Resource Brief
Southeast Alaska Network

National Park Service
U.S. Department of the Interior

Inventory & Monitoring Program

Oceanography

Glacier Bay National Park and Preserve
Klondike Gold Rush National Historical Park
Sitka National Historical Park

Importance

Glacier Bay National Park and Preserve is one of the largest and most "marine" parks in the country, with 1,200 miles (1,930 km) of coastline encompassing nearly 600,000 acres of federally protected marine waters and submerged lands. The incredible biological productivity of Glacier Bay - from primary producers to apex predators - is largely driven by oceanographic conditions across space and time. Many of the park's animals, including Kittlitz's murrelets, humpback whales, and brown bears, are directly or indirectly influenced by physical, biological, and chemical attributes of ocean waters. Consequently, understanding the oceanographic factors that ultimately control marine productivity, and thereby influence the entire park, is critical to wise stewardship. To monitor and better understand changes in ocean water, a set of physical parameters is measured at regular intervals. Representing one of the longest-running oceanographic datasets in Alaskan waters, this monitoring effort provides a consistent dataset from which analyses can be used to better understand how the marine physical environment impacts the abundant marine life found within Glacier Bay. Originally initiated in 1993 and operated in partnership with U.S. Geological Survey through 2008, NPS took on full responsibility for the program in 2009 and completed a comprehensive update and peer-reviewed monitoring protocol based on recommendations from a 2006 program review.

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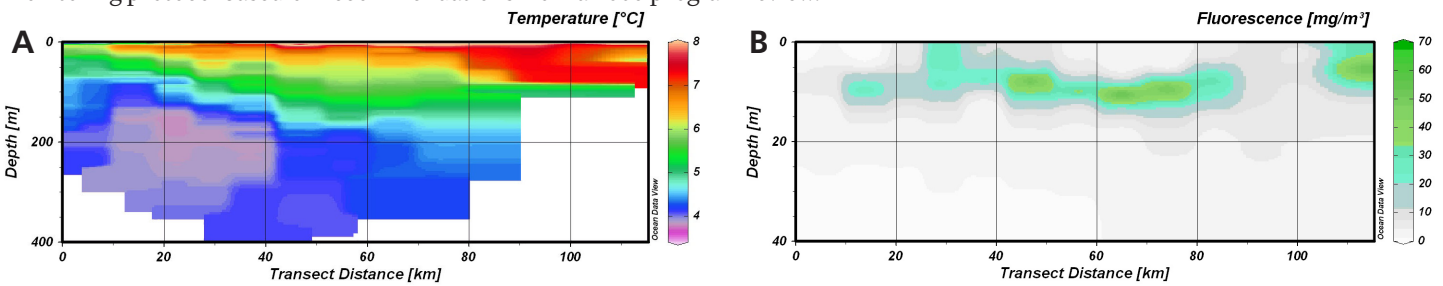

The two graphics represent a transect from up-bay (near glaciers) on the left to lower-bay on the right. The data, from July 2009, shows characteristics of a glacial fjord estuary. Water is colder closer to the glaciers (A) where chilled, fresh, and less-dense meltwater is abundant and 'floats' on tops of more saline water. Fluorescence (B), a measure of chlorophyll-a and an indicator of primary productivity, is highest at shallow depths.

Program Design

Vertical profiling of the water column is conducted in Glacier Bay proper and adjacent Icy Strait using sensors that record temperature, depth, conductivity (salinity), turbidity (clarity), photosynthetically available radiation (light), dissolved oxygen, and fluorescence (an index of chlorophyll-*a*). Sampling at seven select stations occurs monthly March to October to describe seasonal variation during times of highest productivity and dynamism. In July and December, 15 additional stations are sampled to detect annual or longer signals.

Status and Trends

The Network delivers annual and 5-year reports on the status and trends of oceanographic conditions in Glacier Bay. In 2009, all parameters were observed to fall within the expected range based on data collected since 1993 with the exception of temperature. Anomalously cold conditions were recorded across many stations and depths in 2009. In cooperation with researchers at the University of Alaska-Fairbanks, the Network is presently conducting a 5-year analysis to improve understanding of long-term trends and to put recent observations in an appropriate long-term and broader-scale context.

A National Park Service researcher deploys a CTD instrument (Conductivity-Temperature-Depth) to measure water column characteristics at a sampling station in Glacier Bay. This monitoring effort aims to document interannual and seasonal variation in physical oceanographic conditions in Glacier Bay and to provide a baseline oceanographic dataset that can be used by researchers to understand spatial and temporal variation in the biological productivity of Glacier Bay.

Reports, Data Access, and References:
http://science.nature.nps.gov/im/units/sean/OC_main.aspx

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