

EXPLANATION

Glacial Deposits

- Qd** Undifferentiated glacial drift. Inferred to consist of lodgment till, ablation till, and stratified drift. Thickness ranges widely. May include small areas of organic deposits or bedrock that are not mapped separately. Materials inferred to range from nonsorted silt, sand, gravel, and boulders to poorly to moderately sorted sand and gravel with some boulders.
- Qds** Till deposits in the form of lateral or terminal moraines (linear or arcuate areas of hummocky or ridged terrain). Materials inferred to consist mainly of nonsorted silt, sand, gravel, and boulders, but may consist locally of poorly to moderately sorted sand, gravel, and boulders.
- Qdt** Stratified drift in ice-contact deposits (kame terraces or deltas). Identified by high local relief and steeply sloping margins. Materials inferred to consist mainly of poorly to moderately sorted sand and gravel with some boulders.
- Qds** Proglacial stratified drift. Includes stratified and locally forest-bedded sand and gravel that occur below 125 m elevation on West Foreland and from Katchin Creek to Redoubt Point; these deposits are probably emerged delta and glaciolacustrine deposits. Also includes materials beneath nonvegetated to partly vegetated parts of active outwash fans; that is, outwash inferred to have been recently deposited. Materials are mainly moderately to well-sorted sand and gravel with some small boulders.
- Qdf** Moderately to heavily vegetated parts of outwash fans. Areas of Qdf may be subject to future flooding. Materials are chiefly moderately to well-sorted sand and gravel.
- Qdc** Pebble- and boulder-bearing diamiction. Observed at one upland location at West Foreland and in sea cliffs along West Foreland and from Katchin Creek south to near Redoubt Point. Materials are mainly silt and silty sand, but include layers and lenses of gravel and small boulders. X-radiographs show no bedding in a single sample of fine diamiction from near Harriet Point (B.F. Molina, oral comm.). From bedding observed in sea-cliff exposures at West Foreland, the entire unit is tentatively interpreted to be a glaciomarine or glaciolacustrine dropstone deposit. X-ray diffraction analysis of a sample from Harriet Point (-2 micron fraction) yielded 44% chlorite, 40% illite, and 16% expandable clay. The unit generally resembles the Boulleiger Cove Clay of upper Cook Inlet, but a single radiocarbon age of wood from outwash from atop the unit at West Foreland is greater than 42,000 years (Detterman, R.L., and others, 1976, U.S. Geol. Survey Open-file Report 76-477).

Alluvial Deposits

- Qal** Floodplain deposits. Materials inferred to consist of moderately to well-sorted sand and gravel; some silt may occur locally. Subject to flooding.
- Qaf** Deposits of large, flat alluvial fans. Materials inferred to be mainly moderately sorted sand and gravel, but may include poorly sorted sand, gravel, and small boulders with some silt. Areas of unit Qaf may be subject to future flooding.
- Qcf** Deposits of small, steep alluvial-colluvial fans. Materials transported mainly by streams but probably include deposits of rockfalls, snow-ice avalanches, and debris flows. Materials range from nonsorted silt, sand, and gravel to moderately sorted sand and gravel, and possibly some boulders.

Deposits of Mass Wasting

- Qct** Cone-shaped deposits of talus beneath steep bedrock slopes. Materials are chiefly angular blocks ranging from gravel to boulders and may include some silt and sand.
- Qls** Deposits of landslides, including falls, slumps, slides, and failures by lateral spreading. Small slides and falls of unconsolidated deposits now occur along sea cliffs and stream banks. At least one larger landslide 1.6 km west of the outlet of Redoubt Creek (a slump or failure by lateral spreading involving Qct) appears to have occurred within the past few decades. Extensive landslides along sea cliffs north of Redoubt Point (slumps or slides that may involve Tertiary bedrock) and along the north side of Bachata Creek (slumps or slides probably involving pre-Tertiary bedrock) appear to have been stable for at least several decades. Renewed movement of all or parts of the landslide deposits is possible.
- Qcm** Mudflow and debris-flow deposits. Deposits of Qcm in the mountains appear to have originated as slope failures of till or talus. Debris flows and mudflows now occur along the shore of Cook Inlet, particularly where Qct is exposed in sea cliffs. The lowland between Polly Creek and Crescent River is underlain by deposits of nonsorted silt, sand, gravel, and boulders up to 1 m in maximum dimension. These deposits are inferred to be volcanic mudflow (lahar) deposits, which originated on or near Redoubt Volcano.
- Qpr** Deposits of protalus ramparts. Materials are angular blocks of gravel and boulders, but may include some sand and silt.

Other Unconsolidated Deposits

- Qm** Swamp and muskeg deposits. Mainly organic material, but may include clay, silt, or sand. Only larger areas inferred to be saturated are shown as Qm; many other areas are underlain by thin or relatively dry organic deposits.
- Qf** Artificial fill. Fill at Drift River and West Foreland facilities has been obtained from Qdf and Qds within 5 km of the fill sites.
- Qbv** Vegetated beach deposits. Materials consist mainly of mixed sand and gravel. In most cases such deposits are older beach ridges landward of Mean Higher High Water.
- Qbn** Nonvegetated beach deposits. Materials are chiefly mixed sand and gravel, locally with boulders that are eroded remnants of landlides from sea cliffs and of glacial deposits. Beach deposits of sand occur locally (for example, between Redoubt Creek and Harriet Point and near the outlet of Katchin Creek) and are subject to erosion and redeposition, depending on local wave conditions.
- Qlv** Deposits of vegetated tidal marshes. The landward limit shown here is based on change in type or density of vegetation, which may not coincide exactly with the landward extent of salt-water incursion. Materials are organic deposits mixed with silt and sand.
- Qfn** Deposits of nonvegetated tidal flats. No attempt has been made to map the seaward extent of the tidal flats because of the large tidal range of Cook Inlet. Materials consist mainly of silt and sand, but locally may include gravel or boulders.
- Qda** Delta deposits. As used here, delta deposits represent intertidal parts of fans (Qaf and Qdf), have more channels, and contain coarser materials than do deposits of adjacent tidal flats. Materials consist mainly of sand and gravel but may include some silt and boulders.

Bedrock

- bt** Tertiary bedrock. Kenai Group and West Foreland Formation (nonmarine sandstone, siltstone, shale, and claystone, with local coal) (Fisher, M.A., and Magoon, L.B., 1978, Am. Assoc. Petroleum Geologist Bull., v. 62). Weakly consolidated, relative to unit bpT.
- bpT** Jurassic bedrock. Talkeetna Formation (volcanic flows, tuffs, and breccias), metamorphic equivalents, and granodiorite (Detterman and others, op. cit.).

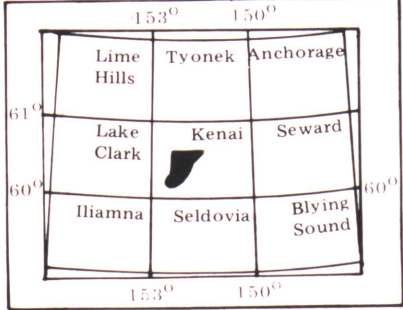
Map Symbols

- Approximate photogeologic contact. Location is highly approximate where dashed.
- Abandoned or underfit stream channel, inferred to be a relict glacial meltwater channel. Symbol used where channel appears to contain few or no stratified deposits. Minor amounts of poorly to moderately sorted sand, gravel, and small boulders may be locally present.
- Photogeologic lineament, largely unevaluated. There is no obvious vertical offset of glacial deposits exposed discontinuously in sea cliffs at the West Foreland lineament, but exposures there were examined only briefly. The lineament northwest of Harriet Point is expressed as a steep, northwest-facing scarp 1 to 3 m high. There is no lateral offset of stream drainages along the lineament. The lineament may be the surface expression of a small reverse fault, possibly due to isostatic rebound following deglaciation of Cook Inlet.
- Areas of discernible progradation of the upper beach.
- Areas where no lateral shifting of the upper beach is discernible.
- Areas of discernible landward shifting of the upper beach (erosion).

Changes of beach position were determined by comparing vertical aerial photographs taken between 1954 and 1973 and oblique air photos taken in 1978. The periods of comparison for different sections of beach are given in parentheses. Our method can detect changes as small as 5 to 10 m. The greatest amounts of erosion are several tens of meters, but most changes are only 10 to 20 m. Areas shown as 'no discernible shifting' may in fact have eroded or prograded by as much as 10 m. Where no symbols are shown, we have no data on changes of beach position.

Inferred direction of littoral transport of beach sediments based on directions of spit growth and of stream offsets.

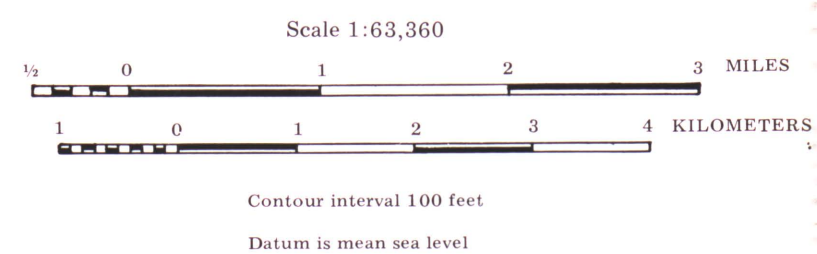
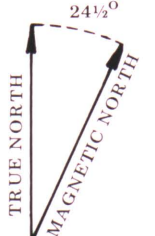
LOCATION INDEX



ACKNOWLEDGMENTS

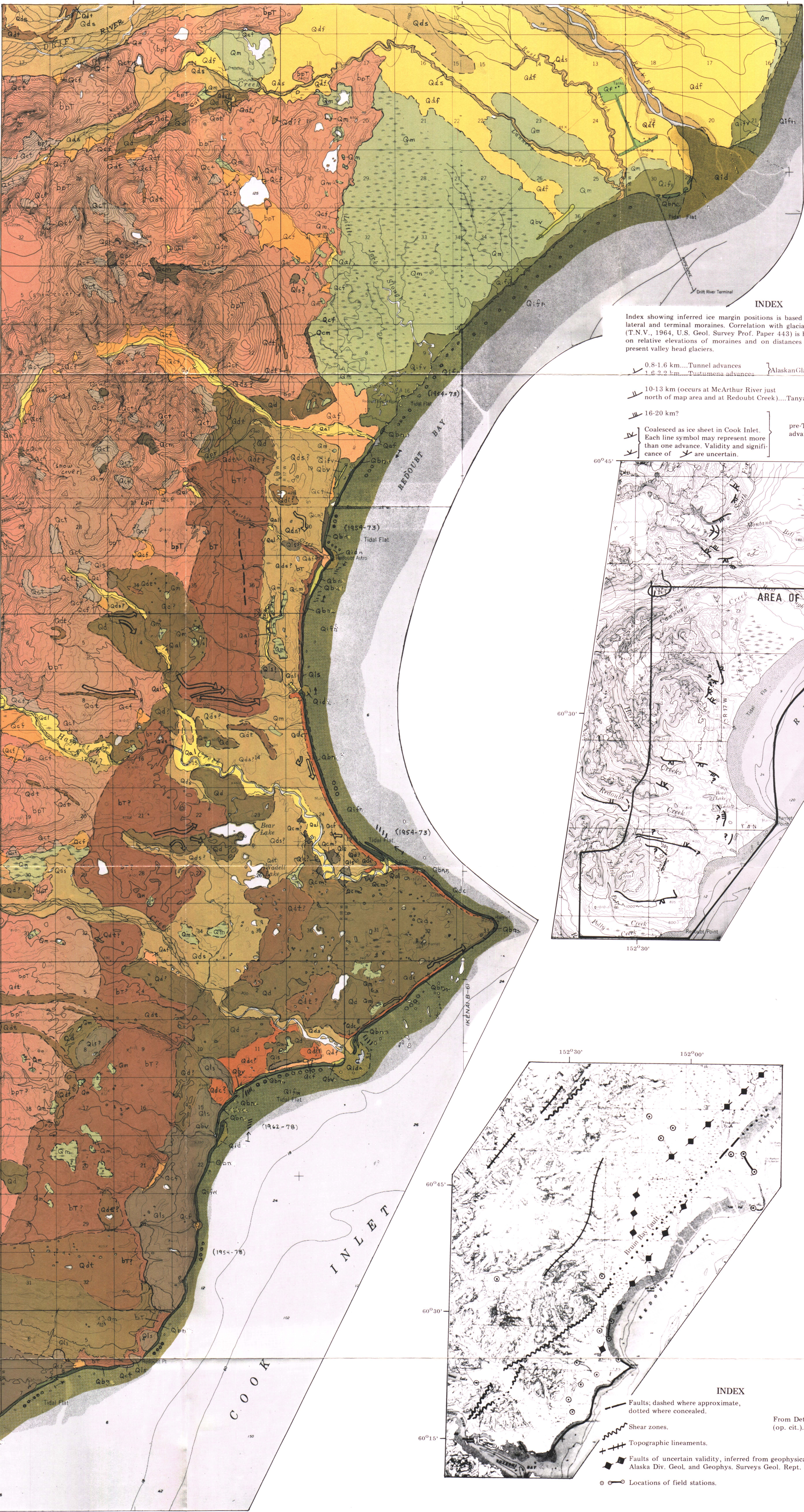
Field work was carried out by helicopter during June 15-22, 1978. Field observations were made by K. Emmel, M. Howland, C. Price, and J. Riehle (ADGGS) and by B. Molina (USGS). The able assistance provided by R. Miller, pilot, and R. Kubbander, mechanic, is gratefully acknowledged. Sea cliffs at West Foreland were briefly examined by G. Pessel, Riehle, and R. Updike (ADGGS) on October 10, 1978; permission to use the airstrip was granted by Marathon Oil and is gratefully acknowledged. N. Vesich (ADGGS) carried out the X-ray diffraction analysis. Molina kindly arranged the X-radiography analysis. A draft version of this map was reviewed by R. Reger (ADGGS) and the final version was reviewed by J. Kline (ADGGS); comments by both reviewers have greatly improved the final version and are gratefully acknowledged. Helpful discussions with Updike, W. Long, and S. Hackett (ADGGS) are gratefully acknowledged.

Base from U. S. Geological Survey, Kenai B-7, C-6, and C-7 Quadrangles, Alaska, 1958.



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Index showing inferred ice margin positions is based on photointerpretive mapping of lateral and terminal moraines. Correlation with glacial advances defined by Karlstrom, (T.N.V., 1964, U.S. Geol. Survey Prof. Paper 443) is highly tentative and is based solely on relative elevations of moraines and on distances of terminal moraines in front of present valley head glaciers.

- 0.8-1.6 km. Tunnel advances
1.6-2.2 km. Tutuena advances
Alaskan Glaciation
- 10-13 km (occurs at McArthur River just north of map area and at Redoubt Creek)...Tanya advances?
- 16-20 km?
- Coalesced as ice sheet in Cook Inlet. Each line symbol may represent more than one advance. Validity and significance of are uncertain.
- pre-Tanya advances

AREA OF PLATE 1

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- Faults; dashed where approximate, dotted where concealed.
- Shear zones.
- Topographic lineaments.
- Faults of uncertain validity, inferred from geophysical data (Hackett, S.W., 1977, Alaska Div. Geol. and Geophys. Surveys Geol. Rept. 49).
- Locations of field stations.

This map produced with funds provided by the State of Alaska Office of Coastal Management.

PHOTOINTERPRETATION MAP OF THE SURFICIAL GEOLOGY,
POLLY CREEK TO DRIFT RIVER, COOK INLET, ALASKA