Colonial Seabirds as Architects of Small Island Vegetation

Russia-U.S. Botanical Research in the Alaska Region

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The Alaska Region's magnificent array of flora and fauna left visiting botanist Dr. Elena Glazkova sleepless for a week after her return from Alaska this summer. Elena is a researcher from the Komarov Botanical Institute in St. Petersburg, Russia, who specializes in colonial seabird nesting habits and the impacts these birds have on the vegetation of small marine islands in the Baltic Sea. She is also a participant in the U.S.-Russian Botanical Exchange Program, which was born out of a general scientific agreement between the two countries signed in 1972 and revised in 1994. The purpose of this scientific exchange program is to increase U.S.–Russia field studies and communication between scientists concerning expeditions, exchange of herbarium specimens, and collaborative botanical research. The Tongass and Chugach National Forests hosted Elena through contributions from the U.S. Forest Service International Programs, the U.S. Fish and Wildlife Service Division of International Conservation, and the Ecological Society of America's Foreign Scientist Travel Program.

Glaucous Winged Gull nest on St. Lazaria Island constructed from grasses and other plants and surrounded by nitrogen-tolerant lichens on rocks.

Dr. Elena Glazkova collects plants associated with the next form the Glaucous Winged Gull colony on St. Lazaria Island near Sitka.

Caspian Tern nest with egg.

Many ecological factors affect small island flora with large seabird colonies in different regions of the world; from the geographical position and size of the islands, the diversity of their climate and landscapes, to the population number and the species composition of nesting birds. Elena is a leading authority in recognizing the spatial patterns and impacts of ornithocoprophilous (or guano-loving) plants on small islands where colonial seabirds nest. Some areas in the nesting sites are higher in nitrogen and phosphorus than others, and only certain plants can withstand these high levels.

Small island fauna and flora can also be disproportionately impacted compared to mainland biota due to invasive species introduction. Invasive plant movement to pristine areas of Alaska has accelerated over the years due to human introduction coupled with changing climatic conditions that favor the dispersal of many species. Limiting in Alaska is the documentation and monitoring of invasive plant passive migration

to pristine areas due to the consumption and excretion of plant propagules by birds and mammals frequently using an area. In Russia and Finland, invasive plant species have migrated to small islands, most likely due to influence from the nesting colonial seabirds. In some instances, colonial seabirds such as cormorants (*Phalacrocorax carbo sinensis*) are increasing in numbers in the Baltic and it is unclear yet as to why.

False Lily of the Valley (Maianthemum dilatutum) on St. Lazaria Island exhibiting giantism due to high nutrients near storm-petrel burrows.

To our knowledge, no one has looked at the relationship nesting seabirds have with the vegetation on small islands in Alaska. Using three pilot test sites, our efforts to bring Elena and her research ideas to Alaska were to: 1) determine if small island vegetation in Alaska is influenced and impacted by the nesting habits of colonial seabirds; 2) document the native and non-native plant species found to be ornithocoprophilous; 3) document what plants are being used by colonial seabirds for their nest construction; 4) select monitoring sites in the Region for future collaboration with the Russian-Finnish monitoring program; and 5) begin to document native and non-native vegetation patterns on small islands due to the influence of the seabirds.

The small islands visited that have active colonial seabird nesting areas were Egg Island and Koken-henik Bar on the Copper River Delta near Cordova and St. Lazaria Maritime Wildlife Refuge near Sitka. Plant surveys were conducted and samples collected. Preliminary results indicate that the vegetation around the nesting sites of Glaucous-winged Gulls (*Larus glaucescens*) on Egg and St Lazaria Islands contained plant communities influenced by the presence of the seabirds. Plant diversity was lower within the nesting sites than other parts of the islands and some species showed signs of gigantism (the appearance of abnormally large leaf surfaces and longer stems), indicating that high nutrient levels are affecting their establishment and growth.

Wildlife biologist Erin Cooper hikes toward the Caspian Tern nesting site on Kokinhenik bar.

One difference on the Alaskan islands compared to similar sites in Russia is that no invasive plants were found in the nesting areas surveyed. The nest bowls appeared to be constructed of plants collected on the islands by nesting birds, primarily grasses, mosses, and other plants with delicate leaf structures. One interesting exception to these results is from Kokenhenik Bar which hosts both nesting Glaucous-winged Gulls and Caspian Terns (*Sterna caspia*). Glaucous-winged Gulls have most likely always nested on the barrier islands of the delta (hence the name Egg Island) but their population appears to be increasing, possibly due to the increasing supplemental food source from the Cordova canneries. The nesting area for the Caspian Tern was only recently discovered and studies of this colony are in the preliminary stages. The nesting area vegetation on Kokenhenik Bar was first documented as part of this project, and to date only two plant species are known to occur on this island. This island is an excellent candidate for long term monitoring of vegetation introduction and succession due to the influence of the nesting birds. The Tongass and Chugach National Forests will continue this relationship with the Komarov Botanical Institute to publish results from this preliminary work and plan for future comparative botanical studies.