

W R A N G E L I S L A N D

Z A P O V E N D N I K

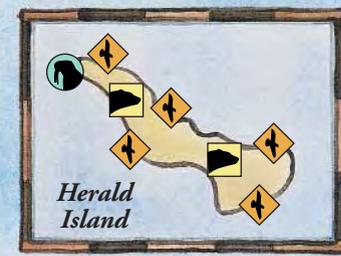
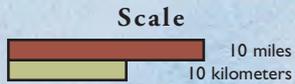


Russian Stronghold for Beringian Biodiversity



Wrangel Island

-  Seabird Colonies
-  Walrus Haulouts
-  Polar Bear Den Areas
-  Snow Goose Colonies



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Ross' gull
A.V. Krechmar

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Cover photo credits

Polar bear family

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Primrose

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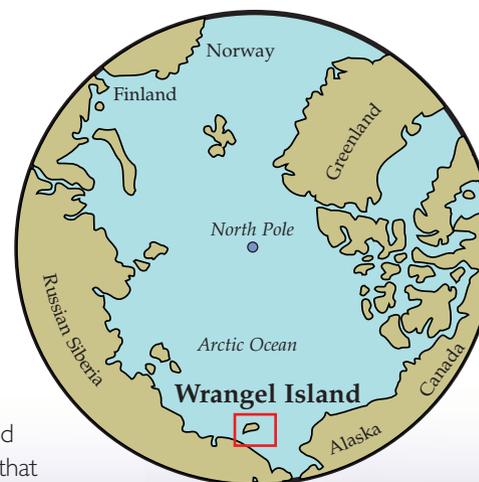
ISLAND OF BLIZZARDS

Near the top of the world in one of the most remote and inhospitable parts of the planet, lie two wild and undeveloped islands of great significance to the conservation of life on earth. Untouched by glaciers during the last Ice Age and looking much as they did in the Pleistocene epoch when woolly mammoths roamed the land, Russia's Wrangel and Herald islands are today best known for their denning

polar bears. But they are also strongholds for arctic biodiversity that is of planetary significance.

Consistent with its plan to develop a system of nature reserves in the Russian Arctic, the Soviet Central Government designated the Wrangel Island Nature Reserve in 1976 to protect its colonies of snow geese, polar bears, and walrus. Together, the reserve's two islands and their surrounding marine waters constitute one of Russia's most treasured sanctuaries for wildlife. It is the first and

largest strictly protected area in the high Arctic with both terrestrial and marine components. As such it has great potential to serve as a model for the conservation of terrestrial and marine biodiversity that are ecologically linked. An



Circumpolar Region

Wrangel Island lies 87 miles (140 km) off the northeast coast of Siberia.



important human dimension to this model is the meaningful involvement of Native people in all aspects of reserve protection and management.

That the reserve is of global significance is evidenced by its candidacy for designation as both a World Heritage Site and International Biosphere

"The moonlight smooths out the outlines of the surface and imports to the scene an endless variety of the subtle shades from silver-white to violet-black. Dead silence reigns. Against a background of myriad stars twinkling in the frozen air, the Arctic wilderness is particularly memorable."

-Vladimir Koshevoi

Reserve by the United Nations Educational, Scientific and Cultural Organization (UNESCO). World heritage sites are considered a common heritage for all people, and are intended to bring closer cooperation among nations and worldwide recognition of the cultural and natural values of a special place. A biosphere reserve, meanwhile, is a unique category of protected area dedicated to cooperative research. Such research will help discover solutions to our world's environmental ills and show how we can live more in harmony with nature.

Wrangel Island lies 87 miles (140 km) off the northeast coast of Siberia

between the East Siberian and Chukchi seas. A large island at 93 miles (150 km) long by up to 78 miles (126 km) wide and encompassing an area of 2,938 square miles (7,609 sq. km), it straddles the 180th meridian and thus lies in both the Western and Eastern hemispheres.

Uninhabited and much smaller Herald Island (4.4 sq. miles; 11.3 sq. km) is situated 40 miles (64 km) northeast of Wrangel Island toward the Bering Strait and Alaska. It consists mainly of granite and gneiss mountains that rise 1,125 feet (343 m) above the surrounding sea. The only vegetation is patchy alpine tundra except around seabird colonies where bird guano results in an unusually rich flora for such high latitudes.

Both Wrangel and Herald islands are surrounded by a 12 nautical mile-wide strictly protected marine zone of 4,457 square miles (11,543 sq. km). Beyond that a 24 nautical mile-wide buffer zone of 14,461 square miles (37,453 sq. km)

provides additional protection. Total size of the reserve (combined terrestrial and marine components) is 21,859 square miles (56,616 sq. km).

The reserve is closely tied ecologically with the Bering Sea ecoregion to the south. In spring and fall there are extensive migrations of fish, birds, and marine

mammals through the Bering Strait that connects the Bering and Chukchi seas like the neck in an hour glass. The ecological health of one sea depends on that of the other.

This unique protected area lies within the Chaunski region of the Chukotka Autonomous District in the Russian Far East. It is a federally protected area (zapovednik) under jurisdiction of the Nature Reserve Department of the Ministry of Natural Resources. Its administrative headquarters is in the village of Pevek on Chukotka's north coast at Chaunski Bay.

Seasonal research and management activities are carried out from field

stations situated in several locations around the islands. The base camp is in the small village of Ushakovskoe on Wrangel Island. During the spring, summer and autumn field seasons up to 25 to 30 reserve staff and researchers may be at work on the reserve. In winter only a few rangers remain to insure an adequate level of law enforcement and base camp maintenance.

A polar hydrometeorological station with a staff of eight to ten people is also located in Ushakovskoe village where less than 100 Eastern Siberian Yupik and Chukchi people reside. Only official personnel or those who have been granted permission are allowed access to the reserve. This applies to both land and surrounding marine waters.



Wildflowers

Travel to Wrangel Island is primarily by helicopter in summer and fixed-wing aircraft (AN-2) in winter via the mainland villages of Schmidt and Pevek. Ships without icebreaking capability can reach the islands only during occasional summer ice-free periods.

The reserve is in the Arctic realm, covered by tundra (a Lappish word for treeless plain) and underlain by "dry permafrost"(permanently frozen ground with low ice content).The soil surface thaws to a depth of only a few inches during the brief arctic summer.

Popularly known as the "Island of Blizzards," Wrangel is swept by fierce

sun does not set for three months during summer; the frost-free period lasts only two to three weeks. Snow cover can be present from late August until the middle of June. From November 22 to January 22 the polar night blankets the land with the full moon and northern lights (aurora borealis) casting an eerie light over the dark and frozen landscape.

Precipitation is very low averaging only 7.87 inches (200 mm) per year primarily in the form of snow. Most is blown off the island by the gale force winds. In this true arctic desert, wetlands are relatively

"Quite often in the reserve the monotony of the deep night is disturbed by the incomparable beauty and brightness of the Northern Lights. They change the appearance of the place beyond recognition. No words can describe this sight." -Vladimir Koshevoi

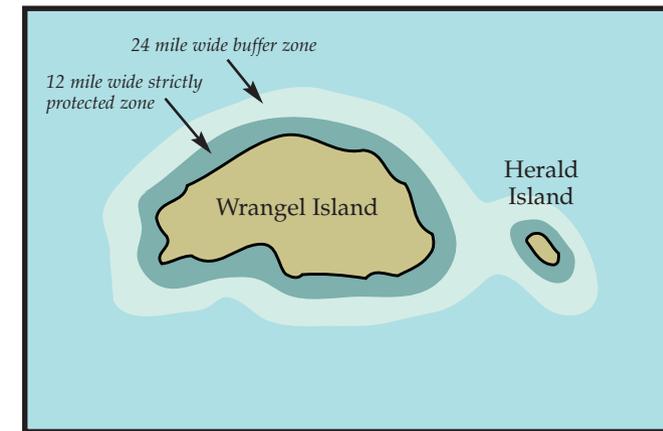
storms that completely erase the border between earth and sky. Icy winds blow the falling snow from open tundra areas and deposit it in deep drifts on lee slopes of stream bottoms and mountain ridges. Overcast skies, thick summer fogs, and impenetrable pack ice add to the island's forbidding character and isolation.

The mean annual temperature is 11.7°F (-11.3°C) with the mean temperature of the warmest month (July) only 36.5°F (2.5°C). Even though the

few. Spring runoff is brief with rivers and streams running very shallow.

Wrangel Island has 900 shallow lakes and several large coastal lagoons. Major rivers and numerous streams flow down from a crescent of low-rounded mountains. The highest peak is Mt. Sovetskaya at 3,596 feet (1,096 m).

The diverse landscape features and climatic variation result in a rich array of microclimates. For example, the northern plains are heavily influenced by the cold



Protected marine zones surrounding Wrangel and Herald Islands.

rich feeding grounds for the diversity of marine life.

Because of a unique combination of landscape features, climatic conditions, geographic history and isolation, Wrangel Island is characterized by greater species richness and community diversity, endemism and relic species than any other part of the Arctic at similar latitude. It also has more American and Eurasian representations.

This booklet is intended to highlight the reserve's natural treasures and provide suggestions on how conservation-minded citizens can help Russian managers conserve its unique biodiversity.

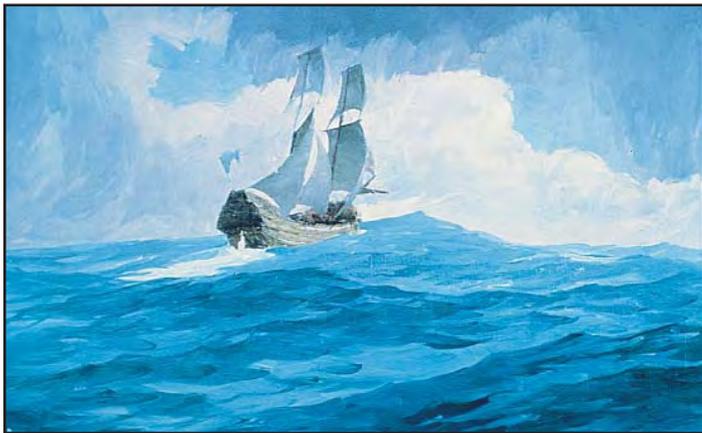
northwest winds, whereas the central highlands and southern exposures are much warmer due to wind protection from the surrounding mountains.

In contrast, Herald Island, as described by polar bear biologist Nikita Ovsyanikov, is a "rocky castle of an island encircled by daunting cliffs." The relatively shallow waters of the surrounding Chukchi Sea, though ice-covered most of the year, provide

TIME CAPSULE

During the height of the last Ice Age some 18,500 years ago, Wrangel and Herald islands were near the center of a 620 mile wide (998 km) bridge of land that connected Asia to present day Alaska. At the time, vast polar and continental glaciers locked up much of the earth's water. As a result ocean levels dropped as much as 600 feet (183 m). A bridge of land known as Beringia emerged allowing nomadic Paleolithic hunters to follow their quarry eastward into the Americas.

Mammoth steppe is a term coined by paleoecologists to describe the landscape of Eurasia and North America during the Pleistocene glacial epoch. A mixture of steppe and tundra plants (unlike any natural community today)



covered Beringia at that time. This lush vegetation in turn supported an abundance of mammals.

It's not hard to imagine the vistas on the mammoth steppes of the Bering Land Bridge resembling a northern Serengeti, with an exotic mix of hoofed animals (wild horses, bison, saiga antelope, caribou, mountain sheep and woolly mammoth) followed by age-old predators (wolf, saber-toothed cat and short-faced bear). The most majestic of all these wild creatures was the woolly mammoth.

Fossils gathered on Wrangel Island show that a dwarf race of woolly mammoth evolved there living among ancient horses, bison, muskox and even woolly rhinoceros. Radiocarbon dates indicate that the dwarf mammoths were alive 7,000 to 3,700 years ago when Egyptian civilization was already established. Based

on the size of their teeth, paleoecologists know they stood about six feet high (1.8 m) as compared to typical woolly mammoths that stood 10-11 feet (3-3.3 m). Limited food resources and absence of predators are believed primarily

responsible for the evolution of the dwarf mammoth on Wrangel Island. Isolated from the mainland, they survived the extinction of other mammoths by more than 6,000 years.

Then about 13,500 years ago, the climate warmed, causing glaciers to melt and sea levels to rise. The Bering Land Bridge disappeared beneath the Bering and Chukchi seas leaving Wrangel and Herald islands as isolated remnants of their rich Beringian heritage.

With the onset of snowier winters and sudden spring thaws, the rich grasses of the mammoth steppes gave way to sedges and mosses. Such forage was not as much to the liking of horses, antelope, bison, and mammoths. Eventually these grazers disappeared into the mists of time along with the saber-toothed cat and short-faced bear.

The earliest evidence shows human occupation of Wrangel Island around 3,400 years ago. These hardy Paleo-Eskimo marine mammal hunters occupied a site, known as Chertov Ovrage, on the island's southern coast at Krasin Bay. They may have used domestic caribou (reindeer) to help them travel the 87 miles (140km) of ice flows between the mainland and the island.

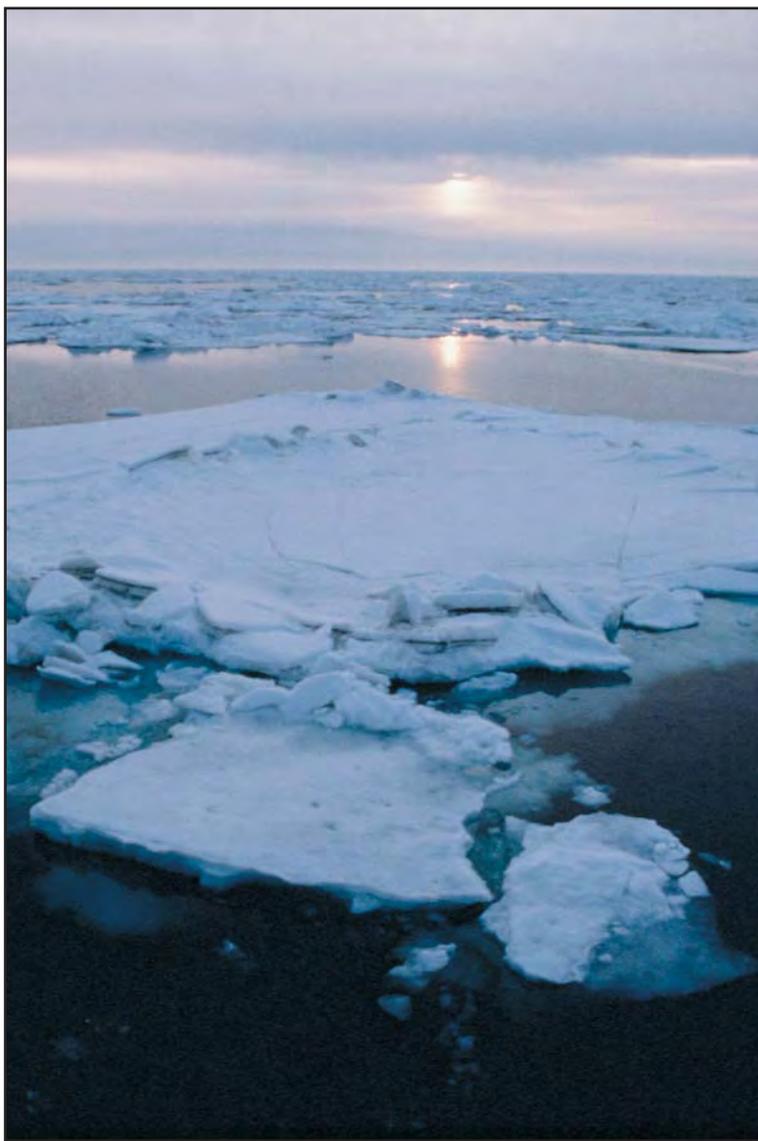
Wrangel Island is named in honor of the Russian navigator and Arctic explorer Ferdinand Petrovich von Wrangel (1790 -1870) who mapped much of the Siberian coast. While in Kolyma in 1824,



Wrangel became convinced that an unknown land must lie to the north of the Chukotka Peninsula between the East Siberian and Chukchi seas. He deduced this from the large flocks of birds seen migrating in that direction and from the stories of a distant land told him by the local Native people.

Despite several efforts to discover "Doubtful Island" by crossing the ice in early spring, open leads and stormy weather forced him to turn back. Nevertheless, it was Wrangel who correctly located the theoretical blank spot on the map where the island named after him was later discovered.

The first European to actually reach one of the reserve's islands was British Captain Henry Kellert. He and his crew landed on Herald Island in 1849 while searching for the lost John Franklin expedition which had disappeared while seeking a Northwest Passage. Kellert named the island after his ship the H.M.S. Herald. Although they could see a mountainous island to the southwest, heavy ice prevented them from reaching it.



Kevin Schofer

Pack ice

As early as 1644, when the Russian Empire thrust into Asia, the Natives of eastern Siberia reported stories of a great northern land to a Cossack trader.

Two decades later in 1867 the American whaler Thomas Long approached and mapped the large island seen by Kellert. But he did not take time from his whaling to go ashore even though it was an unusually favorable ice-free year: It was Long who named the island after Ferdinand Petrovich von Wrangel.

In 1881, the U.S. Coast Guard revenue marine steamer Thomas Corvin, under command of Captain Calvin Hooper and with a contingent of scientists on board, landed on Herald and Wrangel islands while searching for a lost ship named the Jeanette.

The first Russian expedition reached and raised the Russian flag on Wrangel in 1911 aboard the Vaigach. Then in

1916, the Tzarist government declared the island part of the Russian Empire.

The first colonists to arrive on Wrangel Island were sent by the famous arctic explorer Vilhjamur Stefansson from Canada in 1921. This small human community took a heavy toll on the island's wildlife. For two years the Wrangel Island colonists struggled to survive, hunting everything that could be eaten or skinned. Then in 1924, the Soviets displaced the illegal Canadian settlement. They then established a permanent Russian settlement on the island in 1926.

There was considerable controversy during the ensuing years as to which country owned Wrangel Island: the United States, Canada or Russia. Eventually Russia prevailed although controversy continues in some quarters to this day. Subsequent efforts to develop the island's resources led to excessive killing of Wrangel's wildlife until the establishment of the nature reserve in 1976.

"Wrangel Island ... often isolated by impenetrable sea ice, has provoked international controversy, disaster and death."

- Melody Webb

BIODIVERSITY

Biodiversity: the variety of living things in an ecosystem.

Wrangell Island's unusual history, isolation, climate and geology have preserved relics of the mammoth steppe vegetation complex. The island's 400 plant species and subspecies represent an enormous floristic richness for such high latitudes. For example, there are 17 species of arctic poppies alone. Prevailing flora are members of the mustard, rose, buttercup and saxifrage families. Unlike other arctic areas, the pea, sunflower and bluegrass families are also well represented.

Of special significance are the 24 species of vascular plants listed in the Conservation of Arctic Flora and Fauna's (CAFF) Atlas of Rare Endemic Plants of the Arctic. These include several species of poppies, oxytropes and dandelions. They are known from less than 20 sites in the Arctic with their total populations at fewer than 3,000 individuals. In fact, most are found nowhere else in the world except on Wrangel Island.

Grass-lichen, drygrass-grass-lichen, and occasional shrub-forb communities dominate the island's lower and middle mountain slopes. There are also sedge bogs with sphagnum moss, sedge-cotton-grass bogs and thickets of elfin willows. Even on high mountain tops lichens and mosses cling to life on large boulders.

Relatively large areas in the warm central parts of the island are occupied by subarctic vegetative communities composed of mosses, grasses, low shrubs and tussock tundra. Other natural communities include alpine polar deserts, high arctic mineral bogs and arctic meadows. Unique wild pea assemblages with high species diversity and halophyte (salt loving) communities occur on saline soils in central parts of the island.

Willow thickets high in the interior river valleys, sedge bogs in hollows, heather communities and wet meadows in the warmer protected microhabitats represent vegetative communities far beyond the normal northern limits of their ranges.

Vegetation is especially rich along river valleys in the island's interior which are protected by high mountains from the cold arctic winds. Relic steppe and tundra-steppe communities with a diversity of low-growing flowering plants create an impressive carpet of color during the brief arctic summer along the upper reaches of Neizvestnaya (Unknown) River. This is the most important refugium for rare plants on the reserve. For example, the entire world population of three relic endemics (i.e., they have survived since the Pleistocene), *Potentilla Wrangelii*, *Hierochloe vrangolica* and *Oxytropis*



Dove Cline

Wrangel plant expert, Dr. Boris Yurtsev

uniflora, are confined to a few small areas here. Another important refugium is in the Doubtful Bay area where tundra-steppe communities are well represented. These diverse habitats host a far greater variety of species than are found on the mainland or through the entire Canadian Arctic Archipelago and Greenland.

Flowering plants have developed a number of fascinating strategies to survive the reserve's harsh conditions. Most are low growing to avoid the cold polar winds. Some form dense, compact cushions that hug the ground such as the moss campion. Others, such as the woolly lousewort, wrap themselves in a blanket of fine whitish hairs that trap

layers of warm air next to the plant. A third adaptation developed by arctic poppies and mountain avens is to track the sun. By facing directly into the sun as it arcs across the sky, their saucer-shaped petals act as solar collectors reflecting the sun rays into the flower's center and increasing the temperature up to 64.4°F (18°C). Warmth seeking insects inadvertently pollinate the plant, speeding growth and development of the plant's seed.

Insects

Species diversity of insects on Wrangel Island is unusually high for such northern latitudes. For example, there are seven species of leaf beetles, ten species of weevils and twelve species of diurnal butterflies. According to scientists, this phenomena is reflective of the reserve's diverse flora and of its geographic isolation, which led to the evolution of twelve closely related endemic species from the groups mentioned above.

The reserve's insect fauna is dominated by springtails, beetles, butterflies, bees and mosquitoes. What is unique

about them is the high number of advanced species associated with certain groups of plants. In addition, other species of insects on Wrangel Island represent families not normally found in arctic tundra. These include a variety of bugs, mayflies and click-beetles. Species typical of tundra-steppe live in sedge habitat in the vicinity of Doubtful Bay and are found nowhere else on the island.

Finally, three species of "American" mosquitoes and butterflies of the genus *Parabarrovia* are present. They have not been found anywhere else in Eurasia.



Fish

Since Wrangel Island's shallow rivers and lakes freeze to the bottom in winter, there are no resident freshwater fish. Arctic char, pink and chum salmon and occasionally arctic cod and gobs enter coastal lagoons and mouths of larger rivers in limited numbers.

Marine fishes include sculpins, arctic cod, Canadian eelpout, arctic flounder and saffron cod. Comprehensive information is lacking, however, on their life histories, population dynamics, distribution and ecological relationships.

Arctic cod are the most numerous and vitally important food source to a variety of marine birds and mammals. Adult cod are associated with both the ocean bottom and pack ice. They spawn under the ice in winter but just where is unknown. Young of the year are normally found in the upper meter of water where the greatest abundance of their favored planktonic food occurs. The young cod are an early season food source for murre and kittiwakes with peak numbers taken during spring ice breakup.

Large schools of adult cod form in fall (September through October) and enter the warmer coastal waters near river mouths. Here they are pursued by thousands of gulls, seals and large pods of beluga whales.

Birds

Wrangell and Herald islands are the last land falls for migratory birds flying north through central Beringia in search of secure feeding, nesting and brood rearing areas. In many respects the island avifauna are typical of all arctic bird communities. That is, there is a higher proportion of shorebirds and waterfowl compared to passerines that dominate bird communities in all other latitudes, and a high proportion of species with a circumpolar distribution at the northern limits of the tundra life zone.

Yet in other respects reserve birdlife is unique. For example, with 50 nesters and another 110 migrants or occasional visitors (160 total species), there is high species diversity compared to other arctic areas of similar size. Additionally, the reserve birdlife is enriched by more

southern species such as the arctic warbler and ruff, and by higher populations of American species (including snow geese and Baird's and buff-breasted sandpipers) than other parts of Eurasia. Endemism is reflected in the fact that auks, murrelets, puffins, black-legged kittiwakes and snow buntings show definite morphological distinctions from other arctic populations. The only regular year-round residents in good lemming years are the snowy owl and northern raven. The snowy owl is the only bird of prey that nests annually on Wrangel Island.

Waterfowl

Among waterfowl, snow geese are the most noteworthy and one of the principal reasons for establishment of the Wrangel Island Nature Reserve. A colony of 20,000 to 30,000 pairs nest annually in the upper reaches of the Tundra River. This constitutes the only



Horned puffin

Nikolay Konyukov



Snow goose

Nikita Ovsyanikov

large colony of snow geese in Eurasia. In the most favorable nesting years, two colonies of up to 500 pairs can be found in the Mammoth River valley (at Veselyi Creek) and in the upper reaches of the Neizvestnaya River (at Prigalet Creek).

Russian snow goose researcher Evgeny V. Syroechkovsky found that the size of the main snow goose colony varied greatly (500 to 6,400 acres; 202 to 2,590 hectares) from year to year depending primarily on the amount of snow cover in spring. A unique feature of Wrangel snow geese is that some nesting occurs even under the most extreme weather conditions. In years of early snow melt practically all suitable nesting areas are occupied whereas in

years with late springs only the core area is used. In these years many geese move to nest in smaller colonies in the vicinity of active snowy owl nests or abandon their nesting efforts entirely.

Prior to establishment of the Native village of Ushakovskoe in 1926, geese reportedly nested in nearly all of Wrangel Island's mountainous valleys. In the years that followed, the gathering of large numbers of goose eggs by villagers and scientists alike, combined with excessive hunting of molting birds and damage to habitat from reindeer herding caused a dramatic decline in goose numbers until only one large colony remained.

A common strategy of the snow geese is to place their nests in close



Snow geese

Vasily Baranyuk



U.S. Fish & Wildlife Service

King eider

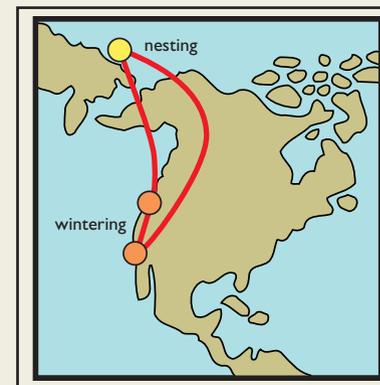
proximity to those of snowy owls. The owls' aggressive defense of their nests against marauding arctic foxes probably protects the geese from the crafty egg-eating predators. High density and stability of the snowy owl nesting population is an important factor for recovery of the depleted Wrangel Island snow goose population.

Wrangel Island snow geese are truly an international resource. Each fall they migrate to wintering areas along the coast of British Columbia and to the Sacramento and San Juan River valleys of California.

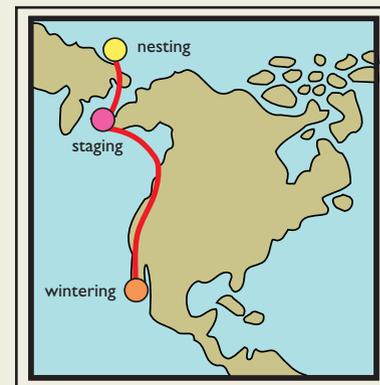
Pacific black brant also nest on Wrangel but in very modest numbers (20 to 30 pairs). Since this small dark-colored coastal goose cannot protect itself very well from the predatory arctic fox, it also commonly places its nests near the protective influence of nesting snowy owls and glaucous gulls. This occurs along upper reaches of major river valleys in central parts of the island.

As typical of most geese, many non-breeding brant summer far north of the population's principal nesting grounds. For Wrangel Island brant these nesting grounds are on Alaska's Yukon-Kuskokwim Delta and Russia's Chukotka Peninsula. An average of 8,000 to

Snow Goose Migration



Black Brant Migration



12,000 birds fly to Wrangel Island to molt their feathers in lagoons on the island's southern and western coasts, and in some lakes on the Academy Tundra. In fall, brant from Wrangel Island join those from throughout the vast Beringia region on the migration south. Practically the entire world's population congregates at Izembek Lagoon on the Alaska Peninsula. Here they spend four to six weeks fattening up on eelgrass before flying across the North Pacific Ocean to their principal wintering areas in lagoons along the west coast of Mexico's Baja Peninsula.

Seaducks, like the common eider, nest solitarily and in colonies up to 25 miles (40 km) from the coast in the

their large bills. Because of the inclusion of sea urchins in their diet, eider bones are often tinted pink.

The only freshwater dabbling duck and irregular breeder on Wrangel Island is the northern pintail. Eight other species of dabblers and several diving ducks are occasional visitors.

Shorebirds

As is typical for the arctic tundra in general, shorebirds are by far the most abundant group of birds on the reserve. The most common and widespread of the 36 recorded species are the black-bellied plover, ruddy turnstone and red knot. These three circumpolar arctic shorebirds find the well-drained dry

Wrangel Island is the last landfall for migratory birds flying north through central Beringia in search of secure feeding, nesting and brood rearing areas. -Dave Cline

vicinity of nesting snowy owls in the very central parts of the island along major river valleys. Its more abundant cousin the king eider is restricted to lowland marshes for nesting. Weighing up to six pounds, the common eider is the largest duck in the Northern Hemisphere. These seaducks rely on a rich diet of seafood that includes amphipods, barnacles, clams, marine worms, and crabs which they crush with

habitats to their liking. Here they can use their short bills to pick favored food items directly from the ground or from the thin vegetative layer.

Dunlin and pectoral sandpipers are also common but prefer moister wetland habitats. Asiatic golden plovers seek out the warmer hollows and southern mountain slopes. The red phalarope is representative of a small group of swimming shorebirds that



Nikolay Konyukhov

Red Knot

forage by spinning and picking their food from the water surface of wetlands.

Baird's and buff-breasted sandpipers are the reserve's rarest shorebirds. Although both are common in tundra areas of North America, they have been recorded in Eurasia only in a few loca-

or mountain canyons where practically no other sandpipers live.

Two American species of shorebirds recently recorded on Wrangel Island are the lesser golden plover and semipalmated plover. And two species more characteristic of southern tundra areas, the short-billed dowitcher and ruff, have also been found nesting on Wrangel Island.

Seabirds

Some of the largest seabird colonies in the Chukchi Sea are situated along the eastern and western coasts of Wrangel and on Herald islands. Seabird numbers vary significantly from year to year (up to 220,000 pairs) depending primarily on severity of the weather and food availability as related to ice conditions. Numbers on Wrangel's Cape Waring colony, for example, range from 20,000 to more than 100,000 pairs. An additional 70,000 pairs nest on Herald Island.



Black guillemot

Nikolay Konyukhov

tions on the Chukotka Peninsula and Wrangel Island. The buff-breasted sandpiper can be considered a typical tundra-steppe species whose range has been significantly reduced since the Pleistocene glacial epoch. It nests on well drained tundra-steppe along the southern coast and central parts of the island. Baird's sandpiper, meanwhile, occurs only along narrow river valleys



Nikolay Konjukhov

Murre chick

All seabird colonies in the reserve are inhabited by a dominant mixture of black-legged kittiwakes, thick-billed murres, black guillemots and pelagic cormorants. Species composition and proportion varies depending on the type of rock structure that form the cliffs where colonies are located. Coastal cliffs on Wrangel Island are composed of relatively thin, easily eroded slates. Colonies situated there are dominated by kittiwakes that make their nests on small ledges formed in the process of slate erosion. Murres cannot nest successfully in such places because they lay their eggs directly on narrow rock ledges. The Cape Waring colony is located on limestone cliffs. Murres and kittiwakes nest there in about equal proportion as conditions are favorable for both species, small ledges are used by kittiwakes and narrow "shelves" by murres. Herald Island, meanwhile, is inhabited mostly by murres and guillemots as its cliffs provide granitic rock

ledges for murres as well as cracks and cavities preferred by guillemots.

Horned and tufted puffins and pelagic cormorants are few in number and at the northern limits of their range in the reserve.

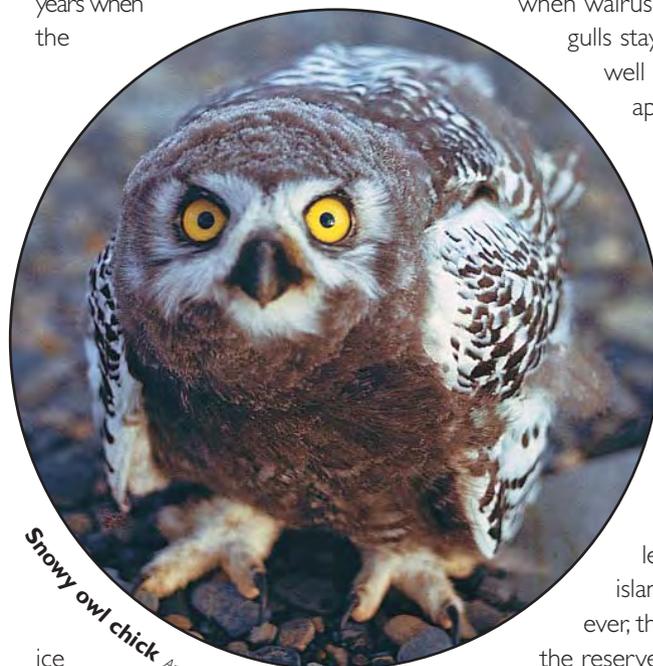
Arctic terns are common and the champion of long distant migrants. Each year they fly some 26,000 miles roundtrip between their nesting grounds on the reserve and the Antarctic ice pack where they spend the winter.

In addition to the abundant black-legged kittiwake, four other species of gull are very common: the glaucous, ivory, Ross' and Sabine's. The latter three are the most handsome, hardest, rarest, and longest flying migrants of the gulls.

Sabine's gull is an ancient arctic species taxonomically isolated from other gulls. Wrangel Island is probably the only place in the Russian Far East where it commonly nests. Loose colonies of 10 to 15 pairs occur on the lake-dotted northern coastal plain. This elegant gull with a dark gray hood and beautifully forked tail feeds on various invertebrates of lake shores. Once young are on the wing, Sabine families fly to coastal lagoons before migrating south to the open waters of the Bering Sea and Sea of Okhotsk.

In fall, the two other rare and beautiful gulls, Ross' and ivory, migrate past the reserve. Like Sabines, both are taxo-

nomically isolated, ancient arctic species. Ross' gulls in their white plumage with soft pinkish blush on breast and belly and thin black necklace, follow the ice edge on their fall migration from nesting grounds in eastern Siberia thus avoiding the open sea. In years when the



Snowy owl chick Anatoly Kochnev

ice edge is to the north-northwest, thousands or even tens of thousands of Ross' gulls migrate along the shores of Wrangel Island. From mid-September to mid-October they can be observed from Cape Blossom to Doubtful and Rogers bays.

The beautiful ivory gull nests even further to the west of Wrangel Island than Ross'. This immaculate white ice-loving gull, although not as abundant as the Ross', migrates past the reserve by the thousands during a two to three-week period in November. In years when walrus are at their haulouts, ivory gulls stay around the local village well into December where they appear as ghost-like butterflies in the polar night.

Raptors

An occasional pair of gyrfalcons nest near seabird colonies on both Wrangel and Herald islands where they prey principally on guillemots. On rare occasions an arctic peregrine falcon and rough-legged hawk may visit the islands. The snowy owl is, however, the principal bird of prey on the reserve. One of the largest of its kind, this handsome day-flying owl with piercing yellow eyes preys primarily on lemmings. During periods of lemming highs which occur on Wrangel Island more frequently than in other parts of the Arctic and usually continue for more than one year, owls reach nesting densities of four nests per four square miles (10 sq. km) over large areas (in moun-

tainous parts of the islands and along high river banks). In the most favorable habitats, densities may reach five to seven nests per four square miles (10 sq. km). Such densities are the maximum known for the species.

Snowy owls breed every year on Wrangel Island with some nests found even during lemming lows. Such stability in nesting owls has not been recorded anywhere else in the Arctic. Several hundred pairs of breeding snowy owls nest on Wrangel Island in good lemming years. In vigorously defending their nests and young from arctic foxes, the adult owls provide a safer nesting haven for snow geese, black brant and eiders. During lemming lows, snowy owls are hard to find on the reserve having migrated to more southern regions where hunting is better. When rodents are not available in these areas, snowy owls switch their diet to ptarmigan, waterfowl, shorebirds, seabirds and even arctic hares.

The reserve's three species of jaeger -- parasitic, long-tailed and pomarine -- are close relatives of gulls that have become predators. All three are expert hunters. In fact the name jaeger comes from the German word for "hunter." Pomarine and long-tailed jaegers are the most common on the reserve, with the parasitic nesting in low numbers. Pomarine numbers rise and fall in synchrony with those of lemmings, its favored prey. Long-tailed jaegers prey

on lemmings but also on insects, bird eggs and young shorebirds. Though less common, their numbers are more stable than the other two. On their wintering grounds at sea, jaegers practice piracy by harassing seabirds until they drop the fish they are carrying. The pirate bird then swoops down to catch the stolen food in midair or retrieve it from the water surface.

Songbirds

Although 52 species of passerines have been identified on the reserve, only three are considered common nesters: Lapland longspur, snow bunting and hoary redpoll.

Snow buntings are the harbingers of spring, arriving on the reserve in April with the land still in the grip of winter. They prefer the drier stony habitats with open ground, and nest in mountainous areas.

Longspurs arrive with other passerines in late May and early June. They prefer tussock tundra and willow thickets. Hoary redpolls are seldom found far away from their favorite willow thicket habitats.

Northern ravens are residents of both Wrangel and Herald islands where single pairs nest and raise young almost every year near major seabird colonies. Ravens are the first bird migrants to arrive on the islands in spring (early March) and can be seen performing



A. V. Kechmar

Bluethroat

their aerial courtship flight antics around cliffs still covered in snow and ice. In late autumn after other bird migrants have already departed, raven family groups range widely over the islands in search of still available food items.

The completely black ravens with naked feet are capable of survival under some of the most harsh weather conditions on earth. Relying on their superior corvid intelligence, these resourceful scavengers are expert at finding carrion on the tundra, exploiting the rich harvest of chicks and eggs at seabird colonies, and cashing food from polar bear kills.

The northern wheatear and white wagtail, although not common, are regular nesters throughout a variety of island habitats. No nests have yet been found, but male arctic warblers are heard singing quite regularly in shrub thickets.

On a rare visit to remote and inhospitable looking Herald Island in 1988, reserve staff were excited to discover Lapland longspurs, white and yellow wagtails, wheatears, American pipits, bluethroats and several other passerines near a seabird colony sheltered from prevailing north and east winds. Seabird guano appeared primarily responsible for the unusually lush vegetation on the site that in turn attracted the surprising diversity of songbirds.

Regular New World visitors to the reserve include cliff swallow, white-crowned sparrow, savanna sparrow and dark-eyed junco. Although no nests for these species have yet been found, ornithologists suspect that nesting may well occur.



Mammals

There are only eight species of resident terrestrial mammals in the reserve. Five of these eight are endemic and two, reindeer and muskox, were introduced. An additional 10 species of marine mammals inhabit the reserve's coastal waters

Polar Bear

The animal for which the Wrangel Island Nature Reserve is most famous is the polar bear. The concentration of an average of 300 to 350 polar bear maternity dens is exceptionally high. The strategic location of the reserve in prime polar bear habitat and deep snow on mountain slopes are key factors for successful overwinter denning of pregnant females. The highest density of dens on Wrangel Island is usually found along the eastern and western coasts, in the Dream Head Mountains, as well as the Thomas, Pillar and Waring Capes. In some years, for example, 50 dens can be found at Cape Waring within a three square miles (eight sq. km) area.

Even higher densities can be found on Herald Island where up to 60 to 80 bears may den in a single season. This represents the highest concentration of denning polar bears in the circumpolar

Scott Schliebe



Polar bear cubs

Arctic. Herald Island is also vitally important to non-denning polar bears in winter. Polynas and leads that remain around the island throughout the winter provide ideal hunting opportunities. It is here that bears can catch seals in open water.

In conserving large predators, we test our capability to save nature; in conserving the polar bear, we test our capability to save the Arctic.

Nikita Ovsyanikov

Pregnant female bears come ashore on the reserve in October and November in search of maternity den sites. Sometimes it's possible to see large concentrations of bears on the islands as in 1985 and 1993, when up to 100 animals gathered to feed on the carcass of a gray whale washed ashore. In the 1990s when the ice pack retreated 62 or more miles (100 km) north of

the reserve, 20,000 to 30,000 walrus hauled-out on Cape Blossom and Doubtful Spit beaches. During September and October more than 150 polar bears were seen stalking the beached walrus herds preying on the occasional young animal and feeding on the carcasses of those crushed when the herds stampeded into the water.

Female bears emerge from their dens in April. After allowing their cubs a period of adjustment to the harsh polar world, mothers lead them from the islands out onto the pack ice. Cubs stay with their mothers two years or more during which time they roam the pack ice in search of seals. In summer, most follow the ice edge north, while the

winter months find many along the coasts of northwest Alaska.

The results of tagging and satellite telemetry studies have revealed that polar bears that den and raise their young on Wrangel and Herald islands belong to the Alaska-Chukotka polar bear population. This population inhabits the Chukchi and northern Bering Sea and eastern part of the East-Siberian Sea.

In 1998, U.S. and Russian negotiating teams developed a bilateral "Agreement for the Conservation and Management of the Alaska-Chukotka Polar Bear Population". The agreement was officially signed by the two nations October 16, 2000. Pursuant to the agreement, Native residents of Alaska and Chukotka will be permitted to hunt polar bears consistent with a quota system to prevent overharvesting. The Wrangel Island Nature Reserve and surrounding waters will, however, remain closed to all hunting. Among the agreement's provisions is a prohibition on taking females with cubs and any bears preparing to enter or leave their dens, and on use of aircraft, large motorized vessels, traps and snares in hunting.

The agreement also identifies the need to conduct collaborative research

and monitoring. A U.S.-Russia Polar Bear Joint Commission will be established with representatives from the two federal governments and Natives of each country. Russian polar bear specialists feel that the implementation of effective law enforcement measures to prevent poaching of polar bears in Chukotka should be given highest priority. Other priorities of the commission will be to identify key polar bear habitats, recommend habitat conservation measures, establish harvest quotas and develop public education materials. This agreement is a major break-through in polar bear conservation. It provides an unprecedented opportunity for a collaborative international effort that will more effectively protect polar bears and their ocean realm. In the process, Arctic biodiversity will be better protected as well.

Nikita Ovsyanikov



Polar bear family

Walrus

Wrangel Island is also one of the key areas in the world for the Pacific walrus, *Odobenus* or "tooth walker". After overwintering in the ice pack of the Bering Sea, walrus follow the ice-edge as it retreats north through the Bering Strait in spring. Although most adult males stay behind on their Bering Sea haulouts, the majority of females and young adults reach the vicinity of Wrangel and Herald islands by the middle of July. Here they feed on clams and other marine inverte-

brates in the islands' shallow coastal waters. Using bristly whiskers on their snouts, the feeding walrus feel their way along the ocean bottom with eyes closed. When clams are detected they are grabbed from the seabed and sucked from their shells. This "tilling" action flushes nutrients into the water column and increases the patchiness of bottom habitats.

In years when the ice edge retreats north from the reserve as it did in the 1990s, more than 100,000 walrus may

occupy favored Wrangel Island haulouts for one to two months. The largest of these haulouts are at Cape Blossom and Doubtful Spit.

When onshore, the blubbery walrus turns various shades of pink as blood is shunted near the skin surface to dissipate heat and prevent

hyperthermia. Should individuals become overheated on sunny days, they clamber over each other to "chill out" in the sea. Walrus haulouts can be great places to view wildlife. Polar bears, arctic fox, wolverine, ravens and a variety of gulls are attracted to the haulouts where they feed on the carcasses of dead walrus.

Female walrus breed in January and February when they are six to seven years old, bearing a single calf on the ice every two to three years during their northward spring migration. With one of the lowest reproductive rates in the animal kingdom, the Pacific walrus population is vulnerable to depletion.

A 1990 joint Russian/American summer-fall census revealed a population of about 200,000 walrus. This represents 80



Polar bear confronts walrus *Nikita Ovsyanikov*

percent of the world's walrus population. The combined Alaska and Russia harvest (including an estimated 40 percent struck and lost) has averaged about 5,000 a year. Walrus have long been a key subsistence food for coastal Native villagers of Chukotka and western Alaska. To this day, they remain an important part of local diets. Walrus ivory tusks are highly prized by Native artisans. A commercial harvest that occurred along the Chukotka coast to provide food for several local fox farm cooperatives has virtually ceased due to loss of government subsidies.



Lemmings

Collared and Siberian lemmings constitute the only native rodents in the reserve. The collared is recognized as an endemic species (Vinogradov's), distant relative of those elsewhere in the Arctic, and the Siberian as an endemic subspecies. Lemmings inhabit the entire islands, the collared preferring the drier habitats and the Siberian the wetter. Lemmings are noted for their four year



Vasily Boroniyuk

Lemming

boom and bust population cycles. In years of population "lows," it can be hard to find a lemming. Then, three to four years later they appear to be everywhere reaching "peak" densities of more than 100 per acre. Despite decades of research, scientists still can't explain what causes such dramatic fluctuations in lemming population numbers.

Lemmings do not hibernate but remain active all winter in elaborate tunnel systems beneath the insulating snow cover. Small spherical bodies, short legs, small ears, furred feet, vestigial tails and the densest fur of any

rodent its size enable lemmings to endure some of the longest and coldest winters on earth. The collared lemming is the only rodent in the world to change the color of its coat from summer brown to cryptic winter white.

Lemmings are a critically important component of reserve food chains. Since they constitute the principal food source for snowy owls, jaegers and arctic fox, the populations of these predators tend to rise and fall in synchrony with those of lemmings. During years of lemming "highs" their predators are most abundant. In these years the breeding success of geese, shorebirds and passerines also tend to increase since their principal predators are concentrating their hunting efforts on lemmings. During lemming lows, snowy owls and pomarine jaegers are hard to find. Arctic foxes decline sharply as they shift their hunting pressure to the eggs and young of geese, eiders and shorebirds. Some foxes specialize on seabird eggs and chicks.

Arctic Fox

Arctic fox tend to be rather abundant on Wrangel Island as conditions are particularly favorable for this resourceful arctic canid. The main reasons for this are the abundance of prey species, favorable denning sites on well drained slopes of river valleys, and the fact that the reserve is closed to trapping. This

opportunistic predator also benefits from being able to range far out on the polar pack ice to scavenge from polar bear kills. Although arctic fox commonly cross the ice to the reserve from the mainland, resident fox populations on the island are demographically very stable. The same adults and their offspring occupy the same optimal den sites and home ranges for a number of years.

Wolverine

That master scavenger of the Arctic, the wolverine, inhabits the reserve in low numbers. First records for the presence of this predator date back to the late 1970's after the introduction of reindeer. Wolverines are commonly seen hunting reindeer and feeding on geese. They are also known to eat eggs, the young of various birds and lemmings, as well as to scavenge from dead reindeer and walrus carcasses.



exciting chapter opened in Wrangel's unique natural history.

Arctic fox
Nikita Ovsyanikov

Wolves and Red Fox

Wolves and red fox have been known to reach the reserve across the ice from the mainland. Wolves actually became established breeders on the reserve in the early 1980s after the introduction of reindeer and muskox, their favored prey. Since they were considered a threat to the reindeer herd, however, the five resident wolves were eliminated from the reserve in 1983 (on orders from Moscow.) Current reserve policy is to allow wolves to become naturally reestablished to help control ungulate numbers. After an almost two decade absence, two wolves were reported to have reached Wrangel Island in 2000. Evidence indicates they are ranging widely over the island preying on reindeer. Should they prove successful breeders, a missing component of the reserve's predator-prey relationships will be restored and a new and

Whales

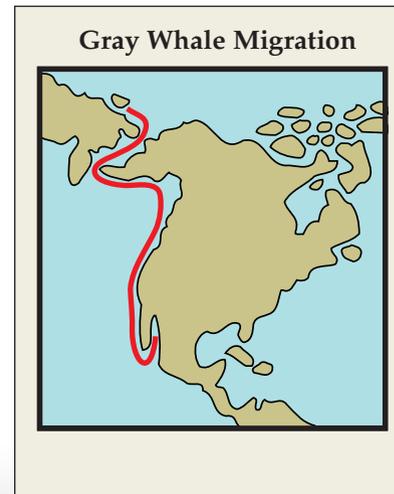
The most commonly observed cetacean in reserve coastal waters is the gray whale. This is the only benthic (bottom) feeding whale and is commonly encountered in shallow water close to shore dredging the bottom for amphipods and crustaceans. Upon surfacing, mud is often seen streaming from a feeding whale's mouth as it forces large volumes of mud and water over its baleen plates to strain food before swallowing. In traveling 10,000 to 14,000 miles (16,093 to 22,531 km) between wintering grounds in the Gulf of California and summer feeding areas in the Chukchi Sea, the gray whale has the longest migration of any mammal. Other baleen whales occasionally seen further offshore are the bowhead and humpback.

Since 1998, the number of gray whales summering in reserve coastal waters has increased quite dramatically. Feeding grays are being observed along most Wrangel coasts. In Krasin Bay for example, up to eight to ten whales can be observed simultaneously. This may reflect changing ice conditions in the Chukchi Sea that allow gray whales to penetrate further north. At any rate, this trend reflects the importance of reserve coastal waters as a refuge for marine mammals.

Among the toothed whales, the melon-headed beluga or white whale has been known to appear by the

thousands along Wrangel Island's southern coast in late autumn. They are believed to migrate west to Wrangel Island from Canada's Mackenzie River delta. Belugas are food "generalists" with more than one hundred species of fish, shrimp, octopus, crabs, and clams in their diet. They also possess the most sophisticated biosonar of all cetaceans, along with varied and complex vocalizations. This enables belugas to communicate and find food in even the most turbid coastal waters. Commercial whalers used to call belugas "sea canaries" because of their wide range of vocalizations.

In years of open water, pods of northern dolphins have occasionally been seen migrating off Wrangel Island's shores.



Seals

Ringed seals inhabit the reserve's coastal waters year round and constitute the principal prey of polar bears. Using their sturdy front claws, they have the ability to scratch breathing holes through the shore fast ice. These breathing holes often open under a snow drift where the seal excavates a cozy cave. There it can haulout and rest protected from the cold arctic wind. Such snow caves also serve as nurseries where the mother seal gives birth to her one-pound pup, the smallest pups of all the true seals.

With the approach of spring at the end of May and early June, ringed seals haulout on the ice to shed their winter



"The wildlife of Wrangel Island show how land and sea are ecologically linked. Many polar bears need to come ashore to den. Seabirds must seek the security of sea cliffs to nest, and walrus frequently haulout on island beaches. To conserve biodiversity on Wrangel Island and in the Chukchi Sea, you cannot draw a line at the shore."

-Dave Cline, Pew Fellow in Marine Conservation

coats. In favorable places like Doubtful Bay some 200 to 300 seals can be seen scattered across the ice surface in the warm spring sunshine.

Bearded seals appear in the spring when openings in the ice begin to appear. They remain throughout the summer until continuous ice cover is established. An adult bearded seal weighs up to 750 pounds (340 kg), twice as much as any other arctic seal. Like the walrus it possesses long whiskers and is a bottom feeder on shrimp, crustaceans, and fish.

Ungulates

At the time of discovery, no hoofed mammals (ungulates) inhabited Wrangel Island. Then in 1948 and 1952, domestic reindeer were introduced and a state herding enterprise was established. With abandonment of herding in 1976, reindeer numbers were reduced to only 1,500. They currently number an estimated 6,000 animals, more than four times the island's carrying capacity.

Another introduction occurred in 1975 when muskox were flown to Wrangel Island from Alaska's Nunivak Island. The animals thrived and now number about 600. Inuit call the muskox "oomingmak" which means bearded one. Well adapted to the "Island of Blizzards," the shaggy haired muskox actually has two coats of hair: an undercoat of soft thin wool called "qiviut" and a heavier overcoat of coarse guard hairs that hang almost to the ground like a robe. This shaggy long overcoat of brown hair on muskox, the most northerly land mammal in the world, recalls that of the woolly mammoth.

During the late summer breeding season or "rut" in August and September, dominant muskox bulls compete for control of their

harems. Using their heavy horns and thickened skulls, the bulls charge into each other in head-smashing cracks from distances of up to 150 feet (46 m).

For decades muskox and reindeer had no natural predators on Wrangel to hold their numbers in check. Both herbivores, when in excessive numbers, pose a serious threat to the nature reserve's unique plant communities. And because they are known to eat goose eggs, too many reindeer may also threaten the viability of the reserve's snow goose colony.



Muskox

Most notable wildlife features

- Most important onshore denning area for polar bears in the circum-polar Arctic.
- Highest density of denning polar bears in the world.
- Largest Pacific walrus haulout in the world.
- Only large colony of nesting snow geese in Eurasia.
- Largest seabird colonies in the Chukchi Sea.
- Refugium for most diverse flora in the Arctic including relic mammoth steppe communities.
- Northern most molting grounds for Pacific black brant.
- Northern most nesting grounds for horned and tufted puffins.
- Gathering place for Ross', ivory and Sabine's gulls, three of the rarest, hardest and long distance migrants in the gull family.
- Free-ranging herds of muskoxen and reindeer.
- Highest density of arctic fox.
- Most dense and stable snowy owl nesting population.

CONSERVATION CONCERNS

Scientists predict that the Arctic will be strongly affected by human caused changes, including global warming, increasing ultraviolet radiation due to ozone depletion, resource development, spreading contaminants, population expansion and burgeoning tourism. Based on the best available scientific information, here are the ways in which the world biodiversity heritage on the Wrangel Island Nature Reserve could be affected by these major human related threats:

Climate Change

The eight-nation working group on Conservation of Arctic Flora and Fauna (CAFF), with direction from the Arctic

Council under authority of the Arctic Environmental Protection Strategy, considers climate change the greatest threat to arctic biodiversity. A planet-wide increase in temperature is being caused mainly by excessive burning of fossil fuels coal, oil and gas. Huge quantities of pollutants like carbon dioxide and methane trap heat in the atmosphere, disrupting the global climate balance. As a result, the world is warming.

Climate change scientists agree that the greatest warming will occur at the higher latitudes. Ice cover in the Arctic Ocean is in retreat and has already thinned by some 40 percent. This threatens biodiversity in special wild places like the Wrangel Island Nature Reserve in the following ways:

- Warming and drying can cause reduced plant diversity and reduction in the preferred forage plants for animals such as caribou and muskox.
- With rise in sea level, coastal nesting habitats for shorebirds such as sanderlings and red knots will be vulnerable to flooding.
- Diminishing snow and ice cover and shorter winters will dramatically affect polar bears which need deep snow banks for denning and extensive ice on which to hunt and breed.
- If early season snows turn to freezing rain, animals such as caribou and muskox will find it difficult to forage on ice-covered vegetation.

The Intergovernmental Panel on Climate Change cites "new and stronger evidence (from more than 400 scientists in some 100 countries) that most of the observed warming of the last 50 years is attributable to human activities." Both the U.S. and Russian governments should, therefore, join in a spirit of cooperation to provide the leadership that will be necessary to negotiate a new international protocol on climate change. Such a protocol should provide incentives to participating nations to reduce their reliance on fossil fuels, thus reducing greenhouse gas emissions, and promote renewable energy sources such as solar, tidal and wind power.

Oil Development

On June 23, 1994 the U.S. and Russia signed a Memorandum of Understanding by which they agreed to a simultaneous joint oil and gas lease sale in the Chukchi Sea. Boundaries of the proposed sale intruded on the Wrangel Island Nature Reserve (see leasing area map).

The U.S. Department of the Interior's Minerals Management Service (MMS) then published a joint U.S./Russian "Request for Interest and Comments" on September 6, 1994. While the U.S. petroleum industry and Department of Energy supported the proposal, Alaska Native and environmental groups in both the U.S. and Russia expressed their strong opposition because of threats posed to the marine environment, its wildlife and subsistence activities.

"Such industrial intrusions into the remote and inhospitable Chukchi Sea pose very serious threats to polar bears and other wildlife of the high Arctic from disturbance and oil spills," said Dr. Nikita Ovsyanikov, Chief Research Scientist for the Wrangel Island Nature Reserve. "For example, some 80 percent of female polar bears in the region come ashore to den on Russia's Wrangel and Herald islands each year. The mother bears are extremely sensitive and cautious at this time and will often abandon their dens and cubs when disturbed. Together with increased

Clearly, altering our Earth's atmosphere through excessive fossil fuel use is a massive experiment with uncertain outcomes. The risks associated with such systemic global change are high."

- Marine Conservation Biology Institute and World Wildlife Fund

poaching for their hides and gall bladders, additional mortality could send polar bear populations plummeting," Dr. Ovsyanikov concluded.

Although the MMS recommended on February 9, 1995 that planning for the simultaneous sale be stopped and deferred for future consideration, it is a safe assumption that the oil industry will show renewed interest in a future lease sale in the Chukchi Sea should the economic rewards look attractive.

The U.S. and Russian governments should prohibit all oil and gas development in the Chukchi Sea because of the serious risks it poses to the marine environment and coastal ecosystems, vulnerable wildlife and local subsistence economies. Instead, the two governments should promote energy efficiency, conservation and development of renewable sources of energy such as solar, wind and tidal power as preferred alternatives to continued wasteful consumption of oil.

Contaminants

Increasing concerns are being raised by scientists, health officials and indigenous peoples about alarming levels of industrial pollutants contaminating arctic food chains. These contaminants are being carried long distances into the Arctic by wind and ocean currents from industrialized areas of Europe and North America.

Information made public in 1992 revealed the deliberate dumping of nuclear materials by Russia in shallow waters of the Arctic Ocean off the Siberian coast. Although serious levels of radionuclides have not yet been reported on or around the Wrangel Island Nature Reserve, there is concern that eastward flowing ocean currents along the Siberian coast could some day bring these deadly contaminants to Wrangel's shores.

Persistent organic pollutants (POPs) are toxic substances that include industrial chemicals like PCBs and pesticides like DDT. Such poisons are found almost everywhere – soil, air and water – and

are highly toxic, having the potential to injure wildlife at very low concentrations. These pollutants are persistent in the environment, and tend to bioaccumulate, thereby causing significant injury to certain human and wildlife populations. The effects of POPs on wildlife

1994 Proposed US/Russia Oil & Gas Leasing Area in Chukchi Sea



and Native people in polar regions are particularly well-documented.

Responding to the growing concern and calls for action on POPs, the United Nations Environment Programme's (UNEP) Governing Council issued a mandate for creation of an intergovernmental negotiating committee (INC) to prepare a legally binding global treaty on POPs. The fifth and final negotiating session was held in Johannesburg, South Africa on December 4-9, 2000. Negotiators finalized a treaty that will, for the first time in history, eliminate or

"The havoc global warming could wreak on ocean life may be much greater than we previously imagined"

- World Wildlife Fund

severely restrict the use and production of this dangerous group of chemicals. A diplomatic signing conference held in Stockholm, Sweden from May 21-23, 2001, resulted in the "Stockholm POPs Convention."

Meanwhile, particulate matter in atmospheric pollution referred to as "arctic haze" now equals the mean level of Los Angeles city smog. Even more threatening is the continued thinning of the Arctic ozone layer caused by ozone-depleting chemical pollutants. This could damage food chains if ultraviolet radia-

tion reaches lethal levels. Fortunately, the Montreal Protocol was adopted on September 16, 1987 as an international treaty to eliminate the production of ozone-depleting chemicals. There are now 172 countries that are parties to the protocol, 130 of which are developing countries.

Signatory nations to the global treaty on POPs and the Montreal Protocol must now insure strict compliance with the provisions of these important international agreements.

Northern Shipping Route

Russia, Japan and other nations have long planned a "northern shipping route" through the Bering Strait and across the Chukchi Sea as a shorter route between industrial ports in Europe and Asia. If ever established, such a venture could pose serious threats to the reserve and its wildlife from year-round disturbance, shipwrecks, dumping of garbage, oil spills, infestation by rats, and possible alteration of marine mammal migrations.

The Russian government should insist that reserve scientists are included on route planning and assessment teams to insure that icebreakers and their ship convoys are kept as far away as possible from reserve waters and sensitive wildlife habitat concentrations such as polynas and lead systems in the Chukchi Sea.

Tourism

Adventure tourism is the fastest growing business in the Arctic with viewing and photographing wildlife among the most popular activities. Thus, even such remote places as the Wrangel Island Nature Reserve have become a destination for some tour companies. The reserve began encouraging strictly guided ecotours to Wrangel Island in 2000. Management priorities for these exclusive tours are focused on nature education while avoiding harm to the reserves plants and animals. Such visitation provides reserve personnel opportunity to institute meaningful educational experiences while earning much needed revenue to support reserve programs.

Tourism also presents challenges, however; to preventing undue disturbance to the reserve's biodiversity, especially its most vulnerable wildlife and unique plant assemblages. Environmental conditions on Wrangel Island Nature Reserve are harsh, life is



Vasily Boromyuk

Snow goose researchers

tough and summertime, when most people want to visit, is brief. This short but critical season is the only time plants and animals can reproduce and prepare for the long winter. They have few energy reserves to waste on recovery from human disturbance.

Adequate levels of staffing and funding will be required if the full potential of ecotours are to be achieved. The following actions are encouraged to insure a high quality visitor experience while protecting the reserve's unique biodiversity values: require strict compliance with permit guidelines for public visitation and establish a reasonable fee structure to support reserve programs; provide tour companies and their clients with detailed guidelines on how best to enjoy the reserve without disturbing its wildlife; require that all visitors be accompanied by a duly compensated reserve guide; and insist that icebreaking tour ships and their onboard helicopters

be kept away from sensitive wildlife habitats, such as polar bear denning areas, walrus haulouts and seabird nesting colonies.

Economic Adversity

Tragically, Russia's ongoing economic difficulties are making the Wrangel Island Nature Reserve and its unique assemblage of wildlife extremely vulnerable to irreparable harm from pollution, oil leasing, shipping, tourism, poaching and just plain neglect. Living and working conditions for scientists and reserve staff are extremely difficult with degrading infrastructure in regional towns and airports. Program funds are insufficient for travel and acquisition of much needed office supplies and field equipment.



Arctic Poppies

Vasily Baranyuk

As a result, research, management and law enforcement programs are suffering.

In a courageous attempt to improve the situation, new reserve manager Leonid Bove developed and implemented a management plan in 1998-99. This resulted in improved refuge administration, logistics and coordination with Moscow. Reserve headquarters were moved, first to the village of Cape Schmidt, and then to Pevek on the Chukotka mainland. Village residents who did not have jobs on the island were assisted in moving to the mainland and in finding living quarters and jobs there. Meanwhile, the reserve's base camp in Ushakovskoe village was reconstructed to reduce maintenance costs, and remote field stations were repaired and upgraded with modest funds raised from filming and ecotourism (educational) projects. Native people who desired to remain on the island and work for the reserve were provided jobs as rangers and technicians. These changes have enabled rangers to maintain a year-round presence on the reserve to provide it better protection and help support seasonal research programs.

Especially Interesting Features of the Reserve Requiring Special Protection and Management

- Lower reaches of Tundra (Tundrovaya) River: Concentrations of molting snow geese and Sabine's gull nesting areas; the world's highest density of arctic fox breeding dens.
- Upper reaches of Unknown (Neizvestnaya) River: Most stable and highest nesting density snowy owl population known for the species; new snow goose nesting colony.
- Doubtful Spit (Kosatomneltaya): Traditional walrus haulout.
- Cape Waring area: Highest density of polar bear dens, large seabird colonies, nesting area of Baird's sandpiper, semipalmated plover and gyrfalcon, and deposits of rock crystal and calcite.
- Western coast: High concentration of polar bear dens, seabird colonies, and Baird's sandpiper nesting area.
- Dream Head Mountains: High concentration of polar bear dens.
- Upper reaches of Tundra (Tundrovaya) River: The only large annual snow goose colony.
- Mountain Kit area: Baird sandpiper nesting area, dancing grounds (leks) of buff-breasted sandpiper, concentrations of molting black brant, and large colony of Sabine's gull.
- Lower reaches of Unknown (Neizvestnaya), Polar Fox (Pestsovoy), Red Flag (Krasniy Flag), and Hydrologists (Gidrografov) Rivers: Concentrations of molting snow geese and main nesting areas of Sabine's gull.
- Goose (Gusinaya) River valley: Relic cryo-steppe (tundra-steppe) plant communities, tallest willow thickets, numerous small colonies of snow geese and black brant, and nesting area of Baird's sandpiper.
- Middle course of Mammoth (Mamontovaya) River: Numerous cryophyt-steppe and tundra-steppe plant communities, relic communities of arctic continental halophytes (plants growing on soils with high salinity), snow goose and black brant colonies, and nesting areas of buff-breasted and Baird's sandpipers.
- Upper Reaches of Unknown (Neizvestnaya) River: Micropopulations of relic plant endemics and other rare plant species and communities.
- Lower Reaches of Mammoth (Mamontovaya) River and Jack London Lake: The largest concentration of molting black brant, concentrations of shorebirds during fall migrations, and large colony of Sabine's gull.
- Doubtful (Somnelt'naya) Bay region: Cryo-steppe and tundra-steppe plant communities, rare and endemic plant species, buff-breasted sandpiper nesting area, walrus haulout, polar bear concentration in the fall, concentrations of migrating Ross' and ivory gulls.
- Cape Blossom region: Walrus haulouts and attendant gathering of polar bears; concentrations of migrating Ross' and ivory gulls, and gray and beluga whales.
- Herald Island: Large concentrations of denning polar bears and largest seabird colonies.
- Coastal and marine zones: essential habitat for marine mammals, seabirds, arctic fishes and invertebrates.

THE FUTURE

The Wrangel Island Nature Reserve is a stronghold of arctic biodiversity of great international significance. It's especially important in providing essential habitat to polar bears, Pacific walrus, snow geese, a host of other migratory birds and a rich assemblage of rare plants. Given its key geographic location and wealth of natural values, the reserve is an ideal location for the study and monitoring of arctic biodiversity, climate change and contaminants.

Designation of the reserve as a World Natural Heritage Site and International Biosphere Reserve by UNESCO, and its selection as an Internationally Important Bird Area by the National Audubon Society, will give this special wild place the recognition it deserves and help reserve staff raise desperately needed funds. Supplemental international funding will in turn greatly enhance the odds that conservation objectives will be achieved.

Recommendations

- Maintain the reserve as a "federally" protected natural area under the jurisdiction of the Russian national government.
- Construct and fully equip a state-of-the-art polar research station on Wrangel Island complete with offices, laboratories, housing, kitchen and maintenance facilities.

- Install wind generators as the primary power source and test under Wrangel Island's severe weather conditions for more widespread applications in the Arctic.
- Assure that all reserve personnel are provided salary and benefit packages commensurate with their job responsibilities.
- Establish a modern radio communication network between reserve headquarters and all field stations and camps.
- Provide reliable, safe and affordable air transportation between the mainland and the reserve, and employ both helicopter and fixed-wing aircraft by building an all-weather airstrip on Wrangel Island.
- Establish satellite ethno-ecological protected areas on the Chukotka mainland to involve Native people in all aspects of protected area conservation and management.
- Conduct periodic joint U.S. - Russia studies and surveys of Alaska-Chukotka polar bear and walrus populations to determine their status and trends.
- Maintain the reserve's reindeer and muskox populations within the carrying capacity of their ranges. Allow wolves to reinvade the reserve to help control these ungulate populations, and seek funding for long-term monitoring of the island's



Nikita Ovsyannikov

Herald Island sunset

- wolf-ungulate-vegetation complex.
- Establish a state-of-the-art contaminants monitoring program for reserve lands and marine waters.
- Clean-up Ushakovskoe village's open dump, the former military base and abandoned village in Doubtful Bay.
- Establish a fully automated meteorological station on Wrangel Island to be linked to national and international weather service centers.

Establishment of a nonprofit *Polar Bear Conservation Fund* is recommended to aid in implementation of the U.S.-Russia bilateral "Agreement on the Conservation and Management of the

Alaska-Chukotka Polar Bear Population" and to secure better protection and management of the Wrangel Island Nature Reserve. As envisioned, the fund would be overseen by an equal number of Russian and American trustees. Principle duties of the trustees would be to fundraise internationally and recommend supplemental financial support for the most deserving polar bear research, habitat protection, public education and law enforcement initiatives. Special emphasis in this work would be given to addressing needs of the nature reserve while insuring a high level of accountability for expended funds.

Polar Bear and Walrus Conservation

Although polar bears inhabit some of the most remote parts of the planet far from human settlements and industrial activity, the earth's growing population is threatening their future. Pollution and poaching are particularly serious concerns. Scientists report that polar bears suffer from elevated levels of POPs which jeopardize their ability to reproduce normally. Oil spills associated with petroleum development and shipping pose additional threats. And global warming will affect the bears' temperature dependent breeding, hunting and migration patterns particularly as the arctic ice pack continues to diminish.

Polar bear expert Dr. Nikita Ovsyanikov reports that "the advent of a market economy in Russia has greatly increased illegal demand for polar bear skins and gall bladders, and international opportunities for black market trading has stimulated an interest in poaching."

Although the Soviet Union made sport hunting of polar bears illegal in 1956, and federal law still prohibits the killing of polar bears in Russia, except for subsistence by indigenous people, the nations economic troubles are making it difficult, if not impossible, to enforce the law.

The U.S. and Russian governments are obligated to fully implement and fund the bilateral "Agreement on the

Conservation and Management of the Alaska-Chukotka Polar Bear Population." The need to prevent poaching is an obligatory condition of the agreement. Protection of key habitats, establishment of hunting quotas, implementation of effective law enforcement measures to prevent illegal shooting of bears, and ongoing cooperative research and monitoring should be made high priority concerns.

Like polar bears, Pacific walrus constitute a shared international resource which requires coordinated management. Unregulated hunting, increasing human activity, oil spills, bottom dragging by commercial fishing fleets, and global warming all constitute significant threats to the future of walrus. As tourism spreads throughout the Arctic, walrus haulouts have become prime targets for wildlife viewing. Extraordinary efforts will have to be undertaken by managers to insure that such viewing does not result in a level of disturbance that drives the walrus away. A bilateral "Agreement for Conservation and Management of Pacific Walrus" similar to that for polar bears should be negotiated between the two countries.



**Polar Bear expert
Nikita Ovsyanikov**

Irina Menyushina

CHRONOLOGY OF EVENTS

Wrangel Island part of Bering Land Bridge; Island separated from the continent by rise in ocean levels.



Irina Menyushina

Snowy owl

Paleo Eskimo marine mammal hunters lived on Wrangel Island's southern coast.

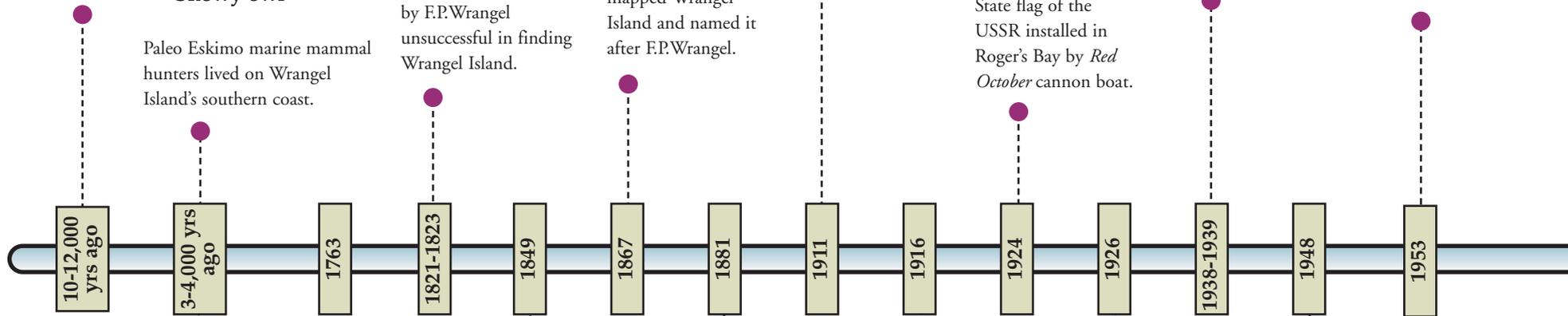
Three expeditions led by F.P. Wrangel unsuccessful in finding Wrangel Island.

American whaler Thomas Long approached and mapped Wrangel Island and named it after F.P. Wrangel.

First Russian expedition to reach Wrangel Island on ship *Vaigach*. Russian flag raised.

Interdisciplinary expedition of the Russian Academy of Sciences visited Wrangel Island to begin in depth studies.

Chukotka Deputy Council passed resolution for protection of walrus haulouts on Wrangel Island.



The island's subspecies of dwarf woolly mammoth became extinct.

Russian academician M.V. Lomonosov drew map of polar areas that showed Doubtful Island where Wrangel Island was later discovered.

British captain Kellet's crew landed on Herald Island in search of the lost John Franklin expedition and named it after his ship the *HMS Herald*.

First landing on the island by crew of *Thomas Korvin* ship; expedition of Lieutenant Berry.

Note of Russian Tzarist government declared that Wrangel Island belonged to Russian Empire.

Resolution of the Central Executive Committee of the USSR declared Russian sovereignty over Wrangel Island. Polar meteorological station and hunting village established on the island.

Reindeer herding enterprise established on Wrangel Island.



Vasily Baranuyk

Long-tailed jaeger

Vasily Baranuyk

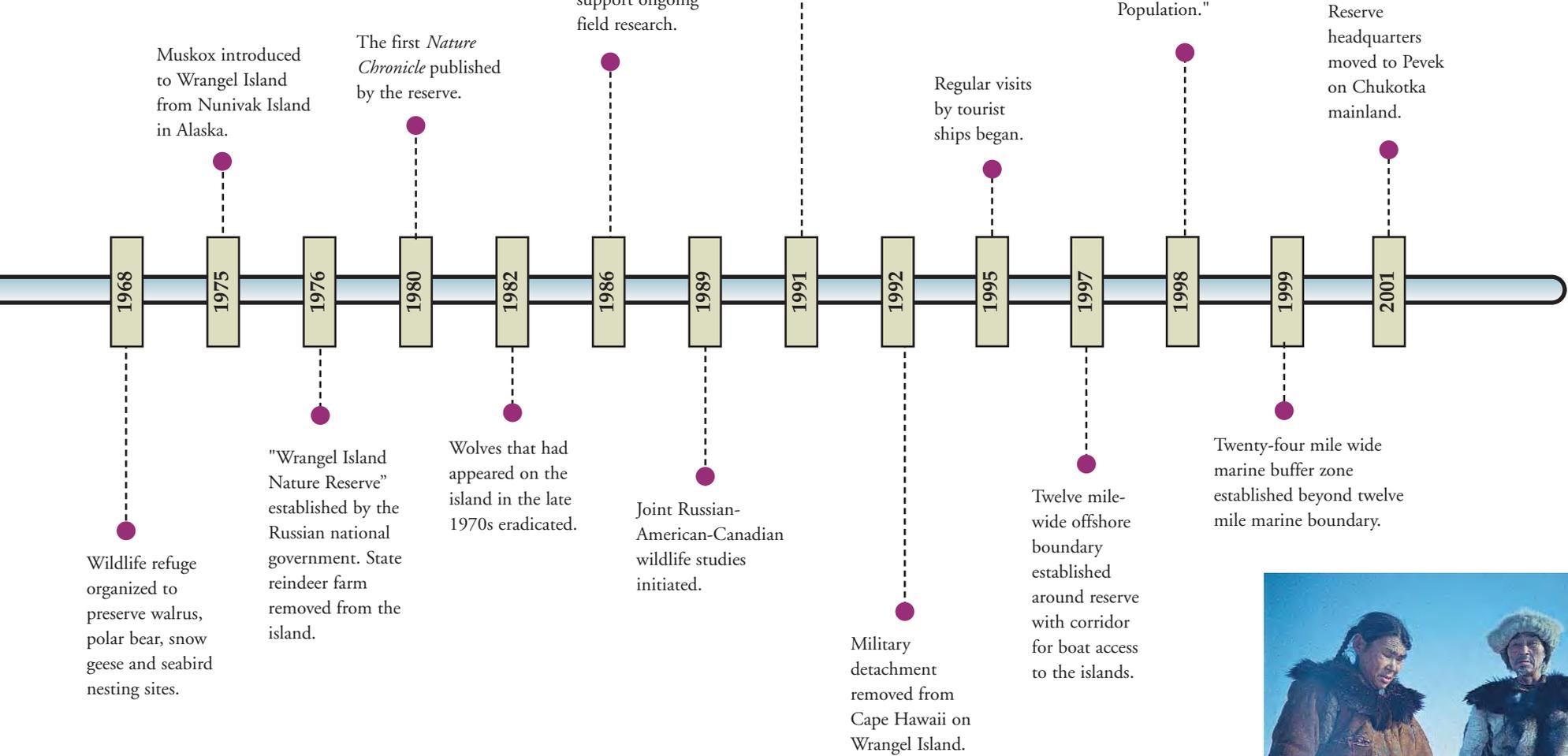
Arctic Rosebay





Vasily Boranyuk

Ivory gull



Wrangel Island Natives
Vasily Pridatko

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Wrangel landscape

Vasily Baranyuk





For additional information on how you
can help protect the Wrangel Island
Nature Reserve during this difficult
period in its history contact:

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