

FOOTNOTES

Arctic Slope

- x(1) Sea bluff section near village of Barrow.-- Vegetation mat, 3 feet; on stratified tan sand with numerous gravel lenses and containing an extensive marine fauna, 25 feet (wood from base of unit dates greater than 38,000 yrs. B.P.: W-380); on tan silt, laminated with dark staining along partings and with high percentage of included ice masses, 15 feet; on pebbly clay, 5 feet (Coulter, H. W., unpublished field notes, 1955)
- x(2) Upland till.-- Weathered brownish black clayey till, with sandstone, schist, gneiss, quartz, black chert and limestone pebbles and cobbles, 3 1/2 feet; underlying highly modified drift-covered upland surface with rare boulder erratics at surface (Lewis, C. R., unpublished field notes, 1959)
- x(3) Sea bluff section, Camden Bay.-- Vegetation mat, 1/2 foot; blue-gray massive silt with lenses and streaks of organic material, 12-15 feet; buff, fine-grained, stratified sand, 3-4 inches; clay with large particles of pink granite, coarse diabase, and gray limestone, 1-6 inches; blue gray silt with scattered rounded black chert and quartz pebbles, 6-10 feet; buff sand, 6-12 inches exposed locally at base of bluff (Lewis, C. R., unpublished field notes, 1959)
- x(4) Sea bluff section near Manning Point.-- Vegetation mat, 3-4 inches; peat and peaty silt, max. 3 feet; buff sand and silty sand with few scattered, rounded quartz pebbles, 12 feet (Lewis, C. R., unpublished field notes, 1959)
- x(5) Sea bluff section, Beaufort Lagoon.-- Vegetation mat, 6 inches; peaty silt, ca. 1 foot; gray to buff sand with scattered lenses of gravel, 6-8 feet (Lewis, C. R., unpublished field notes, 1959)

South flank of Brooks Range and bordering lowlands

- x(1) Sea bluff section, Hotham Inlet.-- Organic silt, 5 feet; on stratified sand and silt, 35 feet; on organic peat and silt, 10 feet (peat dates greater than 38,000 yrs. B.P.: W-344); on gray till, 50 feet (Fernald, A. T., unpublished field notes, 1952)
- x(2) Sea bluff section, Kotzebue Sound near Deering.-- Cover, 20 feet; on organic silt, 20 feet; on weathered gravel, 1 foot; on green silt, 2 feet; cover, 3 feet; woody layer, 1 1/2 foot (wood dates greater than 35,000 yrs. B.P.: W-192); on green silt, 2 feet exposed at base of bluff (Hopkins, D. M., unpublished field notes, 1943)
- x(3) River bluff, Koyukuk River near Bettles.-- About 100 feet of till exposed in bluffs (Schrader, F. C., 1904; U.S.G.S. Prof. Paper 20, p. 89)
- x(4) Alatna River valley just north of Alatna.-- What appear to be till terraces (lateral moraines) occur up to a height of 1,600 feet (Schrader, F. C., 1904; U.S.G.S. Prof. Paper 20, p. 90)
- x(5) River bluff, Koyukuk River near Alatna.-- Predominantly stratified silt and clay, 30-50 feet; on till-like deposit, 50 feet (Schrader, F. C., 1904; U.S.G.S. Prof. Paper 20, p. 90)
- x(6) River bluff, Koyukuk River south of Alatna.-- Gravel deposit, nearly 200 feet above river, composed of angular and subangular ice-worn pebbles with polished surfaces, commonly profusely striated (Schrader, F. C., 1904; U.S.G.S. Prof. Paper 20, p. 90)
- x(7) River bluff, Chandalar valley.-- Yellowish to buff till of ground moraine along the Chandalar River in bluffs about 100 feet high (Schrader, F. C., 1900; U.S.G.S. 21st Ann. Rept., pt. 11-1, p. 441-486)
- x(8) Chandalar valley.-- Isolated patches of drift and apparently ice-scoured slopes and summits above and beyond limits of oldest recognizable end and lateral moraines (Williams, J. R., U.S.G.S. Bull., in press)
- x(9) Fort Yukon well.-- Eolian sand, 45 feet; on gravel, 100 feet; on silt, 242 feet; on silty sand, 35 feet; on silt, 15 feet (Williams, J. R., U.S.G.S. Bull., in press)

Kuskokwim Mountains and bordering interior lowlands

- x(1) Stony River.-- Buried moraine-like ridge of gravel, with marked kettle-like depressions. Nearby river bluffs expose deposits of stratified gravel and sand with scattered boulders overlain by section of well-stratified sand and mud (silt) (Smith, P. S., 1917; U.S.G.S. Bull. 655, pp. 93-95)
- x(2) River bluffs, Big River.-- Peat with admixture of loess, 2 feet; on yellowish-gray loess, 10 feet; on compact peat with admixture of loess, 15 feet; on interbedded till and outwash, 70 feet (Fernald, A. T., 1959; U.S.G.S. Bull. 1071-G)
- x(3) Placer mining cut, Ophir.-- Organic silt with extinct vertebrate fossils, 25-35 feet; on gravel, 5-6 feet; on bedrock. Above placer workings in upper part of Gaines Creek, the valley is flooded with morainal deposits (Mertie, J. B., Jr., 1936; U.S.G.S. Bull. 864-C, p. 184)
- x(4) Placer mining cut, Poorman Creek.-- Organic silt, 18-68 feet; on fine gravel, 1-14 feet; on coarse gravel, 2-12 feet; on bedrock (Mertie, J. B., Jr., 1936; U.S.G.S. Bull. 864-C, p. 161)
- x(5) Placer mining cut, Big Creek.-- Silt and clay, 14-53 feet; on gravel, 1-7 feet; on bedrock (Mertie, J. B., Jr., 1936; U.S.G.S. Bull. 864-C, p. 44-45)

Yukon-Tanana Upland

- x(1) Idaho Bar.-- High level gravel deposit (Maximum thickness, 100 feet) of Pliocene or Pleistocene age occurring at elevation of 1,600 feet (Waters, A. E., 1934; U.S.G.S. Bull. 844-D, p. 183)
- x(2) Happy.-- Silt, 187 feet; on gravel, 46 feet; on bedrock (Pévé, T. L., 1958; U.S.G.S. Geol. Quad. Map 110)
- x(3) Goldstream.-- Silt, 46 feet; on gravel 113 feet; on bedrock (Pévé, T. L., 1958; U.S.G.S. Geol. Quad. Map 110)
- x(4) Crescent Creek.-- The largest glacial deposits recognized in the Yukon-Tanana Upland occur near the head of Crescent Creek, a western tributary of the Charley River. The deposits comprise three concentric morainal belts and underlie an area 1 1/4 miles long and half a mile wide (Mertie, J. B., Jr., 1937; U.S.G.S. Bull., 872, p. 186). The age, or ages, of these moraines is not known, but it is probable that they include moraines of Qm₃ age

Central Alaska Range

- x(1) Riley Creek section, Nenana Gorge.-- Congeliturbate and till-like deposits, 8 feet; on lacustrine clay and sand with layers of peat, 8 feet (peat from middle of unit dates 10,560 ± 200 years B.P.: W-49); on till and drift of Riley Creek age exposed locally at base of railroad cut (Wahrhaftig, Clyde, 1958; U.S.G.S. Prof. Paper 293, p. 45)
- x(2) Nenana Gorge.-- Numerous granite and gabbro erratics of Browne or pre-Browne age on top of 3,674-foot mountain west of Slate Creek (Wahrhaftig, Clyde, 1958; U.S.G.S. Prof. Paper 293, p. 25)
- x(3) Nenana Gorge.-- Erratic boulders of pre-Browne age on top of 2,540-foot mountain 4 miles northeast of Browne (Wahrhaftig, Clyde, 1958; U.S.G.S. Prof. Paper, p. 25)
- x(4) Gold King Creek.-- Erratic boulders of granite and gabbro of Browne age mantle the plateau surface to the east and west of Gold King and Bonnerfield creeks at elevations of between 3,000 and 4,000 feet (Wahrhaftig, Clyde, 1958; U.S.G.S. Prof. Paper 293, p. 25)

Copper River Basin

- x(1) River bluff, Nelchina River.-- Surficial eolian sand, containing organic rich layers, max. 10 feet; on till, 47 feet; on coarse gravel, 12 feet; on stratified sand containing peat beds and woody debris 20-25 feet; (organic sample dates greater than 30,000 yrs. B.P.: W-295); on thick stratified to massive silt and stony silt (Williams, J. R., field notes taken 1954 and 1957)

Copper River Basin (continued)

- x(2) River bluffs, Copper River near Gakona.-- Eolian sand with peaty layers, 5-20 feet (basal peat dates 9,400 ± 300 yrs. B.P.: W-714; on glaciolacustrine and glacioluvial silt, gravelly sandy silt, sand, and gravel of youngest major glaciation, 50-220 feet (wood fragments at base of unit date greater than 30,000 yrs. B.P.: W-531); on glaciolacustrine and glacioluvial silt, sand and gravel of intermediate glaciation, max. 35 feet; on till and glaciolacustrine silty clay of an older glaciation, 15-80 feet (Ferrians, O. J., Jr., and Schmoll, H. R., 1957; Geol. Soc. America Bull., v. 68, p. 1726; _____, unpublished data 1955-1959)
- x(3) River bluff, Gakona River.-- Surface peat, 1-3 feet; on glaciolacustrine stony silt and glacioluvial gravel and sand of youngest major glaciation, 10-20 feet (forest zone at base dates greater than 35,000 yrs. B.P.: W-377); on glacioluvial and glaciolacustrine gravel and sand of an older glaciation, 10-60 feet (Ferrians, O. J., Jr., and Schmoll H. R., 1957; Geol. Soc. America Bull., v. 68, p. 1726; _____, unpublished data, 1955-1959)
- x(4) River bluff, Sanford River.-- Eolian sand, 5-75 feet; on glaciolacustrine and glacioluvial pebbly silt, silt, sand and gravel of youngest major glaciation, 25-130 feet (peat bed 90 feet from top of unit dates 31,300 ± 1,000 yrs. B.P.: W-843); on glaciolacustrine and glacioluvial silt, sand, and gravel of intermediate-age glaciation, max. 40 feet; on volcanic mud-flow, max. 15 feet; on gravel, max. 20 feet; on till and glaciolacustrine fine sand, and silt of an older glaciation, max. 75 feet (Ferrians, O. J., Jr., and Schmoll, H. R., unpublished data 1955-1959)

Cook Inlet

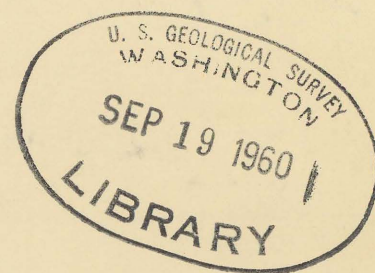
- x(1) Sea bluff near Clam Gulch.-- Surface peat, 5 feet; on stratified silt and gravel complex of Knik and Naptowne age, 160 feet; on poorly stratified sandy silt of Eklutna age, containing ice-rafted boulders, 35 feet; on siltstone and sandstone of Tertiary age exposed at base of sea bluffs (Krisinsley, D. B., U.S.G.S. unpublished report)
- x(2) Sea bluffs, Boulder Point to Swanson River.-- Soil and loess of post-Naptowne and Naptowne age, max. 4 feet; on proglacial lake deposits of late Naptowne age, max. 30 feet; on blue-gray till and stratified drift of early to middle Naptowne age, max. 200 feet; on weathered buff to gray till and stratified drift of Knik age, max. 150 feet; on deeply weathered buff to brown stratified drift and till of Eklutna age, max. 75 feet. Radiocarbon sample collected from Eklutna drift dates older than the dating range: L-117M; the only finitely dated sample collected nearby from early Naptowne deposits dates 39,000 ± 2,000 yrs. B.P.: L-163A; and oldest basal peat from surface bogs dates 8,430 ± 200 yrs. B.P.: L-117 and L-163B, providing a close minimum date for final drainage of proglacial water out of Cook Inlet and below the fifty-foot strand line (Karlstrom, T. N. V., U.S. Geol. Survey Prof. Paper, in press)
- x(3) Sea bluff near Point Possession.-- Stratified sand, largely cliff head dune sand, 40-60 feet; on bog deposits, 8-13 feet; on glaciolacustrine blue-gray stony silt of Naptowne age, 20-30 feet; on weathered buff to gray till and stratified drift of Knik age, 30-40 feet. Basal organic silt unit of buried bog dates 10,370 ± 350 yrs. B.P.: W-474; a stratigraphically higher woody peat bed dates 8,530 ± 200 yrs. B.P.: W-602, and log collected in sand 12 feet above top contact of bog dates 1,530 ± 200 yrs. B.P.: W-838, (Karlstrom, T.N.V., U.S.G.S. Prof. Paper, in press)
- x(4) Mount Susitna.-- Remnants of weathered drift and erratics of Mount Susitna age exposed at elevation of 4,300 feet and above limits of lateral moraines of Caribou Hills age (Karlstrom, T. N. V., U.S.G.S. Prof. Paper, in press)
- x(5) Sea bluff west of Naptowne and moraine near Point McKenzie.-- Undifferentiated soil, loess and proglacial lake sand and gravel of post-Naptowne and Naptowne age, max. 10 feet; on blue-gray laminated silt with middle marine zone containing abundant marine pelecypods and gastropods, 50-60 feet; on blue gray boulder till of Knik age, 5-15 feet exposed locally at base of bluff. Just west of location the Knik till rises higher in bluff section and terminates beneath proglacial lake sediments in a near vertical contact with highly contorted (ice-shoved) buff to brown stratified silt and sand of Eklutna age. The marine horizon records an interglacial high sea level stand between the Knik and Naptowne glaciations. Shells from this horizon collected across Knik Arm near Point Woronzof date sometime between 33,000 and 48,000 yrs. B.P. by the Ionium/Uranium dating method (Sachett, W.M., 1958; Doctoral Thesis, Washington University, St. Louis, Missouri)
- x(6) Sea bluff, Goose Bay.-- Loess, dune sand, and proglacial lake deposits of post-Naptowne and Naptowne age, max. 20 feet; on blue gray till of Naptowne age, 15-30 feet; on advance outwash, 15-20 feet (transported log near base of unit dates greater than 40,000 yrs. B.P.: W-644); on lignitized and contorted peat and organic silt, 3-8 feet (wood near top dates greater than 38,000 yrs. B.P.: W-174; wood near base dates greater than 32,000 yrs. B.P.: W-77); on weathered buff to gray gravel, 20-30 feet; on blue gray laminated silt with buried soil at top and middle marine zone containing highly macerated calcium carbonate mollusks, 5-15 feet; on buff gravel with thin peat and soil at top, 10-20 feet; on unweathered blue-gray boulder till of Knik age exposed only at low tide (Karlstrom, T.N.V., U.S.G.S. Prof. Paper, in press)
- x(7) River bluff, Eklutna valley.-- Undifferentiated soil, loess, and terrace gravel of post-Naptowne and Naptowne age, max. 20 feet; on blue-gray boulder till and stratified drift of Naptowne age, 30-60 feet; on buff to gray weathered till and stratified drift of Knik age, 20-30 feet; on deeply weathered buff to brown drift of Eklutna age, max. 40 feet (Karlstrom, T. N. V., U.S.G.S. Prof. Paper, in press)
- x(8) Matanuska glacier.-- Surface peat and pond silt, 4 feet; on glacial drift of late Naptowne age. Basal peat dates 8,000 ± 300 yrs. B.P.: W-436, (Williams, J. R., and Ferrians, O. J., Jr., 1958; Geol. Soc. America Bull., v. 69, p. 1757)

Kenai Mountains

- x(1) Tustumena glacier.-- Bare to shrub-covered moraines of Tunnel I and Tunnel II age lies respectively 500 and 300 feet in front of Tustumena glacier snout, and about three-fourths of a mile upvalley from forest-covered moraines of Tustumena age. Wood from buried mature forest incorporated in till of Tunnel II age and overlying till of Tunnel I age dates A.D. 1550 ± 150 yrs. B.P.: L-117K. The buried forest records a significant interval of retreat between Tunnel I and II glacial advances (Karlstrom, T.N.V., U.S.G.S. Prof. Paper, in press)
- x(2) Skilak Platform.-- Statistical studies of surface boulders on moraines indicate significant age differences and roughly equal intervals of time between the Naptowne, Knik and Eklutna glaciations and a somewhat longer interval between the Eklutna and Caribou Hills glaciations. A few granite erratics of Mount Susitna age occur on graywacke-argillite bedrock slopes between elevations of 3,500 and 4,000 feet, and above lateral moraines of Caribou Hills age. Rock glaciers of both Tustumena and Tunnel age locally overlap moraines of late Naptowne age (Karlstrom, T. N. V., U.S.G.S. Prof. Paper, in press)
- x(3) Bartlett Glacier.-- Bare to shrub-covered moraines of Tunnel I and Tunnel II age lie respectively 1 mile and 1/2 mile downvalley from Bartlett glacier snout. Railroad cut near Tunnel Section house exposes till of Tunnel I age with incipient soil, 4-6 feet; on buried forest and soil (wood sample dates A.D. 550 ± 220 yrs.: W-318); on till of Tustumena III age, more than 15 feet (wood from ice-scoured log at base of till dates 420 B. C. ± 100 yrs.: W-76) (Karlstrom, T.N.V., U.S.G.S. Prof. Paper, in press)

Pacific Coastal Alaska

- x(1) Pavlof Bay, Alaska Peninsula.-- Extensive, only slightly modified moraines fringe the lower slopes of Pavlof volcano, and contain fragments of coarsely crystalline igneous rock foreign to area (Kennedy, G. C., and Waldron, H. E., 1955; U.S.G.S. Bull., 1028-A, p. 14), probably derived by ice transport from ice centers that covered the Pacific islands to the south during the Brooks Lake (Naptowne) and earlier glaciations (Karlstrom, T.N.V., U.S.G.S. Prof. Paper, in press)
- x(2) Sea bluff, Ayakulik River, Southwest Kodiak Island.-- Unweathered till and stratified drift, 50-100 feet; on beach deposits with marine shells, 20-40 feet; on basal till and stratified drift (Maddren, A.G., 1919; U.S.G.S. Bull. 692-E, p. 307). The drift contains rocks of foreign lithologies which may have come from the Alaska Peninsula (Capps, R.S., 1937; U.S.G.S. Bull. 886-C, p. 163). The surface drift is correlated with the Naptowne, the basal drift with the Knik, and the intervening marine deposits with the interglacial marine horizon exposed at Cook Inlet localities 5 and 6 -- see above (Karlstrom, T. N. V., U.S.G.S. Prof. Paper, in press)
- x(3) Malaspina Glacier, Yakutat Bay.-- Oldest belt of moraines 20 miles in front of Malaspina glacier snout on Pacific coastal shelf is dated between A.D. 600 and 1290; the outermost moraine of a younger morainal belt between A.D. 1700 and 1791, and the intervening interval of retreat between A.D. 1290 and 1700 (Plaister and Miller, 1957; Geol. Soc. America Bull., v. 68, no. 12, pt. 2, p. 1909), or contemporaneous with the Tunnel I and II moraines as dated in the Kenai Mountains (Kenai Mountain localities 1 and 3)



Alaska. Surficial. 1:1584,000. 1960.

Footnotes,

cop. 2



M(200)
R290
no.60-88
Footnotes
[sheet
3 of 4]
C. 2