

EXXON 1989, BP Amoco 1999

THE IMPACTS OF OIL DEVELOPMENT FROM THE *EXXON VALDEZ* TO NORTHSTAR

1. *Introduction: The Exxon Valdez Oil Spill*

On Good Friday, 1964, South-central Alaska was shaken by the most powerful earthquake ever recorded in North America. The earthquake, the epicenter of which was located under northern Prince William Sound, spread shock waves that were felt 700 miles away. It released 10 million times more energy than the atomic bomb that was dropped on Hiroshima. 131 people were killed, and the port town of Valdez was severely damaged.¹

On Good Friday 1989, almost exactly twenty-five years later to the day, Alaska was shaken by a different kind of earthquake – one which took no human life, but killed tens of thousands of marine mammals and seabirds, devastated entire communities and caused environmental damage, the full extent of which is still being assessed ten years later. As with the earthquake of 1964, the shock waves from the 1989 event spread far and wide; once again, the epicenter was Valdez and Prince William Sound.

On the evening of March 23, 1989, the tanker *Exxon Valdez* was carrying over 60 million gallons of oil -- drilled from Alaska's North Slope and transported to Valdez via the Trans-Alaska Pipeline – on a scheduled five-day journey from Prince William Sound for refining in Long Beach, California.² In an attempt to avoid ice that had calved from the nearby Columbia Glacier and drifted into the outbound shipping lane, the tanker's captain, Joseph Hazelwood, had ordered the ship to cross the traffic separation lane and steer closer to the eastern shore of north Prince William Sound. He then absented himself from the bridge; by midnight, the Third Mate was alone in charge of the ship. Through a series of mistakes and lapses in communication, the ship strayed too far off course, and too close to the shore. At 12.04 AM on March 24, the *Exxon Valdez* ran aground on Bligh Reef.

Within five hours, approximately 11 million gallons of crude oil had escaped through the ruptured hull of the tanker and into the waters of the Sound.³ (By way of contrast, the cargo ship *New Carissa*, which ran aground in Coos Bay, Oregon, on February 4 1999, spilled up to 70,000 gallons of bunker oil).⁴ For the first few days, the direction and relative weakness of winds and currents ensured that, although the spill occupied a large area, it was largely confined to the waters in the middle of northern Prince William Sound. However, on Monday March 27, a storm blew down from the Chugach Mountains, whipping up twenty-foot high waves and dispersing the spill rapidly, throughout much of the western Sound and into the Gulf of Alaska and lower Cook Inlet.⁵ Overnight, the main pool of oil moved forty miles, growing from a slick that measured under four miles in length to one that stretched over forty miles.⁶ Within days, approximately 700 miles of coastline was oiled; ultimately, detectable amounts of oil were transported to shorelines nearly 600 miles from the spill site.⁷

2. The Day The Water Died: Impacts of the Spill

Perhaps the most visible impact of the *Exxon Valdez* oil spill was on Prince William Sound's population of sea otters. A total of 871 sea otter carcasses were retrieved in the spring and summer following the spill: 493 from Prince William Sound, 181 from the Kenai Peninsula, and 197 from the Kodiak Island/Alaska Peninsula area. In addition, 123 sea otters died at rehabilitation centers, bringing the total number of carcasses accumulated in the six months following the spill to 994. Undoubtedly, others died after exposure to oil and were not recovered during clean-up efforts; it has been estimated that 3,500-5,500 sea otters, out of a total population of around 35,000 in Prince William Sound and the Gulf of Alaska, may have died within a short time of the spill.⁸

At least 300 harbor seals were believed killed as a result of the oil spill, and 26% fewer pups were produced at oiled sites in 1989 than would have been expected without the spill.⁹ Fourteen members of the resident "AB" pod of killer whales, primarily juveniles and reproductive females, died within three years, an unprecedented mortality rate for North Pacific killer whales.¹⁰

Over 35,000 carcasses of oiled birds were recovered in the first four months following the spill, and overall estimates of the number of seabirds killed ranged from 300,000 to 675,000.¹¹ Almost three-quarters of the carcasses retrieved were common and thick-billed murrelets.¹² As much as 10-15 percent of the area's population of pigeon guillemots died immediately after the spill. The most severe impact may have been on Kittlitz's murrelet: although only 72 positively-identified carcasses were found, nearly 450 more murrelets were found and not identified to the species level; according to the *Exxon Valdez* Oil Spill Trustee Council, "it is reasonable to assume that some of these were Kittlitz's." One estimate places direct mortality of Kittlitz's murrelets from the oil spill as high as 1,000-2,000 individuals; this would represent a substantial fraction of the world population of this species, which is found only in Alaska and portions of the Russian Far East.¹³

According to the *Exxon Valdez* Oil Spill Trustee Council, by February 1999 only two species – bald eagles and river otters – could be considered to have recovered from the impacts of the spill. 1999 marked the first time river otters were given this status; bald eagles were listed as recovered in 1996. Harbor seals, three species of cormorants, harlequin ducks, pigeon guillemots and the AB killer whale pod are "not recovering" – that is, they are "showing little or no clear improvement since spill injuries occurred." There is insufficient data to determine the existence or non-existence of recovery in cutthroat trout, Dolly Varden, Kittlitz's murrelet, and rockfish.¹⁴

Although there were no large-scale die-offs of adult fish immediately following the spill,¹⁵ several species of coastal and offshore fish showed evidence of continuing exposure to hydrocarbons. Oil was found in the gall bladders of pollock in deep offshore areas.¹⁶ Field studies conducted on Pacific herring in 1989 and 1990 documented increased rates of egg mortality and larval mortalities in oiled versus un-oiled areas. In 1993, there was an unprecedented crash in the Pacific herring population, for which the immediate cause was probably a viral infection and fungus. It has since been shown that exposure to very low concentrations of *Exxon Valdez* oil can compromise the immune systems of adult herring

and lead to expression of the viral disease; the extent to which oil exposure contributed to the 1993 crash is uncertain.¹⁷

Recent research has suggested that pink salmon and Pacific herring populations in the region may still be being affected by contamination from the spill. These studies appear to show that developing fish embryos are extremely sensitive to PAH concentrations as low as 1.0 part per billion.¹⁸

The spill also had a number of significant sociological and economic impacts. Residents of Alaska Native villages, particularly Tatitlek and Chenega Bay, which were directly in the path of the spill, experienced high levels of stress in response to the threat posed to their subsistence way of life, and by the sudden influx of scientists, oil industry representatives and media into their isolated communities. Of all the groups negatively impacted by the spill, it has been written, “in many ways Alaska Natives were the most devastated. The oil spill destroyed more than economic resources, it shook the core cultural foundation of Native life ... Not only does the environment have sacred qualities for Alaska Natives, but their survival depends on the well-being of the ecosystem and the maintenance of cultural norms of subsistence.”¹⁹ Non-Native fishing communities also suffered stress and disruption, not only because of their connection to the marine environment and concerns over the possible impact on fisheries resources, but also as a result of the influx of clean-up crews and other outsiders, many of whom benefited monetarily from the spill.²⁰

3. *The Blame Game: Spills Before and Since – and Could It Happen Again?*

Immediately after the *Exxon Valdez* ran aground, Exxon began putting their own spin on the accident. Seven months after the spill, the president of Exxon USA called the event a “bad dream” and attributed it to a quirk of fate, an “act of God.”²¹ Exxon also focused much of the blame on human error – specifically, Captain Hazelwood. However, while there is no doubt that Hazelwood’s actions – including the fact that he had apparently been drinking, as well as the fact that he stood down from the bridge, leaving a relatively inexperienced navigator in charge of the vessel – directly led to the tanker’s grounding, the company has been widely blamed for a number of policies which created a climate in which such accidents could occur. These ranged from cutting back on personnel, to encouraging their captains to get up to sea speed as soon as possible, even while in the dangerous Narrows in Prince William Sound, to continuing to build single-hulled tankers even after promising double-hulled ones.²² (Indeed, not one of the companies operating in Prince William Sound has yet introduced more double-hulled tankers, despite promises to do so; only ten per cent of the fleet in the area have double hulls).²³ On a broader scale, however, the Alaska Oil Spill Commission report into the spill noted that, “The grounding of the *Exxon Valdez* was not an isolated, freak occurrence, but simply one result of policies, habits and practices that for nearly two decades have infused the nation’s maritime oil transportation system with increasing levels of risk. The *Exxon Valdez* was an accident waiting to happen ...”²⁴

The fact is that the *Exxon Valdez* was just the latest in a long and continuing line of spills and accidents that have bedeviled the oil industry, in Alaska and elsewhere. These

incidents have not been restricted to tanker accidents. Alyeska Pipeline's records show 642 spills totaling 1.2 million gallons of oil since operation of the Trans-Alaska Pipeline began in 1977.²⁵ The same year as the *Exxon Valdez* grounded, 1,314 oil spills were recorded during operations off Alaska's North Slope.²⁶ At the time of the *Exxon Valdez* spill, oil executives and technicians were gathered in Valdez, reviewing containment of a spill of 1,700 barrels of oil from the British Petroleum (BP) tanker *Thompson Pass* at the Alyeska terminal just two months earlier.²⁷

Elsewhere, it is a similar story. A mere two weeks before the *Exxon Valdez*, another Exxon tanker, the *Exxon Houston*, had broken away from its mooring chain in Hawaii during a storm and blown into a reef, resulting in the loss of a total of 800 barrels of oil.²⁸ In June 1989, just a few weeks after the *Exxon Valdez*, three large spills occurred within 12 hours: the *World Prodigy* leaked 420,000 gallons off Naragansett, Rhode Island; a barge in the Houston Ship Channel lost 250,000 gallons; and the *Presidence Rivera* spilled 800,000 gallons into the Delaware River.²⁹

If none of these spills came close to the size of the *Exxon Valdez*, there have been plenty – before and since – which have. The *Exxon Valdez* received a great deal of attention, not only because of its size, but because it occurred in the media-enriched United States and severely impacted wildlife in a relatively pristine part of the world. But according to the Oil Spill Information Center, it is only the 40th largest tanker spill to have occurred since 1960, the dawn of the age of supertankers.³⁰ If other forms of spills – such as those resulting from the Persian Gulf War, a 1992 oil well blowout in Uzbekistan, or the rupture of the Komineft pipeline in Russia in 1994 – are included, it ranks only 53rd.³¹ Since March 1989, in addition to the three aforementioned non-tanker spills, there have been seven tanker spills larger than the *Exxon Valdez* spill:

- 11 April 1991, the *Haven* spilled 42 million gallons in the port of Genoa, Italy;
- 5 January 1993, the *Braer* spilled 25 million gallons at Garth Ness, Shetland Islands, Scotland;
- 3 December 1992, the *Aegean Sea* spilled 21.9 million gallons in La Coruña port, Spain;
- 15 February 1996, the *Sea Empress* spilled 21.3 million gallons at Milford Haven, Wales;
- 19 December 1989, *Khark 5* spilled 20 million gallons 115 miles off the coast of Morocco;
- 28 May 1991, *ABT Summer* spilled 15 million gallons 800 miles off Angola;
- 26 April 1992, the *Katina P.* spilled 15 million gallons 112 miles east of Durban, South Africa.³²

Altogether, between 1993 and 1997, an average of 32.8 million gallons of oil were spilt each year.³³ Clearly, large spills are a regular occurrence. And yet, the industry appears to remain ill-prepared to deal with them. Exxon and Alyeska came in for severe criticism for their slowness in responding to the *Exxon Valdez* spill; a decade later, a surprise oil-spill drill in Valdez in January 1999 revealed that “nearly all of Alyeska Pipeline Service Co.’s response workers have not been fully trained for their jobs ... the state Department of Environmental Conservation also found that some of Alyeska’s staff and contract workers didn’t respond quickly enough, and others were not clear on just what their tasks would be in the event of a spill.”³⁴

Plainly, contrary to assertions from the oil industry, large spills are a frequent occurrence. But they are not the only form of environmental damage resulting from oil development. In few cases is this more apparent than Alaska and the Arctic.

4. Oil in the Arctic: From the Trans-Alaska Pipeline to British Petroleum's Northstar Project

The first commercial oil discovery in Alaska was made in 1902 near Katalla, near the mouth of the Bering River close to Cordova. This field produced until 1933. Companies first discovered oil in the Cook Inlet in 1957, at Swanson River on the Kenai Peninsula. Production began two years later. The first offshore oil field in Cook inlet began producing in 1962; today, there are 15 offshore oil and gas platforms in the Inlet area.³⁵

However, oil production in Alaska is dominated by the fields off the North Slope, and in particular by Prudhoe Bay. Ninety-nine per cent of the oil produced in Alaska is from the Slope; it was oil from Prudhoe Bay that the *Exxon Valdez* was carrying.

The Prudhoe Bay oil fields were discovered in 1968, and were swiftly recognized to be the largest oil deposits found in the US. Today, more than 32 oil fields have been discovered on the North Slope and in adjacent offshore waters; there may additionally be more than 50 satellite fields. The 15 fields currently being produced have thus far yielded approximately 12 billion barrels, out of estimated reserves exceeding 18 billion barrels.³⁶

Oil production in the region has left its mark on the North Slope. In addition to spills, there have been impacts from pollution, pipeline and roadway construction, seismic testing and routine operation of oil facilities, among others. Oil wells and pipelines interrupt migratory paths of caribou, and destroy habitat in bird nesting grounds. The tundra has been crisscrossed by scars from seismic testing, pipelines and roads. Causeways servicing offshore drill sites have degraded nearshore habitat essential for anadromous fish. Subsea gravel and sand mining and excavation for pipelines destroys benthic habitat and sub-sea permafrost structure. Toxic drilling wastes, containing a wide range of substances including hydrocarbons, barium, chromium, mercury, zinc, cadmium and radioactive radium, are voluminous; radioactivity in produced waters resulting from oil drilling is between five and thirty times greater than the government permits to be released from nuclear power plants.³⁷

Of particular concern has been the impact of roads and pipelines on the distribution and movements of the Central Arctic caribou herd. Females with calves are particularly sensitive to disturbances and the herd has been displaced from some preferred calving areas.³⁸

Oil from the North Slope is transported to the tanker terminal at Valdez via the 800-mile Trans-Alaska Pipeline. From the time that the pipeline was first proposed, it has been the subject of a great deal of controversy and criticism from those concerned about its likely environmental impacts.³⁹ This concern has proved justified: over the last twenty years, dozens of spills have gone undetected, including one of 20,000 gallons in 1996. Alyeska Pipeline Service Co. – owned by a consortium of seven oil companies, with BP holding a 50% stake -- has been repeatedly criticized in recent years for allowing the pipeline to fall into a state of disrepair and for undertaking sub-standard work to fix and

maintain it.⁴⁰ There have even been hearings in Congress to address the fact that Alyeska has repeatedly harassed and intimidated employees and contractors who have attempted to bring this sub-standard work to light.⁴¹

The oil industry, the state of Alaska and the federal government have continually conspired to expand the reach of oil in the arctic, using whatever tactics may seem appropriate. In 1964, the state, realizing that the North Slope was a potentially rich oil reserve, applied to the Federal Bureau of Land Management (BLM) for the two million acres lying along the arctic coast in the Prudhoe Bay vicinity. Although the land was a traditional hunting and fishing ground for Inupiat Eskimos, the state application claimed that it was free of aboriginal use and occupancy.⁴² The urgency of securing access to fossil fuel reserves is widely credited for providing the impetus behind the Alaska Native Claims Settlement Act (ANCSA) – highly-touted by its supporters at the time as being a great step forward in recognition of native titles. Subsequently, however, “the Native peoples of rural Alaska ... know that under ANCSA their aboriginal rights were extinguished and that many uncontrolled and perhaps uncontrollable forces now threaten their way of life ... Alaska Natives now realize that ANCSA has failed them and that its goals are at cross purposes with their own.”⁴³

Such is the oil industry’s determination to secure access to every square inch of the North Slope that it has expended enormous effort and resources to opening up the one part of that region that has been expressly declared off-limits: the 1.5 million-acre coastal plain of the Arctic National Wildlife Refuge. Known as “America’s Serengeti” for its biological richness, the Arctic Refuge is critical denning habitat for polar bears, calving grounds for caribou, and home to wolves, muskoxen, and millions of migratory birds.⁴⁴

The *Exxon Valdez* disaster killed one bill before Congress to open up the Refuge, but the industry has continued to lobby for drilling to be allowed. In the meantime, the rest of Arctic Alaska has witnessed the most concentrated period of oil and gas exploration and development in the nation’s history. In August 1998, the Clinton Administration announced the opening up of nearly five million acres of Alaskan wilderness, in the northeast quadrant of the National Petroleum Reserve-Alaska (NPR-A) -- a 23 million acre region that was set aside in 1923 for use only in cases of national emergency. A few days earlier, five oil companies laid out \$6 million for leases in a nearby region of the Beaufort Sea. Additional lease sales are planned in the Cook Inlet in April 1999, elsewhere in the Beaufort in 2000 and in the Chukchi Sea at some point after 2002.⁴⁵

The risk of major spills resulting from such development further despoiling the region are remarkably high. Various analyses by US government departments have placed the odds of a major spill occurring in the Beaufort and Chukchi Seas as a result of offshore oil drilling and exploration at over 90 percent. The US Department of the Interior’s Minerals Management Service (MMS) predicts that 10 such spills will occur in the Arctic Ocean as a result of offshore development, and that, all told, 9.3 million gallons of oil will be spilled in the area. For those who have argued that the *Exxon Valdez* was a once-in-a-lifetime experience, MMS predicts 16 major tanker spills in Prince William Sound and the Gulf of Alaska resulting from all arctic oil development, and a total spillage from all spills (from tankers and other sources) of 70 million gallons – including three equal in volume to the *Exxon Valdez* and one twice that size. Although MMS defines a “major” spill as being one in excess of 1,000 barrels (or 42,000 gallons), the agency

assumes that the average major spill would be 22 times greater, or 22,000 barrels (924,000 gallons). Furthermore, all the aforementioned estimates are based on the same spill model used for non-arctic outer continental shelf (OCS) regions, and do not take into account the higher risk conditions of operating in the Arctic.⁴⁶ These include the additional difficulties of detecting and responding to spills in areas of water that are covered with either solid or broken ice for a eight months a year, and in a region which is subject to extreme conditions such as cold, wind, storms, and months of unbroken darkness.

Despite these concerns, the industry continues to expand its development in the region. Although the drop in oil prices since mid-1998 has led to some scaling back of activities on Alaska's North Slope, one major controversial project continues, despite widespread criticism and opposition – British Petroleum's Northstar Project.

The Northstar Unit is located approximately six miles offshore of the Point Storkersen area in the Alaskan Beaufort Sea. BP's Alaska subsidiary, British Petroleum Exploration (Alaska) Inc (BPXA), plans to drill for oil by building an offshore platform on an artificial island, and then to transport that oil to shore through a pipeline buried beneath the Arctic Ocean. Once ashore, this pipe will then connect to the Trans-Alaska Pipeline system. BPXA expects the unit to produce approximately 65,000 barrels of crude oil per day, for a period of about 15 years.⁴⁷

The Northstar Project would be the first true offshore oil and gas facility in the Arctic; unlike previous such developments, such as BP's Endicott, there would be no causeway linking the drilling island to shore, just the undersea pipeline.⁴⁸ It would be using new and untested technology in a harsh, unpredictable environment. Sub-sea pipelines are unprecedented in the Arctic, and with good reason. The Beaufort Sea is frozen for six to eight months of the year, making spill detection and response virtually impossible. In addition, sea ice is dynamic, moving constantly during periods of fall freeze-up and spring break-up, as well as the winter solid ice phase. It routinely gouges and scours the sea floor, raising concerns about the integrity of the pipeline.⁴⁹

Accordingly, widespread concerns have been raised about the risk of oil spills and the overall impacts of operating such facilities on the environment and on the subsistence way of life of Alaska Natives.⁵⁰

The Final Environmental Impact Statement (FEIS) for Northstar, issued in February by the US Army Corps of Engineers, notes that "the calculated total probability of one or more large oil spills (greater than 1,000 barrels [42,000 gallons]) from any source is approximately 11% to 24% over the 15-year project life."⁵¹ It acknowledges "potential volumes of a large oil spill ... including 15,000 barrels per day for 15 days from a well blowout, and a total of 2,800 barrels from a ... diesel tank rupture."⁵²

Much of the concern over the project centers on the safety of the technology involved in the pipeline. Despite assurances from BP that there "will be no shortcuts on this project,"⁵³ the US Environmental Protection Agency (EPA) contrasts the proposed construction of BPXA's pipeline with ARCO Alaska's plans to build a safer, double-walled pipeline under the Colville River for its Alpine Project. The EPA assigned the draft Environmental Impact Statement for Northstar a rating of EO-2, meaning that the agency has environmental objections to the project, and considers the EIS to contain insufficient information to enable the EPA to fully assess likely environmental impact.⁵⁴ The FEIS indicates that the likely potential spill size from a ruptured or leaking pipeline as built

under BPXA's favored proposal would be between 3,600 and 6,600 barrels from the offshore pipeline segment, and 6,400-6,600 for the onshore segment.⁵⁵

There are concerns about the likelihood of chronic spills, in particular from the pipeline, being detected. The leak detection limit for the pipeline is close to 100 barrels (4,200 gallons) per day, meaning that a leak of considerable size could go undetected for some time. Although pipelines are normally monitored once a week, Northstar requires monitoring only once a month; given the immense difficulties of detecting any leak, however frequent the monitoring, by drilling randomly through ice in conditions of near-total darkness, it is likely that any leak which occurred in winter would go undetected until spring. In addition, Native knowledge and western studies have both documented the existence of strong undersea currents which could disperse a spill far from its original site, for a period of several weeks or longer until it was eventually detected. Even then, the Draft EIS for Northstar acknowledges that any oil spill response could be delayed or hindered for over 50% of the year due to ice, sea or wind conditions.⁵⁶

The likely impacts of a major oil spill from Northstar are considerable. An FEIS list of some of them paints a grim picture of the effects of a spill on the Arctic environment and local people:

- Contamination of soils, sediments, and surface water bodies from direct oiling and deposition of tar balls;
- Mortality of polar bears from ingestion of oil during grooming, consumption of oiled prey, or loss of insulation and subsequent hypothermia;
- Mortality of freshwater invertebrates [and] potential long-term impacts to various life stages due to contamination of sediments;
- Damage to sensitive coastline vegetation from oil spill response activities;
- Mortality of sea ducks (including spectacled eiders) in marine waters or lagoon areas due to direct contact with oil if a spill occurred during the open water period;
- Injury and/or mortality of bowhead whales from oil contacting the spring lead system coincident with migration;
- Reduction or suspension of subsistence harvesting due to displacement or mortality of marine mammals (including bowhead whales), fish and waterfowl, or fears of resource contamination;
- Irreparable damage to historic artifacts and interference with radiocarbon dating tests from contact with spilled oil;
- Damage to the integrity of coastal and onshore cultural/archaeological sites from spill response activities;
- Damage to North Slope and statewide socio-economics due to loss of revenues and increased costs;
- Sudden increase in high wage paying jobs and subsequent inflation due to hiring of local labor for cleanup operations;
- Reduced access to community services due to a rapid expansion of workforce needed for cleanup operations.⁵⁷

There are other concerns, including pollution and other forms of industrial disturbance noise disturbance from seismic exploration and routine operation of the drilling platform. Such disturbance, both individually and cumulatively, has been shown to

have serious negative behavioral impacts on marine mammals, including polar bears, ringed seals and endangered bowhead whales.⁵⁸

Among the most severe critics of the Northstar project, and indeed of offshore oil and gas drilling in general, have been the Inupiat Eskimo communities of Alaska's North Slope. "Our biggest concerns are, and always have been, noise and spilled oil impacts on subsistence resources like the bowhead whale. The risks this type of proposed development injects into the Inupiat physical and cultural environment, however insignificant or imperceptible they may be, are unacceptable ... We have a responsibility to our present and future generations to insure they do not feel the loss the native people of Prince William Sound felt when the *Exxon Valdez* oil spill devastated their subsistence resources from 1989 to this very day."⁵⁹

In spite of such objections, BP, the State of Alaska and the federal government appear determined to press ahead with Northstar. In January, Greenpeace filed for a motion to stop Northstar construction, maintaining the Alaska Department of Natural Resources (DNR) had granted BPXA an improper "go-ahead" to begin construction of the project by telling BPXA it could start building ice roads – the first stage of Northstar construction. At that time, state and federal environmental reviews were still ongoing, and BPXA lacked the requisite permits for building ice roads. Although the court refused to grant Greenpeace's motion on the grounds that it had not exhausted all other appeal processes, Greenpeace is continuing with what it anticipates being a long battle to halt the Northstar Project.

5. From Sea to Sky: Oil Development and Climate Change

While many discussions on environmental damage from oil exploration have tended to concentrate on the effects of spills and related pollution, concern is increasingly being expressed about the impact of oil and other fossil fuels on the global climate. The burning of fossil fuels -- primarily coal, oil and gas -- by agriculture, industry and automobiles in towns and cities of the industrialized world is adding large amounts of so-called "greenhouse gases" to the atmosphere. These gases trap the sun's heat, causing the Earth's temperature to increase. Since pre-industrial times, atmospheric concentrations of the principal greenhouse gas, carbon dioxide, have gone up 30 per cent, from 280 parts per million to more than 360 parts per million. In the last 35 years alone, CO² levels increased over 12 percent. In line with this increase, the global average temperature has, since 1860, increased by over half a degree Celsius, and some experts project that, unless we begin reducing the amount of fossil fuels we burn, it will increase by another 2 degrees by the end of next century.⁶⁰

Scientists have predicted that some of the greatest increases, and some of the earliest, most severe impacts of human-induced climate change, will occur in parts of the Arctic, a prediction that is borne out by evidence. Alaska, for example, has undergone considerable warming since the 1950s, much of that since 1976; in high northern latitudes, overall temperature increases are predicted to be between 4 and 6 degrees C.⁶¹ According to some research, temperatures have changed three times as fast in Alaska and northwestern Canada as elsewhere in arctic regions.⁶²

Scientists are already noting changes in the Alaskan environment as a result of climate change. In South-central Alaska, the black-headed budworm and the spruce bark beetle have between them destroyed almost two million hectares of spruce forests; according to Dr. Glenn Juday of the University of Alaska Fairbanks, the devastation has been so extensive that it is no longer a question of whether the forests will recover, but what kind of ecosystem will arise to replace that one that has been destroyed. Dr. Juday and others believe that the infestation has been nurtured by warm summers which have stressed the trees, making them more vulnerable, and which have simultaneously allowed the insects to halve their breeding cycles, effectively doubling the population.⁶³

On Cooper Island, off Alaska's North Slope, the state's only breeding colony of black guillemots is in decline, as a result of decreasing and retreating sea ice. Black guillemots feed on the Arctic cod that live beneath the floes; ice-free areas harbor fewer fish, forcing the birds to fly farther in search of food.⁶⁴

Several studies have pointed to melting and sinking of permafrost in Alaska as a result of warming temperatures;⁶⁵ recent research suggests that climate change is resulting in major changes in the Arctic sea ice ecosystem.⁶⁶ Concerns have also been widely raised about the impact of retreating sea ice on marine mammals.⁶⁷

The most dramatic evidence that climate change is already affecting Alaska and the Arctic, however, comes from observations by Alaska Native communities. In 1997 and 1998, the Greenpeace ship *MV Arctic Sunrise* visited a series of Yup'ik, Siberian Yup'ik, and Inupiat communities along the Bering and Chukchi Sea coasts of Alaska, gathering testimonies from villagers about changes they have seen in the climate, and impacts those changes have had on their traditional, subsistence way of life. From Gambell and Savoonga on remote St. Lawrence Island, to the northern whaling towns of Wainwright and Point Lay, the villagers told similar stories: of ice forming later in the fall, breaking up sooner in the spring and being thinner and less stable than usual; of changes in the migration patterns of some species and the appearance of other species totally new to the area; and of landslides and erosion.⁶⁸ Almost without exception, these observations matched predictions from the Intergovernmental Panel on Climate Change – a body of approximately 2,000 scientists from around the world, which is considered the single most authoritative source of information on global climate change – on the kinds of impacts and changes which should begin to occur in the Arctic as a result of global warming.⁶⁹

For Alaska Natives, such changes are of more than passing or academic interest. Thinning and retreating sea-ice and fiercer storms make hunting and food gathering more dangerous and uncertain, as do changes in wildlife populations and the availability of plants and berries. Storm-induced erosion threatens several coastal villages; the inhabitants of Shismaref have decided to move to a new location after the village has been devastated by storms, while on remote Little Diomed Island, melting permafrost is prompting landslides that threaten to obliterate their village. For a culture that is already under assault from the intrusions of the industrialized world, a changing climate as a result of fossil fuel burning could prove to be the final nail in the coffin.

6. Conclusion

The *Exxon Valdez* disaster was not an isolated event. It was just one in a series of ongoing major oil spills, from tankers and other sources, that have wreaked environmental havoc across the world. Such spills are, in turn, one source – among many -- of pollution and environmental damage resulting from oil exploration and development. After years of concern over the impacts of oil pollution on marine and coastal environments, and on the migration routes of such animals as caribou, attention is turning increasingly to the fact that the burning of fossil fuels such as oil and gas is now affecting the climate of the entire planet.

The story of the *Exxon Valdez* did not begin on the evening of March 23, and it didn't end with the tanker running aground on Bligh Reef. Solutions to the issues it raised will not be found by asking whether or not Joseph Hazelwood was drunk, or even solely by introducing more double-hulled tankers – although such a move is an essential step. The only way truly to insure that tragedies such as the *Exxon Valdez* are not repeated is for the industrialized world to wean itself from its dependence on fossil fuels.

A good way to start would be for the US government to address the issue of subsidies to the oil industry. At present, the federal government provides between about \$5 billion and \$12 billion a year in subsidies to the oil industry in the form of tax breaks, maintenance of coastal and inland shipping routes and taxpayer underwriting of oil companies' insurance and liability policies. Add in the cost of defending supplies from the Persian Gulf, and the total rises by about \$20 billion.⁷⁰

In the same week that the Clinton Administration was announcing the opening up of part of the NPR-A to lease sales, Vice President Al Gore held a press conference to declare that July 1998 was the hottest recorded month in global history. Unless we act, warned Gore, "we can expect even more extreme weather – more heat waves, more flooding, more powerful storms, and more drought."⁷¹

If the Administration was as genuinely committed to addressing global climate change as it claims, it would shift current oil subsidies into the development of alternative energy technologies – and, in the meantime, bring about a freeze on all new exploration and drilling.

Such a step would not only go a long way toward reducing the risk of future disasters like the *Exxon Valdez*. It would also begin to address the dangers an addiction to fossil fuels poses to the Earth's climate.

¹ Anon. 1998. *The Alaska Almanac: Facts About Alaska*. 22nd Edition. Seattle: Alaska Northwest Books; Sims, Grant. 1994 *Leaving Alaska*. New York: The Atlantic Monthly Press

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