FIGURE 2.—Slumping of 2-m-high bluff following formation of basal niche.

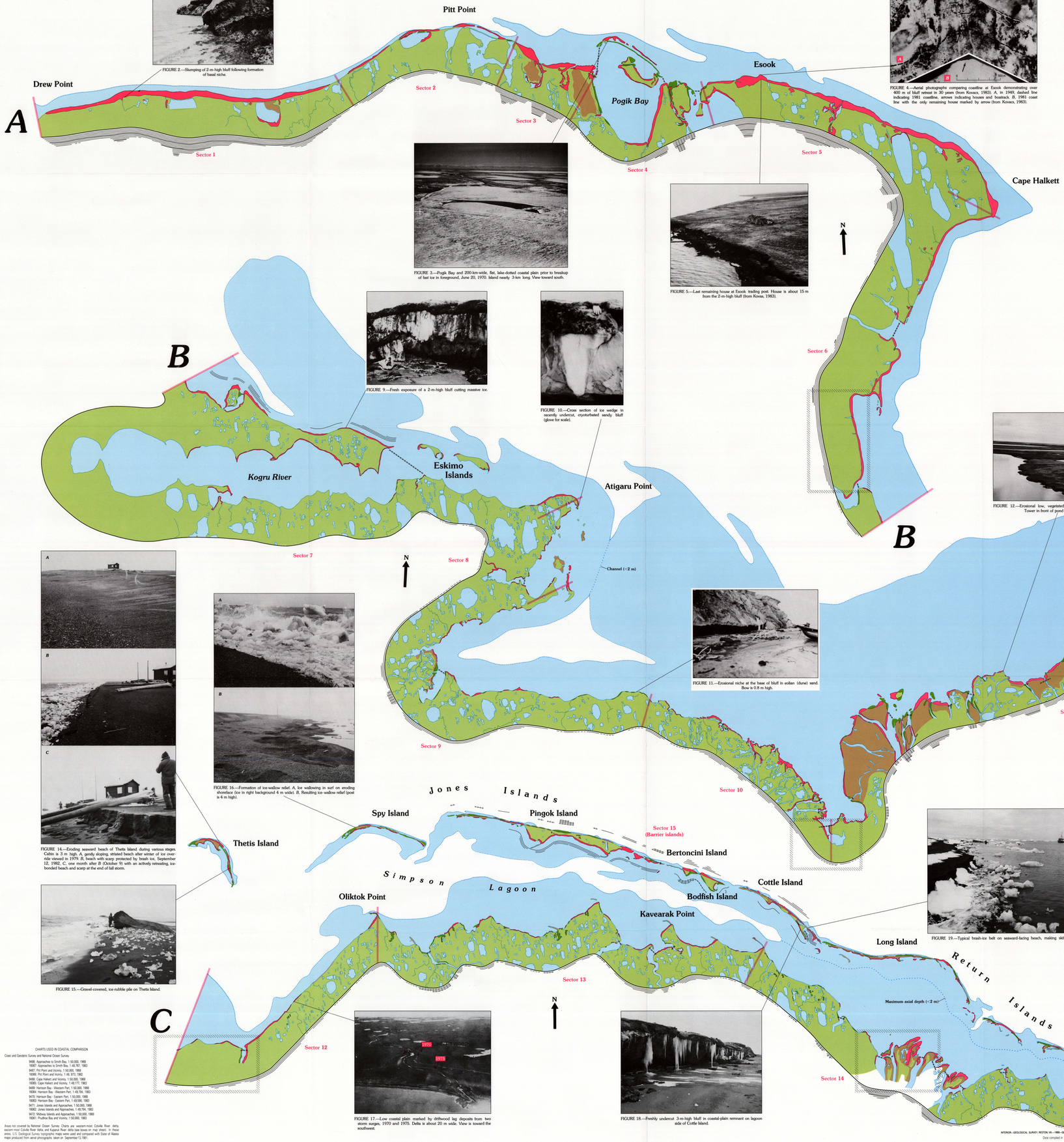


FIGURE 3.—Pogik Bay and 200-km-wide, flat, lake-dotted coastal plain prior to breakup of last ice in foreground, June 20, 1970. Island nearly 3-km long. View toward south.

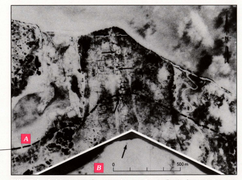


FIGURE 4.—Aerial photographs comparing coastline at Esook demonstrating over 400 m of bluff retreat in 30 years (from Kovacs, 1983). *A*, in 1949, dashed line indicating 1981 coastline; arrows indicating houses and boatrack. *B*, 1981 coast line with the only remaining house marked by arrow (from Kovacs, 1983).

FIGURE 5.—Last remaining house at Esook trading post. House is about 15 m from the 2-m-high bluff (from Kovac, 1983).

FIGURE 6.—Aerial photograph of beach transgressing over low tundra with ice-wedge polygons (from Kovac, 1983). Average-sized polygon is 7 m across.

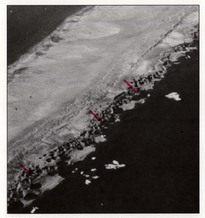


FIGURE 7.—Seaward side of a barrier island showing ice-wallow relief (arrows). Barrier island is 40 m wide in this section.

FIGURE 8.—Pillows of anchor ice (underwater ice attached to submerged objects) seems to be widespread in shallow coastal waters during breeze-up storms. Pillow in foreground is 50 cm across, attached to medium-grained unfrozen sand at 5-m water depth.

FIGURE 9.—Fresh exposure of a 2-m-high bluff cutting massive ice.

FIGURE 10.—Cross section of ice wedge in recently undercut, cryoturbated sandy bluff (glove for scale).

FIGURE 11.—Erosional niche at the base of bluff in eolian (dune) sand. Bow is 0.8 m high.

FIGURE 12.—Erosional low, vegetated, inactive Colville River delta. Tower in front of pond is 15 m high.

FIGURE 13.—Mud flat on prograding part of Colville River delta, viewed southward. Large channel is about 400 m wide.

FIGURE 14.—Eroding seaward beach of Thetis Island during various stages. Cabin is 3 m high. *A*, gently sloping, striated beach after winter of ice cover-ride viewed in 1979. *B*, beach with scarp protected by brush ice, September 12, 1982. *C*, one month after *B* (October 9) with an actively retreating, ice-bonded beach and scarp at the end of fall storm.

FIGURE 16.—Formation of ice-wallow relief. *A*, Ice wallowing in surf on eroding shoreface (ice in right background 4 m wide). *B*, Resulting ice-wallow relief (post is 4 m high).

FIGURE 15.—Gravel-covered, ice-rubble pile on Thetis Island.

FIGURE 17.—Low coastal plain marked by driftwood lag deposits from two storm surges, 1970 and 1975. Delta is about 20 m wide. View is toward the southwest.

FIGURE 18.—Freshly undercut 3-m-high bluff in coastal-plain remnant on lagoon side of Cottle Island.

FIGURE 19.—Typical brush-ice belt on seaward-facing beach, making skiff landings easy.

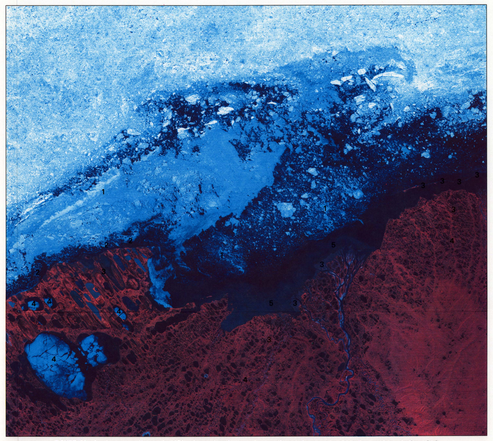
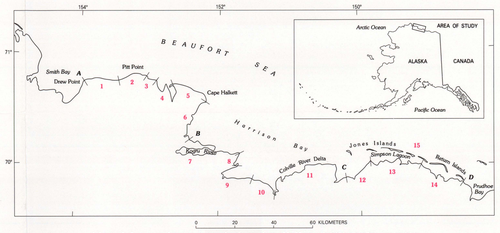


FIGURE 20.—Landsat image (August 1, 1976) of central study area showing: (1) typical summer ice distribution, restricting significant fetch to warm, shallow, coastal leads, (2) absence of protecting barriers along Cape Halkett coast, where most sediment is introduced, (3) tundra-covered older surfaces (including numerous islands), versus recent, active, and barren surfaces (delta flats and barrier islands), (4) deep (over 2 m) ice-covered lakes versus shallow ones, and (5) sediment-laden waters in inner Harrison Bay.



Index map for 3 major coastal segments represented on this map sheet and for 15 sectors for which calculations were tabulated (Reimnitz and others, 1985).

EXPLANATION

- Eroded area
- Accreated area
- Coastal plain tundra
- Delta mud flats/beaches/nonvegetated barrier islands—Except where erosion or accretion is indicated
- Ocean out to 2-m isobath
- Generalized rates of change in shoreline position—Number of shore-parallel lines indicate rates in meters per year
  - Retreat
  - Advance
- Seaward limit of measured areas (2-meter isobath)—Wider spacing where generalized
- Landward limit of remapped land surface
- Sector boundary
- 11 Sector number
- Area where U.S. Geological Survey topographic maps used for compilation—Filling gaps in adjacent NOS charts
- Coastlines—Shown from charts used in this study
  - 1951
  - 1983

SCALE 1:82,000

2 1 0 2 4 6 8 NAUTICAL MILES

2 1 0 2 4 6 8 MILES

2 0 2 4 6 8 10 KILOMETERS

MAP NOT INTENDED TO BE USED FOR NAVIGATION

CHARTS USED IN COASTAL COMPARISON

Coast and Geodetic Survey and National Ocean Survey

9498: Approaches to Smith Bay, 1:50,000, 1968
16087: Approaches to Smith Bay, 1:40,767, 1963
9497: Pitt Point and Vicinity, 1:50,000, 1968
16088: Pitt Point and Vicinity, 1:40,373, 1963
9496: Cape Halkett and Vicinity, 1:50,000, 1968
16089: Cape Halkett and Vicinity, 1:49,177, 1963
9499: Harrison Bay—Western Part, 1:50,000, 1968
16084: Harrison Bay—Western Part, 1:49,794, 1963
9470: Harrison Bay—Eastern Part, 1:50,000, 1968
16083: Harrison Bay—Eastern Part, 1:49,590, 1963
9471: Jones Islands and Approaches, 1:50,000, 1968
16082: Jones Islands and Approaches, 1:49,794, 1963
9472: Midway Islands and Approaches, 1:50,000, 1968
16081: Prudhoe Bay and Vicinity, 1:50,000, 1963

Areas not covered by National Ocean Survey Charts are western most Colville River delta, eastern most Colville River delta, and Kuparuk River delta (see boxes on map sheet). In these areas, U.S. Geological Survey topographic maps were compared with State of Alaska maps produced from aerial photographs taken on September 12, 1982.

U.S. Geological Survey, 1:63,360
Harrison Bay (C-5), (B-3), (B-1);
Beechey Point (B-4), 1955

State of Alaska, 1:50,000, Cape Halkett, Harrison Bay West, Harrison Bay East, Beechey Point, 1981

THIRTY-YEAR SHORELINE COMPARISON, EROSION RATE INDICES, AND CHARACTERISTIC PHYSIOGRAPHIC AND OCEANOGRAPHIC SETTINGS

BEAUFORT SEA COASTAL EROSION, SEDIMENT FLUX, SHORELINE EVOLUTION, AND THE EROSIONAL SHELF PROFILE

By
Erk Reimnitz, Scot M. Graves, and Peter W. Barnes

1988

INTERIOR—GEOLOGICAL SURVEY, RESTON, VA.—1988—G88181
Data compiled in 1985.

For sale by U.S. Geological Survey, Map Distribution, Box 25286, Federal Center, Denver, CO 80225
Exploratory pamphlet accompanies map.