

Base enlarged from Blying Sound D-8 1:63,360 quadrangle. Shorelines were adjusted from 1977 and 1978 air photography to show present approximate mean high water, and reflect changes in the coastline due to the 1964 Alaskan earthquake. Glaciers are sketched and contoured to show approximate 1978 conditions. Compiled at U.S. Geological Survey, Project Office - Glaciology, Tacoma, Wash.

Setting
Aialik Bay is a beautiful inlet situated on the coast of the Gulf of Alaska southwest of Seward, Alaska. The shores of the bay "are very irregular being indented by many approximately semicircular small bays and coves which represent old glacial cirques partly or completely drowned" (Grant and Higgins, 1913, p. 57). The bay heads in Aialik Glacier, which descends steeply from the Harding Icefield and discharges innumerable icebergs from a tidal ice cliff as much as 300 ft (100 m) high.

Bathymetry
Aialik Bay was surveyed by the U.S. Coast and Geodetic Survey (now National Oceanic and Atmospheric Administration-NOAA) Survey Register No. H-3412, scale 1:40,000, dated 1912. In the northern part of the bay, shown here, this survey was incomplete, and the positions of soundings and shorelines were shown only approximately. This survey was enlarged and adjusted to best fit the modern maps, and the soundings were transferred to this sheet (fig. 1, large numbers).

In June 1978, the U.S. Geological Survey 50-ft Research Vessel Growler, while collecting data on drastically calving glaciers, spent two days in Aialik Bay with a Ross 4028^m depth recorder, collecting the field data reported here. The soundings shown in small numbers in fig. 1 were adjusted to approximate lower low water from plots made from predicted tides for nearby stations compiled by the National Ocean Survey, National Oceanic and Atmospheric Administration. Positions were obtained with a Decca 110 radar equipped with a precision measuring device. As thick brash ice was present, the soundings lines were necessarily crooked with many speed variations. Data was obtained only in areas where shown, and mariners are cautioned that undetected rocks and shoals may exist.

*The use of brand names or model numbers in this report does not imply endorsement by the U.S. Geological Survey.

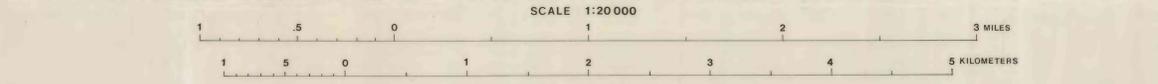
Neoglacial Advance

A terminal-moraine shoal crosses the head of Aialik Bay 5 mi (8 km) from the glacier. This marks the glacier's greatest neoglacial extent (hooked line dated 1807; profiles A-A' and B-B', fig. 2). Although the slopes of the bay are thickly covered with dense brush thickets, the absence of forest gives the illusion that the glacier ended on the moraine quite recently. Close inspection, however, reveals that there are very few large trees anywhere in the northern part of the bay and that the few scattered trees or groups of trees present are situated both within and outside the moraine limit. The absence of forest is evidently due to local climatological effects similar in nature to those in undrained areas in Blackstone Bay and College Fjord (Cooper, 1942, p. 11, 16).

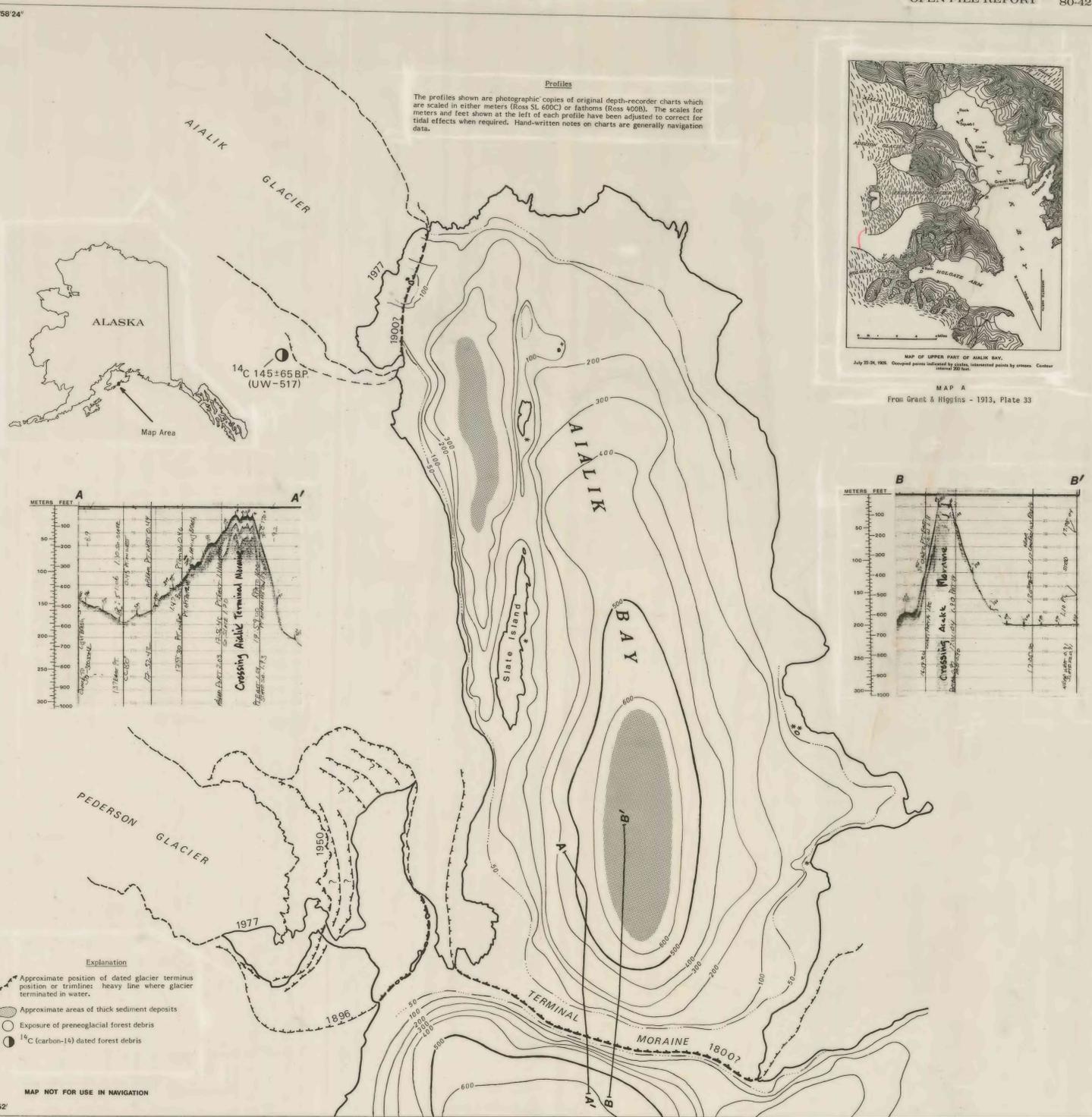
A faint lateral trimline or lateral moraine on the east side of the bay rises slowly in a northerly direction from the terminal-moraine bar. This feature appears to be recent, and an attempt was made in 1978, without success, to detect some changes in vegetation where a stream crossed the moraine line. An unsuccessful search was also made for preneoglacial forest debris in the same stream channel and in a small till deposit west of the south end of Slate Island. A more extensive search may reveal data from which this advance may be dated.

It is presumed, with little direct proof, that Aialik Glacier began advancing in tidewater perhaps 2000 to 4000 years ago, which is a period of glacier advance in nearby fjords (Post, 1979a; 1979b).

PRELIMINARY BATHYMETRY OF AIALIK BAY AND NEOGLACIAL CHANGES OF AIALIK AND PEDERSON GLACIERS, ALASKA



CONTOUR INTERVAL 100 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929
DEPTH CURVES AND SOUNDINGS IN FEET-DATUM IS MEAN LOWER LOW WATER
SHORELINE SHOWN REPRESENTS THE APPROXIMATE LINE OF MEAN HIGH WATER
THE MEAN RANGE OF TIDE IS APPROXIMATELY 8 FEET
By Austin Post 1980



Neoglacial Retreat

Grant and Higgins estimated in 1909 that Aialik Glacier terminated on the moraine "several centuries ago" (1913, p. 58). In 1978 a fragment of a stump, judged to be from shrubbery similar to living alders growing on the slopes above, was found in a stream channel on the south side of Aialik Glacier. This wood had a carbon-14 date of 1524±65 years before present (B.P.). This provides a minimum date since the glacier retreated to near its present position. If the retreat from the terminal moraine was rapid, as all observed tidal glacier retreats in similar situations, the retreat could have begun as recently as 1800 A.D.

Grant and Higgins noted a recent "maximum position" moraine and trimline about 0.25 mi (0.4 km) in front of Aialik Glacier, from which the glacier had retreated about 10 years earlier (hooked line dated 1907, fig. 2). Since 1909 the glacier has retreated slightly from rocks near the center of the ice cliff; an embayment apparently opens and closes on the south side during some years, but overall the change in position is minor. Clearly the glacier terminates at the head of tidewater at a retracted, stable position. Major advance can occur only when this glacier, a debris-free glacier, can accumulate enough boulders and coarse rock to build a terminal-moraine barrier which will greatly reduce calving losses. This apparently will take a much longer time for this glacier than for debris-laden glaciers such as the Grand Pacific or Johns Hopkins Glaciers in Calving Bay, which have advanced over 1 km since their drastic retreats which ended only about 30 years ago.

Pederson Glacier

This glacier, which practically filled a tidal lagoon in 1909 (Map A), has retreated about 0.8 mi (1.3 km) from a maximum neoglacial moraine which Grant and Higgins estimated had been in contact with the ice about 15 years earlier (hooked line, fig. 2, dated 1896). The 1912 moraine was plotted from air photography; the question-marked moraines were plotted from aerial photographs and have not been checked on the ground.

Sediment Accumulation
Although the construction of a terminal-moraine barrier in front of the present Aialik Glacier is evidently a slow process, the deposit of fine rock debris which can flow to, and pond in, the deepest basins, is clearly taking place. Flat, featureless flow to, and pond in, the deepest basins, is clearly taking place. Flat, featureless flow to, and pond in, the deepest basins, is clearly taking place. Flat, featureless flow to, and pond in, the deepest basins, is clearly taking place.

East of Slate Island is a much larger flat-floored basin (shown in part in profile B-B') with present depth of 640 ft (193 m) when in 1912 the depth was 660 ft (201 m). These figures suggest similar accumulation but at a much slower rate than the west basin.

Acknowledgments

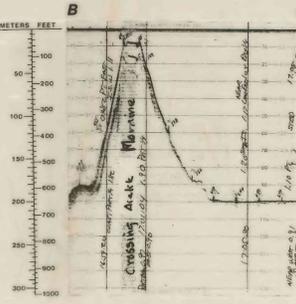
This study was aided by instruments, charts, and data provided by the National Ocean Survey, National Oceanic and Atmospheric Administration. Carbon-14 dating was done by the University of Washington, Seattle, Wash.

References

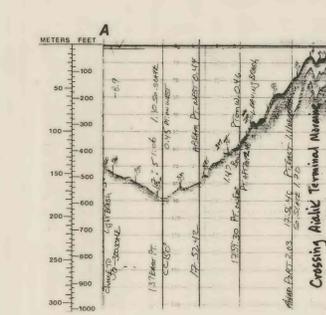
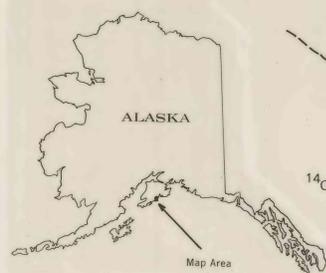
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MAP A
From Grant & Higgins - 1913, Plate 33



The profiles shown are photographic copies of original depth-recorder charts which are scaled in either meters (Ross SI 600C) or fathoms (Ross 400B). The scales for meters and feet shown at the left of each profile have been adjusted to correct for tidal effects when required. Hand-written notes on charts are generally navigation data.



Explanation
Approximate position of dated glacier terminus position or trimline; heavy line where glacier terminated in water.
Approximate areas of thick sediment deposits
Exposure of preneoglacial forest debris
14C (carbon-14) dated forest debris