

# Nunatak Communities

## Vital Signs Monitoring- Southwest Alaska Network



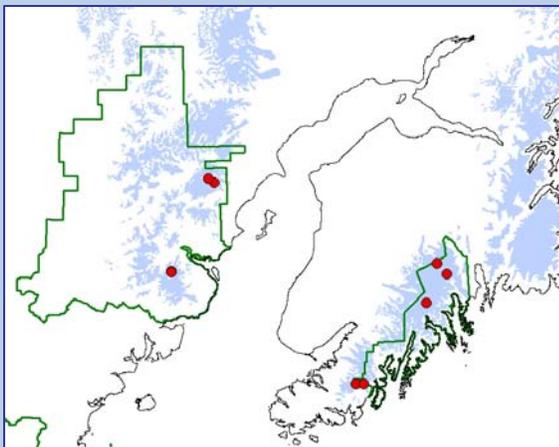
### Importance / Issues

Nunataks, or exposed mountain ridges surrounded by ice, were included as a SWAN vital sign under sensitive plant communities. Nunataks are of interest due to their geographic isolation and because they may have supported populations that survived the Last Glacial Maximum, approximately 20,000 years bp. In addition to harboring regionally or globally rare species, nunataks are sensitive to subtle changes in climate. They may also play an important role in the re-establishment of plant and animal species in recently deglaciated areas. In 2005, the SWAN, in cooperation with the Alaska Natural Heritage Program, found seven species of conservation concern and four new range extensions during an inventory of nunatak flora in Lake Clark NPP (LACL) and Kenai Fjords NP (KEFJ).

### Sampling Design and Objectives

Monitoring objectives for sensitive plant communities are to estimate long-term changes in species richness, cover and diversity in focal communities, and, where applicable, document changes in woody species abundance.

A GIS was used to select locations for nunatak monitoring  $\geq 1.5$  km from the ice margin and  $\geq 25$  ha in area. At each site, two to three 30-m permanent transects were established in one or more dominant communities (Miller et al. 2006).



Location of nunatak monitoring sites in LACL and KEFJ. Glaciers are indicated in blue.



Top: Mt. Redoubt and Double Glacier, Lake Clark NPP. Lower left: SWAN ecologist Amy Miller uses a 0.25 m<sup>2</sup> quadrat to document species composition on a nunatak in Lake Clark NPP. Lower right: *Kumlienias cooleyae* (Cooley's buttercup) was one of several rare species found on nunataks.

### Current and Future Monitoring

In 2005, 8 permanent monitoring sites were established in LACL and KEFJ for monitoring changes in species composition and cover on nunataks.

The sites will be revisited every 2-3 years for the first ten years of monitoring, and at 5-10 year intervals thereafter. Funds permitting, additional sites may be added in the future. Historic survey and high-altitude aerial photography, late-season Landsat TM/ETM+ scenes, and IKONOS imagery will be used to track changes in snow and ice cover around nunataks. Where possible, ancillary climate data will be used to interpret short-term variation and longer-term change.

### Contacts:

Amy Miller, SWAN [amy\\_e\\_miller@nps.gov](mailto:amy_e_miller@nps.gov)

Miller, A., M. Carlson, R. Lipkin, and P. Spencer. 2006. Vascular plant inventory and baseline monitoring of nunatak communities (2005). Lake Clark National Park & Preserve and Kenai Fjords National Park. Southwest Alaska Network, National Park Service, Anchorage, AK. 43 pp.