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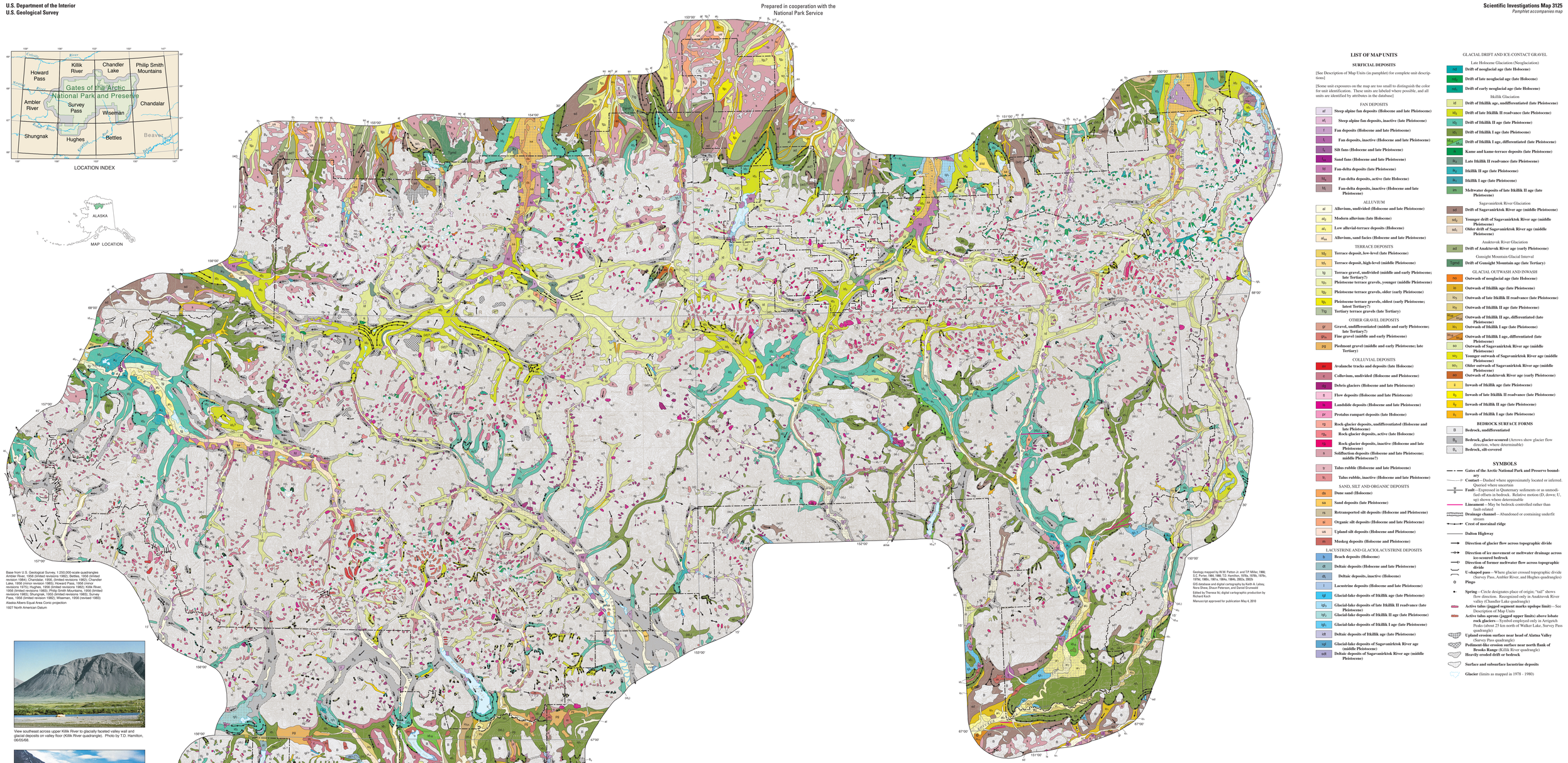
U.S. Department of the Interior
U.S. Geological Survey

Prepared in cooperation with the
National Park Service

Scientific Investigations Map 3125
Pamphlet accompanies map

LOCATION INDEX

MAP LOCATION



Base from U.S. Geological Survey 1:250,000-scale quadrangles Ambler River, 1958 (limited revisions 1982); Bettles, 1956 (limited revision 1984); Chandalar, 1956, (limited revisions 1982); Chandler Lake, 1956 (minor revision 1983); Howard Pass, 1956 (minor revision 1983); Killik River, 1956 (limited revisions 1982); Philip Smith Mountains, 1956 (limited revisions 1983); Shungnak, 1955 (limited revisions 1983); Survey Pass, 1956 (limited revision 1982); Wiseman, 1956 (revised 1983)
Alaska Albers Equal Area Conic projection
1927 North American Datum

Geology mapped by W.W. Patton Jr. and T.P. Miller, 1966; S.C. Porter, 1964, 1966; T.D. Hamilton, 1978a, 1978b, 1979c, 1979d, 1980c, 1981a, 1984a, 1984b, 2002a, 2002b
GIS database and digital cartography by Keith A. Labay, Nora Shea, Shaun Peterson, and Daniel Grunwald
Edited by Theresa Ikl; digital cartographic production by Richard Koch
Manuscript approved for publication May 4, 2010

View southeast across upper Killik River to glacially faceted valley wall and glacial deposits on valley floor (Killik River quadrangle). Photo by T.D. Hamilton, 06/05/68.

Glacier and neoglacial moraine, northeast flank of Okadak Mountain (southeast corner of Chandler Lake quadrangle). Photo by J.P. McCalpin, 08/08/77.

U-shaped glacial divide crossing at head of Seward Creek, 8 km (5 mi) west of Wild Lake (Wiseman quadrangle). Photo by T.D. Hamilton, 07/30/77.

SCALE 1:300 000

0 10 20 40 60 80 KILOMETERS

0 5 10 20 30 40 MILES

CONTOUR INTERVAL 200 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

APPROXIMATE MEAN DECLINATION, 2011

Surficial Geologic Map of the Gates of the Arctic National Park and Preserve, Alaska

By
Thomas D. Hamilton and Keith A. Labay
2011

LIST OF MAP UNITS

SURFICIAL DEPOSITS

[See Description of Map Units (in pamphlet) for complete unit descriptions]

[Some unit exposures on the map are too small to distinguish the color for unit identification. These units are labeled where possible, and all units are identified by attributes in the database]

FAN DEPOSITS

af — **Steep alpine fan deposits (Holocene and late Pleistocene)**
af_i — **Steep alpine fan deposits, inactive (late Pleistocene)**
f — **Fan deposits (Holocene and late Pleistocene)**
f_i — **Fan deposits, inactive (Holocene and late Pleistocene)**
f_s — **Silt fans (Holocene and late Pleistocene)**
f_{sd} — **Sand fans (Holocene and late Pleistocene)**
fd — **Fan-delta deposits (late Pleistocene)**
fd_a — **Fan-delta deposits, active (late Holocene)**
fd_i — **Fan-delta deposits, inactive (Holocene and late Pleistocene)**

ALLUVIUM

al — **Alluvium, undivided (Holocene and late Pleistocene)**
al_2 — **Modern alluvium (late Holocene)**
al_1 — **Low alluvial-terrace deposits (Holocene)**
al_{sd} — **Alluvium, sand facies (Holocene and late Pleistocene)**

TERRACE DEPOSITS

td_2 — **Terrace deposit, low-level (late Pleistocene)**
td_1 — **Terrace deposit, high-level (middle Pleistocene)**
tg — **Terrace gravel, undivided (middle and early Pleistocene; late Tertiary?)**
tg_3 — **Pleistocene terrace gravels, younger (middle Pleistocene)**
tg_2 — **Pleistocene terrace gravels, older (early Pleistocene)**
tg_1 — **Pleistocene terrace gravels, oldest (early Pleistocene; latest Tertiary?)**
Ttg — **Tertiary terrace gravels (late Tertiary)**

OTHER GRAVEL DEPOSITS

gr — **Gravel, undifferentiated (middle and early Pleistocene; late Tertiary?)**
gr_{fs} — **Fine gravel (middle and early Pleistocene)**
pg — **Piedmont gravel (middle and early Pleistocene; late Tertiary)**

COLLUVIAL DEPOSITS

av — **Avalanche tracks and deposits (late Holocene)**
c — **Colluvium, undivided (Holocene and Pleistocene)**
dg — **Debris glaciers (Holocene and late Pleistocene)**
fl — **Flow deposits (Holocene and late Pleistocene)**
ls — **Landslide deposits (Holocene and late Pleistocene)**
pr — **Protalus rampart deposits (late Holocene)**
rg — **Rock-glacier deposits, undifferentiated (Holocene and late Pleistocene)**
rg_a — **Rock-glacier deposits, active (late Holocene)**
rg_i — **Rock-glacier deposits, inactive (Holocene and late Pleistocene)**
s — **Solifluction deposits (Holocene and late Pleistocene; middle Pleistocene?)**
tr — **Talus rubble (Holocene and late Pleistocene)**
tr_i — **Talus rubble, inactive (Holocene and late Pleistocene)**

SAND, SILT AND ORGANIC DEPOSITS

ds — **Dune sand (Holocene)**
sa — **Sand deposits (late Pleistocene)**
rs — **Retransported silt deposits (Holocene and Pleistocene)**
si — **Organic silt deposits (Holocene and late Pleistocene)**
us — **Upland silt deposits (Holocene and Pleistocene)**
m — **Muskeg deposits (Holocene and Pleistocene)**

LACUSTRINE AND GLACIOLACUSTRINE DEPOSITS

b — **Beach deposits (Holocene)**
dl — **Deltaic deposits (Holocene and late Pleistocene)**
dl_i — **Deltaic deposits, inactive (Holocene)**
l — **Lacustrine deposits (Holocene and late Pleistocene)**
lgf — **Glacial-lake deposits of Ikillik age (late Pleistocene)**
lgf_2 — **Glacial-lake deposits of late Ikillik II readvance (late Pleistocene)**
lgf_2 — **Glacial-lake deposits of Ikillik II age (late Pleistocene)**
lgf_1 — **Glacial-lake deposits of Ikillik I age (late Pleistocene)**
sdl — **Deltaic deposits of Ikillik age (late Pleistocene)**
lgf — **Glacial-lake deposits of Sagavanirktok River age (middle Pleistocene)**
sdl — **Deltaic deposits of Sagavanirktok River age (middle Pleistocene)**

GLACIAL DRIFT AND ICE-CONTACT GRAVEL

Late Holocene Glaciation (Neoglaciation)

nd — **Drift of neoglacial age (late Holocene)**
nd_2 — **Drift of late neoglacial age (late Holocene)**
nd_1 — **Drift of early neoglacial age (late Holocene)**

Ikillik Glaciation

id — **Drift of Ikillik age, undifferentiated (late Pleistocene)**
id_2 — **Drift of late Ikillik II readvance (late Pleistocene)**
id_2 — **Drift of Ikillik II age (late Pleistocene)**
id_1 — **Drift of Ikillik I age (late Pleistocene)**
id_{2-1} — **Drift of Ikillik I age, differentiated (late Pleistocene)**
k — **Kame and kame-terrace deposits (late Pleistocene)**
km_2 — **Late Ikillik II readvance (late Pleistocene)**
km_2 — **Ikillik II age (late Pleistocene)**
km_1 — **Ikillik I age (late Pleistocene)**
km — **Meltwater deposits of late Ikillik II age (late Pleistocene)**

Sagavanirktok River Glaciation

sd — **Drift of Sagavanirktok River age (middle Pleistocene)**
sd_2 — **Younger drift of Sagavanirktok River age (middle Pleistocene)**
sd_1 — **Older drift of Sagavanirktok River age (middle Pleistocene)**

Anaktuvuk River Glaciation

ad — **Drift of Anaktuvuk River age (early Pleistocene)**

Gunsight Mountain Glacial Interval

$Tgmd$ — **Drift of Gunsight Mountain age (late Tertiary)**

GLACIAL OUTWASH AND INWASH

no — **Outwash of neoglacial age (late Holocene)**
io — **Outwash of Ikillik age (late Pleistocene)**
io_2 — **Outwash of late Ikillik II readvance (late Pleistocene)**
io_2 — **Outwash of Ikillik II age (late Pleistocene)**
io_{2-1} — **Outwash of Ikillik II age, differentiated (late Pleistocene)**
io_1 — **Outwash of Ikillik I age (late Pleistocene)**
io_{2-1} — **Outwash of Ikillik I age, differentiated (late Pleistocene)**
so — **Outwash of Sagavanirktok River age (middle Pleistocene)**
so_2 — **Younger outwash of Sagavanirktok River age (middle Pleistocene)**
so_1 — **Older outwash of Sagavanirktok River age (middle Pleistocene)**
ao — **Outwash of Anaktuvuk River age (early Pleistocene)**
i — **Inwash of Ikillik age (late Pleistocene)**
i_2 — **Inwash of late Ikillik II readvance (late Pleistocene)**
i_2 — **Inwash of Ikillik II age (late Pleistocene)**
i_1 — **Inwash of Ikillik I age (late Pleistocene)**

BEDROCK SURFACE FORMS

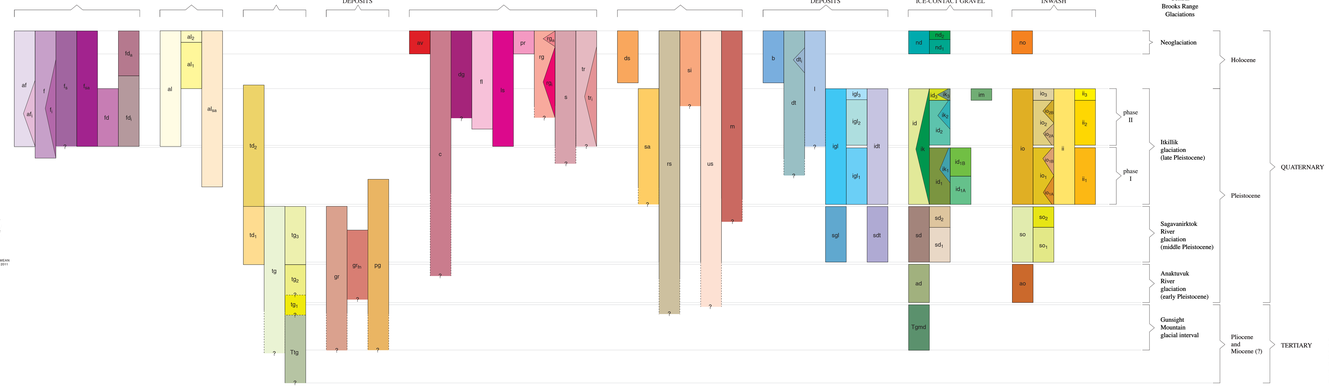
B — **Bedrock, undifferentiated**
B_g — **Bedrock, glacier-scoured** (Arrows show glacier flow direction, where determinable)
B_s — **Bedrock, silt-covered**

SYMBOLS

Gates of the Arctic National Park and Preserve boundary
Contact—Dashed where approximately located or inferred. Queried where uncertain
Fault—Expressed in Quaternary sediments or as unmodified offsets in bedrock. Relative motion (D, down; U, up) shown where determinable
Lineament—May be bedrock-controlled rather than fault-related
Drainage channel—Abandoned or containing underfit stream
Crest of morainal ridge
Dalton Highway
Direction of glacier flow across topographic divide
Direction of ice movement or meltwater drainage across ice-scoured bedrock
Direction of former meltwater flow across topographic divide
U-shaped pass—Where glacier crossed topographic divide (Survey Pass, Ambler River, and Hughes quadrangles)
Pingo
Spring—Circle designates place of origin; "tail" shows flow direction. Recognized only in Anaktuvuk River valley (Chandler Lake quadrangle)
Active talus (jagged segment marks upslope limit)—See Description of Map Units
Active talus uproms (jagged upper limits) above lobate rock glaciers—Symbol employed only in Arrigetch Peaks (about 23 km north of Walker Lake, Survey Pass quadrangle)
Upland erosion surface near head of Alatna Valley (Survey Pass quadrangle)
Pediment-like erosion surface near north flank of Brooks Range (Killik River quadrangle)
Heavily eroded drift or bedrock
Surface and subsurface lacustrine deposits
Glacier (limits as mapped in 1978 - 1980)

CORRELATION OF MAP UNITS

SURFICIAL DEPOSITS



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