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SENSITIVITY MAPPING OF THE PRIBILOF ISLANDS, ALASKA AN AREA OF EXTREME ENVIRONMENTAL SENSITIVITY

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Background and purpose

The Pribilof Islands (Figure 1) represent one of the most environmentally sensitive areas in all of North America. During the warmer months, particularly from mid-May to September, the area is home to approximately 1 million fur seals and more than 3 million seabirds. Fur seals in the area may remain as late as December. An oil spill during this time would be devastating. At other times of the year, it has the potential to affect over-wintering species and may interfere with returning fur seals.

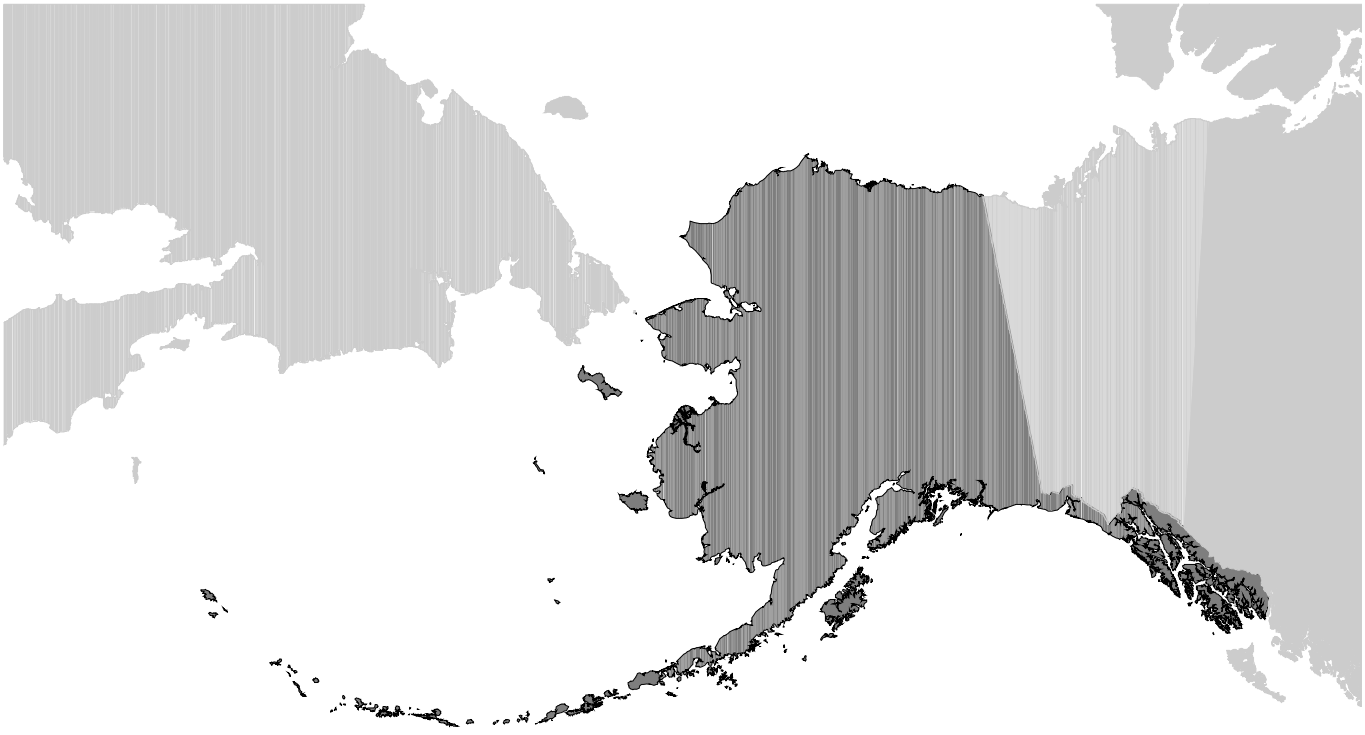

Figure 1. The location of the Pribilof Islands, Alaska.

This poster (excerpted in Figure 2) provides information regarding the major species present in the area, including their population and seasonality. In addition, shoreline information, listed in order of increasing sensitivity to oil spills, is provided to assist both contingency planning and response actions.

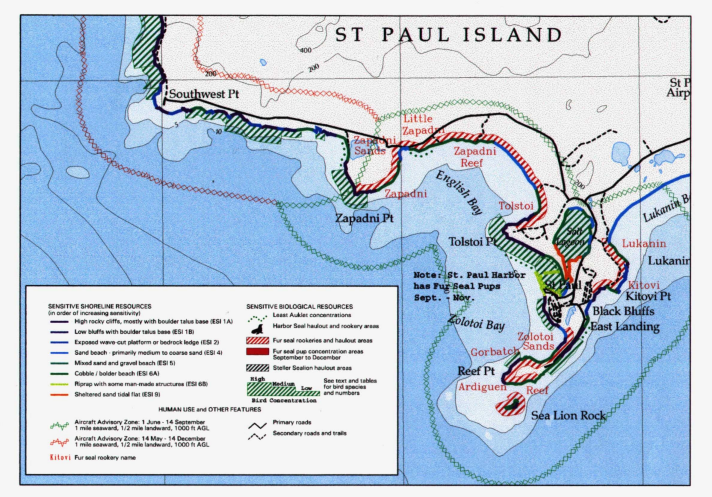

Figure 2. This is an excerpt from the full Pribilof Island map showing the area around St. Paul harbor.

The land area and most of the species present are protected under various local, state, and federal laws. There are substantial penalties associated for both species injury and harassment. Also note that from mid-May to mid-December, a "No Fly Zone" is indicated to avoid disturbance of the fur seals and nesting birds. If disturbed, birds can lose eggs or chicks and may even abandon the colony. Seal pups can be crushed when adults panic, or may be killed when disrupted territorial males fight. Birds also pose a strike hazard to aircraft, therefore colonies should be avoided. When operating in these areas, all vessels, aircraft, and shore-based activities are expected to use extreme caution.

Sensitive shoreline habitats

Shorelines of the Pribilof Islands are dominated by high bedrock cliffs, low bluffs, rock platforms, sand beaches, and mixed sand and gravel beaches. Boulder-dominated sediments are common at the water line along the base of the cliffs and bluffs. The port areas at St. Paul Village and at the south side of St. George Island contain large protective riprap with some interior man-made harbor structures. With the exception of Salt Lagoon near St. Paul Village, the coastlines of the Pribilof Islands are exposed to the very high wave conditions common in the central Bering Sea. This wave action will greatly reduce the persistence and physical impacts associated with oil spills and generally indicates low *shoreline* sensitivities, particularly with respect to exposed cliffs, bluffs, and bedrock platforms. However, where seasonal bird or fur seal populations are present, the *ecological* sensitivity of these same areas is extremely high.

The Salt Lagoon shows the highest shoreline sensitivity found on the Pribilofs because of its sheltered nature. Sand-dominated tidal flats are found along both sides of the entry channel leading into the lagoon. Oil may become mixed into these sediments, or be deposited along the other shorelines in the Lagoon, with only limited wave energy to remove it. The area, however, is generally accessible to cleanup operations.

Of intermediate shoreline sensitivity are those beaches composed of medium-to-coarse grained sand and mixed sand and gravel. Mixed sand and gravel beaches are common on all islands, while broad sand beaches are primarily found along the eastern and northeastern shores of St. Paul Island. Access to these areas is possible, although direct road connections are very limited. Oil on both of these shoretypes may persist and become a cleanup problem, particularly during the calmer summer months. Riprap harbor structures react similarly to boulder-dominated shorelines, with oil persisting longer in the crevices between the rocks within the sheltered portions of the structures. There are no docks or man-made landing areas present on Walrus Island, Otter Island and Sea Lion Rock.

Areas having the lowest physical sensitivity to oil include shorelines dominated by high and low bluffs. Cleanup access to the shoreline from the cliffs is very limited and dangerous, but is generally possible in low bluff areas. Both shoreline types commonly have boulder-dominated rubble at the water's edge along the base of the cliff or bluff. Mixed in with the cliffs and bluffs are short stretches of shoreline having a bedrock platform or ledge.

Sensitive biological resources. The spatial distribution of marine species potentially exposed to an oil spill or related disturbance are indicated as polygons or points. The species icon(s) and associated number depict the type of species present as referenced in the Biological Resources Table. To avoid excessive clutter, species common to the waters surrounding the Pribilofs are identified by a box labeled "Common Throughout Area."

The Biological Resources Table uses the following terminology, now common to all sensitivity mapping projects undertaken by the National Oceanic and Atmospheric Administration (NOAA). The first column (RAR#) provides the Resources at Risk Number which links the table to the point or polygon on the map, followed by species name. The third and forth columns refer to the species' listing as a state (S) and/or federal (F), endangered (E) or threatened (T) species. In cases where a federal threatened or endangered species is listed by the State of Alaska as a "Species of Special Concern", then the state designation is considered to be the same as the federal. The fifth column provides an estimate of the Concentration of each species. Concentrations, when known, are listed as "HIGH," "MED," or "LOW," based on population studies of the area and expert opinion. Species presence is indicated in the next 12 columns representing months of the year. The last columns provide life history information.

Fish. Large fish populations support the enormous numbers of birds and marine mammals seasonally found in the Pribilof Islands. There are no streams on the Pribilofs, so a local anadromous (e.g., salmon) fishery is not supported. Species most likely to show spill-related injury are those that have major concentrations and spawn in the area. These include Pacific cod, walleye pollock, Alaska plaice, and Pacific halibut. Spawning generally occurs from late winter to early summer (February to June), although the Pacific halibut spawn from December to February. While fish may not be killed during a spill, uptake and tainting of the flesh may occur which will restrict fish sale and consumption on both commercial and subsistence levels. Additionally, oil-related impacts on non-commercial species will then affect the bird.

Shellfish. The area around the Pribilof Islands has become a major shellfish harvesting area. Major adult concentrations of several species of crab (Biardi Tanner, Blue King, Korean Hair, and Opiolio Tanner) occur in the area. All species are present year round, although the duration of the commercial season is severely limited for all species except the Brown King Crab. Spawning and hatching mostly occurs in winter to early summer (January to June), although the Korean Hair Crab spawns and hatches from November to March. For the most part, these species are less likely to show impacts from an oil spill because they are deep-water bottom dwellers. However, during spawning and hatching the organism is present within the water column at which time it is more susceptible to oil-related injury.

Birds. The Pribilof Islands are the seasonal home to several million birds. Largest colonies are found on St. George, particularly on the cliffs that surround most of the island. Murres have the largest population numbers with approximately 1.7 million found on St. George and 149,000 on St. Paul. Auklets (parakeet, crested and least auklets) have the second highest populations, with nearly 450,000 individuals found on St. George and 63,000 on St. Paul. Pelagic species (kittiwakes, shearwaters, and fulmars) are the second most abundant bird group, with over 350,000 individuals found on St. George and approximately 35,000 on St. Paul. Over 75 percent of the red-legged kittiwake population are found in the Pribilofs, primarily on St. George Island. There are also substantial seasonal populations of shorebirds (turnstones, phalaropes and sandpipers) and several species of over-wintering waterfowl. The marine birds found on the Pribilofs generally forage throughout the waters indicated on the maps, and are depicted as "Common Throughout Area". However, harlequin ducks are generally found in waters closer to shore.

Most species migrate to the Pribilofs for breeding in the spring/early summer (generally May–June). Those nesting in or at the base of the cliffs (murres, auklets, puffins, kittiwakes, fulmars, and cormorants) are highly susceptible to oil spill-related injury and death. In addition to potential exposure to spilled oil while foraging, these species flock off the cliffs and would settle onto the oiled water if disturbed. Therefore, at all times, and particularly during an oil spill incident, disturbance of the birds must be avoided. A No Fly Zone is indicated on this map to exclude aircraft from flying less than 1,000 ft above ground level and 1/2 mile landward and 1 mile seaward of the bird colonies from 14 May to 14 September to avoid bird disturbance. All cleanup and response activities that may directly or indirectly affect the birds must be first approved by the U.S. Fish and Wildlife Service.

Marine mammals. The Pribilof Islands have the greatest concentration of Northern Fur Seals in North America. The present population, although reduced from previous levels, has approximately 700,000 to 800,000 individuals on St. Paul Island and adjacent Sea Lion Rock, another 100,000 to 200,000 on St. George, and less than 1,000 on Otter Island. This represents approximately 70 percent of the world's Northern Fur Seal population. Fur seal rookeries and haul out areas are found on sand beaches, mixed sand and gravel beaches, and in low bluff areas. The Steller Sea Lion population is much smaller in number and is decreasing. Less than 1,000 individuals are found on Walrus Island only. Low numbers of Harbor seals are found to haul out on all the islands and to breed on Otter Island. Sea otters have been sighted around St. Paul and St. George Islands, but are not common. The

latter three species are year-round residents, while fur seals have distinct seasons, arriving in May/June and leaving primarily in September after the birthing and breeding season. Pups and some adults may remain until December before heading out to sea. Fur seals return each year to the same beaches of their birth.

Fur seals, and particularly fur seal pups, are especially susceptible to injury during an oil spill and related disturbances from the ground or air. Fur seals use the water for a source of food as well as a refuge when threatened. Spilled oil coats the fur of the animal and may cause death, particularly of the new born pups. Oiling also causes eye irritation and damage. If disturbed, pups and even small males or females animals are likely to be trampled to death as the herd escapes to the water. A No Fly Zone of 1,000 ft above ground level, 1/2 mile landward, and 1 mile seaward is indicated on the map from 14 May to 14 December to avoid disturbing fur seals.

All access and cleanup measures to be undertaken with respect to marine mammals and their habitat must be first approved by the National Marine Fisheries Service (NMFS), a division of NOAA. Outside of a few public viewing blinds, access to the fur seal areas is totally restricted and only by permission of NMFS. While most fur seal breeding and haul out occurs well-designated localities, they can temporarily haul out almost anywhere in the Pribilofs, and be found fishing anywhere in the surrounding waters. Several mammals are additionally listed by the U.S. Government to receive special protection. This includes the Steller Sea Lion (Endangered), the Bowhead Whale (Threatened), and the Pribilof Shrew (Species of Special Concern).

Resources not shown. Users of this map should be aware that it includes most available but still incomplete information regarding the sensitive resources of the Pribilof Island area. In particular, there are a number of marine mammals that are categorized as occasional visitors to the area, and are generally considered less sensitive to spilled oil as compared to fur seals and other marine mammals that haul out and breed along the shoreline. This includes several whale species (Killer, Beluga, Gray and Minke) that may pass by the islands during migration periods or during summer residence in North Pacific/Bering Sea. Additionally, during winter periods, there are a number of ice-associated seals (Bearded, Ringed, Spotted, and Ribbon) and whales (Bowhead) that may be found in the pack ice or along the ice front which sometimes extends to the Pribilof Island area. There are also many other fish and shellfish species also found in the area in addition to the commercial species displayed here. Sites of historical and/or archeological importance are also not illustrated. Land-based mammals, also not indicated on the map, include the common arctic fox, reindeer on St. Paul and St. George, and the Pribilof shrew and the black-footed brown lemming. Reindeer and the arctic fox are known to forage in the intertidal zone and thereby be exposed to potential injury during an oil spill. The black-footed brown lemming is endemic to St. George Island. Lastly, a few sea otters have been sighted in the coastal waters around St. Paul and St. George Islands, and may also be present along the other islands as well.

Other mapped information. St. Paul and St. George Islands have well maintained gravel roads that connect the primary parts of each island, principally along the east and southern sides of St. Paul Island, and between the north and south coasts of St. George Island. Other roads generally serve as access to the fur seal areas and other sites on the two islands and may not be well maintained. Many are only rough trails, passable solely by high clearance, four-wheel drive vehicles.

Through major investments in infrastructure, both St. George and St. Paul now have excellent port facilities. Additionally St. Paul airport has been expanded and upgraded to permit landing in almost all conditions. St. George airport is also in excellent condition, but is more dependent on good weather conditions. Boat ramps are present in St. George and St. Paul, but loading and unloading is usually very difficult due to rough sea conditions. St. George and St. Paul Islands both support seasonal canneries that directly utilize sea water. Intake closure during a spill can be undertaken by notify the Harbor Master on each island.

The Pribilof Islands, due to its historic importance for fur seal harvesting, was owned and maintained by the U.S. Government after the sale of Alaska from Russia in 1867. Today there is some private land ownership particularly in the villages of St. Paul and St. George. However, most of the islands are still owned by the Federal Government and administered by U.S. Fish and Wildlife Service as part of Alaska Maritime National Wildlife Refuge. Government ownership specifically includes all bird colonies and fur seal areas, as well as the three uninhabited islands of the Pribilofs (Otter Island, Walrus Island and Sea Lion Rocks).

Data sources and acknowledgements. Most of the data used for this map are derived from published sources and updated by scientists actively working in the Pribilof Islands. Primary sources of ecological data include: Bering, Chukchi, and Beaufort Seas, Strategic Assessment Data Atlas, NOAA—National Ocean Service, 1988; NOAA, Fur Seal Investigations, 1994 (Sinclair, ed); The Bering Sea Ecosystem, 1996, National Academy Press; and the Catalog of Alaskan Seabirds, U.S. Fish and Wildlife Service, 1978.

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