



Alagnak

Aniakchak

Katmai

Kenai Fjords

Lake Clark

Coastal Shoreline Change

Resource Brief
October 2011

Importance

Land loss or gain at the marine edge has important ecological and boundary implications. The SWAN coastal shoreline is dynamic and constantly changing due to coastal accretion and erosion from natural events, such as storm-driven waves, high tides, nearshore currents, rainfall and runoff, landslides, and earthquakes. Changes in the position of the shoreline affect the composition, relative abundance, and distribution of coastal habitats.



Long-term Monitoring

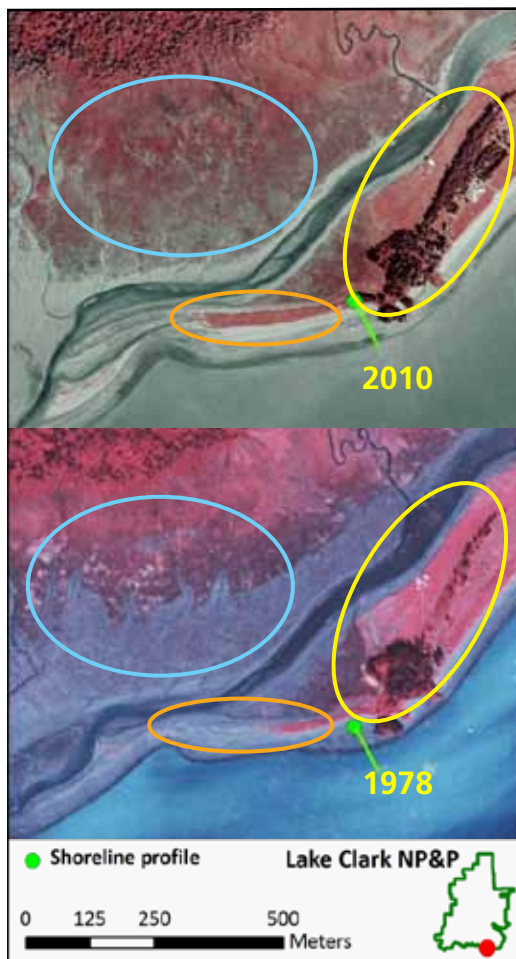
Ten shoreline profiles were established along the coast of LACL in 1992 and were revisited in 1994, 2004, and 2011. The profiles were established using optical leveling techniques along a draped tape and were referenced to local benchmarks. Collectively, they

represent the longest repeated field survey of coastal shoreline change in the SWAN. Changes in elevation and position along a shoreline profile result from accretion or erosion.

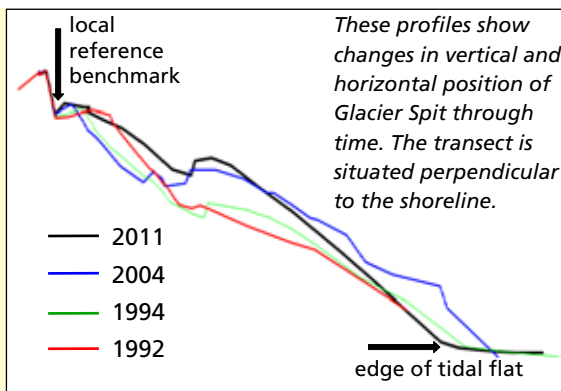
Aerial photography and satellite imagery of SWAN coastal areas were acquired in 1948-1957, 1977-1986, 1989-1994, and 2004-2011. These photographs and imagery are being orthorectified (corrected for distortion) using satellite-based digital elevation models and a limited number of ground control points. The resolutions of these products are sufficient to document meter-scale changes in coastline and other features.

Discussion

In 2011 the shoreline profiles were measured using optical leveling and survey-grade Real-Time Kinematic Global Positioning Systems. A passive control network was also established using geodetic monuments, increasing accuracy (centimeter-level), and precise of horizontal and vertical data. Analysis of shoreline change over larger areas can be done in a Geographic Information System using orthorectified photographs and imagery. Spatial analyses can quantify rates of erosion or accretion, as well as changes in rates through time. Analyses will be completed for selected areas of interest when orthorectified images are available for the entire SWAN coastline.



Comparison of orthorectified aerial photographs (left) of Glacier Spit in Chinitna Bay, LACL from 1978 and 2010. The shoreline profile and local benchmark are represented by the green line and circle. Changes are evident in spit development (orange circles), wetlands (blue circles), and forested areas (yellow circles).



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