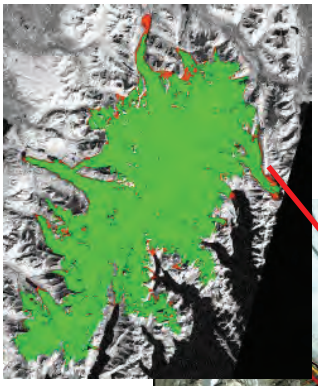
Glacial Extent

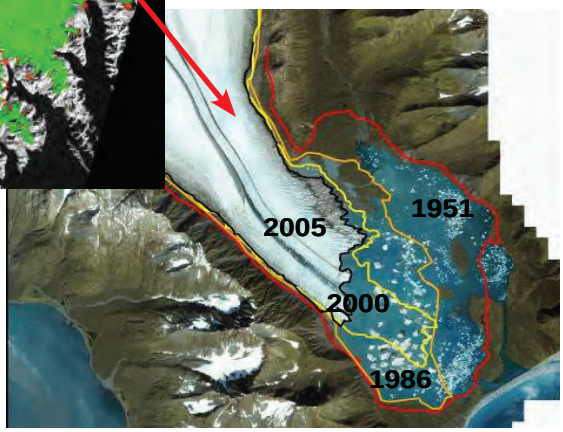
Resource Brief

Importance

Glaciers are a significant feature in the SWAN park units, especially in Katmai NPP (KATM), Kenai Fjords NP (KEFJ) and Lake Clark NPP (LACL), where glaciers/permanent snowfields comprise approximately 5%, 50% and 22% of the landscape, respectively. Alaska's glaciers have been retreating since the waning of the Little Ice Age (~100 years ago). Although historically ice loss occurred at varying rates, current evidence suggests that the rate has increased in recent decades. This widespread glacial recession is largely responsible for substantial landscape changes in SWAN park units that are visible today. Glaciers act as huge ice reservoirs for many of the large freshwater systems in the Network and as such, glacial extent directly affects the character of the Network's watersheds and is indicative of potential shifts in aquatic communities.



Changes in the Harding Icefield - green represents glacier ice present in 2000; red represents areas of additional glacial coverage in 1986 (Hall et al. 2005).

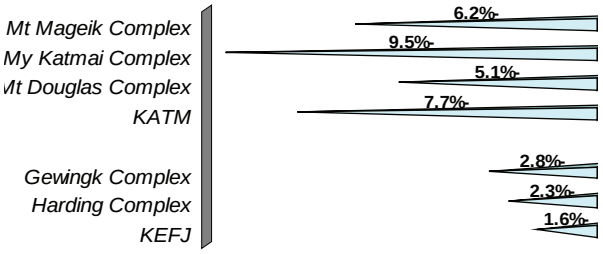


A 2005 Ikonos image of the Bear Glacier (KEFJ). Glacier terminus positions shown in red (1951), orange (1986), yellow (2000) and black (2005).

Long-term Monitoring

Landsat satellite imagery is being used to map glacier extent on a decadal scale in SWAN park units. Icefields and outlying glaciers are delineated using a combination of automated and manual methods. Geographic Information System (GIS)analysis is used to quantify change in glacier extent and identify those areas that are changing anomalously.

Glacier Retreat (percent loss) by Park



Overall glacier extent declined by 1.6% and 7.7%, respectively, in KEFJ and KATM between 1986/87 and 2000. However, the decline varies across the region. For example, the Mt. Katmai complex covered 563 km^2 in 1986 and 509 km^2 in 2000, a loss of 9.5%. The Harding Icefield complex, which extends beyond the park boundary, covered 1,828 km^2 in 1986 and 1,786 km^2 in 2000, a loss of 2.3%.

Status and Trends

In KATM from the early 1950s through 2000, interior-flowing glaciers exhibited rates of recession averaging 18 m/yr; coastal-flowing glaciers averaged a retreat of 17 m/yr. During the 1986/87 to 2000 time period, coastal-flowing glaciers exhibited rates of recession averaging 9 m/yr, whereas interior-flowing glaciers receded at more than twice that rate (19 m/yr). Glacier termini completely mantled by thick volcanic ash exhibited very little change in area.

All glacier termini measured in KEFJ have receded between the early 1950s and 2005; some have moved back dramatically. From the early 1950s through 2000, interior-flowing glaciers exhibited rates of recession averaging 29 m/yr, whereas coastal-flowing glaciers averaged 32 m/yr. However, between 2000 and 2005, the coastal glaciers in KEFJ show a dramatic increase in recession rates (78 m/yr), largely due to the dramatic recession of the Bear Glacier during this time.

Glacier mapping continues in LACL; no analysis is available at this time.

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