U.S. Department of the Interior
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Scientific Investigations Map 3122
Sheet 1 of 4
Pamphlet accompanies map

High-Resolution Bathymetry and Perspective Views of Muir Inlet, Glacier Bay National Park and Preserve, Alaska

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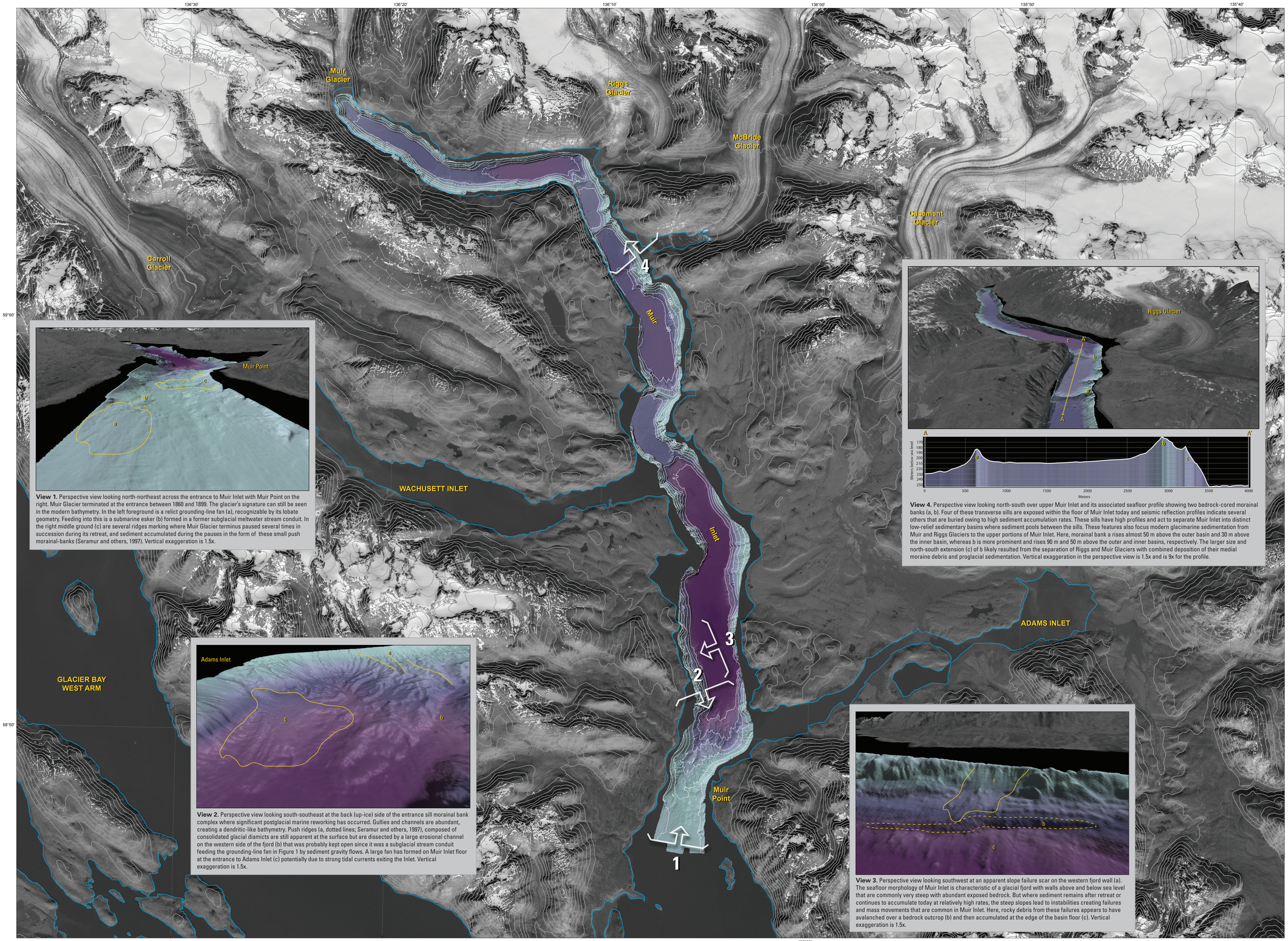
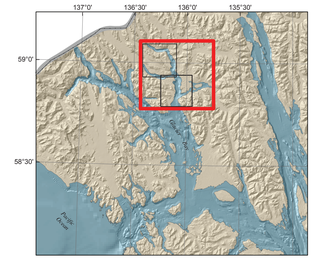


View 1. Perspective view looking north-northeast across the entrance to Muir Inlet with Muir Point on the right. Muir Glacier terminated at the entrance between 1860 and 1899. The glacier's signature can still be seen in the modern bathymetry. In the left foreground is a relict grounding-line fan (a), recognizable by its lobate geometry. Feeding into this is a submarine esker (b) formed in a former subglacial meltwater stream conduit. In the right middle ground (c) are several ridges marking where Muir Glacier terminus paused several times in succession during its retreat, and sediment accumulated during the pauses in the form of these small push morainal-banks (Seramur and others, 1997). Vertical exaggeration is 1.5x.

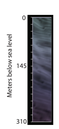
View 2. Perspective view looking south-southeast at the back (up-ice) side of the entrance sill morainal bank complex where significant postglacial marine reworking has occurred. Gullies and channels are abundant, creating a dendritic-like bathymetry. Push ridges (a, dotted lines; Seramur and others, 1997), composed of consolidated glacial diamicts are still apparent at the surface but are dissected by a large erosional channel on the western side of the fjord (b) that was probably kept open since it was a subglacial stream conduit feeding the grounding-line fan in Figure 1 by sediment gravity flows. A large fan has formed on Muir Inlet floor at the entrance to Adams Inlet (c) potentially due to strong tidal currents exiting the Inlet. Vertical exaggeration is 1.5x.

View 4. Perspective view looking north-south over upper Muir Inlet and its associated seafloor profile showing two bedrock-cored morainal banks (a, b). Four of these transverse sills are exposed within the floor of Muir Inlet today and seismic reflection profiles indicate several others that are buried owing to high sediment accumulation rates. These sills have high profiles and act to separate Muir Inlet into distinct low-relief sedimentary basins where sediment pools between the sills. These features also focus modern glacimarine sedimentation from Muir and Riggs Glaciers to the upper portions of Muir Inlet. Here, morainal bank a rises almost 50 m above the outer basin and 30 m above the inner basin, whereas b is more prominent and rises 90 m and 50 m above the outer and inner basins, respectively. The larger size and north-south extension (c) of b likely resulted from the separation of Riggs and Muir Glaciers with combined deposition of their medial moraine debris and proglacial sedimentation. Vertical exaggeration in the perspective view is 1.5x and is 9x for the profile.

View 3. Perspective view looking southwest at an apparent slope failure scar on the western fjord wall (a). The seafloor morphology of Muir Inlet is characteristic of a glacial fjord with walls above and below sea level that are commonly very steep with abundant exposed bedrock. But where sediment remains after retreat or continues to accumulate today at relatively high rates, the steep slopes lead to instabilities creating failures and mass movements that are common in Muir Inlet. Here, rocky debris from these failures appears to have avalanched over a bedrock outcrop (b) and then accumulated at the edge of the basin floor (c). Vertical exaggeration is 1.5x.



Location map showing locations of map (red) and upper (sheet 2) and lower (sheet 3) Muir Inlet.



Base from U.S. Geological Survey, National Elevation Dataset
NASA Landsat 7 Imagery, 1999
Universal Transverse Mercator Zone 8N Projection, WGS84

SCALE 1:63360
0 1.25 2.5 5 MILES
10,000 5,000 0 10,000 FEET
0 1.25 2.5 5 KILOMETER
LAND CONTOUR INTERVAL 100 METERS
BATHYMETRY CONTOUR INTERVAL 40 METERS
SEA LEVEL, CYAN

Seafloor geology mapped by Luke D. Trusel, 2008. Based on multibeam sonar data collected in June 2004 under National Science Foundation award OCE03-41096

GIS database and digital cartography by Luke D. Trusel. Based on cartography by Karen L. Wheeler.

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