Southwest Alaska Network
Inventory & Monitoring Program

National Park Service
U.S. Department of the Interior

Alagnak *Aniakchak* *Katmai* *Kenai Fjords* *Lake Clark*

2012 Field Season Highlights

Spruce woodlands respond favorably to recent warming in Katmai and Lake Clark

SWAN and collaborators at Humboldt State University are using tree-ring and plot-level data to better understand stand tree growth-climate interactions in white spruce woodlands. Forest monitoring plots located in low-elevation, open spruce stands are arrayed across a 300-km north-south transect that spans Lake Clark and Katmai National Parks and Preserves. In 2012, SWAN staff sampled six new sites, filling in several gaps across the two parks. All trees analyzed to date have shown increased growth in the last 10-30 years. Trees in the northernmost sites show the earliest response to warming with increases in growth appearing a decade or more ahead of trees in plots at the southern end of the transect. The positive growth of white spruce in response to warming in this area contrasts with the decreases in growth often seen in drought-stressed trees in interior Alaska.

A white spruce tree is cored near the base of the trunk for an estimation of tree age and annual growth.

Uncommon bryophytes and lichens found in Kenai Fjords

In August 2012, SWAN staff conducted a preliminary survey of lichens and bryophytes in coastal forest of Kenai Fjords. During this initial effort, several regionally uncommon species of moss, liverwort, and lichen were collected in the park, and these collections will form the basis of a future comprehensive inventory. These species included the Pacific Rim moss, *Takakia lepidozioides*, the globally scattered liverwort, *Anastrepta orcadensis*, and the western North American endemic lichen, *Hypogymnia duplicata*. In the summer of 2013, SWAN will collaborate with Oregon State University to conduct a lichen survey in Katmai. The inventory will focus on likely habitat for rare or unusual species and is expected to result in many new collections for the park.

Pacific Rim moss, *Takakia lepidozioides*, is one of three regionally rare species of non-vascular plants collected in Kenai Fjords this summer.

SWAN staff conducted a spring bear den survey in Katmai using new methods that add greater statistical power to the program.

New methods tested for mapping bear den habitat in Katmai

In 2012, SWAN tested an alternative method of monitoring brown bears using observations of dens in a 3,000-km^2 area in central Katmai. Overall, the ability to detect dens, given that they were there, was about 34%. About 64% of the grid cells in the study area were suitable for bear dens. A rudimentary habitat model fit to the den site data shows that bears preferred sites with steeper slopes for denning. However, some dens were found in sites with low overall slope, so bears sometimes place dens on small habitat features, such as moraines, that are not reflected in the mean slope values of the larger site. A benefit to using this method is the ability to fit a basic occupancy model with data collected from a single season. By contrast, a population estimate for bears takes several years to fit using line transects due to the amount of data required.

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http://science.nature.nps.gov/im/units/swan/

Time-lapse cameras record intra-season variability in snow cover as well as the timing of green up. Photos are taken hourly 12 times per day. Images shown are from the Contact Creek RAWS in southern Katmai

Time-lapse cameras provide insights into seasonal processes

Photo series from time-lapse cameras provide details about the timing and variability of natural processes that occur seasonally, such as the start of the growing season, snowpack development and snowmelt, and ice break-up on small lakes. The photos are being used by SWAN to supplement data from weather and vegetation monitoring. For example, in the winter of 2010-2011, the photos show thin and often brief snowcover at three camera sites in Katmai and Lake Clark National Parks and Preserves. The cameras also show green up lagging snow melt by as much as two and a half months. In 2011-2012, the continuous snow season started earlier than the previous year, with snowpack persisting into early April. A fourth camera is now mounted on the Port Alsworth RAWS and adds to the existing cameras, which are located at the Pfaff Mine, Snipe Lake, and Coville stations. The time-lapse cameras have produced an archive of daily photos spanning two years (2010-2012). This year, SWAN entered a partnership with the PhenoCam Network, a collaborator with the USA-National Phenology Network (NPN), and is providing digital images to the PhenoCam Network's archive. Soil temperature loggers are also co-located with weather stations to further integrate findings from weather, vegetation, and landscape processes monitoring efforts.

Decrease in mussel density in Kenai Fjords and Katmai

One of the more remarkable observations of the 2012 nearshore marine sampling trips was the lack of mussels previously abundant at established mussel bed sampling sites in both parks. In particular, new growth of first year barnacles had largely replaced mussels on Katmai sites. Staff hypothesize that wide-spread ice scour removed mussels and created bare substrate for barnacle settlement to occur. Predation is not believed to be the primary driver of the shift because of the continuous and widespread declines in mussels observed. In addition, low densities of mussel predators (snails, stars, etc.) were also observed. Staff have placed time-lapse cameras at specific mussel beds in anticipation of being able to capture disturbance events, such as ice scouring, during the winter months.

High water observed throughout the ice-free period

Over the last five years, SWAN Aquatic Ecologists have been monitoring lake out flow and water temperature in Lake Clark (LACL) and Naknek Lake (KATM). This year high snow-pack coupled with persistent rainfall throughout the summer resulted is the highest observed lake levels and coolest lake temperatures observed to date. Between September 20 and September 28, Naknek Lake rose approximately 2.5 ft producing a 2900 cubic feet per second (cfs) increase in lake outflow. This sudden increase was likely due to reduced water storage capacity in the watershed. Long-time residents in the Bristol Bay area have not seen lake levels this high for many years.

2012 Field Season by the Numbers

13,000	Approx. number of mussels measured in KATM and KEFJ since 2006
4.55	Largest 24-hour water temperature change (°F, 2.55 °C)) in Naknek Lake, 7/11/12
5,928	Tree diameters (DBH) measured
96,360	Number of water temperature readings recorded each year from the Lake Clark and Naknek Lake
122	Number of bald eagle nests occupied by nesting eagles
205	Trees cored
1,000	Approx. number of new lichen and bryophyte collections
20+	Pounds peanut butter consumed by field crews
27	Epiphytic macro lichen inventory plots completed in KATM, LACL, & KEFJ
10.66	Max daily rainfall (in), 9/19/12 at McArthur Pass, KEFJ
49	Number of dens seen during the spring bear den survey, KATM
103.1	Max wind gust (mph), 9/22/12 at Harding Icefield, KEFJ
16,022	Highest recorded discharge (cfs) value from Naknek Lake outflow, 9/28/12 (6 yr avg peak, 12,009cfs)
14.2	Minimum temperature (°F), Sept. 19, 2012 at Chigmit Mountains, LACL
28	Number of new bald eagle nests found in 2012
75.2	Maximum temperature (°F), 9/22/12 at Contact Creek, KATM

STAFF NEWS

Welcome Tim Shepherd, SWAN's new data manager.

Best of luck to Claudette Moore who is leaving SWAN after six years of service for a position with USGS in Colorado.