# Oil pollution and birds


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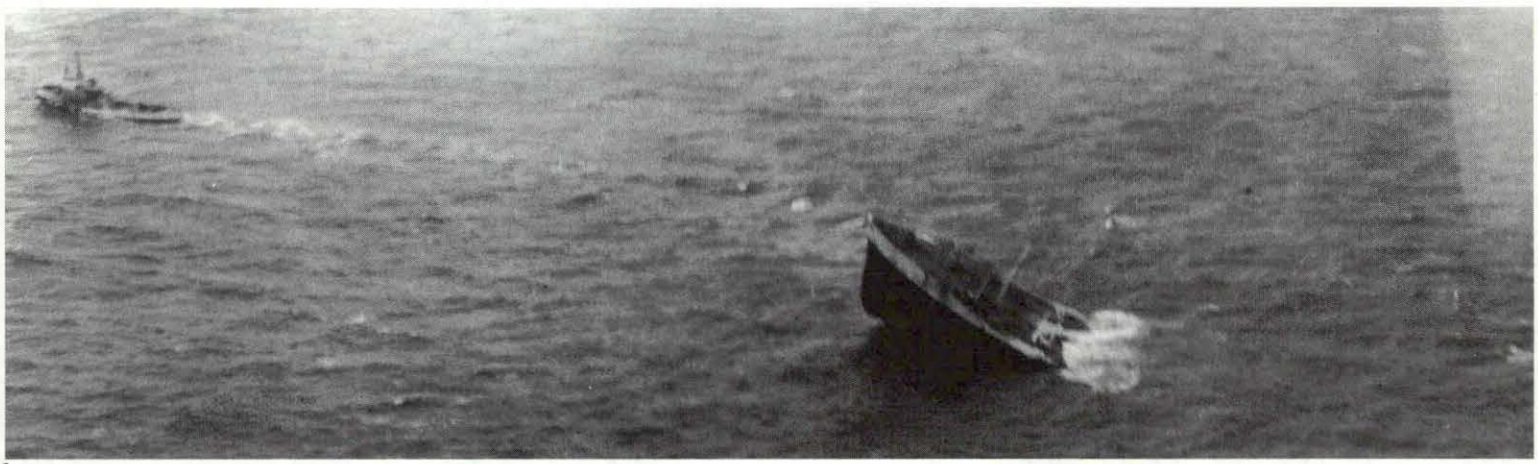
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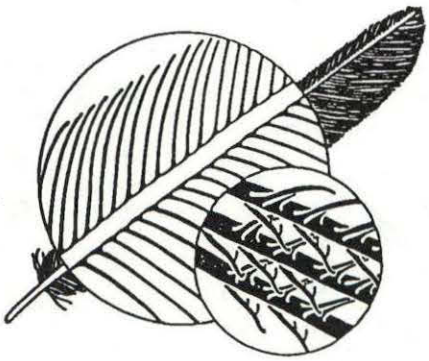
Cover photos

1. Clean-up at Cap Tourmente. Photo: Environment Canada
2. A badly oiled Northern Gannet. Photo: Courtesy of the World Wildlife Fund.
3. The bows of the oil tanker, *Kurdistan*, under tow in Cabot Strait in April 1979. Photo: R.G.B. Brown

Oil and birds don't mix. The wrecked supertanker, spewing a black tide of oil, has become a powerful symbol of ocean pollution, and of our destruction of the natural environment. So have the seabirds, black and sodden, that wash up along the beach.

Oil kills birds in many ways. Its first effect is to break down the birds' waterproofing. Water runs off a duck's back because the bird is protected by a layer of feathers, overlapping like the tiles on a roof (see sketch). Their fine structure makes them waterproof. The separate strands, or *barbs*, in each feather are bound together by rows of tiny hooks, or *barbules*, into a



tight weave, like the cloth of a raincoat, that water cannot penetrate. The duck's skin, and the downy feathers that insulate it from the cold, stay warm and dry underneath. But it takes very little to disturb these intricate arrangements. The duck spends much of its leisure nibbling at its feathers, cleaning off any specks of dirt and re-hooking the barbules. It smears the feathers with oil from the preen gland at the base of the tail, rubbing it on with its head. This preening keeps the feather supple and waterproof.

Oil destroys the duck's "raincoat" by clogging the barbs and barbules. Cold water quickly soaks into the insulating down and reaches the skin. A healthy bird has a body temperature of 41°C, fuelled by its intake of food. The fat under its skin is a fuel reserve and an extra layer of insulation. But further losses of body heat upset this balance.

Distribution of Common and Thick-billed Murres, birds highly vulnerable to offshore spills

O Breeding colonies

Wintering range

→ Main shipping lanes


In cold climates, the temperature stresses on an oiled duck may be double those on a clean one. The amount of oil is not important; even a small spot may be enough. The waterlogged duck burns up its fat reserves, losing at the same time its last layer of insulation against the cold. In extreme cases the muscles that power its flight break down as well. Yet it can only save itself by spending even more energy in search of food, handicapped by its extra burden of wet feathers. The oiled bird is caught in a vicious cycle, with little chance of escape.

The bird's immediate response is to preen itself. It cannot restore the intricate interlocking of barbs and barbules that waterproofed the feathers in their original state. But, as it nibbles at its oily feathers, the bird also inhales or swallows toxic compounds that damage its liver, lungs, kidneys, intestines, and other internal organs. This poisoning is as lethal as the loss of waterproofing, though slower to take effect, so hypothermia is the actual cause of death. However, fatal pulmonary edema, for one, can act very rapidly indeed.

Oil from the feathers of an incubating bird may pass through the pores in eggshells and either kill the embryos or induce abnormalities.

*Divers at high risk*

The most vulnerable birds are those that dive, because they spend much of their time sitting on the water. In the Great Lakes, and along the Pacific and Atlantic coasts, they include Oldsquaw, mergansers and other diving ducks, loons, and grebes. Eiders are common victims of marine spills close to land; murres and other auks are trapped farther out at sea. Fulmars do not dive, but they are often caught in offshore spills. These albatross relatives eat oily foods, so they may also be attracted to spilled oil. Black Ducks do not dive either, but they are often oiled when they feed in contaminated salt marshes. Bald Eagles scavenge on the oiled corpses along the tideline and are oiled in their turn.

Some species are at greater risk than others. Black Ducks lay clutches of 5–17 eggs. Their populations can absorb some of the "extra" deaths caused by oil spills. But murres, laying only one egg a year, have no such safety margin. In an actuarial sense, therefore, murres are more vulnerable than Black Ducks. The species also differ in their physiological vulnerability. Mallard and Canvasback ducks respond well to cleaning, with a recovery rate of up to 75%. But loons and grebes are very difficult to save. Even under the most favourable circumstances, the survival rate for oiled Common Loons is 50% or less.

*Oil spills in Canadian waters*

Canada has had its share of wrecked and damaged oil tankers. In February 1970, *Arrow* was wrecked on the coast of Nova Scotia, spilling about 9000 t of Bunker C fuel oil into the sea. This opened our eyes to the hard facts of marine pollution. In all, at least 2400 oiled loons, grebes, diving ducks, and other waterbirds came ashore on the mainland. Another 4800 birds, mostly Dovekies and murres,

Sites of oil spills


were caught in the slicks that drifted out to Sable Island, 180 km offshore. (Nobody knows how many more seabirds were oiled offshore, but did *not* reach Sable Island.) In March 1979, *Kurdistan* broke up without warning in the middle of Cabot Strait, leaving a similar trail of oiled birds and beaches. On the west coast, after an accident in December 1988, the barge *Nestucca* spilled 800 t of Bunker C, and at least 30 000 oiled murres and Cassin's Auklets came ashore in Washington State and southwestern British Columbia.

However, most spills in Canadian waters have been much smaller than these—often too small to notice at the time. This makes no difference in practice, because the size of a spill has little to do with the damage it can cause. In March 1970, the barge *Irving Whale* spilled 30 t of Bunker C off southern Newfoundland, after a hatch came loose in a storm. The slick drifted across an eider feeding area, oiling about 5000 birds. The toll was nearly as large as *Arrow's*, from a spill only 1% of the size. More recently, at least 17 500 oiled murres washed up in Placentia Bay, Newfoundland, during winter 1989–90. This pollution probably came from oily bilge water, pumped into the sea from passing ships. Technically speaking, bilge discharges are not "oil spills" at all, but a normal part of the ships' routine. Unfortunately, the effects on birds are just the same.

These marine incidents can be matched by others in inland waters. In some ways a spill in fresh water is more dangerous than one at sea, because it is more likely to catch large numbers of birds in a confined space, and to contaminate their food as well. In December 1975, oil from an unknown source killed 2800 diving ducks in eastern Lake Erie. Downstream, in the lower St. Lawrence, the marsh at Cap Tourmente is famous for its flocks of Greater Snow Geese in spring and fall. Most of the birds from the eastern Arctic stop there to feed, grazing on the roots of grasses and sedges. In fall 1963, 140 ha of marsh were contaminated by about 5 t of Bunker C, probably discharged from a ship's ballast tanks. The oil threatened 70 000 geese and their food supply. Fortunately, a massive salvage operation cleared the tainted plants away before most of the birds arrived, and no geese were lost to oil pollution.

So far, Canada has only had a few small oil spills in the Arctic, but we know what to expect. In Alaska in 1989, the wreck of the supertanker *Exxon Valdez* spilled 40 000 t of Alaska crude and oiled at least 30 000 birds. A spill near the big Canadian seabird colonies in Baffin Bay could lead to a similar disaster. The remoteness of the region, its ice, and its harsh climate increase the chances of accidents to shipping and multiply the difficulties of dealing with them. The oil will probably remain unweathered and toxic for longer than in warmer waters farther south, so the processes of natural recovery will be slower. The risk of oil spills is already there: from offshore oil operations in the Beaufort Sea, for example, or from ships on the commercial route into Hudson Bay and up the west coast of Greenland. It is bound to increase as the Arctic is opened up for development.

*Prevention is better than cure*

Oil pollution is not a problem we can leave until after the event, washing it away with new and improved cleaning technologies. Once the birds and beaches have been oiled, it is very difficult to restore them to their original state. *Prevention is better than cure*. The old maxim holds good in many ways: from safer ship design and better aids for navigation, to something apparently as trivial as keeping oily bilge water out of the sea.

One answer to the bilge spills, for example, is deterrence: bring the polluter to court and make the guilty parties pay for the damage. The theory is simple. Each cargo of oil is a unique mixture of hydrocarbons, with a chemical "fingerprint" that links a spill to the ship that spilled it. Environment Canada and the Canadian Coastguard have launched *Operation Clean Feather* in

Placentia Bay, Newfoundland, the base for offshore oil exploration in eastern Canada. Every ship is "fingerprinted" when it enters the harbour.

However, this registration scheme does not apply to offshore traffic. Newfoundland is close to the transatlantic shipping lanes, so a ship pumping oily bilge on the Grand Banks may be in Hamburg, or New York, before the spill is discovered. Advances in ship design provide other solutions. The latest type of bilge tank filters out the oily wastes for recovery ashore.

In the long run, however, we must change the way we think about the sea. It is not just a convenient dump for waste oil and other garbage, but a complex set of ecosystems whose well-being is central to the health of our planet. To help this understanding, Environment Canada publishes a multilingual brochure, "Oil Kills Seabirds," that is distributed to fishing boats and other ships in Newfoundland ports. It shows where seabirds are most vulnerable, and emphasizes that *every* oil spill, however small, is a potential hazard.

*Cleaning oiled birds*

An oiled bird is a wretched sight, and it is natural to want to rescue it. Recent advances in veterinary science give it a reasonable chance of recovery, if treatment begins early enough. These techniques are described in "Oiled Bird Rehabilitation" (Tri-State 1990), a practical handbook developed by a leading research group in this field. For further information, contact the offices of the Canadian Wildlife Service, Environment Canada; or Tri-State Bird Rescue and Research Inc. (See *For further reading* for address).

The successful rescue of an oiled bird is a thoroughly rewarding experience. However, the techniques are not easy, and volunteers need training if they are to help the bird. Cleaners of oiled birds also need experience and endless patience. An oiled seabird is not a sick pet. It is a wild animal in severe trauma, made worse by handling. If it is weak enough to be caught, it is *very* ill: probably without most of its fat reserves, and poisoned internally by the oil it has swallowed. Cleaning cannot even begin until these problems have been treated. At every stage, helpers should know that their own health may be at risk from inhalation of, and other contacts with, petroleum products.

*It takes a tremendous dedication of skill, time, and money to provide the necessary care for an oiled bird.* Anything less will only prolong its dying. Every helper should understand, well in advance, just what he or she is taking on.

*For further reading*


Brown, R.G.B. 1991. The natural history of oil spills. Pages 121–124 *in* J. White, editor. The effects of oil on wildlife: research, rehabilitation, and general concerns. The Sheridan Press. Hanover, Pennsylvania.

Chardine, J.W. 1991. Newfoundland: crossroads for sea birds and shipping in the Northwest Atlantic. Pages 113–120 *in* J. White, editor. The effects of oil on wildlife: research, rehabilitation, and general concerns. The Sheridan Press. Hanover, Pennsylvania.

Levy, E.M. 1983. Commentary: what impact will the oil industry have on seabirds in the Canadian Arctic? Arctic 36:1–4.

Piatt, J.F., C.J. Lensink, W.B. Butler, M. Kendziorek, and D.K. Nysewander. 1990. Immediate impact of the "Exxon Valdez" oil spill on marine birds. Auk 107:387–397.

Tri-State. 1990. Oiled bird rehabilitation. A guide for establishing and operating a treatment facility for oiled birds. Tri-State Bird Rescue and Research, Inc. P.O. Box 289, Wilmington, DE 19899, United States.

Vermeer, K. and R. Vermeer. 1975. Oil threat to birds on the Canadian west coast. Canadian Field-Naturalist 89:278–298.


*The Canadian Wildlife Service*

The Canadian Wildlife Service of Environment Canada handles wildlife matters that are the responsibility of the Canadian government. These include protection and management of migratory birds as well as nationally significant wildlife habitat. Other responsibilities are endangered species, control of international trade in endangered species, and research on wildlife issues of national importance. The service cooperates with the provinces, territories, Canadian Parks Service, and other federal agencies in wildlife research and management.

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Catalogue No. CW69-4/85E
ISBN: 0-662-19415-2
Text: R.G.B. Brown
Sketch: Wendesigns