Progress Notes **Canadian Wildlife Service**

Progress Notes contain *interim* data and conclusions and are presented as a service to other wildlife biologists and agencies.

Aussi disponible en Français

No. 31, May 1973

Sea-birds and oil pollution: the investigation of an offshore oil slick[1]

by R.G.B. Brown, Canadian Wildlife Service, Eastern Region, Dartmouth, Nova Scotia

Abstract

Many marine oil slicks never come ashore. These are potentially more hazardous to sea-birds than those in coastal waters, but it is hard to estimate the hazard, in the absence of counts of dead birds on beaches. This note describes a technique for making such estimates. The drift of the oil, estimated on the basis of wind speed and direction, is compared with the average densities of the sea-bird species in the area of the slick. This is applied to an oil slick reported on the Grand Bank of Newfoundland, at 44°41'N 51°10'W on June 9, 1972. Alcids are the sea-birds most vulnerable to oil, but the numbers of Common Murre (*Uria aalge*), the commonest species in the area, are too low for this slick to have created a serious hazard. However, there may have been some mortality in a less vulnerable species, the Greater Shearwater *Puffinus gravis*.

Résumé

De nombreuses nappes de pétrole répandues en mer ne parviennent jamais au rivage. Elles représentent cependant pour les oiseaux de mer un plus grave danger que les nappes des eaux côtières, mais l'importance de ce danger est difficile à évaluer à cause de l'impossibilité de dénombrer les oiseaux morts sur les plages. Le présent cahier de biologie fait état d'une technique d'évaluation pour les cas de ce genre. Le mouvement de dérive du pétrole, déterminé selon la vitesse et la direction du vent, est comparé à la densité moyenne des colonies d'oiseaux de mer qui se trouvent dans la zone de la nappe. Cette technique a été appliquée dans le cas d'une marée noire signalée, le 9 juin 1972, dans la région du Grand Banc de Terre-Neuve, à 44° 41' de latitude nord et 51° 10' de longitude ouest. Parmi les oiseaux de mer, ce sont les alcidés qui sont les plus vulnérables au pétrole, mais l'espèce la plus abondante de cette famille dans la région, la Marmette commune *(Uria aalge)*, était alors en trop petit nombre pour que le passage de la nappe ait entraîné des conséquences graves. Il peut cependant y avoir eu des cas de mortalité chez une espèce moins vulnérable, soit le Grand Puffin *(Puffinus gravis)*.

Assessments of oil pollution at sea have so far concentrated on major emergencies, such as the wreck of the tanker "Arrow" in Chedabucto Bay in February 1970. The emphasis has been on oil along the coast, with a tendency to feel relief when a slick moves out to sea. But there is also significant oil pollution out at sea. For example, during the period from July 20, 1971, to January 24, 1972, the Steamship Inspection Service of the Department of Transport at Halifax received reports of 28 oil slicks of offshore origin (as opposed to leaks from ships in harbour or from shore-based installations) in the waters off eastern Canada. At least 20 of these do not seem to have come ashore. By "Arrow" standards, all 28 were minor. But even a small, offshore slick can be a significant pollution hazard.

This is particularly true for sea-birds. Brown *et al.* (in preparation) estimate that slicks from the "Arrow" caused a minimum of 4,800 bird deaths in the waters between Chedabucto Bay and Sable Island, against a minimum of 2,300 in the bay itself. The same report estimates that only 7,000 gallons of Bunker C fuel oil, leaked by the barge "Irving Whale" at about the same time, killed a minimum of 5,500 birds off southern Newfoundland, and was almost certainly the more serious of the two spills.

Estimates of this kind are possible only after the slick and the dead birds have come ashore. But it is important to be able to estimate in advance the damage likely to be caused by an offshore slick. To take an example: on the morning of June 9, 1972, observers on the drilling rig SEDCO I, at 44°41'N 51°10'W on the southern Grand Bank, sighted a slick of bunker-type oil, about 1 x 1/2 miles in area, drifting NNE. The report was passed on to the Environmental Protection Service of the Fisheries Research Board of Canada, at Halifax, and from them to the Canadian Wildlife Service. Although no birds were seen in the slick, the immediate question was to judge whether it had been or could be a hazard to sea-birds in the area. To answer, it was necessary to compare the slick's position and likely line of drift with the local distributions of the birds.

Estimating the slick's drift was complicated by the fact that there were no further reports of it. However, the "Arrow" investigations suggested that bunker-type oil out at sea drifts with the wind, at 3.5 per cent of the surface wind speed. If this is applied to the six-hourly meteorological reports sent from SEDCO I to Atlantic Weather Central, Halifax, the slick would have reached 45°25'N 50°58'W by 2359 hours GMT on June 13 – about 43 miles NNE of SEDCO I. On the present evidence, there seems no point in predicting its drift beyond this. Prediction for a similar interval before its sighting at SEDCO I would put the slick at 43°38'N 50°11'W at 0001 hours GMT on June 5 – about 77 miles SE of the rig. This suggests that the slick originated from a ship crossing the southern tip of the Grand Bank, but much depends on how long it takes a slick of this kind to disperse; one of the "Arrow" slicks, in much colder water, held together for 22 days in drifting from Chedabucto Bay to Sable Island.

The "Arrow" and the "Irving Whale" investigations showed that the birds most affected by the oil were, with one exception, diving species – grebes, ducks and alcids. The exception was the Fulmar (*Fulmarus glacialis*), which was probably caught while sitting on the water near fishing boats.

[1] An investigation associated with the program "Studies on northern sea-birds," Canadian Wildlife Service, Environment Canada.

Ducks and grebes do not occur on the southern Grand Bank, and the only alcid there in any numbers at this time of year is the Common Murre (*Uria aalge*). The Programme Intégré des Recherches sur les Oiseaux Pélagiques (PIROP) of the Université de Moncton, jointly with the Canadian Wildlife Service, has a systematic collection of quantitative data on sea-bird distributions in Canadian Atlantic waters; Figure 1 shows the distribution of murres off Newfoundland at this time of year. (The data were all collected in a single cruise in 1969; however, distributions during a given season remain very constant from year to year.) The map has been adapted from one produced by an IBM 1620 computer, programmed to draw an outline of the coast, and to plot the average number of murres seen in a 10-minute watch from the moving ship, for each 1°N x 1°W block visited during the cruise. It shows that murres are scarce at this time of year in the area of the slick; they are much commoner close to their colonies in eastern Newfoundland. It is therefore unlikely that the slick caused much murre mortality, provided it stayed on the southern Grand Bank.

Fulmars are almost absent from this area in early June. On the other hand, there are very large numbers of Greater Shearwaters (*Puffinus gravis*), related birds with similar habits. Figure 2 shows that they were particularly abundant in the area of the slick. Some may have been caught in the oil; however, the hazard is probably not as great as it would be a little later on, when many of the shearwaters are moulting their flight feathers and spend much of their time on the water.

It was not possible to take any practical measures to control this slick, and in any case such action seems unnecessary from the point of view of hazards to sea-birds. The protection of sea-birds is not one of the weightier factors in deciding whether or not to control a given slick. Nonetheless, there are circumstances where this would become important – for example, in waters close to colonies of major biological importance, and/or economic value, such as Bonaventure Island, Quebec, and the bird islands in Witless Bay, Newfoundland.

References

Brown, R.G.B., D.I. Gillespie, A.R. Lock, P.A. Pearce and G.H. Watson (in preparation). Bird mortality from oil slicks off eastern Canada, February–April 1970. Canadian Field Naturalist.

Figure 1
Distribution of murres off Newfoundland, May 29 – June 12, 1969. Solid line marks predicted drift of slick, from 0001 GMT June 5 to 2359 GMT June 13

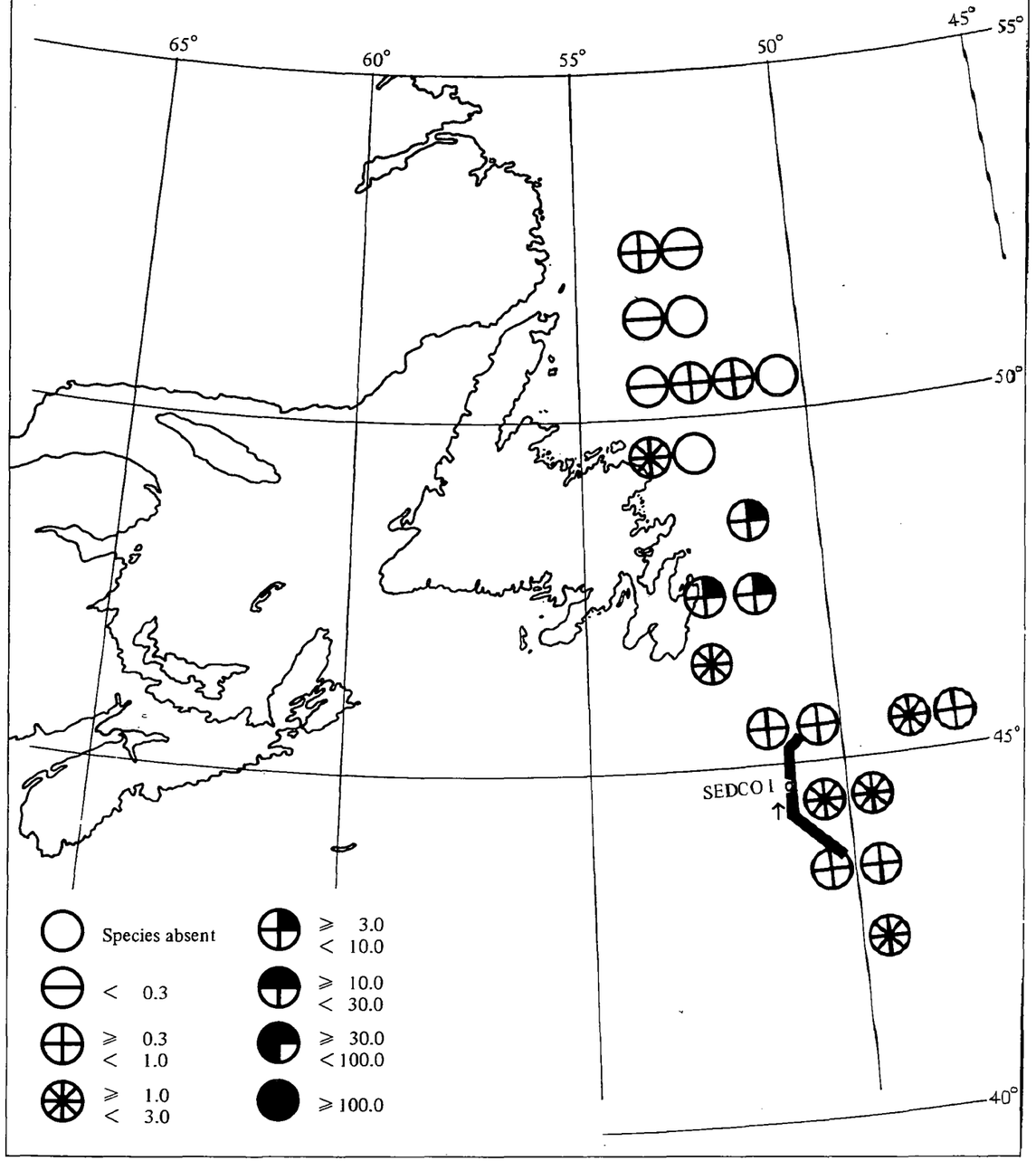

Figure 2
Distribution of Greater Shearwaters off Newfoundland, May 29 – June 12, 1969. Solid line marks predicted drift of slick, from 0001 GMT June 5 to 2359 GMT June 13