OPERATION CLEAN FEATHER: REDUCING OIL POLLUTION IN NEWFOUNDLAND WATERS

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Summary

Oil pollution of marine waters around Newfoundland, and in particular in the vicinity of Placentia Bay, is a frequent occurrence. Many oiled seabirds are found on beaches in the bay, particularly in winter. The most likely culprits are ship operators who dump waste oils from bilges and slop tanks instead of using approved waste disposal methods such as commercial, on-shore reception or incineration. In an effort to reduce the chronic discharge of waste oil into Placentia Bay, and thus the incidence of bird oiling, Operation Clean Feather was mounted. The operation ran for three months (January-March) in 1991 and 1992 and consisted of (1) weekly surveys of Placentia Bay beaches, (2) sampling of oil from vessels using the bay, and from oiled birds and beaches, (3) ground and aerial surveillance, (4) a communications program, and (5) experimentation to determine possible recovery rates of birds oiled at sea. Project elements were delivered jointly by Canadian Wildlife Service and Environmental Protection Branch of Environment Canada, and Canadian Coast Guard of Transport Canada.

Operation Clean Feather was considered a success at several levels. First, the desired effect on the numbers of oiled birds reported in winter from Placentia Bay was realized with significant reductions in numbers in both 1991 and 1992 compared to 1989 or 1990. Specifically, estimated oil related mortality was reduced to approximately 25% of levels seen in the two years prior to the operation. Second, the operation provided the opportunity to test and refine an organizational framework designed to deal with the problem of chronic oil pollution reports. Third, communication efforts heightened the awareness of the problem of oil pollution in Newfoundland waters and better positioned Environment Canada and Transport Canada to continue efforts in this direction with the production of a brochure entitled "Oil Kills Seabirds". This brochure describes the seriousness of oil-related marine bird mortality and also warns potential polluters that they are subject to substantial fines under the Canada Shipping Act.

It is hoped that Operation Clean Feather can be used as a working model for future projects both within Atlantic Canada and elsewhere.

Résumé

La pollution des eaux marines entourant Terre-Neuve et en particulier de la baie Placentia est un phénomène courant. On trouve de nombreux oiseaux de mer souillés de mazout sur les plages de la baie, surtout l'hiver. Le plus souvent, les coupables sont des exploitants de bateaux qui déversent directement dans la mer des déchets d'hydrocharbures - fonds de cale ou citernes à résidus - plutôt que de s'en défaire par des méthodes approuvées comme la consignation commerciale à terre ou l'incinération. L'«Operation Clean Feather» a été mise sur pied dans le but de réduire les déversements chroniques de déchets d'hydrocarbures dans la baie Placentia et d'atténeur par conséquent le mazoutage des oiseaux. L'opération s'est déroulée pendant trois

mois en 1991 et 1992 (janvier à mars) et elle comprenait: 1) des recensements hebdomadaires des plages de la baie Placentia; 2) l'échantillonnage du mazout des bateaux fréquentant la baie et du mazout souillant les oiseaux et les plages; 3) une surveillance aérienne et au sol; 4) un programme de communication; et 5) une expérience visant à déterminer le taux éventuel de récupération des oiseaux mazoutés en mer. Le Service canadien de la faune et le service de la protection de l'environnement d'Environnement Canada ainsi que la Garde côtière canadienne de Transports Canada assuraient conjointement l'exécution de divers éléments du projet.

L'«Operation Clean Feather» a été qualifée de succès à divers niveaux. D'abord l'opération a eu l'effet désiré puisque le nombre d'oiseaux souillés qui était signalé pendant l'hiver dans la baie Placentia a considérablement diminué en 1991 et 1992 comparativement aux années 1989 ou 1990. De façon plus précise, la mortalité que l'on évalue comme étant liée au mazoutage a été réduite d'environ 25% par rapport aux niveaux de mortalité des deux années précédant l'opération. Deuxièmement, le projet a permis de mettre à l'essai et de perfectionner le cadre organisationnel nécessaire pour aborder le problème de la pollution chronique par les hydrocarbures. Enfin, les efforts de communication ont sensibilisé le grand public au problème de la pollution par les hydrocarbures dans les eaux de Terre-Neuve et ont permis à Environnement Canada et à Transports Canada de mieux se positionner pour poursuivre leurs efforts en ce sens; ils ont ainsi réalisé une brochure intitulée «Le mazout tue les oiseaux marins». La brochure décrit la gravité de la situation relative aux mortalités d'oiseaux de mer attribuables au mazoutage et elle met aussi les pollueurs éventuels en garde contre les amendes substantialles auxquelles ils s'exposent en contrevenant aux dispositions de la Loi sur la marine marchande du Canada.

On espère que l'«Operation Clean Feather» pourra servir de modèle à d'autres projets dans la région de l'Atlantique et ailleurs.

1. Introduction

As in many other parts of the developed world, oil pollution is a frequent occurrence in the waters surrounding the island of Newfoundland (Piatt et al. 1985). Placentia Bay, in the southeast portion of the province appears to be particularly affected. Surveys of beaches in the area reveal frequent bird oiling incidents, in particular during the winter months (Chardine et al. 1990). Several factors including the numbers of birds involved and their distribution, seasonal frequency, and types of oil suggest that the culprits are ship operators who deliberately discharge waste oil from bilges or slop tanks while steaming in or out of Placentia Bay, or passing through provincial waters. A major oil spill has not yet occurred in Newfoundland waters. However, the report of the Public Review Panel on Tanker Safety and Marine Spills Response Capability (Brander-Smith et al. 1990) states that: "Placentia Bay is considered by many to be the most likely place in Canada for a major oil spill" (p. 113).

In an attempt to reduce the incidence of chronic discharges of oil into Placentia Bay and thus seabird mortality due to oiling, Operation Clean Feather was developed as a multi-faceted project to be delivered by the Newfoundland offices of Conservation and Protection, Environment Canada (Canadian Wildlife Service [CWS], Environmental Protection [EP]) and the Canadian Coast Guard (CCG). The reader is referred to the original project proposal (Appendix A). This report summarizes the accomplishments of the operation, evaluates project elements, and makes recommendations for future operations.

1.1. Objectives:

The overall objective of Operation Clean Feather was to reduce the incidence of chronic discharges of oil into the marine environment of Placentia Bay, Newfoundland and environs, and thus reduce mortality of marine wildlife,

particularly seabirds. Within the general framework of this overall objective are the following specific objectives:

- To increase aerial and marine surveillance of vessels to act as a deterrent to any deliberate discharge of waste oils coupled with aggressive legal action against offenders. It is intended to pursue cases involving oiled birds to the fullest extent with a view to setting a precedent for use within the Canadian legal system.

- To test and refine protocols developed for reacting to oiled bird incidents in Placentia Bay and to improve response to such incidents by federal agencies.

- To prepare an information brochure on the impacts of vessel bilge release for distribution to the marine sector including ships crews, shipping companies and their agents.

- To enhance public awareness of the problem of oiled birds in Newfoundland and to improve the public's perception of government's ability to respond to these incidents.

- To evaluate the need in Placentia Bay for land based oily waste reception facilities.

- To begin development of a data base that will facilitate estimation of total marine bird mortality due to oil spills.

2. Project descriptions, results and recommendations

Operation Clean Feather comprised five project elements. These were as follows:

Project element (title)	Agency responsible
Beached bird surveys	CWS
Oil sampling and archiving	All
Ground and aerial surveillance	CWS, CCG
Communications	All
Drift experimentation	CWS

The following describes each project element and results, and makes recommendations for future operations.

2.1. Beached bird surveys

2.1.1. Description

Beached bird surveys were conducted to monitor the occurrence of oiled birds and oil on beaches through the project periods. Surveys of 33 beaches in Placentia Bay commenced in early January and ran through March-end in 1991 and 1992. Appendix B lists the survey beaches and geographic coordinates. Figure 1 shows the location of survey beaches. Twenty-two beaches on the east side of the bay (known as the Cape Shore) were surveyed weekly. Eleven beaches on the Burin Peninsula were surveyed about once every month, weather and travel conditions permitting. Most Cape Shore beaches had been surveyed previously during monthly visits as part of CWS, south-Avalon beached bird surveys. Those on the Burin Peninsula had rarely if ever been

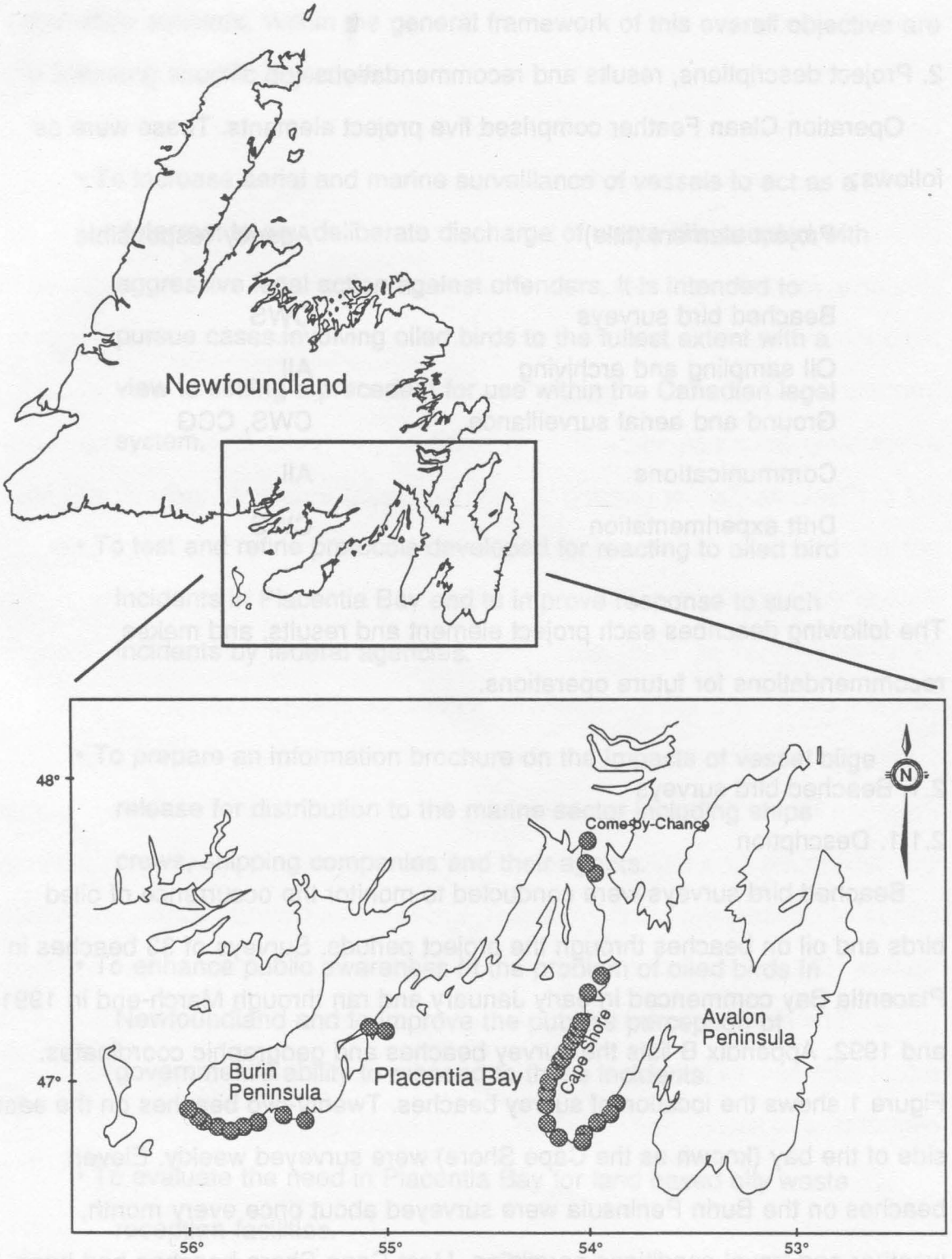

Figure 1. Map showing locations of beached bird surveys (●) performed during Operation Clean Feather

surveyed. Standard methods were used to survey beaches for oiled seabirds (Appendix C).

In addition to tallies of oiled birds obtained from beach surveys, survey workers opportunistically recorded reports of oiled birds from Placentia Bay communicated to them by the general public.

In the two years prior to the operation, Cape Shore beaches were surveyed once per month by CWS staff. Once an oil pollution event was detected, survey intensity increased in the affected area in an effort to assess the marine bird mortality. CWS also recorded reports of oiled birds communicated to them by the general public. In all years, every effort was made to avoid double-counting of oiled birds.

2.1.2. Results

During the 3-month periods of the project in 1991 and 1992, 607 and 689 oiled birds were reported in each year respectively. These totals were substantially lower than those reported over a similar period in 1989 when about 1,500 oiled birds were found (CWS unpubl. data), or 1990 when about 2,500 were found in the same general area (CWS unpubl. data). The difference appears even more marked given that surveillance of beaches in the bay was more intense in 1991 and 1992 than in previous years.

There are a variety of possible reasons why the numbers of oiled birds reported from Placentia Bay in 1991 and 1992 were lower than in the two previous years. One explanation is that Operation Clean Feather had the desired effect in reducing either the number of oiling events or the amount of oil discharged into the waters south of Newfoundland, thus reducing the number of oiled birds recovered. However, other factors such as weather, ice, and the distribution of birds may have differed in the two operation years, and changes

in the number of oiled birds recovered could be an artifact of these effects alone. Repetition of the operation is future years will be needed to confirm its efficacy.

Table 1 shows a breakdown of the oiled birds found in 1991 and 1992 by species and condition when found, i.e., dead or alive. The most common species found oiled were murres (Uria spp.), accounting for 45 and 46% of oiled birds in both years respectively. Common Eider (Somateria mollissima) and Dovekies (Alle alle) accounted for a further 51% of birds found oiled in 1991 and 38% in 1992. Significant numbers of Oldsquaw (Clangula hyemalis), and Black Guillemot (Cepphus grylle) also were found, particularly in 1992. All these species spend significant amounts of time swimming at the surface of the water and diving for food, and are thus particularly vulnerable to oil pollution. More aerial species such as gulls, storm-petrels and shearwaters, although abundant in Newfoundland waters, are less susceptible to oiling and were not found commonly during beach surveys.

In addition to these species, small numbers of other marine birds such as Northern Fulmar (Fulmarus glacialis), scoters (Melanitta spp.), Red-necked Grebe (Podiceps grisegena), and Common Loon (Gavia immer) also were reported oiled. There were no reports of oiled Harlequin Ducks, which is an Endangered species in eastern North America.

About half to two-thirds of the oiled birds were found alive, depending on year. Since it is likely that oil kills seabirds relatively quickly in the cold waters around Newfoundland, this observation suggests that many of the birds were found shortly after being oiled. The fact that inshore species such as Common Eider, Black Guillemot, and Oldsquaw were commonly found oiled suggests that the oiling events often occurred relatively close to shore. This is not to say

Table 1. Numbers and condition of seabirds found dead or alive during the operation in 1991 and 1992.

Species	Dead (n)	Alive (n)	Total (n)	%
1991				
Murre spp.[1]	171	104	275	45
Common Eider	43	197	240	40
Dovekie	57	9	66	11
Oldsquaw	3	8	11	2
Black Guillemot	3	0	3	0
other species	9	3	12	2
Total 1991	286	321	607	
1992				
Murre spp.	159	156	315	46
Common Eider	12	148	160	23
Dovekie	50	51	101	15
Oldsquaw	4	68	72	10
Black Guillemot	14	12	26	4
other species	3	12	15	2
Total 1992	242	447	689	

1. Common or Thick-billed Murre

that the oil was discharged close to shore, just that the birds likely contacted the oil there.

Most reports came from the eastern side of the bay with relatively few oiled birds being found along the Burin Peninsula on the west side. This trend may be explained by prevailing wind and ocean current patterns that tend to push birds onto beaches on the east side of the bay.

Figure 2 shows the number of oiled seabirds found dead or alive on survey beaches, according to date in 1991 and 1992. The two years were very similar in the temporal pattern of oiling. Most birds in both years came from two periods, one in early January and the other in early- to mid-February. In both years relatively few birds were found between mid-January and early February or in March. It is likely that the two "flushes" of oiled birds found in both years were the result of particular oil discharge events into waters used by the birds.

2.1.3. Conclusions and recommendation

Beached bird surveys were an essential component of Operation Clean Feather. Most importantly, they provided timely feedback as to the state of the beaches in Placentia Bay and the incidence of bird oiling. They also provided a relatively complete record of oiled seabirds from survey beaches, which could be compared with previous tallies. The contractors responsible for the surveys set up communication networks with local fishermen and hunters in the area. Reports of oiled birds that would have been otherwise missed were thus accumulated. An important aspect of this liaison was one of information transfer: the contractors' activities on beaches and in local communities considerably heightened awareness of the oil pollution problem and the profile of the operation.

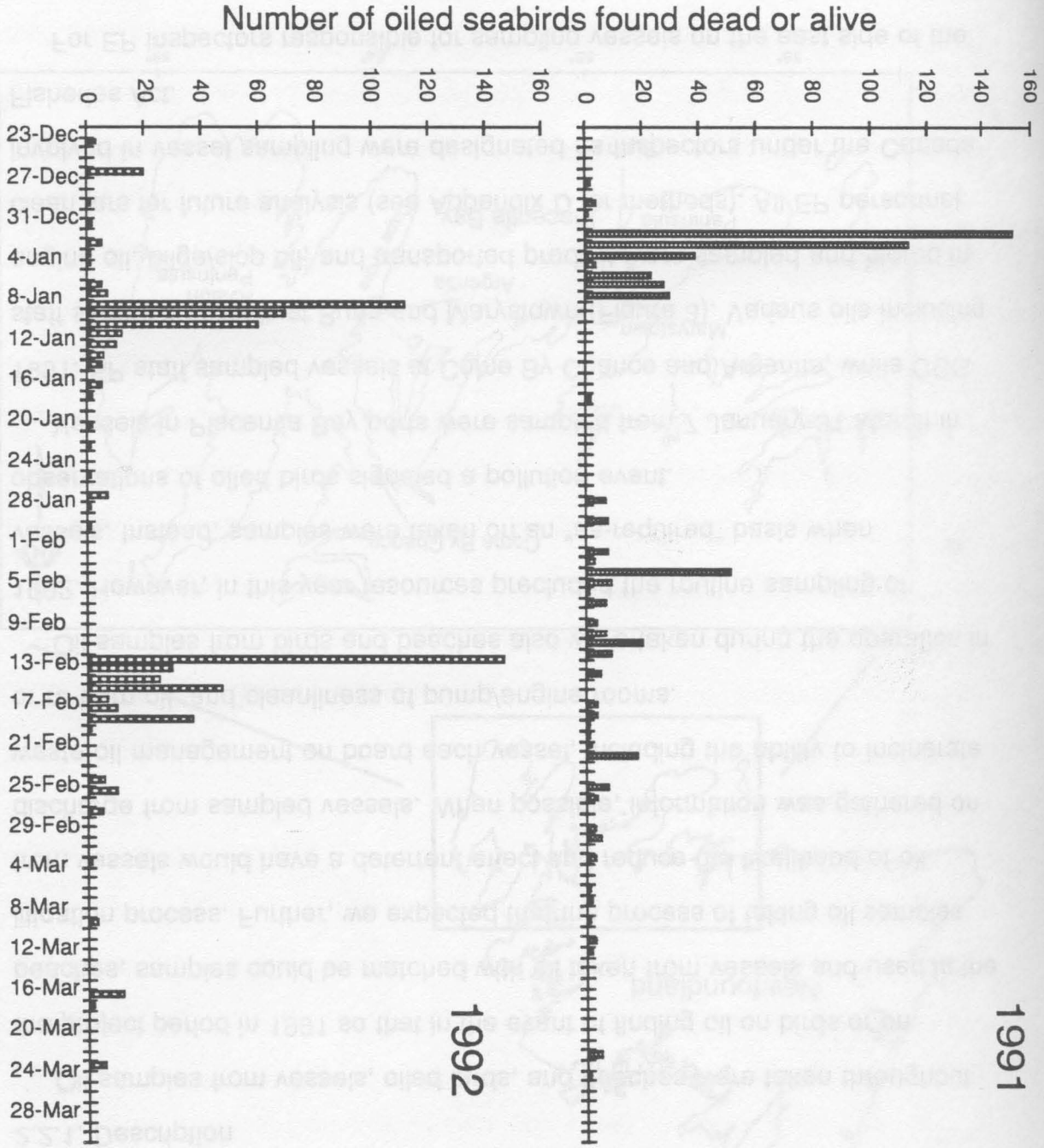

Figure 2. Number of oiled seabirds found in each year of the operation according to date

• beach surveys of the type described here should be continued during the winter months in Placentia Bay.

2.2. Oil sampling and archiving

2.2.1. Description

Oil samples from vessels, oiled birds, and beaches were taken throughout the project period in 1991 so that in the event of finding oil on birds or on beaches, samples could be matched with oil taken from vessels and used in the litigation process. Further, we expected that the process of taking oil samples from vessels would have a deterrent effect and reduce the likelihood of oil discharge from sampled vessels. When possible, information was gathered on waste oil management on board each vessel, including the ability to incinerate or re-burn oil, and cleanliness of pump/engine rooms.

Oil samples from birds and beaches also were taken during the operation in 1992. However, in this year resources precluded the routine sampling of vessels. Instead, samples were taken on an "as-required" basis when observations of oiled birds signaled a pollution event.

Vessels in Placentia Bay ports were sampled from 7 January-31 March in 1991. EP staff sampled vessels at Come By Chance and Argentia, while CCG staff sampled vessels at Burin and Marystown (Figure 3). Various oils including engine oil, bilge/slop oil, and transported product were sampled and stored in clean jars for future analysis (see Appendix D for methods). All EP personnel involved in vessel sampling were designated as Inspectors under the Canada Fisheries Act.

For EP inspectors responsible for sampling vessels on the east side of the bay, the operation period was sub-divided into two-week shifts during which

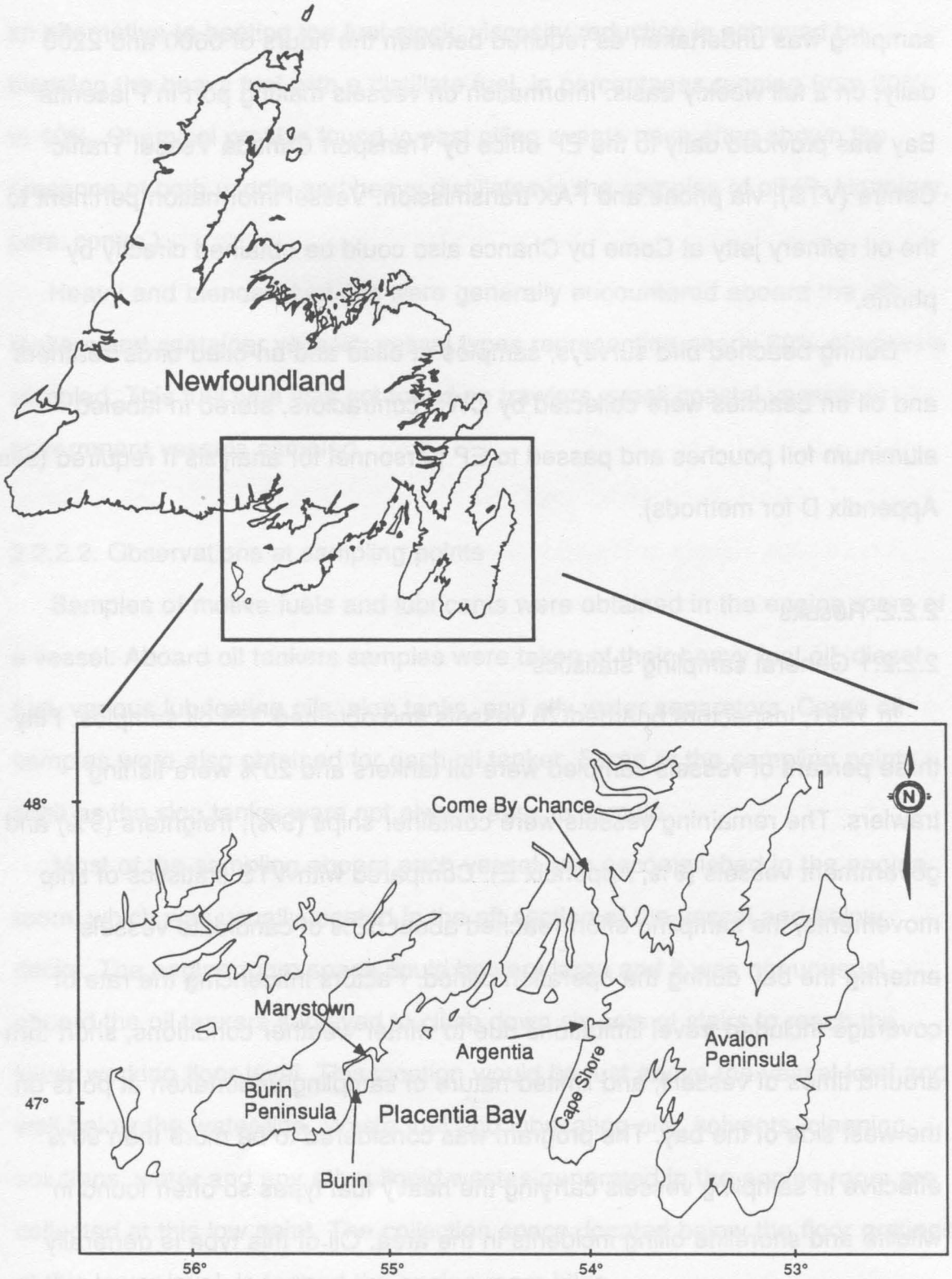

Figure 3. Map showing locations of ports at which vessels were sampled

sampling was undertaken as required between the hours of 0600 and 2200 daily, on a full weekly basis. Information on vessels making port in Placentia Bay was provided daily to the EP office by Transport Canada Vessel Traffic Centre (VTS), via phone and FAX transmission. Vessel information pertinent to the oil refinery jetty at Come by Chance also could be obtained directly by phone.

During beached bird surveys, samples of oiled and un-oiled birds' feathers and oil on beaches were collected by CWS contractors, stored in labeled aluminum foil pouches and passed to EP personnel for analysis if required (see Appendix D for methods).

2.2.2. Results

2.2.2.1 General sampling statistics

In 1991, inspectors boarded 76 vessels and obtained 373 oil samples. Fifty-three percent of vessels sampled were oil tankers and 20% were fishing trawlers. The remaining vessels were container ships (9%), freighters (9%) and government vessels (9%; Appendix E). Compared with VTS statistics of ship movements, the sampling effort reached about 52% of candidate vessels entering the bay during the operation period. Factors influencing the rate of coverage included travel limitations due to winter weather conditions, short turn-around times of vessels, and limited nature of sampling undertaken at ports on the west side of the bay. The program was considered to be more than 90% effective in sampling vessels carrying the heavy fuel types so often found in wildlife and shoreline oiling incidents in the area. Oil of this type is generally dark brown to black in colouration and very viscous when cool. Heavy fuels are commonly used to power large vessels. The viscous nature of heavy fuel requires that it be heated in order to lower its viscosity for pumping purposes. As

an alternative to heating the fuel stock, viscosity reduction is achieved by blending the heavy fuel with a distillate fuel, in percentages ranging from 20% to 40%. Chemical profiles found in past oiling events have often shown the presence of both middle and heavy distillates in the samples of oil (P. Hennigar, pers. comm.).

Heavy and blended fuel oils were generally encountered aboard the oil tankers and container vessels; vessel types representing nearly 60% of vessels sampled. This fuel type was not found on trawlers, small coastal vessels or government vessels sampled.

2.2.2.2. Observations at sampling points

Samples of motive fuels and lubricants were obtained in the engine room of a vessel. Aboard oil tankers samples were taken of their heavy fuel oil, diesel fuel, various lubricating oils, slop tanks, and oily water separators. Cargo oil samples were also obtained for each oil tanker. Some of the sampling points, such as the slop tanks, were not always easy to sample.

Most of the sampling aboard each vessel was accomplished in the engine room, which was usually located in the aft section of the vessel and below decks. The engine room space could be very large and it was not unusual aboard the oil tankers surveyed to climb down six sets of stairs to reach the lower working floor level. This location would be just above the vessel keel and well below the water-line. Waste fuel and lubricating oils, solvents, cleaning solutions, water and any other liquid wastes generated in the engine room are collected at this low point. The collection space, located below the floor gratings at this lower level, is termed the engine room bilge.

Aboard oil tankers, a second area for the collection of wastes is found in the pump room. Tankers have large capacity pumps to discharge their cargo

ashore and these are normally located in an area below decks, between the engine room and cargo tanks. The pump room bilge is located at a point near the vessel keel and collects oil wastes that occur during maintenance or from leakage at the pumps and associated piping. Oil types found in the bilge would reflect the cargo carried, such as crude or refined oil. Bilge wastes are normally pumped to a cargo slop tank and combined with other sources of cargo oil, such as from pump and line stripping operations. The contents of the slop tank are often added to product being discharged to shore tanks.

2.2.2.3. Disposal practices for waste oil

Liquid bilge wastes collected in the engine room were dealt with in a number of ways. For smaller vessels the option often chosen is to pump the complete liquid waste at sea, adding perhaps bilge cleaning chemicals to effect a dispersion of any contained oils. Other vessels of the same class may be equipped to separate oil from the water portion of the bilge content. Oils collected by this method would be directed to a slop tank for storage pending disposal ashore. Aboard tanker-class vessels, oil/water separators are required by regulation. These separators are equipped to measure the oil content in the water fraction being discharged, complying with international tanker standards.

Captains and crews on oil tankers boarded reported disposing of their oil wastes in one of four ways: (1) blending it into cargo oil, (2) discharging it for disposal on shore, (3) blending it into heavy motive fuels aboard the vessel, or (4) burning the waste oil in an on-board incinerator. For obvious reasons, personnel on these vessels did not proffer that an alternative to these methods was the disposal of waste oil into the sea.

2.2.2.4. Shipboard conversations

While aboard vessels the EP sampling team had an opportunity to speak to officers and crew members about the problems of oil discharges into the marine environment. In these conversations it became obvious that the seafaring community is drawn from many countries around the world and it was not unusual to find several languages being spoken aboard each vessel. The diversity of nationality blended with individual experiences from travel to ports worldwide provided an insight into the problem of waste oil aboard vessels from the perspective of the mariner. Some highlights from these conversations are as follows:

- It was clear that the situation regarding waste oil disposal from ships is not uniform around the world. There is a general shortage of waste oil reception facilities. Many commented on the fact that the MARPOL convention provides that these facilities be made available in signatory countries but in practice this has not happened. It appears that while government regulations against pollution at sea are becoming more stringent, alternatives for oily waste disposal are either too costly or simply not available.

- Where available, the cost of waste oil collection is variable from as low as gratis to $5 per ton in European centres, to $100 per ton in the U.S.. Some countries such as Japan do not accept any oil wastes. The cost to discharge oily water ballast at oil refineries is high and this promotes disposal practices at sea. One tanker reported being charged an additional $15,000 at a Canadian

refinery because the amount of ballast water aboard exceeded 50,000 barrels.

• One individual described his tanker arriving "in ballast at a refinery" in the southern U.S. to find that there was no ballast-water reception facility available. A U.S. Coast Guard officer monitored this vessel's discharge of ballast water into the harbour to ensure that there was no deposit of oil.

• It was stated that at one European port a barge comes along side each vessel specifically to remove oil wastes.

• The shipping business is very competitive and cost management is a prime consideration. Pressure is often exerted by vessel owners to utilize waste oil tank storage space (slop tanks) for the shipment of cargo oils in order to maximize voyage profits, at the expense of being able to collect waste oil for proper disposal ashore.

• In the southern Pacific, the passage of vessels through these waters is commonly marked by trailing oil slicks.

• Container vessels and dry bulk carriers were regarded as most disadvantaged by the lack of shore reception facilities. One crew member stated that he had been reprimanded by the captain of his vessel for not throwing garbage overboard when ordered to do so.

• In the matter of vessel waste oil disposal there is a difference between the terms "deballasting facility" and "shore reception facility". Empty oil tankers in transit to a refinery for a cargo of refined product must ballast the vessel down with seawater to provide stability at sea. This seawater is generally contained in the cargo tanks and thereby contaminated by residual fuel in the tanks. Upon arrival at a refinery this ballast water must then be discharged to shore prior to taking on a cargo. The oil refinery often provides a deballasting facility for this purpose and charges the tanker owner for its use based on the volume of ballast water discharged. The opportunity to discharge oil ashore does not generally include the oil wastes accumulated in the engine room because they contain a mixture of chemicals such as degreasers and solvents. Disposal of engine room oil wastes, from all types of vessels, would require shore reception facilities for this purpose. Such facilities are, for all practical purposes, not available at many Newfoundland ports, or commonly available elsewhere in Canada

2.2.2.5. Laboratory support

A substantial number of oil samples were taken from ships, birds and beaches and although most were not analysed during the project periods, they provide an excellent resource for retrospective analysis of the type of oil involved in oiling incidents in Placentia Bay. Samples taken in connection with the four bird oiling events that occurred in the two operations periods were analysed by Peter Hennigar of the EP laboratory in Dartmouth. In most cases, no matches were found between the samples provided from vessels and oil found on the feathers of birds retrieved from shore. An exception occurred in the

February 1992 oiling event, when oil rolling up onto the beach at Branch was found to match that found on birds recovered in the previous few days in the area.

2.2.3. Recommendations

- if resources (in particular personnel) allow, routine sampling of vessels should continue in the future. Sampling of oil on birds and any found on beaches or in the water should continue in support of opportunistic vessel sampling performed by CCG if a particular vessel is suspected in an oil pollution event.
- as an alternative to the vessel sampling program that formed part of the 1991 Clean Feather operation, it is recommended that contract personnel be hired seasonally and trained to deliver an information package to vessel operators dealing the environmental effects of oil discharges from vessels.

2.3. Surveillance

2.3.1. Description

A CCG DC-3 aircraft (Transport 950) commenced aerial surveillance of the area in early January and continued activities in the area until March-end in both years (weather permitting and excepting maintenance periods). A standard route usually was flown from St. John's airport northwest to Come By Chance and then southwest into Placentia Bay. Offshore areas on the south coast were covered up to 250 kms seaward. All oil slicks observed and photographed from the aircraft were recorded together with their estimated size and thickness (tar code). Particular attention was given to vessels reported to be in the area including those in port and under way.

The CWS enforcement vessel, the L.M. Tuck, was operational in the Placentia Bay area from 15 February to 31 March 1991. The purpose of deploying the vessel in the project was to collect samples of oil on the water during a pollution event, to liaise with fishermen and hunters using the bay, and to provide ground support to surveillance activities of the DC-3. Preparation for winter operation prevented the vessel from being on site earlier in the project.

2.3.2. Results

Aerial surveillance provided numerous reports of oil slicks sighted in the area. Many were in the vicinity of the oil refinery at Come by Chance, or in the harbours at Burin, Marystown, Mosquito Cove, and Bay Roberts. A few vessels were observed discharging oil while underway. When investigated, many of these reported slicks were not visible from sea level, a point that attests to the sensitivity of observations made from the aircraft. In many of the reports investigated, no single source of oil could be established and many could have arisen from either marine or land runoff sources. Some reports of oil in the waters adjacent to the Come By Chance refinery were likely associated with off-loading or loading of product creating small spillages. Leaking stern tubes and the refinery waste water treatment plant were other sources of oil.

Marystown and Burin harbours appeared to be particularly affected by oil pollution. It is likely that at these locations, the oil pollution problems observed from the air were largely due to the storage of oily equipment and materials on wharves at the Fisheries Products International (FPI) refit centre in Burin and the Marystown shipyard. Repeated washing of these items by rainfall likely resulted in oily water run-off into adjacent harbours. Rain run-off from the parking lot close to the Marystown shipyard also may have contributed to the problem at that location. Site visits by EP personnel to Burin and Marystown have resulted

in improvements in housekeeping practices, which may reduce the oil pollution problems in these areas.

2.3.2.1. Prosecutions

Four vessels were observed discharging oil while underway in the two years of the operation (one in 1991 and three in 1992). An additional vessel was seen by Transport 950 crew discharging oil in the Gulf of St. Lawrence in May 1992. Thus far, three of these observations have resulted in charges and in two cases, fines of $3,000 and $15,000 have been levied by the courts (CCG-Ship Safety files). The former charge was significant in that it set a major precedent for such a substantial fine resulting from the spillage of an estimated 0.6 litres of oil. In this case the crown called a member of CWS staff (Chardine) as an expert witness. In his summation, the judge appeared to accept the argument of the witness that even very small amounts of oil can be responsible for the death of many seabirds.

Preparation of the CWS vessel for winter operation delayed its deployment until 15 February - well into the project period. Subsequently, inclement weather and sea conditions restricted vessel usage to 16 days of operation (45 patrol hours). Although the opportunity to collect oil samples from the water or otherwise support aerial surveillance operations did not present itself, the CWS vessel was particularly suited to liaison with hunters and fisherman in the area. It provided a visible presence "on the ground" and a point of contact for people with concerns about oil pollution and other issues.

2.3.3. Conclusions and recommendations

The surveillance aspects of the operation were very important to its success. DC-3 overflights of ships provided a potent deterrent effect to captains and

crews who may have been considering dumping waste oil at sea, during daylight hours. CWS vessel support was important to the communications aspect of the operation although it should be noted that maintenance of the vessel on site for the entire operation period was very costly.

- CCG should continue DC-3 aerial surveillance of the area during the winter months in the future
- in order to enhance cooperation in enforcement and prosecution activities, and in keeping with a recommendation of the Public Review Panel on Tanker Safety and Marine Spill Response Capability, CWS enforcement staff should be designated as Pollution Prevention Officers under the Canada Shipping Act.

2.4. Communications

2.4.1. Description

The communications element of the operation had several components. All were aimed at heightening the awareness of the oil pollution problem, and the efforts underway to counter the problem.

An information brochure was designed in 1991 and distribution commenced in 1992 to ship captains and crews, harbour masters, other government offices, and the general public (Appendix F). The brochure graphically communicates to potential polluters such as ship operators three important messages:

- Newfoundland and Labrador are very important areas for seabirds and that those seabirds are important for the local economy

- small amounts of oil such as that pumped from bilges or slop tanks while underway, can kill many seabirds

- discharge of oil is illegal and fines up to $250,000 can be levied under the Canada Shipping Act.

The text in the brochure was published in Canada's two official languages and in Spanish and Korean. Spanish and Korean were chosen for the initial printing of the brochure on the advice of CCG staff who advised that these two languages would reach a large contingent of ship crews sailing in Newfoundland waters. The brochure doubles as a poster showing a stylized map of Atlantic Canada on which is highlighted important seabird areas and the common species of the region.

Every opportunity was taken to communicate with the public during the project. Beach survey contractors and the CWS crew of the L.M. Tuck frequently communicated with fishermen and hunters in the area. EP and CCG personnel sampling oil on vessels discussed relevant issues with ship captains and crews.

Press releases announcing the operation were prepared by Environment Canada Communications Unit, Dartmouth, and issued by Hon. John Crosbie's office. Contacts with the media were sought to publicize activities under the operation.

2.4.2. Results

The communication efforts associated with the operation had the likely effect of heightening awareness of the oil pollution problem in the area. A higher proportion of the public may now be more inclined to report sightings of oiled birds and oil on beaches. Personnel sampling oil on vessels reported a very

positive response from most ship captains and crews when asked to discuss the issue of oil pollution. In this regard, the "Oil Kills Seabirds" brochure was particularly effective.

2.4.3. Recommendations

- the communications aspects of the operation should be continued and strengthened in the future.
- the "Oil Kills Seabirds" brochure should be distributed at every appropriate opportunity and will form an integral part of the information package supplied to ship operators during on-board visits by contract personnel.
- the brochure should be reprinted in Russian and Norwegian, so that its message will reach a larger segment of shipping industry personnel.

2.5. Drift experimentation

2.5.1. Description

Drift experiments have been used to track oiled seabird corpses during oil spills and as a method of determining the proportion of oiled corpses recovered. As a substitute for the release of bird corpses, tagged, wooden blocks have been used as models (e.g., Threlfall and Piatt 1982). As part of Operation Clean Feather 600 blocks were constructed early in the project period in 1991. Details of the block construction are in Appendix G. It was intended that the blocks would be released after a major oil pollution event, if one occurred during the operation. However, no oil pollution events of a sufficient size to warrant release of blocks occurred. In lieu of a major release of blocks, a test release of 120 blocks was made into Placentia Bay in late March 1991 at a location a few kilometres south

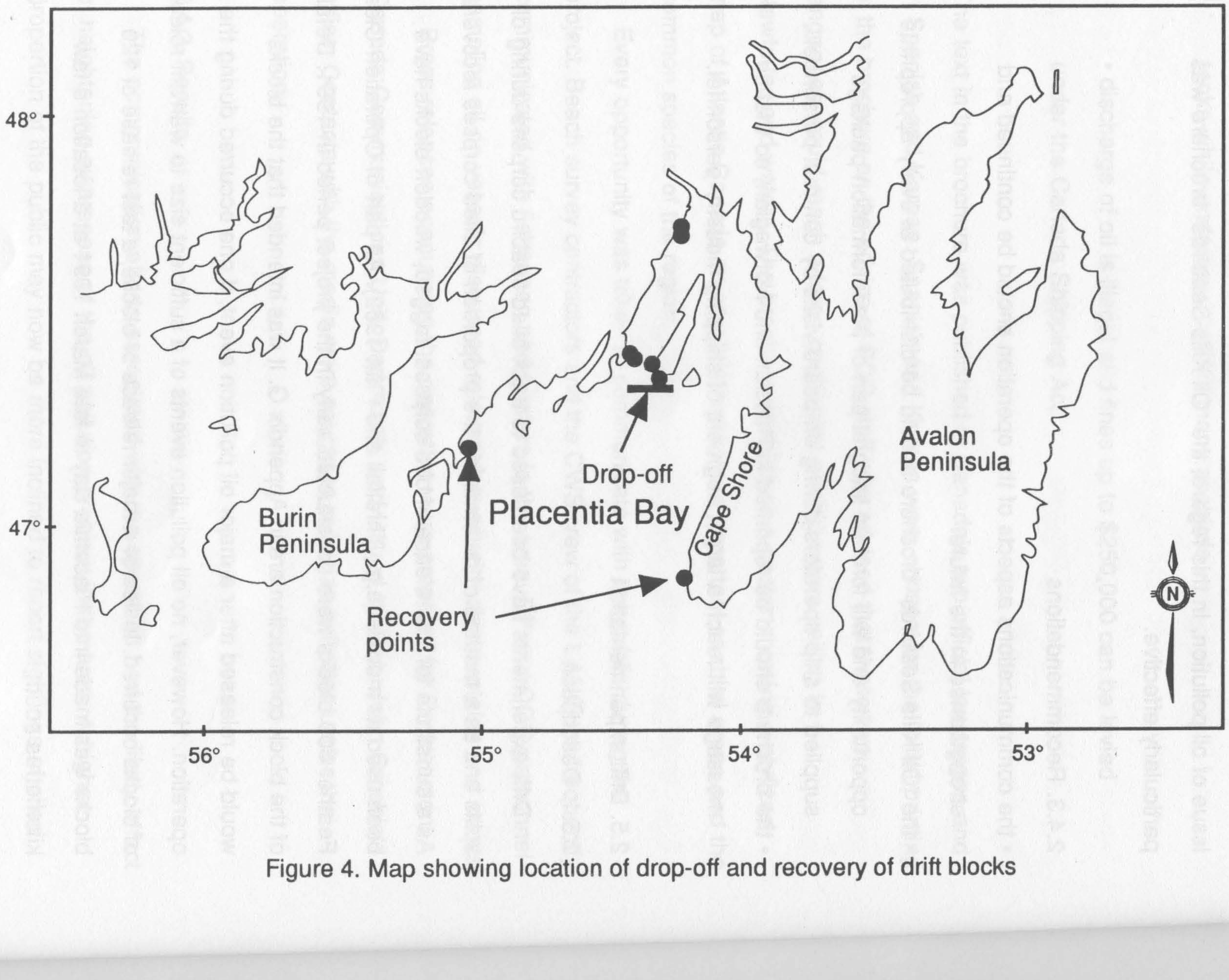

Figure 4. Map showing location of drop-off and recovery of drift blocks

of Merasheen Island (Figure 4). The release was publicized during site visits to the area and by beach survey contractors.

2.5.2. Results

Eight of 120 blocks (7%) have been recovered to date (January 1993). All were recovered in Placentia Bay (Figure 4). Four blocks were sighted in locations close to the drop-off point while two more drifted to the head of the bay. Two other blocks drifted out of the bay and were recovered on beaches on the Cape Shore, near St. Brides, and on the Burin Peninsula.

2.5.3. Recommendation

- during an oil pollution event in a future operation, a well publicized drop of drift blocks should be made.

3. Overall conclusions

Operation Clean Feather appeared to have the desired effect on the release of oil in Placentia Bay and adjacent waters during the winter months: significantly reduced numbers of oiled birds were reported in 1991 and 1992 compared to similar periods in the previous two years. Survey methodologies differed in the two sets of years, in particular, survey intensity was greater during operation years. Thus, methodology alone would tend to inflate numbers of oiled birds found during the operation, making the observation of fewer birds even more significant. It was encouraging to find reductions in oiled birds in both operation years. This lends strength to the argument that factors associated with Operation Clean Feather were the cause of the reductions in oiled birds and not factors peculiar to any one of the years such as changes in bird distribution or weather.

It is instructive to consider the temporal distribution of oiled seabird observations in southern Newfoundland because it may help to interpret the actual causes of the reduced numbers of oiled birds recovered during operation years. Typically, December to March is the "oiled seabird season" in southern Newfoundland (Piatt et al 1985, Chardine et al. 1990). Within this period, oiled birds tend to be recovered in spurts or "flushes", which almost certainly coincide with one or more oil pollution events. The flushes last for a few days to two weeks or more before the number of oiled birds declines to background levels. Typically, one or two flushes occur per winter in the Placentia Bay area of southern Newfoundland. During Operation Clean Feather, two flushes of oiled birds occurred in each year (Fig. 2), one in early January and the other in early-mid February, and the number and timing of these events was similar in the two previous years. Therefore, reductions in the number of oiled birds recovered during Operation Clean Feather was not due to fewer flushes occurring, but to fewer birds per flush being recovered.

How could Operation Clean Feather have reduced the number of oiled birds per flush? Fewer birds per flush may be an indication of reduced amounts of oil being released per pollution event (Burger 1993). Reduced amounts of oil per pollution event may result not only from less oil being released per vessel, but also from fewer vessels releasing oil at the same time. A particular oil pollution event could be the result of oil discharges from more than one vessel, and it is likely that as the number of separate discharges increase, so the toll of seabird oiling will tend to increase.

Operation Clean Feather provided the opportunity to test and refine an organizational framework to deal with the problem of chronic oil pollution reports. Previous to the operation, response plans were in place only for large oil spills through the Regional Environmental Emergency Team (REET) and

response to small, chronic seabird oiling events was ad hoc at best. Through the specific activities under the operation (beach surveys, surveillance, oil sampling, etc) and the requirement to coordinate activities through inter-agency communication, a more structured response system for chronic oiling events in Newfoundland was worked out and is now in place.

Communications efforts heightened the awareness of the problem of oil pollution in Newfoundland waters and better positioned Environment Canada and Transport Canada to continue efforts to reduce this problem. A valuable legacy of the operation is the "Oil Kills Seabirds" brochure which continues to be a useful communications tool. Recently, officials in Norway have considered the Clean Feather brochure as model for a similar document to be used there.

Considerable interest in Operation Clean Feather has been generated both within Canada and internationally. It is likely that some or all of the projects undertaken as part of Operation Clean Feather could be implemented to advantage in places elsewhere that suffer from chronic oil pollution.

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Appendix A. Project proposal: Operation Clean Feather

BACKGROUND

Placentia Bay experiences frequent bird oiling incidents during the winter months due to chronic deliberate discharges of oil into the marine environment. Even small amounts of oil can be devastating for wintering marine bird populations, including the endangered Harlequin Duck.

Additionally, the report of the Public Review Panel on Tanker Safety and Marine Spills Response Capability states that: "Placentia Bay is considered by many to be the most likely place in Canada for a major spill."

Other features of the Placentia Bay area are:

- major shipping lanes pass just south of the bay. These bring all types of vessels within scant miles of the coast of Newfoundland.
- there are tankers entering the bay enroute to an oil refinery: Newfoundland Processing Ltd., located near the community of Come By Chance. Tanker traffic using this industrial site has long been suspected as a source of repeated bird oiling events.
- other vessel traffic in Placentia Bay waters using ports at Marystown, Argentia, Long Harbour, St. Lawrence and Arnold's Cove. These vessels are primarily fishing trawlers.

In November 1988, a workshop on the subject of oiled birds was held in St. John's, which resulted in the preparation of a report entitled: Mitigation of Effects of Oil Pollution on Seabird Populations: Prevention and Prosecution in Newfoundland Waters. The report identified a need to routinely sample vessels, to enforce pollution regulations outside of the 12 nautical mile limit, to assess the need for waste oil reception facilities and to produce information on the subject for the marine industry.

The discharge of oil from vessels into the ocean is regulated under the Canada Shipping Act. Administered by the Canadian Coast Guard, this Act is the prime piece of federal legislation that can be applied to the current problem of chronic discharges. Other relevant legislation applicable to the issue are the Fisheries Act and Migratory Birds Convention Act.

Past bird oiling incidents have been investigated by Canadian Coast Guard and Environment Canada personnel in efforts to determine the responsible vessel(s). Coast Guard also commenced aerial patrols in March 1990. At the current level of application, none of these activities has been successful in the identification of a vessel responsible for an oiled seabird event.

The overall objective of the program is to reduce the incidence of chronic discharges of oil into the marine environment and their effects on marine wildlife, particularly seabirds. It will also help meet the objective of implementing the recommendations of the Public Review Panel on Tanker Safety and Marine Spill Response Capability. Within the general framework of these overall objectives are the following specific objectives.

1. To increase aerial and marine surveillance of vessels to act as a deterrent to the deliberate discharge of waste oils coupled with aggressive legal action against offenders. It is intended to pursue cases involving oiled birds to the fullest extent with a view to setting a precedent for use within the Canadian legal system.

2. To test and refine protocols developed for reacting to oiled bird incidents in Placentia Bay and to improve response to such incidents by federal agencies.

3. To prepare an information brochure on the impacts of vessel bilge release for distribution to the marine sector including ships crews, shipping companies and their agents.

4. To enhance public awareness of the problem of oiled birds in Newfoundland and to improve the public's perception of government's ability to respond to these incidents.

5. To evaluate the need in Placentia Bay for land based oily waste reception facilities.

6. To begin development of a data base that will facilitate estimation of total marine bird mortality due to oil spills.

PROJECT ELEMENTS

Vessel Sampling Program

Beginning in the first week in January, and extending to 31 March 1991, a sampling regime will be carried out for vessels over 20 metres in length. Sampling will include not only bilge oils but also lubricating oils, motive fuels and cargo, such as crude or refined product. The Canadian Coast Guard will perform sampling on the West side of Placentia Bay and Environmental Protection will sample on the East side. Samples will be archived by EP for potential future use as legal evidence. While an attempt will be made to obtain as complete coverage as possible, it is recognized that logistical and personnel considerations will cause some vessels to be missed.

During vessel sampling, estimates will be made of the amount of oil present in the engine room bilge. These estimates will provide data on the quantities of oil that are available for collection at waste reception facilities that may be established in the future. Current disposal practices utilized by the vessel will be assessed at the time of its inspection.

Laboratory Support

Laboratory analysis of complex oil mixtures will be performed at the Environmental Protection Laboratory at the Bedford Institute of Oceanography. On the assumption that there will be at least one bird oiling event within the time period involved in this project, it is estimated that analysis of 150 samples will be required.

Aerial Surveillance

The Canadian Coast Guard will provide aerial surveillance of Placentia Bay and the shipping lane to the south of Newfoundland. Coverage will be for two-week periods with two-week intermissions during which the aircraft is required elsewhere. The surveillance will facilitate identification of oil releases and instigation of legislative action. Canadian Coast Guard will also provide up-to-date vessel movement information on which daily sampling routines can be based.

CWS Vessel Support

The CWS vessel (L.M. Tuck) will conduct reconnaissance for oil slicks and oiled birds and sample oil from slicks where possible. Periods of surveillance will coincide with the periods of CCG aerial surveillance. Assistance will be provided to CCG and EP as required during oiling incidents. The ability to

sample oil slicks is particularly important to the project in terms of matching with oil samples from bilges and from birds. The vessel also will be used in other CWS experiments planned in conjunction with this project. Two persons will be available to operate the boat.

Weekly Beached Bird Surveys

Weekly beached bird surveys will be carried out beginning in the second week in January and utilizing expertise gained by area residents through CEIC-sponsored training programs. The functions of these surveys will include: (1) provision of an ongoing tally of oiled birds appearing on beaches in Placentia Bay, (2) indications that an oiling event has taken place in the bay or vicinity, (3) provision of oil samples that may be matched to samples taken from bilges or cargo, and (4) quantitative comparisons with previous surveys that will give a partial measure of the success or failure of Operation Clean Feather.

Corpse-drift Project

If a bird oiling event occurs during the project, a corpse-drift experiment will be initiated as soon as possible after the start of the event. The purpose of the corpse-drift experiment will be two-fold. First, we will be able to generate an empirical estimate of the proportion of oiled birds that eventually die, which are not accounted for on beached bird surveys. This will enable us to quote estimates of the total numbers of oiled birds that died based on data derived at the same time and area of the event. Second, the use of wooden blocks (which do not sink) will allow the estimation of the effect of corpse sinking or breakup. The release of wooden blocks will also provide estimates of oiling rates over a fixed length of time and drift vectors (direction and speed).

Communications

A press release will be issued early in January describing the purpose, components and participants of the operation.

A brochure will be developed by Environment Canada Communications Unit-AR and Canadian Wildlife Service. The most common languages used aboard vessels entering Placentia Bay will be featured and the message will be directed at ship's captains, crews, shipping agents and vessel owners. It will stress the important role that Newfoundland waters play in the life cycle of seabird populations and how they can be affected by indiscriminate dumping of waste oil. Publication of the brochure will take place approximately half-way through the project and thereafter it will be distributed to ships' crews when they are boarded for sampling.

Information flow between EP, CWS and the CCG will be coordinated by Gordon Pelly of EP. Briefing notes on components involving more than one area of responsibility will be prepared jointly by representatives of the respective jurisdictions.

Resourcing

Environment Canada has allocated $100,000 to Operation Clean Feather. It has been agreed that $65,000 will be utilized to support CWS activities and $35,000 to support EP activities. The Canadian Coast Guard will cover all costs of its participation in the operation.

The rapid development of the project, fiscal restraints within Environment Canada and the emerging role of CCG, have created a situation wherein final detailed budgets within the above mentioned limits have yet to be specified. This will be done by 7 January 1991.

Appendix B. Names and coordinates of beaches surveyed during the operation

	Beach	Lat (N)	Long (W)
east side of Placentia Bay (Cape Shore)	Beckford	46° 54'	53° 54'
	Branch	46° 53'	53° 57'
	Red Head	46° 51'	53° 59'
	Gull Cove	46° 50'	54° 01'
	Pt. Lance	46° 48'	54° 05'
	Golden Bay	46° 49'	54° 09'
	Lear's Cove	46° 52'	54° 11'
	St. Brides	46° 55'	54° 11'
	Cuslett	46° 57'	54° 10'
	Angel's Cove	47° 00'	54° 08'
	Patrick's Cove	47° 02'	54° 07'
	Gooseberry Cove	47° 04'	54° 06'
	Ship Cove	47° 06'	54° 05'
	Great Barasway	47° 08'	54° 04'
	Little Barasway	47° 11'	54° 03'
	Pt. Verde	47° 14'	54° 01'
	Placentia	47° 15'	53° 57'
	Argentia A & B	47° 19'	54° 00'
	Ship Harbour	47° 22'	53° 54'
	Southern Harbour	47° 43'	53° 58'
	Arnold's Cove	47° 45'	53° 59'
	Come By Chance	47° 49'	54° 00'
Burin Peninsula (west side)	Jean de Baie	47° 13'	55° 04'
	Cow Head	47° 12'	55° 06'
	Shoal Cove	46° 53'	55° 24'
	Lawn	46° 57'	55° 33'
	Lord's Cove	46° 53'	55° 40'
	Taylor's Bay	46° 53'	55° 43'
	Point au Gaul	46° 52'	55° 46'
	Lamaline	46° 52'	55° 49'
	High Beach	46° 54'	55° 53'
	Point May	46° 54'	55° 55'
	Lories	46° 54'	55° 57'

Appendix C. Protocol for beached bird surveys under Operation Clean Feather (as supplied to contractors)

1. On the initial visit to the beach, draw a sketch map of the beach showing prominent features, the amount of beach covered and distance. Record latitude and longitude of the centre of the beach.

2. Complete a Beached Bird Survey report form each time a beach is surveyed. Do this even of no birds are found.

3. Survey the same stretch of each beach once per week. On the first week of a particular month of surveys, mark all dead bird corpses with a 5cm length of coloured wire twisted around a part of the corpse not likely to fall off and be lost (leg, base of wing). Record the number of each species found dead, if possible by age (adult or immature) and sex on the forms provided. Also record the number of each species in the following categories describing the amount of the oil on their feathers:

    0. No oil

    1. Slight oiling- smudges of oil that do not totally penetrate the breast feathers or coat the wings

    2. Moderate oiling- oil penetrates to base of feathers or saturates wings; < 25% body affected

    3. Heavy oiling- oil penetrates to base of feathers; >25% of body affected

    4. unknown- less than half the body remains (often wings, head/neck only) and oil at levels 1 and 2 could thus be missed. Use this code even if oil is present. When single wings are found, use the minimum number of birds found, not total wings.

LEAVE THE CORPSE UNDISTURBED ON THE BEACH. On the second and third weeks, repeat this procedure and record the number of corpses found that were marked on each previous week.

4. On the 4th week (survey timed to occur sometime in the last week of each month), clear the beach of all dead birds and record data as for birds found but not collected in previous weeks.

5. On each survey, record the relative amounts of fresh oil (from the last visit), snow, ice, and heavy seaweed on the areas of the beach where birds would be expected, as follows:

Beach codes for oil:

0. Clean

1. Slightly oiled- Few small patches or tar-balls (<1 per 50m)

2. Moderately oiled- several large patches of oil or many small ones with flotsam speckled with oil

3. Heavily oiled- tideline and flotsam extensively covered with oil

Note: if level 1, 2 or 3, describe in the remarks section of the form the extent of oil (sketch map), position in relation to tide mark, fresh or old, smell, texture (runny or thick), colour.

Beach codes for snow/ice or seaweed:

0. Covers 5% of beach or less

1. Covers up to 30% of beach

2. Covers 30-60% of beach

3. Covers >60% of beach

7. Ensure that the entire area of the beach is searched with equal intensity. To survey a beach, walk one way along the line of flotsam closest to the water, scanning each side. Then return along the next flotsam line above. If a beach is particularly deep, several sweeps will be required.

8. Record data on any sick or oiled live birds on a separate part of the data sheet provided.

Appendix D: Protocols for sampling oil from vessels and birds' feathers

Sampling of vessels

1. Amber glass bottles with Teflon lined caps are to be used in this sampling procedure. Plastic and glass bottles that have not been properly cleaned are unacceptable for sampling. Amber coloration reduces the effects of light on the sample.

2. Sampling will be undertaken on all petroleum products aboard a vessel, including motive fuels, cargo oils and lubricating oils. Samples will be obtained from all bilge areas.

3. A sample of oil should be just that, with as little associated water as possible. There should be no problem in sampling bulk petroleum products. Sampling bilge fluids may present more of a challenge due to the spacing at the actual location of the engine room or pump room bilge area.

4. Bilge spaces contain mixtures of water and petroleum product. The petroleum layer itself is usually a mixture of collected engine room oily wastes and may include lubricating oil and/or motive fuels. In these locations, the sample bottle should be affixed to a sampling wand and carefully dipped into the bilge space such that the lip of the bottle is partially submerged below the upper liquid layer in the bilge. In this manner, oil on the surface of the bilge will preferentially flow into the bottle. Check to determine if sufficient oil has been collected. Wipe off the sample bottle and label it with the following information:

Date:
Time:
Port Location:
Vessel Name:
Sampling Location:
Product Type:
Name of Inspector:

Log the information in your field notes. Tighten the sample bottle cap firmly to prevent leakage and wrap masking tape around the cap and bottle. The inspector's initials should be marked across this masking tape seal as an added assurance of security. Place each sample into a separate plastic bag which is then sealed. This action will reduce the chance of cross contamination due to sample bottle breakage. Following this, secure the samples in a locked box for which there is only one key, which is held by the inspector. Keep collected samples cool: a refrigerator will suffice.

Sampling oiled bird feathers

1. Collect a sample of oiled and, if available, un-oiled bird feathers from the same bird, of all oiled birds found. If many birds are involved, randomly select a sub-sample of individual birds. If clean feathers are available on the bird

specimen, conduct their sampling first in order to avoid contamination. To reduce problems associated with cross contamination, all feather sampling should be done before the bird carcass has been bagged with other oiled corpses

2. The bird corpse to be sampled should appear to be a fresh specimen, ideally not already scavenged to the point that only portions of the carcass remain. The bird should show fresh (somewhat shiny and thick) oil on its feathers.

3. Wearing a pair of clean surgical gloves and using a clean scalpel blade, cut away a sample of un-oiled and oiled feathers from the bird carcass. Samples of feathers should be at least 1cm^2 in size and preferably about 4 cm^2 or larger. Place samples separate, sealed, aluminum foil pouches. Seal pouches by folding the foil and securing with masking tape. Initial masking tape. Affix a label to each sample with the following information:

Date:
Location:
Identifier: (use unique number or letter to identify sample)
Bird species:
Sex:
Feather: Oiled/Clean
Sample taken by:

4. Log the sample information in your field notes. Place the sample(s) from each bird into a small plastic bag and tape the bag shut. Collected samples should be stored in a cold area, preferably a freezer. Take care to dispose of used blades and gloves in an acceptable manner.

Appendix E: Vessels boarded and sampled during the operation in 1991

Vessel	No.[1]	Loc.[2]
1. Star Houston	5	C
2. Marine Voyager	3	A
3. Sylvie Valerie	3	A
4. Petrobulk Silvera	6	C
5. Torm Thyra	5	C
6. Probo Bani	6	C
7. Obo Venture	5	C
8. Irving Canada	12	C
9. Atlantic Champion	3	A
10. Torm Gunhild	7	C
11. Aime Gaudreau	4	SJ
12. Saint Helen	6	C
13. Sir Humphrey Gilbert	5	A
14. Marine Eagle	3	A
15.* Marine Voyager	3	A
16.* Petrobulk Silveria	7	C
17. Pistolet Bay	3	A
18. Valiant Express	9	C
19. Jin He	6	C
20. Gadus Atlantica	3	A
21. Skogafoss	5	A
22. Chelsea	6	C
23. M.V. Grand Baron	3	M
24. Provo Wallis	3	M
25. Atlantic Dorothy	3	M
26. Miramar	6	C
27. Galahad	6	C
28. Almare Seconda	7	C
29. Polar Nanoq	4	A
30.* Valiant Express	7	C
31.* Skogafoss	4	A
32. Sea Spirit	6	C
33. Front Condor	6	C
34. Ulyanovsk	3	C
35. Zambezi	2	B
36. Penny Hope	3	B
37. Zandberg	3	M
38. Atlantic Carol	3	M
39. Jahre Transporter	5	C
40. Palima	8	C
41. Sea Teal	7	C
42. Hoeg Fulmar	7	C
43. Sea Spirit	2	C
44. Reykjafoss	5	A
45. Harp	4	A
46. Irving Cedar	4	C
47. Onoba	8	C
48. Thanissis A	5	C
49.* Galahad	7	C
50.* Hoeg Fulmar	2	C
51.* Palima	7	C
52.* Sir Humphrey Gilbert	4	A
53.* Marine Voyager	3	A
54.* Petrobulk Silvera	7	C
55. Prime Noble	6	C
56. Solar	4	C
57.* Reykjafoss	5	A
58. Endurance	7	C
59.* Skogafoss	5	A
60. Grand Banker	3	A
61. Sir Wilfred Grenfell	5	A
62.* Petrobulk Silvera	7	C
63.* Irving Cedar	3	C
64. Alvelos	6	C
65. Delphina	8	C
66. Limbazhi	7	C
67. Jennie W	3	A
68.* Petrobulk Silvera	7	C
69.* Reykjafoss	4	A
70. Zebulon	3	B
71. Zermatt	3	M
72. Zurita	3	M
73. Atlantic Peggy	3	M
74.* Atlantic Dorothy	2	M
75. Atlantic Ruthann	2	M
76.* Atlantic Carol	3	M

Summary:
373 samples taken from:
40 oil tankers
15 fishing trawlers
7 container vessels
7 government vessels
7 freight vessels

1. Location: A = Argentia, B = Burin, C = Come by Chance, M = Marystown, SJ = St. John's

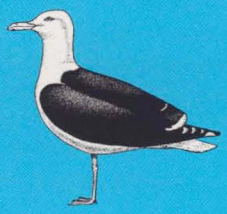
2. Number of samples taken

* Previously sampled

Appendix F. The "Oil Kills Seabirds" brochure developed over the course of the project

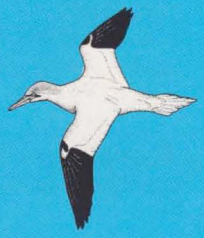
The Seabirds of Newfoundland and Labrador
Les oiseaux marins de Terre-Neuve et du Labrador
Aves acuáticas de Terranova y Labrador
뉴펀들랜드와 라브라도로의 바닷새들

Auks, Turrs
Pingouins
Pájaros bobos
바다오리와 새



Gulls
Goélands
Gaviotas
갈매기

Seaducks
Canards de mer
Patos marinos
바다오리



Gannets
Fous de bassan
Alcatraces
갈매기와의 바닷새

Shearwaters
Puffins
Meaucas (pico tijeras)
섬새

ILLUSTRATIONS: DAWN NELSON
DESIGN: GAYNOR / SARTY

R.G.B. BROWN

Oil Kills Seabirds

Le mazout tue les oiseaux marins

El petróleo es enemigo de las aves

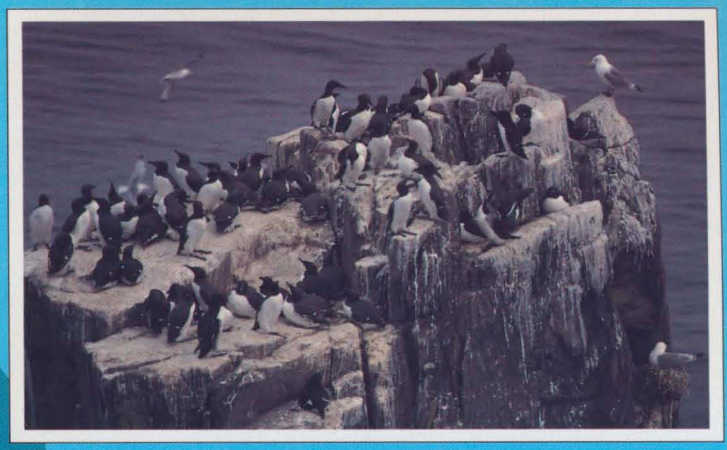
기름이 바닷새를 죽임

R. BELANGER

Environnement Canada
Conservation et Protection

Environment Canada
Conservation and Protection

Canada



J.W. CHARDINE

LABRADOR
라브라도로

NEWFOUNDLAND
TERRE-NEUVE
TERRANOVA
뉴펀들랜드

GRAND BANKS
GRANDS BANCS
GRAND BANKS
그랜드 뱅크스

J.W. CHARDINE

J.W. CHARDINE

Oil Kills Seabirds

Discharging oil is illegal

Why protect our seabirds?

• Newfoundland and Labrador are two of the world's most important areas for seabirds.
• About 10 million seabirds breed here and 30 million more travel thousands of kilometers to feed in our waters.
• Seabirds are extremely important to our economy, and they are an important source of food.

How does oil kill seabirds?

When a bilge or slop tank is pumped:

• The oil rapidly spreads over the water and any seabirds in the area quickly become oiled.
• Oil matts the bird's feathers, which become water-logged with cold sea water and the bird slowly freezes to death.
• Oil also poisons the bird internally.

J.W.CHARDINE

Why is there oil on the ocean?

• Most of the oil that kills our seabirds comes from pumping bilges and slop tanks.
• Thousands of seabirds die needlessly in Newfoundland and Labrador every year because ships deliberately dump their waste oil into the ocean.

Why not discharge your oil safely?

• Discharging oil into Canadian waters, or fishing zones, is illegal.
• Waste oil must be discharged ashore in a reception facility, or burned onboard.
• The Canadian Oil Pollution Prevention Regulations will give you further details. You can get a copy from the Canadian Coast Guard.

You could be fined $250,000!

This is a general information brochure and not a legal document. It does not replace any existing regulations.

Le mazout tue les oiseaux marins

Il est illégal de vidanger le mazout en mer

Pourquoi protéger nos oiseaux marins?

• Terre-Neuve et le Labrador comptent plusieurs colonies d'oiseaux marins parmi les plus importantes au monde.
• Chaque année, environ 10 millions d'oiseaux marins se reproduisent dans ces colonies et quelque 30 millions d'autres viennent s'alimenter dans les eaux environnantes.
• Les oiseaux marins représentent un élément moteur de notre économie, en plus de constituer une ressource alimentaire de base.

Comment le mazout affecte-t-il les oiseaux marins?

• Les hydrocarbures se répandent rapidement à la surface de l'eau, enduisent tout oiseau qui nage dans la zone affectée.
• Une fois ses plumes imbibées de mazout, elles deviennent perméables à l'eau de mer glacée et l'oiseau meurt de froid.
• Le mazout empoisonne aussi les oiseaux qu'il recouvre.

Pourquoi y a-t-il du mazout sur l'océan?

• Le mazout qui tue nos oiseaux marins provient surtout du pompage des cales et des citernes de navires.
• Des milliers d'oiseaux meurent pour rien dans les eaux de Terre-Neuve et du Labrador à cause des vidanges d'huiles usagées dans l'océan.

Pourquoi ne pas vidanger votre huile de la bonne façon?

• Il est illégal de vidanger du mazout dans les eaux canadiennes ou dans une zone de pêche.
• Les huiles usagées doivent être vidées au port dans des récipients prévus à cette fin, ou encore incinérées à bord.
• Pour de plus amples renseignements à ce sujet, demandez à la Garde côtière canadienne un exemplaire du Règlement canadien sur la prévention de la pollution par les hydrocarbures.

Vous pourriez encourir une amende de 250 000 $!

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El petróleo es enemigo de las aves

Los derrames de petróleo son ilegales

¿Por qué es necesario proteger a nuestras aves marinas?

- Terranova y Labrador son dos de las áreas más importantes para las aves marinas en todo el mundo.
- Unos 10,000,000 de aves marinas pasan su época de reproducción en esas áreas y unos 30,000,000 viajan miles de kilómetros para buscar alimento en nuestras aguas.
- Las aves marinas no sólo tienen gran importancia para nuestra economía sino que también son importante fuente de alimentos.

Efectos del petróleo sobre las aves marinas

Cuando se bombea una sentina o tanque de decantación de mezclas oleaginosas...

- el petróleo se esparce rápidamente en al agua, y todas las aves marinas en la zona se cubren de petróleo en poco tiempo.
- el petróleo impregna el plumaje de las aves, que se satura con las frías aguas del océano, y el ave muere de frío lentamente.
- el petróleo representa también un veneno para los órganos internos del ave.

R.D.ELLIOT

¿Por qué hay petróleo en el océano?

- La mayor parte del petróleo que acaba con las aves marinas proviene del bombeo de sentinas y tanques de decantación de mezclas oleaginosas.
- En Terranova y Labrador, todos los años mueren innecesariamente miles de aves marinas debido al petróleo vertido deliberadamente en el océano.

¿Por qué no eliminar el petróleo sin riesgos?

- Es ilegal verter petróleo en aguas canadienses, o en zonas pesqueras.
- Los residuos de petróleo deben descargarse en una instalación costera apropiada, o quemado a bordo.
- Para mayores detalles, remítase a los Reglamentos Canadienses de Prevención de Contaminación del Petróleo. Para obtener un ejemplar, diríjase al Servico Canadiense de Guardacostas.

¡Las multas pueden alcanzar $250,000!

Este es un folleto de información general y no un documento legal, por lo que no reemplaza ningún reglamento existente.

기름이 바닷새를 죽임

기름을 마구 버림은 법에 저촉됨

왜 바닷새를 보호해야 하는가?

·뉴펀들랜드와 라브라도로는 세계에서 바닷새로 제일 중요한 곳 다.
·이곳들에서 천마리 가량의 바닷새가 번식하며, 3천마리를 더 자의 바닷새가 우리 바다에서 먹이를 구하러 수천킬로를 날아옵
·바닷새는 우리 경제에 아주 중요하며, 식량의 중요한 원천도 됩니

기름이 어떻게 바닷새를 죽이는가?

배 밑에 괸 더러 정물 탱크를 펌

·기름이 재빨리 주위의 어느 기름에 뒤덮이
·기름이 새의 게하여 찬바닷 에 막혀 새는 죽습니다.
·또한 기름은 어가면 독이 됩

왜 대양에 기름

·우리의 바닷새 름의 대부분은 더러운물이나 를 펌프질 해내 나옵니다.

·해마다 뉴펀들랜드와 라브라도로에서 선박들이 알면서도 폐유를 에 버리기 때문에 수천마리의 바닷새가 불필요하게 죽어 갑니다.

왜 기름을 안전하게 버리지 않으십니까?

·캐나다의 영해나 고기잡이 구역에 기름을 버림은 법에 저촉됩니다.
·폐류는 육상처리시설에 버리거나 선박안에서 태워버려야 합니다.
·캐나다의 기름공해방지규정(Canadian Oil Pollution Prevention Regulations)에 더 자세한 내용이 있는데, 캐나다 해안경비대(Canadian Coast Guard)로부터 구하실 수 있습니다.

2십5만불의 벌금형을 받으실 수도 있습니다 !

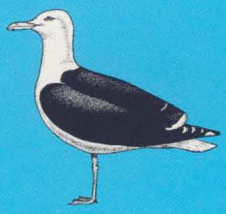
이 통지는 일반적인 안내서이지 법적인 서류가 아니며, 이미 있는 들중 어느것도 대신할 수 없습니다.

Appendi
and

Appendix G. Reprinting of "Oil Kills Seabirds" brochure in two official languages and Russian and Norwegian

The Seabirds of Newfoundland and Labrador
Les oiseaux marins de Terre-Neuve et du Labrador
Sjøfuglene ved Newfoundland og Labrador
Морские птицы Ньюфаундленда и Лабрадора

Auks, Turrs
Pingouins
Alker
Гагарки



Gulls
Goélands
Måker
Чайки

Seaducks
Canards de mer
Sjøender
Нырковые утки

Gannets
Fous de basssan
Hazsuler
Олуши

Shearwaters
Puffins
Stormfugler
Буревестники

ILLUSTRATIONS: DAWN NELSON
DESIGN: GAYNOR / SARTY

R.G.B. BROWN

Oil Kills Seabirds

Le mazout tue les oiseaux marins

Olje dreper sjøfugl

Морские птицы гибнут от нефти

R. BELANGER

Environnement Canada
Conservation et Protection

Environment Canada
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Canada

J.W. CHARDINE

LABRADOR
Лабрадор

NEWFOUNDLAND
TERRE-NEUVE
TERRANOVA
Ньюфаундленд

GRAND BANKS
GRANDS BANCS
GRAND BANKS
Большая Ньюфаундлендская банка

J.W. CHARDINE

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J.W.CHARDINE

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Olje dreper sjøfugl

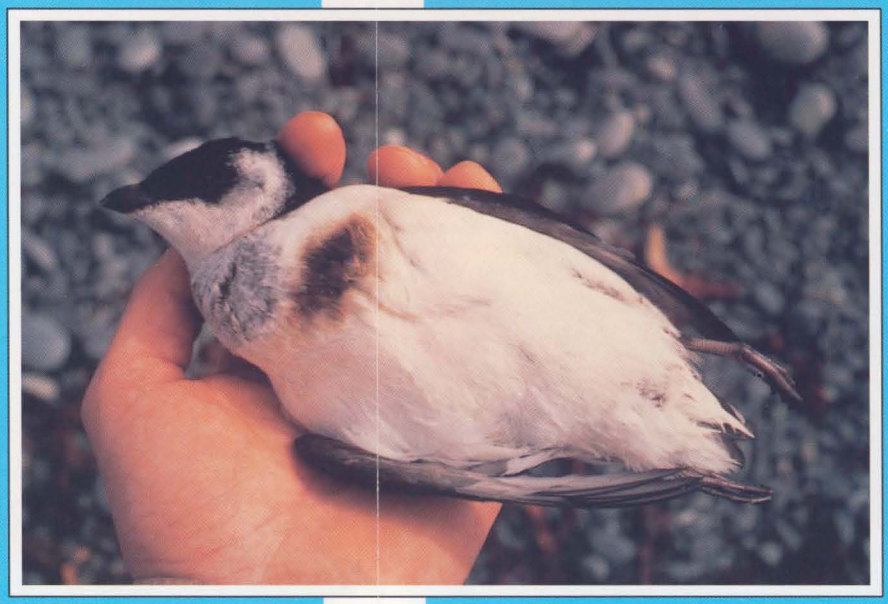
Utslipp av olje er ulovlig

Hvorfor må våre sjøfugl beskyttes?

• Newfoundland og Labrador er to av verdens viktigste områder for sjøfugl.
• Omtrent ti millioner sjøfugl hekker her, og ytterligere tredve millioner flyr mange tusen kilometer for å finne mat i våre farvann.
• Sjøfugl er særdeles viktige for vår økonomi, og de er en viktig matkilde.

Hvordan dreper olje sjøfugl?

Når en lensetank eller en sloptank pumpes:
• sprer oljen seg fort på vannets overflate og enhver sjøfugl i området er snart dekket av olje.
• oljen ødelegger fuglens fjærdrakt som blir vasstrukken med kaldt sjøvann, og fuglen fryser langsomt ihjel.
• oljen forgifter også fuglen innvortes.



R.D.ELLIOT

Hvorfor finnes olje på havet?

• Storparten av oljen som dreper våre sjøfugl kommer fra lensetanker og sloptanker som pumpes overbord.
• Mange tusen sjøfugl lider en unødvendig død fordi skip bevisst pumper sin spillolje i havet.

Hvorfor ikke losse din olje på en betryggende måte?

• Utslipp av olje i kanadiske farvann eller fiskerisoner er forbudt.
• Spillolje må losses i en landinstallasjon som kan ta imot den, eller den må brennes ombord.
• De kanadiske Oljeforurensningsregler vil gi deg flere detaljer. Du kan få en kopi fra Canadian Coast Guard.

Du kan få en mulkt på $250.000!

Dette er en informasjonsbrosjyre og ikke et juridisk dokument. Den erstatter ikke gjeldende regler.

Морские птицы гибну нефти

ЗАКОН ЗАПРЕЩАЕТ СЛИВ НЕФТИ В МОРЕ

Почему надо охранять морских п

• Ньюфаундленд и Лабрадор входят в число важнейших районов обитания морских птиц
• Здесь размножается около 10 миллионов морских пти миллионов других прилетают из расположенных за тыс километров мест, чтобы питаться в наших водах
• Морские птицы имеют большое значение для нашей эк и являются важным источником питания для морской

Как нефть губит морских птиц?

При очистке или отстойн цистерн
• Нефть быст распростран воде, и морск в этом район скоро оказыв покрытыми н пленкой
• Нефть покр оперение пти которое пропитывает холодной мор водой, отчего постепенно замерзают
• Нефть попад также в орган птиц, и они по от отравления

Как неф попадает на поверхность океана?

• Бóльшая часть нефти, убивающей наших морских птиц, попадает в океан при откачке воды из трюмов и отстойны цистерн
• Каждый год тысячи морских птиц бессмысленно гибнут у берегов Ньюфаундленда и Лабрадора, потому что суда сознательно сливают нефтяные отходы в океан

Почему бы нефть не удалять безопасным образом?

• Слив нефти в канадских водах или рыболовных зонах запрещается законом
• Нефтяные отходы следует сливать на берегу в специальны емкости или сжигать на борту судна
• Более подробная информация об этом содержится в Канад правилах по борьбе с загрязнением океана нефтяными продуктами Ее можно получить у представителей Канадск береговой службы

ШТРАФ ЗА НЕЗАКОННЫЙ СЛИ НЕФТИ – 250 000 ДОЛЛАРОВ !

Настоящая брошюра содержит лишь самые общие сведения является юридическим документом Она не заменяет действующих правил и инструкций

Appendix H. Details of construction of drift blocks

1. Cut blocks 20 cm long from commercially available 4"x 4"x 8' spruce posts.

2. Paint each block with latex enamel. Paint half the blocks with two adjacent sides yellow/two sides white and the other half black/white.

4. Label each block with a uniquely numbered 8x13 cm (1.5 mm thick) aluminum tag, nailed on with aluminum nails and stating:

165
PLEASE WRITE

CANADIAN WILDLIFE SERVICE

ST. JOHN'S NFLD
A1A 2X9
OR CALL COLLECT
709-772-5585

TELL US WHERE AND WHEN FOUND