

POSTERS

History, Ethnography, and Archaeology

Researching Traditional Activities in the Exit Glacier Area of Kenai Fjords National Park

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Herman Leirer Road, an eight mile stretch of paved highway, parallels the Resurrection River providing the only established land route into Kenai Fjords National Park. The Harding Icefield, Exit Glacier, and Resurrection River Valley provide park visitors with the opportunity to enjoy a multitude of recreational activities including skiing, snow machining, dog sledding, biking, hiking and camping. Prior to the road's construction in the 1960s and 70s, such convenient access was not always possible. Primary sources indicate the Resurrection River Valley and Exit Glacier area were used continuously throughout the 20th century by Seward residents, but this finding begs the question... "How and why was this remote area accessed?"

In an attempt to identify what pre-park activities occurred in the Exit Glacier area, the park has embarked on a project that serves a two-fold purpose: 1) to preserve local and park history through oral interviews, and 2) to identify what constitutes traditional activities in and around Seward. Recent oral histories reveal the Harding Icefield and Exit Glacier area have hosted a rich variety of use related to hunting, gathering and recreation. Ongoing research will provide interpretive insight into these 20th century activities and describe uses that may be defined as traditional. We present a selection of stories and images illustrating these early activities in the Harding Icefield and Exit Glacier area.

Emerging Management Issues

Mapping Wilderness Eligibility for the NPS Alaska Region

Susan Rego, National Park Service, Alaska Regional GIS Information Resources Team

Wilderness stewardship in the NPS Alaska Region was profoundly influenced in December 1980 by the passage of the Alaska National Interest Conservation Act (ANILCA). ANILCA not only outlined Congressionally-designated wilderness acreage for the Alaska Region, it defined wilderness land management expectations and directed wilderness suitability reviews of all non-designated land within administrative boundaries. Wilderness suitability reviews conducted in the 1980s remain the authority for wilderness eligibility in the Alaska Region. The Wilderness Eligibility Mapping project initiated in March 2010 focuses on integrating this information into ESRI® ArcGIS to facilitate planning, permitting, and wilderness stewardship in the NPS Alaska Region.

Visitor Use Monitoring in the Southwest Alaska Network

Susan Rego, National Park Service, Alaska Regional GIS Information Resources Team

Visitor use information is integral to evaluating impacts human activities have on ecosystem change in the NPS Alaska Region. The majority of visitor use data for the Southwest Alaska Network is obtained

through a NPS commercial use authorization (CUA) reporting system that was established in 2005. Under this workflow a variety of CUA visitor data is annually collected and archived into the NPS CUA Activity Report database. Data collection and management tasks associated with this reporting system were reassessed in 2011 to identify areas for improvement that help ensure the NPS Alaska Region maintains solid defensible visitor use data for the future in a manner that is relevant to the parks and can be sensibly evaluated.

The Invasive Plant Situation on the Chugach National Forest

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Invasive plants pose a growing threat to ecosystem function, biological diversity, and sustainability. Compared to the contiguous United States and Hawaii, Alaska currently has fewer and less abundant invasive plant species. Existing surveys on the Chugach National Forest found that most areas of invasive plant occurrence on the Forest are presently in areas of intensive human-caused disturbance such as road edges, visitor facilities, trailheads, and trails. Invasive plants are presently rare within natural communities on the Forest. Specifically, within the boundary of the Forest, there are documented occurrences of 92 species of plants non-native to Alaska. In the Forest Inventory and Analysis (FIA) data set, 498 vascular plant taxa were observed from the 361 plots representing the spectrum of vegetation conditions. None of these taxa are non-native plants. Since about 99% of the Forest is roadless these systematic FIA points represent roadless conditions. Further, among 2293 plots chosen to represent natural vegetation communities on the Forest, 10 non-native plant species were observed with a total of 31 occurrences (i.e., less than 1.5% of the sample plots had non-natives). In contrast, non-native plants were present on 94% of 700 sites distributed along roads, trails, and other locations of human caused disturbance. By geographic area, non-native plant richness and abundance is highest on the Kenai Peninsula, lowest in Prince William Sound, and intermediate on the Copper River Delta. Additional summary findings are: a) the number and abundance of non-native plant species decline with distance from areas of human caused disturbance, b) non-native plants are generally absent in areas of dense shade and in the alpine tundra, and c) many non-native plant species are adapted to areas of sustained moderate natural disturbance (such as along glacial rivers).

Brown Bear-Human Interactions in Katmai National Preserve

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Moraine Creek and Funnel Creek in Katmai National Preserve attract seasonal concentrations of brown bears (*Ursus arctos*) that come to feed on spawning sockeye salmon (*Oncorhynchus nerka*). In recent years, the area has also become popular with anglers, bear-viewers, and hunters. Although the creeks are relatively remote, visitor use has increased in recent years. Since 2000, brown bear and human activity in the area has been monitored to detect any changes in brown bear use of the area associated with increased human use. Brown bear composition data has also been collected to determine what effect increased human activity, especially hunting, may be having on the brown bear population that relies on the preserves resources.

Identifying Indicators of Quality for the Backcountry Visitor Experience at Kenai Fjords National Park, Alaska

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Managing visitor use in coastal areas of Alaska National Parks is an increasing challenge. At Kenai Fjords National Park (KEFJ), suitable landing beaches and camping areas are topographically limited, thus concentrating visitor use in more accessible areas. This higher density of visitors in specific areas yields the potential for more rapid and severe impacts to resource and social values. A program of ongoing research is identifying indicators and standards of resource and social condition quality in backcountry areas in KEFJ. A survey incorporating a series of open and close-ended questions was developed to identify potential indicators of quality, and administered to backcountry visitors during the summer of 2010. Results suggest that opportunities for solitude, the scenic quality of the natural environment, wildlife-viewing opportunities, kayak/tourboat interactions, and natural soundscapes are important to the quality of the visitor experience. Currently, a second phase of research to be completed in summer 2011, is quantifying visitor standards for resource conditions on backcountry campsites and visitor experience thresholds at important coastal locations. This paper will present results from both phases of this research and discuss the implications of findings to park management and planning.

Freshwater Ecosystems

Evaluating Effects of Atmospheric and Geologic Disturbance on a Southwest Alaska Lake

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Lake systems have been identified as sentinels of environmental change because they integrate the impacts of terrestrial and atmospheric disturbances over time (Williamson et al 2009). Lake systems are well defined, provide measureable physical, chemical and biological indicators that can be monitored with a high degree of sensitivity, and extend over a wide geographic range enabling researchers to investigate the spatial and temporal effects of environmental change (e.g., changes in temperature, freeze-up/break-up and glacial extent). The Southwest Alaska Network (SWAN) aquatic systems are represented by two of the largest lakes in the National Park System, Naknek Lake (58,824 ha) in Katmai National Park and Preserve and Lake Clark (31,117 ha) in Lake Clark National Park and Preserve. The objectives of the SWAN freshwater monitoring program are to estimate inter-annual variability in water quality parameters throughout the water column and across lake basins and to determine trends in timing, duration, and magnitude of summer lake hydrology. Herein, we present examples of how Lake Clark has responded to environmental disturbance and how these signals are reflected in inter-annual variability. When integrated with emerging data from other vital sign monitoring, including landscape processes, glacial extent and climate/weather, we can begin to assess cause and effect relationships across the landscape and quantify spatial and temporal changes within these lake systems.

Wetlands Functional Assessment Project

Karyn Noyes, Homer Soil and Water Conservation District

The Homer Soil and Water Conservation District (HSWCD) is conducting wetland functional assessments on non-Federal lands of the Kenai Peninsula. This collaborative project, funded by the EPA's Wetland Program Development Grant, will give landowners and land managers information to make better land use decisions. The wetlands have already been mapped, and assessing their functions is the next logical step in wetland management for this rapidly developing area of Alaska.

Wetland functions include things that wetlands “do”, such as storing runoff from storms and snowmelt, contributing to stream flow, filtering waterborne sediment, and providing salmon habitat. The functional assessments concentrate on 4 major components; hydrology, habitat, species occurrence, and social uses. The wetlands are being assessed at a landscape scale, primarily using GIS. The cities of Anchorage and Homer have done wetland assessments at a more detailed scale using methodology based on the Ontario Wetland Evaluation System. These methodologies are providing the foundation of the Kenai Peninsula assessment; however innovative departures from those methodologies are necessary, as all wetlands won't be visited. Experts from a wide variety of agencies and organizations are assisting with the development of the assessments. This input will help ensure the needs of a wide variety of users are met to the extent possible.

The functional assessments are scheduled to be completed in spring 2012, and the information will be available to the public via the web.

Trophic Patterns of Mercury Concentration in a Nonanadromous Aquatic Ecosystem in Southwest Alaska

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Mercury (Hg) is a pervasive environmental contaminant and neurotoxin in its methylated form (MeHg). While naturally present as a trace element, Hg is a concerning ecotoxin due to increasing levels of anthropogenic Hg emissions, the ability of anthropogenic Hg to contaminate remote ecosystems globally via atmospheric deposition and ocean transfer, and the capability of Hg to biomagnify up trophic webs. The bioconcentration of Hg varies both inter- and intraspecifically, dependent on an organism's trophic position. At northern latitudes there are three primary sources of Hg in freshwater ecosystems; (1) geological sources contributing background levels of Hg, (2) atmospheric deposition of Hg, and (3) marine derived Hg transfer via ocean currents and migrating marine organisms. The goal of this project is to utilize stable isotopes of carbon and nitrogen to interpret trophic patterns of Hg concentration in a nonanadromous freshwater lake in southwest Alaska, Jo-Jo Lake, that lacks anadromous sockeye salmon (*Oncorhynchus nerka*) as the principal regional source of marine-derived Hg. This objective will be addressed through three specific aims: (1) by measuring Hg concentration in lake sediment cores from Jo-Jo Lake and comparing to nearby anadromous and nonanadromous lakes; (2) by determining how the bioconcentration of Hg varies intraspecifically between two trophically polymorphic populations of nonanadromous sockeye salmon (kokanee), in Jo-Jo Lake; and (3) by quantifying Hg concentrations interspecifically in predominant species of both benthic and limnetic trophic webs within Jo-Jo Lake, and comparing with Hg levels in nearby anadromous systems. These results will help elucidate how Hg concentration varies trophically in an aquatic ecosystem lacking marine Hg from anadromous salmon. This will provide further insight into how Hg biomagnifies in aquatic trophic webs in Alaska and how Hg accumulates in organisms at higher trophic levels, including freshwater fish that are consumed by humans as sport-fish and important subsistence foods.

Freshwater Baseline Inventory and Monitoring in Nushagak and Kvichak Headwater Streams

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Bristol Bay is home to one of the largest, most valuable salmon fisheries in the U.S. owing largely to its pristine nature. In Alaska, fish must be explicitly documented in a water body for fish conservation statutes and regulations to apply, though less than half of the state's streams have been surveyed. Consequently, presence/absence surveys were conducted in headwater streams of the Nushagak and Kvichak Rivers including the Kaktuli River, Talarik Rivers, Chulitna Creek, Sixmile Lake, and the Newhalen River. Non-salmon species important to subsistence and sportfishing stakeholders, including Dolly Varden and rainbow trout, were found in 93% of streams surveyed, and salmon were documented in 3 of every 4 streams surveyed excluding those in the Chulitna drainage. Freshwater macroinvertebrate, diatom, and physical habitat monitoring was conducted concurrently to produce baseline data for the region within and adjacent to mining claims in the region. This study underscores both the importance of headwater streams as essential salmon rearing habitat and the lack of data for two of the world's most productive salmon ecosystems. The work provides some legal protection to 149 kilometers (92.5 miles) of newly documented salmon streams.

Marine Ecosystems

Alaska SeaLife Center Citizen Science Monitoring Program for Marine Invasive Species

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Abstract: Marine invasive species (MIS) are an expanding global problem and pose threats to ecosystem biodiversity, human health, and communities reliant on marine resources. Citizen science monitoring in coastal areas is a useful mechanism for prevention and early detection of MIS. The Alaska SeaLife Center is a marine science facility in Seward, Alaska, and is situated on Resurrection Bay neighboring federal marine protected areas. The Center participates in citizen science monitoring for invasive tunicates and European green crab. Tunicate monitoring is led by the Invasive Tunicate Network through the Smithsonian Environmental Research Center and San Francisco State University. These data are collected four times a year by deploying PVC settlement plates on docks and retrieving plates after three months. Crab monitoring is conducted in statewide coastal communities where traps are deployed for a 24 hour period once a month between May and September. Field sites are located in vessel traffic and public use areas. Through monitoring, we communicate with community members and organizations such as a high school Marine Science class and the National Park Service. As a result, MIS content and field monitoring is incorporated into the high school curriculum and plans are underway for monitoring in Kenai Fjords National Park. We plan to expand our field monitoring program and these partnerships in the coming years 1) to purchase equipment to establish long-term salinity and temperature data and for use during underwater dive surveys, 2) to establish collaborations between monitoring programs and high school classes in coastal communities of Alaska by demonstrating our model, and 3) to hold a Seward Marine Invasive Species Bioblitz where community members can learn about and search for MIS in our community. The MIS citizen science monitoring program has helped improve public understanding and connection to this important marine conservation issue.

Evaluation of the Southwest Alaska Network Nearshore Monitoring Program: Synthesis, analysis, and insight from the first 5-years

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The SWAN Nearshore Monitoring Program measures over 50 biological, chemical, and physical metrics encompassed within six SWAN I&M designated vital signs. The sampling design incorporates well known ecological interactions and processes primarily within the nearshore food web, at spatially balanced, randomly selected sites within the coastal network of southwestern parks in Alaska. To date, we have complete 5-year data sets for approximately half of the metrics. Because of the holistic nature of the design, we can now utilize existing data sets to evaluate several aspects of the program. While we are interested in what the data are telling us about ecosystem processes, we will also evaluate the functionality of the program. For each metric we will determine whether current sampling intensity and frequency are sufficient to detect change and whether sampling frequency can be reduced, thus allowing us to minimize costs. We will incorporate results in sampling protocols to optimize our ability to detect trends for the nearshore vital signs.

Integrating Upper Trophic Species into Ecosystem Studies along the Kenai Coast

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Long-term data series of individual marine species is providing valuable information about stability and dynamics of populations, vital rates, and demographics. Along the coast of the southern Kenai Peninsula, the Alaska SeaLife Center has conducted research on multiple marine species, including Steller sea lions, harbor seals, seabirds, and fishes. Steller sea lion behavior, diet, and population dynamics have been monitored for more than a decade, harbor seal population dynamics, habitat use, and productivity has been monitored for three decades, phenology, productivity, and habitat use of selected seabirds has been monitored for 3 years, and seasonal and interannual changes in the diet of commercially important fish (salmon and halibut) for 2 years. These studies will be expanded and integrated into ecosystem studies on bottom-up and top-down processes within a coastal marine food web. Concurrent, multidecadal studies on physical processes and lower trophic level dynamics conducted by University of Alaska Fairbanks provide unique opportunities for comparative and integrated ecosystem studies on upper trophic level species responses to environmental variability. Integrating comparative information across species and trophic levels with data on environmental drivers and conditions provides opportunities to understand how ecosystem components interact with each other in this dynamic coastal marine ecosystem along the Kenai Peninsula, involving coastline of the Kenai Fjords National Park, glacial fjord ecosystems, and areas influenced by the Alaska Coastal Current.

Seaweeds of Alaska: Statewide Datasets to Knowing What's on Your Coastline

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In the past, seaweeds in Alaska have been largely overlooked and yet they provide essential habitat and food to many marine species in the shallow nearshore. There are now many new tools available online to managers, researchers, educators and the public focusing on coastal resources and Alaska's seaweeds. An overview of these tools will be given from statewide datasets such as ShoreZone, Shore Stations (see

companion abstract by S. Saupe), and seaweedsofAlaska.com. Seaweeds from the SWAN areas of interest will be highlighted along with how to identify seaweeds near your coastline using the newly published Field Guide to Seaweeds of Alaska.

Monitoring for Trends in the Distribution and Abundance of Colonial Nesting Seabird Populations on the Kenai Fjords Coast

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Seabirds are important upper trophic level predators in marine food webs, and can serve as indicators of marine ecosystem health. Seabirds can also be sensitive to both human-driven and natural variability in environmental conditions, such as prey availability, oceanographic conditions, commercial fishing activity, both natural and introduced predators, contaminants, habitat loss, and climate change. Because seabirds are both significant and vulnerable, they are considered Species of Management Concern at Kenai Fjords National Park. Over the past 35 years, there have been several efforts to quantify seabird populations on the eastern side of the Kenai Peninsula in and around the area that is now Kenai Fjords National Park, Alaska; however, these efforts have not been standardized, making population trends difficult to identify. In order to test and standardize survey methods, we developed a cooperative project between the National Park Service (Kenai Fjords National Park), the U.S. Fish and Wildlife Service (the Alaska Maritime National Wildlife Refuge), and the University of Alaska Fairbanks to assess occupancy, distribution, and abundance of colonial breeding seabird populations in the Kenai Fjords region during the summers of 2011-2013. In 2011, we conducted boat-based surveys with the objectives of identifying colony locations, counting individuals and nests, recounting historical photo plots established during the 1989 Exxon-Valdez oil spill, and establishing new photo plots for large colonies of cliff nesting species. In addition, passive monitoring methods (time lapse cameras) were considered for certain colonies and species that were difficult to access or to allow more extensive and detailed data collection. We tested these methods with the goal of developing a long-term monitoring plan for seabird species in the Kenai Fjords region by using Bayesian hierarchical modeling to document the ability of our proposed protocols to detect population trends.

Use of Time-lapse Photography to Monitor Common Murre Productivity on Barwell Island

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Barwell Island, at the entrance of Resurrection Bay and part of the Alaska Maritime National Wildlife Refuge, is small (36 acres), steep-sided, and contains nesting habitat for several species of seabirds. During World War II concrete shelters were built atop the island for searchlights, radios, and crew. Recently it was discovered that some of these shelters had become fatal traps for seabirds. In 2009 the Army Corps of Engineers sealed the traps, removed a fuel tank, and removed exposed lead-shielded cable. During this work the Refuge installed time-lapse cameras to obtain the first measurements of reproductive success of common murre nesting on the island. These measurements are a gauge of the condition of the colony and can be compared with results from other colonies in the region.

The island's small size, steep topography, and remote location had prevented manual methods of regular, through-season direct observation of reproductive success that the Refuge employs for monitoring other nesting colonies. Advances in digital photography, microcontrollers, and digital storage now permit

automatic repeat photography to continue reliably over long time periods in remote locations. We recorded images of nesting murrens every three hours for four months, visiting the colony only before and after the nesting season. From these images we determined dates for laying, hatching, and fledging, and calculated the proportion of eggs that hatched and chicks that fledged. To analyze the images we used protocol from conventional monitoring methods: in addition to using actual sightings of eggs and chicks, we inferred their presence from the posture of adult murrens. This poster shows methods and results for this investigation.

Understanding Change Tidewater Glacier Habitats: What Can Harbor Seals Tell Us?

Anne Hoover-Miller, Alaska SeaLife Center

Tidewater glacier fjords provide spatial transitions from watersheds to the open oceans. Roughly 50 tidewater glaciers remain in the North Pacific, nearly all terminating on lands managed by the National Park Service and US Forest Service in Alaska. Tidewater glacier fjords show individuality with respect to states of advancement, recession, and stability of associated glaciers, fjord morphology, and characteristics of marine waters adjacent to the glaciers. Tidewater glacier fjords also have become important tourist destinations – generating economic stimulus, interpretative opportunities, and management responsibilities. These environments are dynamic, unique, and diminishing as the climate warms.

Harbor seals are being monitored to evaluate and distinguish effects of environmental change and human impacts in tidewater glacier fjord habitats. Harbor seals are a piscivorous, high-trophic level, long-lived, coastal marine mammal. Long-term monitoring in Aialik Bay (Kenai Fjords National Park) and Glacier Bay (Glacier Bay National Park and Preserve), have documented persistent declines in numbers of seals. Reasons for the declines are uncertain, but are indicative of diminished ecosystem integrity. Ongoing research in Aialik Bay uses remotely controlled video cameras to track numbers of harbor seals, glacier status and activity, ice conditions, and human activities near Aialik and Pedersen glaciers in the Kenai Fjords National Park. Research has documented haul out behavior and harbor population dynamics during the past three decades that suggests plasticity in the behavior of seals which is responsive to local environmental conditions. Current research is documenting interannual variability in ecological attributes in order to investigate effects of ice availability, marine conditions, and human activities on harbor seals. Results will be used to help distinguish natural and anthropogenic influences that are adversely affecting seals and contribute to broader assessments of the integrity of tidewater glacier environments in Alaska relative to climate change.

SWAN Digital Shorelines Updates using Best Available NOAA data

Joel Cusick, National Park Service, Alaska Regional GIS Information Resources Team

Alaska Regional GIS Team has updated five Alaska coastal park shorelines including Kenai Fjords and Lake Clark using the best available digital shorelines from the National Oceanic and Administration (NOAA) National Ocean Service (NOS) services. These data will be integrated into the National Hydrographic Dataset (NHD) and will replace in many cases, 1950's era shoreline digitized off of the USGS Topographic quads. This presentation will discuss the trials and tribulations of this seemingly simple procedure and the effect this has on large and small spatial scale datasets that rely on an accurate digital representation of our coasts.

ShoreZone Mapping in Alaska

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John Harper, Coastal and Ocean Resources Inc.
Mary Morris, Archipelago Marine Research Ltd.
Mandy Lindeberg, NOAA Fisheries, Alaska Fisheries Science Center, Auke Bay Laboratories
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ShoreZone is a coastal marine habitat mapping system, in which spatially referenced aerial imagery is collected specifically for classification. The resulting mapped dataset includes imagery with geomorphic and biological attributes as a searchable geospatial dataset of coastal habitat features. The imagery provides a useful baseline and visual reference. The mapped features include: shoreline morphology, substrates, and biotic resources such as eelgrass, canopy kelps, salt marshes and other habitat descriptors. The many data applications include: oil spill contingency planning, conservation planning, habitat research and other coastal site evaluations.

Approximately 96,600 km of ShoreZone imagery exists for the Pacific Northwest coastline including the entire shoreline of Washington (5,000 km), British Columbia (40,000 km), and ~51,600 km of the Alaskan coast. The project is on-going with ~23,800 km of Alaska coastline left to be imaged. Imagery gaps include the Alaska Peninsula, the Aleutian Islands, Western Alaska, and northern Alaska. The Alaska imagery can be viewed online at <http://akr-mapping.fakr.noaa.gov/szflex/>.

The ShoreZone program is built on a foundation of funding and contributing partners, including state and federal governmental agencies, nonprofit organizations, spill response planners, and industry, as well as other scientists and spatial data specialists. The multi-agency program provides a framework to build on and supports a contiguous, integrated coastal resource database that extends from the mouth of the Columbia River, through British Columbia, the Gulf of Alaska, Bristol Bay, and northwards to the Arctic coast.

Wildlife

Stable Isotope ($\delta^{13}\text{C}$, $\delta^{15}\text{N}$, $\delta^{34}\text{S}$) Analysis and GPS Depict Complexity of Gray Wolf (*Canis lupus*) Diets in Southwest Alaska

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Throughout Alaska, gray wolves (*Canis lupus*) are a top predator of large ungulates. While they primarily rely on ungulates such as moose (*Alces alces*) and caribou (*Rangifer tarandus*), they are opportunistic feeders and use alternative resources. The variation of supplemental protein sources in wolf diet has not been studied extensively on live animals currently using the landscape. With large seasonal influxes of Pacific salmon (*Oncorhynchus sp.*) into Alaska, terrestrial carnivore use of marine species is of particular interest. Using stable isotope ($\delta^{13}\text{C}$, $\delta^{15}\text{N}$, and $\delta^{34}\text{S}$) analysis of wolf guard hair and blood, this study aims to determine the proportion of marine derived nutrients in the diets of wolf packs in southwest Alaska. GPS data from sampled animals facilitates correlating isotopic traits with landscape use patterns.

Wolf pack territories in and around Lake Clark National Park appear to vary in spatial extent and in availability of marine derived nutrients, such as salmon. Initial analysis shows that two packs with smaller home ranges, centrally located around areas with greater salmon availability are enriched in ^{15}N and ^{13}C compared to packs that have larger home ranges, not centralized around salmon spawning waters. This enrichment indicates a sustained use of marine nutrients, and is found in red blood cells, blood serum and hair, each which represent diets over different time scales. In the Lake Clark region, salmon may be a substantial part of the diet of packs centralized around salmon spawning waters. In contrast, packs with larger home ranges and less access to salmon have stable isotope values representative of a primarily terrestrial diet and may be less reliant on salmon.

Bald Eagle Nest Occupancy and Productivity Across SWAN Parks: Protocol Standardization for Long-term Monitoring

Leslie Witter, National Park Service, Southwest Alaska Network

Bald eagles (*Haliaeetus leucocephalus*) play an important ecological role as predators of seabirds and fish in southwest Alaska. Eagle populations are influenced by a range of factors including food availability, weather, climate, and human impacts (i.e., ecotourism, fishing, resource extraction, pollution). Nest occupancy and reproductive success of the large breeding populations of bald eagles within Katmai NPP (KATM), Kenai Fjords NP (KEFJ), and Lake Clark NPP (LACL) have been selected as a “vital sign” for monitoring as they are indicative of the health of both freshwater and marine systems. Records of nesting activity were collected fairly regularly from 1975-1994, 1986-2002, and 1983-present in KATM, KEFJ, and LACL, respectively. Survey areas and methodology have varied, however, making year to year comparisons of eagle productivity difficult in some cases. In 2009, work began in KEFJ to field test a standardized protocol for monitoring eagle productivity that incorporates dual-frame sampling with a double-observer component to correct for biases in nest sightability. Using this methodology, eagle surveys were reinitiated in KATM in spring 2011. The goal is to finalize a rigorous survey design that will use nest data from a random sampling of eagle habitats to make inferences about the health of eagle populations parkwide in KATM and KEFJ. Since 1992, LACL has had the resources to collect census data on nests in both coastal and interior eagle habitat. Going forward, the type of data collected in the LACL census will mirror that from KATM and KEFJ surveys to facilitate comparisons of eagle nest occupancy and productivity both within and between parks. In this poster, I will present a compilation of historic nest data as well as detail ongoing development of the protocol to standardize data collection for long-term monitoring of bald eagle breeding populations in SWAN parks.

Moose Population and Status Trends in Katmai National Park and Preserve

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 Carissa Turner, National Park Service, Katmai National Park and Preserve
 Sherri Anderson, National Park Service, Katmai National Park and Preserve

Moose are an integral part of subsistence to local Native Alaskans and have strong effects on terrestrial systems through browsing effects and as prey species. Tracking densities and bull/cow ratios provides information on reproductive success and population status and trends. Katmai National Park and Preserve has collected age and sex composition of moose since 1969. Data is collected as part of a joint effort with Alaska Game and Fish and the Fish and Wildlife Service, which is then used to evaluate population status and address harvest regulation changes. Surveys in established trend areas are conducted November through the first week of December, snow dependent. Double-observer aerial surveys were used to collect group numbers, age/sex class, snow depth and coverage. Line-transect estimates for areas were used to get an error estimate, which traditional counts did not incorporate, to try to document respectability and to maintain utility of historical data. In 2010, multiple surveys were performed in the Park Border Trend Area to examine the respectability of the method.

Brooks River Timelapse Photography Project 2004 -2011

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Brooks River, an important brown bear (*Ursus arctos*) feeding area in Katmai National Park, is a migratory route and spawning stream for salmon (*Oncorhynchus* spp.). It is also an area that has seen visitor use increase in the last 30 years as bear viewing has become popular. Viewing platforms on the North side of the river and other visitor facilities on the South side are connected by a floating bridge on the lower section of the river. Using timelapse photography, density levels of bears and people were documented, both up river and down river of the floating bridge. Two cameras, mounted on the viewing platform, began taking time-interval photographs before salmon arrived and continued until October. (There was no data collected in 2005 and 2009.) The activity levels of bears and people, in relation to the season and the time of day were also studied. Data is being analyzed to see examine patterns within and among years. The documentation of bear and people density is a record of the yearly situation on the Brooks River and does not imply that the project will affect bear or people activities in the future but gives resource managers general information about the patterns of bear and people activities on the Brooks River.

Archiving Historic Bird Checklists from Southwest Alaska's National Parks into eBird and AKN databases

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During 2008, The Alaska Natural Heritage Program visited Alaska 16 National Park Service offices to gather records of historical bird observations. These records, primarily from field camps and ranger logs, were at risk of being lost if not properly archived. eBird and Avian Knowledge Network (AKN) are international databased used by birders for archiving bird information. The goals of this project were to compile historical bird records from park units in southwest Alaska and enter these records into a publicly accessible, archival database (eBird or AKN). We summarized 8,704 observations for 183 species, including 32 species of conservation concern, from 82 sources dating back to 1919. Four new bird species were added to park checklists and 23 had their status upgraded from probably present to present. We also developed a user's manual for entering observation into eBird; this information could be used to annually update park checklists.

Physical Science, Climate, and Vegetation

Extreme Weather Events and Climate Variability at Remote Weather Stations across Southwest Alaska

Chuck Lindsay, National Park Service, Southwest Alaska Network

Situated between the Gulf of Alaska and the Bering Sea, southwest Alaska's dynamic weather and climate is influenced by the region's high-latitude, proximity to oceans, complex topography, and the interaction of these features with global atmospheric circulation. The Alaska and Aleutian Ranges and Kenai Mountains intercept moist air masses from the Gulf of Alaska and heavy precipitation falls on their eastern flanks. Interior regions of southwest Alaska are largely protected from this maritime influence and experience a large annual range in temperature and relatively little precipitation. The open waters of the Bering Sea moderate summer temperatures, but winters are cold due to the presence of sea ice in some months. Although southwest Alaska has a sparse distribution of weather stations that are mostly located at low elevations close to where people live, recently installed automated weather stations are beginning to document the variability and extremes in weather at remote locations across southwest Alaska. This study presents a summary of these weather observations.

Timing and Extent of Lake Ice Cover in Southwest Alaska: 2001-2011

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The impacts of climate change in the northern high latitudes are expected to alter freeze and breakup dates of lake ice – affecting lake ecology, wildlife migration and habitat, and human subsistence and recreation. We used daily Moderate Resolution Imaging Spectrometer (MODIS) imagery and climate data (temperature, precipitation, and wind) to assess variability in the timing of freezing and breakup of 17 lakes, totaling 5,410 km² in a network of national parks and wildlife refuges in southwest Alaska. Because digital image classification techniques often resulted in misclassification, we relied on manual interpretation of imagery to quantify lake ice cover using a minimum mapping area of 1 km². There was considerable year-to-year variability in freeze-up dates, duration, and extent of lake ice cover during 2001-2011. Lake ice was responsive to both global-scale changes in atmospheric and oceanic circulation – the El Niño Southern Oscillation – and to regional-scale weather events including mid-winter warm air advection events (characterized by above-freezing temperatures, strong wind, and rain) and cold-snaps.

Advancing USGS Mineral Resource Assessment Techniques for Concealed Mineral Deposits in Southwest Alaska

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An understanding of the distribution of mineral resources on public, state, or Federal lands is important for land management decisions and helps predict the natural environmental effects resulting from erosion and weathering of mineral deposits. Most remaining undiscovered mineral resources are not exposed at the Earth's surface but are instead concealed beneath surficial deposits. Using geophysical, mineralogical, and geochemical techniques, the U.S. Geological Survey (USGS) is refining assessment techniques for identifying concealed mineral resources. Field studies in 2010 were focused in the Lake Clark National Park; these results have been integrated with data collected further southwest, including the region containing the concealed Late Cretaceous Pebble porphyry Cu-Au-Mo deposit. Porphyry deposits often occur in space and time as clusters in linear, orogen-parallel belts suggesting the region is highly prospective for similarly aged porphyry deposits.

Geophysical investigations include magnetic-field, gravity, and magnetotelluric (MT) measurements. Magnetic-field data show the Pebble deposit to be associated with highly magnetic rocks and a linear northeast-southwest trend of similar magnetic anomalies extends for over 350 km, including areas within the Lake Clark National Park. Models of magnetic-field, gravity, and MT data suggest an abundance of near-surface igneous rocks and a large electrically-conductive zone at depth below the Pebble deposit.

Porphyry copper indicator minerals in glacial till samples can be used to identify the type, location, and distance to concealed deposits. The abundance and morphology of gold and jarosite grains are the best vectors.

Water samples from lakes, ponds, streams, and seeps proximal to mineral deposits contain anomalous concentrations of dissolved Cu, Mo, F, and SO₄ compared to distal samples. The high concentrations of metals in water samples are due to natural weathering of the buried deposits. Depending on analytical methods used to determine trace elements, soil samples may be used to indicate the depth of the deposits.

“Recent” Geologic History of Lake Clark National Park and Preserve

Jonathan Harvey, University of California Santa Barbara, Department of Earth Science; Geological Society of America Geocorps

In 2009, a broad-scale survey of the Quaternary geology of Lake Clark National Park and Preserve was conducted. Goals included field checking a surficial geologic map compiled by F. Wilson (USGS) from aerial photography, determining the age of formation of particular landforms, and summarizing the major geologic events and processes that have culminated in the park’s modern landscape. A few sites throughout the park were the subject of more detailed investigations:

“Young” glacial moraines: Lichenometric techniques were used to date the formation of the prominent, sharp-crested moraines present in many alpine valleys in the park. Results suggest that these moraines were occupied multiple times during the last millennium, most recently toward the end of the 19th century during the “Little Ice Age.” Most glaciers have retreated hundreds of meters to kilometers up-valley since.

Paleo-lake deposits near the head of the Crescent River: Samples were collected for OSL dating to determine the age of the lake that apparently backed up in the upper Crescent River drainage. Despite problematic samples, it appears that the lake formed during deglaciation behind an ice- or debris-dam during the early Holocene (~12-8 ka)

Deposits underlying coastal bluffs near Harriet Creek: Detailed stratigraphic descriptions were collected, along with OSL samples for age estimation. These deposits appear to date to the Last Glacial Maximum (~18-22 ka), and record deposition from rivers that flowed along Cook Inlet while sea level was > 100 m lower than at present.

This preliminary effort highlights the interesting and often extreme processes that continue to shape this geologically active landscape. Future efforts may include measuring rates of bedrock uplift and erosion along the coast using INSAR and cosmogenic nuclides, respectively.

Glacier Monitoring in Kenai Fjords National Park

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Kenai Fjords National Park was established in 1980 to “maintain unimpaired the scenic and environmental integrity of the Harding Icefield, its outflowing glaciers and coastal fjords and islands...”. Despite this enabling legislation, many studies in the park have focused on the landscape, ecosystems and wildlife populations. Supplementing a few key studies by outside researchers, Kenai Fjords National Park began monitoring the Harding Icefield in the mid-1980s – mapping the extent of glacier ice using air photos and satellite imagery and later documenting flow rates at Exit Glacier. Winter

accumulation measurements, based on snow pits located on Exit Glacier, have been collected since 2000. In 2009, the NPS implemented a glacier monitoring and research program to better understand the cumulative effects of climate change on this massive body of ice. Here we present a contemporary strategy for monitoring and research of the Harding Icefield and its outflowing glaciers as well as preliminary results.

Application of Landsat Imagery Time Series to Characterize the Snow Regime of Lake Clark National Park and Preserve

Matt Macander, ABR inc, Environment Research and Services

In support of NPS inventory and monitoring objectives, the National Park Service (NPS) is working with scientists at ABR, Inc.—Environmental Research & Services to develop a soils map for LACL. As part of this effort, an extensive time series of Landsat imagery was acquired (1985–2010). The Landsat time-series data was used to characterize patterns of snow persistence on the landscape, which is related to snow depth and growing season length—factors important to soil development. Snow cover has a very heterogeneous distribution within LACL. Therefore, an analysis was conducted utilizing the time series of Landsat imagery to characterize the snow regime across LACL at a relatively fine scale (30 m pixels).

We acquired an extensive collection of Landsat Thematic Mapper (TM) and Enhanced Thematic Mapper+ (ETM+) imagery for LACL to support the soil landscape modeling. Scenes with substantial cloud-free coverage over the study area (1,077 scenes in total) were obtained and calibrated. The images were classified to snow, snow-free or unknown (cloud or image gap). The time series was then analyzed using a binary classification tree for each pixel, with Julian date as the predictor and snow state—presence (1) or absence (0)—as the response. The results were compiled to produce a map depicting the typical snow-free date for Lake Clark National Park and Preserve at 30 m resolution. The results from the Landsat snow pattern analysis will be presented. In addition, other potential applications of the Landsat time series will be discussed.

Soil-Ecological Site Inventory and Mapping across Southwest Alaska

Michael Mungoven, USDA-Natural Resources Conservation, Soil Survey division

USDA-Natural Resource Conservation Service (NRCS) Soil Survey division has mapped over 11 million acres in 7 projects from Seward to the Pribilofs since 1995. Products include spatial data layers showing geographic distribution of soil and ecological types; tabular datasets containing physical and chemical data for individual soils; interpretations of soil and ecological sites for various uses and for response to management and disturbance. Maps are produced at three scales; “detailed” at 1:25,000 for areas of intense management, “detailed reconnaissance” at 1:63,000 for river corridors, managed wildlands, and areas of concern, and “reconnaissance” at 1:250,000 for remote wildlands. Soil mapping in southwest Alaska requires extensive ground travel, frequent use of air and watercraft, and exploitation of a variety of remotely sensed data. Soil/ecological site mapping makes use of an assumed formative relation between soil development and landform character. Crews of one soil scientist and one ecologist describe 6 to 12 hand excavated soil pits centered in a 1/10 acre vegetation plot along a pre-selected line-intersect transect each field day between June and October. Soils are described according to NRCS Alaska soil survey standards and classified according to US Soil Taxonomy. Vascular and nonvascular plant species within the plot are listed and their percent contribution to the plot cover is ocularly estimated. Geomorphic and ecological data is collected. Each soil-vegetation “component” is identified as a member of an ecosite with a seral status applied. The site is associated with a soil Map Unit, a repeating combination of soil types across a landscape. Selected sites are sampled for full physical and chemical characterization and vegetative production.

In four project areas, maps and associated data are shown to provide fundamental resource information to ecological scientists and land managers. Soil/ecosite properties provide a context, and real data, for use in modeling/interpreting landscape evolution. The Nushagak survey has documented the distribution of loess, permafrost, organics, glacial material, and associated landforms across the Bristol Bay lowlands. The Togiak soil survey is currently investigating the soil and ecological site properties of selected watersheds around high value salmon spawning grounds. The Kodiak soil survey has mapped the geographic extent and textural distribution of the 1912 Novarupta plume on NE Kodiak. This ash deposition radically reduced the erosion potential of upland soils which in turn may have affected the input of nutrients to the local coastal waters. In the Seward area characterization and interpretation of local landform conditions will be used by city and borough planners.

Report on Holocene Insect Fossil Assemblages, Little Takli Island, Katmai National Park and Preserve

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A bluff on the west coast of Little Takli Island exposes approximately 2.3 m of peat that was deposited in a small bog throughout much of the Holocene (i.e., the last 11,000 years). During August, 2010, a National Park Service field party went to the island, and excavated a column of peat at the same site where a previous excavation had taken peat for paleobotanical studies. The new peat column was taken specifically for the extraction of insect fossil remains. The aim of the study was to use the fossil insect assemblages extracted from the peat to reconstruct post glacial environments on the island, which is adjacent to another small island from which significant archaeological finds have been documented.

The assemblages yielded a minimum of 433 individuals of insects and arachnids. These include 50 insect taxa in 14 families of beetles, caddisflies, true flies, and wasps. Beetles (Coleoptera) were by far the most common insect order preserved in the assemblages. While preservation of specimens was generally excellent, the numbers of individuals and of different taxa was generally rather poor. Most fossil assemblages contained less than ten different taxa. This paucity of specimens limits the utility of the site in terms of precision and detail of paleoenvironmental interpretation. Nevertheless, some significant trends can be seen in the data.

Using Scenarios to Prepare for Climate Change in Southwest Alaska

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Changing climatic conditions are rapidly impacting environmental, social, and economic conditions in and around National Park System areas in Southwest Alaska. With over 8.5 million acres of parklands to administer, Southwest Alaska area managers need to better understand climate change trends to better manage these subarctic and maritime coastal ecosystems and human uses and enjoyment of these areas. National Park Service (NPS) managers are exploring scenario planning as an alternative approach for science-based decision-making in the face of an uncertain future. Because the magnitude and effects of climate change are highly uncertain, scenarios address multiple plausible futures; they are not forecasts. Climate change scenarios will help prepare area managers make informed decisions with least regrets for future outcomes.

NPS and the University of Alaska Fairbanks Scenarios Network for Alaska Planning (UAF-SNAP) are collaborating on a three-year project to develop plausible climate change scenarios for all NPS areas in Alaska. Final products will include climate change model projections from UAF-SNAP, scenario planning exercises, and final reports for all the NPS units in Alaska, with efforts organized around each of four inventory and monitoring (I&M) networks. The Southwest Alaska I&M Network workshop occurred in February 2011 and addressed areas in and near Kenai Fjords National Park, Katmai National Park and Preserve, Lake Clark National Park and Preserve, Aniakchak National Monument and Preserve, and Alagnak Wild River.

This poster will show examples of best-fit modeled projections for climate variables (e.g. temperature and precipitation) in Southwest Alaska at various future time intervals, the process for developing scenarios, and sample outcomes from this process. In preparing for possible future outcomes from climate change, the scenarios need to be relevant, challenging, divergent, and plausible.

Status and Trends of Alaska NPS Glaciers: Workplan and Early Results

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Glaciers cover about 75,000 km² of Alaska's land surface and approximately one-quarter of those glaciers are located within National Park boundaries. Changes in these glaciers are of global importance, since over the past half-century Alaskan glaciers have contributed more than a quarter of the total sea level rise attributed to melting glaciers and ice caps worldwide. Local impacts of glacier retreat are important, too, and include ecological changes, hydrological threats to major infrastructure, and significant changes in recreational viewsheds. To develop a more comprehensive understanding of the glacier resource in Alaskan National Parks and to assess the extent and impacts of recent changes to that resource, NPS recently initiated a collaborative 3-year project with investigators from University of Alaska Fairbanks and Alaska Pacific University. The project consists of three major components: 1) map the areal extent of all NPS glaciers in the 1950s (from topographic maps) and the 2000s (from satellite imagery); 2) use existing repeat laser altimetry to estimate volume changes in a geographically diverse subset of the NPS glaciers; and 3) more thoroughly characterize historic changes to and landscape-scale impacts of 1-3 "focus glaciers" per glaciated park unit. Criteria for inclusion in the list of focus glaciers includes relative accessibility to visitors, an existing history of documentation including published and unpublished research, and representation of one of the many unique ways that glaciers respond to climatic change. In the Southwest Area Network, the current list of focus glaciers includes Aialik, Exit, and Skilak Glaciers (KNFJ), Turquoise, Tanaina, and Tuxedni Glaciers (LACL), Fourpeaked and Knife Creek Glaciers (KATM), and remnant ice in the Aniakchak Caldera (ANIA). In this presentation, we use early results from Southwest Area and other statewide glaciers to document our ongoing methodology and seek feedback on the projected outcomes of the project.

Soil Mapping in Lake Clark National Park and Preserve Using a Soils Landscape Approach

Aaron Wells, ABR, Inc. Environmental Research and Services

Soil inventories in Alaska national parks provide valuable information about the influence soils have on landscape and ecosystem functions. To increase the understanding of how soils contribute to the richness and character of Lake Clark National Park and Preserve (LACL), the National Park Service (NPS) is working with scientists at ABR, Inc.—Environmental Research & Services to develop a soils map for LACL. A soil inventory is a snapshot in time of the condition and status of soil resources, and provides the data needed to map the distribution and abundance of the different soil types found in an area. The soil landscape approach to soil inventory is well suited for the large expanses of NPS lands in Alaska. Field data are analyzed using rule-based GIS modeling, satellite image processing techniques, and multivariate statistical analysis to develop ecological models for extracting spatially-explicit soils information (soil landscapes).

During the summer of 2011, field sampling locations were stratified across LACL using a gradient-directed sampling scheme to sample the range of ecological conditions, and to provide the spatially-related data needed to interpret ecosystem development. Intensive sampling was conducted along toposequences located within broad ecoclimatic regions by major physiographic unit. Rule-based modeling was used to characterize ecological relationships at the plot-level (ecotypes and soil landscapes). Several pre-existing GIS inputs, including geology, physiography, and ecoclimatic region, were combined spatially with a pre-existing landcover map of LACL to create a landcover-strata layer, and a crosswalk was developed between the ecotype and soil landscape classes and the vegetation classes from the LACL landcover map. The crosswalk was used to recode the landcover map into an ecotype map, which was the recoded again to create a soils landscape map.

Aniakchak National Monument and Preserve: Plant Associations and Earth Cover Classes

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We present a two tiered classification system for Aniakchak National Monument and Preserve composed of a vegetation map and plant associations. Twenty-four vegetated earth cover classes were mapped within Aniakchak National Monument and Preserve by Ducks Unlimited as part of the Alaska Peninsula and Becharof National Wildlife Refuges earth cover classification project. Earth cover classes represent coarse-scale vegetation map units based on the Alaska Vegetation Classification. We provide a detailed description of each earth cover class including characteristic landforms, elevation and slope ranges, dominant plant species, and common plant associations. We described 68 plant associations for Aniakchak National Monument and Preserve based on 204 plots sampled in 2009 and 2010. Plant associations represent the finest level of community classification of both the Alaska Vegetation Classification and the National Vegetation Classification Standard. Plant associations are defined based on diagnostic species, distinct floristic composition, uniform habitat conditions and physiognomy. Each plant association represents a relatively narrow segment of the variation in vegetation defined by topographic climate, substrate, hydrology, and disturbance regimes. We assigned conservation status ranks to each association following international guidelines established by NatureServe. Because of the low level of anthropogenic disturbance within Aniakchak National Monument and Preserve, most plant associations were ranked “secure” or “apparently secure” (G5S5 or G4S4). Two were ranked as “vulnerable” (G3S3), and six were ranked “vulnerable” to “apparently secure” (G3G4; S3S4). The two levels of classification provided through this project provide baseline information about the extent and distribution of habitats and plant species. These products can be used to assess status and trends in the condition of ecosystems within the park.

What's eating my trees and berries? Geometrid moth outbreak in South-central Alaska.

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An outbreak of defoliators has been occurring in South-central Alaska during the last two years. Hundreds of trees and berry plants have been completely or nearly completely defoliated at the upper reaches of Hiland and Arctic Valley Roads north of Anchorage; Summit Lake, Homer, and Seward on the northern Kenai Peninsula; and around Nanwalek on the southern Kenai. Several geometrid moth species have been associated with this event, but *Eulithis* spp., the autumnal moth, *Epirrita autumnata*, and Bruce spanworm, *Operophtera bruceata*, appear to be the primary agents (J. Kruse, *personal comm.*). Willow, birch, salmonberry, blueberry, alder, cottonwood, and various high elevation shrubs have been affected. Defoliation could be found in elevation bands above 1400 ft in the Matsu Valley and northern Kenai Peninsula (primarily *Eulithis* spp.), and much lower on the southern Kenai and Anchorage bowl (*Epirrita* and *Operophtera*). Caterpillars fed on opening buds and expanding leaves in mid-May. Feeding ended by late June when larvae dropped to the ground to pupate. The adult moths began emerging in late August. Bruce spanworm and the autumnal moth fly late in the year. Re-foliation of affected trees has been monitored throughout the summer, and different tree species showed a variety of rates and developmental patterns of recovery. Most geometrid moth outbreaks last fewer than three years, and seldom cause permanent damage. The University of Alaska Cooperative Extension Service and USDA Forest Service Forest Health Protection teamed up with various other stakeholder groups and citizen scientists to acquire and collate information as the outbreak progressed. A major effort was made to keep the affected communities informed.

Monitoring of Airborne Contaminants in the Southwest Alaska Network Using the Common Moss, *Hylocomium splendens*

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While parklands within southwest Alaska might still be considered pristine, the transport and deposition of airborne contaminants have been recognized as a possible threat to aquatic and terrestrial ecosystems for many years. Toxic compounds and metals are deposited through wet and dry deposition from sources as close as the local communities to as far away as Europe, Asia, and eastern North America. These airborne contaminants can pose serious biological consequences on Southwest Alaska Network (SWAN) resources, including degradation of highly sensitive nonvascular plant (i.e., mosses and lichens) communities, bioaccumulation in fauna, and increased contaminant levels in forage. Recognizing the potential ecological impacts of increasing contaminant concentrations, the SWAN is developing a suite of contaminant monitoring protocols, which includes using the common moss *Hylocomium splendens* as a passive sampler to establish baseline levels and long-term trends of metals, sulphur, and nitrogen within the terrestrial environment. Within Alaska, *H. splendens* sampling has proven to be an effective tool in documenting not only regional and global patterns of airborne contaminant deposition, but also local patterns related to development and mineral extraction activities. We present a brief overview on the

importance of monitoring airborne contaminants, why and how *H. splendens* monitoring data are gathered, and important management applications.

Automated processing and distribution of MODIS NDVI data through UAF-GINA: current products and monitoring applications for growing season metrics

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In cooperation with the National Park Service (NPS), Alaska Region, MODIS-derived true color imagery, Normalized Difference Vegetation Index (NDVI) products (2000-present) are now being acquired, processed, and distributed by the University of Alaska-Geographic Information Network of Alaska (GINA). Standardized MODIS products are being obtained from existing archives at the USGS-EROS Data Center and distributed using web coverage (WCS) and mapping (WMS) services. GINA has also been developing an algorithm to standardize the calculation of growing season metrics for the NDVI products, based on the algorithm developed by Reed (2006). The NDVI metrics calculation is generated from eMODIS Alaska data sets. One year of 7-day 250 meter NDVI composites are filtered and stacked together into a one-year NDVI composite. A smoothing algorithm is applied along the time series to clean up the final data using a nonlinear running median line-smoother. Twelve seasonal metrics are derived from the smoothed NDVI data. The NDVI time-series values of every pixel, their backward/forward moving average, and the differentiation are compared to get the sudden increase and decrease that signals the onset of greenness and the end of greenness. The smoothed one-year composites and derived metrics will then be made available as an additional WCS feed. The data products will be used by NPS to monitor interannual variability in start of season, end of season, and growing season length across Alaska.