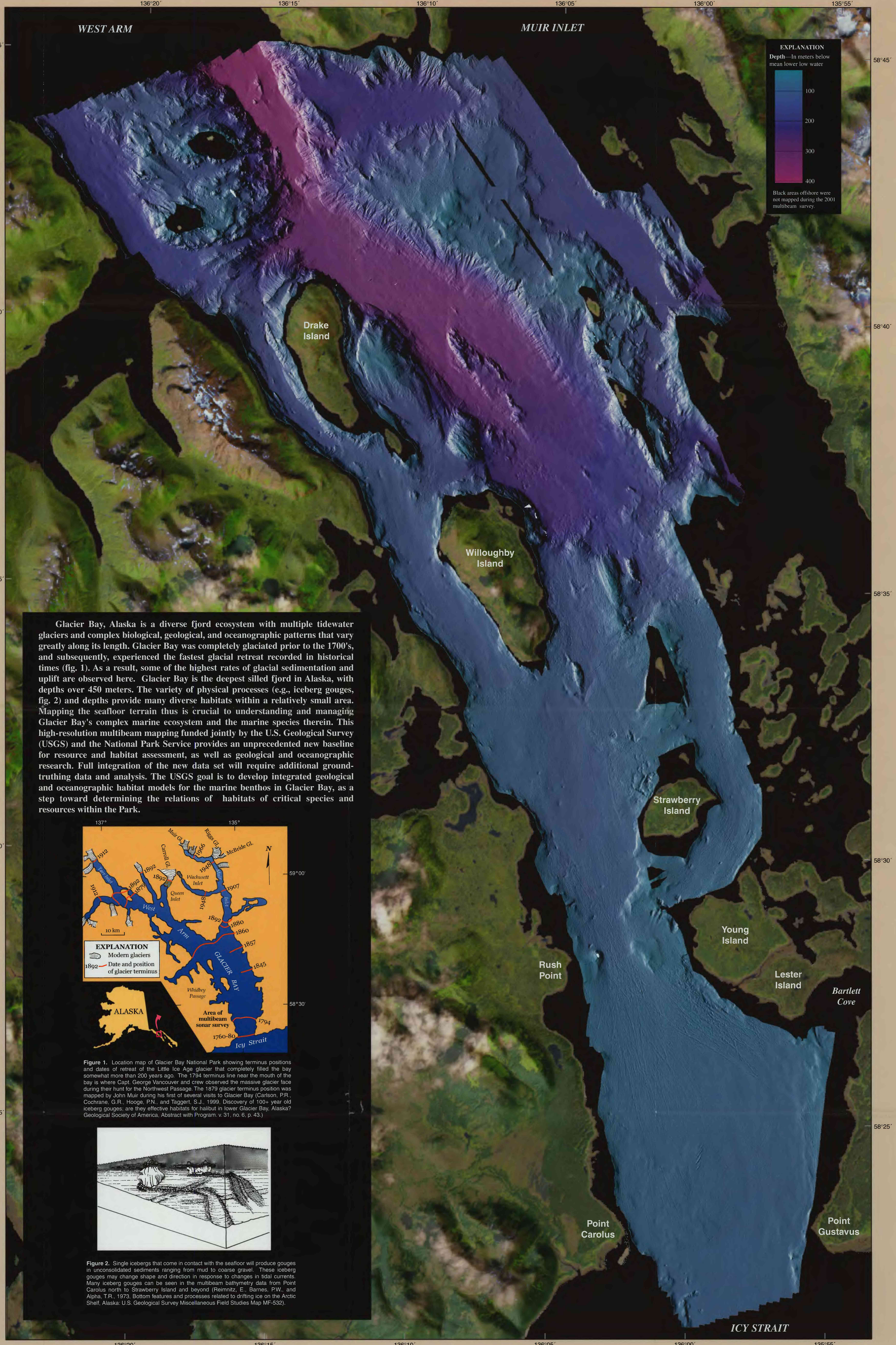
U.S. Department of the Interior
U.S. Geological Survey

WATER-RESOURCES INVESTIGATIONS REPORT 03–4141
Sheet 1 of 2
Bathymetry and Perspective Views
Carlson, P.R., and others, 2003
Multibeam bathymetry and selected perspective views of Glacier Bay, Alaska

GLACIER BAY NATIONAL PARK, ALASKA



Glacier Bay, Alaska is a diverse fjord ecosystem with multiple tidewater glaciers and complex biological, geological, and oceanographic patterns that vary greatly along its length. Glacier Bay was completely glaciated prior to the 1700's, and subsequently, experienced the fastest glacial retreat recorded in historical times (fig. 1). As a result, some of the highest rates of glacial sedimentation and uplift are observed here. Glacier Bay is the deepest silled fjord in Alaska, with depths over 450 meters. The variety of physical processes (e.g., iceberg gouges, fig. 2) and depths provide many diverse habitats within a relatively small area. Mapping the seafloor terrain thus is crucial to understanding and managing Glacier Bay's complex marine ecosystem and the marine species therein. This high-resolution multibeam mapping funded jointly by the U.S. Geological Survey (USGS) and the National Park Service provides an unprecedented new baseline for resource and habitat assessment, as well as geological and oceanographic research. Full integration of the new data set will require additional ground-truthing data and analysis. The USGS goal is to develop integrated geological and oceanographic habitat models for the marine benthos in Glacier Bay, as a step toward determining the relations of habitats of critical species and resources within the Park.

Figure 1. Location map of Glacier Bay National Park showing terminus positions and dates of retreat of the Little Ice Age glacier that completely filled the bay somewhat more than 200 years ago. The 1794 terminus line near the mouth of the bay is where Capt. George Vancouver and crew observed the massive glacier face during their hunt for the Northwest Passage. The 1879 glacier terminus position was mapped by John Muir during his first of several visits to Glacier Bay (Carlson, P.R., Cochrane, G.R., Hooge, P.N., and Taggert, S.J., 1999, Discovery of 100+ year old iceberg gouges; are they effective habitats for halibut in lower Glacier Bay, Alaska? Geological Society of America, Abstract with Program. v. 31, no. 6, p. 43.)

Figure 2. Single icebergs that come in contact with the seafloor will produce gouges in unconsolidated sediments ranging from mud to coarse gravel. These iceberg gouges may change shape and direction in response to changes in tidal currents. Many iceberg gouges can be seen in the multibeam bathymetry data from Point Carolus north to Strawberry Island and beyond (Reimnitz, E., Barnes, P.W., and Alpha, T.R., 1973, Bottom features and processes related to drifting ice on the Arctic Shelf, Alaska: U.S. Geological Survey Miscellaneous Field Studies Map MF-532).

Base from U.S. Geological Survey digital data, 1:24,000 and 1:100,000, 1969-85
Universal Transverse Mercator projection, Zone 8, WGS84 ellipsoid.

SCALE: 1:50 000

KILOMETERS 3 0 3 6

NAUTICAL MILES 3 0 3

Bathymetry image generated from multibeam-bathymetry data acquired July 2001 by the U.S. Geological Survey in cooperation with the National Park Service, Glacier Bay using a Reson 8101 multibeam sonar system. Bathymetry pixel resolution is 5-meters. Depths are in meters below the sea level referenced to mean lower, low water. Land image generated by combining Landsat-5 imagery (acquired 6/27/1995, bands 7,4,1, 30-m pixel resolution) with shaded-relief imagery generated from USGS 7.5 minute DEM's.

More information available on World Wide Web at
<http://geopubs.wr.usgs.gov/open-file/of02-391> [last modified October 31, 2002]

Bathymetry formal metadata available on World Wide Web at
<http://geopubs.wr.usgs.gov/open-file/of02-391/gb-data.html>

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U.S. Geological Survey, Branch of Information Services,
Box 25286, Denver, CO 80225-0286

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MULTIBEAM BATHYMETRY AND SELECTED PERSPECTIVE VIEWS OF GLACIER BAY, ALASKA

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2003