



Base from U.S. Geological Survey Afognak and Naknek, 1952; Mount Katmai, 1951 with minor revisions

SCALE 1:250,000

This map is preliminary and has not been reviewed for conformity with U.S. Geological Survey editorial standards and stratigraphic nomenclature.

DESCRIPTION OF MAP UNITS	
Surficial Deposits and Sedimentary Rocks	
Qa	SURFICIAL DEPOSITS (HOLOCENE AND PLEISTOCENE) - Unconsolidated to poorly consolidated alluvial, colluvial, glacial, marine, lacustrine, and eolian deposits. Mainly gravel, sand, and silt; locally includes extensive redeposited pumice and ash initially deposited during the 1912 Katmai eruption.
Qls	LANDSLIDE DEPOSITS (HOLOCENE AND PLEISTOCENE) - Nonsorted, nonstratified coarse angular rubble forming lobate masses. Larger blocks resemble undisturbed bedrock.
Tu	SEDIMENTARY ROCKS, UNDIFFERENTIATED (TERTIARY) - Poorly to moderately well indurated, fluvial sandstone, siltstone, and conglomerate of uncertain age; larger clasts consist of both plutonic and volcanic rocks of local derivation. Comprises local deposits that occur northwest of the Aleutian Range crest and at least in part is probably equivalent to the Copper Lake Formation (unit Tc). Maximum known thickness is about 300 m, 4 km north of the west end of Grosvenor Lake.
Th	HEMLOCK CONGLOMERATE (UPPER OLIGOCENE) - Poorly indurated fluvial conglomerate, pale brown tuffaceous sandstone, siltstone, shale, coal, and tuff. Conglomerate contains dominantly metamorphic and plutonic clasts and less abundant clasts of silicified volcanic rocks. Rare tree stumps in growth position; abundant megaflora in the fine-grained beds. A measured thickness of 558 m at Cape Nukshak is probably the maximum in the map area.
Tc	COPPER LAKE FORMATION (EOCENE AND PALEOCENE?) - Massive, well indurated polymictic conglomerate, sandstone, and siltstone. Clasts are subequally plutonic, metamorphic, and volcanic rocks. Carbonaceous detritus occurs locally in the finer sedimentary rocks. A measured thickness of 1,025 m at Spotted Glacier northwest of Cape Douglas is probably the maximum in the map area.
Kk	KAGUYAK FORMATION (UPPER CRETACEOUS) - Upper part consists of interbedded siltstone and graded greywacke sandstone which represent the upper and middle regimes of a submarine fan. Lower part consists of thinly bedded siltstone and some thin limestone beds and includes abundant ammonites, pelecypods, and limestone concretions. The type locality is seacliff exposures between the Swikshak and Big Rivers (Keller and Reiser, 1959; Detterman and Miller, 1985), where the measured thickness of 897 m is close to the maximum in the map area of about 1,050 m.
Kp	UNNAMED FORMATION (LOWER CRETACEOUS) - Thick-bedded grey sandstone and minor amounts of siltstone and shale that contain ammonites of Albian age. Occurs at the coast between Katmai and Dakavak Bays and at the head of the landslide-dammed valley about 12 km north-northeast of Mt. Katmai (dominantly siltstone at the second occurrence). The maximum known thickness of 82 m is at the seacoast exposure, but the distribution of these rocks is poorly known.
Kh1	HERENDEEN LIMESTONE (LOWER CRETACEOUS) - Calcareous sandstone and siltstone, thinly bedded, light to dark olive grey. Contains abundant <u>Inoceramus</u> prisms and, locally, complete <u>Inoceramus ovatooides</u> . The maximum thickness is about 250 m, 12 km north-northeast of Mt. Katmai, but the average thickness throughout the map area is probably about 25 m.
Ks	STANIUKOVICH FORMATION (LOWER CRETACEOUS) - Siltstone, shale, and thinly bedded, fine-grained, feldspathic and laumontitic brown sandstone. Known exposures are confined to the region centered about 12 km north-northeast of Mt. Katmai, where the thickness probably ranges from 0 to 100 m; however, the distribution of this unit is poorly known.
Jn	NAKNEK FORMATION, UNDIVIDED (UPPER JURASSIC) - The main sedimentary rock unit of the map area, consisting of sandstone, conglomerate, siltstone, and dark shale. The formation comprises five members, from oldest to youngest: massive conglomerate and thinly bedded sandstone; thick bedded to massive sandstone; thinly bedded, dark grey siltstone with limestone concretions; thinly bedded sandstone and siltstone; massive conglomerate. Clasts in both the oldest and youngest conglomerate members are dominantly metamorphic, volcanic, and sedimentary rocks with subordinate granitic rocks. Fossils in the fine-grained rocks are locally abundant and are chiefly several species of the pelecypod <u>Buchia</u> . The lowermost conglomerate is well exposed in the vicinity of the unnamed lake near the center of the north margin of the map, but the base of the formation is nowhere exposed in the map area. The thickness probably ranges between 2,000 m and 3,000 m in the map area.
Jt	TALKEETNA FORMATION (LOWER JURASSIC) - Lava flows, breccias, and lahars locally interbedded with volcaniclastic sandstones, conglomerates, and shales. Includes sills of uncertain ages. Metamorphosed to non-schistose epidote-albite-calcite assemblages suggestive of lower greenschist facies. Conglomerates fracture across the clasts and secondary quartz, calcite, or zeolite minerals are common. The maximum exposed thickness in the map area is about 1200 m at Oakley Peak on the south shore of Kulik Lake.
TRk	KAMISHAK FORMATION (UPPER TRIASSIC) - Slightly to moderately recrystallized, non-fossiliferous limestone. Exposed only along the King Salmon River (Takayofo Creek) in the southwest part of the map area, where the thickness is about 200 m. Intruded

0 5 10 15 20 25 KILOMETERS

CONTOUR INTERVAL 200 FEET
DATUM IS MEAN SEA LEVEL
DEPTH CURVES IN FEET DATUM IS MEAN LOWER LOW WATER
SHORELINE SHOWN REPRESENTS THE APPROXIMATE LINE OF MEAN HIGH WATER
1956 MAGNETIC DECLINATION AT SOUTH EDGE OF SHEET VARIES FROM 21° TO 22° EAST

Volcanic Deposits and Rocks

NGER DEPOSITS AND ROCKS OF THE ALEUTIAN VOLCANIC ARC (QUATERNARY AND UPPER TERTIARY) -

Pyroclastic-flow deposits (Holocene). Poorly sorted, variably indurated deposits of ash, vitrophyric blocks, and/or pumiceous lapilli. Comprises the 1912 ash flow of Atma (Novarupta) and the Holocene block-and-ash flows of Kaguyak caldera. Individual pumiceous clasts are andesitic (some Novarupta), dacitic (Kaguyak), or rhyolitic (most Novarupta). None of the deposits have been glacially eroded. Maximum thickness of the Novarupta deposit away from the caldera around Novarupta is possibly 250 m (Hildreth, 1983), and that of the Kaguyak deposit is probably about 125 m.

Domes (Holocene). Domes of dacitic or rhyolitic composition. A dacitic dome at Snowy volcano occupies the central vent of an older composite cone, whereas dacitic domes within Kaguyak volcano and the rhyolitic dome of Novarupta are both intra-caldera domes. Cerberus, Falling Mountain, and unnamed domes on Mageik Creek and outside Kaguyak caldera are all of dacitic composition.

Younger central-vent deposits and rocks (Quaternary). Lava flows, tuffs, and breccias dominantly of andesitic composition (55-61% SiO₂) but locally including lava flows of low-silica dacitic composition (61-66% SiO₂), airfall deposits of andesitic to rhyolitic composition on Baked Mountain and Broken Mountain, and scoria cones of basaltic composition (<51% SiO₂). May include some unidentified domes. Mainly unaltered and only slightly to moderately dissected by glacial erosion. Rocks of this unit comprise part or all of the following volcanoes: Mt. Douglas, Fourpeaked Mountain, Kaguyak crater, Devil's Desk, Kukak, Mt. Stellar, Mt. Denison, Snowy Mountain, an unnamed peak 5 km southwest of Snowy Mountain, Griggs Volcano (formerly Knife Peak), Mt. Katmai, The Trident, Mt. Mageik, Martin Mountain, and three unnamed basaltic scoria cones: 24 km west of Kaguyak crater (VABM "Iron"), 19 km north of Snowy Mountain on the northeast side of the Rainbow River, and 11 km east of Blue Mountain (Whale Mountain) on the north side of Becharof Lake.

Pyroclastic-flow deposits, undifferentiated (Pleistocene and upper Tertiary) - Poorly sorted, variably indurated deposits of ash, vitrophyric blocks, and/or pumiceous lapilli. Primary compositions are uncertain owing to alteration but probably range from andesitic to dacitic. Known occurrences are: 5 km northeast of Devil's Desk, 4 km east of Griggs Volcano (Knife Peak), and at the south margin of the map area 22 km east of Blue Mountain (Whale Mountain). Maximum preserved thickness at each occurrence is about 200 m.

Central-vent deposits and rocks, undifferentiated (Pleistocene and upper Tertiary) - Lava flows, breccias, and domes of andesitic and dacitic composition. Locally moderate to extensive alteration associated with fossil fumaroles (e.g., bleaching to light red or yellow shades). Moderately to extensively dissected by glacial erosion. Thickness at the following vents or volcanic centers exceeds 300 m: Kejulik Mountains (south margin of the map area), Aleutian Range crest between Mt. Katmai and Snowy Mountain, and the ridge between Devil's Desk and the Niniagiaik River. Other, smaller centers or vents marked by plugs are along the Savonoski River northwest of Hook Glacier, a ridge 8 km northwest of Kiukpalik Island, and small flows or domes capping ridges up to 10 km west of Martin Mountain.

DER VOLCANIC ROCKS OF THE ALEUTIAN VOLCANIC ARC (UPPER TERTIARY) - Breccias, lava flows, sills, and local pyroclastic and epiclastic tuffs that comprise a late Tertiary volcanic field located southeast of the Aleutian Range crest and extending from the Katmai River to Kukak Bay. Dominantly of andesitic and dacitic composition. Propylitic alteration is extensive and argillic or potassic alteration is locally intensive, such as near contacts with hypabyssal intrusives of unit Ti. The maximum known thickness of about 800 m occurs along the axis of an open syncline which trends through Kukak Bay.

CANIC ROCKS OF THE MESHIK VOLCANIC ARC (LOWER TERTIARY) -

Basaltic lavas. Plugs, dikes, and flows of basaltic composition (<51% SiO₂) which intrude or overlie rocks of unit Tvm. Maximum thickness of lava flows is probably about 200 m.

Andesitic and dacitic lava flows and breccias. Includes local domes or tuffs of rhyolitic (?) composition, now altered to quartz and sericite or kaolinite. Maximum thickness is probably 600 m northeast of Idavain Lake.

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with U.S. Geological Survey editorial
standards and stratigraphic nomenclature.

scale, a text briefly describing the map units, some material not included in all prior topical and regional studies. Our map differs from the Keller and Reiser (1959) map in the detailed distribution of map units and occasionally in assignment to major units; however, we emphasize the advantages we enjoyed in the superior logistical access afforded by helicopter, in the greater time of the AMRAP project, and in our better understanding of the regional geology as a result of mapping in adjacent quadrangles published after 1959. The northeastern portion of our map was included in a compilation by Magoon, Atkinson, and Egbert (1976) of data which were previously published, such as radiometric ages from the Alaska-Aleutian Ranges batholith by Reed and Lanphere (1972), as well as previously unpublished. A portion of the compiled map in the Kamishak Hills and Douglas River area was subsequently modified by Magoon, Egbert, and Petering (1978). Lastly, the distribution of the ash-flow tuff in the Valley of Ten Thousand Smokes is essentially that shown by Hildreth (1983). We have benefited from, and attempted to incorporate the results of, all of these prior mapping studies.

Despite the amount of fieldtime invested in the map, in several essential respects it is still a reconnaissance product. The detailed eruptive products of individual vents of the various Quaternary volcanoes cannot be shown at 1:250,000 scale. The assignment of particular volcanic deposits to Quaternary, Quaternary and/or Tertiary, or Tertiary units is locally uncertain; moreover, contacts involving both volcanic rocks and hypabyssal rocks, especially in rugged terrain near the Aleutian Range crest, are commonly only approximately located. Distinction between early Tertiary (unit Tvm) and early Jurassic (unit Jt) volcanic rocks west of the Aleutian Range crest is ambiguous. Contacts between compositional units (plutons?) of the Alaska-Aleutian Ranges batholith are approximate; following Detterman and Reed (1980) in the adjacent Iliamna quadrangle, many of our contacts are only midpoints between locations where different lithologies were sampled, although in some cases pluton-pluton contacts are recognizable by alteration ("gossan") of the older pluton by the younger.

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PRELIMINARY GEOLOGIC MAP OF THE MT. KATMAI QUADRANGLE AND PORTIONS OF THE AFOGNAK AND NAKNEK QUADRANGLES, ALASKA

By

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