International Council for the
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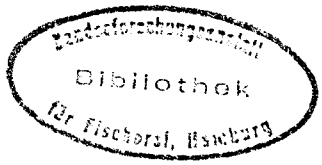
CM 1991/N.1
Report of Activities



MARINE MAMMALS COMMITTEE

by

P.J.H. Reijnders

1990

BELGIUM

C. Joiris

A cooperative scheme was started in 1990 in order to collect marine mammals and seabirds found dead along the Belgian coast. The aim is to provide information on the health status (anatomy pathology, parasitology, microbiology and virology) to determine the cause of death (coordination: Prof. F. Coignoul Veterinary School, Liège, in complement to the activities of Dr. Vet Van Gompel).

The study will continue in 1991, and be complemented by ecotoxicological determinations (organochlorines, heavy metals, Se, metallothioneins. (C.C. Joiris, Brussels and J.M. Bouquegneau, Liège)

CANADA

W.D. Bowen & K. Ronald

SEALS

In March 1990 I-H. Ni and G. Stenson conducted photographic and visual aerial surveys to estimate pup production of harp and hooded seals off the coast of southern Labrador (the 'Front'). they are also continuing studies on stomach content analysis, vital parameters and morphometrics of harp, hooded, grey, ringed, and bearded seals. J. Brattey is continuing his studies on parasitic loads of pinnipeds and J. Hellou is examining concentrations of Poly-aromatic hydrocarbons (PAHs) in pinnipeds and cetaceans. G. Stenson is conducting a cooperative study with J. Lien (MUN) and J. Chardine (Canadian Wildlife Services) to estimate levels of incidental catches of marine mammals and sea birds in fishing gear. In 1990 this study focused upon a comparison of methods of reporting by-catch and the bias inherent in the various methods. A study of entrapments of small cetaceans in experimental salmon drift netting was also conducted. A study of the biology of harbour porpoise in Newfoundland was initiated in 1990 and will continue in 1991. (G. Stenson, I. Ni, Department of Fisheries and Oceans Northwest Atlantic Fisheries Centre).

Grey seals

In January-February 1990, 9675 grey seal pups were tagged on Sable Island in the final year of complete cohort tagging. In addition, an aerial photographic survey was conducted to allow comparison of this method of enumerating pup production with complete cohort tagging. Resighting surveys of brand-marked grey seals were again conducted at regular intervals over the breeding season to extend the 12 year time series which includes more than 400 individual animals.

To study the energetic cost of reproduction, 10 mothers and their pups were recaptured 4 times during the 16 day lactation period. These longitudinal data will be used to estimate changes in milk composition, milk intake (based on isotope dilution), the relationship between milk intake and growth, and the biochemistry of lipid mobilization and deposition.

Harbour seals

Complete production (567 pups) was again tagged on Sable Island, thus extending the time

series to 12 years. In addition, 99 female and 99 male pups were branded to provide longitudinal data on recruitment, survivorship, and age related changes in reproductive success.

Sixteen harbour seal mothers were equipped with time-depth recorders and given deuterium oxide to study maternal attendance, diving activity, and food intake during lactation. Body composition at the beginning and end of lactation was determined using isotope dilution. Additional studies of total metabolism and nitrogen turnover in mothers and pups during lactation were also completed using three isotopes. (W.D. Bowen, W.T. Stobo, Bedford Institute of Oceanography)

Grey Seals

An energetics study of grey seal mother-pup pairs is being conducted including estimates of mass transfer and the diet of lactating grey seals in the pack ice of the southern Gulf. Work is continuing to refine estimates of pup production. A study is underway on mass loss and the activity budget of male grey seals on the pack ice, and work on the grey seal diet through stomach collection is continuing, but at a reduced rate due to funding shortages. Work has continued on analyzing survey and tag data obtained in January 1990 to generate an estimate of pup production. (M.O. Hammill)

Harp seals

Surveys were made in the Iles-de-la-Madeleine area of harp seal and hooded seal pup production. (M.O. Hammill, Maurice Lamontagne Institute)

Harbour seals

Necropsis were performed necropsies on four fresh water harbour seals taken in the Seal Lakes of Northern Quebec. These animals were taken incidentally in fresh water nets set by a group contracted by Hydro Quebec as part of their studies there. (Thomas Smith's group from the Arctic Biological Station)

CETACEANS

Studies have been completed, in collaboration with colleagues at the Pathology Department, University of Guelph, of the dynamics of tooth growth in white whales which had previously been injected with tetracyclines. Single teeth removed from live captured animals contain a fluorescent band (detected under ultraviolet light) which marks the time of drug injection and the rate of succeeding dentine deposition. The rate of deposition can be used to define annual growth cycles as an index of age, an important parameter and one which is highly controversial in the field of population dynamics and growth. The findings indicate that more than one, and likely two layers, are deposited annually. (P. Brodie, Department of Fisheries and Oceans Bedford Institute of Oceanography)

Harbour porpoise

A trial survey by boat was made by Michael Kingsley off the Gaspe Peninsula and in the Baie des Chaleurs, from 16 to 31 July, 1990. A more quantitative analysis of these preliminary data is planned for next year, as well as another pilot survey in the northern Gulf, off Anticosti Island.

A questionnaire as to the incidental by-catch of harbour porpoise by Quebec fixed-gear fishermen was carried out. Initial actions have been taken to repeat the questionnaire survey among the fixed-gear fishermen of northern New Brunswick, northern Nova Scotia, and western Newfoundland, with the intention of completing the estimate of by-catch for the whole of the St. Lawrence Gulf area.

Four carcasses were obtained from this by-catch for necropsy.

Arrangements have been made to start collaborative work with the University of Guelph on the differentiation of the stocks by genetic means, and the comparison of organochlorine levels of porpoises from the collections of different areas. (Maurice Lamontagne Institute)

Whitesided dolphin

Sixteen whitesided dolphins were necropsied. These animals had stranded singly over a 12 week period, and the histological investigation is still under way. The study of stranded cetaceans is expanding at AVC, and as many as possible are investigated on Prince Edward Island and elsewhere in the Gulf of St. Lawrence area. (Pierre-Yves Daoust of the Atlantic Veterinary College (AVC)at Charlottetown, Prince Edward Island)

Large whales

A report on a study of trends in distribution of fin, minke and humpback whales in the Mingan Island area of the Gulf of St. Lawrence was prepared and submitted to the Department of Fisheries and Oceans. (Richard Sears, Mingan Island Cetacean Study)

Beluga Whales

Under contract of the St. Lawrence Action Plan. Dead cetaceans stranded on the shores of the St. Lawrence River and Gulf as far as the western coast of Newfoundland have been collected. Over the three year period that the program has been operating, 25% of the animals collected have been beluga whales. Pathological analysis has been carried out to determine contaminant levels in blubber, muscle and some organs. The various heavy metals and organochlorines are of particular interest in this analysis. (Pierre Beland, St. Lawrence National Institute of Ecotoxicology)

Also under funding of the St. Lawrence Action Plan, aerial surveys were flown to estimate the seasonal distribution of the beluga, data being gathered for the first time of their winter range. Observations were solicited from the crews of ferries and other boats which regularly ply the St. Lawrence River and Gulf for whale sightings, and interviews were recorded with retired

fishermen and lighthouse keepers on the presence of beluga whales near their former work stations on the lower St. Lawrence. These two surveys will result in published reports.

Five belugas were captured and tagged with satellite transmitters in Cunningham Inlet, North West Territories, and these animals were subsequently tracked for periods of up to two months. As part of a continuing behavioral study on beluga, observations were carried out from mid-July to mid-August in Cunningham Inlet and estuary. (Thomas Smith)

Beluga samples collected earlier were examined for genetic differences and, with ring seals, for lipid differences related to stock identification. Contaminants analysis of tissues from these beluga was completed and 2 papers submitted for 1991 publication. Samples of beluga taken in a savsat near Tuktuyaktuk in 1989 were received and subdivided for mixed function oxidase and related analyses. Studies continued on beluga vocalizations in the western and high Arctic and the development of techniques to locate sound sources.

A program on bowhead was initiated in the western Arctic to develop biopsy techniques, text sonic tags and develop DNA analytic methods. (Winnipeg)

In the western Arctic, monitoring of the beluga harvest continued, while in the eastern Arctic, the population dynamics of beluga were studied using satellite telemetry, aerial survey and mark-recapture techniques. In addition, the narwhal harvest in the Lankaster Sound area was monitored. (P. Richard, P. Weaver, J. Orr, R. Moshenko, B. Dunn, Winnipeg Habitat Management Directorate)

Research centres on factors underlying natural mortality in marine mammals. Topics include the effects of algal toxins, petroleum hydrocarbons, polychlorinated compounds, and microbial and parasitic disease. Ongoing investigation on marine mammal strandings has provided insight into the life history of pinnipeds and cetaceans along the Atlantic and Arctic coasts of Canada and the United States. Studies on secretion and control of thyroid and adrenal hormones in small odontocetes have set the stage for a better understanding of the dynamics of these endocrines during stress and disease. (University of Guelph, J.R. Geraci, D.J. St. Aubin)

J. Lien and associates (MUN) are involved in a number of avenues of research related to the biology of cetaceans and interactions with commercial fisheries. Current research topics include a study of the level of entrapments of large cetaceans in fishing gear, the acoustical detectability of fishing gear by cetaceans, ice entrapments of blue whales, methods of propulsion in cetaceans, and the development of a photo-identification catalogue of cetaceans.

A study of food selection using stable isotope analysis was also continued. A joint MUN/DFO stranding and sighting network was maintained . (J. Lien, Memorial University)
Population models of blue and humpback whales in the northwest Atlantic were develope. (H. Gaskill, MUN)

Walruses

Boat surveys were carried out in the Salisbury and Nottingham Islands areas of Hudson Strait, for potential walrus haul-out sites. (T. Smith's group at the Arctic Biological Station)

Marine mammals purchased from native hunters of western Hudson Strait and northeastern Hudson Bay, were sampled as part of the continuing studies in this area.

Marine Mammals Lost to Fishing Gear and Strandings. A study of the different types of fishing gear which are involved in the accidental by-catch of small cetaceans was completed. The report also details an intervention plan for stranded marine mammals (both alive and dead), for those animals found suffering from harassment, caught in savsatts, and those which have strayed from their normal migration range. (Guy Bourassa for the Department of Fisheries and Oceans, Quebec Region)

Ringed seal behaviour and distribution were examined in Resolute Passage in March-June. A collection of ringed seal tissues for future contaminants analysis was started in Pangnirtung in September, to continue for 12 months.

Walrus in Foxe Basin were the subject of a study to determine population structure and thermal profiles for remote sensing. Analysis for metals contamination were initiated on walrus tissues collected in 1987 and 1988 in Foxe Basin and Frobisher Bay. (R. Stewart, Winnipeg, Science Directorate)

An aerial survey was conducted to estimate the size of the Hudson Bay-Fox Basin walrus population. (Fisheries and Habitat Management Directorate, Winnipeg)

During 1990, further studies were conducted on the energetics and diving behaviour of harp seals, hooded seal social behaviour and energetics, harbour seal haul-out patterns, phocid vocalizations, and maternal investment by otariids and odobenids. (K. Kovacs, University of Waterloo)

The ultrastructure and biochemistry of hooded seal platelets were described, as well as the role

of platelets in normal haemostasis and pathological atherscelerosis. Pinnipeds were used as a model to study the dietary effects of marine seals on circulatory mammalian thrombocytes. The fatty acid and physiopholipid compositions of hooded seal platelets were found to be similar to those of other northern phocids, as well as Greenland Inuits and North American or Europeans consuming a diet rich in seal or fish oil. (J.A. Miller and K. Ronald)

The second supplement of the pinniped bibliography, entitled "An Annotated Bibliography on Seals, Seal Lions and Walrus (Pinnipedia)" is ready for final proof and will be published by ICES in 1991. (K. Ronald, B.L. Gots, J.D. Lupson, C.J. Willings, and J.L. Dougan)

In co-operation with Fisheries and Oceans Canada, the effect of the chemosterilant Depo provera on grey seal ovulation was evaluated. (K. Ronald, A. Seely, and L. Noonan)

A monograph on the care and maintenance of captive phocids (7 species) is in preparation and will be based on the 25 years that seals have been under experimentation at Guelph. (K. Ronald, H. Pedersen, and A. Seely)

Ongoing studies on the metabolic rates of captive harp and harbour seals, mating strategies in wild harbour seals, mother/pup interactions in harp and hooded seals, non-vocal communication in grey seals, and differential maternal investment in harbour seal pups were continued. (D. Renouf and associates, Memorial University)

DENMARK

F. O. Kapel

SEALS

Research on pinnipeds was carried out by: the Salt Water Aquarium (SWA), DK-6700 Esbjerg; by Ornis Consults ApS (OC), Vesterbrogade 140, DK.1620, Copenhagen V; by the National Forest and Nature Agency (NFN), Ministry of Environment, Slotsmarken 13, DK-2970 Hørsholm; by the Greenland Home Rule Administration (GH), Sjæleboderne 2, DK-1016 Copenhagen K; and by Greenland Fisheries Research Institute (GF), Tagensvej 1351, DK-2200 Copenhagen N.

Harbour seal

During systematic surveys of Danish beaches (900 km) in February-March, a small number of stranded harbour seals were found (OC).

Aerial surveys were carried out in late August 1990 for all seal localities in Danish waters, except those in the Wadden Sea. The Limfjorden and Kattegat areas were surveyed in three days, the southeastern localities were covered in five days. Results will be published together with data obtained from similar surveys in 1991 (NFN).

In the Danish part of the Wadden Sea, the monitoring of harbour seal was intensified through a coordinated project on population parameters in the International Wadden Sea. The Danish part of the population indicates an increase of appr. 10% to a maximum number of 1050 in 1990. As part of a coordinated telemetry program in the International Wadden Sea, five harbour seals were tagged with a transmitter in the Danish part of the area, and will be tracked until next year. (S. Tougaard, SWA)

Results of analyses of the mass dying of seals in 1988 was published in 1990. (T. Härkönen and M-P. Heide-Jørgensen, for NFN)

Harp seals

The analyses of the feeding habits of harp seals during their stay in West Greenland waters were continued in 1990, and a report on the results from examining a total of 871 stomachs was concluded.

Additional material of harp seal stomachs was collected in May-June 1990 in Southwest Greenland (appr. 130 samples), and in August in Upernavik district, Northwest Greenland (appr. 30 samples). A preliminary examination of the stomach contents does not seem to change the above mentioned analyses significantly. (L.A. Angantyr and F.O. Kapel, GF)

Walruses

Aerial surveys of Atlantic walrus (*Odobenus rosmarus rosmarus*) were conducted in Central West Greenland in early April 1990. A total of 13 groups representing 24 walruses were recorded, resulting in an estimate of abundance at about 300 animals on the wintering grounds (not corrected for non-observed animals at the surface or submerged walruses). This result supports the findings from previous surveys (in 1981, 1982, and 1984), that the number of walruses wintering in Central West Greenland is probably less than 1000 animals. (E.W. Born, GH)

In continuation of the work initiated in 1989, six adult male walruses were successfully immobilized at Lille Snenæs (Dove Bay, Northeast Greenland), and satellite transmitters deployed on the tusks in the period 30 July to 23 August. Five of the six transmitters were still active by the end of October, two by mid-January 1991. (E.W. Born and L.Ø. Knutsen, GH)

WHALES

Research on cetaceans was carried out by the Zoological Museum (ZM) and the Institute of Cellbiology and Anatomy (ICA), Universitetsparken 15, DK-2100 Copenhagen Ø; by Ornis Consults ApS (OC), Vesterbrogade 140, DK-1620 Copenhagen V; by the Museum of Natural History (NMF), Fútalág 40, FR-100 Tórshavn, Faroe Islands; by the University of the Faroe Islands (UF), Nóatún, FR-100 Tórshavn, by the Fisheries Department of the Faroese Government (FDF), Tinganes, FR-100 Tórshavn; by Greenland Environmental Research Institute (GE), Tagensvej 135^4, DK-2200 Copenhagen N; and by Greenland Fisheries Research Institute (GF), Tagensvej 135^1, DK-2200 Copenhagen N.

CETACEANS

Small cetaceans in Danish waters

A number of ship-based surveys were carried out in February, March and August in the North Sea, the Kattegat and the Baltic Sea. Seabirds and marine mammals were observed during a total of about 300 km of line transects. Harbour porpoises (*Phocoena phocoena*) as well as

flocks of killer whales (*Orcinus orca)* and white-beaked dolphins (*Lagenorhynchus albirostris*) were seen (OC).

In February and March 1990, systematic surveys of oil pollution and stranded animals were carried out. About 900 km of beach was surveyed twice, and a small number of stranded harbour porpoises and white-beaked dolphins were found. Four stretches of beach were surveyed monthly, and few porpoises were found dead (OC).

Sightings, strandings, and by-catch data were collected for all cetacean species occurring in Danish waters, with special emphasis on the harbour porpoise. Between 1 March 1990 and 28 February 1991, 39 harbour porpoises, 4 white-beaked dolphins, 1 killer whale, and 1 sperm whale (*Physeter macrocephalus*) were examined, and skeleton and soft tissue samples were incorporated in the collection of the Zoological Museum, Copenhagen. A special project on the management and conservation of the harbour porpoise was concluded. (C.C. Kinze, ZM)

A special study on the reproduction of the harbour porpoise was carried out. (T.B. Sørensen, ICA)

A project on the intraspecific variation and distribution of white-beaked and white-sided dolphins (*Lagenorhynchus acutus*) was continued. (M. Mikkelsen, ZM)

Small cetaceans in Faroese waters

Sightings, strandings, and catch/by-catch data were collected for all cetacean species occurring in Faroese waters. A total of 916 long-finned pilot whales (*Globicephala melas)* from 11 different schools were taken in 8 different whaling bays in 1990. Atlantic white-sided dolphins (*Lagenorhynchus acutus*) were mixed with one of the schools. All the long-finned pilot whale schools were sexed systematically by the assessors, and the skinn values were recorded for further research (for skin values: see Bloch and Zachariassen 1989). Biological samples were collected from two schools in September. (NMF, UF, FDF)

55 Atlantic white-sided dolphins were beached, 5 in connection with a pilot whale drive in Fámjin, July 17, and 50 in Kolla-fjørdur, August 10 (FDF).

Five harbour porpoises (*Phocoena phocoena*) were caught from which samples were collected (NMF, UF).

Small cetaceans in Greenland waters

The collection of samples from the inuit catch of white whales (*Delphinapterus leucas*) and narwhals (*Monodon monoceros*) was continued in 1990. A total of appr. 160 and 15 samples was collected in West and East Greenland, respectively.

In April 1990, an aerial survey of white whales wintering in Central West Greenland indicated a significant decline in abundance compared to surveys conducted in the same area in 1981 and 1982. A contributory factor could be an unusual large ice entrapment ('sassat') in the Disko Bay in February 1990: an estimated 500 white whales were taken, and an unknown number struck-and lost. (M-P. Heide-Jørgensen, GF)

A joint program on satellite tracking of narwhals was initiated by GE and GF. (R. Dietz and M-P. Heide-Jørgensen)

A test program on an elastic flipper tag for toothed whales was conducted jointly by GE, GF. (R. Dietz, M-P. Heide-Jørgensen) and Duisburg Zoo, Germany)

Large cetaceans in Faroese waters

A minke whale (*Balaenoptera acutorostrata*) was seen by a local fisherman close to the shore on 1 May. It was marked on the left side with an orange tag, possibly in Lofoten, Norway, either in the summer 1988, or the summer 1989 (NMF).

In the summer of 1990, an unusually high number of large whales were seen close to the islands as well as offshore, e.g. a blue whale (*Balaenoptera musculus*); humpback whales (*Megaptera novae-angliae*) twice (1+7); fin whales (*Balaenoptera physalus*) five times (1-5); minke whales (*B. acutorostrata*) seven times (1-3); sperm whales once (5); northern bottlenose whale (*Hyperoodon ampullatus*) once (3); and killer whales (*Orcinus orca*) twice (2+4) (NMF).

A very rotten sperm whale stranded in December 1989, and another one in 1990. One tooth was collected for age determination from both of these, as well as teeth from those which have stranded previously, one in 1987, and one of two stranded in 1988 (NMF).

Large whales (*Balaenopteridae*) in Greenland waters

Aerial surveys were again carried out in West Greenland in July-August 1990 with the purpose of assessing the stocks of minke and fin whales (*Balaenoptera acutorostrata* and *B. physalus*). (F. Larsen, GF)

Collection of material for identification of individual whales -by photographs as well as by

skin biopsy - was continued in West Greenland waters as well as in the Caribbean Sea. (F. Larsen and P. Palsbøll, GF)

GENERAL STUDIES

In the Faroe Islands, samples were collected in September from two schools of long-finned pilot whales (*Globicephala melas*) for investigation of dioxin contamination and the amount of valerian acid in the melon of the whales. (NMF)

Statistical analysis and publishing of results from the project "Heavy metals in the Greenland Marine Environment", have continued (GE).

A joint program on polychlorinated hydrocarbons in belugas has been initiated by GE, GF and the Freshwater Institute, Winnipeg, Canada.

GE has served as a secretariat for the Danish contribution to "State of the Arctic Environment Report". The report was carried out in connection with the Finnish Initiative on Protection of the Arctic Environment. Consultants from LGL Ltd, Canada, and Ødegaard & Danneskiold-Samsøe ApS, Copenhagen, were involved in preparation of the report on underwater noise.

FINLAND

O. Stenman

SEALS

Baltic grey seal *(Halichoerus grypus)*

Research on grey seal continued for the fifth year in succession as an Finnish-Swedish joint project supported by the WWF. By the end of the year the Finnish part published a final report on its work. In Finland the grey seal numbers in summer were as follows: 600-850 in the southwestern archipelago, 40-50 in the Gulf of Finland and 25-50 in the Gulf of Bothnia. In total this makes roughly one third of the whole Baltic population. Due to exceptionally limited ice-cover, the pup production of this population could be assessed more accurately than ever before by Estonian, Finnish and Swedish researchers. The results of pup surveys indicated that at least 600 pups were born in the Baltic. Of these 240 were tagged. One of the recoveries came outside of the Baltic. All the 25 individuals drowned in fishing gears or found dead in Finland were studied for pathology and sampled for analyses of environmental contaminants.

Baltic ringed seal *(Phoca hispida botnica)*

The joint project mentioned before also included research on ringed seal. The lowest figure for the ringed seals that could be counted on the ice in spring was estimated to 5000-6000 for the whole Baltic. From calculations of size, structure and reproductive capacity of this population it can be concluded that about 1000 pups were born. Of these only 16 could be tagged. Studies on age structure and occurrence of occlusions in females of reproductive age in the Bothnian Bay population continued as well as analyses of organochlorine compounds.

Eero Helle and Olavi Stenman, Game Division of the Finnish Game and Fisheries Research Institute, and a working group consisting of researchers from the universities of Helsinki and Turku, the State Veterinary Medical Institute, the Institute of Marine Research and the Technical Research Centre of Finland.)

Saimaa ringed seal *(P.h. saimensis)*

The population, amounting to 150-180 specimens at present, was again monitored extensively. Estimation of the population size relied mostly on a count of winter lairs and that of reproductive success on the number of birthlairs among them. Specimens found dead were studied for pathology and environmental contaminants. Detailed field studies on the ecology

and behaviour of a sub-populations were continued. (The research and conservation work was carried out by a specialist group within the WWF, operating chiefly at the Department of Biology, University of Joensuu, and led by Heikki Hyvärinen.)

FRANCE

R. Duguy

PHOQUES

Les deux espèces de phoques qui se trouvent sur les côtes de Manche et d'Atlantique ont fait l'objet d'une surveillance suivie qui a permis de collecter 162 observations d'animaux (isolés ou en groupes), dont 26 *Phoca vitulina*, 71 *Halichoerus grypus* et 65 indéterminés. La prospection a été plus particulièrement intensifiée dans les zones où la présence de groupes permanents s'avère confirmée: en baie de Somme et baie des Veys (Manche) pour *P. vitulina*, dans l'archipel de Molène-Ouessant (Finistère) et aux Sept-Iles (Côtes d'Armor) pour *H. grypus*.

Dans le cadre du programme des sauvegarde des jeunes phoques, soutenu par le WWF, 21 jeunes ont été mis en soins et 11 relâchés après double marquage (marques du Sea Mammal Research Unit et plaque sur la nuque, série de Brest). Aucun phoque autopisié n'a montré les signes d'une atteinte par le PDV; toutefois, la vaccination avec le vaccin Solvay a continué à être pratiquée chez les animaux relâchés. Une étude des paramètres sanguins chez les jeunes mis en soins a été entreprise et des prélèvements des sang conservés à -70° ont été stockés en banque de données (Océanopolis, Brest) en vue d'un programme de génétique. Par ailleurs, les résultats de nos recherches sur l'intoxication par ingestion d'hydrocarbures ont fait l'objet d'une publication.

CETACES

Les observations de cétacés échoués ou capturés accidentellement sur nos côtes ont continué à être systématiquement collectées et s'élèvent, en 1990 à 467 (464 Odontocètes et 3 Mysticètes). Ces données sont stockées en informatique au Musée Océanographique de la Rochelle ainsi qu'au Secrétariat Faune-flore du Museum National. D'autre part, les observations de cétacés en mer ont également été préparation. Un programme de recherches sur *Tursiops truncatus* est poursuivi dans les trois secteur où la présence de groupes est permanente: dans le golfe normano-breton, dans l'archipel de Molène-Ouessant et dans le bassin d'Arcachon.

Les échouages de *Stenella coeruleoalba*, anormalement élevés en Méditerranée, ont donné

lieu à des prélèvement qui ont confirmé une origine virale (Laboratoires Kennedy à Belfast et Osterhaus, à Utrecht).

En ce qui concerne les Terres Australes et Antarctiques françaises, les observations sur *Cephalorhynchus commersonii* se poursuivent et une étude comportementale des orques aux îles Crozet est en cours.

FEDERAL REPUBLIC OF GERMANY

H. Benke & R. Lick

SEALS

Harbour seals

A sries of aerial counts of harbour seals in the waddensea of Schleswig-Holstein and Lower Saxony were carried out with a higher frequency between the mid of may and late august. These censuses revealed a stock size of about 2.000 individuals in Schleswig-Holstein and about 1.600 in Lower Saxony. That means an overall growth rate of about 14,4%. Reproduction rates were calculated as 22,5% and 21,4% respectively, also indicating an improvement compared to 1989 (ref. figures 13,0% and 16,3%).

At the same time, the mortality rate in Schleswig-Holstein is still unusually high: 66 harbour seals were investigated at the Univerity of Kiel. Because of logistical problems, this figure most probably only represent a part of the entire amount of animals washed ashore. First results of virological studies have shown that the Phocine Distemper Virus is still resident in the population and incidentally causes letal diseases. Thus, the mortality rate is still higher than before 1988.

Several studies on the cause of the epidemic in 1988/89 have been continued mainly emphasizing on the impact of organochlorids on the immunesystem of seals. Histopathological investigations, presented at a scientific meeting in Kiel on August 30/31 1990 revealed chronical damages of the thyreoidea of seals already before the epidemic.
In addition, several observations in the wild have been conducted to estimate the role of disturbances caused by touristical use of the seals' habitat. This study is part of an ecosystem research programm in the Schleswig-Holstein waddensea. (G. Heidemann & J. Schwarz)

The international cooperative project on population biology of harbour seals in the international Wadden Sea was continued. The aim of the joint project is to carry out a comprehensive study on population parameters. Parameters, relevant for population dynamics, will be ascertained along with the telemetric establishment of movements, migration and diving-patterns in the four parts of the Wadden Sea of Denmark, Schleswig-Holstein, Lower Saxony and the Netherlands. On the basis of the results of the studies a joint conservation and management plan of the seal population shall be established. (G. Heidemann, S. Vogel & J.

Schwarz, University of Kiel; E. Vareschi & I. Traut, University of Oldenburg; P. Reijnders & E. Ries, Research Institute for Nature Management, Texel; S. Tougaard & N. Norgaard, Fiskeri- og Sofartsmuseet, Esbjerg)

Long-term studies on population dynamics of harbour seals were continued. Since 1958 the seal population of the Wadden Sea of Lower Saxony has been monitored by boat countings. Additionally, flight countings are carried out in the pupping season several times a year since the early seventies.
(M. Dippel, Bezirksregierung Weser-Ems; M. Stede, Seehundaufzucht- und Forschungsstation Norden-Norddeich)

Zoological and ethological investigations were carried out on the cause of the seal death. The aim of the project was to make a contribution to the documentation, interpretation and analysis on the cause of seal death by means of recording and evaluating phenological observations as well as data and findings recorded on seals found dead in Schleswig-Holstein. (G. Heidemann, M. Jäger & J. Schwarz, University of Kiel; M. Stede, Seehundaufzucht- und Forschungsstation Norden-Norddeich)

A study had been carried out to determine and describe the residual pattern of PCB isomers and congeners as well as organochlorine insecticides in different tissue samples of seals. These tissues have been extracted and purified by gelchromatography and silica-gel. Organochlorines have been detected by capillary gaschromatography. (A. Vagts, University of Kiel)

PCB pattern in lymphatic tissues of harbour seals were investigated. In order to trace the immunotoxic effects of PCBs in seals, the fractions of 51 congeners of the PCB mixtures found in various lymphatic tissues of this species have been examined by congener specific determinations via GC-MS. (W.A. Heidmann & G. Staats de Yanés, School of Veterinary Medicine Hannover)

Investigations on determining the actual total mercury concentration of various tissues and on characterizing the mercury binding to these tissues were contiuned. The aim of this study is to clarify the significance of mercury of the mass mortality of seals in the summer of 1988. (H.A. Rüssel-Sinn & K. Edeler, School of Veterinary Medicine Hannover)

Investigations of the pathology and pathogenesis of the mycoplasma infection of seals were started. During the seal epidemic in 1988 a high number of mycoplasmas were isolated from several organs of dead seals or diseased seals. In the present studies, these mycoplasmas are

characterized and investigated relative to their cytotoxic potential and their pathogenicity. (H. Kirchhoff & J. Pohlenz, School of Veterinary Medicine Hannover)

Studies on nematode, trematode, cestode, and acanthocephalan infections of harbour seals in the Wadden Sea of Lower Saxony were finished. In total 115 seals found dead in the Wadden Sea during the seal disease epidemic in 1988 were examined for helminth infections. Prevalence and mean intensities of infectons correlated significantly with anamnestic data. (M. Stoye, School of Veterinary Medicine Hannover)

Morphological investigations concerning the pathogenesis of the epidemic disease in harbour seals (1988) were carried out (light- and electron-microscopy, enzymehistochemistry), completed by findings experimentally induced disease (mycoplasma, CDV-like virus, combined infections with and without PCB exposition). Special interest was paid to alterations of the respiratory and gastrointestinal tract, the hematopoietic and central nervous system as well as the sensorium. (J. Pohlenz & H.-A. Schoon, School of Veterinary Medicine Hannover)

Oogenesis and architecture of the ovary of harbour seals are being studied. There is a lack of detailed information about the cause of low reproduction rates of the seal population along the frisian coast. The influence of PCBs on the reproduction is still in discussion. This research about architecture and ultrastructure of the ovary by means of histology and electron-microscopy and histochemistry will also give information on the oogenesis in the ovary, which is important for the assessment of the cause of the low reproduction rate. (K.-D. Budras, Free University of Berlin; M. Stede, Seehundaufzucht- und Forschungsstation Norden-Norddeich)

Comperative basic research on the anatomy and ultrastructure of the skin of harbour seals are carried out in order to get basic knowledge about the pathogenesis of skin diseases and possible effects of pollutants on the skin. (K.-D. Budras, Free University of Berlin; M. Stede, Seehundaufzucht- und Forschungsstation Norden-Norddeich)

Morphological investigations on the cause of the seal death were carried out. It was the aim of the investigation to define the morphological changes of several organs of seals, which had died during the recent epizootic. Formalin fixed autopsy samples were used. A severe lymphocyte depletion was found to occur within the lymphatic organs, consistent with a viral infection. Furthermore, a lack of colloid was found in some of the investigated thyroids. This might be attributed to environmental factors such as e.g. PCB intoxication. The comprised seals may therefore be more susceptible to a viral infection. (U. Welsch & U. Schumacher, University of Munich; G. Heidemann, University of Kiel)

Analytical investigations on the presence of hazardous compounds in the hair of seals are made. The intention of the project is to answer the question, whether the deaths of a large number of seals which occurred during 1988 and 1989 in the Northern Sea may be attributed (in addition to the Phocine Distemper Virus) at least in part to the chronic contact to certain hazardous compounds present in the water of the Northern Sea. In the first step of the investigation, it was possible to demonstrate the presence of polychlorinated biphenyls in the hair of seals indicating a long term exposure of the seals to these compounds. During the next step the question will be answered whether certain phthalates such as dibutylphthalate and di-(2-ethylhexyl)-phthalate, triarylphosphates and other compounds of ecotoxicological interest are present in addition. (H.U. Wolf, A. Weinand-Härer & D. Wiedemann, University of Ulm; G. Heidemann, University of Kiel)

Effects of military activities on birds and seals in the Wadden Sea were investigated. The aim of the investigation at Königshafen, List/Sylt and Meldorfer Bucht was to find out, in which way military activities (low flying, shooting sand bombing and tests of ballistic weapons) by themselves, in combination with and in relation to other disturbance can be minimized or avoided. (E. Küster & H. van Raden, German Military Geophysical Office, Traben-Trabach; National Park Service, Tönning)

Immunological and hematological investigations on seals are continued. Considerable distortions of these parameters were found in diseased seals during the epidemic in 1988 and 1989. At present experimental immunological and hematological investigations are performed with seals under well controlled conditions regarding environmental influences and exposure to define amounts and compositions of PCB-congeners as well as to in vitro propagated strains of mycoplasma and Morbilli virus (PDV: phocine distemper virus) which had been isolated from diseased and dead seals in 1988. (W. Leibold, School of Veterinary Medicine Hannover; Th. Willhaus & M. Stede, Seehundaufzucht- und Forschungsstation Norden-Norddeich)

Studies on distribution and pattern of organochlorine insecticides and polychlorinated biphenyls (PCB) in different seal tissues (fat, liver, brain, spleen, spinal cord) were carried out, as well as analysis of organic brominated compounds in seal tissues. (G. Rimkus, Lebensmittel- und Veterinäruntersuchungsamt, Neumünster)

Investigations on the behaviour of the harbour seal in a public sea aquarium were finished. Results of a two year study involved two main aspects: Development and application of telemetric devices for the discrimination of different kinds of seal behaviour, and partly basing on this data. Evaluation of potential influence factors which are likely to affect the seal

behaviour and its possible rhythms, e.g. changing public density and weather, by multivariate analysing methods. (A. Lacek, University of Kiel)

Grey seals

Besides single individuals observed at different sites in the Wadden Sea only a small colony of about 50 grey seals regularly occures in Schleswig-Holstein. There are only few suitable pupping sites for this species and little is known about any pups born in winter 1989/90. But about 7 have been observed in 1990/91. It is to assume that most of them have survived. For hydrological reason, the haul-out sites of that colony near the isle of Sylt are eroded continously by the sea. In addition to disturbances by tourists this may cause further problems for a long term occurence of grey seals in Schleswig-Holstein. (G. Heidemann & J. Schwarz)

Weddell Seals

Studies on the diving and feeding behaviour of weddell seals were continued at the eastern Weddell Sea coast (Antarctica) from January to late February 1990. Time-depth recorders were attached to seals and provided dive profiles which were charakterized by pelagic dives of 50-150 m and bottom dives of 400-450 m. A new advance to come from this work was the successful deployment of jaw-activity strain gauge which measured prey-handling activity. This unit was attached to a seal together with a time-depth recorder. Preliminary analysis indicates that depths at which prey were caught can be elucidated by consideration of results from both systems. (J. Plötz, Alfred-Wegener-Institute for Polar and Marine Research, Bremerhaven; H. Bornemann, University of Berlin)

California sea lion

The sensitivity of the vibrisse of a California sea lion was studied. 1) Tactile form recognition: A blindfolded sea lion was able to identify 5 geometrical objects by means of its vibrissae. 2) Tactile size discrimination: A blindfolded sea lion was trained to discriminate the difference in size between circular targets. Different thresholds were obtained for three different stimulus magnitudes. The lowest Delta D (O) value is 0.32 cm. A comparative study with the harbour seal is in progress. (G. Dehnhardt, Dolphinarium Münster)

Two male and one female California sea lion have been examined for their ability to distinguish colour graduation of the colours red, green and blue against a series of 30 values of grey. All three animals could distinguish blue significantly from grey, two animals could distinguisch green significantly from grey, but no animal could distinguish red from grey. This means that California sea lions probably have the ability of dichromatic colour sense. Their sense of colour in the blue-green range of the colour spectrum is a physiological adaptation to

the aquatic coastal habitat. (U. Griebel & B. Neurohr, Zoo Duisburg)

Seals in general

Seals from different marine regions (Arctic, Antarctic, Iceland, North Sea, Baltic Sea) were analyzed for chlorinated pesticides and PCB. Evaluation of the data demonstrated significant geographical differences in both level and pattern of the contaminants analyzed, thus giving an insight into the global distribution of organochlorine pollution. (W. Vetter & B. Luckas, University of Hohenheim)

CETACEANS

The November 1990 meeting of the German members of the European Cetacean Society in Münster was attended by 31 participants. Its aim was presentation of the various German research projects on cetaceans as well as the first contacts concerning possible future cooperation.

Harbour porpoises

A project has been started to investigate stocks, state of health and migration of the small cetaceans, mainly harbour porpoises, in German waters. Animals drowned in fishing gear or found dead on beaches are examined at the University of Kiel or Marine Museum Stralsund. Samples are collected for studies of pathology, contaminant levels, parasitology, age determination, diet and reproduction. Researchers outside the FRG are also supplied with samples. All reported sightings of cetaceans in German waters are collected and analysed at the University of Kiel. (W. Schultz & H. Benke, University of Kiel; G. Schulze, Marine Museum Stralsund)

Observations on harbour porpoises in the Wadden Sea of Schleswig-Holstein had been carried out in the period from September 1988 until January 1991. A publication is in preparation. (H. Kremer & B. Adloff, University of Kiel; L. Koch, O. Schneider, W. Fischer & B. Baschek, Schutzstation Wattenmeer, Hörnum)

A project to monitor harbour porpoises by the help of numerous observers in a two weeks intervall and by a standardized sighting method has been started on the Isle of Sylt in November 1990. (L. Koch, B. Baschek & J. Siepmann, Schutzstation Wattenmeer, Hörnum)

Bottlenose dolphins

Studies of bottlenose dolphins in the Sado estuary, Portugal, are continued. The investigations comprise social behaviour, social organisation, population dynamics, bioacoustics and the environmental implications of and on this population. The research group consists of four scientists from three countries and has constituted itself as "Projecto Delphis". (S. Harzen, University of Bielefeld)

Experiments on the acoustic interaction behaviour of bottlenosed dolphins were conducted in the dolphinarium "Marineland" (Mallorca, Spain). Three dolphins were confronted via loudspeaker with playbacks of whistles and pulsed tones which they had previously uttered. The dolphins reaction resulted in an remarkable increase in whistle duration and variability of frequency modulation and a highly significant preference for one special whistle type. (K. Schneider & H. Jurk, Free University of Berlin)

A project concerning context-specific variations in the vocal expressions of a bottlenose dolphin during a learning process was started in 1990. The analysis concentrates on variations due to the dolphins' success or failure in different time classes. New computerized signal analysis techniques allow a more detailed look at small differences in this context, which are probably very important for the communication system of the bottlenose dolphin. (V. Janik, Free University of Berlin)

Studies on the visual information processing in the bottlenose dolphin were carried out. In a series of "visual successive reversal" studies it has been demonstrated, that the bottlenose dolphin is capable of very efficient visual information processing. A study on "visual lateralisation" in the bottlenose dolphin is in progress. (G. Dehnhardt, Dolphinarium Münster)

Common dolphins

In 1989 a project on the sounds and the behaviour of Odontocetes in the Western Mediterranean Sea (Southern Spain) was started. The first part of this work has been finished, presenting results on the feeding behaviour and the sounds of wild common dolphins. The project will be continued in due time. (A. Kilian, University of Bonn; C. Haag & D. Herbers, University of Kiel)

Tucuxi dolphins

A study on the communicative behaviour of the tucuxi dolphin was started at the Zoo of Nürnberg. (A. Kilian, University of Bonn; C. Haag & D. Herbers, University of Kiel)

Amazon river dolphins

Investigations on the usage of toys of Amazon river dolphins have been made. (W. Gewalt, Zoo Duisburg)

Mediterranean cetaceans

In the Strait of Gibraltar, a ferry based transsect-study on cetceans and seabirds was carried out over a period of two months. this continuation of previous transsect-series was financed by the Greenpeace Mediterranean Project. (D. Hashmi, Munich; B. Adloff, University of Kiel)

Cetaceans in general

Osteological and functional-morphological investigations on the flippers of cetaceans were completed. 51 species have been examined with regard to the osteology of the flipper and the scapula and, in addition to this, video-recordings of 13 different species have been analyzed. In order to get an accurate insight into the functional aspect of these bones, the muscles of the pectoral girdle of some sample species of both mysticetes and odontocetes have been examined. (H. Benke, University of Kiel)

Morphological and histological investigations on the brains of the sperm whale and the narwhale and the acoustic system of dolphins were made. (H.A. Oelschläger, University of Frankfurt)

MARINE MAMMALS IN GENERAL

Ecopathological monitoring of marine mammals in the coastal waters of Lower Saxony is continued. Autopsy is made of diseased and stranded marine mammals with special reference to contagious diseases, possible effects of human activities in the wild like omphalogene infections and skin diseases, parasitology and pollutants. (M. Stede, Seehundaufzucht- und Forschungsstation Norden-Norddeich)

Studies on the biology and protection of cetaceans and seals at the coast of Mecklenburg-Prepomerania are continued. For many years, the Marine Museum Stralsund has collected information on the existence of harbour porpoises, harbour seals, ringed seals, and grey seals at the southern shores of the Baltic Sea. Furthermore, the purpose of the museum is to collect all animals found dead, to gather all evidence on the state of health, and to analyse and interprete the results. (K. Harder & G. Schulze, Marine Museum Stralsund).

Gamma - radiological monitoring of muscle and liver tissue of stranded marine mammals mostly, harbour seals and harbour porpoises, is continued. The activity of radionuclides is less important than the pattern of nuclides which indicates a sneaking pollution of the sea by the nuclear industry. (J. Stockemer & M. Stede; Staatliches Veterinäruntersuchungsamt für Fische und Fischwaren, Cuxhaven)

Studies on morbillivirus infections in marine mammals were started. Previously never described morbilliviruses of phocine origin, tentatively named "phocine distemper virus" (PDV) are generally accepted as being the primary cause of 1988's mass mortality among seals in northern European waters. Continued research on the prevalence and incidence of this virus has been extended from the seal populations in the North and Baltic Seas to other marine mammals such as porpoises and other cetaceans. As an aid to clarify the origin of PDV, detailed studies on the antigenic relationships to other morbilliviruses are carried out, employing homologous monoclonal antibodies (moAbs). So far a panel of nine moAbs is available which makes the precise discrimination of PDV from any other morbillivirus species possible. The panel shall be extended and the moAbs will be applied to new diagnostic applications. (B. Liess, School of Veterinary Medicine Hannover)

A project is evaluating the role of herpesviruses in the seal mass mortality 1988. There is a very close antigenetic and genetic relationship between seal herpesvirus isolates and feline herpesvirus type I. Furthermore, studies were carried out to characterize dolphin DNA-virus isolates from the recent epizootic in the Mediterranean Sea. (H. Ludwig & O. Stenvers, Free University of Berlin)

Parasites and food analyses of the digestive tract of harbour seals in the German and in the Danish part of the Wadden Sea and of harbour porpoises in the North Sea and in the Baltic Sea were examined in a project concerning the nematode problem in fish. In addition, the stomach and intestine of one Delphinus delphis, one Lagenorhynchus albirostris, one Halichoerus grypus and one Phoca groenlandica had been investigated. (R. Lick, University of Kiel)

Evaluation of a heavy metal-accumulation pattern in soft and hard tissues of marine mammals - namely harbour porpoises and harbour seals - and their role in the metabolism of calcium in relation to precise age and sex is made. Investigations on the mineralization pattern in growth layers of marine mammal teeth by emission spectrometry and evaluation of the biological relevance of changes in the calcification are made. Analysis of sighting and stranding data of harbour porpoises and their significance for the migration pattern in the

Southern North Sea was done and improvement and development of new techniques for precise age determination of marine mammals is continued. (H. Kremer, University of Kiel)

ICELAND

J. Sigurjónsson

SEALS

E. Hauksson, S. Einarsson

Seal hunting

Catch for 1990 was 765 common seals (*Phoca vitulina*) and 1,664 grey seals (*Halichoerus grypus*).

Research at the Icelandic Fisheries Laboratories

Around the coast of Iceland an aerial census of common seals at hauling-out sites during low tide was conducted during the summer of 1990. A similar census was carried out in 1989. The results of these two censuses indicate that the number of common seals has decreased since 1980, when common seals were first counted around the whole coast of Iceland, but apparently the population is now stable. The seasonal hauling-out behaviour of common seals during low tides was studies at selected sites at Vatnsnes in Húna-Bay, northwestern Iceland. The research involved counts from land utilizing binoculars with high magnification.

Grey seals were counted at all breeding places on the coast of Iceland in the autumn of 1990. The results of that census compared with two done earlier, in 1982 and 1986, indicate that the grey seal population of Iceland is increasing slightly.

In 1990 a new 5 year research plan for the Icelandic grey seal commenced. It involves: 1) annual monitoring of the sealworm abundance and other biological data of grey seal and common seal gathered from selected sites along the coast during feeding time, 2) aerial censuses of grey seal pups and common seals, carried out at least twice during the five year period, 3) tagging of seals for studying dispersal and eventual migrations between coastal areas, 4) seal behavioral studies accomplished by using radio transmitters in order to receive additional information on feeding and haul-out behaviour, 5) the food of grey seals and common seals will be studied and comparisons made with data from former surveys, and finally 6) results in relation to changes in population status and availability of main food species will be evaluated.

Research on the recent seal epizootic and seal parasites

At the Institute of Experimental Pathology (University of Iceland) studies have been conducted on pollutant burden and immunological aspects of seals off Iceland with special reference to the recent seal epizootic at the coast of northwestern Europe. A study on parasites in seals has been completed.

WHALES

J. Sigurjónsson & G. Víkingsson

As in recent years investigations conducted by the Marine Research Institute (MRI), Reykjavik and cooperating institutions concentrated on fin (*Balaenoptera physalus*), sei (*B. borealis*) and minke whales (*B. acutorostrata)* in Icelandic and adjacent waters. Other species studies were blue (*B. musculus*), humpback (*Megaptera novaeangliae*), killer (*Orcinus orca*) and long-finned pilot whales (*Globicephala melas*).

In accordance with the four year programme (1986-1989) of intensified whale research, the field collection of data was completed in 1989. The main objective of the programme was to increase the knowledge on the status of the different whale stocks with respect to exploitation and conservation, and to assess the role of cetaceans in the ecosystem off Iceland. The investigations were Iceland's contribution to the International Whaling Commission (IWC) Scientific Committee's Comprehensive Assessment of the whale stocks which was scheduled to be completed by 1990.

In 1990 no whaling was conducted from Iceland for the first time in 32 years. Whale research activities were mostly centred around the working up of the collected material, and presentation of results. The order of priority was partly influenced by the timing of IWC's Comprehensive Assessment of the different whale species. In June 1990 the Scientific Committee completed its deliberations on the North Atlantic minke whale stocks and in February, 1991 a special meeting on North Atlantic fin whales is scheduled to take place in Reykjavik, Iceland.

General biology of exploited species

Working up all available biological material on the Central North atlantic stock of minke whales was completed. This comprised material collected in connection with the fishery during 1977-1985, and a few stranded animals examined by the MRI staff in recent years. Among the

results presented to the IWC's Scientific Committee were studies on age and reproduction, food and feeding, and parasite infections of minke whales. Results from analysis of genetic variability in minke whale stocks off Iceland, Norway and West Greenland were also presented at this meeting, revealing apparent differences between minke whales inhabiting the three areas.

Detailed biological sampling was performed from the fin and sei whales caught under a special permit in 1986-1989. In connection with the whaling operation environmental factors, such as prey density, temperature and primary production on the whaling grounds, were monitored. Results of some of these studies have already been reported to the IWC's Scientific Committee. These include studies on age, reproduction, energetics and morphometrics.

Validation of all available data on age and reproduction in fin whales is now completed, and a final report on biological parameters and their trend over time will be presented at IWC's special meeting on North Atlantic fin whales. Other biological studies on fin whales that will be reported on to this meeting include studies on trends in age at sexual maturity over time, based on transition layer counts in earplugs, growth rate analysis, study on age at recruitment for the Icelandic fin whale fishery, levels of sex hormones in relation to sexual status, sero-epidemiological studies, and studies on diurnal and seasonal variations in feeding rates.

Detailed data on the catch/effort relationship in the fin whale fishery off Iceland have been analyzed. The data (including log-book data for the entire fleet since 1962 and time-budget data since 1979) have been computerized, validated and forwarded to the IWC Secretariat for the conduct of the comprehensive assessment of the fin whale stock.

Major emphasis has been placed on studies which address the question of stock identity of fin whales within the North Atlantic Ocean. Genetic studies have been undertaken comparing protein and DNA from fin whales caught off Iceland and Spain, and arrangements have been made to obtain samples from Canada and West Greenland. A study of marking data with reference to the stock identity question is completed and will be presented to the special meeting on North Atlantic fin whales. Detailed morphometrical data have been collected since 1986.

Management models

In cooperation with researchers at the Science Institute of the University of Iceland models of whale stocks have been tried and investigated in conjunction with the IWC Scientific Committee's development of revised management procedures.

Whale censuses

Sightings surveys and estimation of abundance of different whale species was one of the most important components in the programme of intensified whale research 1986-1989. The MRI participated in large scale sightings surveys in the North Atlantic in 1987 and 1989 (NASS-87 and NASS-89), in cooperation with Denmark (off Greenland), Faroes, Norway and Spain. The area covered extended from the Barents Sea and Svalbard in north to Spain in south, and from West Greenland to the coast of Norway. Up to 15 vessels and 2 aircrafts were simultaneously operating in the area.

In 1987 the main emphasis was placed on the estimation of abundance of fin and minke whales, whereas in 1989 the sei whale was the main target species. All data with respect to minke, sei and fin whales has been validated and analyzed with respect to abundance in different areas. Based on the results of the sighting surveys, the Scientific Committee of the IWC accepted an estimate of 28,000 as the best estimate of the number of minke whales in the central stock area at its annual meeting in 1990. At the 1989 annual meeting the Committee agreed that 11,563 was the best available estimate of the East Greenland-Iceland stock of fin whales, based on the 1987 survey. A new estimate of fin whale abundance based on the NASS-89 survey will be submitted to the fin whale special meeting.

All whale species have been routinely recorded onboard the whaling vessels west off Iceland. This data has shown significant increase in the abundance of blue and humpback whales since 1969.

Humpback whales and killer whales

A special project designated to killer whale research was continued with the main aim to estimate the stock size off Iceland and the predation of killer whales on the local herring stock. In the autumn of 1990, the MRI continued collecting photographs of killer whales (for individual identification) east and southeast off Iceland, in conjunction with the herring fishery.

Arrangements have been made for studies on humpback whales in the capelin grounds in January/February, 1991.

Whale strandings and net entanglements

The MRI staff investigated or received information on a number of whales that beached or stranded on the Icelandic coast in 1990. These include 2 (or 3) male sperm whales (*Physeter catodon*) that were found in N Iceland (11 April 1990, 16 m and 24 April 1990, 16-17 m;

possibly the same animal), and E Iceland (25 April 1990, 13.75 m); one minke whale that beached in SW Iceland (3 April 1990, 6.35 m, female); two killer whales found in SE Iceland (21 November 1990, 6.35 m female and 5 December 1990, 2.3 m, calf); 22 pilot whales which were found dead in NE Iceland (7 November 1990, 18 males and 4 females).

A review of strandings and net entanglements of minke whales in Iceland was presented at the annual meeting of the Scientific Committee of the IWC in 1990.

International cooperation

As in previous years, the MRI has arranged collection of samples upon request from research laboratories in other countries. Several such requests were received in 1990. One of the killer whales found dead in SE Iceland in 1990 was shipped frozen to Germany for examination and preparation of the skeleton for museum display.

NORWAY

A. Bjørge and I. Christensen

Research on marine mammals in Norway is organized within a five-year programme. Annual budgets for the programme are approximately NOK 20 mill, running from 1989. The programme focuses primarily on the biology of marine mammals, but includes also bio- and socio-economic projects.

SEALS

Harp and hooded seals

Field investigations on harp and hooded seals in the Greenland Sea (West Ice) were continued in the 1990 breeding season. About 3000 harp seal pups were tagged. In a feasibility study, fixed-wing aircrafts, helicopters and vessels were used for line transects in order to develop practical methods for assessment of seal abundance in breeding layers. Experiments with photographic documentation of seals on the transects were also conducted. (Inst. of Marine Research, Bergen)

During an expedition to the West Ice in July 1990, seven moulted hooded seals were equipped with satellite transmitters. Seal movements were recorded during several weeks. (Univ. of Tromsø)

The investigations on harp seal food selection in the Barents Sea were continued. During an expedition to the ice edge east of Svalbard in August - September 1990, 22 harp seals were collected. The amphipod (*Parathemisto libellula*) was identified as the predominant food item. (Inst. of Marine Research, Dept. Tromsø.)

Age distribution and stomach contents of harp seals incidentally caught in Norwegian coastal waters during the extreme seal migrations 1986-1988 were analyzed in 1990. (Inst. of Marine Research, Dept. Tromsø, and Univ. of Oslo)

Impacts of migrating harp seals on fish communities in fjords were studied in Ullsfjorden. (Univ. of Tromsø)

Common and grey seals

The Phocine Distemper Virus 1988 killed more than half the population of common seals in

the outer Oslofjord. Studies of the impact on the seal population continued in 1990. (Univ. of Oslo)

The dramatic changes in seal abundance in outer Oslofjord were used to detect and quantify any impact on local fish stocks. (NINA-Oslo and Imperial College, London)

Surveys were carried out in order to assess abundances of common and grey seals in Central and Northern Norway. (NINA-Trondheim and Inst. of Marine Research, Dept. Tromsø)

In June-July 1990, four common seals were equipped with depth-velocity and heart-rate sensors as well as sonic and VHF transmitters in order to study their feeding behaviour and habitat use in Froan Nature Reserve, Central Norway. (NINA-Oslo, and SMRU, Cambridge)

Ringed seals

Milk consumption and growth of free living ringed seal pups at Svalbard were studied using tritiated water. Weight loss in lactating females, and the energy content of new born and weaned pups were also recorded in this project. (Univ. of Oslo)

Walruses

The population of walrus at Svalbard was surveyed, and satellite telemetry was used to study the range of the population and movements of individual walruses. (Norwegian Polar Research Inst.)

WHALES

Minke whales

Five minke whales were caught for scientific purposes in 1990. The main objective was to investigate the function of the multi-chambered minke whale stomach and the digestive role of citinolysing anaerobe bacteria, found in large numbers in minke whale stomachs. The digestibility of crustaceans and their importance as energy source for minke whales were also studied. (Univ. of Tromsø)

Further development of methods for stock assessment, and experiments with sighting surveys in order to assess the detectability of minke whales on the transect line, were continued in 1990. (Inst. of Marine Research, Bergen, and Norwegian Computing Center, Oslo)

Killer whales

Killer whales are studied in two areas, Møre and Lofoten-Vesterålen. Off Møre recordings were made of their sound production, and individual whales were photo-identified. (Univ. of Trondheim)

In the Lofoten-Vesterålen area, their feeding behaviour were recorded and supplemented with photo-identifications of individual whales. (Univ. of Tromsø)

Harbour porpoises

The examination of incidentally caught porpoises continued in 1990. Growth, age at attainment of sexual maturity and pregnancy rates, as well as stomach content and the levels of chlorinated hydrocarbons and heavy metals were studied. (NINA-Oslo)

STUDIES ON MARINE MAMMALS IN GENERAL

Stock identity

The prospects of using lipid configurations and enzymes for stock identification were further explored in 1990. Particular emphasis was put on harp seals from the Greenland and Barents Seas and harp seals incidentally caught at the Norwegian coast. (Univ. of Bergen)

The stock identities of harp seals and minke whales are further studied using DNA-fingerprint techniques. (Univ. of Tromsø)

Energetics and ecophysiology

The energy budgets of marine mammal populations were studied experimentally and by using simulation models. The results will be used in multispecies models, and provide a basis for better knowledge on the interactions between marine mammals and fisheries. (Univ. of Oslo)

Parasites in marine mammals

The mechanisms involved in transfer of parasites from fish to fish and from fish to seals were studied, and the population dynamics of gastroide nematodes in seals were modelled. (Univ. of Oslo)

Pollutants and Pathogens

Detoxificating enzymes in marine mammals are analyzed in order to assess the abilities of different species to metabolize and excrete hazardous organic compounds, and thereby reduce

the body burden of these compounds. (Univ. of Bergen)

A baseline study on the levels of organochlorines and metals in marine mammals in Norwegian waters, and post mortem examination of stranded whales are undertaken by veterinaries. (Norw. College of Veterinary Medicine/ National Vet. Inst.)

POLAND

K.E. Skóra

MARINE MAMMALS IN GENERAL

Monitoring investigations of occurrence of pinnipeds in the region of Admiralty Bay (King George, S Shetlands Is., Antarctic) (S. Rakusa-Suszczewski).

Observations on sea mammals were conducted during "Sov-Nor-Pol 1 expedition to Franz Jozef Land". Seals, walruses, polar bears, greenland whales were observed during the expedition. (J. Marcin Weslawski)

Investigations were carried out on occurrence of sea mammals (harbour porpoise and seals) in Southern Baltic (K.E. Skóra)

SPAIN

S. Lens and O. Cendrero

SEALS

Stranding records of pinnipeds on the north and northwest coast are continue.

(Spanish Institute of Oceanography, Santander and Vigo; Maritime Museum of Santander; University of Oviedo, Faculty of Biology and the Museum of Natural History of the University of Santiago de Compostela).

CETACEANS

Work was focused on preparing all the relevant information concerning the exploitation of whale stocks in Spain in the period 1952-1985. This was part of the Spanish contribution to the Comprehensive Assessment undertaken by the International Whaling Commission. The information mentioned refers to catch and effort data for that period, sighting data of the North Atlantic Sightings Survey (NASS) in 1987 and 1989, artificial marking data, and age and reproductive data for fin whales.

Stranding records of cetacean species were also recorded under the same scheme as mentioned earlier under SEALS.

SWEDEN

Mats Olsson

SEALS

Grey seals

Annual surveys of grey seal (Helander) along the Swedish coast during the last 15 years indicate a small increase of the population in the Gulf of Bothnia and a decrease in the Baltic proper. The survey continue.

The Baltic grey seals breed in February-March on ice. The warm winter 1988/89 implied an almost complete lack of ice this winter. A sudden increase of the number of adult grey seals hauled out in May-June in the Åland Sea area was noticed in 1989. Similar climatic conditions were prevailing during the winter 1989/90 and also this year a large number of grey seals were found in May-June in Åland Sea. Whether lack of ice and large number of seals in the Åland Sea is correlated is not known. From earlier periods it is reported that grey seals migrate in order to find ice for breeding.

A breeding programme for grey seal is in progress. Adult grey seals in an enclosure are fed fish with low levels of organochlorines. Three week old grey seal pups are implanted just after weaning in southern areas of the Baltic where existing subgroups of grey seals are very poor. This is done in order to maintain the grey seal in the entire Baltic.

Common seal

Annual surveys of the common seal population along the Swedich westcoast (Härkönen) has been carried out since the 70s and continue. The die-off caused by a morbillivirus (PDV) implied that about 60% of the population were found dead. In the surviving population the reproduction in 1989 was almost normal in the subgroups of the population where the PDV epizootic hit animals before breeding season and after the mating season. In areas where subgroups were hit during breeding and mating season the reproduction was severely reduced. In 1990 a normal reproduction has been reported from all subgroups.

The common seal population in the Baltic (Helander) was only partly hit by PDV. Only in the the southwestern areas animals died and the mortality rate was similar as to the Swedish westcoast. In 1989 and 1990 the reproduction was comparabel to earlier years. The annual

surveys of common seal, which started during the 70s continue.

A study on the food selection and energy budget of common seals in the Swedish west coast population is carried out. (Härkönen).

Investigations of population dynamic and migration pattern in groups of common seals along the Swedish westcoast are under study. (Härkönen).

The epizootiology of the 1988 seal disease is investigated. (Härkönen).

Ringed seals

The aerial survey of ringed seal carried out in 1990 (Härkönen) confirmed earlier estimates of the population and the number of specimens in the area have been stable during the 80s.

SEALS IN GENERAL

Autopsies on stranded or drowned seals are continously carried out (Bergman). Samples for histological examinations and studies of environmental pollutants are collected as well as samples for parasitological, bacteriological and virological studies. So far no females older than 20 years has been found healthy and all having patHological changes indicating hyperadrenocortisism.

The presence of antibodies for morbilliviruses in various subpopulations is continously followed (Klingeborn).

The spatial and temporal variation of frequensis of bone lesions in seal sculls is studied. Especially the material collected during the PDV epizooty is scrutinized (Härkönen, Olsson).

Experimental toxicological works are conducted in order to study the mechanism behind the disease complex (adrenocortical hyperplasia) found among Baltic seals.(Olsson).

Samples from various subpopulations of common, grey and ringed seal are analysed for presence of contaminants. Samples representing subadults from both before and during the PDV infection are analyzed as well as adult animals suffering from hyperadrenocortisism and healthy animals. Contaminants determined are total PCB, individual PCB congeners, DDT substances, methylsulphonated metabolites of DDT and PCB, toxaphenes, chlordanes,

brominated halogenes, dioxins and eighteen heavy metals. A total of 110 specimens are analyzed from the Swedish westcoast and the Baltic.

WHALES

Harbour porpoise

Sightings of *Phocaena phocaena* in Swedish waters are recorded (Berggren, Pettersson) . Autopsies and saving of tissue samples is in progress and seasonal as well as studies of temporal variation in bycatches and stranding of cetaceans in relation to fishing activities (Lindstedt).

During 1990 in total 142 Harbour Porpoises, 2 Common Dolphins (*Delphinus delphis)*, 4 White-beaked Dolphin (*Lagenorhynchus albirostris)* and 1 Beluga (*Delphinapterus leucas*) have been found dead along the Swedish coast or caught in fishing nets by Swedish fishermen. (Lindstedt)

THE NETHERLANDS

P.J.H. Reijnders

SEALS

Harbour seals

Aerial surveys indicated that the population in the Dutch part of the Wadden Sea is recovering from the virus epidemic: the maximum number observed was 562, including 122 pups. Comparison with the other areas in the Wadden Sea revealed that the increase in these areas was higher, predominantly caused by an improved pup production. The pup production was very low last year, probably as a result of the mating and implantation period coinciding with the at that time still existing epidemic. (P.J.H. Reijnders)

The research on population biology of the harbour seal stock in the Dutch Wadden Sea was intensified. Ten seals were provided with radio-transmitters to study their dispersal behaviour and feeding ecology. The registration was carried out by an automatic registration unit-receiver, multi-channel scanner and data logger, and by manual tracking. The latter one being carried out from boats as well as from land. The receiving equipment as well as the data processing were further developed and provided to the other partners in this international project. (P.J.H. Reijnders & E.H. Ries)

A project was started on the influence of pollutants on the functioning of the immune system in seals. Two groups of young harbour seals, are fed differing in contaminants burden. The seals were collected in Scotland in collaboration with Dr. P. Thompson, University of Aberdeen.
A pilot study was carried out to modify existing tests on the function of the immune system to be used in seals. Functional in vitro and in vivo assay systems are tested. These include lymphocyte profileration, secondary antibody production, NK-cell activity and antibody titers after immunisation, delayed type hypersensitivity and contact sensitivity. (R. de Swart, A.D.M.E. Osterhaus & P.J.H. Reijnders)

Since the outbreak of phocid distemper virus (PVD) among harbour seals (*Phoca vitulina*) in Northwest Europe an inactivated morbillivirus vaccine able to induce protection against PDV infection was needed to prevent virus spread among captive seals.
In a collaboration effort of the Seal Rehabilitation and Research Centre (SRRC) in

Pieterburen, The Netherlands, and the Laboratory of Immunobiology of the National Institute of Public Health and Environmental Protection (RIVM) in Bilthoven, The Netherlands, seals admitted to the sanctuary were vaccinated with a heterologous vaccine that has been proven to be protective against lethal infection with phocid distemper virus.
Analysis of the genome of PDV and a morbillivirus isolated from Baikal seals (*Phoca sibirica*) is still under investigation, as well as the genome analyses found dead along the coast of The Netherlands.
Probably due to another morbillivirus infection hundreds of striped dolphins (*Stenella coeruleoalba*) were found dead along the Mediterranean coast of Spain in 1990. The relationship of this virus to other morbillivirus known to infect marine mammals is being investigated at the moment. (A.D.M.E. Osterhaus)

A study on the endoparasitic helminths of harbour seals was finished. The results are processed and a publication has been submitted. (F.H.M. Borgstede)

Grey seals

The colony of grey seals in the Western Dutch Wadden Sea continued to increase and amounted to 100 animals in 1990. Five pups were observed. The morphology of the traditional haulout sandbanks is still changing and the animals are more dispersed compared with former years. (P.J.H. Reijnders, J. van Dijk & D. Kuiper)

Seals in general

In the framework of an ongoing programme to collect stranded marine mammals, post mortem was made on 25 seals (harbour, grey, harp and monk seals). Samples of tissue have been collected for further parasitological, virological and toxicological research. (J.S. van der Kamp).

CETACEANS

Shipbased counts of cetaceans, seals and seabirds using different research vessels, counts of seabirds are realized throughout the North Sea, and throughout the year. During these counts all cetaceans and pinnipeds encountered are also noted. All records are published in the journal 'SULA', of the Netherlands Seabird Group (four times a year). The most remarkable findings in 1990 are described below.

Harbour porpoise

Harbour porpoises are relatively common in inshore waters, north of the Frisian Islands in the period January-March. In summer most were seen in offshore waters, all through the central North Sea. Concentrations of feeding porpoises were seen in August, southwest of Helgoland, and in September, off the Wash and the river Humber.

Grey seals

Grey seals were also seen at sea off the Wash and the river Humber in this period.

White-beaked dolphins

White-beaked dolphins seemed less common than in previous years. Most were seen (as usual) in September off the English east coast, on the herring spawning grounds.

Minke whales

Minke whales are usually common in 1990! Some 25 animals were seen off the English east coast, in September. (M.F. Leopold)

Tissue samples of stranded harbour porpoises were collected and analyzed for chlorinated hydrocarbons (P.J.H. Reijnders & E.M. de Ruiter)

Autopsies on stranded small cetaceans were carried out and investigated for causes of death and parasitic infestation. Relevant tissues were collected for various further studies. (J.S. van der Kamp)

Aerial surveys on occurrence of marine mammals in the Dutch sector of the North Sea were continued. A summary of results for *Phocoena phocoena* were presented at the 1990 IWC-meeting. (H.J.M. Baptist)

Research on threshold sonar perception in *Tursiops truncatus*, whistle signatures from *Sotalia fluviatilis guianensis* and morphology of odontocetes in relation to sound production theories was continued. (C. Kamminga, M. van de Water, A. Kilian & M. Garcia Hartman)

Parasitic occurrence - endoparasitic helminths - in harbour porpoises was studied and a report is in preparation. (F.H.M. Borgstede)

MARINE MAMMALS IN GENERAL

Research on the taxonomy and general biology of marine mammals went on during 1990. A catalogue of the odontocete remains in the Institute of Taxonomic Zoology became ready and will be published in 1991. From studies of fossil, subfossil and recent material it became clear that *Cystophora cristata*, *Erignathus barbatus* and *Odobenus rosmarus* most probably were originally no species with a solely arctic distribution but that they occurred in suitable habitats along the Westeuropean coast from about 50° North on. Their actual distribution is the result of prehistoric and historic hunting activity. (P.J.H. van Bree)

UNITED KINGDOM

J. Harwood

SEALS

Common seals

Radio-tracking studies of common seals in the Moray Firth continued into the spring of 1990, with the primary aim of assessing the species' winter feeding distribution. Haul-out counts were made during the summer inorder to monitor population trends and pup production. Ten mother-pup pairs were captured during July to obtain paired blood samples and, in collaboration with Glasgow Veterinary School, to determine whether morbillivirus antibodies were passed from mothers to their pups. Faecal samples were collected during the summer months in order to compare the diet of common and grey seals in the Moray Firth. (P.M. Thompson, University of Aberdeen).

Radio- and acoustic tracking was used to study the movements and diving behaviour of common seals in Froan, Norway in a collaborative study with the Norwegian Institute for Nature Research. (A. Bjørge, Norwegian Institute for Nature Research; M A Fedak, P S Hammond & D Thompson, Sea Mammal Research Unit)

The diet of UK common seals is being studied using hard parts of prey recovered from faeces. Particular attention has been focussed on the diet and haul out behaviour of seals in the Oban area on the west coast of Scotland.
(P. Hammond & J. Prime, Sea Mammal Research Unit; G. Boyle, Imperial College of Science, Technology & Medicine; A. Smith, University of Leicester)

Common seal populations on the west coast of Scotland were surveyed in August using a thermal imager mounted in a helicopter. Populations on the east coast of England were surveyed in the same month using conventional photography. Results were similar to those obtained in 1989. (C. Duck, A.R. Hiby, D. Thompson, Sea Mammal Research Unit)

Grey seals

All major grey seal colonies in England and Scotland were surveyed during the autumn of 1990. Results of these surveys are not yet available. (C. Duck, A.R. Hiby & D. Thompson, Sea Mammal Research Unit)

Movements of grey seals off the northeast coast of England and southern Scotland were studied using radio- and satellite-link tracking. (C. Chambers, P.S. Hammond, B.J. McConnell & K.S. Nicholas, Sea Mammal Research Unit)

The transfer of organochlorine contaminants from grey seal females to their pups, and the effects of this on the development of the pups' immune system is being studied at the Isle of May. (A.J. Hall, J. Harwood, P. Pomeroy & M. Walton, Sea Mammal Research Unit)

The diving physiology of grey seals is being studied using animals held at the Institute for Nature Management, Texel, Netherlands and wild seals. (J.Z. Reid, University of Birmingham & M.A. Fedak, Sea Mammal Research Unit)

Seals in general

The scheme for sampling dead cetaceans, described above, has been extended to include post-mortem analysis of all suitable seals found dead around the UK. (T. Kuiken, Institute of Zoology; J. Baker, University of Liverpool; H. Ross, Scottish Agricultural College).
Telemetry systems suitable for studying the behaviour (swimming speed, dive depth and heart rate) and movement of a wide range of seal species have been developed by the Sea Mammal Research Unit. Automatic receiving stations can provide information on the presence of absence of tagged seals in a locality over an extended period. These are now being modified to provide additional directional information. Acoustic transmitters provide real time information on diving behaviour. Satellite-link transmitters can provide locational information with a precision of better than $\pm$ 1km. The current version of this transmitter now used by SMRU now relays summary information on swimming speed and dive profiles. During 1990 transmitters of these types were deployed on grey seals in the UK, common seals and hooded seals in Norway, and southern elephant seals in the Antarctic. One female elephant seal was tracked for more than 2,000 km. (C. Chambers, B.J. McConnell & K S Nicholas, Sea Mammal Research Unit)

CETACEANS

Harbour porpoise

A long-term study of the biology of the harbour porpoise based on bycaught and stranded animals has begun. Preliminary studies of the movements and diving behaviour of free-ranging animals have begun on the island of Skomer in Wales. Ecological studies are also being carried out in Shetland and the west coast of Scotland (the study on the west coast of

Scotland includes minke whales, *Lagenorhynchus* spp. and Risso's dolphin). (P.S. Hammond, C. H. Lockyer, A.R. Martin, Sea Mammal Research Unit; S. Northridge, Imperial College of Science, Technology & Medicine, London; P.G.H. Evans, University of Oxford).

Bottlenose dolphin

Studies of the population biology and behaviour of resident bottlenose dolphins are being carried out in Cardigan Bay and the Moray Firth. In the Moray Firth fieldwork concentrated on boat-based photo-identification surveys in order to determine group structure and the movements of known individuals and groups. Small cetacean strandings in the study area were also monitored and, where possible, post-mortem investigations were carried out by the Scottish Agricultural Colleges Veterinary Investigation Centre. (P.M. Thompson, Aberdeen University; H. Ross, Scottish Agricultural College; S.J. Mayer, Greenpeace UK; P.S. Hammond, Sea Mammal Research Unit.)

An automated system for detailed analysis of dolphin click rates has been developed. Twenty-four hour acoustic and visual watches of a "friendly" wild dolphin at Amble, Yorkshire have indicated that it has a very restricted range. Only 30-45% of time is spent using active sonar. Further observations will explore the effects of visitors on the animal's behaviour. Equipment is now available for recording the full frequency range of cetacean acoustic emissions in the field and under controlled conditions. This facility is available for cooperative use. (D. Goodson, University of Loughborough; M. Klinowska, University of Cambridge, P. Bloom, Flamingoland; M. van Hove, University of Delft).

The effects of sound disturbance is also being investigated. (P.G.H. Evans, University of Oxford and Marconi Instruments Ltd).

Beluga

In collaboration with the Department of Fisheries and Oceans, Canada satellite-link transmitters were attached to five female belugas in the Northwest Territories and used to monitor their movements for a numbre of weeks. Two of these devices relayed information on dive profiles. (A.R. Martin, Sea Mammal Research Unit; T.G. Smith, Department of Fisheries and Oceans, Canada)

Inia* and *Sotalia

Studies of ageing and morphometrics using samples collected in Brazil are continuing. (V. da Silva & M. Klinowska, University of Cambridge)

Cetaceans in General

A national scheme for systematic land-based monitoring of coastal cetaceans around the UK has been developed. This includes a national sightings network, and quantified effort monitoring on platforms of opportunity. (P.G.H. Evans, University of Oxford).

The national scheme for recording and obtaining samples from cetaceans which are stranded or caught in nets around the coasts of England and Wales has been expanded, with financial assistance from the National Rivers Authority and the Department of the Environment. As many animals as possible are subject to detailed pathological examination and samples are collected for contaminant analysis. A detailed post-mortem schedule has been developed. (T. Kuiken, Institute of Zoology; M. Sheldrick, Natural History Museum; J. Baker, University of Liverpool; M. Walton, Sea Mammal Research Unit; R. Law, Ministry of Agriculture, Fisheries & Food).

Catch positions from a register of records of whales landed at the four UK whaling stations in Shetland between 1908 and 1914 in the Scottish Records Office are being examined in relation to geomagnetic and other characteristics with a view to obtaining information on travel strategies of large whales in UK waters. (M. Klinowska, University of Cambridge).

Entanglement of Small Cetaceans in Fishing Gear

The FAO Fisheries Technical Paper on incidental entanglement of cetaceans is being brought up to date. A study of the impact of driftnets on non-target species is being conducted for FAO. (S. Northridge, Imperial College of Science, Technology & Medicine, London)

Investigations of methods for reducing entanglement of small cetaceans in fishing gear have been carried out with support from the Commission of the European Communities and visitors to Flamingo Land and Windsor Safari Park. This includes the design of target-enhancing passive acoustic devices for attachment to nets and exploration of non-acoustic parameters. The latter study suggests that deployment of nets parallel to putative cetacean travel paths (as defined by oceanographic or geophysical characteristics) and investigation of the chemical characteristics of nets and their contents may be friutful. (M. Klinowska, University of Cambridge; D. Goodson, Loughborough University; P. Bloom, Flamingo Land; S. Walton, Windsor Safari Park)

UNITED STATES

R.V. Miller

SEALS

Northern Fur seal

Studies were conducted on population biology, foraging ecology, disease and migration of northern fur seals. Population monitoring studies indicated that the fur seal population on the Pribilof Islands (St. Paul and St. George) remains stable, while the colony on Bogoslof continued to grow. Potential changes in the diet of fur seals which forage around the Pribilof Islands were monitored through the analysis of faecal material. Disease studies were conducted in cooperation with the Moss Landing Marine Laboratory to determine baseline information on potential bacterial pathogens.

Winter migration of pups and adult females were studied cooperatively with scientists from the Japanese Fisheries Research Agency and the University of California, respectively. In late October and early November, researchers attached satellite tags to 5 adult females and radio tags to 94 pups and 6 adult females. Specific objectives of the pup tagging were to determine the direction and rate of travel of pups from St. Paul Island to the Aleutian Islands (year 1) and the direction of travel as the pups leave the vicinity of the Aleutian Islands in their southward migration into the North Pacific Ocean (year 2).

Cooperative studies were also conducted with Russian scientists on the Commander Islands (Soviet Union) to obtain information on age specific attendance patterns of lactating fur seal females, diet of female fur seals determined from the analysis of faecal material, age determination of female fur seals on the basis of vibrissae/pelage characteristics, and potential pathogenic bacterial diseases of fur seals.

Entanglement rates and changes in survival related to entanglement of northern fur seals in marine debris were studied on the Pribilof Islands in July, 1990. NMML scientists conducted 122 roundups to examine (or reexamine) 25,829 juvenile male seals for entangling debris or tags applied in previous years. Data were collected for the rates of entanglement and the relative rates at which tagged entangled and tagged control seals are resighted.

Historical data for territorial male fur seal counts and estimates of fur seal pups born was analyzed to determine how fur seal distribution on the Pribilof Islands changes over time. For a time period between 1912 and 1990, some rookeries showed significant increases or decreases while others remained relatively constant. Over 18 years of fur seal pup necropsy data is being analyzed for trends in causes of death over time, correlations with weather, differences

between sexes, etc. This data has been reported for individual years and has not been analyzed for all years together.

A study correlating pup weight and survival of northern fur seals was completed using pup weights and tag recoveries during the commercial harvest in the 1960's. It was concluded that larger pups have higher post-weaning survival than smaller pups.

A study was begun to investigate possible changes in the number of feeding trips made by lactating female northern fur seals from the Pribilof Islands during the period 1949-1981. Nursing line in the teeth of juvenile males taken in the commercial harvest is being examined in this study, in order to relate changes in foraging trips to possible changes in food availability.

The maximum net productivity level of marine mammal populations has both theoretical and applied significance. However, for natural populations this level has been very difficult to determine, primarily due to a lack of both life history information and an understanding of how life histories change with population abundance. The maximum net productivity level of northern fur seal populations is estimated through the use of extensive computer modelling. Importantly, the results provide a measure of confidence with which any particular estimate can be evaluated.

The pup tagging data for the 1947-68 cohorts of the Pribilof
fur seal population, plus the subsequent harvest and tag-recovery data, have been compiled. The data are being re-analyzed using the Chapman-Junge mark-recapture model. The model permits geographic stratification of the population under study and allows for variable tagging and harvest probabilities among the strata, in this case among the various rookeries on the islands. The study will provide a new profile of the changes in the numbers of fur seal pups born on the islands over the course of the study period.

The numbers of northern fur seal and California sea lion pups born at San Miguel Island again increased in 1990. Counts of northern fur seal pups yielded 1149 in Adams Cove and 649 on Castle Rock. This brings pup production to about 1800 which equates to a population of about 7200 animals. (T.R. Loughlin, C.W. Fowler, R.L. DeLong)

California Sea lion

There were approximately 13,300 California sea lion pups counted on San Miguel Island in late July. In March, 6 adult male California sea lions were captured in Seattle's Shilshole Bay, fitted with radio tags, marked and transported to the California Channel Islands and released to evaluate translocation as a method of mitigating the interactions between the declining steelhead run and sea lions. Four of the 6 animals returned to Washington state waters within 30 to 45 days of their release. The animals travelled over 1,100 nautical miles. One of the

returning animals was subsequently a territorial male on San Miguel Island during June and July. (R.L. DeLong)

Steller Sea lion

Northern sea lion studies during 1990 focused on monitoring population trends and research on foraging. Aerial and shipbased surveys were conducted at Alaskan sea lion haul-outs and rookeries from the Kenai Peninsula to Kiska Island. Results indicated that numbers in most areas had declined by 78% since 1985, which supports the findings of the 1989 survey. Twenty satellite transmitters were deployed on adult sea lions (19 on females) at six rookeries in the Gulf of Alaska and Aleutian Islands. Data reported by these instruments indicated that during summer, animals remained close to the rookeries (within 30 km) and dove to shallow depths (<50 m). However, during winter animals ranged much farther (up to 400-500 km offshore) and dove much deeper (typically over 100 m). Food habits materials were also collected and are presently being analyzed. (T.R. Loughlin)

Northern Elephant seal

Studies of foraging ecology of northern elephant seals were continued in collaboration with Hubbs/Seaworld Marine Research Center. Using microprocessor recorders foraging areas and dive records were obtained from adult males and females. The sexes appear to be separated while foraging in the north Pacific. Males forage in more northern areas from the Eastern Gulf of Alaska westward to the eastern Aleutian Islands and females forage in deep waters roughly 5 degrees on either side of 40 degrees north, westward into the central Pacific. (R.L. DeLong)

Elephant seals

The SWFSC has been monitoring the population of northern elephant seals at San Miguel Island during the winter breeding season by making counts from low level (800-1000 feet) vertical colour photographs taken from an aircraft equipped with a 9-inch or 5-inch format camera. One flight is made in late January or early February when most adults are breeding (peak Season) and a second flight is made in mid to late February (late season) for counting the maximum number of pups produced. Results of counts from all breeding sites at San Miguel Island for 1985, 1986, 1988, 1989, and 1990 show an increase in pups and adult males over the six year period; however, adult females do not show an increase in numbers.

Harbour seals

During 1990, SWFSC and California Department of Fish and Game scientists captured and attached small radio tags on each hind flipper of twelve harbour seals. Three permanent radio receiving stations have been established along the mainland and two stations were established

on San Miguel Island, California. Additionally, the radios were monitored from an airplane and from shore with hand held receivers approximately on a monthly basis while the accumulated data were downloaded from the computers at the permanent stations. These data will be used to estimate the proportion of the seal population ashore during annual surveys conducted by CDF&G and to document movement patterns by time and season.

California Sea lions

The SWFSC also conducted aerial and ground counts of hauled California sea lions at San Clemente Island, San Nicolas Island, and Santa Barbara Island. On San Clemente Island four ground counts were taken in January, April, July and October. Only one ground count took place on each of the other two islands. Aerial photographs were taken at San Miguel Island in July, to count sea lion pups using a Hoppman Viewer Enlarger. From 1986 through 1990 between 11,000 and 12,800 pups have been counted annually from aerial photographs, which have proved useful in combination with ground counts for monitoring California sea lion populations. Current estimated for the California sea lion population are in the range of 67,000 to 107,000 animals. Over three hundred scat samples to analyze food habits were also collected from all three islands. (J. Barlow)

WHALES

Harbour porpoise

The interaction of harbour porpoise and Makah tribal salmon set net fisheries along the Washington state coast were monitored. Fishing effort was lower during the 1990 season than it had been in the past two years and only 13 porpoise were taken in the fishery. Surveys of porpoise abundance conducted during 1990 resulted in estimates of about 850 animals in northern Washington waters. (R.L. DeLong)

Monitoring of porpoise stocks

Two NOAA research vessels, the David Starr Jordan and the McArthur, participated in a four month survey to census dolphins and their habitat in the eastern tropical Pacific (ETP) Ocean. This is the fifth in a series of at least six research vessel surveys to monitor trends in abundance of dolphin stocks. The primary objective of the cruise was to collect information to estimate the density, size and species composition of dolphin schools in the ETP in order to determine the trends in population sizes.

The vessels surveyed along predetermined tracklines during the four month survey. The cetacean sightings from both vessels included 12 species of small cetaceans (several hundred

individuals), 2 species of beaked whales (over 75), and over 100 large whales (mostly Bryde's and sperm whales).

For the fourth year, aerial photographs were taken during the surveys to calibrate observers' estimates of dolphin school size. It is not known whether dolphin observers are making large systematic errors when estimating dolphin school size. Such errors would appear directly as biases in the estimation of dolphin abundance. To resolve the question of bias, a helicopter and an aerial photography programme were incorporated into the dolphin surveys. The helicopter operates from the NOAA Ship Jordan. Two high-resolution aerial reconnaissance cameras are mounted below the helicopter fuselage. Large-format 5 inch photographs are taken of dolphin schools. From these photographs an estimate of the actual number of dolphins in a school can be made and individual observer estimates can be calibrated against the more precise photo estimates. The helicopter flew more than 110 hours during the survey and photographed sixty-eight schools of small cetaceans and 6 large and small whales.

In addition, the second year of genetic stock identification studies using tissue samples was completed. We are using tissue samples to study the stock structure of the species/stocks primarily impacted by the ETP tuna purse-seine fishery: spotted, spinner, striped, and common. At present these four species of dolphins are divided into 13 stocks, based on differences in various morphometric and life history parameters, and gaps or breaks in distribution. The current stock specific quotas on the U.S. fleet are based on these determinations. We intend to employ PCR techniques coupled with direct genomic sequencing for resolving intra-specific genetic differences between population centres, if such differences exist. Tissue samples were collected using a low-powered crossbow from 7 different species of marine mammals. Mitochondrial DNA analysis will be conducted on these samples to determine if there are any discernable stock differences within the species. (T. Gerrodette, A. Dizon)

Hawaiian monk seal

Hawaiian monk seal populations were monitored at five major breeding locations. Beach counts from these locations averaged 592 seals, including pups of the year. The minimum number of pups born was 143, a 23% decline from the 1983-89 average. Weaned pups were tagged at all locations, and adult male and female seals were tagged at Laysan Island. Weaned pups and immature seals were weighed and measured at Laysan Island and at French Frigate Shoals (FFS). Six underdeveloped pups were collected from FFS and brought to Honolulu for rehabilitation. Three yearlings which had been rehabilitated in 1989-90 were released at Kure Atoll, and five healthy weaned pups were transported from FFS to Kure Atoll. Three female pups born at Kure Atoll were maintained in a protective enclosure from April to August. Behaviour and haul-out patterns of seals were closely monitored at Laysan Island as part of

continuing research into the phenomenon of mass attacks, or "mobbings" of adult female seals and immature seals of both sexes by large groups of adult males. (G. Gilmartin)

Biological assessment programmeme

The Southwest Fisheries Center (SWFSC) is examining age-dependent life-history parameters of female spotted dolphins (Stenella attenuata). Initially focusing on the northern offshore spotted dolphin stock, the study is using age at sexual maturation (ASM), percent pregnant, lactating or resting, and calcium resorption, to identify biological changes in life history parameters that may have occurred as a result of the fishery reducing population size relative to pre-fishery condition, as well as those resulting from stock-specific differences.

Calcium resorption is studied in teeth collected from spotted dolphin taken incidentally during tuna fishing since 1968. Calcium resorption is proposed as a potential indicator of stress phenomena related to fishery activities, and degree of the response may be directly related to the severity of the stressor.

Additional life history studies include investigations of the causes of variation in life history parameters due to sampling, measurement, or estimation error rather than natural variation. The emphasis has been on error in age estimation and in methods used to estimate the average age at attainment of sexual maturation. Calibration of growth layers in teeth of captive and wild dolphins has provided data on correct methods of estimating age and likely errors when age is estimated incorrectly.

The observed dolphin kill from the fishery is comprised of 70% spotted, 23% easter spinner, 3% whitebelly, and 4% common dolphins. Reproductive condition as determined from specimens collected during tuna purse-seine fishing in the ETP is expressed as the proportion of mature females pregnant, lactating, simultaneously pregnant and lactating, or resting. For populations below carrying capacity, the proportion of mature females that are simultaneously pregnant and lactating may be the best indicator of a density dependent response. Preliminary results indicate that the common dolphin, the least exploited species, has the highest proportion of females that are simultaneously pregnant and lactating and the smallest number of resting females. The proportions of simultaneously pregnant and lactating mature females for eastern whitebelly and northern offshore spotted dolphins are lower than might be expected for these more greatly exploited stocks that are estimated to be well below carrying capacity. (A. Dizon)

Harbour porpoise

During 1990, the SWFSC staff and California Department of Fish and Game scientists conducted aerial surveys for harbour porpoise along the Central and Northern California coast. Surveys covered over 4,190 km between Point Conception and the Russian River. Within this

area, 77 sightings were made and 157 animals were counted. Aerial surveys were also conducted in a 1112 km area north of the Russian River to the Oregon border with 180 sightings and a total of 309 animals counted. A total of 15 survey days took place between August and October. (J. Barlow)

Bottlenose dolphin population monitoring

Two contract low-level monitoring studies, have completed their third year of data collection and a new low-level monitoring study was initiated. These studies are designed to detect large-scale (halving or doubling) changes in local bottlenose dolphin (*Tursiops truncatus*) populations and to provide an enhanced database from which to monitor future population dynamics. The first, by Mote Marine Laboratory, Sarasota, FL, (G. Patton) is working in Florida's Indian-Banana River complex, to monitor the bottlenose dolphin population, and is replicating aerial surveys for *Tursiops* conducted in 1979. The second, conducted by Dolphin Biology Research Associates, Inc., Sarasota, FL, (R. Wells) is surveying Sarasota and Tampa Bays (Florida) from small boats and using photographic identification techniques to monitor bottlenose dolphin populations there. This is a continuation of a long-term study begun over 20 years ago.
The new low-level *Tursiops* monitoring project, initiated in 1990 through Texas A&M University (B. Wursig), is monitoring populations on the Texas and Florida Gulf coasts. These studies will utilize small boat surveys and photographic identification of individual dolphins, and will establish an archival database for long-term population trend detection.
The Southeast Fisheries Center (SEFC) - Miami Laboratory (L. Hansen) initiated a low-level monitoring study on bottlenose dolphin in Biscayne Bay, (FL). Boat-based surveys and photographic identification of individuals are being used to estimate abundance, monitor trends, and characterize *Tursiops* utilization of this area of high human population density. (G. Scott)

North Atlantic Right Whale Programme: NARWP

The endangered North Atlantic right whale population has been the subject of an intensive, coordinated, multi-institution study since 1986 which focuses on detecting changes and causes of changes in the population size (see NARWP projects below). The overall coordination of this study has facilitated the organization of individual identification and sighting survey data that had been collected by numerous organizations over the past decade, and the integration of that data into comprehensive data bases. Additional studies will be required to implement an Endangered Species Recovery Plan. (T. Smith, Northeast Fisheries Center)

NARWP: Sighting data and habitat use

The Sighting Data and Habitat Use project of the North Atlantic Right Whale Programme

maintains a comprehensive database of all sighting data from cooperating institutions, conducts analysis of these data relative to habitat usage, conducts sighting surveys, and oceanographic studies to determine habitat requirements. (H. Winn, R. Kenney, Univ. Rhode Island, Naragansett)

NARWP: Habitat requirements

The Habitat Requirements project of the North Atlantic Right Whale Programme has focused on measuring the prey concentrations in Cape Cod Bay that are exploited by right whales, with the goal of developing a model of habitat requirements of these animals. Additionally, the identity of animals using the Bay is monitored.

The prey studies focus on understanding the fine scale distribution of zooplankton, both vertically and horizontally. The vertical depths of surface patches (roughly 15 cm) along slicks or frontal areas, appear to be important to right whales feeding on the surface. (S. Mayo, Center for Coastal Studies, Provincetown, MA)

NARWP: Individual identification

This project of the NARWP maintains an archive of individual identification data and photographs from all cooperating institutions, establishes individual identity using the reference catalog of known individuals, and collects additional individual sighting data, primarily from the Bay of Fundy and the Southeastern USA. A photographic catalog was assembled and printed (see list of publications). (S. Kraus, New England Aquarium, Boston, MA)

NARWP: Population dynamics

The Population Dynamics project analyzes of the temporal and spatial dynamics of the right whale in the North Atlantic. The primary goal is the development of a series of mathematical models of the dynamics of the North Atlantic right whale population using the vital rates as estimated from the individual identification data and spatial movement patterns from sightings and other sources. Such models, both spatially defined and more traditional, are designed to help interpret the data being made available from the other NARWP projects, and will help design further sampling to fill in gaps. The existing life history model was used to help evaluate sources of risks to the population, especially in the development of a draft Endangered Species Recovery Plan, and the sighting data were implemented in a Geographic Information System for further analysis. (J. Finn, Dept. of Fisheries and Wildl., Univ. Mass. Amherst.)

Harbour Porpoise Programme: HPP

The harbour porpoise in the Northwest Atlantic has been subject to levels of by-catch in a sink-gill net fishery in U.S. and Canadian waters for several years. The levels of by-catch may be biologically significant. To determine the significance of the by-catch, studies are conducted to estimate total abundance, and to determine seasonal distribution patterns, especially relative to the distribution of fishing activity and fishery resource species (see HPP projects below). This information is synthesized along with estimates of total by-catch and estimates of vital rates to determine the biological significance of the by-catch, and to determine possible approaches to reducing by-catch levels. (T. Smith, NEFC)

HPP: Sighting surveys

New estimates of the abundance of harbour porpoise in the Gulf of Maine and Bay of Fundy are needed in order to evaluate the biological significance of the by-catch of these animals in commercial fishing operations. Because of the strong seasonal movement patterns of the species, initial studies have focused on determining the spatial distribution of the species in the late summer and fall months, the most likely period for a comprehensive sighting survey. This year a survey was conducted in Canadian waters southward along the western shore of Nova Scotia to the tip, and northward towards Halifax, documenting the nearly continuous distribution of the species throughout this region. Future studies will be focused on using this information to design and conduct a comprehensive sighting survey to estimate the density of animals. (T. Polacheck, NEFC)

HPP: Sighting survey methods

The use of shipboard sighting surveys to determine the abundance of cetaceans has become routine, but many of the underlying assumptions of this approach have not been adequately tested. Because of their behaviour patterns, some of these assumptions may be violated when such methods are applied to harbour porpoise. Additionally, the seasonal high density of harbour porpoise in the Bay of Fundy provides an experimental setting that allows testing of some of the underlying assumptions of line transect surveys which may have applicability more generally. Several aspects of sighting surveys have been investigated over the past few years, and analyses of previously collected data were completed and new experiments designed. Further field experiments were conducted as part of a cruise in August of 1990, and analyses are underway. (T. Polacheck, NEFC)

North Atlantic Humpback Whale Programme: NAHWP

The endangered North Atlantic humpback whale population has been the subject of a series of research projects over the past several years, both within the Gulf of Maine and more

generally across the North Atlantic and in the Caribbean. The NMFS is nearing finalization of an Endangered Species Act Recovery Plan for this species. Projects on the distribution and habitat requirement and on maintaining a centralized photographic catalog were supported this year. Overall coordination of research on this species is needed to ensure that the status of the species is considered in the appropriate spatial context, and especially that the complex breeding and social behaviour of this species is properly accounted for. A series of international meetings were held among scientific researchers with active projects studying this species, and a two year research plan was developed that involves sampling all known winter and summer grounds for both photographic and biopsy sampling for estimating total and regional abundance, and for genetic studies. (T. Smith, NEFC)

NAHWP: Distribution and habitat usage of large cetaceans

The habitat requirements of humpback and fin whales which use areas around Cape Cod seasonally are not well known. Such high use habitats may be extremely important to some large cetacean populations, and identifying the factors that attract and maintain seasonally high concentrations is important to understanding the dynamics of such populations. Studies involve sighting surveys, individual identification, oceanographic sampling for physical and biological water column characteristics, and behavioral observations. Data collected will be compared to similar data collected since 1978 to determine longer term changes. The study area was expanded based on the results of last year's work, and surveys were conducted across the Gulf of Maine. (C.A. Mayo, Center for Coastal Studies)

NAHWP: Humpback whale individual identification

The archiving and identification of individual humpback whales from photographs collected throughout the northeastern USA has been centralized at the College of the Atlantic for several years. Individual scientists contribute to this archive, and the photographs that are submitted are compared to the catalog of known individuals for identification. The resulting data are useful for determining vital rates such as reproductive rates, and for estimating total population size. The expansion of focus beyond the Gulf of Maine has resulted in this project taking on a primary coordinating role for individual identification of humpback whales across the North Atlantic. (S. Katona, Coll. of the Atlantic, Bar Harbour, ME)

MARINE MAMMALS IN GENERAL

Impacts of Exxon Valdez oil spill

Possible impacts from the Exxon Valdez oil spill were conducted on harbour seals, Steller sea lions, killer whales, and humpback whales in Prince William Sound, Alaska, during 1990. The studies included assessment of abundance and distribution, analysis of pinniped tissues for hydrocarbon concentration and pathology, and possible changes in use of important feeding areas over time. Preliminary results indicate likely affects on harbour seals and killer whales, but the affects on Steller sea lions and humpback whales are equivocal. Studies on harbour seals and killer whales will continue in 1991. (T.R. Loughlin)

Marine mammal contaminants studies

Chemical and biochemical analyses of chemical exposure in both healthy and stranded marine mammals were carried out in 1990. Biochemical analyses, which included measurements of cytochrome

P-450 and contaminants bound to DNA, were partially successful because, in many cases, the quality of tissues was variable, particularly those from stranded animals. Chemical analyses, however, yielded data primarily on levels of chlorinated compounds (e.g., PCBs, DDTs, chlorinated pesticides) and several metals in tissues.

The first study titled "Chemical and Biochemical Analyses of Marine Mammals" provided data from several Alaskan pinnipeds and Atlantic pilot whales. Tissue samples were analyzed from 9 harbour seals, 8 Steller sea lions, 2 northern fur seals and 5 pairs of pilot whales (mother and fetus). Tissues, especially blubber, from several of the Steller sea lions contained concentrations of chlorinated compounds, e.g., PCBs comparable to those in pilot whales from the East Coast. Data obtained from the pilot whales indicated transfer of chlorinated compounds from mother to fetus.

The second study, "Contaminants in Gray Whales" provided data on chlorinated compounds (e.g., PCBs, DDTs) and several metals from tissues obtained from 6 stranded gray whales, with most of these occurring in 1990. The levels of chlorinated contaminants and most metals were generally very low and would not be viewed as the cause of death of the whales. The concentration of aluminum in one sole brain sample available for analysis was similar to literature value, apparently elevated. This finding is believed to be a consequence of their feeding habits and may not be attributable to pollution. (Usha Varanasi)

The Southeast Fisheries Center (SEFC) is monitoring cetacean stocks in the NMFS Southeast Region, which includes the western north Atlantic south from the Virginia-North Carolina border, and the U.S. Gulf of Mexico. Work is primarily conducted through contracts for low-

level bottlenose dolphin population monitoring, SEFC-conducted surveys, and marine mammal stranding investigations. (B. Brown)

Marine mammal surveys

A survey of marine mammals in the northern Gulf of Mexico (L. Hansen) was conducted aboard the NOAA R/V Oregon II from May 12 to 26, 1990 to evaluate the feasibility of using ship-based surveys to determine marine mammal distribution and abundance, and population trends in offshore waters of depths < 3300 m. An average of approximately six cetacean herds were sighted each day. Cetacean sightings over 1986 km of trackline averaged 0.043 herds/km or 0.42 animals/km. The pantropical spotted dolphin (*Stenella frontalis*) and bottlenose dolphin were the most common of 36 species identified from 96 marine mammal sightings.
The SEFC-Pascagoula (MS) Laboratory in cooperation with the Minerals Management Service, conducted aerial surveys of cetaceans in the northern Gulf of Mexico for 6-8 days per month from January through June, 1990 (K. Mullin). The study area was the continental slope south of Alabama, Mississippi, and Louisiana extending for 44 km southward from the 200 m depth contour. The six surveys resulted in 145 cetacean herd sightings consisting of 4,199 individuals of 15 species. Pantropical spotted dolphin and striped dolphin (*S. coeruleoalba*) were the most frequently observed species. (L. Hansen)

Marine mammal stranding investigations

In response to an unusually high number of bottlenose dolphin strandings on the Gulf coast during January-May 1990, particularly in Texas (approximately 166 reported stranded as of June 1990, and 161 recovered),the SEFC increased NMFS involvement with marine mammal stranding investigations in the region. Strandings along the Texas coast recovered during January, February and March were 43, 39 and 65, respectively, and are the highest on record for those months. Texas strandings for January were 4.4 times the 1986-89 average, for February, 2.3 times the 1986-89 average, and for March, 1.5 times the 1986-89 average. The cumulative total of Texas strandings for January-March was 2.1 times the 1986-89 average.
A total of 113 animals, about 40% of the total recovered strandings in the Gulf of Mexico, were recovered during the same period along the coasts of Mississippi (35 dolphins), Alabama (33), Louisiana (23), and 22 along the Florida coast from Tampa Bay to the Alabama border. Most of the Mississippi strandings were recovered during March (20 of 35), most of the Florida strandings during February (13 of 22), and most of the Louisiana strandings during April (13 of 23).
The 1990 Texas strandings were analyzed by the SEFC-Miami Laboratory to examine the influence of a number of environmental variables on stranding rate. The SEFC-Beaufort Laboratory has investigated the possible role of brevitoxin in the Gulf coast strandings. Tissue

samples were sent to the US Armed Forces Institute of pathology (AFIP) and the Northwest Fisheries Center for histological studies and contaminant analysis, respectively.
The Miami laboratory and the Southeast Marine Mammal Stranding (SEUS) Network Director consulted in an effort to upgrade both the quantity and quality of data obtained from stranding events. SEFC investigation of marine mammal strandings has evolved into a multi-disciplinary approach focusing on population abundance and trends; stock identification; age structure of stranded animals; and food habits. Other themes relate to extent and causes of mortality, and include studies of biotoxins, contaminants, pathology (including bacteriology and virology), and efforts to recover stranded animals.

Research on marine mammals by the North East Fisheries Center (NEFC) increased in 1990 with creation of a new group of six scientists and technicians dedicated to the study of fishery by-catch and ecological interactions of these species in the Northwest Atlantic. Their research is primarily an expansion of work effort done in the past two years. In addition, the programme of placing observers aboard domestic and foreign vessels has been continued and expanded, and is providing valuable information on the by-catch of marine mammals, primarily small cetaceans. The several projects conducted in 1990 are described below.

Commercial fishery monitoring

Significant by-catch of several species of marine mammals has been demonstrated in waters between Cape Hatteras and the Bay of Fundy, occurring primarily in three fisheries: Gulf of Maine sink-gill net fishery, Mid-Atlantic and S. New England swordfish gillnet fishery, and the Mid-Atlantic and S. New England mackerel trawl fishery. Observer sampling of domestic fishing activities was begun in FY89 under a data collection contract, wherein the intensity of sampling of different fishing fleets is adjusted to meet a complex set of objectives, including monitoring marine mammal by-catch. Observer sampling of foreign fishing activity begun in 1977 continued. (D. Christensen, P. Gerrior, NEFC)

Predation and spatial co-occurrence

Predation by marine mammals on various fishery resources in Northeastern USA waters has been estimated to be substantial. The effects of these predatory relationships in either reducing the amount of fishery resources available to fishermen, or in fishing reducing the amount of prey available to marine mammals, are not sufficiently known to determine the significance for management of either fishing or mammal populations. Stomach samples from animals killed during commercial fishing operations provide some indication of predation patterns, but the samples are limited in number and may be biased by the target species of the fishery. Seasonal distribution patterns of marine mammals and their prey species provides more

generally reliable information on possible predation patterns. Existing and new data on spatial distribution are being assembled and analyzed using new Geographic Information System technology to study the relationship of cetacean distribution, prey species distribution, and environmental features. (G. Waring, NEFC)

Fishery resource and marine mammal sighting surveys

Systematic sighting surveys for marine mammals, seabirds, and sea turtles have been conducted for several years aboard Northeast Fisheries Center vessels in conjunction with fishery resource surveys. The area covered is from Nova Scotia to Cape Hatteras, seaward to roughly the 100 fathom depth contour. The sighting effort was discontinued this year because of a reduction in fishery resource surveys, and loss of the R/V Albatross from the NEFC fleet. This year data collected over the previous decade were further analyzed, and scientific papers prepared. (P.M. Payne, Manomet Bird Observatory)

Cetacean habitat survey

Several species of cetaceans which are killed during commercial fishing operations in both the winter and the summer-fall period are distributed in the Mid-Atlantic Bight and Southern New England from the continental shelf seaward to at least the Gulf Stream. The distribution patterns at any season are poorly known because few systematic sighting surveys have been conducted seaward of the 1000 m depth in this region, and ideas about seasonal movements are derived from only nearer shore surveys. A series of simultaneous fishery resource and cetacean sighting surveys will be required over the next several years to define the seasonal distribution and the factors determining cetacean habitat. In 1990 an initial survey was conducted in July along the Gulf Stream from Cape Hatteras north to Georges Bank, and along the southern edge of Georges Bank in areas fished by the swordfish gill net fleet. (G. Waring, NEFC)

Marine mammal biological sampling

Carcasses of marine mammals caught in commercial fishing operations are frequently made available by fishermen for sampling at sea by observers and as whole animals returned to port. Samples include those for routine life history studies (e.g. teeth and reproductive organs), tissue and biochemical studies, and stomachs. A variety of sampling protocols and sample storage techniques are utilized, and special collections made on request. Stomach contents samples are of special interest, and are analyzed to determine the range of prey species consumed in different areas and by different species. This year collections were expanded to take advantage of the greater number of samples available from the expanded observer programme. A catalog of cetacean specimens sampled over the past five years was prepared,

and existing samples at NEFC and at the Smithsonian Institution were catalogued for entry into a database for tracking collection, storage, and analysis of samples. (J. Nicolas, NEFC)

USSR

A.A. Elizarov

SEALS

Investigations on seals in the Greenland Sea (harp seal and hooded seals) and harp seal in the White and Barents Seas have been carried out in 1990 according to the programme adopted at the 18th Session of the Mixed Soviet/Norwegian Fisheries Commission.
The main aims are:
- to assess current stock status;
- to set allowable catch;
- to study ecology and biology.

A body of material: investigations on hooded seal at early stage of forming of moulting rookeries were conducted in the Greenland Sea. Distributions, migrations and behaviour of mammals were studied. 800 specimens of this species were analyzed for age, reproduction, state of hair cover, feeding, morphometry and fatness. Ecology of harp seal when moulting is continued to be studied; in the total 780 specimens were examined. Distribution and migrations of harp seal were studied in the White Sea. 2000 specimens have been examined. In total 3642 pups and 5 adult females have been tagged on breeding grounds.
Analysis for the data available gives good reasons to state a status of seal stocks in the Greenland Sea to be stable.
No year classes of mammals born in 1968-89 are registered in age structure of harp seals population. Females at age 6-9 make up a minor portion.
Abundance of grey seal and Baltic seal populations is still very low. The state of Lagoda seal population is satisfactory. Lower DDT and PCB levels are registered in examined animals from the Baltic region. (All Union Research Institute of Marine Fisheries and Oceanography, VNIRO).