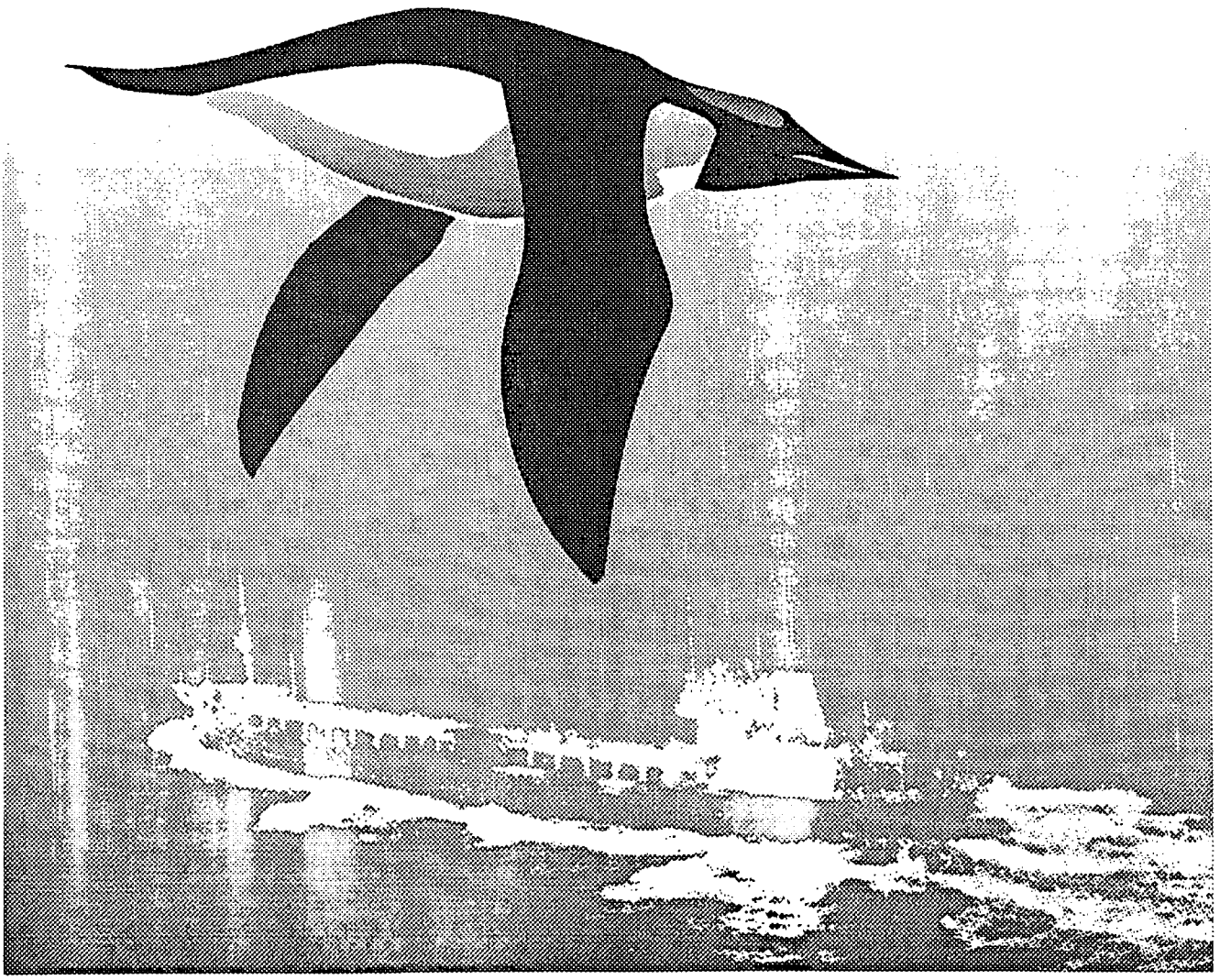
MIGRATORY BIRDS OIL SPILL CONTINGENCY PLAN

FOR THE MARINE ENVIRONMENT OF THE ATLANTIC REGION

March 1994



Canadian Wildlife Sevice
Environmental Conservation Branch
Environment Canada
Atlantic Region

TABLE OF CONTENTS

1. BACKGROUND

1.1 INTRODUCTION

When oil is spilled into the marine environment its most serious impacts are on seabirds and other animals which inhabit the air-sea interface. The experience gained in combating oil spills in recent years has shown that their impacts extend beyond the fauna of the coastal zone, which includes waterfowl, loons, shorebirds, mink, river otters, ospreys, etc. Marine oil spills are having their most serious impact on species that spend most of their lives at sea. These are the pelagic seabirds such as auks, fulmars and shearwaters, birds with which most people are unfamiliar.

Most of the oil entering the sea comes from land sources, and the greater part of this is dispersed in water runoff. In this form it is not a major threat to wildlife. Oil released directly into the oceans is most damaging to marine birds. Marine accidents resulting in oil discharges are well publicised and they take a heavy toll of seabirds, but deliberate releases of oil by marine traffic have a greater cumulative effect on seabird populations. However, because these discharges of oil are frequent and generally relatively small, it is difficult to design an effective environmental response strategy to combat them.

Land spills also release major amounts of undispersed oil into coastal waters, and in such cases, coastal seabirds are usually the first victims. If the oil is removed from the water surface by being carried ashore, the danger to bird populations is diminished. If, however, winds and currents carry the oil out to sea it becomes a major threat to pelagic seabird populations.

In the Maritime Provinces waterfowl are the usual victims of coastal oil spills. Such oil spills can have a devastating effect on eiders, scoters and a variety of other seaducks, but these species have the potential for recovery, perhaps within a decade given favourable conditions. This is because they produce multiple egg clutches and have a short period of sexual immaturity. Shorebirds are at greater risk from oil spills in the Bay of Fundy than in other parts of this region, though Piping Plovers are vulnerable at their breeding sites throughout the Maritime Provinces and in Quebec. In Newfoundland and Labrador shorebirds are a concern at only a few sites.

Coastal oil spills in Newfoundland, Labrador and the northern parts of the Gulf of St. Lawrence also have the potential of causing serious ecological damage. As with offshore oil-spills anywhere in the Atlantic Region, coastal spills in the northerly parts of this region in breeding season will affect pelagic seabird species, particularly puffins, murres and Razorbills. These species lay only a single egg and typically have a five year period of sexual immaturity. Seabird populations will take decades to recover from population reductions even in good conditions. Because these species also sustain mortality from gill net entanglement and hunting, their recovery potential is even further reduced.

Major oil spills which have occurred recently in western Canada and Alaska have underlined the need for specific contingency plans to guide those involved in the protection and rehabilitation of oiled birds. Such plans, to be effective, must consider both chronic and catastrophic oil pollution events. An early application of this plan will be in co-ordination of CWS/provincial preparedness for the salvage of the *Irving Whale*, an oil barge that sank north of Prince Edward Island in 1970.

1.2 SCOPE OF THE PLAN

This plan specifies actions to be taken by the Canadian Wildlife Service (CWS), Atlantic Region in the event of a marine oil spill. Both large and small discharges are addressed with no attempt to concentrate on the "mega-spill". This plan does not replace any elements of the *REET Atlantic Region Contingency Plan for Spills of Oil and Other Hazardous Materials* but, elaborates on those parts of it that pertain to migratory birds. It is thus complementary to the REET (Regional Environmental Emergencies Team) and Canada-United States Joint Marine Pollution Contingency Plans.

All migratory bird species that may be affected by marine oil spills, and their habitats in marine and inter-tidal waters are within the purview of this plan. At present the plan addresses oil spill response requirements for species managed by the Canadian Wildlife Service, but it is anticipated that it will be expanded or combined with the plans of other agencies to form a blueprint for dealing with all wildlife species affected by marine oil spills.

It is not within the scope of the plan to identify all potential participants in migratory bird-related oil spill response. But information and reporting paths are specified and responsible officers in organisations with interests in or responsibility for wildlife are identified.

1.3 CONTRIBUTING AGENCIES

Many agencies, in addition to CWS, have an interest in the protection of migratory birds and other wildlife in the event of an oil spill. They include government agencies with legislated mandates for wildlife and habitat management, as well as wildlife interest groups.

1.3.1 Provincial Wildlife Agencies

Provincial governments are responsible for management of all wildlife species with the exception of migratory birds and marine mammals. This responsibility includes bird species which are not specified in the Migratory Birds Convention Act, species such as cormorants, eagles, ospreys, and kingfishers, as well as mammals such as otters and mink. All these species are threatened by marine oil spills. It is necessary therefore, to co-ordinate federal and provincial efforts in planning for contingencies that can affect wildlife species managed under the respective mandates.

1.3.2 Co-operating Non-Government Agencies

Members of non-government wildlife-oriented organisations may want to help as volunteers in the event of an oil spill. The Canadian Wildlife Service will take advantage of the expertise and resources that exist in non-government wildlife interest groups, particularly those with a migratory birds orientation. In addition, universities are a source of specific expertise relating to various aspects of oil spill response.

Tri-State Bird Rescue and Research, a US organisation specialising in cleaning oiled birds set up an office in the Maritime Provinces in 1994. It has had considerable experience in organising bird cleaning operations and its manuals are widely used in bird rescue operations. Tri-State will be offering courses on bird cleaning and aftercare to interested individuals and organisations in Canada. It is expected that this organisation and provincial Societies for the Prevention of Cruelty will have a central role in oil spill responses involving of oiled birds. Equipment and supplies for oiled bird rehabilitation are maintained in a trailer by PIER Atlantic in Dartmouth. A core group of respondents will be trained in oiled bird rescue so that the PIER Atlantic trailer can be used effectively in time of need.

1.4 THE ROLE OF THE CANADIAN WILDLIFE SERVICE

With the Migratory Birds Convention Act of 1916 the Government of Canada undertakes responsibility for the conservation and protection of migratory birds. The Canadian Wildlife Service administers that act and is responsible for the management of migratory birds involved in an oil pollution incidents.

In reacting to marine oil spills the responsibilities of CWS include:

- providing information on migratory bird resources at risk to the On-Scene-Commander through the Regional Environmental Emergencies Team
- documenting the effects of oil-spills on migratory birds
- issuing permits which allow the use of firearms and other pyrotechnic devices for the for the dispersal of birds, and for bait stations which attract birds to non-polluted areas
- co-operating with agencies that work to remove oil from the marine environment, thus reducing the chances that birds will come into contact with oil
- providing leadership and co-ordination to agencies or groups that wish to attempt to clean oiled migratory birds
- issuing permits which allow the collection, transport and cleaning of oiled birds and their maintenance in captivity while they are recovering
- issuing permits which allow others to kill migratory birds that are too badly oiled to survive.

2. ORGANISATION

2.1 FEDERAL ACCOUNTABILITY

The Environmental Protection Branch of Environment Canada is the federal government agency responsible for ensuring that appropriate reporting, surveillance and response mechanisms are in place to deal effectively with environmental emergencies. The Regional Environmental Emergencies Team co-ordinates the efforts of government and industry in their response to environmental emergencies. It consists of representatives of federal, provincial, municipal and industrial organisations which have a role in emergency response. Within Environment Canada, the Atmospheric Environment Branch provides weather, sea state and ice information, slick and airborne contaminant trajectories; the Environmental Conservation Branch has expertise on migratory birds and the Environmental Protection Branch has responsibility for preparing REET contingency plans, undertaking emergency countermeasures, chairing REET and co-ordinating environmental advice.

2.2 CWS REGIONAL AUTHORITIES AND EXPERTISE

Ultimate responsibility for CWS's response to marine oil spills in the Atlantic Region lies with the Regional Director, Environmental Conservation Branch. The delegation of this authority recognises a Maritimes District and a Newfoundland and Labrador District. This is in keeping with geographic realities as well as the organisational structures of major REET

players including Environmental Protection and the Canadian Coast Guard. For purposes of reacting to marine oil spills and dealing with REET, the Regional Director has designated Regional and District Co-ordinators as follows.

- Atlantic Region ..... Manager, Newfoundland and Labrador: (902) 426-6314
- Maritimes District .....Wildlife Biologist, Marine Issues: (902) 426-6052
- Newfoundland and Labrador District ..Wildlife Biologist, Populations: (709) 772-5585

The above listed District Co-ordinators will act as the first line of contact in the event of an emergency and will be accountable for all CWS input to REET. Other CWS Atlantic staff have in - depth knowledge of specific parts of the Region and its biota. Those who may be called upon to give advice on specific regions are listed in Annex A.

2.3 CWS NATIONAL STRIKE TEAM

The Canadian Wildlife Service has developed oil spill response expertise in most of its Regions. In the event of an emergency of such magnitude that it cannot be managed with only regional resources, experts and equipment from other CWS Regions will be requested to assist CWS Atlantic. This response mechanism has been formalised into a CWS National Strike Team for Oil Spill Response.

Each Regional Director will appoint a National Strike Team Co-ordinator who will mediate regional input to the National Strike Team and maintain data on regional oil spill response expertise, and capability. The National Strike Team may be mobilised by the CWS Director General at the request of the Regional Director, Environmental Conservation, and in consultation with the Regional Director General. Funding for Strike Team response will come from an emergency fund administered by the Director General, C.W.S. and from the Region which requests Strike Team mobilisation.

2.4 SHARED RESPONSE WITH OTHER CWS REGIONS

2.4.1 Quebec Region

It is possible that oil spills will occur that will affect waters off the coasts of both the Atlantic and Quebec regions as defined by Environment Canada. Such scenarios are possible at Chaleur Bay, between Prince Edward Island and Iles de la Madeleine, and between the Quebec "North Shore" and Newfoundland and Labrador. In these cases CWS Atlantic authorities specified in Section 2.2 will function in co-operation with CWS Quebec Region authorities listed in Annex A.

2.4.2 Western and Northern Region

It is possible that oil spills will occur that will affect waters off the coasts of both the Atlantic and Western and Northern regions as defined by Environment Canada. Although the two regions are not joined by land, such scenarios can occur in the northern areas of the Labrador Sea and Hudson Strait. In these cases the CWS Atlantic authorities specified in Section 2.2 will function in co-operation with Western and Northern Region authorities listed in Annex A.

2.5 PARKS CANADA

The participation of the Parks Canada in oil spill response efforts is co-ordinated through its representative on REET. An oil spill contingency plan has been prepared by each National

Park which details that park's oil spill response commitments and strategy. In general, warden staff will be extensively involved in the response to marine oil spills that have a real or potential impact on any National Park.

In a major oil spill situation in the vicinity of a park, it is expected that Park staff will become involved in the REET response and that park equipment such as boats and snowmobiles may be mobilised to assist. Where there is a major impact on migratory birds, and a requirement for an oiled bird management program to be set up, parks facilities may become available for oiled bird triage, treatment and euthanisation centres.

2.6 PROVINCIAL GOVERNMENT AGENCIES

Although the administration of the Migratory Birds Convention Act is assigned to CWS, provinces have considerable involvement in management of migratory bird populations. This involvement is reflected, for example, in joint Federal-Provincial waterfowl management plans. Provincial involvement in oil spill response also derives from ownership of habitat. The majority of habitat critical for migratory birds is provincially owned and a significant proportion enjoys provincially legislated protection.

Management of those bird species not specified in the Migratory Birds Convention Act as requiring protection has devolved to the provinces. Several of these species, including hawks, eagles, cormorants etc., are vulnerable to oil spilled into the marine environment. Provincial wildlife and environment agencies also have widely distributed field staff who can play a central role in oil spill reporting, investigation and response. CWS will endeavour to co-ordinate federal/provincial migratory bird oil spill response.

It was agreed at the Atlantic Wildlife Directors Meeting of 25 January, 1994, that there is a need for a core, within each provincial wildlife agency, of people trained to respond to oiled-wildlife reports. CWS will co-ordinate a course on oiled wildlife management for CWS Regional Response Team members and provincial nominees. This course will involve training by Coast Guard, Tri-State, provincial SPCs, and PIER Atlantic on all aspects of wildlife-related oil spill response. It will be offered in 1994 and in future years as needed.

2.6.1 Nova Scotia

Department of Natural Resources, Wildlife Division

The prime contact for co-ordinating the input of the Department will be the Manager, Wildlife Resources (Non-Game) or, in his absence, the Manager, Wildlife Resources (Wetlands and Waterfowl) Kentville. The names, positions and telephone numbers of senior Wildlife Division staff are provided in Annex A. It is anticipated that there will be a substantial reliance on subdivision staff in the execution of oil spill countermeasures.

2.6.2 New Brunswick

Department of Natural Resources and Energy, Fish and Wildlife Branch

The overall co-ordinator for the Branch will be the Project Leader, Wetlands and Coastal Habitat Project. Specific departmental expertise is identified in Annex A.

2.6.3 Prince Edward Island

Department of Environment, Fish and Wildlife Branch

Prince Edward Island Marine Spill Support Plan charges the provincial Fish and Wildlife Branch with responsibility for any matters relating to oil damage to fish or wildlife. Given that

CWS has no staff on PEI, a co-operative arrangement with the Fish and Wildlife Branch ensures that expertise is available for timely front line reaction in the event of an oil spill. The primary contact and overall co-ordinator of the Branch's activities will be the Waterfowl and Fur-bearer Biologist. Other key personnel are listed in Annex A.

2.6.4 Newfoundland and Labrador

Department of Tourism and Culture

Within the Department of Tourism and Culture the Wildlife Division has primary responsibility for wildlife management. However, the Parks Division has a mandate for management of five Seabird Ecological Reserves which contain a very large proportion of the total North Atlantic breeding population of several seabird species.

Wildlife Division

The primary Wildlife Division contact in the event of an oil spill will be the Chief, Information and Education, who is particularly knowledgeable about the large seabird breeding colonies.

Parks Division (Seabird Ecological Reserves)

The overall co-ordination of the Parks Division's reaction will be carried out by the Chief of Planning and Development. There would be substantial reliance on regional staff (Regional Supervisors) to institute any emergency measures within the capability of Divisional resources. Key personnel are listed in Annex A.

2.7 WILDLIFE INTEREST GROUPS

The coastlines of the Maritime Provinces are, for the most part, accessible by road and there is a well distributed network of both professionals and potential volunteers to assist in the event of a serious oiling incident. The situation prevailing in Newfoundland and Labrador is very different. In Insular Newfoundland a number of local naturalist and wildlife societies exist but the coastline is less accessible. On the Labrador coast the human population is sparse and there are no nature-focused citizens organisations. Here access to the coast is most difficult even in summer when the waters are ice free.

In addition to the provincially based organisations, local committees of Ducks Unlimited can provide personnel with an extensive knowledge of the waterfowl of many coastal wetlands which may be affected by oil spills. Their local knowledge will be of use in the design of specific wetland response strategies. The current addresses and phone numbers of organisations which may contribute to oil spill response are listed in the contact list appended as Annex A.

2.7.1 Nova Scotia

The Nova Scotia Bird Society is an organisation of individuals with a special interest in birds. Many members are knowledgeable about near-shore marine bird distributions from activities such as Christmas bird counts and other field trips. Depending upon the location and time of year, some members may be available on a volunteer basis to assist in the assessment of damage by censusing oiled birds. *Halifax Field Naturalists* is a more broadly based organisation and its members have a wide range of expertise. It is expected that, in an emergency involving oil impacts on sensitive shore areas and on marine birds, these organisations could function to co-ordinate amateur response.

The *Nova Scotia Marine Mammal Stranding Network* is established across Nova Scotia to co-ordinate the rescue of stranded marine wildlife. Its chief focus is on disabled marine

mammals but its concerns and expertise extend to marine turtles and birds. The *Nova Scotia Society for the Prevention of Cruelty* maintains animal shelters at four locations in the province and will, with the Canadian Wildlife Service, work to ensure humane treatment of oiled wildlife and provide expertise in animal care. The *Nova Scotia Raptor Rehabilitation Centre* at the Head of St. Margarets Bay, near Halifax, will be a resource, particularly for oiled raptors, but their expertise in wild bird maintenance will be valuable in any situation where wild birds are held for cleaning. *The Nova Scotia Wildlife Federation,* and its contributing associations, have members who are practiced in wildlife identification and have knowledge of local conditions. They may be available for consultation or as volunteers in managing the capture and rehabilitation of oiled wildlife.

2.7.2 New Brunswick

In this province two major organisations will serve as contacts for volunteer involvement in oil spill response. Members of *The New Brunswick Wildlife Federation* and *The New Brunswick Federation of Naturalists* have a variety of out-door and biological skills and have, also, the interest in participating in conservation efforts. *Tri-State Bird Rescue and Research* has recently set up an office in New Brunswick. This American organisation has an expertise in cleaning oiled birds. The *New Brunswick Society for Prevention of Cruelty* maintains animal shelters throughout the province and has experience and knowledge of the requirements and standards for animal treatment and care.

2.7.3 Prince Edward Island

The PEI Natural History Society and the *PEI Wildlife Federation* are the organisations most concerned with wildlife preservation in Prince Edward Island. Members of both organisations are likely volunteers in efforts to assess or redress oiled bird problems in the province. *The Island Nature Trust* is more particularly focused on habitat preservation. Members of *The Prince Edward Island Stranding Network* are knowledgeable concerning wildlife and have a frequent presence on beaches. It is likely that oiled bird reports will be received from Stranding Network members and it is probable that members will become involved in bird rehabilitation efforts. The *Canadian Co-operative Wildlife Health Centre,* with an Atlantic regional office located at the Atlantic Veterinary College, can provide expert advice and diagnosis of wildlife health and animal care problems.

2.7.4 Newfoundland and Labrador

Of the Atlantic Provinces, Newfoundland and Labrador is experiencing the most difficulty with chronic oil pollution. One of the positive results of this situation is that some expertise in the capture and rehabilitation of oiled birds has been developed there, not only among CWS staff, but also among wildlife interest groups and individuals who have acted as volunteers. The *Newfoundland and Labrador Environmental Association* has experience in the capture and rehabilitation of oiled birds and is particularly well positioned to assist in countermeasures for spills occurring on the Avalon Peninsula. *The Wilderness Society* and *The Natural History Society of Newfoundland and Labrador* are likely sources of volunteer help and expertise in Eastern Newfoundland. *Tuckamoor Club* members are likely to be available as volunteers in the event of a spill on the west coast of Newfoundland.

2.8 INTERNATIONAL LINKAGES

2.8.1 USA and State of Maine

Oil spills in the outer Bay of Fundy and in the George's Bank area can affect migratory birds in waters under both Canadian and United States jurisdiction. In such events contacts with US agencies will be established under the REET mechanism. However, direct contacts with

US wildlife agencies will be established by CWS to facilitate exchanges of data. It may be necessary, for instance, to use both CWS Pelagic seabird census data and comparable data derived from files held at Manomet Bird Observatory.

2.8.2 St. Pierre et Miquelon (France)

Oil spills involving the waters of southern Newfoundland and St. Pierre et Miquelon can have a serious impact on migratory birds shared by Canada and France. These include, not only seabirds, but also marine waterfowl. The CWS accountable officer will be the District Co-ordinator for Newfoundland and Labrador and area expertise will be provided as per Annex A. The primary contact in St. Pierre will be with Services de l'Agriculture.

3 OPERATIONS

3.1 INFORMATION SOURCES

The assignment of migratory bird experts on a geographic basis, along with the use of outside expertise, will ensure that information on the resources at risk is readily available for reaction through the REET process or, in the case of smaller spills, for communication with other co-operators. However, situations will arise where it is necessary to refer to documented sources of information. The following should be used.

- Gazetteer of Marine Birds in Atlantic Canada; an Atlas of Seabird Vulnerability to Oil Pollution
  - Labrador Marine Ecoregion
  - Atlantic Newfoundland Marine Eco-region
  - Gulf of St. Lawrence Marine Eco-region
  - Atlantic Nova Scotia Marine Eco-region
  - Bay of Fundy Marine Eco-region

- Revised Atlas of Eastern Canadian Seabirds: Brown, 1986
- Atlas of Eastern Canadian Seabirds: Brown, *et al.*, 1975
- Wetlands Inventory for New Brunswick, Nova Scotia and P.E.I., Smith, 1989
- Aerial Waterfowl Surveys: Maritimes; 1960 to 1987. CWS Sackville, N.B.
- Researchers Guide to Seabird Colonies in Newfoundland: Cairns *et al.* 1989
- The Avalon and Burin Peninsulas; an Ecological Land Survey: Hiscock, 1981
- The Northeast Coast of Newfoundland; an Ecological Land Survey: Hiscock & Maloney, 1983

3.2 REPORTING

Departmental reporting procedures for oil spills are detailed in the *Regional Environmental Emergency Team Atlantic Region Contingency Plan for Spills of Oil and Other Hazardous Materials*. Reporting procedures outlined herein are intended to be an amplification thereof, rather than a substitute for them.

Over all, chronic oil pollution of the oceans takes a heavier toll of marine birds than do the major, well publicised catastrophic events. Spills which warrant a full REET response are relatively rare. For most small spills the full REET response does not, and cannot, be expected to "kick in". Because of their impacts on seabird populations, it is important that the reporting procedure for these smaller spills be understood and followed.

All marine oil spill incidents with a potential for affecting migratory birds should be reported to the respective CWS District Co-ordinator who will, in turn, inform the Manager, Newfoundland and Labrador who will inform the Director, Atlantic Region. In situations where the potential impact on migratory birds is judged to be severe, the Regional Director will inform the Director General of the Canadian Wildlife Service. He may also liaise with the CWS Director General and the Directors of other CWS Regions to initiate mobilisation of the CWS National Strike Team for Oil Spill Response. As appropriate, the District Co-ordinators or the Manager, Newfoundland and Labrador will contact their counterparts in neighbouring jurisdictions including Quebec and Western & Northern Regions of CWS, the State of Maine and the government of St. Pierre et Miquelon.

CWS authorities at all levels will ensure they have input to any DOE reports to the media concerning scientific or technical aspects of impacts of marine oil spills on migratory birds. Most marine oil spills are reported, in accordance with REET procedures, to CWS by the Environmental Protection Branch (EPB), Dartmouth for the Maritimes, or EPB, St. John's for Newfoundland.

3.2.1 Spill Reports from EPB to CWS:

- Information provided by EPB is recorded in a computerised database and each report received is written up as a memo to file.

- Information on birds or habitat at risk is provided to EPB and the press as required.

- The Regional Co-ordinator or the Manager, Environmental Conservation Branch (ECB), Newfoundland and Labrador decides if further action is required. No immediate action may be required if, for instance, the spill is small and little damage is expected, if the spill is in an area not heavily used by migratory birds, or if an EPB or qualified provincial officer is at the scene or en route.

3.2.2 Oiled Bird Reports to CWS from sources other than EPB.

Frequently in Newfoundland, and occasionally in the Maritimes, a member of the public or provincial or federal agencies will phone in a spill and/or oiled bird report to CWS. Sources include hunters who are harvesting oiled birds, other private individuals who frequent the coastal zone, and beached bird survey workers. Several federal and provincial agencies also have employees at work in coastal areas who will report oiled birds. Following are the general procedures to guide CWS staff in their response to oil spill or oiled bird reports from the general public and from other government agencies.

When an oiled bird report is received, as much information as possible should be collected and recorded in a standardised manner to facilitate immediate or future analysis and comparison. To this end a CWS Oiled Bird Reporting Form is attached as ANNEX B. Relevant information not available at the time of reporting will be obtained by phoning government agencies or individuals in the local area. When the CWS Oiled Bird Reporting Form is completed, it should be filed in the "Oil Pollution - Significant Events" file. If the form has been completed by someone other than the appropriate CWS District Co-ordinator, that individual should be provided with a copy. A similar process should be followed for reports of oil on beaches or water with no affected birds. In such a case care should be taken to indicate that the number of oiled birds observed is zero. Reports of oiled birds received by CWS will be passed on immediately to Canadian Coast Guard Operations Centres.

3.3 FIELD ASSESSMENT

When a report of oiled birds is received, consideration should be given to whether or not field assessment by CWS staff is necessary. Field activities are costly and not always essential. Among the factors that should be considered in determining whether a site visit is required are: the magnitude of the event in terms of number of birds involved and severity of oiling; type of event in terms of whether dead or live birds are being washed ashore or collected by hunters, etc.; status of species involved, and travel logistics and costs. Further assessment of these parameters and on-the-job experience will eventually lead to the formulation of firm criteria for determining the necessity of field work. In the interim the following criteria will be employed. If more than 100 oiled migratory birds of any species, or any individuals of threatened or endangered species, have been reported:

- CWS personnel will, if at all possible, visit the site for a detailed assessment.
- If no CWS personnel are available, the nearest provincial biologist or conservation officer, will be requested to conduct an oiled bird count and assess the overall risk. Request for assistance of fisheries officers must be channelled through the local Habitat Co-ordination Officer.
- CWS will arrange for humane dispatch of heavily oiled birds, or collection for cleaning of birds that are lightly oiled and can be easily captured.

3.3.1 Aerial Surveys

Aerial surveys are undertaken to determine the real-time impact of an oil spill on migratory birds and habitats, and to assess resources at risk. Helicopters are best for reconnaissance but a light, high wing aircraft can also be used. Flight speed should be less than 240 km. per hour and preferably about 160 km. per hour. Survey altitudes are usually 30 to 150 meters. In most instances, aerial transportation will be provided by the Coast Guard. Undue disturbance, especially to breeding birds, will be avoided. Tape recorders and maps will be utilised to record time, speed of aircraft, location of birds, species, and any abnormal behaviour. Surveys by helicopter also offer an opportunity to collect oiled birds for "fingerprinting".

3.3.2 Surveys by Boat

Surveys by boat yield better information on lightly oiled birds and on the number of birds in the water than do aerial surveys. Data will be collected on bird numbers and distributions by species and on numbers of live or dead, and oiled or clean birds. Bird numbers may be recorded by location, distance intervals or time intervals. It may be possible to record degree of contamination and behavioural responses that may not be evident with aerial surveillance.

3.3.3 Ground-based Shoreline Inspections

In the investigation of a small spill or the result of chronic oil pollution, shoreline surveys are usually the best and most cost effective means of assessing impacts, and providing quantitative data on the numbers, species and seriousness of oiling of affected birds. Accurate identification and other observations can be made and specimens can be collected for analysis. Report forms will be held in St. John's, Dartmouth, and Sackville for use by individuals taking part in shoreline surveys. They should provide for the recording of the following information.

- observer's name and address
- area covered; start and finish points

- time and date
- weather conditions including wind, temperature and precipitation
- beach type (mud, sand, shingle, cobble, bedrock)
- length of beach and of the area surveyed
- part of beach surveyed (high water line, water edge etc.)
- beach condition (ice, snow, seaweed etc.)
- degree of oiling, e.g. % of beach slightly oiled, heavily oiled
- type of oil, where known
- number of live oiled birds encountered
- number of live oiled birds captured for cleaning or euthanisation
- number of dead oiled birds found
- number of dead birds collected, buried, etc.
- for both live and dead birds record:
    - degree of oiling
    - species
    - age
    - sex
    - presence and number of band or tag
    - whether a "fingerprint" oil sample was taken

3.4 BIRD DISPERSAL AND DETERRENCE

CWS, in co-operation with the Canadian Coast Guard and REET, will make every effort to keep oil and birds apart. In some cases booming may be effective in containing oil and it may be possible to force the birds out of the area. Given that birds will usually only leave and stay away if they have another place to go, alternative sites may have to be made attractive by supplying food and keeping disturbance at those sites to a minimum. Baiting of birds requires the permission of the Canadian Wildlife Service. This strategy will more likely be successful for dabbling ducks than for seabirds and marine ducks. While attempts will be made to keep oil and birds apart, it is recognised that there are some situations where this is impossible. A summary of techniques for deterring or dispersing birds is presented as ANNEX C.

3.5 HABITAT PROTECTION

The protection of critical habitat may be as important as protection of migratory birds themselves. This will be particularly true when habitat at risk to oil pollution is about to be occupied by migrating birds. Habitat which is critical for feeding, such as eel grass beds for geese, or mud flats for shorebirds, deserves particular attention. Information on such sensitive areas will be transmitted to on-scene commanders as having high priority for protection.

3.6 MANAGEMENT OF OILED BIRDS

In all oil spills in the pelagic realm and in most spills in coastal waters, the major ecological damage is that sustained by populations of waterfowl and seabirds. In the cold waters off eastern Canada most birds die if they encounter even a small amount of floating oil. A bird debilitated by oil-caused insulation loss will not usually come to land where it is vulnerable to predators, it will usually attempt to stay away from the shore. Birds that come to land are

usually those which have metabolised their energy reserves and are near death. The rehabilitation of oiled birds which come ashore is a difficult and costly task, and experience has shown that only a small proportion of birds which are oiled and then cleaned survive to re-enter the wild breeding population.

Petroleum Industry Environmental Response (Pier Atlantic) have outfitted a trailer with equipment and supplies for oiled bird rehabilitation. This trailer will be available to groups or agencies wishing to carry out bird cleaning if they have a demonstrated competence and are in possession of a permit from the CWS. The Migratory Birds Convention Act provides for protection and management of migratory birds in Canada. Regulations 4 and 5 of that act specify that no person may be in possession of a migratory bird unless issued a permit by CWS.

In management of oiled birds:

- The Canadian Wildlife Service will not clean oiled birds other than those of Vulnerable, Threatened or Endangered species. The cost to CWS of cleaning birds will be recovered from the party responsible for the spill.

- CWS will provide leadership to, and co-ordination of, agencies or groups involved in the assessment of oil impacts on birds, their collection, cleaning or euthanisation.

- CWS will maintain current information on the availability of equipment, and the capture, handling and assessment of oiled birds and on methods of cleaning and rehabilitating oiled birds. CWS will disseminate this information to other agencies or groups that wish to clean oiled birds.

- Where oiled birds can be retrieved CWS may issue permits to allow competent persons to retrieve and hold oiled birds temporarily in captivity for rehabilitation, or to kill birds too badly oiled to survive. Such permits will be issued only where facilities for, and capability of, cleaning and the facilities and personnel for after-care are available.

- If significant numbers of birds are killed by oil, CWS will assess the biological and socio-economic consequences of the loss and seek appropriate restoration or compensation measures. CWS habitat and species restoration costs will be recovered from the party responsible for the spill.

Procedures for the capture, care, cleaning and release of oiled birds are contained in: *Rescue and Rehabilitation of Oiled Birds*, 1991, attached as Annex D. However, this publication is issued by US Fish and Wildlife Service and is to be used as a technical guide only. Policies or regulations cited in that document refer to US legislation and practices and do not apply to individuals or agencies involved in the execution of this plan.

3.7 MANAGEMENT OF OFFSHORE OIL SPILLS

Response to major offshore oil spills requires the convening of REET to provide advice and to co-ordinate response. CWS has a representative on REET whose duty it is to transmit wildlife data and priorities to the on-scene commander through the REET chairman.

The majority of offshore oil spills are relatively small and do not result in assembly of the REET. However, with the start of offshore oil production on both the Scotian shelf and the

Grand Banks this situation could change. In the event of a major oil spill at an offshore location, CWS will provide advice to REET on seabird numbers, distributions and vulnerabilities, and on strategies to keep birds away from the slick. No attempt will be made to capture, clean and rehabilitate oiled birds.

It has long been recognised by the Canadian Wildlife Service that the impact of a spill on marine birds depends not only on spill size, but on the time, place and the type of oil spilled. If a relatively small spill, one which would not normally precipitate a full REET response, is recognised by CWS as potentially very damaging to marine birds because of its timing and location, the CWS REET representative will inform the Regional Environmental Emergencies Co-ordinator of its potential for damage and recommend an enhanced response.

March 1994

ANNEX A:
OIL SPILL RESPONSE CONTACT LIST

CANADIAN COAST GUARD

Pollution reporting centres - 24-hour phones

Maritimes:	1- 800-565-1633
Newfoundland and Labrador:	(709) 772-2083

ENVIRONMENTAL PROTECTION B RANCH

Environmental Emergencies Coordinators - 24 hour phones

Regional (R. Percy)	(902) 426-6200
Newfoundland and Labrador: (G. Worthman)	(709) 772-5488

PETROLEUM INDUSTRY EMERGENCY RESPONSE

PIER Atlantic (Bill Pistruzak)	(902) 461-9170

CANADIAN WILDLIFE SERVICE

REET RESPONSIBILITY	NAME	OFFICE	HOME
• Atlantic Region	Eric Hiscock	(902) 426-6314	860-2696
• Maritimes District	Tony Lock	(902) 426-6052	479-2520
• Newfoundland and Labrador District	John Chardine	(709) 772-5585	437-5010

CWS REGIONAL RESPONSE TEAM

Area	Primary Responder	Phone	Secondary Responder	Phone
Labrador	A. R. Lock	o. (902) 426-6052 h. 479-2520	P. Ryan	o. (709) 772-5585 h. 437-6765
Newfoundland	P. Ryan	o. (709) 772-5585 h. 437-6765	S. Gililland	o. (709) 772-5585 h 437-1946
N. S. Atlantic Coast	A. R. Lock	o. (902) 426-6052 h 479-2520	W. Barrow	o. (506) 364-5046 h. 686-3713
Fundy, Gulf of Maine	R.D. Elliot	o. (506) 364-5014 h. 536-4049	P. Hicklin	o. (506) 364-5042 h. 536-0703
Gulf of St. Lawrence	C. McKinnon	o. (506) 364-5039 h. 536-4283	M. Bateman	o. (506) 364-5041 h. 532-0813
St. Pierre & Miquelon	J. Chardine	o. (709) 772-5585 h. 437-5010	P. Ryan	o. (709) 772-5585 h. 437-6765

NOVA SCOTIA

Department of Natural Resources, Wildlife Division.
The prime contact for coordinating the input of the Department will be J. Sherman Boates, Manager, Wildlife Resources (Non-Game), Kentville: (902) 679-6091.

Headquarters Staff

Director, Merrill Prime..... (902) 679-6091
Manager Wildlife Resources, Habitat, Tony Duke..... (902) 679-6091
Manager Wildlife Resources, Wetlands andWaterfowl,
Randy Milton..... (902) 679-6091
Manager Wildlife Resources, Upland Game
and Furbearers, Barry Sabean..... (902) 679-6091
Manager, Wildlife Resources, Big Game, Tony Nette..... (902) 679-6091

Subdivision Biologists

Baddeck: Dan Banks..... (902) 295-2554
Sydney: Dave Harris..... (902) 564-6389
Antigonish: Mark Pulsifer..... (902) 863-4513
Bible Hill: Ross Hall..... (902) 893-5620
Waverley: Mike O'Brien..... (902) 861-2560
Bridgewater: Peter MacDonald..... (902) 543-0636
Yarmouth: Paul Tufts..... (902) 742-7846

Wildlife Interest Groups

Organisation	Contact	Office	Home
N.S. Society for the Prevention of Cruelty	Don Marston	835-4798	542-9323
N. S. Stranding Network	John Parsons Pager, 24 hours	494-1426 458-5018	469-2420
Raptor Rehabilitation Centre	Mike Kew	876-2308	826-7430
N.S. Bird Society	Carol MacNeil	429-8653	454 5337
N. S. Wildlife Federation	Tony Rogers	423-6793	
Halifax Field Naturalists	Colin Stewart	466-7168	466-7168
Ducks Unlimited	Chuck MacInnes	667-9937	667-2476

NEW BRUNSWICK

Department of Natural Resources and Energy, Fish and Wildlife Branch .
The overall coordinator for the Branch will be Pat Kehoe, Project Leader, Wetlands and Coastal Habitat (506) 453-2440.

Headquarters staff

Director of Wildlife Management,	
Arnold Boer	(506) 453-2433
Wetland Habitat, Pat Kehoe	(506) 453-2440

Regional Wildlife Biologists

Bathurst: Gilles Godin	(506) 547-2075
Hampton: Thomas Pettigrew	(506) 832-5532
Edmundston: Norman Prentice	(506) 735-4751
Newcastle: Robert Currie	(506) 622-2636
Fredericton: Gary Moore	(506) 453-1802

Regional Fisheries Biologists

Alan Madden	(506) 753-3327
Bernie Dubee	(506) 622-2636
Ed LeBlanc	(506) 735-4751
Peter Cronin	(506) 453-1802

Wildlife Interest Groups

Organisation	Contact	Office	Home
Tri-State Bird Rescue and Research	Peter Fennety	(506) 529-8241	
N.B. S.P.C.A.	Ray Ward	(506) 857-8698	
Ducks Unlimited	Chuck MacInnes	(902) 667-9937	(902) 667-2476
N. B. Fedn. of Naturalists	M. Majka		(506) 882-2100
N.B. Wildlife Federation	Dick Stickles		(506) 472-7809

PRINCE EDWARD ISLAND

Department of Environment, Fish and Wildlife Branch.
The coordinator for oil spill response will be Randy Dibblee, the Small Game and Furbearer Biologist. Office phone (902) 368-4666.

Tim Lash, Acting Director	(902) 368-4684
Alan Godfrey, Fisheries and Upland Game Biologist	(902) 368-4689
Nelson Hurry, Chief Conservation Officer	(902) 368-4686
Rosemary Curley, Wetlands Biologist	(902) 368-4807
Robert Thompson, Montague Watershed Project	(902) 368-4808

Wildlife Interest Groups

Organisation	Contact	Office	Home
PEI Marine Mammal Stranding Network	Pat Gray		(902) 569-4803
PEI Natural History Society	Dan MacAskill	(902) 368-4802	
PEI Nature Trust	Diane Griffin	(902) 892-7513	
PEI Wildlife Federation	Steve Cheverie	Fax 687-2350	(902) 687-3489
Canadian Cooperative Wildlife Health Centre	P. Y. Daoust	(902) 566-0667	

NEWFOUNDLAND AND LABRADOR

Department of Tourism and Culture, Wildlife Division.
The primary contact will be Dennis Minty, Chief, Information and Education: (709) 729-6974 or 729-2549

Headquarters Staff	Phone
Director, J. Hancock	(709) 729-2817
Chief, Wildlife Management, K. Curnew	(709) 729-2540
Chief Wildlife Protection Officer, R. Whitten	(709) 729-2647
Non-game Biologist, Joe Brazil	(709) 576-3773
Regional Staff	
Western (Pasadena)	
Wally Skinner, Regional Biologist	(709) 686-2381
Clarence Maloney, Enforcement Coordinator	(709) 686-2371
Central (Gander)	
Oscar Forsey, Regional Biologist	(709) 651-2055
Harold Abbott, A/Enforcement Coordinator	(709) 651-2055
Eastern (Clarenville)	
Dave Fong, Regional Biologist	(709) 466-7449
Mike Parsons, Enforcement Coordinator	(709) 466-7449
Labrador (Goose Bay)	
(Vacant), Regional Biologist	(709) 896-2732
Randy Trask, Enforcement Coordinator	(709) 896-2732

Parks Division (Seabird Ecological Reserves)
Overall coordination of Parks Division reaction will be carried out by Glen Ryan, Chief, Planning and Development: (709) 729-2427

Headquarters Staff	
D. Hustins, Director	(709)729-2424
Bob Halfyard, Natural Heritage Areas Plannner	(709) 729-2421

Regional Supervisors

Avalon (Whitbourne), Gerald March	(709) 759-2584
Eastern (Notre Dame Park), Nehemiah Pinsent	(709) 686-2088
Central (Pasadena), Dave Rolls	(709) 686-2088
Western (Stevenville), Albert Samms	(709) 643-2541

Wildlife Interest Groups

Organisation	Contact	Office	Home
Nfld. and Labrador Environmental Association	Stan Tobin	(709) 227-7099	
Natural History Society of Nfld. and Labrador	John McConnel Roger Burrows	(709) 579-9240 (709) 753-8862	
Bay St. George Wilderness and Conservation Club	Ray Mackie	(709) 643-4044	
Tuckamoor Club	Barry May	(709) 639-7279	
Wilderness Society	Shelley Bryant	(709) 576-2428	(709) 753-3680

CWS INTERNATIONAL AND INTER-REGION COOPERATION

ATLANTIC REGION - QUEBEC REGION

ATLANTIC REGION CONTACTS

Quebec/Maritimes Interregional	P. Hicklin	(506) 536-3025	C. MacKinnon	(506) 536-3025
Quebec/Nfld. Interregional	J. Chardine	(709) 772-5585	A. R. Lock	(902) 426-6052

QUEBEC REGION CONTACTS

Regional Authority: Charles Drolet (418) 649-6136

Primary contact: Denis Lehoux (418) 648-2544

ATLANTIC REGION - WESTERN AND NORTHERN REGION

ATLANTIC REGION CONTACTS

Arctic/Atlantic Interregional	J. Chardine	(709) 772-5585	A. R. lock	(902) 426-6052

WESTERN AND NORTHERN REGION CONTACT

Chief, Northern Conservation, Yellowknife Office: K. McCormick (403) 920-8531

ATLANTIC REGION - INTERNATIONAL

ATLANTIC REGION CONTACTS

US. - Atlantic International	E. Hiscock	(902) 426-6314	A. R. Lock	(902) 426-6052

US AND STATE OF MAINE CONTACTS

NOAA	Steve Lehmann (617) 223-8016
U.S. Fish & Wildlife Service	Dolores Savignano (413) 253-8613
Maine Planning Commission	Alan Clark (207) 289-5265
Manomet Bird Observatory	Josette Carter (508) 224-6521

ST. PIERRE AND MIQUELON CONTACTS

Michel Borotra: 41-3396

March 1994

ANNEX B

CWS OIL SPILL REPORT FORM

CWS Oiled Bird Reporting Form

(Fill out a form for every report of oiled birds from a particular location and time)

Location			Lat. Long.
Date (dd/mm/yy)	Time (24 h)	Date report rec.	Time report rec.
Name of reporter			
Address of reporter			Phone number
Circumstances at time of observation (e.g., hunting, walking beach)			
Weather at time of observation and day before (wind direction & speed, temp., precip.)			

Name and affiliation of recorder
Other details

Number of oiled birds

Species	dead/ alive	Total	On land	In water	Collected	Heavy or Light oiling	Notes
	d						
	a						
	d						
	a						
	d						
	a						
	d						
	a						
	d						
	a						
	d						
	a						

March 1994

ANNEX C

METHODS FOR DETERRING WATERBIRDS FROM CONTAMINATED AREAS.

by Roger Applegate
Maine Depatrment of Inland Fisheries and Wildlife

METHODS FOR DETERRING WATERBIRDS FROM CONTAMINATED AREAS

ROGER D. APPLEGATE

Recent concerns over oil spills and other environmental contaminants, resulting from the Exxon Valdez spill in Alaska, are prompting a new look at methods for excluding birds from certain habitats.

Exxon Valdez was alone estimated responsible for the death of approximately 100,000 to 300,000 marine birds (Piatt et al. 1990). Smaller spills along the Atlantic coast have resulted in the mortality of numerous marine and wetland birds. For example, the Arrow and Irving Whale spills off Nova Scotia and Newfoundland in February 1970 resulted in the estimated loss of 12,000 birds, and 7 spills in the Dalaware and Chesapeake Bay areas resulted in an estimated mortality of 52,500 birds (Brown et al. 1973, Perry et al. 1978).

Methods have been developed for deterring depredating waterfowl from crops and fish hatcheries. A few of these techniques have potential for deterring waterbirds from estuaries, lakes, ponds, and other wetland habitats when birds are threatened with oil and other contaminants.

The purpose of this chapter is to provide a laundry list of available techniques which apprear useful for deterrence and summarize the potential pluses and minuses of these techniques. The selection of technique will need to be made on a case-by-case basis depending on species of birds present in an area and the type of contaminant involved. Bear in mind that these techniques are not tried and true methods but only a starting point toward protecting as many birds as possible from contamination.

Deterrence Techniques

The following methods are available for deterring birds from contaminated habitats. Details of techniques can be found in Knittle and Porter (1988), Oneale (n. d.), Stephen (1961), and Ward (1977).

Method	Use	Limitations
Scarecrows	Deter waterfowl and and waterbirds	Effective only in daylight
Helium Balloons	Prevent birds from landing in area	Effective only in daylight
Propane Cannons/ AV Alarms	Reduce density of bird flocks	Small effective area, short effective duration (maximum of 2 or 3 days), variable effectiveness with bird species, limited usefulness in rough open water, fire hazard
Shell Crackers/ gun shots	Reduce or move bird flocks	Labor intensive (Parsons et al 1990), short effective duration, fire hazard, limited effective area (Biehn 1951)
Hazing with	Move waterfowl	Diving birds will dive and not

Aircraft	that typically fly in response to disturbance. Helicopters can be used to herd flightless young waterfowl	move from contaminated areas, temporary
Herding with Boats	Move flightless young waterfowl and other non-diving birds	Slow, labor intensive, temporary most useful if birds have been repeatedly chased (Parsons et al. 1990)
Revolving Lights	Reduce or move flocks	Effective only at night (Stephen 1959)

Capture and Relocation

Capture and relocation may be used as a last resort technique to remove from a contaminated area those critically sensitive species that will not respond to deterrence. The major limitation of relocation of birds is that many birds may return to the contaminated area after release and capture is labor intensive.

Capture Technique	Species	Reference
Drive Traps	Flightless geese	Nastase 1982
	General	Wilbur 1967
Bait Traps	Canvasback	Haramis et al. 1987
	Canada geese	Hanson 1949
Mist Nets	General	Keyes and Grue 1982
		Low 1957
	Snipe	Fogarty 1969
	Shorebirds	Graul 1979
		Murphy 1955
	Waterfowl	Briggs 1977
Nightlighting	Eiders	Snow et al. 1990
	Waterbirds	Cummings and Hewitt 1964
	Waterfowl	Drewien et al. 1967
Nooses	Cormorants	Hogan 1985
Drop Nets	Shorebirds	Peyton and Shields 1979
Cannon Nets	Eagles	Grubb 1988, 1991
	Waterfowl	Dill 1969

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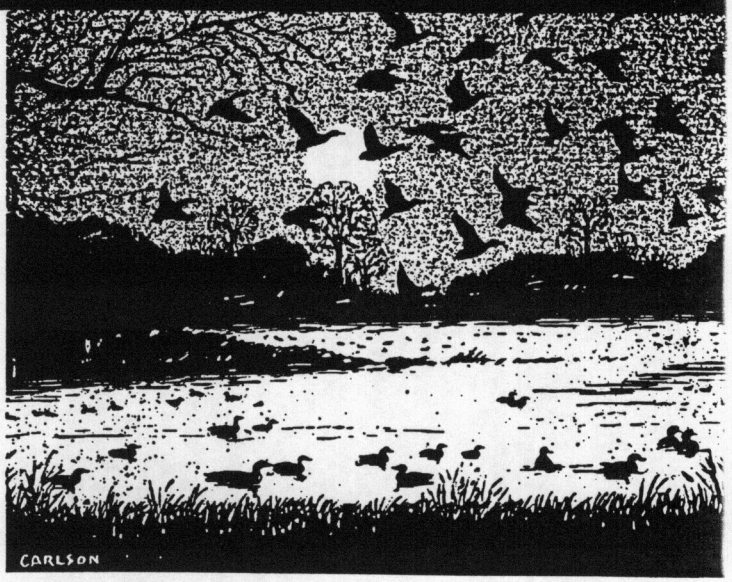
March 1994

ANNEX D:

Rescue and rehabilitation of oiled birds 1991 by: S. Welte and L. Frink, US fish and Wildlife Service, fish and Wildlife Leaflet 13.2.8. Note: This publication is to be used as a guide only. Policies, Regulations and Permit requirements contained therein do not apply to individuals or agencies involved in the execution of this plan.



13.2.8. Rescue and Rehabilitation of Oiled Birds

Sallie Welte and Lynne Frink
Tri-State Bird Rescue and Research, Inc.
P.O. Box 289
Wilmington, DE 19899

Oil contamination of waterfowl and seabirds has been documented as a significant cause of morbidity and mortality in birds for more than 50 years. Each year more than one million birds may die from oil contamination in North Atlantic waters alone; worldwide mortality is unknown.

Of special concern is that many of the seabirds commonly affected are not prolific breeders, and assessment of each species' status is handicapped by the difficulty of accurately monitoring trends in marine bird populations.

Oiled bird rehabilitation is an intensive, crisis-oriented response, requiring an experienced management agency, specialized medical expertise, stockpiles of specially designed equipment, and a tremendous investment of human resources.

Nevertheless, after a major oil spill, the public demands that the affected wildlife species be treated, and the Fish and Wildlife Service, as the mandated response agency for the United States, will be called in to respond to the situation.

Unfortunately, very few organizations have the expertise required to rehabilitate oiled birds. Public interest and involvement in the plight of oiled wildlife have resulted in some disastrous rehabilitation efforts. Oiled birds have been rolled in kitty litter, dipped in melted butter, covered with cornmeal, and plucked, all with tragic consequences. When overseen by an experienced agency, however, successful oiled bird rehabilitation has occurred. Particular rehabilitation success is seen in swans, geese, and ducks, with average release rates exceeding 90%.

In this chapter we attempt to provide the wildlife professional with a basic understanding of the internal and external effects of oil on birds, and the key components of an effective oil spill response. We emphasize the handling of waterfowl and seabirds. This chapter does not provide the detailed information needed to manage a major oil spill response.

Effects of Oil Contamination

Once a bird is contaminated by oil, a sequence of physiologic and metabolic changes begins which contributes to its decreased chance of survival and reproductive success. Oil exposure, unless excessive, is not immediately incapacitating; most birds remain vigorous enough to avoid capture for one or more days. This delay contributes to avian mortality by complicating rehabilitation efforts and increasing the secondary exposure of eggs, nestlings, scavengers, and predators to oil.

External Effects

An immediate effect of oil exposure on birds is the disruption of their feather structure. The resulting decreases in flight ability and water repellency limit the animal's ability to forage for

Double-crested cormorant contaminated with North Sea crude oil.

food and to escape predation. Contamination and disruption of a bird's plumage also reduce the insulating properties of its feathers, increasing the bird's vulnerability to temperature extremes. In addition, a bird's direct contact with oil components can result in chemical burns and the absorption of toxic chemicals through its skin.

Internal Effects

Internal effects of oil result from the ingestion, aspiration, or absorption of oil components. Although visually less apparent than external oil effects, the internal effects of oil are equally life-threatening and often more difficult to treat. While some damage is specific to the oil fractions and contaminants involved, a general pattern of pathological changes characterizes oil toxicosis. These changes include kidney damage, altered liver function, aspiration pneumonia, and irritation of the intestines.

Birds ingest oil when they preen in an attempt to clean their feathers. The resulting intestinal irritation can exacerbate dehydration and metabolic imbalances caused by decreased food intake. The bird can no longer absorb nutrients or regulate body fluids and electrolytes adequately, and may even hemorrhage into its intestinal tract. Anemia due to oil toxicosis has been documented. In addition, birds become less tolerant of stress and more susceptible to disease and to the effects of previously accumulated toxins.

Whereas all types of birds can be affected by a spill, some species are more vulnerable than others. Particularly susceptible are the diving birds, such as loons, cormorants, and diving ducks. Entire populations can be at risk when species that have delayed maturity and low reproductive potentials are contaminated. Birds that live in harsh environments may not survive the added stress of oil exposure and reduced food supplies.

Long-term and Secondary Effects

Oiled adults frequently contaminate nests, eggs, and young. Likewise, secondary oiling of other flock members and predators can occur.

Decreased reproductive success has been seen in birds experimentally oiled or force-fed oil. Delayed onset of laying, decreased fertility of eggs, abnormal yolk composition, and altered shell thickness have all been documented. Secondarily exposed embryos may die from suffocation or hatch with gross skeletal and bill abnormalities. Decreased growth rates and body weights of experimentally exposed juveniles may result from the ingestion of contaminated foods or the impaired parenting ability of affected adults.

In major oil spills, habitats are altered, food resources changed, and resident animals subjected to chronic oil exposure through contaminated substrates. The potential for bioaccumulation of toxic substances in invertebrates and lower vertebrates warrants further study.

Rehabilitation of Contaminated Birds

Successful oiled bird rehabilitation involves six basic procedures:

- prompt intervention and retrieval of contaminated birds;
- stabilizing the bird;
- removing oil from the bird's feathers;
- removing the cleaning agent from the feathers;

- restoring waterproofing; and
- acclimating the bird for release.

Effective rehabilitation efforts require coordination of State, Federal, and private agencies. The importance of establishing contingency plans in high-risk areas before oil spills occur cannot be overemphasized.

All field agents should be trained in handling techniques that are nonstressful to birds. A facility having adequate space, ventilation, and a regulated temperature should be identified. Hot-water sources and an approved wastewater disposal system must be located. Basic rehabilitation equipment can be stockpiled in advance, so that medical care, nutritional support, and cleaning efforts can begin without delay. Licensed rehabilitators trained in oil spill response protocols should be contacted as soon as a spill occurs.

Field Assessment, Intervention, and Retrieval

Mechanisms should be in place for all aspects of bird retrieval and management, including:

- field strategies for aerial overflights, and ground teams to identify birds at risk;
- procedures for preventing exposure of unaffected animals;
- protocols for field retrieval, emergency stabilization, and transport of contaminated birds; and
- risk assessment and safety protocols for field personnel.

Preventing Exposure

Various techniques can be used to disperse uncontaminated animals from a problem area or to concentrate and hold them in clean areas. Efforts to discourage unoiled birds from contaminated areas must be done early in the spill; these can include scare devices such as propane exploders and cracker shells, hazing with motorized equipment, or relocation through baiting at an alternative feeding area. No attempt should be made to disperse oiled birds since this can lead to introduction of oiled animals into uncontaminated populations.

For priority species, unoiled animals can be relocated through capture in cannon nets, drop nets, rocket nets, and swim-in or walk-in traps, and rapidly transported to "safe" areas. The effort and expense required to trap, examine, and relocate unoiled birds is significantly less than that required to retrieve and rehabilitate oiled animals. Appropriate hazing and trapping techniques differ in each spill situation.

Capture and Transport of Oiled Waterfowl

Human safety should be considered before any retrieval effort is made; hazardous weather conditions, unsafe footing, icy rivers, or dangerous seas may preclude a rescue attempt.

Teamwork is essential to minimize stressing these already compromised animals. As oiled birds lose their waterproofing, they move to shore, first preening on the open beaches and later hiding effectively under tussocks of grass or next to boulders. Birds in this condition should be retrievable by teams on foot; every day's delay in retrieval significantly increases mortality.

Beached birds should be approached quietly and smoothly from the water's edge; this technique can be extremely effective if the retrieval crews are in place shortly before dawn. If the capture attempts fail, birds should not be chased. In marine situations, boats and long-handled dip nets can be used for an approach at low tide to birds that have come ashore.

Immobilization is accomplished by placing towels, sheets, or nets over the entire bird, including the head. Heavy gloves, which reduce human dexterity and can thus cause injury to the animal, are not recommended. Birds are carefully handled through light coverings that minimize damage to the birds' feathers and human exposure to the oil.

Netted birds are gently removed from the netting and completely covered with cloth. Care must be taken to fold the bird's wings in a normal position against its body. A small bird can be secured against the field agent's abdomen, at waist level; the bird is cradled in one hand with the other hand placed lightly on the back. Larger waterfowl and some species with sharp bills can be carried in a reverse body hold: the towel-covered bird is placed, facing backward, against the side of the handler's body, under the arm. Support for the bird's legs is provided by the hand and forearm, with the bird's head facing backward between the handler's upper arm and side of the body.

Aggressive birds such as raptors, cormorants, and herons can seriously injure even experienced handlers. While head restraint is important for all species, it is critical when handling these birds;

raptors should have their legs secured as well. We recommend that field personnel be trained in handling techniques for these more aggressive species.

Suspension of any bird through "wing holds" at its humerus is strongly discouraged because of the high incidence of shoulder injuries associated with this form of immobilization.

After capture, birds should be immediately placed in ventilated, solid-sided carriers—such as cardboard boxes or shipping kennels—for transport. Burlap bags and wire cages can contribute to eye injuries and feather damage, respectively, and should not be used. Social, nonaggressive birds may be placed with one or two conspecifics, but aggressive species such as loons and cormorants should be individually housed.

Crated birds should not be placed in direct sunlight or transported in open vehicles (such as pickup trucks). Birds must be evaluated frequently for overheating when the ambient temperature is greater than 70° F and for possible chilling in cooler weather. If the birds demonstrate open-mouthed breathing or other signs of heat stress, additional ventilation holes can be made and the number of birds per carrier can be decreased. Draping a portion of the container with a towel or blanket provides some protection from cold. Captured birds should receive medical evaluation and preliminary treatment within 1 to 2 hours. This can be done by trained personnel in the field or at a treatment center.

Field agents should be instructed to record all bird sightings, whether a capture effort is successful or not, so that an accurate assessment of spill impact can be made. Dead birds are retrieved and placed in plastic bags, which are then labeled with pickup location and date.

Stabilizing the Bird

Immediate treatment reduces the toxic effects of ingested oils and stabilizes the bird before cleaning. The following procedures can be done in the field; otherwise they are part of the entry treatment at a rehabilitation center.

First, oil is removed from the bird's nares and oral cavity with clean gauze or cotton swabs. Contaminants are flushed from the eyes by irrigation with a warm, sterile, 0.9% (physiologic) saline solution.

Next, a clear electrolyte solution (e.g., Pedialyte, lactated Ringer's solution) is administered by stomach tube (15–20 cc/kg) to rehydrate the bird while flushing oil from its gut; this is followed by a small volume (2–4 cc/kg) of the enteric protectant Pepto-Bismol. Only birds that can maintain normal head carriage are given oral fluids; extremely depressed animals should receive immediate emergency treatment, including intravenous fluids for rehydration.

On admittance to the rehabilitation center, each bird is identified with a temporary leg band and given a complete physical examination; the bird's temperature and weight should also be recorded. The bird's vent is checked for possible impaction by oil or matted feathers. Feather and blood samples can be collected for diagnostic, documentation, or research purposes. Debilitated animals require more extensive medical care.

Birds that have been examined are kept warm and quiet, away from people and other stressors until judged stable enough to withstand the cleaning procedure. Once cleaned, a bird is fed a nutrient-rich tubing solution at 4–6 hour intervals until it can be given free access to food and water.

When large numbers of birds have been contaminated, it may be necessary to first treat the animals that have the best probability of survival or the greatest "value" as a species. Euthanasia may be considered for common birds that exhibit acute signs of disease or that have injuries that would require extended treatment.

Birds brought in dead, or dying at the center should be necropsied to aid in determining treatment protocols for the survivors.

Removing Oil From Feathers

Oil must be removed without damaging feather structure. A safe and effective method uses successive detergent baths in warm (103–104°F) water. Oil will not lift off the feathers in cooler water. In addition to being able to remove the oil, the cleaning agent must not irritate the skin or damage feather structure; it must be easily rinsed without leaving a residue that might interfere with waterproofing.

Extensive research indicates that Dawn dishwashing detergent (Proctor & Gamble) best meets these criteria. Many "miracle cleansers" are promoted during major oil spills; every effort should be made to avoid experimentation with these products.

Effective detergent concentrations vary from 2–15%, depending upon oil characteristics. Large quantities of detergent solution are mandatory. Ten-gallon tubs should be used to wash birds the

Cleaning a Canada goose contaminated by #6 fuel oil.

size of ducks or geese; larger birds require children's wading pools or human bathtubs.

Two handlers should restrain the bird in the tub while the detergent solution is ladled over its body and wings and the feathers gently stroked in the direction of growth. During the washing, the bird's eyes should be frequently flushed with a sterile saline solution to prevent irritation. The bird's head should be secured at all times to prevent injury to workers or its possible immersion in the detergent solution. If raptors are being cleaned, additional immobilization of the feet is necessary. Washing is successively repeated in three or more tubs, depending upon the extent and nature of the oil. Special procedures are required when tarry oils or adhesives are involved.

Removing the Cleaning Agent From Feathers

Rinsing is carried out with a combination of spray rinses and tub baths in 104°F water, until beads of water roll freely from the feathers, and the bird begins to look "dry." Special attention should be given to the undertail coverts, under the wings, and the neck of the bird. Incomplete rinsing prevents adequate waterproofing of the feathers and is a primary cause of bird's failure to rehabilitate. Feathers should be blotted with a clean towel; the bird should then be placed to dry with free access to heat lamps.

With appropriate organization, the entire cleaning effort should take about 60 minutes; a bird that becomes stressed (rapid heart rate, open-mouthed breathing, drooping head) during cleaning should be quickly rinsed and placed in a clean, quiet area. Once stablized, it should be washed again.

Restoring Feather Structure

Newly washed birds are placed in clean holding pens and given access to food and water.

Sterile saline is used to flush the eyes of a great blue heron to remove contaminants.

Cushioning is necessary for diving ducks and other species that are not mobile on land (e.g., loons), and appropriately sized branches should be provided for raptors and other perching birds. The birds are monitored for abnormal droppings, loss of appetite, depression, or signs of disease, and appropriate treatment is given. After 24 hours, the birds should be given access to pools of water in which they can swim and preen. Required pool size depends on the species, but the pool may need to be as large as 10 feet × 10 feet × 30 inches deep. Misting may be used to stimulate preening in those species that normally do not swim. Diving, swimming, and preening enables the bird to realign its feathers and restore feather structure. Natural oils distributed from the uropygial gland enhance feather restoration, but are not required for it. Waterproofed birds will demonstrate diamondlike beading of water on their feathers and will be able to remain in water (the time varies with species) or be misted without getting wet.

For properly washed birds not suffering from complicating factors, the entire cleaning and restoration process can occur in 48–96 hours.

Acclimating and Evaluation for Release

Waterproofed birds are gradually exposed to outside weather conditions. Seabirds are preconditioned by being fed successive tubing solutions of 2.0% saline for 24–48 hours before release to stimulate and evaluate salt gland function.

Candidates for release must be waterproof, active and alert, of average weight for species and sex, have adequate musculature, and exhibit no discernible signs of disease.

Birds should be banded with U.S. Fish and Wildlife Service bands (State and Federal banding permits required) and released early in the day in an appropriate, oil-free habitat.

Management of Major Oil Spill Crises

Rehabilitating a single oiled bird is difficult; an oil spill involving 50, 100, or 1,000 contaminated animals introduces crisis-management concerns, including media relations, volunteer and staff training, human health hazards and liability, interagency communication and coordination, disposal of environmental wastewater, and stress management.

Delineation of Responsibility

Federal field response coordinators should focus on supervision of the overall response, including the private and State agencies and cleanup contractors responsible for retrieval, rehabilitation, and release of wildlife. All costs should be documented and recovered from the spiller or from specially designated Federal accounts.

To ensure a safe, efficient response, no agency or organization should be contracted to rehabilitate oiled birds unless it possesses proper Federal permits, has adequate liability insurance for staff and volunteer workers, and is experienced in wildlife oil spill responses. The organization should be able to obtain independent analysis of the oil and assessment of potential hazards to human workers. All treatment protocols should be clearly presented, and, if necessary, justified for the designated Service field response coordinator.

Worker safety and agency liability are areas of growing concern. Occupational Safety and Health Administration (OSHA) standards concerning hazardous wastes and emergency responses also apply to some aspects of oil spill responses. Application of these rulings is not uniform; we recommend that regional OSHA offices be contacted for current information. Disposal of wastewater from a cleaning center must be in compliance with State and Federal regulations; current techniques include reclaiming oil fractions and treating wastewater or disposing of it in an approved landfill. Disposal contracts should be made with reputable and licensed haulers. County health departments, local hospitals, and area veterinarians can offer assistance for proper disposal of medical wastes. Nonperishable supplies can be stockpiled for use in future spills.

Controlled Access and Public Relations

Access to the rehabilitation center must be strictly controlled. Only trained volunteers and those directly participating in the response should be admitted. All workers should wear name tags identifying their assigned responsibilities.

Members of the general public attempting to visit the center should be thanked for their concern and given a brochure describing the center's procedures and offering them an opportunity to sign up for future training sessions or to donate needed materials (sheeting, towels, pie plates, etc.).

Center policies should be established and posted to aid in effective and accurate media

communication. Comments to the media should be restricted to those taken directly from the daily news release, which should be typed every morning and be available to the press.

Interviews and video opportunities should be limited to one or two 15-minute sessions daily, with the times clearly posted at the entrance to the center.

Rehabilitation Center Operations

During the first days of an oil spill response, the center is open almost 24 hours a day, with staff and volunteers working rotating shifts. Certain policies are followed to provide continuity and consistency of operation.

Each area of the facility should be clearly identified and posters describing the treatment protocol for that area should be prominently displayed. An end-of-day report summarizing all pertinent operational and caseload information should be completed each day by the appropriate staff.

At least one person should be on duty during each shift to handle all telephone calls; a second worker should be responsible for weekly scheduling of staff and volunteers. A supplies team should obtain all items necessary for smooth operation of the center.

Even in a small oil spill response, resource needs are tremendous. If the rehabilitation center admitted and treated 30 birds a day, three wash lines would be needed, necessitating 10 bird-cleaning volunteers for each 8-hour shift. As much as 4,500 gallons of clean water would be required, half of which would become oil-contaminated, requiring special disposal. Workers would also be needed for each shift for operations control, medical, and rehabilitation areas, swelling the number of people needed for one 24-hour day to 54.

Conclusion

Bird rehabilitation after a major oil spill is an emergency operation requiring immediate action by prepared, experienced personnel. The key components of an effective response are:

- contingency planning to identify key agencies, people, and material needs;
- rapid response;
- enlisting an experienced response agency to direct wildlife care; and
- adherence to proven protocols.

Suggested Resources

Bayer, R. D. Oiled birds: How to search for and capture oiled birds at Oregon intertidal areas. Gahmken Press, Newport, Oreg. 30 pp.

Burridge, J., and M. Kane, editors. 1985. Rehabilitating oiled seabirds: a field manual. American Petroleum Institute, Publication 4407. Washington, D.C. 79 pp.

Environment Canada. How to rescue oiled birds. (For information on this 20-minute video, contact Environment Canada, 351 St. Joseph Boulevard, Ottawa, K1A OH3.)

Friend, M. 1987. Field guide to wildlife diseases. Vol 1: General field procedures and diseases of migratory birds. U.S. Fish Wildl. Serv., Resour. Publ. 167. 225 pp.

Frink, L. F., and S. Welte. 1990. Oiled bird rehabilitation: a guide for establishing and operating a treatment facility for oiled birds. Unpublished manual. Tri-State Bird Rescue and Research, Inc., Wilmington, Del. 65 pp.

Leighton, F. 1983. The pathophysiology of petroleum oil toxicity in birds: a review. *In* D. G. Rosie and S. N. Barnes, eds. The effects of oil on birds: physiological research, clinical applications and rehabilitation. Proceedings of a 17–19 September 1982 conference at the Wetlands Institute, Stone Harbor, N.J.

Experienced Response Agencies

International Bird Rescue Research Center, 699 Potter Street, Berkeley, Calif. 94710. (415)841-9086.

Tri-State Bird Rescue and Research, Inc., P.O. Box 289, Wilmington, Del. 19899. (302)737-7241.

Environment Canada has trained response agencies in Newfoundland, Nova Scotia, and Quebec. Contact: Gilles Lauzon, Contingency Planning Officer, Environmental Emergencies, Environment Canada, PVM, 15th Floor, 351 St. Joseph Blvd., Ottawa, Canada, K1A OH3.

Note: Use of trade names does not imply U.S. Government endorsement of commercial products.

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