



Alagnak

Aniakchak

Katmai

Kenai Fjords

Lake Clark

Sensitive Plant Communities

Resource Brief
October 2011

Importance

Even small changes in the environment may have significant effects on plant communities that are strongly controlled by physical factors (e.g., hydrology, snow cover), or on species that occur at the edge of their range. Sensitive communities targeted for monitoring in the SWAN include (1) nunataks, or high-elevation ridges that are thought to have acted as refugia for plants and animals during the Last Glacial Maximum; and (2) salt marshes, which provide critical foraging habitat for brown bears, nursery areas for fish and shellfish, and staging grounds for migrating waterfowl.

Status

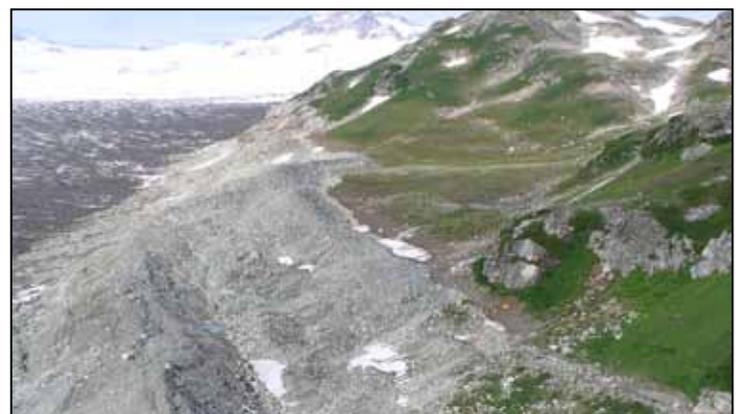
Nunatak sites were established and inventoried in Lake Clark NPP (LACL) and Kenai Fjords NP (KEFJ) in cooperation with the Alaska Natural Heritage Program in 2005, and baseline monitoring was initiated at eight sites. Monitoring sites were established in salt marsh communities of LACL and Katmai NPP (KATM) in 2007-2008. Baseline monitoring in salt marshes included a suite of variables (vegetation, soils, sedimentation, topography) measured across the marsh gradient, and manual interpretation of a time-series of aerial photos (see Vegetation Composition and Structure). Collectively, these data are expected to provide an integrated measure of environmental change.



Lemmon's rockcress (*Boechera lemmonii*), a species of conservation concern found in LACL during the 2005 nunatak inventory. Lake Clark populations were found approximately 555 km west of the nearest known collection from Wrangell-St. Elias and have unusual morphological features that suggest genetic isolation.

Discussion

Nunataks represent relatively stable environments: ice-free during the Last Glacial Maximum, approximately 20,000 years before present, they are thought to have provided habitat for species that have since disappeared from the region, or are now rare. Although several of the sites in KEFJ appear to have only recently melted out, at least two sites in LACL are characterized by deep soils and an unusual suite of species suggesting that they have been ice-free much longer. Rare taxa found at these latter sites included Rocky Mountain disjuncts (e.g., Lemmon's rockcress - *Boechera lemmonii*; rayless arnica - *Arnica diversifolia*; Drummond's cinquefoil - *Potentilla drummondii*); Pacific coastal species (e.g., dunhead sedge - *Carex phaeocephala*), and Alaska-Yukon endemics (e.g., Alaska rock jasmine - *Douglasia alaskana*; pale poppy - *Papaver alboroseum*; Carlson et al., in review).



Alpine vegetation marks the trimline, or recently exposed rock along the receding glacier, on a nunatak on Double Glacier, LACL. A number of rare plants were found at a neighboring site, suggesting that it remained ice-free during the Last Glacial Maximum.

Discussion (continued)

In contrast, salt marshes are extremely dynamic ecosystems, located at the interface of land and sea. An analysis of air photos taken over a 50-year period (1955-2005) has shown measurable change in these systems, including channel abandonment and spruce establishment on beach ridges (Fig. 1). Salt marsh communities are highly diverse, ranging from tidally-inundated sedge (e.g., *Carex ramenskii*) meadows to shrub-dominated (e.g., *Myrica gale*) bogs.

The nunatak and salt marsh monitoring sites will be revisited every ten years, and where possible, aerial photos and ancillary climate data, e.g., Remote Area Weather Stations (RAWS) and Moderate-resolution Imaging Spectroradiometer (MODIS) will be used to interpret change. For example, changes in snow depth and duration, and, in the case of nunataks, increased snow accumulation or ablation, could have measurable effects on site area, species establishment, and turnover.

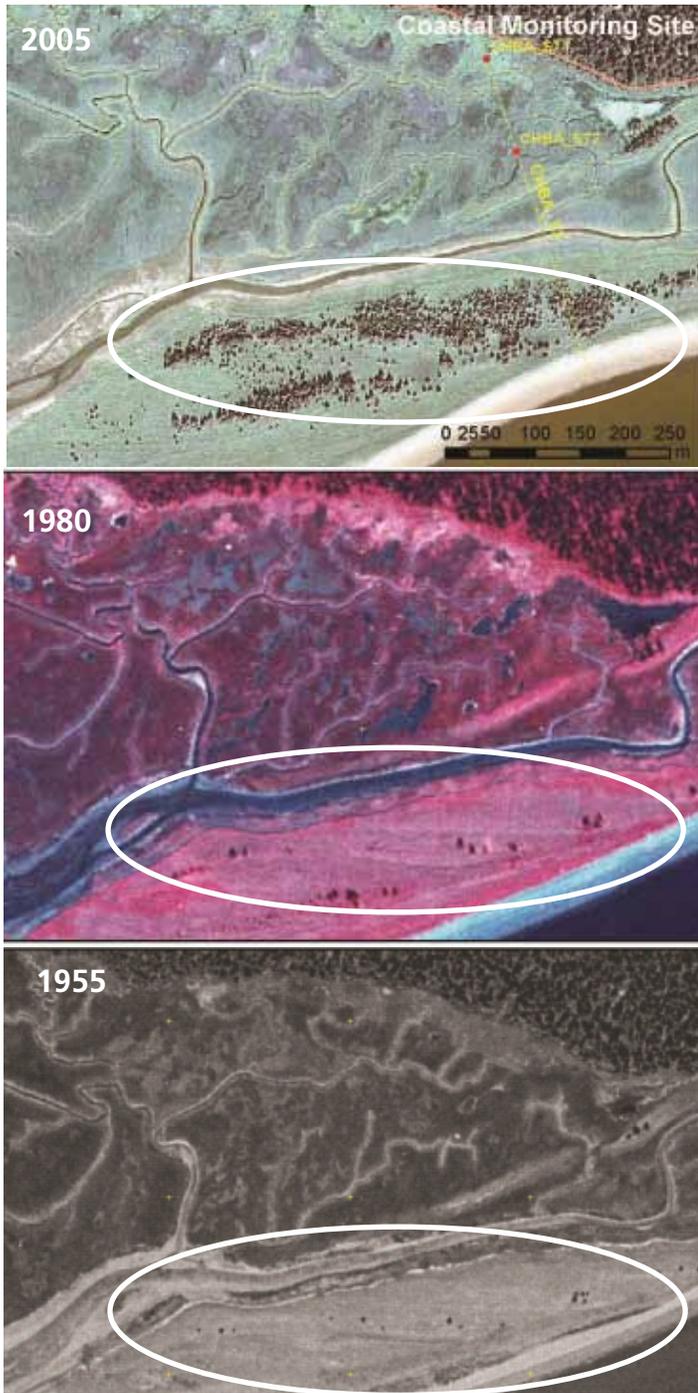


Figure 1. These images show spruce establishment on beach ridges along Chinitna Bay, LACL, over a 50 year period. Air photos from 1955 and 1980 were orthorectified (geometrically corrected) to an IKONOS base image from 2005 to estimate changes in tree cover. Spruce tree cover expanded approximately 7% between 1955 and 2005.



Salt marshes provide important foraging habitat for brown bears (Hallo Bay, KATM).



SWAN and ABR ecologists sample salt marsh vegetation at Hallo Bay, KATM. A series of plots were established from the tide line to the upland along four transects.

References

Carlson ML, Lipkin R, Roland CA, Miller AE. Recent notable vascular plant collections from south-central and southwest Alaska. *Canadian Field Naturalist* (in review).

Contacts

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