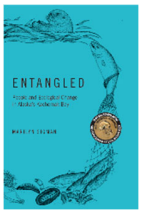
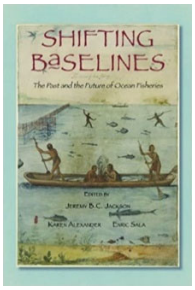
Shifting Baselines



Kachemak Bay is an edgy place. It straddles the edges of lands scarred by glaciers. The cooled ash of volcanoes is interwoven with the leavings of streams that meandered the landscape for millions of years. Glaciers and streams wrote their chapters into this land. The volcanoes provided punctuation, and an entire book lies beneath the rubble, written huge by the patterned, heaving rhythm of the world's tectonic heart. Beyond a southern horizon of peaks, the Pacific Plate nudges the North American Plate in the many-fathomed Aleutian Trench. The plates lock up and then bolt into earthquakes. The Pacific Plate dives down and bubbles back up as fiery lava.

The water shape-shifts, from bay to fog and cloud and back to the bay again as rain or snow. Currents and tides arrive from the south and depart to the north in a great counterclockwise gyre spun up by the moon and the revolving planet. The tides, with a range that is among the most extreme on Earth, are two enormous in-and-out breaths every day. The land recedes in trickles and sudden slips.



The phenomenon of "shifting baselines" underlies this exhibit. It emerged as a concept in fisheries management in the 1990s to describe how human perceptions about the "health" of a fish population change over time. People who remember accurately that the halibut they caught were bigger in "the good old days" are often unaware that the fish were even bigger and more abundant before humans entered the picture with our increasingly efficient fishing technology. But the environment has been and always will be dynamic even as we are experiencing the intensity and scale of ecological change that are the consequence of living in the Anthropocene—the era in which our species is the dominant factor influencing geological and ecological interactions on a global scale.

Baselines exist at various scales—from personal memories that anchor us to events and periods in our life that were particularly ecstatic or traumatic to the natural and historical events and new ideas that manifest as sweeping changes in cultures and societies. This exhibit examines some of the consequences of shifts in what is now the modern field of natural history as a discipline within the natural sciences. These shifts represent changes in thinking about human relationships and responsibilities to the other species enmeshed in ecosystems in which we humans co-exist and depend on.

The modern museum in the western tradition had its beginnings in the 18th century. Its purpose as a repository for natural history objects that could be used both for scientific study and as educational resources for the public is similarly recent. The collection and transmission of natural history information, on the other hand, is an ancient tradition. Knowledge about local environments and the ways of the plants and animals that people depended on for food, clothing, and shelter has always been critical to the sustained survival of cultures and societies.

Ecological knowledge about the interrelationships of the species that interact within an ever-changing physical environment is also essential, particularly during times of rapid global climate change. Global trade in natural resources, which reached Alaska with the advent of the first naturalists on voyages with the primary goal of expanding empires, has caused major ecological shifts on scales from the local to the global. Natural history collections can provide baselines to measure and document the consequences of shifting ecologies.

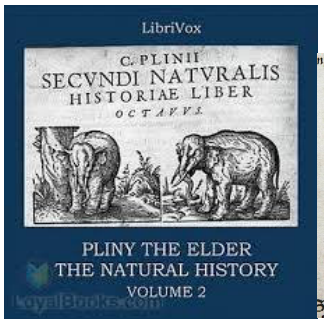
The Curious Process of Collecting from Nature

In Homer, the penchant for roaming the landscape and seascape is a preoccupation of visitors, those newly arrived and long-time residents alike. Many bring home souvenirs. Private collections are on display in homes, many of which in Homer are owner-built and perpetually under construction. As Marilyn Sigman wrote in *Entangled* about her first years after settling here:

> *I like to think of this as my Victorian naturalist period, in the sense of giving full rein as passionate amateur interested in all aspects of nature. . . I became a collector of the remains of living things and the facts of their natural histories. Unlike the Victorians, however, I had no curio cabinet or parlor to show off my finds. I didn't even have separate rooms for living and entertaining guests. Shells, rocks, and artifacts—selected for their striking patterns and my quest for the stories that shaped them—slowly settled as sediment on my window ledges and bookshelves.*

From Cabinets of Curiosities to Museums: The Lure of the Strange and Exotic

Pliny the Elder



Rabbit-Bird

The western tradition of documenting natural history has its roots in bestiaries, exhaustive anthologies of the natural world that first appeared in ancient Greece. In 77 AD Pliny the Elder's *Natural History* provided an encyclopedic catalog and description of what was known about the natural and sometimes supernatural world within the entire Roman Empire. His 37 volumes compiled his first-hand observations, the accounts of people who had traveled throughout the Empire, and popular stories. Like other early bestiaries, accounts of what were real-life animals, plants, and gemstones included bizarre details and co-existed with accounts of animals like dragons that existed as ancient legends or in Greek myths. Pliny duly reported the lifespan of the phoenix to be exactly 540 years (after which combusted and was reborn from its ashes) and accounts from fishermen finding the remains of nereids (mermaids) and tritons (mermen). But he also described bats as a winged creature that gave live birth and produced milk for its young and divided birds into those that were always around and those that were only around part of the year. Crows, which he described as a "bird of ill-omened garrulity" could only be found "from the rising of the constellation Arcturus until the arrival of the swallow."

In contrast, the western scientific process that emerged in the Middle Ages in Europe required evidence to support claims about the nature of reality. Fact could be separated from fiction by systematic observations of living plants and animals and their preserved remains after death.

The development of the scientific method coincided with the Age of Discovery and expansion of empires into the Americas that began in the 1500s as Spain, Portugal, and England began seeking new trade routes beyond Europe. Russia began expanding eastward from its base in Moscow across Siberia in search of furs. Desires for exotic specimens of plants and animals to populate "cabinets of curiosity," which often expanded to "wonder rooms" combined with the desire to claim new territory and sources of trade items on behalf of these expanding empires. By the time that the voyages of discovery reached Alaska, however, many private collections had been transferred to national museums.

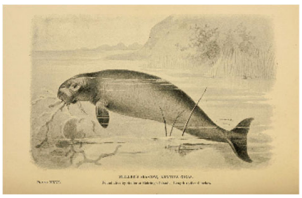
Voyages of Discovery: The Lure of New World Species

When the naturalist Georg Steller was allowed his brief time onshore on Kayak Island, the Indigenous peoples he encountered possessed a detailed natural history knowledge that was both local and regional, passed down through an oral tradition across generations that embedded the knowledge in language and stories.

In contrast, European naturalists on the voyages of discovery were motivated by the opportunity to be the first to document species unknown to science in a "New World." They were generalists, eager to collect all types of plants and animals, using methods of preservation that are still in use today. Bering's voyage occurred after the Linnaean system for classifying and naming different types of plants and animals had been adopted by European naturalists. This involved a separation into different types, or species, through comparison of physical characteristics. Naturalists thus collected tangible evidence to bolster claims based on preserved specimens, illustrations, and written descriptions that a new species should be added to the scientific roster.

When Steller brought back a specimen of a brightly-colored jay to the ship, he was able to recognize they had reached the Americas because he could compare the bird's crest to one in an illustration of another jay species collected on the eastern shore of the North American continent. Every new species was placed within an ordered hierarchy through comparison of its physical characteristics with similar species to place it within one of two kingdoms (plants or animals) and within one of the multiple orders, families, and genera within that kingdom. All new species were given a two-part Latin name that combined a genus usually (but not always) shared with its closest relatives and a unique species name and a common name. To honor Steller, the bird was later named the Steller's Jay, *Cyanocitta stelleri*.

Steller's sea cow became defenseless prey for Russian sailors who dispatched the last one 27 years after Steller first described it. The sea otter furs the Steller and the crew brought back to Siberia had a seismic ecological effect on the entire North Pacific Ocean ecosystem through the near-extinction of this keystone species by 1900.



Steller's illustration of the sea cow

What's in a Name?

In addition to animals named after Georg Steller (Steller's Jay, Steller's Eider, Steller Sea Lion, Steller Sea Cow), other plant and animal names reflect the name of the person who first described it scientifically or the desire to honor a scientist or another prominent person. Withdrawing the honor for some people is now being considered based on current standards of honorable behavior.

The Townsend's warbler (*Setophaga townsendi*), a common bird in Kachemak Bay in all seasons but winter, was named after naturalist and ornithologist John Kirk Townsend. He visited Kachemak Bay in 1892 as a federal biologist and collected one of the first museum specimens of a song sparrow, later determined to be a new sub-species. As was a prevailing practice at the time in anthropology, Towsend also collected human skulls from Native American gravesites. This practice is now considered both colonial and racist and some birders and ornithologists are advocating for re-naming this species.

The American Ornithological Society (AOS) has received petitions to change the name of the McCown's Longspur. Ornithologist John Porter McCown was involved in the forcible relocations of Native Americans during the 1840s and then dropped out of the U.S. Army to serve as a Confederate general.

Attention to honorific names for species is increasing in the wake of the controversy over statues and names of institutions that honor leaders of the Confederacy. In Alaska, protests have focused on statues of people who are symbolic of colonial and racist policies. As the number of Indigenous language speakers increases, traditional names for plants and animals that were replaced by scientists are being revived.

The Victorian Golden Age of Collecting: The Lure of Alaska Megafauna

Natural history flourished in the U.S., in the 18th and 19th centuries. U.S. Presidents Washington, Jefferson, and Theodore Roosevelt were avid and avowed naturalists. Basic knowledge of local plants and animals was considered part of a good education -- and of being a good citizen. Interest in natural history museums peaked during America's Victorian Age (1870-1930). The same period was also a heyday for taxidermy and the inclusion of whole-body mounts into museum dioramas.

Workshop of the Smithsonian's Chief Taxidermist William Templeton Hornaday

AMNH moose diorama with Kenai Peninsula habitat

The publication of Darwin's theory of evolution in the late 1850s spurred widespread collections of specimens for natural history museums in Europe and the U.S. At the same time, the theory revolutionized the study, organization, and classification of natural history specimens. Before Darwin's theory of evolution became the accepted explanation of how species developed, museums collected "type specimens" of as many species as possible as references for all subsequent comparisons. The theory of evolution revolutionized the concept of a species as something unchanging into something that evolved in response to the selective pressures of changing environments.

The Andrew J. Stone Expeditions to the Kenai Peninsula

Andrew J. Stone

After Alaska was purchased by the U.S. from Russian in 1867, America's recently-founded national museums—the Smithsonian and American Museum of Natural History (AMNH)— mounted expeditions to Alaska to fill out their natural collections and populate their displays. The AMNH expeditions led by Andrew J. Stone spent the most time in Kachemak Bay, based out of Homer in 1901 and Seldovia in 1903, with forays into the Kenai Mountains to search of caribou, moose, and Kenai white sheep (then considered a sub-species of Dall sheep).

The AMNH expeditions followed the 1899 Harriman Expedition of collecting for the Smithsonian Museum of Natural History. With John Burroughs and John Muir and more than 20 distinguished naturalists and scientists onboard, the collections made by the Harriman Expedition collections has never been equaled. They brought more than 5,000 specimens of insects alone.

Why Collect So Many Specimens?

The large number of specimens collected at the turn of the century was, in part, the result of competition by museums to each have "one of everything" and the development of group dioramas for large mammals. But as the recognition of the evolutionary significance of variation of individuals over a geographic area increased, more specimens were needed to document that variation.

Multiple specimens were also needed to determine sub-species that might have evolved as a consequence of the geographic isolation of a population from other populations of its species. The scientific term for being unique to a defined geographic location is endemism. The Kenai Peninsula in particular is considered likely to harbor endemic species and sub-species because of its geographic isolation from the rest of mainland Alaska during glacial advances and by the narrow isthmus that now connects it.

Museum specimens now play a critical role in determining whether genetic analysis can determine the amount of genetic variation across populations and whether it is sufficient to declare a separate sub-species. The Kenai song sparrow, Kenai red fox, Kenai ground squirrel, and Kenai marten are still recognized as endemic sub-species, as is Kenai birch as an endemic species.

Shifting Toward Conservation and Curation of the Local

The collection of large numbers of specimens on national museum expeditions in the early 20th century occurred after the near-extinction of sea otters and at the same time that commercial whaling was decimating whale populations. The commercial fishing industry was expanding into Alaska waters with large-scale, unregulated harvests of salmon, halibut, and other marine fish. Moose were subject to market hunting to supply meat to miners and settlers at 10 cents/pound and to supply legendary trophies to big game hunters. In 1901, federal biologist Wilfred H. Osgood made bird observations in Kachemak Bay and commented on the systematic killing of gulls for the millinery trade in plumes for women's hats and collectors.

When the Homer Society of Natural History was organized in the mid-1950s, several species and sub-species on the Kenai Peninsula were extirpated (locally extinct) or extinct. Sea otters had last been seen in Kachemak Bay in 1901. Few Stone's woodland caribou (named after Andrew J. Stone) were reported after 1912, likely a result of the combined effects of hunting and habitat loss after extensive human-caused fires. These same fires, however, created habitat for moose, who rebounded from heavy hunting. The Kenai sub-species of wolf, the largest wolf that ever existed, was exterminated, however, as its predator. In the absence of wolves, coyotes became established in 1926.

American naturalists and scientists, including those of the Harriman Expedition, and hunter/naturalists were sometimes overzealous collectors but they also observed the heavy exploitation of Alaska's fish and game populations and began to raise alarms. The 20th-century shift toward conservation led to a system of science-based regulation to ensure sustainable harvests of fish and wildlife and protection of habitat through designations of the Kenai Moose Range (later Refuge), the Alaska Maritime National Wildlife Refuge, and the Kachemak Bay Critical Habitat Area.

Pratt Curator Betsy Webb

After the Pratt Museum opened to the public in its present location, museum professionals and volunteers expanded the Pratt Museum's natural history collections to be comprehensive at the local scale. Museum collections now play a role in conservation as they provide baselines of species distribution, size, and genetic variation. The data from each specimen is a snapshot of a species or community at a particular point in time and space with the potential to provide a wealth of unexpected information as well as opportunities. The specimens also provide opportunities for hands-on education.

Shifts in the biodiversity and abundance of species on the Kenai Peninsula and coastal habitats continue. Small numbers of barren-ground caribou were transplanted from the Nelchina Herd in the 1960s and again in the 1980s. A remnant population of sea otters expanded into Kachemak Bay in the 1960s and the Alaska wolf expanded southward across the isthmus by 1965. The marine environment of the North Pacific Ocean has gone through several major shifts, including a regime change that re-organized the food web in the 1990s and a marine "heat wave" from 2014-2016 that resulted in a large-scale die-off of murres and much-reduced cod populations. The warmer climate of the last several decades has also increased the number and extent of non-native species. By 2016, the Kenai Peninsula was host to 138 exotic plant types and 30 non-native animal species.

Chinese Ring-Necked Pheasant

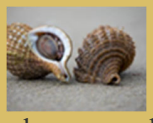
Clues from About Past Environments in Kachemak Bay from Ancient Garbage Piles

The excavation of archaeological sites in Kachemak Bay has provided a layer-cake view of the peoples who lived in Kachemak Bay during different periods after the last Ice Age ended 10,000 years ago. During the 1980s, several zooarchaeologists began analyzing the remains of animals that had been discarded and preserved in large heaps called middens that accumulated in year-round settlements and camps over thousands of years. When people ate an abundance of snails, mussels, or clams and threw their shells into the midden, the calcium carbonate in the shells slowed the decay process for other shells and animal bones.

1800+ Archaeologists can distinguish the most recent layer in middens as the time after contact between Indigenous peoples and Europeans. Trade goods began to show up in middens, including broken pieces of china that were part of the maritime trade of sea otter and other furs to Chinese merchants, in permanent settlements established around trading posts, canneries, schools, and churches.

1000 BP – 1800 AD: The story told about the traditional Dena'ina lifeway is one of the absence of animal remains and other artifacts in middens. This puzzled archaeologists at first. But the story is not one of silence. Anthropologists were able to interview individual Dena'ina descendants with knowledge about traditional Dena'ina culture in the 1930s and the Dena'ina language and traditional stories remained in the memories of a small group of Dena'ina language speakers. Linguists, including the late Alan Boraas, assisted Peter Kalifornsky and other Dena'ina Elders in reviving the language and documenting the traditional stories. The reason for the absence of any type of artifact in this layer of middens emerged as the consequence of the traditional Dena'ina spiritual belief system that required that all things that humans contacted during their life be returned to nature. So the remains of land animals were returned to the land and the remains of water animals to the water. These rituals, the Dena'ina believed, removed *beggesha*, the taint or scent of the human, and returned nature to its state of purity, *beggesh*.

3000 – 1500 BP The Evolution and End of the Kachemak Tradition:
The Kachemak Tradition was a culture named after the place where it was first described by the anthropologist Frederica De Laguna and as a "tradition" after anthropologists found similar "toolkits" in middens across a large geographic area from the Pacific coast of the Alaska Peninsula, the Kodiak Archipelago and the Kenai Peninsula. In early Kachemak times, the midden analysis concluded that people made use of a diversity of marine animals. They hunted marine mammals (harbor seals and harbor porpoise), caught fish (flounder, cod, and halibut), collected shellfish collected from beaches at low tide, and also hunted waterbirds, in terms of the order of importance. But during the period from around 250 – 600 AD, major shifts occurred in what the zooarchaeologists found in middens on Chugachik and Yukon Islands, during a period when global cooling and glacial advances were occurring on the Kenai Peninsula.

On Yukon Island, beach foods narrowed to a few species of whelks (marine snails) and butter clams. Fishing intensified for halibut and cod as did hunting of harbor seals and harbor porpoises to levels that that were likely unsustainable locally.

The Kachemak Tradition ended in Kachemak Bay but persisted for another 500 years on Kodiak Island.

Related Pratt Museum "People and Place" Exhibits: Open a drawer to see the "Living in Place" exhibit that represents a 2,000-year-old midden in Kachemak Bay and the animals that were commonly harvested at that time. .

The Once and Future Climate of Kachemak Bay

The Kenai Peninsula has become a much warmer and drier place than it was 50 years ago. Summer growing seasons are longer; winters are, on average, milder.

A warmer terrestrial climate has resulted in a rising tree line and thus, shrinking alpine habitat for Dall sheep and marmots. Glaciers are melting and shrinking. Other ecological changes on the Kenai Peninsula by 2016 included the following:

- In the 1990s, spruce bark beetles that like warm summers killed 30 million spruce trees. What was forest is now grassland savanna.
- Forty-seven of 48 streams measured in July 2009 were warm enough (above 55 degrees Fahrenheit) to cause heat stress in salmon.
- Bird-watchers identified 27 new species on the Peninsula between 2007 and 2016. Many species began arriving earlier in spring and migrating out later in fall.
- Black spruce and shrubs had begun to creep into peat and sphagnum bogs that had sat unchanged for thousands of years.'

During the same period, the northern Gulf of Alaska marine ecosystem that includes Kachemak Bay has oscillated between periods of warmer-than-average and colder-than-average temperatures on the scale of decades. Shorter-term changes include the marine heat wave event that persisted over three years in 2014-2016.

But what can the evidence that has been collected tell us about how unusual are these conditions on a much longer time-scale? Which species will be resilient to these changes? Museum specimens in addition to those found in middens that can be dated to earlier times can provide important evidence of earlier climates, especially using modern methods that include carbon-dating and other sophisticated methods of isotope analysis.

A more holistic and global picture is emerging about how the climate affected human societies, both locally in Kachemak Bay and on larger geographic scales. as a context for how human societies are affected by changing climates and how people affect the climate. But questions remain**: How can past baselines inform our decisions to create and sustain the future environments that we desire and depend on to meet our survival needs? If current climate trends continue, is the restoration of past biodiversity and abundance even possible? If not, what adaptations will be needed?**

Woolly Mammoth Tooth

30-50,000 Years Ago: Ice or Ice-Free?

Collections of woolly mammoth teeth, the ankle bone of an astragalus (hooved animal), and cores of steppe bison horns on Homer beaches bolster scientists' perception of Homer and the southern Kenai Peninsula as a place not completed covered by ice but instead a haven for grazing mammals during the many glacial advances and retreats during the Pleistocene Era. Pleistocene animals roamed the earth and likely the more extensive grasslands in the area that is now the Caribou Hills during this period.

10 to 20 Million Years Ago Sequoia Forests

Plant fossils from eroding bluffs in Kachemak Bay and Cook Inlet provide evidence of earlier and warmer climates. Fossils of the characteristic needles of the Dawn Redwood (Metasequoia), a cousin to the Giant Sequoia in California, have been collected on beaches below Homer area rock formations that are 10 million years old and below Seldovia area formations that are 20 million years old. Climate modeling predicts a return to the conditions in which the redwoods thrived by 2100 if current global warming trends continue.

Dawn Redwood Fossil

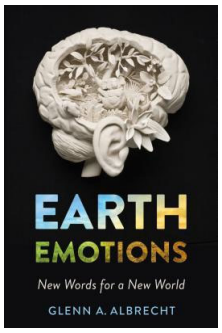
The Future of Natural History Collecting

During the last two centuries, the western tradition of museum collections and displays has valued the curious and the exotic from the viewpoint of a world system based on the acquisition and global trade of other species as natural resources and commodities. Museum collections grounded in the western scientific methods of classification of different species began as a process of ordering nature based on appearance. It proceeded to determinations of relatedness in the evolutionary sense, eventually at the biochemical level of genetic variation. Museums were subsequently called on to assist with attempts to manage and control nature to benefit a single species - humans. But attitudes also shifted toward conservation which now involves documentation and prediction of the changes in biodiversity that are the consequence of a rapidly-changing global climate.

The pace of change in the world overtook me. . . . I miss the Kenai wolf, that great carnivore that stood shoulder-high to a lion and roamed the Kenai Peninsula . . . and the giant Kenai moose, whose antler are all gone to walls and dusty attics. . . I miss the sea stars recently hit by a disease aptly named sea star wasting disease. . . . The strands of kelp draw tighter as we are all rolled in and out with the tides. It's hard to find the place I can plant myself and hold fast.

- Marilyn Sigman, *Entangled: People and ecological change in Alaska's Kachemak Bay*

What we choose to take home after a beach walk or hike through a forest or up to the alpine zone will evoke memories of our experiences immersed in the natural world even as our sense of place is confounded by rapid ecological change. Many people experience nostalgia—a homesickness for places that they have left and for times that will never come again. A new term – *solastalgia* – has been coined by Glenn Albrecht, an Australian professor in the field of sustainability, for the homesickness you feel as your home changes around you. Ecological grief is a consequence of changes that we compare to our earlier baselines and grieve as losses.



The curation of museum and home collections can provide a pathway toward hope through reflections and the re-living of memories of our meaningful encounters and experiences in nature. Thus, our sense of place and home can evolve, even as the places we love inevitably change.

What's in a Name? Revisited

The common and scientific names applied to new scientific "discoveries" by early naturalists and scientists visiting Alaska ignored the fact that the species most important to Indigenous they encountered already had names and stories in Indigenous languages and local dialects. These names and stories, and the natural history information they conveyed, had been passed down for generations through the oral tradition. Many of the stories explained relationships among different species and depicted proper human behaviors toward other species that were very different from those embraced by Europeans in the 19th and 20th century and imposed on peoples they colonized.

Both the Dena'ina and the Sugpiat/Alutiit have detailed and rich ethnobotanical knowledge that includes some of the traditional uses of plants as food and medicine brought from Siberia by Russian fur traders who settled in Alaska. A traditional Dena'ina story describes the spruce tree as the companion to the human species, enumerating the many ways in which parts of the tree can be used beneficially. *Naparpiaq*, an Alutiiq name for Sitka spruce translates as "real tree." *Elnguq*, the name for birch, translates as "flexible," a reference to its many potential uses.

A traditional Sugpiaq/Alutiiq legend describes the origin of the close and reciprocal relationships between humans and sea otters. A human trapped by the rising tide was transformed into a sea otter, creating all of the sea otters. Accordingly, humans had a special relationship with sea otters and the hunting of sea otters traditionally involved rituals and special treatment after death, including providing a drink of fresh water, even after hunters were forced to harvest sea otters for the Russians.

Names also reflect cultural biases in what is considered the most important information to convey about a particular plant or animal. When biologist John Morton compared the differences in the common names of birds in English and Dena'ina compiled by Priscilla Russell for 70 Kenai Peninsula area birds, he found that half of the bird names in English reflected easily-observable physical attributes (e.g., black-capped chickadee, spotted sandpiper), about a quarter reflected the names of individuals or other strong cultural biases (Lincoln's sparrow, American wigeon) and some were not descriptive enough to identify the bird to species unless you knew something about bird taxonomy. Only four species' names were partially based on behavior such as the "dipping" behavior of the American dipper for food in the water and fly-catching by the olive-sided flycatcher. Only three were based on sound, including the call of the mew gull.

In contrast, more than half of the Dena'ina bird names, when translated into English, were based on behavior or sound. "So the cliff swallow is one that daubs mud," Morton wrote, "the olive-sided flycatcher is one that says 'dry fish' [in Dena'ina], the ruffed grouse is the one that pounds . . . and the northern hawk owl is one that sits on branches whereas the boreal owl is one that stays under trees." Although red-necked phalaropes and red-necked grebes are not taxonomically related, the name in Dena'ina for the phalarope translates as "the younger brother" of the grebe. The brant's name translates as "raven's son."

Citing the story told by Peter Kalifornsky, one the last-speaking Kenaitze, about *tsik'ezdalgh* (Golden-crowned Sparrow) that heralded the first salmon run in the spring on the Kenai Peninsula, Morton concluded that "If you knew birds by their Dena'ina names, you might understand something of what it means to be truly native to the Kenai Peninsula."

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