Changes in the benthos had been noted as the sediments had been changed from superficial muddy sand (Macoma/Abra) to a hard, stony bed. A review will shortly be made available on "Dragages et exploitation des sables marin: qualité des materiaux et consequance sur le milieu" (Thesis of G Boutmin, 1 July 1986). IFREMER has made an important investigation in the north of France of the sand and gravel deposits, including research on the effects of their extraction on fisheries. It has also started in 1986 a geological evaluation of maerl deposits in Brittany and research on their ecology.

7.6 Ireland: No research is currently in progress but studies on the effects of extraction of maerl are planned.

7.7 Netherlands

7.7.1 A paper was presented by Dr Essink (see Annex IV) on sand and shell extraction in the Waddensea. Extraction was permitted only in the channels, where infill was rapid, rather than the flats where pits were long-lived. Impact of the fine particulate plume could be measured in terms of suspended solids levels and bioassays of mussel growth up to 2 km downstream. Shell is extracted on the basis that the resource represents ten years' accumulation, and thus 10% can be removed each year. Since shell extraction often takes place at sand-bars in channels, the deepening of these areas may affect the suspended solids regime of the entire estuary or channel and affect stability of the area. An increase in suspended solids has been noted over 15 years but it is not clear whether there is any affect on the stability of the islands.

7.7.2 A paper by Marquenie (Agenda V, item 11) concerning contamination of Scheldt dredgings was noted. Near Rotterdam, it is proposed to build an island as a containment site for 90 Mm^3 of contaminated dredgings from that port (the Slufter Project).

7.8 Sweden: Biological studies on extraction sites in the Oresund are being carried out by the University of Lund and should be published within a year. If extraction is licensed north of Gotland, studies will also be carried out on effects at this site.

7.9 United Kingdom

7.9.1 Since the Southwold study, reported at the 1979 Working Group meeting, no field studies have been carried out; the results of that study were equivocal but did not suggest significant effects on benthos.

7.9.2 Research in progress is pointing to the importance of some gravel areas for overwintering female crab which may be found in large numbers partially buried in suitable substrates. They are highly vulnerable to disturbance.

7.9.3 Prior to the issue of dredging permits, the potential for coastal erosion is assessed. Licence conditions ensure that no erosion occurs.

7.9.4 A large review of the industry has been carried out which should be published shortly. A resource survey is being carried out by the British Geological Survey (BGS) for the Crown Estate Commissioners in the Thames and East Anglia areas where demand is greatest.

7.10 Other international research programmes

7.10.1 Dr Heip informed the group of the work of the EC/COST coordinated research project COST-647 (Coastal Benthic Ecology) and of the ICES Benthic Ecology Working Group.

7.10.2 The COST-647 group at their December 1985 meeting in Brussels (proceedings to be published in Hydrobiologia) concluded that the major variations in benthos composition observed over the years might be attributed to temperature influences and also that eutrophication may play a role. The effect of localized pollution could be established by comparing the developments of benthic communities (e.g. Macoma balthica) over the full range of its distribution area. Reliable results could be obtained only after ca. 15 years of research.

To study the temporary effects of dredging on the relatively mobile sand biotope, the recovery of the affected area need only be followed over a period of 1-2 years. The disturbed area should be compared with the developments in a non- disturbed area of the same benthic communities.

It is likely that the effect of the dredge-plume, the cloud of resuspended fine material in the wake of a dredger, only affects a very limited area outside the extraction area.

7.10.3 The ICES Benthic Ecology Working Group is mainly concerned with methodological intercomparability but has recently started to consider the measurement of effects of point source pollution on benthos. It might also be able to give advice on assessing the effects of dredging on benthos (see Recommendation 3).

7.11 Discussion and conclusions

7.11.1 Extraction activities may impact on fisheries at two levels. Firstly, there is interference with fishing activity, through temporary or permanent loss of access to fishing grounds or accidental damage to gear. Impact at this level is often greater in anticipation than in outcome; better communications between fishermen and dredgers are essential to reducing this type of conflict.

7.11.2 Secondly, there is the possibility of impact on the biology of the fish through destruction of feeding areas or spawning areas. It was noted that in naturally dynamic areas such as sandbanks and waves, the impact was, at most, transient; in more stable structures such as relict gravel banks the impact might be longer term and was as yet not well characterized. Key target species include herring and sandeel which lay eggs on or in the sea bed and gravid female crab which may congregate in large numbers in some area. It was considered that benthic organism in the path of the dredger suction head should be effectively written off as few were likely to survive.

8. RECENT ACTIVITY ON SUPERFICIAL SEDIMENT MAPPING

8.1 Belgium: Two mapping exercises are in progress. The Belgian Geological Survey is preparing superficial sediment maps and the Ministry of Public Health is updating a 1976 resource and seabed use map, including information on temporal changes in sediments.

8.2 Canada: Because of growing interest in the non-oil-and-gas mineral resources of the Canadian shelf (equal in area to ca. two-thirds of the land mass) the Canadian Departments of Energy, Mines and Resources and of Fisheries and Oceans, in conjunction with the Atlantic Provinces, are now planning a mineral and fishery resource mapping study. A database is being developed from existing sources which will allow identification of key areas needing more detailed survey. The aim is to avoid conflict by guiding mineral exploitation away from areas of traditional fisheries interest.

8.3 Denmark: A survey is in progress at present which aims to map all coastal mineral resources before licensed exploitation takes place. The maps will take fisheries and conservation areas into account. A large part of the Belt Sea has now been covered and several other areas are under survey; the work will be completed in 1988.

8.4 Finland: Areas of importance to extraction in the south-western archipelago and off the eastern part of the Gulf of Finland have been surveyed; further surveys are planned for the area off Helsinki this summer.

8.5 France: A series of maps exists for the English Channel area (including UK side) which is being coordinated to provide 1:100 000 maps of geology, superficial sediments and isopachytes of alluvial fills and sandbanks. Similar maps have been prepared for the northern Biscay area (and the Gulf of Lyons). A further series of high resolution maps of morphology based on side-scan sonar, TV and photographic surveys is being prepared for some inshore areas. Additional mapped information exists, but it is largely on confidential commercial files.

8.6 Ireland: Surveys of superficial sediments on the east coast have been reported to the 1979 Working Group meeting. Boomer and side-scan surveys have been carried out on the south-east and west coasts, but the data are not yet available.

8.7 Netherlands: Dr Schüttenhelm provided a detailed paper on 'Recent efforts to map superficial marine sediments in the Netherlands sector of the North Sea' and an updated version of the 1976 1:100 000 superficial sediment map. The Netherlands is cooperating with the UK (BGS) and Belgium in preparation of 1:250 000 UTM maps of underlying geology, quaternary deposits and superficial sediments. Only one gravel area has been found so far, in the north-western area (Botney Gut, Klaverbank), but this is in or near an area where herring spawning has recently recommenced, though outside the restricted areas indicated previously by ICES (Coop. Res. Rep. 64 (1977), Figure 2).

8.8 Sweden: The Swedish Geological Survey is mapping the Oresund at 1:50 000; five maps are currently available. Maps are also being produced at 1:100 000 for the Gotland area (three are currently available). Mapping is also in progress in the southern Kattegat, which will be covered over the next 6 years at 1:100 000. The input to the mapping includes morphology, bedrock, superficial sediment isopachytes drawn from seismic, side-scan and TV profiles.

8.9 United Kingdom: The British Geological Survey is producing a series of 1:250 000 UTM maps of underlying geology, quaternary deposits and superficial sediments (coordinating with the Dutch series); the first sheets are now appearing. A resource survey of the Thames and East Anglia area is being carried out by BGS in conjunction with the Crown Estate Office.

8.10 Discussions and conclusions

8.10.1 Superficial sediment and mineral resource maps are being prepared for many coastal regions in the ICES area. It was noted that comparable mapping of fisheries resources and activities on a detailed scale is much rarer. Much of the local information is in the hands of fishermen who are often unwilling to disclose it, especially if they suspect this may lead to loss of grounds to dredging.

8.10.2 The Working Group concluded that to avoid conflicts between resource uses, accurate databases of both mineral and fishery resources are an essential tool; if these can produce a mapped output interpretation is made easier. Unless potential overlaps between activities can clearly be identified, conflicts will continue to arise during operations instead of being cleared up before permitting.

9. NATIONAL LICENSING SYSTEMS AND CODES OF PRACTICE (INCLUDING CHANGES SINCE 1979)

9.1 Belgium

9.1.1 Legislation

(i) law of June 1969 concerning the Belgian continental shelf;

(ii) Royal Decree of October 1974 modified by the Royal Decree of 22 April 1983, concerning the licensing of concessions for the exploration and exploitation of the mineral and other non-living resources of the continental shelf.

The modification of 22 April concerns the sand intended for harbour construction and shoreline development works that are carried out by or for the State in well-defined zones: a request for a concession is replaced by a declaration issued by the Minister of Public Works. The exploration and exploitation works can be started after the Minister of Economics has published the declaration.

(iii) Royal Decree of 16 May 1977; there are only two zones in which concessions and permits are allowed (the Flemish and Zeeland Banks). In 1981 a request was made for a third zone. No decision has been taken as yet.

9.1.2 The licensing regulations

In Belgium the licensing regulations consist of the Royal Decree, which sets down the permit conditions, the general conditions of exploration (techniques, minimal amounts), register systems and control procedures, quarterly reporting, sanctions and penalties, and of the ministerial decrees. The ministerial decrees are the actual permits. They contain provisions as to authorized amounts, authorized zone, levies and security, renewal, cancellation or abolition of the permit. They grant the permit on the basis of the results of an assessment that takes account of the evaluation made by various authorities. The first permits were delivered for a test period of three years. For zone 2 (the Zeeland Banks) exclusively, most of the private firms have received a new permit for 10 years (Table 3); the regulations applicable to the private sector, no new royal or ministerial decree has been delivered since the test period. Beside a new test period, the only change that has occurred is the modification of 22 April 1983, mentioned in 2.1(ii).

9.2 Canada: Legislation exists concerning dredge spoil disposal; the Ocean Dumping Control Act gives effect to the London Dumping Convention. The federal and provincial governments have begun consultations on the possibility of developing a uniform regulatory system for the development of minerals other than oil and gas that could be applied to all Canadian waters. Efforts are being made to minimize potential conflicts before development takes place through good planning and liaison.

9.3 Denmark: Regulations are under review; currently only the vessel is regulated (under Bekendtgorelse af lov on rastoffer; Miljoministeriets lovbekendtogorelse nr.531 af 1o. Oktober 1984) and, with some exceptions, the dredging area is not. In some areas, dredging within 1 km of the coast is prevented, to protect the shore, and the

shell deposit area in north Sjaelland is protected. There is no code of practice but operators are referred to the booklet 'Ral-og sandsugerne' (see Annex VI, item 17).

9.4 Finland: The Act Nr.555/1981 (Act on Soil Extraction) requires permitting by the communes and municipalities for sand and gravel extraction. If a risk to the water environment can be foreseen, permission by the Water Court is needed according to the Water Act. When sand and gravel extraction takes place in a sea area owned by the State, permission is given by the authority, which controls the area in question. Also in this case permission of the Water Court is needed if a risk for environmental deterioration is expected. A new law is under consideration.

9.5 France: There has been no change since 1979; The controls are described in the last WG report.

9.6 Ireland: There has been no change in the licensing system since 1979, but new procedures are under consideration.

9.7 Netherlands

9.7.1 There has been no change with respect to extraction licensing procedures since 1979, but new controls have been applied since 1985 to the quality of dredged spoil for dumping at sea. Only unpolluted material of mainly marine origin may be returned to the sea; dredged material of largely riverine origin must not be dumped.

9.7.2 A temporary storage area has been created on the sand depot near Maasvlakte with a capacity of 9 Mm^3, sufficient up to mid-1987. A start has been made in the construction of an artificial peninsula (the Slufterproject) nearby which from mid-1987 will receive up to 90 Mm^3 of maintenance silt over the next 20 years, including that from the temporary storage area.

Apart from the Slufterproject, another containment area (ca. 1.5 Mm^3 capacity is being constructed near Maasvlakte to receive the most heavily polluted silt from the industrialized Rotterdam Port area. Special measures are being taken to prevent groundwater pollution.

9.7.3 A charge of Dfl 0.25 per m^3 is levied on extraction; this is kept low so as to encourage marine extraction.

9.8 Sweden

9.8.1 The extraction of non-living resources is in Sweden regulated mainly by the Continental Shelf Law, but is partly also regulated by among others the Water Law, the Protecting Law of Archaeological Sites. The Swedish shelf area is divided in three parts: the inner part, which is private or owned by municipalities and which extends from the shore and out to a water depth of 3 m or to a limit of 300 m off land. The extraction within these areas can be done by the owner for his own need. Bigger extractions must be permitted by local governments; the second area of the shelf extends from the outer limit mentioned above to the 12 miles limit. The permissions for extraction within this area are given by the Geological Survey of Sweden; the third area goes from the 12 miles limit to the midline between the neighbour countries and Sweden. Here the permissions are given by the Swedish Government.

9.8.2 The extraction companies have to pay a fee to the Swedish Government, which varies between 4 to 6 Skr (depending on the quality of the extracted material).

9.9 United Kingdom: The licensing and assessment procedure has not changed since 1979, but is under reconsideration at present. The permitting system in the UK is a purely commercial one; a royalty of between £0.12 and 0.25 is charged per tonne depending on quality and location of the resource.

9.10 Discussion and conclusions

9.10.1 Licensing systems vary substantially from country to country but there is a trend towards a two-stage approach of prospecting before permitting; the permit is often dependent on the information given by the prospector.

9.10.2 Charging systems vary from country to country as do the levels of the charges. In some cases a part of the levy will be diverted to research on effects.

9.10.3 The use of black-boxes in enforcement of licence conditions regarding areas and times of dredging was considered. A primary requirement is for very accurate position fixing since dredgers often operate small concessions close to land. The Dutch members agreed to provide a report on the Rijkswaterstaat experience with black-boxes. Pressure sensor devices can be used to record dredging activity and high accuracy navigational systems are becoming available in many sea areas (Loran C in the west Atlantic, Hyper Fix in the North Sea).

10. INFORMATION ON ACTIVITIES IN THE NEAR FUTURE, AND THEIR POSSIBLE IMPACT ON THE MARINE ENVIRONMENT AND FISHERIES

10.1 Belgium: The channel in the area of mud settlement to the north of the Zeebrugge channel will be dredged and the mud disposed of in a natural pit close to shore. Alteration of location of the main dumping ground for the Zeebrugge channel to a biologically unproductive area in the north-west is under consideration, to improve dispersion, but may not be economical. (No change is expected in aggregate extraction activity.)

10.2 Canada: In the near future relatively small-scale near-shore aggregate dredging operations may commence. Future activity will depend on the new licensing arrangements and resource surveys.

10.3 Denmark: In general aggregate extraction is declining but political pressure to reduce land exploitation may lead to resurgence.

10.4 Finland: See ICES C.M. 1985/E:5.

10.5 France: No change expected.

10.6 Ireland: Maerl extraction on the west coast may commence soon. A study of a small deposit in Bantry Bay will commence shortly; the aim will be to quantify the resource and its rate of production, with the possibility of applying a renewable resource, 'maximum sustainable yield', approach to management. Studies will also be carried

out on the Galway maerl resource by the Zoology Department, University College, Galway, prior to exploitation.

10.7 Netherlands: Several major beach replenishment plans will take place over the next few years as part of routine replenishment cycles (Goeree, near the Hague (2), south of Den Helder (Callantsoog), Texel). The Antwerp approach (W. Scheldt) will be deepened, displacing some 50 Mm^3 of sand per year. The Slufter Plan for disposal of contaminated dredgings in an artificial nearshore island has commenced, (building time 1.5 years) but another proposal, for pumped-storage energy generation using a ring-dyke, is not likely to proceed. An enormous new land programme to the north and south of the Nieuwe Waterweg (Europoort/Rotterdam) is under consideration (Plan Waterman, ca. 3.5 k hectares) but is not likely to proceed in the near future.

10.8 Sweden: Off north-east Gotland extraction of quartz-rich sand-silt is to start during this year. At the Disken area in the Straits of Oresund, increased extraction is planned to provide additional landfill outside Malmo, so the industries can be able to expand there.

In Kattegatt, extraction is planned at Stora Middelgrund close to the midline between Denmark and Sweden. If this project succeeds, the sand and gravel will be sold to Denmark according to Danish wishes.

10.9 United Kingdom: It is expected that demand for marine aggregates will continue to increase and extraction on the east and south coasts is expected to increase to meet the demand. New licence areas are under consideration in the Isle of Wight and Hastings areas in the English Channel; particular conflicts of interest have arisen in the latter case because of the presence of a crab overwintering area but it is hoped these can be resolved through appropriate permit conditions. Studies on the resource and the impact of fines are currently underway. Several beach replenishment and coastal construction schemes are commencing; the construction of the Conwy road tunnel in North Wales will require marine-won aggregates. In total these new projects will require around 5 Mt pa.

10.10 Discussion and conclusions: The Working Group noted the prospective increased demand for marine aggregates and proposals for major coastal engineering projects; it reiterated the importance of assessing the fishery resources likely to be affected so as to avoid conflicts. The need for information exchange between the dredging and fishing industries must be two-way if it is to be effective in this matter.

11. TECHNIQUES FOR REDUCING THE EFFECTS OF MARINE AGGREGATE DREDGING ON FISHERIES

11.1 Few new developments in dredging methods have occurred. De-gassing techniques help to increase the density of silts taken by suction dredging, thereby reducing dispersion during dumping. Similarly, silt may be returned to the sea bed via the suction pipe, but this increases the dredgers idle time at sea and its cost-effectiveness depends on prevailing hydrography and frequency of storms. Where maintenance dredging is concerned, dredging companies are increasingly using disturbance methods to remove lighter uncompacted silts

in order to avoid the need to transport and dump; however this may lead to localized increases in suspended sediments.

11.2 In the UK, Crown Estates Commissioners are assessing the significance of oversanding of gravel deposits by excessive screening at the extraction site. The Working Group was informed that a report on the effects of aggregate extraction on fisheries has been produced in the US by A Hurmi for the Army Corps of Engineers which reportedly concludes that the plume causes few and transient effects.

In the UK, a model developed by Hydraulic Research Ltd for particle transport in estuaries is being adapted to assess the deposition of fines around one proposed gravel extraction area, at Hastings.

11.3 Sea mining for placer deposits is likely to lead to rejection of at least 90% of cargo which is likely to cause far more seabed disturbance than ordinary extraction.

11.4 The Working Group briefly considered possible beneficial interaction between dredging and fishing. A case was cited in the UK (Isle of Wight) where fishermen were opposed to dredging in particular by trailer dredger because of potential loss of gear. They were less opposed to anchor dredging, not only because they feared less loss of gear but also because they thought that the pits left behind might enhance static gear and crustacean fisheries. In some areas, selective removal of certain grain sizes might improve the productivity through changes in the benthic community; large stone, which is usually rejected, might be placed for reef construction. It would be worth exploring trade-offs between possible damage and possible enhancement between fishermen and dredgers.

12. FUTURE ROLE OF THE WORKING GROUP

12.1 The Chairman pointed to items (e) and (f) of the terms of reference (Annex II) which call upon the group to provide advice on technical/policy issues, on management and on research needs.

12.2 The group discussed the coverage of its activities which include

- dredging of sand and gravel, metallic mineral deposits and calcareous deposits for onshore uses;
- dredging and deposition of sand and gravel in beach replenishment and offshore island construction schemes;
- dredging for capital harbour development and new waterway and approach channel schemes, with sea disposal or recovery of spoils;
- maintenance dredging of harbours and channels, with dumping of spoil (including capped disposal at sea).

The group agreed that all these activities can exert a physical impact on marine life and fisheries and may interfere with exploitation of fishery resources. This physical impact should form the group's area of interest; other bodies (ICES Working Group on Marine Sediments in Relation to Pollution and Dumping Convention working groups) were concerned with the chemical impact of dumped spoil.

Dr Parker undertook to circulate recent Oslo and London Dumping Convention guidelines on spoil disposal, which include a section on physical impact.

12.3 The statistical report forms should distinguish between the functions listed in 12.2, in particular avoiding creating any perceptual link between mining and waste dumping activities since the former do not result in contamination.

12.4 The group agreed that its current composition was a good one since it included fishery biologists, ecologists, geologists, dredging engineers and representatives of management or regulatory agencies. The delegates were urged to maintain this balance of membership.

12.5 Standing agenda items for future meetings should include exchange of information on

- publications;
- other ICES activities of relevance (e.g. Benthic Ecology Working Group, Working Group on Marine Sediments in Relation to Pollution);
- other international activities of relevance (e.g. IOC, COST 647).

In addition Dr Pasho agreed to try to provide an overview of recent Japanese programmes of relevance to the Group.

12.6 The Group considered that in response to the terms of reference they should aim to produce a Cooperative Research Report, containing a comprehensive overview of national activities and drawing conclusions leading to guidelines for management where possible. The contents of this CRR would include

- national extraction programmes;
- studies on effects, including case histories, and covering water quality, habitat destruction and recolonization (including damage by fishing activity) as they apply to key target species;
- management mechanisms
  - regulation, assessment and review, controls;
  - planning and information needs; sea use;
  - communication - liaison with other industries;
  - surveillance and monitoring.

It was agreed that the Chairman and Rapporteur should draft a table of contents for circulation, and agreement by the time of the Statutory Meeting. The Group would work by correspondence in 1987 to produce a first set of drafts for a meeting in 1988 (see Action List and Recommendations).

12.7 The Group identified areas requiring further work:

- the basis for establishment of controls on extraction rates;
- methods of assessment of the impact of extraction including cost/effectiveness, time frames and interpretation of the results in terms of consequences to fisheries;
- approaches to enforcement and control (black-boxes);
- beneficial interactions, and impact reduction and repair.

12.8 It was agreed that in the interim period before the next meeting, all member countries should try to initiate research on effects in at least one extraction area and report to ICES.

13. ANY OTHER BUSINESS

There was no other business.

14. RECOMMENDATIONS

The WG adopted the recommendations listed in Annex VII. An action list is appended in Annex VIII.

15. CLOSURE OF MEETING

On behalf of the members, the Chairman thanked the Director of the Rijksstation voor Zeevisserij and his staff, especially Dirk Maertens and Monique Baeteman, for all their assistance in making the meeting run smoothly.

ANNEX I - ATTENDANCE LIST

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ANNEX II - TERMS OF REFERENCE

C. Res. 1985/2:25 A new Working Group on the Effects of Extraction of Marine Sediments (Chairman: Dr S J de Groot) will be established to replace the former Working Group on the Effects on Fisheries of Marine Aggregate Extraction. It will meet for three days in May 1986 at the Station de Pêche Maritime in Ostende, with the following terms of reference:

(a) to update the present status of marine extraction operations and their impact on the marine environment;

(b) to examine the recent results of national research programmes on the effects of marine extraction operations on the marine environment, particularly the influence on fisheries;

(c) to compare the national codes of practice for the control of dredging activities and to evaluate the changes since 1979;

(d) to provide information on activities in the near future and their possible impact on the marine environment and effects on fisheries;

(e) to advise on major issues where an ICES policy is needed;

(f) to make recommendations on management and research, as necessary.

ANNEX III - AGENDA

Welcome by Dr P Hovart, Director, Rijksstation voor Zeevisserij

1. Opening of the meeting

2. Introduction of the members

3. Appointment of Rapporteur

4. Terms of Reference of the WG (C. Res. 1985/2:25)

5. Adoption of the agenda

6. Present state of marine sediment extraction and its impact on the marine environment (1979-present) by ICES member countries

7. An overview of the recent results of national research programmes on the effects of marine extraction operations on the marine environment particularly the influence on fisheries

8. An overview of recent efforts to map the superficial marine sediments by ICES member countries

9. A review of national current licensing regulations and codes of practice for the control of dredging activities and to evaluate the changes since 1979

10. Information on activities in the near future and their possible impact on the marine environment and effects on fisheries

11. Techniques for decreasing the effects on fisheries of marine aggregate dredging

12. The role of the WG in future
    Terms of references (e) "to advise on major issues where an ICES policy is needed"
    (f) "to make recommendations on management and research, as necessary"

13. Any other business

14. WG recommendations

15. Close of the meeting

ANNEX IV - PAPERS TABLED FOR DISCUSSION AT THE MEETING

Agenda point 7

Essink, K., Summary report of Dutch investigations on the effects of sand and shell extraction in the Wadden Sea.

Maertens, D., Present state of marine extraction and scientific control in extraction areas on the Belgian continental shelf.

Maertens, D., The effects of sand extraction and dredging on the bottom fauna of the Belgian continental shelf.

Moor, G. de, Natural and aggregate extraction conditioned sandy shelf sediment dynamics.

Ottmann, F., An overview of the recent results on the effects of marine extraction operations on the marine environment - France.

Agenda point 8

Schüttenhelm, R. T. E., Recent efforts to map superficial marine sediments in the Netherlands sector of the North Sea.

Agenda point 11

Ottmann, F., Techniques for decreasing the effects on fisheries of marine aggregate dredging.

ANNEX V - OFFPRINTS CITED OR MADE AVAILABLE DURING THE MEETING

1. Orlowski, A. (1984). Application of multiple echoes energy measurement for evaluation of sea-bottom type.

2. Anon. (1984). Projectnota/Milieu-effectraport-Grootschalige locatie voor de berging van baggerspecie uit het benedenrivierengebied. Main Report, 1 October 1984, 399 pp.
Bijlagen Ecologie - Invloed van het depot op de ecosystemen van de zee en duinen, nrs. 1-6, 8. Publ. Gemeente Rotterdam Rijkswaterstaat, Openbaar Lichaam Rijnmond.

3. Ottmann, F. (1985). Un problème controverse pour l'environment marin: les dragages et leurs consequences. MS, Laboratoire de Géologie Marin et Appliquée, Université de Nantes, Institut des Sciences de la Nature.

4. Lahuec, G. (1975). Dragages en mer: quelques problèmes géologiques. Bulletin de Liaison des Laboratoires des Ponts et Chaussées, 75, 26-29.

5. Ottmann, F. and Lahuec, G. (1972). L'amelioration de l'équivalent de sable lors de dragages et de remblaiements hydrauliques. Bulletin de Liaison des Laboratoires des Ponts et Chaussées, 60, 117-123.

6. Ottmann, F. and Lahuec, G. (Undated). Dredging and geology, Terra et Aqua, 11, 9 pp.

7. Ottmann, F. and Boutmin, G. (1984). Problèmes géologiques lies aux impacts de l'extraction des granulats sur le milieu marin. Bulletin of the International Association of Engineering Geology, 29, 311-314.

8. van der Veer, H. W., Bergmann, M. J N. and Beukema, J. J. (1985). Dredging activities in the Dutch Wadden Sea: effects on macrobenthic infauna. Netherlands Journal of Sea Research, 19, 183-190.

9. Brakel, J. (1985). Dredging developments in the Canadian Arctic. Terra et Aqua, 29, 10-15.

10. de Jonge, V. N. (1983). Relations between annual dredging activities, suspended matter concentrations, and the development of the tidal regime in the Ems Estuary. Can. J. Fish. Aquat. Sci, 40 (Suppl. 1), 289-300.

11. Marquenie, J. M. (1985). An evaluation of dredging in the Western Scheldt (The Netherlands) through bioassays. TNO Report No. R85/075 (Order No. 12878).

12. Waterman, R. E. (1986). A new coastline for Southern Holland. Land and Water International, 57, 3-10.

13. Berggren, H. (1985). Storage site for polluted harbour silt should rid Rotterdam from tricky problem. Rotterdam Europoort Delta, 5, 8-13.

14. Hovers, G. and Orlovius, V. (1985). Unterhaltzungsbaggerungen in den seewärtigen Zufahrten zu den Seehäfen der Bundesrepublik Deutschland. Schiff & Hafen/Kommandobrücke, 37, 59-65.

15. State of New York (1985). Sand Mining Program. Public Letter from Joseph Stellato, Office of General Services, Executive Department, State of New York, and Program description, 25 pp. [Available from Dr J B Pearce, US NMFS, Wood's Hole.]

16. Kiørboe, T. and Mohlenberg, F. (1982). Sletter havet Sporene? En biologisk undersøgelse af miljøpåvirkninger ved ral-og sandsugning Miljøministeriet, fredningsstyrelsen, 96 pp. ISBN 87-503-4247-9. [Effects on marine ecology and fisheries of sand and gravel extraction.]

17. Christiansen, H. and Pedersen, J. K. (1984). Ral-og sandsugerne. Miljøministeriet, København.

18. Heip, C. and Polk, P. (1985). Biological processes and translocations. Action de Recherche Concertées Rapport Final, 3, 226 pp.

19. Augris, C. and Cressard, A. P. (1984). Les granulats marins. Publ. Centre National Exploitation des Océans (CNEXO). Rapp. scient. techn., 51, 1-89.

20. Drinnan, R. W. and Bliss, D. G., 1986. The UK experience on the effects of offshore sand and gravel extraction on coastal erosion and the fishing industry. Draft report being prepared under the Canadian Nova Scotia Mineral Development Agreement. Canada Oil and Gas Lands Administration, Ottawa, Canada.

21. Herbich, J. B. (1985). Environmental effects of dredging - the United States' experience. The Dock and Harbour Authority, 66, 55-57.

22. Pasho, D. W. (1986). The United Kingdom offshore aggregate industry: a review of management practices and issues. Final draft - Canada Oil and Gas Lands Administration, Ottawa, Canada, January 1986.

23. Riddell, J. (1986). Dredging - a new awareness. The Dock and Harbour Authority, 66, 58-59.

24. Vanosmael, C., Willems, K. A., Claeys, D., Vincx, M. and Heip, C. (1982). Macrobenthos of a sublittoral sandbank in the Southern Bight of the North Sea. J. mar. biol. Ass. U.K., 62, 521-534.

25. Willems, K. A., Vincx, M., Claeys, D., Vanosmael, C. and Heip, C. (1982). Meiobenthos of a sublittoral sandbank in the Southern Bight of the North Sea. J. mar. biol. Ass. U.K., 62, 535-548.

26. Willems, K. A., Vanosmael, C., Claeys, D., Vincx, M. and Heip,C. (1982). Benthos of a sublittoral sandbank in the Southern Bight of the North Sea: general considerations. J. mar. biol. Ass. U.K., 62, 549-557.

27. Sind (1980). Grus och sand på land och hav. ISBN 91-38-05383-7 ISSN 0346-5748.

ANNEX VI - MARINE AGGREGATE EXTRACTION IN THE ICES MEMBER COUNTRIES, 1979-84 (the amounts are expressed in 10^6 m^3, assuming 1 m^3 = 1.8 tonnes for sand and gravel. * = estimated)

	1979	1980	1981	1982	1983	1984
Belgium						
Sand	1.97	3.49	5.90	3.10*	3.10*	>0.5
Canada						
Sand and gravel	6.0	4.4	7.5	7.8	2.8	
Denmark						
Sand	6.905	5.984	2.934	3.306	3.744	
Gravel					0.017	
Calcareous material					0.113	
Finland						
Sand			0.5	0.5	1.0	
Gravel		+				
France						
Sand and gravel		2.053	2.110	2.310		
Calcareous material		0.482	0.498	0.525		
West Germany						
Sand, North Sea				0.85	1.31	2.51
Sand and gravel, Baltic	0.106	0.022	0.138			0.202
Iceland						
Sand	0.106	0.145	1.311		0.368	0.390
Gravel		0.096	0.317		0.245	0.260
Calcareous material		0.110	0.628		0.107	0.115
The Netherlands						
Sand, North Sea	2.707	2.865			2.21	
Sand, Waddensea	7.2	6.5	3.9	1.8	3.7	7.0
Sand, Western Scheldt	4.5	4.5	4.5	4.5	4.5	4.5
Calcareous material, Waddensea	0.087	0.11	0.11	0.12	0.12	0.13
Poland						
Gravel	+	+	+	+	+	+
Sweden						
Quartz sand	0.043	0.112	0.019	0.029	0.003	0.012
Channel maintenance/quartz sand	0.02	0.023	0.003	0.012	0.046	0.061
Landfill	0	0	0.53	0.10	0.003	0.039
England and Wales						
Sand and gravel	9.7	9.4	8.1	8.1	8.4	8.6
Fill material	0.5	0.5	0.7	1.1	0.6	0.7
USA						
Sand)		1.88	0.022			
Gravel)						

ANNEX VII - RECOMMENDATIONS

1. In order to avoid conflicts over utilization of fishery and mineral resources, member countries should

   (a) develop data bases of these resources which can be used to identify areas of overlap or conflict,

   (b) develop communications and liaison between fishermen and dredgers to resolve problems locally.

2. Member countries should carry out research in at least one aggregate extraction area to assess the effects on the local ecology and fisheries, and report to ICES on the results.

3. The Benthic Ecology Working Group should be asked to consider methods for assess ing the impact of dredging on benthic communities and production.

4. The current form for reporting on aggregate extraction should be replaced by a version to be tabled at the ICES Statutory Meeting, after agreement of WG members by correspondence .

5. A 'special topic' session on the interactions between fisheries and mineral exploitation should be held at the Statutory Meeting, 1988.

6.1 The Working Group should prepare a Cooperative Research Report that (a) will provide an overview of current actvity and research in this field and (b) will draw conclusions concerning management of resource use conflict and suggest guidelines. The WG should work by correspondence during 1987 to prepare a first draft in 1988.

6.2 The WG should meet to consider these drafts in May 1988 [in Galway, Ireland] under the Chairmanship of Dr S J de Groot (Netherlands) and also to consider in particular

   1. national extraction activity, 1986-88 and future plans;

   2. reports of national research programmes;

   3. the scientific basis for control of extraction rates for sand, gravel and calcareous deposits;

   4. methods for assessment of impact of dredging activity;

   5. control of dredging activity (including black-box recorders);

   6. beneficial interactions between mineral and fishery resource exploitation.

6.3 The WG should work by correspondence after this meeting to prepare the final draft for completion at a meeting in 1989.

6.4 It is recommended that the WG continue to include not only biologists and geologists but also representatives of the regulatory agencies concerned and dredging engineers, and that when a final draft of the Cooperative Research Report is available, a meeting should be sought to discuss its contents with the dredging industry.

ANNEX VIII ACTION LIST

1. Revised Report Formats

Dr Scarratt will prepare new draft report formats and send them to the Rapporteur for circulation with the draft WG report.

All members should submit comments, via the Rapporteur, by the end of July.

Dr Scarratt will revise the formats and send a final version to the Chairman by the end of September for discussion at the Statutory Meeting.

2. Outline of contents of Co-operative Research Report

The Chairman and Rapporteur will prepare a draft set of contents for the Co-operative Research Report, to be circulated with the draft Working Group Report.

All members should submit comment to the Rapporteur by 1 September, indicating sections on which they could take a lead in preparation.

Chairman and Rapporteur will prepare a second draft of the contents for circulation during the ICES Statutory Meeting and Council approval.

Appropriate Members will prepare sections for presentation once Council Approval has been given, for presentation at the next meeting (May 1988). The deadline for submission will be 1 March 1988 but if possible sections should be sent to the Rapporteur for circulation prior to this date.

3. Information papers for the next meeting

D Pasho - Overview of recent Japanese programmes on aggregate exploitation.

D Scarratt - Outcome of a Canadian Workshop on standardization of measurements on superficial sediments.

G Ottevanger - Use of black-boxes in control of dredging activities.

I Cato - Studies on the new extraction area north of Gotland.

M Parker - Recent Oslo and London Dumping Convention reports and guidelines on dredged material disposal.

All members - Research reports on effects of exploitation at at least one dredging area.