Vegetation of the Arctic Slope of Alaska

EXPLORATION OF NAVAL PETROLEUM RESERVE NO. 4 AND ADJACENT AREAS, NORTHERN ALASKA, 1944–53

PART 2, REGIONAL STUDIES

GEOLOGICAL SURVEY PROFESSIONAL PAPER 302–B

Prepared and published at the request of, and in cooperation with, the U. S. Department of the Navy, Office of Naval Petroleum and Oil Shale Reserves

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By LLOYD A. SPETZMAN

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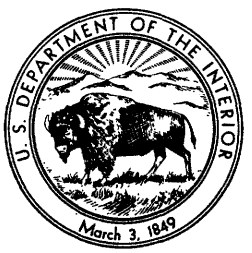

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VEGETATION OF THE ARCTIC SLOPE OF ALASKA

By LLOYD A. SPETZMAN

ABSTRACT

The environment of the Arctic Slope is described by physiographic provinces, namely, the coastal plain, foothills, and mountains. Topography, rock composition, soil, vegetation, and climate are considered for each province.

Six major plant communities, which together compose the tundra of the Arctic Slope, are described. These are the niggerhead meadows, wet sedge meadows, dry upland meadows, flood-plain and cutbank vegetation, outcrop and talus vegetation, and aquatic vegetation of lakes. The dominant and secondary plants in each community are given, as well as local variations in the vegetation which are related to minor habitat differences such as slope exposure or bedrock.

Lines of successional change, primarily for the vegetation in the foothills, are suggested.

Seven localities, representing the common habitats of vegetation occurring on the Arctic Slope, are described to illustrate natural mosaics of plant communities.

Included is a list of 439 species of higher plants which grow on the Arctic Slope, together with their distribution, altitude range, abundance, flowering period, and habitat. This list is based on about 4,500 collections of plants made from 1945 through 1951, supplemented by information of previous collections which is compiled in Hultén's flora of Alaska.

INTRODUCTION

Plant collections from the Arctic Slope of Alaska have been made periodically since 1826 (Hultén 1940). As ships were the prevalent means of transportation, and overland travel was very difficult in summer, especially across the coastal plain, almost all plant collections made before 1945 were from a narrow zone along the coast. Thus the foothills and mountains of the Arctic Slope remained relatively unexplored botanically until 1945.

Since 1945 much of the interior of the Arctic Slope has been explored botanically in reconnaissance manner during the United States Navy's geologic exploration of Naval Petroleum Reserve No. 4; the U. S. Geological Survey participated in that program as a cooperating agency, and the present report is a byproduct of that cooperative effort. Exploration parties traveled by small airplanes on skis, floats, or wheels; by amphibious tracked vehicles (weasels), which can cross rivers as well as hills; and by folding boats, by means of which travel started near the mountain front and continued down many of the major rivers to the Arctic Ocean. Several supply and transportation centers, such as Point Barrow, Umiat, and Barter Island, were established by the Navy, from which one could fly to the most remote part of the Arctic Slope in a few hours. From 1945 to 1951, the Navy provided relatively complete aerial photographic coverage of northern Alaska, from which good maps were compiled by photogrammetric methods.

This vegetation study began in the summer of 1946 and continued each summer thereafter through 1951. In 1946 and 1947, while a student at the University of Minnesota, the writer was a summer employee of the U. S. Geological Survey, and began a collection of Arctic plants. In 1948 and 1949 this study was supported by a grant from the Arctic Institute of North America. In 1950 and 1951 the writer was again employed by the Geological Survey and continued collecting and observing the Arctic flora. During this 6-year period some 4,500 plants were collected from more than 50 localities on the Arctic Slope (fig. 4), of which about 3,000 were collected by the writer and 1,500 by other persons, mostly fellow workers in the Survey.

These collections were critically studied at the herbarium of the University of Minnesota, under the guidance of Prof. W. S. Cooper, with assistance from several authorities on Alaskan plants, primarily Eric Hultén, of Sweden, and J. P. Anderson, of Iowa State College, both authors of works on the flora of Alaska (Hultén 1941–50; Anderson 1943–52).

The writer is grateful to the many persons who have contributed to this effort; to the Arctic Institute of North America, which furnished field expenses in 1948 and 1949; also to the U. S. Navy and the U. S. Geological Survey, which made this exploration possible.

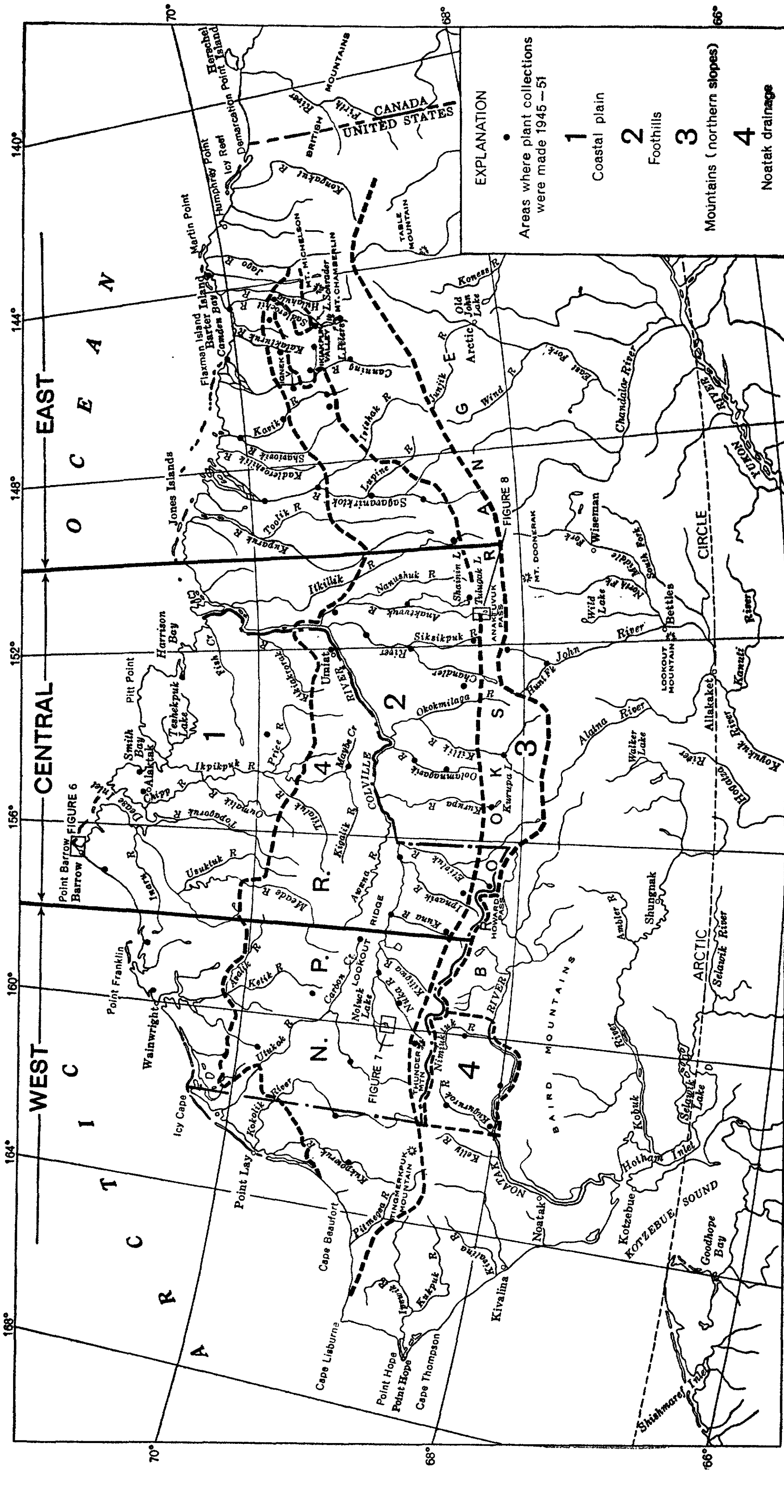


FIGURE 4.—Index map showing outline of zones used to illustrate known distribution of plants on the Arctic Slope of Alaska and location of figures 6, 7, and 8.

ENVIRONMENT

The Arctic Slope of Alaska extends from the crest of the Brooks Range northward to the Arctic Ocean and from the Canada-Alaska boundary, 141° W., westward to Cape Lisburne. It extends more than 600 miles east-west and from 100 to 200 miles north-south; it constitutes one-seventh of Alaska, and is roughly equal in area to the State of Minnesota.

The Arctic Slope is divided into three physiographic provinces (Payne and others, 1951): the coastal plain, the foothills, and the northern slopes of the mountains. Each of these provinces has unique topography, geology, soil, vegetation, and to some extent climate.

COASTAL PLAIN

The coastal plain extends about 500 miles east-west and is as much as 100 miles wide; it ranges from sea level generally to about 500 feet and locally to 1,000 feet in elevation. Parts of the coastal plain were below sea level as recently as the Quaternary period.

The coastal plain is extremely flat, poorly drained, and almost entirely underlain by permafrost from a few inches to a few feet below the surface. Frost polygons, in the form of shallow depressions as much as 50 feet in diameter, separated by low ridges, are prevalent, especially wherever there is vegetation cover. About one-fifth of the coastal plain consists of lakes, which remain partly frozen until early July, and streams, which thaw in June and meander toward the coast in broad, shallow, braided, silty to sandy channels.

Surficial material of the coastal plain consists primarily of Quaternary deposits, as much as 250 feet thick, of unconsolidated gravel, sand, and clay, in most places overlying Upper Cretaceous conglomerate, sandstone, and shale. Locally east of the Colville River there are hills of unconsolidated Tertiary gravel.

Much of the coastal plain soil is coarse, derived from unconsolidated deposits, and generally contains reddish-brown plant remains near the surface. In broad shallow wet depressions, thin deposits of peat are common, mostly formed from sedges and mosses. Along flood plains and beaches there are clean mineral soils, sorted by wind and water.

The climate of the coastal plain (fig. 5; table 1) is modified by the adjacent Arctic Ocean. The average temperature of the 3 summer months, June through August, at Barrow is only 38°F; the average diurnal range during this period is 10°, and there are only about 600 day-degrees above freezing during an entire summer. The average frost-free season, 17 days at Barrow, has no real significance, because plants are actively growing before and after this period, and the microclimate is frequently several degrees warmer than the air temperatures recorded.

During the summer months constant strong winds average more than 12 miles per hour, and 70 percent of the time cloudiness or fog prevails.

FOOTHILLS

The foothills are 10 to 100 miles in width and more than 500 miles east-west, narrowing at both ends. In elevation, they range from sea level near Cape Lisburne to about 2,500 feet along the mountain front. The foothills have been above sea level since the Early Cretaceous epoch, and for the most part were never glaciated. They consist of rolling hills and valleys, with moderately drained slopes and poorly drained lowlands. Most of the foothills, except possibly along large rivers, are underlain by permafrost within a few feet of the surface. Frost polygons, outlined by low ridges, are typical in lowlands, whereas vegetation hummocks, accentuated by frost action, are typical of the uplands. There are few lakes in the foothills, and large rivers meander down broad incised valleys.

The foothills consist of two subsections. The northern foothills are characterized by long parallel east-west ridges and valleys; the ridges commonly are formed of sandstone and conglomerate. The southern foothills have complex topography, forming isolated hills of sandstone and limestone separated by lowlands commonly underlain by softer rocks such as shale.

In the foothills three soil types are widespread: residual silty soils on the uplands, peat deposits in the wetter lowlands and depressions, and coarse sand and gravel alluvium along the flood plains. Sandy glacial outwash is also present locally in valleys near the mountain front. The residual soils, even though subjected to considerable frost action, have a characteristic profile. The A–horizon is generally dark brown, high in humus, acid, and is about 6 inches thick. The B–horizon is commonly light gray, silty, acid, and forms adobelike masses when dried; it is 1 to 2 feet thick, and locally is exposed at the surface in the form of frost boils. The C–horizon is perennially frozen, thus preventing downward drainage. Peat soils are formed of detritus of mosses, sedges, and small woody plants; they are usually permanently frozen a few feet below the surface. Alluvial soils contain strata of sand and boulders, and they thaw to a depth of several feet, especially where they have little plant cover along streams.

The foothills climate (fig. 4; table 1) is more suitable for plant growth than the climate of either the coastal plain or the mountains, primarily because it is warmer. From records compiled at Umiat and scattered field observations, the average summer temperatures are at least 10° warmer in the foothills than at Barrow or Barter Island on the coast. The foothills have more hours of summer sunshine, yet greater precipitation

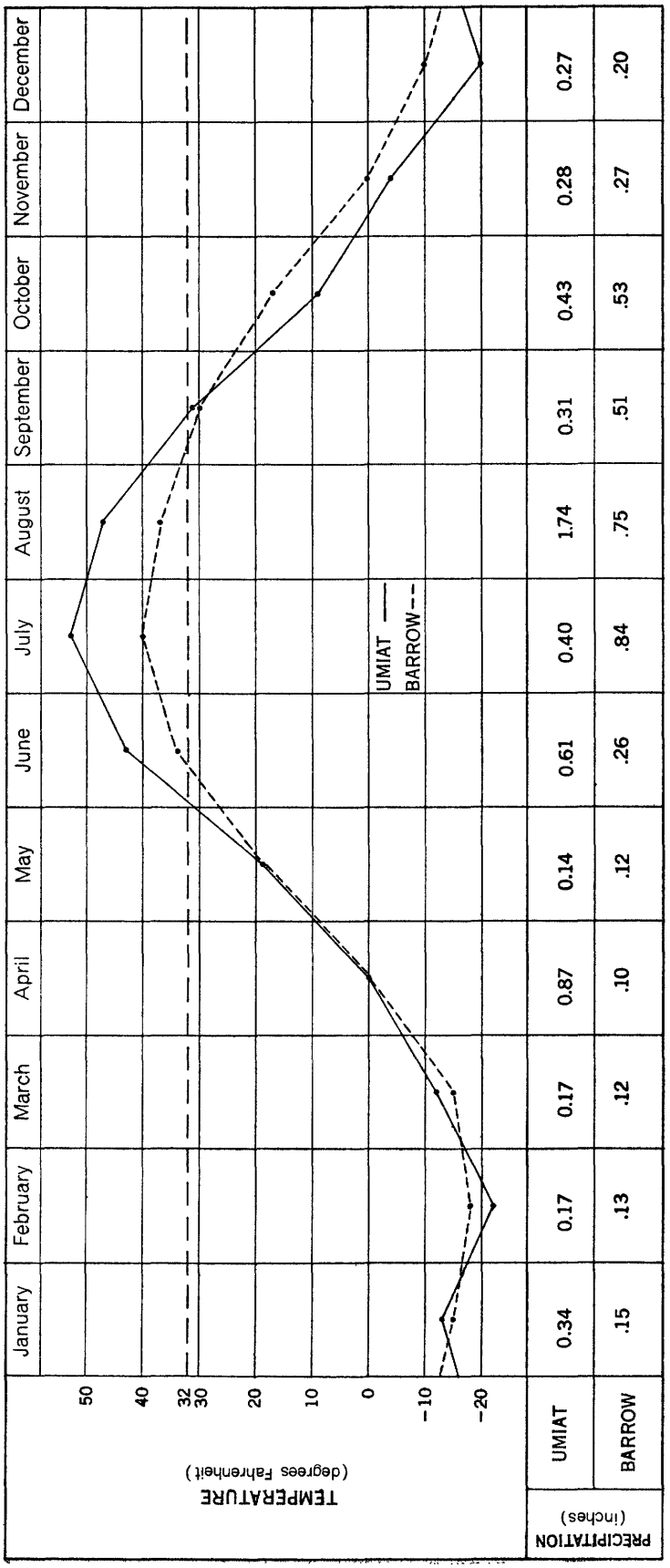


FIGURE 5. Climatic data for the Arctic Slope. Average monthly temperature and precipitation at Barrow (29-year record) on the coastal plain and at Umiat (3-year record) in the foothills. U. S. Weather Bureau.

A. NIGGERHEAD MEADOW COMMUNITY

Dominated by a tufted cottongrass, *Eriophorum vaginatum spissum*, this is the most common plant community in the foothills. Near Canning River, 2,000 feet elevation, view west, August 1947.

B. WET SEDGE MEADOW AND OXBOW LAKE ON RIVER TERRACE

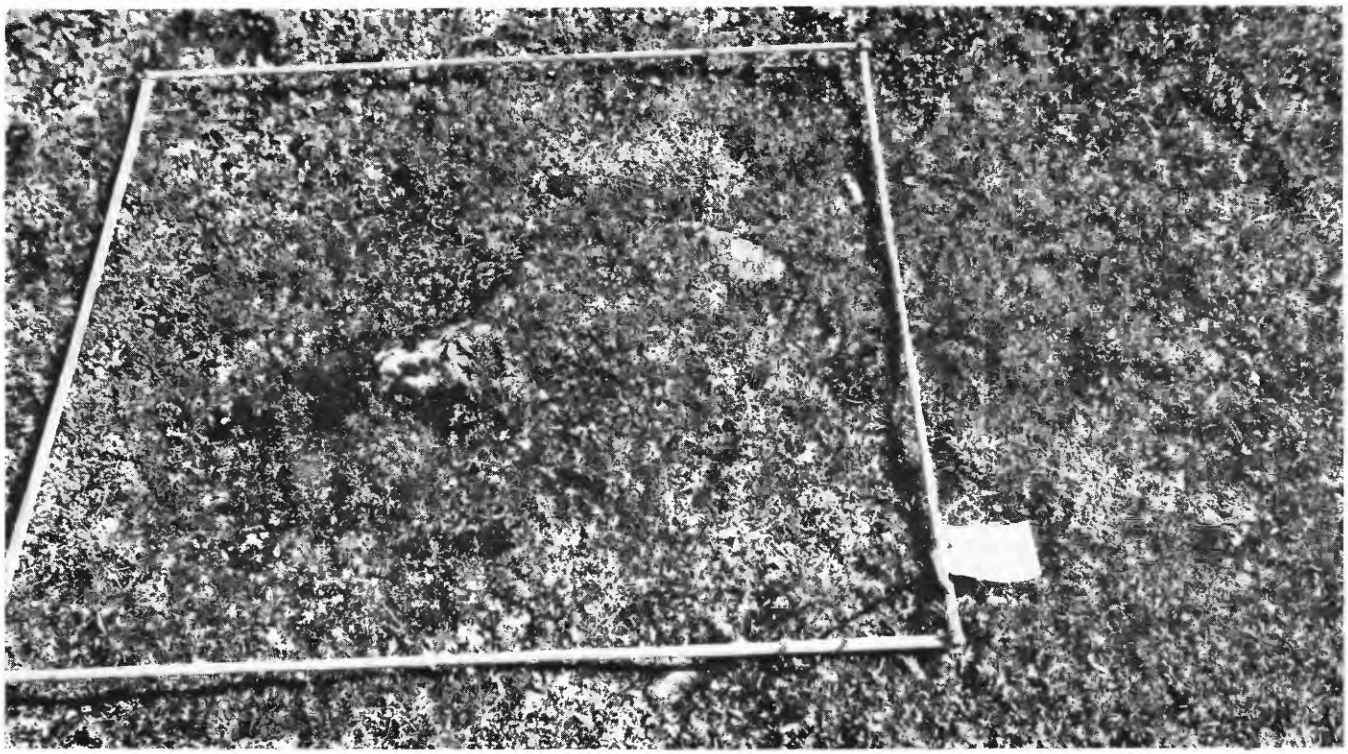
Flat wet areas of sedge, *Carex aquatilis*, subdivided by darker ridges covered with willow, *Salix richardsonii*. Sagavanirktok River, 1,500 feet elevation, July 1946.

A. VEGETATION ON FLOOD PLAIN OF SMALL STREAM

Feltleaf willow, *Salix alaxensis*, 3 to 5 feet high, near banks covered by cottongrass, *Eriophorum scheuchzeri* and horsetail, *Equisetum arvense*. Shaviovik River drainage basin, 1,000 feet elevation, July 1947.

B. FLOOD-PLAIN WOODS

Feltleaf willow, *Salix alaxensis*, 20 feet high. Umiat, Colville River, 350 feet elevation, August 1947.

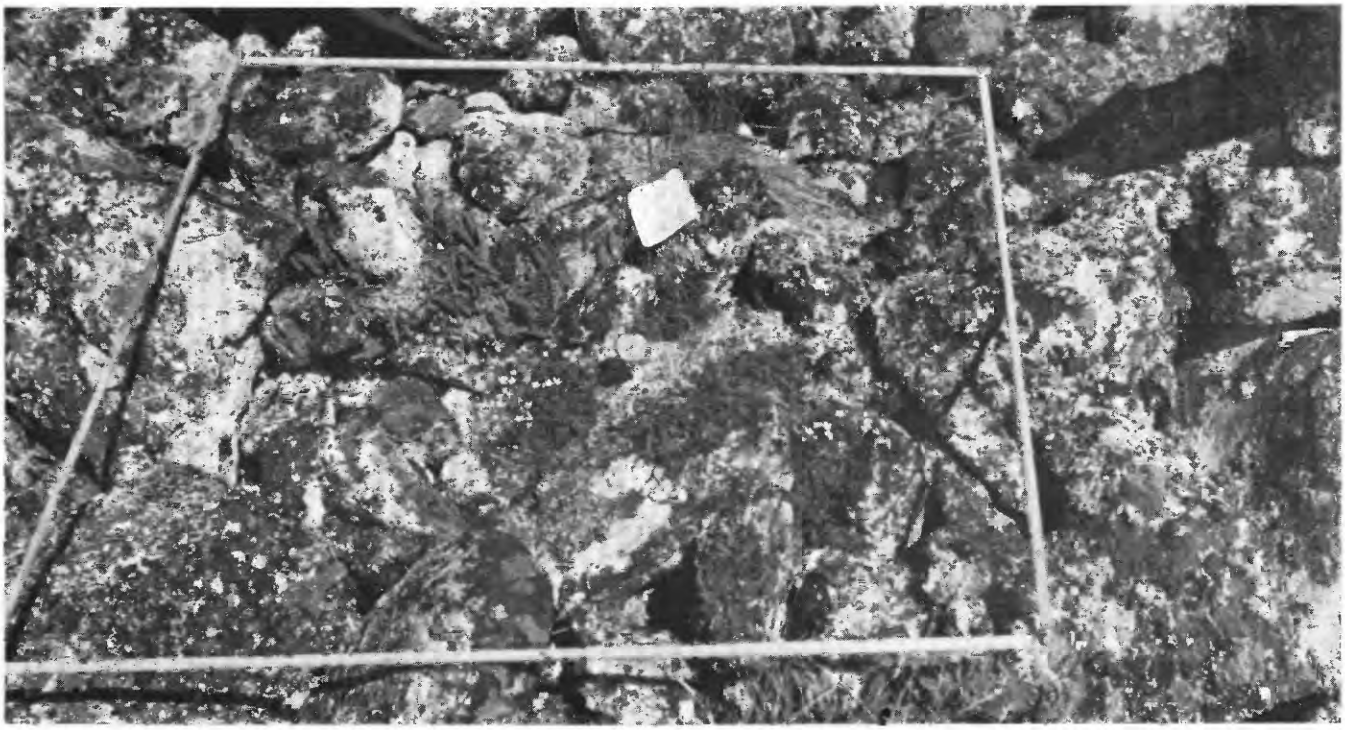


A. DETAILED VIEW OF *DRYAS*-LICHEN DRY MEADOW

Plants about 1 inch high. On moraine, south end of Tulugak Lake, July 1949. Detailed view, 1 meter square.

B. ZONE OF MOUNTAIN HEATHER ON SLOPE

Dry-meadow slope showing dark zone (center) of mountain heather, *Cassiope tetragona*, where snow accumulates, and light zone of *Dryas octopetala*-lichen vegetation (above). Anaktuvuk Pass near Tulugak Lake, view north, July 1949.



A. DETAILED VIEW OF VEGETATION ON SANDSTONE TALUS

Sparse growth of *Dryopteris fragrans, Saxifraga tricuspidata, Hierochloe alpina,* and lichens. Anaktuvuk Pass, mountain slope east of Tulugak Lake, 2,500 feet elevation, July 1949. Detailed view, 1 meter square.

B. LAKE-MARGIN VEGETATION

Shallow southern end of Lake Peters showing cottongrass, *Eriophorum angustifolium,* sedge, *Carex aquatiles.* Lake is opaque from glacial rock flour. View east, 3,500 feet elevation, July 1948.

TABLE 1.—*Growing-season temperatures of stations on the coastal plain, foothills, and mountains*

[Items marked with an asterisk (*) indicate data lost. Field observations and U. S. Weather Bureau data for Barrow]

Station	Range	5-day temperature summaries (°F) for—																	Frost-free period
		June						July						August					
1946																			
Sagavanirktok River (foothills).	Max	76	81	80	70	--	65	75	85	84	75	78	76	59	82	78	78	60	--	June 3–July 24 (52 days).
	Min	21	34	33	34	--	42	36	39	44	32	31	34	30	30	31	37	32	--	
	Mean	47	56	55	54	48	50	50	55	64	52	51	54	51	56	48	52	44	--	
Barrow (coastal plain)	Max	33	42	53	47	52	48	43	73	61	59	60	50	45	61	66	52	54	51	July 7–15 (10 days).
	Min	19	27	29	30	30	29	27	30	33	27	29	28	28	31	28	31	29	31	
	Mean	26	34	36	35	38	35	34	47	45	35	38	39	35	44	39	39	37	39	
1947																			
Shaviovik–Canning River (foothills).	Max	76	70	74	74	74	60	62	54	84	84	84	72	56	64	73	52	67	64	July 3–Aug. 3 (32 days).
	Min	25	34	30	28	34	28	30	32	34	42	43	40	31	25	31	28	27	34	
	Mean	42	47	47	46	50	43	44	42	61	62	60	51	40	44	47	37	44	44	
Barrow (coastal plain)	Max	32	34	34	32	41	40	40	39	58	61	53	50	48	47	56	40	60	48	July 9–30 (22 days).
	Min	21	21	22	21	26	29	29	29	34	37	32	31	33	33	34	32	37	32	
	Mean	25	29	28	27	35	34	34	34	41	49	41	39	36	37	41	34	41	35	
1948																			
Lake Schrader–Sadlerochit River (mountains).	Max	50	50	55	55	60	55	60	65	68	74	70	75	79	60	80	57	45	50	June 22–July 9 (17 days).
	Min	20	27	28	26	26	35	35	31	35	33	30	32	36	34	29	20	14	23	
	Mean	33	33	38	37	43	44	47	46	52	49	44	49	55	48	48	37	32	34	
Barrow (coastal plain)	Max	37	33	37	36	38	40	62	62	57	70	42	51	58	46	55	45	41	37	July 5–19 (15 days).
	Min	24	24	22	31	32	32	29	34	34	30	30	33	35	36	29	27	26	23	
	Mean	27	27	27	32	33	33	38	45	45	42	33	40	45	40	38	34	32	28	
1950																			
Noluck Lake (foothills)	Max	46	60	58	66	(*)	(*)	(*)	(*)	(*)	(*)	(*)	60	75	63	63	75	65	53	June 8–Aug. 25 (78 days).
	Min	26	29	35	42	(*)	(*)	(*)	(*)	(*)	(*)	(*)	38	40	33	36	42	30	29	
	Mean	39	41	45	52	47	44	53	64	58	58	62	49	52	50	48	56	49	44	
Barrow (coastal plain)	Max	35	37	42	41	40	49	46	48	49	48	59	38	57	58	45	47	40	49	June 28–July 13 (16 days).
	Min	21	24	29	32	30	31	32	32	31	32	37	30	29	33	31	31	31	31	
	Mean	30	30	35	36	34	39	38	40	39	40	47	35	40	47	36	40	36	39	

than along the coast. Umiat has an average temperature from June through August of about 49°F, with a summer diurnal range of 20°, and it receives a total of about 1,800 day-degrees above freezing in summer. In July, days with a maximum temperature of 75°F are common, and freezing is relatively rare, though snow flurries occasionally occur in midsummer. Precipitation is scant, about 4 to 8 inches per year, with the greatest amount in summer in the form of light showers.

MOUNTAINS

The Brooks Range is the northerly continuation of the Rocky Mountain system. It is widest, highest, and most rugged in eastern Alaska, and it decreases in width and height westward, from about 9,000 down to 3,000 feet elevation, over a distance of 500 miles. The lower north-south passes through the mountains are at about 2,000 feet. These mountains were uplifted near the end of the Cretaceous period, and have since been continually above sea level. Pleistocene valley glaciation was widespread, and small glaciers persist today on some mountains which rise above 6,000 feet elevation.

In several valleys along the mountain front, commonly at about 3,000 feet elevation, are large, beautiful glacial lakes. Two large springs occur in the mountains, Shublik Springs near the Canning River and Tulugak Springs in Anaktuvuk Pass.

Exposed bedrock in these mountains includes great thicknesses of limestone, sandstone, conglomerate, and shale. Schist is also common in the east, as is basalt locally.

Because of glaciation, frost action, and rapid erosion of steep slopes by running water, little soil has accumulated, and vegetation is sparse in the mountains. Loose material is quickly carried down mountain streams into broad valleys, where extensive alluvial fans are formed. Moraine and outwash deposits are locally common along mountain valleys.

Little is known about the climate of the mountains, except that it is generally cooler than the adjacent foothills in summer. Climate is highly variable from place to place, but, in general, temperatures decrease with higher elevation. Slope exposure has a great influence on microclimate. Further complications are caused by convection currents upslope which sometimes cause summer thunder showers, wind channels along valleys, wind barriers, and rain shadows.

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PLANT COMMUNITIES

The Arctic Slope lies in the zone where tundra vegetation predominates, north of the transcontinental coniferous forest, or taiga zone. Tundra vegetation consists of several plant communities which are characteristically treeless, and almost completely cover the ground. Where the vegetation is very sparse, as in the Brooks Range, rock desert is a more appropriate general name for the vegetation. The distinction between arctic and alpine tundra is impossible to make on the Arctic Slope, although several species of plants are restricted to alpine situations, and form what might be called alpine communities. Trees are not entirely lacking on the Arctic Slope; along larger valleys in the foothills and to a lesser extent in mountain valleys there are narrow belts of tree-sized feltleaf willow and, locally, balsam poplar. The white spruce-tree line along the southern slopes of the Brooks Range occurs usually between 1,000 to 2,000 feet elevation. There are no natural spruce on the Arctic Slope, but the writer in 1949 and 1950 transplanted a few to a south-facing slope at Umiat; they were still alive when last observed in 1951.

Six major kinds of plant communities are widespread on the Arctic Slope:

1. Niggerhead meadows
2. Wet sedge meadows
3. Dry upland meadows
4. Flood-plain and cutbank vegetation
5. Outcrop and talus vegetation
6. Aquatic vegetation of lakes

There are, naturally, local variations within these communities, transitional areas between communities, and local areas with other plant communities. Coastal plant communities were not sufficiently studied to develop generalized descriptions for them.

Plant communities, as described below, consist of natural associations of plants restricted, in general, to a typical habitat; that is, a close interrelationship between the vegetation, climate, soil, drainage, and, for some plants, rock type and slope.

NIGGERHEAD MEADOWS

The niggerhead meadow community (pl. 7*A*) is widespread on the Arctic Slope. It is characteristic of the elevated southern parts of the coastal plain; it is the dominant plant community in the foothills, where it continues for tens of miles over gently rolling hills, dissected locally by small drainageways lined with shrub willows; and it occurs locally along the lower slopes of mountain valleys to about 3,000 feet elevation.

These meadows are mostly on residual soil modified by frost action as previously described under foothill soils. Drainage is fair, though water accumulates in holes dug down to the frozen layer, and the surface soil is usually saturated for a few weeks during the spring thaw in late May.

One plant dominates in niggerhead meadows, the tussock-forming cottongrass, *Eriophorum vaginatum spissum*, commonly called niggerhead. This species forms tussocks 6 to 10 inches across and equally high, separated by mossy channels a few inches wide. The tussocks flower very early in the growing season, from late May through June, at which time they are grazed by caribou. Locally, between the tussocks, small mounds or patches of bare soil, called frost boils, are squeezed to the surface by frost action. Lichens and mosses are common in niggerhead meadows.

Secondary plant species scattered through relatively closed stands of niggerheads include various grasses and sedges, small shrubs, and herbs.

Grasses and sedges:
- *Arctagrostis latifolia*
- *Carex bigelowii*
- *Luzula confusa*
- *Poa arctica*

Small shrubs:
- *Betula nana exilis*
- *Dryas integrifolia*
- *Empetrum nigrum*
- *Ledum palustre decumbens*
- *Salix pulchra*
- *reticulata*

Herbs:
- *Eutrema edwardsii*
- *Polygonum bistorta plumosum*
- *Rubus chamaemorus*
- *Saussurea angustifolia*
- *Saxifraga hieracifolia*
- *punctata nelsoniana*

Frost boils locally have a few small grasses and herbs.

Small grasses and herbs:
- *Chrysosplenium wrightii*
- *Festuca brachyphylla*
- *Juncus biglumis*

WET SEDGE MEADOWS

About half the area of the coastal plain and about one-quarter of the foothills are covered by wet sedge meadows (pl. 7*B*), but in the mountains they are scarce. These meadows are characteristic of flat poorly drained lowlands, the margins of flood plains, and lake margins. They usually occur on peaty soil that remains saturated throughout the summer, and the surface is usually covered by a few inches of standing water. During summer the upper 1 to 2 feet of soil thaws, gradually melting downward and forming a level frozen subsurface to which one sinks when walking across these meadows. Frost polygons are well

developed, giving a paddy-field appearance of basins 50 feet or more across, surrounded by low ridges 6 to 12 inches high.

Carex is the dominant genus in the wet sedge meadows, comprising about three-fourths of the vegetation. Any of several species of sedge or cottongrass may dominate in a given part of a wet sedge meadow, because most of the dominant species expand by vegetative growth to form a local patch of only one or two species. The flatness of most wet sedge meadows makes the habitat within each polygon fairly uniform. Slight differences between neighboring polygons, such as water level, favors one species of sedge over another, with the result that the predominant species may differ in closely adjacent polygons. There are many mosses, a few minute liverworts, and generally no lichens in this community.

Carex aquatilis is usually as abundant as all the other Carices combined. This species has a wide habitat tolerance; it grows on flood plains, in wet meadows, along lake margins, in wet sand, or in peat. The largest plants grow as high as 18 inches in the foothills, but in the Point Barrow area this species is less than 6 inches high.

Other sedges which dominate parts of wet sedge meadows include:

Carex chordorrhiza
membranacea
rariflora
rotundata

Along the Arctic coast the grass *Dupontia fischeri* and the cottongrass *Eriophorum scheuchzeri* are locally dominant.

Secondary species, fairly common at least in some wet sedge meadows, include grasses, sedges, cottongrasses, rushes, small heath shrubs, small willows, various herbs, and horsetail. Some of these plants are typically found on the flat wet parts of the wet sedge meadow, whereas others, especially the shrubs, are typically found along the ridges which separate the polygonal depressions.

Grasses:
Alopecurus alpinus
Dupontia fischeri psilosantha
Hierochloe pauciflora
Sedges:
Carex bicolor
capillaris
lachenalii
lugens
microglochin
misandra
physocarpa
williamsii
Cottongrasses:
Eriophorum angustifolium
callitrix
russeolum leucothrix
Horsetail:
Equisetum palustre
Rushes:
Juncus biglumis
triglumis
Scirpus caespitosus austriacus
Small heath shrubs:
Andromeda polifolia
Chamaedaphne calyculata
Ledum palustre decumbens
Oxycoccus microcarpus
Small willows:
Salix fuscescens
pulchra
reticulata
richardsonii
Herbs:
Cardamine pratensis
Chrysosplenium tetrandrum
Lysiella obtusata
Pedicularis pennellii
sudetica
Petasites frigidus
Pinguicula villosa
vulgaris
Rubus chamaemorus
Saxifraga cernua
foliolosa
hirculus
Tofieldia pusilla
Triglochin maritima
Valeriana capitata

FLOOD-PLAIN AND CUTBANK COMMUNITIES

Extensive nearly level flood plains and steeply sloping cutbanks occur along major streams. The flood plains are usually several times the width of the stream under normal flow. The cutbanks occur where the stream undercuts the walls of the valley. Flood-plain soils are, for the most part, coarse gravel, sand, or silt sorted by alluvial action; cutbank surfaces are highly variable either of bedrock or unconsolidated material. When the streams thaw generally in late May to early June, the vegetation is partly destroyed on both flood plains and cutbanks by floods and floating ice masses, leaving bare surfaces upon which plants can readily become established later in the summer. Four successive stages of vegetation develop in this environment, in the following order: Pioneer stage, tall-shrub stage, low-shrub stage, and finally niggerhead meadows. These stages evolve as the habitat is gradually changed owing to downcutting of the streams, reactional effects of the vegetation, and variations in the permafrost level caused by insulating effects of the vegetation.

The pioneer or invasion stage is characterized by many kinds of plants (about 75 species at Umiat) both

woody and herbaceous, usually widely spaced with bare areas between individual plants (pl. 8*A*). Typical pioneer species include horsetails, grasses, sedges and rushes, shrubs, and many herbs, especially pinks, mustards, legumes, and composites. Most of these species are typical of both flood plains and cutbanks, but several are found only on one or the other.

Horsetails:
- *Equisetum arvense*
  - *variegatum*

Grasses:
- *Agropyron* spp.
- *Arctagrostis latifolia*
- *Bromus pumpellianus*
- *Calamagrostis inexpansa*
- *Deschampsia caespitosa*
- *Festuca altaica*
  - *rubra*
- *Hierochloe alpina*
  - *odorata*
- *Poa arctica*
  - *glauca*
- *Trisetum spicatum*

Sedges and rushes:
- *Carex aquatilis*
  - *membranacea*
  - *physodcarpa*
  - *rupestris*
- *Eriophorum angustifolium*
  - *scheuchzeri*
- *Juncus arcticus alaskanus*
  - *castaneus*
- *Luzula* spp.

Shrubs:
- *Potentilla fruticosa*
- *Salix alaxensis*
  - *arbusculoides*
  - *niphoclada*
  - *pulchra*
  - *richardsonii*
  - *walpolei*
- *Shepherdia canadensis*

Herbs:
- *Artemisia arctica*
  - *tilesii*
- *Aster sibiricus*
- *Astragalus alpinus*
  - *umbellatus*
- *Cardamine richardsonii*
- *Castilleja pallida*
- *Cerastium beeringianum*
- *Draba* spp.
- *Epilobium angustifolium*
  - *latifolium*
- *Erigeron* spp.
- *Erysimum pallasii*
- *Hedysarum alpinum americanum*
  - *mackenzii*
- *Lupinus arcticus*
- *Melandrium* spp.
- *Merckia physodes*
- *Minuartia* spp.

Herbs—Continued
- *Oxytropis* spp.
- *Papaver macounii*
- *Parnassia kotzebuei*
- *Pedicularis* spp.
- *Phlox sibirica*
- *Polemonium* spp.
- *Saxifraga* spp.
- *Senecio lugens*
- *Solidago multiradiata*
- *Taraxacum* spp.
- *Zygadenus elegans*

The tall-shrub stage, which develops several tens of years after the pioneer stage, usually on slightly elevated parts of the flood plain and along the base of cutbanks, consists of dense willows with a sparse undergrowth of shale-tolerant herbs, mosses, and lichens. The most conspicuous species, by reason of its size, is the feltleaf willow, *Salix alaxensis* (pl. 8*B*), a sparsely branched tree 10 to 25 feet high, which spreads by vegetative growth to form clumps and patches. In addition to the shade effect, this stage has greater competition between species, increase in soil humus and litter, and cooler soil temperatures.

The principal species in the tall-shrub stage of the flood plains in the foothills include trees, shrubs 3 to 10 feet high, herbs, and many mosses and lichens.

Trees:
- *Populus tacamahacca*
- *Salix alaxensis*

Shrubs:
- *Alnus crispa*
- *Salix arbusculoides*
  - *desertorum*
  - *glauca acutifolia*
  - *niphoclada*
  - *pulchra*
  - *richardsonii*
  - *walpolei*
- *Shepherdia canadensis*

Herbs:
- *Aconitum delphinifolium*
- *Anemone richardsonii*
- *Astragalus eucosmus*
- *Dodecatheon frigidum*
- *Hedysarum alpinum americanum*
- *Parnassia palustris*
- *Pedicularis capitata*
  - *verticillata*
- *Polemonium acutiflorum*
- *Polygonum viviparum*
- *Primula egaliksensis*
- *Pyrola grandiflora*
  - *secunda obtusata*
- *Valeriana capitata*

Following the tall-shrub stage, the low-shrub stage is dominated by smaller willows and heath shrubs. Its development is correlated with continued accumulation

of organic debris, abundant growth of mosses, and reduction in the depth of soil thaw in summer because of the insulation blanket thus produced. The mossy layer is probably unsuitable for germination of many kinds of plants. The larger willows may persist locally, but gradually die out. On upper parts of cutbanks the pioneer stage is generally followed by the low-shrub stage.

The principal species in the low-shrub stage are shrubs and a few grasses and herbs.

Shrubs:
Arctostaphylos alpina rubra
Betula nana exilis
Cassiope tetragona
Ledum palustre decumbens
Rhododendron lapponicum
Salix niphoclada
pulchra
richardsonii
Vaccinium uliginosum
vitis-idaea
Grasses and herbs:
Arctagrostis latifolia
Eriophorum vaginatum spissum

With increased organic accumulation the low-shrub stage is gradually replaced with the very stable nigger-head meadow community. However, the low-shrub may persist for a considerable time on well-drained river terraces and steep cutbanks.

DRY UPLAND MEADOWS

This community is found along ridges and on rubble slopes, where bedrock is close to the surface, and on very porous soil, such as alluvial fans, and the driest parts of river terraces. The soil is generally coarse and mineral, containing a small amount of humus near the surface. Dry meadows are most common along the mountain front between 2,000 to 4,000 feet elevation, where in places they cover more than half the surface. The vegetation of dry meadows is somewhat sparse, and usually only a few inches high (pl. 9*A*). Plant associations differ from one place to another, but *Dryas octopetala* and lichens are usually of primary importance. *Dryas octopetala* is a low-spreading mat plant a few inches high, with twisted prostrate woody stems and creamy flowers about an inch across.

Other than *Dryas octopetala*, there are many kinds of low plants, such as grasses, dry-land sedges and rushes, ground shrubs, and various herbs, especially pinks, saxifrages, legumes, and louseworts.

Grasses:
Arctagrostis latifolia
Calamagrostis purpurescens
Festuca brachyphylla
Hierochloe alpina
Sedges and rushes:
Carex misandra
obtusata
rupestris
scirpoidea
Kobresia myosuroides
simpliciuscula
Luzula confusa
Shrubs:
Empetrum nigrum
Loiseleuria procumbens
Rhododendron lapponicum
Salix phlebophylla
reticulata
rotundifolia
Vaccinium vitis-idaea
Herbs:
Bupleurum americanum
Minuartia arctica
macrocarpa
Oxytropis gracilis
maydelliana
nigrescens
Pedicularis lanata
langsdorfii
Phlox sibirica
Polygonum viviparum
Saxifraga flagellaris
oppositifolia
reflexa
Silene acaulis
Tofieldia coccinea

Around the margins of outcrops of sandstone and conglomerate, which form east-west ridges in the Noluck Lake area, small rock fragments accumulate on moderate slopes. Rubble slopes that face south have two distinct seasonal aspects during the growing season and a considerably different vegetation than north-facing rubble slopes.

SOUTH-FACING RUBBLE SLOPES

The soil is warm, dry, and partly covered with dry-meadow vegetation. The principal species is *Dryas octopetala*. The secondary species give the slopes a colorful rock-garden appearance.

Spring aspect, June:
Androsace ochotensis
Draba spp.
Erysimum pallasii
Hierochloe alpina
Kobresia spp.
Oxytropis nigrescens
Pedicularis lanata
Phlox sibirica
Silene repens
Summer aspect, July:
Antennaria spp.
Arenaria capillaris
Arnica spp.
Astragalus lepagei

Summer aspect, July—Continued
Bromus pumpellianus
Bupleurum americanum
Calamagrostis purpurascens
Carex rupestris
Castilleja pallida
Delphinium brachycentrum
Dianthus repens
Epilobium latifolium
Erigeron spp.
Potentilla spp.
Taraxacum spp.
Tofieldia coccinea

NORTH-FACING RUBBLE SLOPES

The soil is cool, moist, and almost completely covered with plants, primarily *Dryas octopetala* and saxifrages, with *Cassiope tetragona* in snow-accumulation areas (pl. 9*B*). Vegetation is composed of moss, herbs, and low shrubs:

Arctostaphylos alpina rubra
Astragalus umbellatus
Diapensia lapponica obovata
Empetrum nigrum
Geum glaciale
Lloydia serotina
Loiseleuria procumbens
Lupinus arcticus
Lycopodium selago adpressum
Myosotis alpestris asiatica
Oxytropis mertensiana
Pedicularis langsdorfii
Pyrola grandiflora
Salix reticulata
Saussurea angustifolia
Saxifraga bronchialis funstonii
davurica grandipetala
eschscholtzii
serpyllifolia
tricuspidata
Senecio atropurpureus tomentosa
Therofon richardsonii
Vaccinium uliginosum

Patches of grass grow around ground squirrel diggings along ridge crests:

Arctagrostis latifolia
Poa arctica
glauca
Trisetum spicatum

COMMUNITIES ON OUTCROPS AND TALUS

Communities on outcrops and talus occur mainly in the higher parts of the foothills and in the mountains from about 1,500 to 4,500 feet elevation. Above 4,500 feet most of the mountains are bare except for rock lichens, but a few flowering plants grow up to about 6,000 feet.

The vegetation consists of only a scattering of plants, not combined into characteristic communities. Extensive areas of bare rock are exposed between patches of plants. Each plant, confined to a small pocket of shallow rocky soil, finds little competition from other species.

Several minor varieties, related to differences in rock type and exposure, have been distinguished, but further study would undoubtedly reveal additional minor varieties.

LIMESTONE

Limestone, of the Lisburne group, which forms many rugged peaks in the Brooks Range, appears ashy gray and barren from a distance. It is very resistant to weathering, and forms little soil (pH of about 7 to 8) which accumulates in crevices. This limestone has a very scant vegetation, chiefly of saxifrages:

Saxifraga caespitosa sileneflora
davurica grandipetala
oppositifolia
tricuspidata

Scattered ferns, grasses, dwarf herbs, and mat shrubs are also common:

Androsace ochotensis
Cystopteris fragilis
Dryas octopetala
Festuca brachyphylla
Oxytropis nigrescens
Phlox sibirica
Poa arctica
Tofieldia coccinea
Woodsia glabella

Dense patches of mountain heather, *Cassiope tetragona*, are found in snow-accumulation areas.

SANDSTONE AND CONGLOMERATE

Sandstone and conglomerate (pl. 10*A*), which form ridges along the mountain front, commonly appear greenish brown from a distance. They are resistant to weathering and form coarse soils with a pH of about 5 to 7.

Various plants, such as *Dryas octopetala*, *Saxifraga* spp., or *Smelkowskia calycina*, are locally dominant on these rocks. Scattered about the coarse rock fragments are ferns, grasses, and small herbs:

Arenaria capillaris
Dianthus repens
Dryopteris fragrans
Hierochloe alpina
Kobresia myosuroides
Luzula confusa
Poa glauca
Saxifraga bronchialis funstonii
davurica grandipetala
eschscholtzii
oppositifolia
serpyllifolia
tricuspidata
Selaginella sibirica
Silene acaulis
repens
Woodsia glabella

SHALE

Shale outcrops generally consist of crumbling bare gray-black unstable slopes, usually with a stream undercutting the base. Shale is very weakly resistant to weathering and erodes rapidly. Very few plants can get a footing on such material. A few herbs, usually with deep tap roots, form a scattered growth locally:

Crepis nana
Descurainia sophioides
Epilobium angustifolium
Ermania borealis
Erysimum inconspicuum
Oxytropis mertensiana

SCHIST

Schist outcrops generally appear bluish from a distance. They are moderately resistant to weathering, and form well-drained flaky soil. The vegetation of ferns, grasses, saxifrages, and low shrubs is somewhat similar to that found on sandstone:

Betula glandulosa
Carex scirpoidea
Cystopteris fragilis
Dryopteris fragrans
Empetrum nigrum
Festuca brachyphylla
Lycopodium selago adpressum
Poa alpina
glauca
Salix rotundifolia
Saxifraga dasurica grandipetala
eschscholtzii
oppositifolia
reflexa
Selaginella sibirica
Woodsia glabella

BASALT

Several exposures of reddish-brown basalt occur east of the Canning River. They are moderately resistant to weathering, and had a vegetation intermediate between that on limestone and sandstone, of ferns, grasses, and saxifrages:

Carex rupestris
scirpoidea
Dryopteris fragrans
Festuca brachyphylla
Saxifraga bronchialis funstonii
eschscholtzii
tricuspidata
Selaginella sibirca
Woodsia glabella

AQUATIC COMMUNITIES OF LAKES

Almost all aquatic vegetation of the Arctic Slope occurs in lakes. On the coastal plain, broad generally shallow lakes make up about 20 percent of the surface. In the foothills and locally in the mountains oxbow lakes along major valleys are the predominant type. Along the mountain front are several very large beautiful glacial lakes in valleys dammed by moraine, including from east to west Lake Peters (pl. 10*B*) and Schrader, Sagavanirktok, Shainin, Chandler, and Kurupa Lakes. Lake bottoms are usually of organic muck, though some oxbow lakes have sandy bottoms and some mountain lakes have boulder bottoms. Lake shores are commonly surrounded by ice-push ridges as much as 6 feet high.

Rivers on the Arctic Slope do not contain higher plant vegetation except locally in backwaters. Most of the smaller streams dry up or freeze to the bottom in winter, and these have clean sand or gravel bottoms. Some streams, as the outlet of Lake Schrader, are perennial and have algae-covered rocky bottoms.

Two large perennial springs occur on the Arctic Slope, Tulugak Springs in Anaktuvuk Pass and Shublik Springs in the Canning River valley. These areas contain a few species of plants not found elsewhere in the region.

Very few kinds of higher aquatic plants grow on the Arctic Slope, and their distribution is erratic. Plant communities in each lake are usually arranged in concentric bands, corresponding to depth of water. Most vegetation is limited to water less than 4 feet deep, and the depth preferred by any given species decreases from the foothills northward into the more severe climatic conditions of the coastal plain. Each species forms an extensive colony, mostly by vegetative means, once it becomes established, thus excluding most other species. Two ecologic life forms occur, rooted submerged and rooted emergent aquatics. The former are relatively unimportant and usually lacking; the latter play an important part in the obliteration of lakes through the accumulation of peat. In small lakes, the remains of emergent aquatics from the lake margins accumulate, with the result that the water is gradually replaced by fibrous organic debris and the bottom gradually freezes to higher levels, which eventually permits the development of a mat of vegetation over the lake bed. Thus, a wet sedge meadow is finally formed.

In the spring growth of aquatic plants is retarded, owing to the slow warming of the water, but in the fall the water helps to protect the plants from freezing during early frosts.

The principal aquatic plants are submerged rooted aquatics, which grow in as much as 4 feet of water, emergent rooted aquatics, in 1 to 3 feet of water, and marginal emergent aquatics, in less than 1 foot of water.

Submerged rooted aquatics:
Potamogeton spp.
Ranunculus gmelini yukonensis
Sparganium hyperboreum

Emergent rooted aquatics:
Arctophila fulva
Equisetum limosum
Hippuris vulgaris
Menyanthes trifoliata
Potentilla palustris
Ranunculus pallasii
Marginal emergent aquatics:
Carex aquatilis
Eriophorum angustifolium
Caltha palustris arctica
Alopecurus alpinus

Sandy lake shores commonly have scattered plants on the beach, with willow thickets a few feet above lake level.

SUCCESSIONAL RELATIONSHIPS

A single climax vegetation type does not exist for the entire Arctic Slope, because various parts of this area differ so greatly in topography, soil, geology, and climate. However, lines of succession leading to niggerhead meadow climax are fairly clear in the foothills, and possibly a second climax of *Dryas*-lichen dry meadow occurs in the low mountains.

In the foothills the niggerhead meadow may be accepted as the climatic climax, for the following reasons:

1. Niggerhead meadow is by far the most extensive community, covering an estimated 60 percent of the foothills province, as well as parts of the coastal plain and mountains. It grows equally well on various kinds of soil, on ridges and in valleys, and on all slope exposures, as long as the gradient is moderate.
2. It is believed by the writer to have been little disturbed by climatic change or such agencies as fire for the past several centuries. Since the Cretaceous period this province has remained above sea level and most of it has not been glaciated. Thus, the vegetation has had time to develop considerable uniformity.

Field observations suggest convergence of several lines of succession, xerarch, mesarch, and hydrarch, into niggerhead meadow. This is summarized as follows:

Xerarch (*bedrock ridges*)	*Mesarch* (*flood plain*)	*Hydrarch* (*lake*)
	Pioneer plants	
Crevice plants	Tall shrubs	Aquatic plants
↓	Low shrubs	↓
Low shrubs →	Niggerhead meadow	← Wet sedge meadow

The coastal plain is very young; parts of it were below sea level into the Quaternary period. Much of it has extremely poor drainage; wet sedge meadows occupy about half of the area. Coastal-plain vegetation does not show very clear lines of succession, and needs further study.

In the mountains atmospheric and soil conditions are very erratic. Slopes and ridges are unstable and poorly vegetated, whereas the valleys have been overrun by Quaternary glaciers and extensive Recent alluvial fans. The most widespread plant community between 2,000 to 4,000 feet is the *Dryas*-lichen dry meadow, which may prove to be the climax vegetation for this area, which also is in need of further study.

REPRESENTATIVE LOCALITIES

Descriptions given here are of seven representative localities on the Arctic Slope in which rather intensive investigation was carried on. These are intended to supplement the general treatment just presented, by showing specific examples of vegetation consisting of several major and minor plant communities in mosaic. Local environmental factors and local terrain features of general interest are also described.

COASTAL PLAIN

BARROW VILLAGE AND POINT BARROW

Situation.—Point Barrow (fig. 6) is the most northerly point of land in Alaska. For this reason it has attracted scientists for the past century. In the native village of several hundred people, houses are scattered with no special arrangement, as there are practically no streets. The houses have no underground wells or pipes because the soil is constantly frozen almost to the surface; however, underground rooms are used to store frozen meat. In favorable weather many of the natives live in tents along the sandy coastal beach. In general, they are a part of the natural environment, and do little to disturb natural vegetation.

The coastal plain around Barrow is flat and has many lakes. In July and August land travel is very difficult across this area. The Arctic Ocean is frozen during most of the year, and pack ice frequently lies along the shore in midsummer.

Point Barrow probably has the most severe climate of any part of the coastal plain. The average frost-free season is 17 days, the July average temperature is 40°F, and there is no physiographic hindrance to the constant strong winds.

Vegetation.—One hundred and eight species of higher plants have been identified within a few miles of Barrow. Plants are, for the most part, depauperate and poorly formed. One life form which seems to survive well here is the perennial, rhizomatous grass with shallow roots. This sort of plant has sufficient underground storage tissue to develop new leaves in short favorable periods and has strongly developed vegetative reproduction; it is protected during winter by even a thin snow.

A. ALONG SMALL INTERMITTENT DRAINAGE IN THE FOOTHILLS

Stream margin zone of sedges, *Carex aquatilis* and *Petasites frigidus;* higher zone of willow shrubs, *Salix pulchra* and *S. richardsonii,* about 3 feet high. West side of Shaviovik River drainage basin, view east, 700 feet elevation, June 1947.

B. ALONG ENTRENCHED STREAM, LOOKING WEST

North-facing (left) side with mountain heather, *Cassiope tetragona* and dwarf birch, *Betula nana,* above the snowfield; willow mats, *Salix polaris* and *S. reticulata,* a few inches high, below the snow; willow shrubs, *Salix alaxensis* and *S. richardsonii,* 5 to 10 feet high, along the stream; and willow clumps, *Salix niphoclada,* 2 feet high, on the south-facing (right) slope. West side of Sadlerochit River, 2,000 feet elevation, late July 1948.

VEGETATION ZONES

VEGETATION OF SANDY OUTWASH WITH BLOWOUTS

Feltleaf willow, *Salix alaxensis* (left center), and low willow thickets, *Salix niphoclada*, *S. walpoei*, and *S. glauca acutifolia*, Anaktuvuk River near Tulugak Lake, view west, 1,800 feet elevation, July 1948.

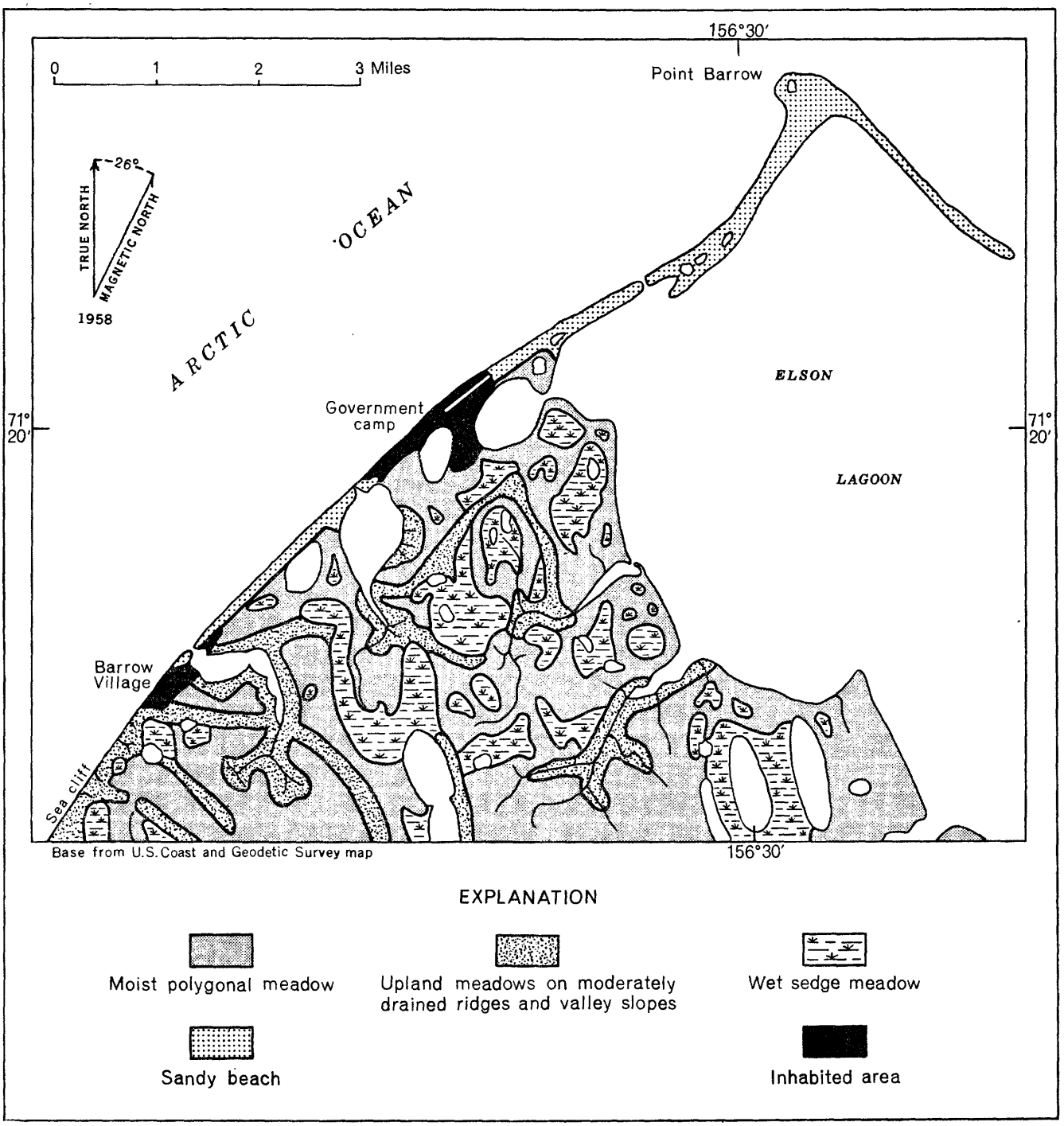

FIGURE 6.—Coastal plain vegetation at Point Barrow area.

Wet sedge meadows around Barrow Village and Point Barrow are numerous along the margins of lakes and in poorly drained depressions. *Carex aquatilis* seems to be the most common species, but very few fruiting plants were observed during the 1949 growing season. Fruits are probably formed only in favorable years. Plants locally important in wet sledge meadows include grasses, *Alopecurus alpinus*, *Dupontia fischeri*, and cottongrasses, *Eriophorum russeolum leucothrix*, *E. scheuchzeri*. Also common are Arctic holygrass, *Hierochloe pauciflora*, and bog lousewort, *Pedicularis sudetica*.

Aquatic plants occur in shallow water along the margins of small lakes and ponds, namely: *Arctophila fulva*, *Caltha palustris arctica*, in places submerged with floating leaves, *Carex aquatilis*, *Eriophorum*

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angustifolium, *Hippuris vulgaris*, *Ranunculus gmelini yukonensis*, *R. pallasii*, and *Sparganium* sp.

East of Barrow the lakes and lowlands are separated by moist grassy polygonal meadows, and better drained low ridges and stream valley slopes, sparsely covered with depauperate plants, mostly less than 3 inches high. Common plants of these meadows include:

Carex misandra
Luzula confusa
Pedicularis lanata
langsdorfii
Petasites frigidus
Salix ovalifolia camdensis
rotundifolia
Saxifraga hierachifolia
oppositifolia
Vaccinium vitis-idaea

A few miles southwest of Barrow sea cliffs of silt rise to 15 feet in elevation. Actively eroding slopes of silty soil face the sea and border small gullies which dissect the cliff. On these fresh surfaces a scattered growth of small herbs grow:

Juncus biglumis
Oxyria digyna
Polygonum viviparum
Ranunculus pygmaeus
Saxifraga rivularis

On the drier uplands between gullies grow *Festuca brachyphylla* and *Rumex arcticus*.

A coastal strip of sand extends from Barrow Village for 5 miles to the northeast, and beyond this a sandspit continues another 5 miles to Point Barrow. Along the northwest side of these sands no plants grow near the water, but several feet above sea level are dense grassy patches of *Elymus arenarius mollis* and scattered mats of *Honchenka peploides* and *Mertensia martima*. In small depressions, protected from the wind, lichen colonies have developed. On the southeast side of the sandspit, bordering Elson Lagoon, slight depressions provide sufficient protection for the development of scattered stands of small herbs:

Cochlearia officinalis
Ranunculus pygmaeus
Saxifraga rivularis
caespitosa sileneflora
Cerastium beeringianum
Papaver sp.
Draba lactea

Larger depressions, giving better protection, exhibit a grassy community of *Alopecurus alpinus*, *Arctophila fulva*, and *Dupontia fischeri*, with lesser amounts of *Poa arctica*, *Calamagrostis neglecta*, *Puccinellia paupercula*, *Salix pulchra*, and *Potentilla emerginata*. On the west brackish shore of the sandspit bordering Elson Lagoon the only important higher plant is a small grass, *Puccinellia phryganoides*.

Around the native village the ground is somewhat disturbed where natives excavate cellars and dig sod blocks. Common invaders following disturbance include:

Phippsia algida
Oxyria digyna
Cochlearis officinalis
Ranunculus pygmaeus

ALAKTAK

Situation.—Alaktak is about 50 miles southeast of Point Barrow and about 10 miles from the coast. It is in a very flat area covered with lakes, wet meadows, and meandering streams. During spring flooding by the Ikpikpuk River most of this area is submerged. A solitary reindeer ranchhouse is on a low sandhill, perhaps 10 feet higher than the surrounding flat. This hill is composed of relatively clean sand, probably deposited by wind which eroded the sandy and silty flood plain of the Ikpikpuk River, a few hundred yards to the west of the ranchhouse. Other similar sandhills 3 miles to the east are obviously small dunes.

About 60 percent of this area is wet sedge meadow, 30 percent lakes, and 10 percent flood plain and dunes. Soils here include alluvial silt and sand, windblown sand, and peat.

Vegetation.—Wet sedge meadows here are dominated by sedges, primarily *Carex aquatilis*. In addition these areas have—

Alopecurus alpinus
Carex chordorrhiza
lachenalii
membranacea
rariflora
Chrysosplenium tetrandrum
Dupontia fischeri
Eriophorum scheuchzeri
Pedicularis sudetica
Saxifraga foliolosa

Aquatic species growing in the lakes were about the same as those found at Barrow, but individual plants were somewhat larger. Along the flood plain are patches of willows as much as 2 feet high, including:

Salix alaxensis
anglorum
arctica
niphoclada
ovalifolia camdensis
pulchra
reticulata
richardsonii

Between the small patches of willows were scattered herbs including—

Chrysanthemum huronense
Equisetum arvense
variegatum
Juncus arcticus alaskanus
Merckia physodes
Parnassia kotzebuei
Senecio congestus
Taraxacum lacerum
Valeriana capitata

Sandhills were thickly populated with colorful flowering plants when observed in early August. The species seen were as follows:

Anemone parviflora
Antennaria ongustata
Arctagrostis latifolia
Armeria martitima
Astragalus alpinus
umbellatus
Campanula uniflora
Cardamine pratensis
richardsonii
Carex maritima
Cerastium beeringianum
Chrysanthemum integrifolium
Delphinium brachycentrum
Descurainia sophioides
Draba spp.
Dryas integrifolia
Erigeron eriocephalus
Festuca brachyphylla
Melandrium apetalum
Minuartia arctica
Papaver alboroseum
radicatum
Parrya nudicaulis
Pedicularis capitata
lanata
langsdorfii
Poa arctica
Ranunculus pedatifidus affinis
Saussurea angustifolia
Saxifraga hieracifolia
nivalis
oppositifolia
punctata nelsoniana
Senecio atropurpureus frigidus
Silene acaulis
Stellaria laeta
Trisetum spicatum

Two miles north of the ranchhouse, on the southern margin of a lake which has been pirated by a stream meander, are silty erosion slopes 6 feet high. Small herbs found on these slopes include:

Oxyria digyna
Ranunculus lapponicus
Epilobium anagallidifolium

FOOTHILLS

NOLUCK LAKE

Situation.—Noluck Lake (fig. 7) is in the southwestern part of the foothills about 200 miles west of Umiat, 160 miles east of Cape Lisburne, and 6 miles north of the mountains. The lake is about 2 miles long, 1 mile wide, and about 10 feet deep; it is 2,200 feet above sea level. The east-west depression in which the lake is situated primarily consists of shale; parallel ridges of sandstone and conglomerate, rising as much as 500 feet higher than the lake, are north and south of it. Rocks surrounding Noluck Lake are Early Cretaceous.

The drainage from an area of about 8 square miles flows into Noluck Lake, and Meridian Creek flows out of the lake over a bedrock outlet. Meridian Creek flows northward in a narrow incised channel to the Colville River. Few lakes occur in this general area.

No trees grow around the margins of the lake, but old willow logs as large as 3 inches in diameter were found in some of the eroding lake banks beneath 5 to 10 feet of alluvial sediment.

Evidence of former human inhabitants occurs in middens containing much chipped and charred bone, mostly of caribou, associated with chert stones formed into cutting tools. These were found along the western shore of the lake beneath 6 to 18 inches of peaty soil; chipped chert fragments were also found along rocky ridges which overlook the lake. More recent Eskimo camp remains, such as antler tent stakes and white spruce logs, probably carried here from the south side of the range, were also found. A well-preserved musk-ox skull was dug from a streambank south of the lake below 10 feet of frozen silt, and mammoth leg bones were collected from the Storm Creek flood plain.

One and one-half miles west of the lake is the westernmost tributary of the Colville River, Storm Creek, which drains the area around Thunder Mountain 10 miles to the south. During summer this somewhat braided stream is about 25 feet wide and 1 foot deep. Willows grow to a height of 5 feet along its valley.

The frost-free season in 1950 lasted 78 days, and the average July temperature was 57°F. Ice on the lake began to break up on June 20 and was completely gone by July 3. The highest temperatures, the greatest development of plants, and the period during which clouds of mosquitoes was prevalent was from June 25 to July 25. The first fall frost came with a light snow on August 25. Some plants were in bloom from May 17 until early September.

Vegetation.—Niggerhead meadows cover most of the moderately rolling uplands. Grasses, herbs, and low shrubs grow between the tufts of niggerhead cotton-

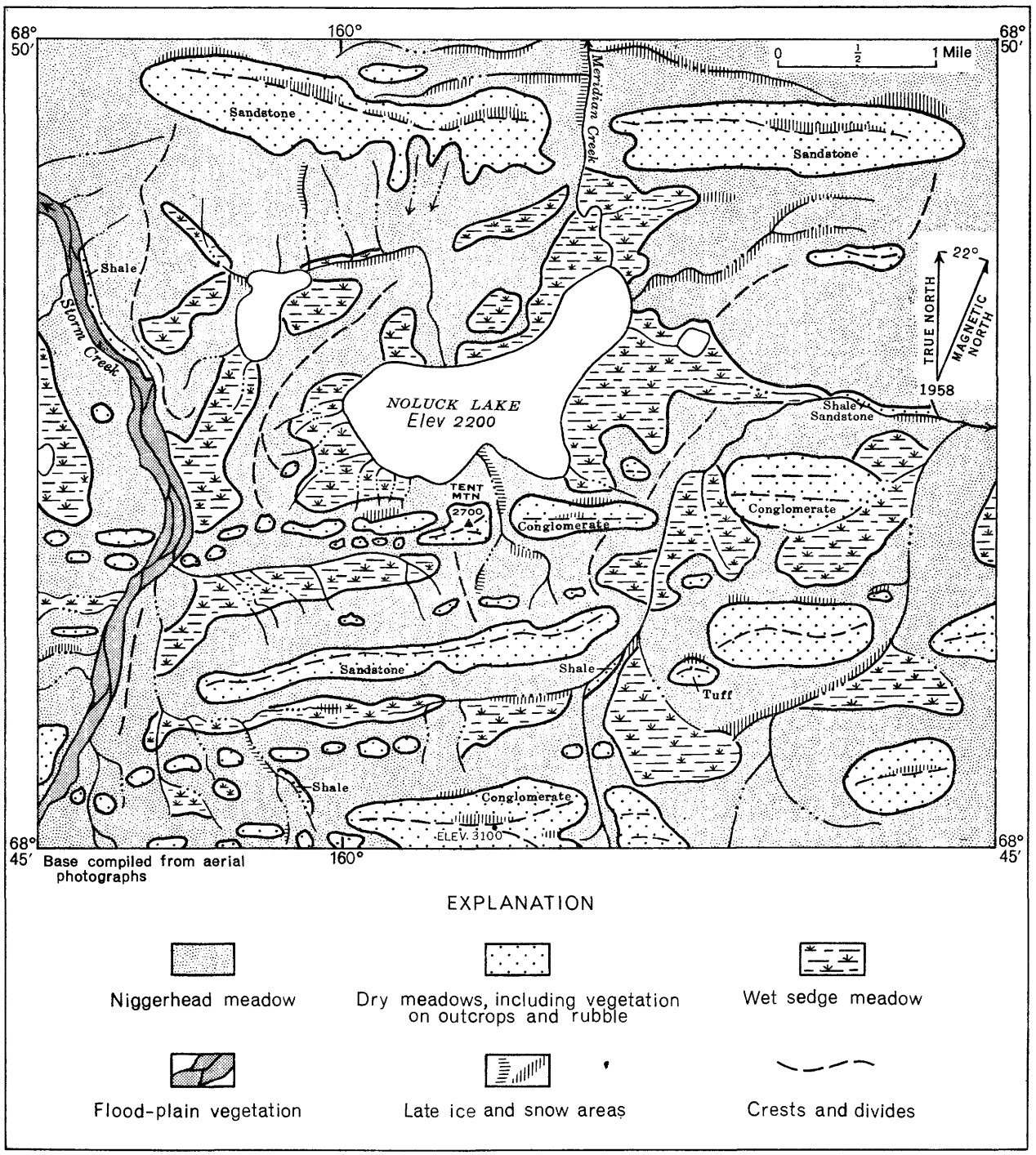

FIGURE 7.—Foothills vegetation at Noluck Lake.

grass. Many small drainageways with intermittent streams occur throughout the rolling niggerhead meadows (pl. 11*A*). These are usually small linear depressions, 6 to 15 feet below the surrounding level, which remain partly filled with snow somewhat later in spring than the surrounding meadows. Two minor plant communities grow along these drainageways; in the lowest part the vegetation, grassy in aspect, consists of sedges and herbs:

Anemone richardsonii
Caltha palustris arctica
Carex aquatilis
lachenalii
membranacea
Equisetum arvense
variegatum
Eriophorum angustifolium
scheuchzeri
Juncus castaneus
Ranunculus nivalis
Saxifraga cernua
hirculus

Along the sides of these depressions are dense low willow thickets, *Salix pulchra,* with a colorful herbaceous undergrowth:

Aconitum delphinifolium
Anemone parviflora
Artemisia spp.
Astragalus umbellatus
Carex montanensis
Cerastium beeringianum
Corydalis pauciflora
Dodecatheon frigidum
Logotis glauca stelleri
Myosotis alpestris asiatica
Pedicularis capitata
Petasites frigidus
Polemonium acutiflorum
Polygonum bistorta plumosum
Salix reticulata
Saxifraga punctata nelsoniana
Valeriana capitata

Most of the dry meadows around Noluck Lake occur on rubble slopes, where bedrock closely underlies the surface, and drainage is good. Locally dry meadows have the aspect of a well-kept rock garden. There seems to be little competition between plants; individuals do not generally touch one another. About half of the higher plant cover consists of mats of *Dryas octopetala.* In addition there was a scattering of many other species, which showed some preference for north- or south-facing slopes, as described in the generalized section. On south-facing sandstone block talus of Tent Mountain on the south side of Noluck Lake, the most common plant is *Smelowskia calycina integrifolia.*

Lowlands, saturated during most of the summer and containing wet sedge meadows, cover extensive areas around Noluck Lake. Some of these, though not all, represent former lake beds. The vegetation is similar to that described under major plant communities.

Around the border of Noluck Lake, submerged in about 3 feet of water with a sandy bottom, *Potamogeton pectinatus* grows. In shallower parts of this and other small lakes is a grassy growth of emergent aquatics, such as:

Arctophila fulva
Caltha palustris arctica
Carex aquatilis
Eriophorum angustifolium
Hippuris vulgaris
Potentilla palustris
Ranunculus gmelini yukonensis
hyperboreus
pallasii
Sparganium hyperboreum

The roots of these plants usually form in the water a tangled fibrous mat, insufficient to support the weight of a man, which extends downward about 2 feet to a frozen layer below. The transition from aquatic vegetation to wet sedge meadow occurs in some places.

Along Storm Creek, west of Noluck Lake, there are sand and gravel flood plains. Most of these support patches of willows, 2 to 5 feet high, including—

Salix alaxensis
niphoclada
pulchra
walpolei

Beneath the willows and scattered over the sands are many colorful herbs and grassy plants—

Arnica spp.
Artemisia spp.
Aster sibiricus
Astragalus alpinus
umbellatus
Carex aquatilis
membranacea
Cardamine bellidifolia
Castilleja pallida
Cerastium beeringianum
Crepis nana
Draba spp.
Equisetum spp.
Erigeron purpuratus
Festuca altaica
Hedysarum alpinum americanum
Juncus castaneus
Luzula confusa
Melandrium taylorae
Merckia physodes
Oxytropis spp.
Papaver macounii
Parnassia kotzebuei
Pedicularis capitata
Polygonum bistorta plumosum
Senecio spp.
Stellaria spp.
Taraxacum spp.

Moderately late-melting snow patches (pl. 11*B*) provide seepage downslope late into summer, and commonly have a vegetation mat dominated by mountain heather, *Cassiope tetragona*. In places, however, where the snow barely melts by the end of summer, as in deep gullies, or on steep north-facing slopes seldom reached by the sun, vegetation is almost absent. The species which occur sparsely in very late snow patches are—

Oxyria digyna
Phippsia algida
Poa paucispicula
Ranunculus nivalis
pygmaeus
Saxifraga caespitosa sileneflora
rivularis

UMIAT

Situation.—Umiat airstrip is on a river terrace on the north side of the Colville River 3 miles west of Umiat Mountain (elev 915 feet), a landmark which from the south looks like an overturned boat. The river valley is 2½ miles wide at this point, and the valley flat is about 350 feet in elevation. The Colville River flows east, is usually very clear, and is confined to a few channels, the widest of which is one-fourth to one-half mile across and about 10 feet deep in summer. The riverbed consists of clean sand and gravel, and there are no higher aquatic plants in the main channels.

The flood plain is made up of gravel bars, sand bars, and higher islands which are under water only in spring floods. Many of the bars are barren and level enough for the landing of small airplanes on wheels. Willow trees and shrubs are common on the islands.

Along the valley, terraces stand well above the river under normal conditions. On these terraces are shrub thickets or wet sedge meadows, depending on local drainage. Old stream meander scars with oxbow lakes are also common features. The largest meander scar is between Umiat and the north side of the valley; the scar contains within a 3-mile span 12 fairly large oxbow lakes. The largest, Umiat Lake, is 1 mile long.

Cutbanks and bluffs are common along the river where it flows against the sides of the valley. The largest of these is a steep slope from the top of Umiat Mountain (915 ft) down to the river (350 ft). Talus slopes have formed along former cutbanks. Outcrops of sandstone preserve fairly steep bluffs along the valley.

The rolling hills away from the valley are covered with niggerhead tundra, except along small ephemeral streams and on widely scattered ridges where bedrock is at or near the surface. In these places shrub willows occur.

Soils of the valley are mostly coarse alluvium or peat, whereas those of the rolling hills away from the valley are mainly residual and silty. Solifluction is pronounced on Red Hill a few miles northwest of Umiat; some of the red silty unstable soil is almost without vegetation.

Vegetation.—Two hundred fifty species of higher plants grow within a few miles of Umiat. Niggerhead meadows, essentially as already described under major plant communities, cover about 80 percent of the rolling hills away from the Colville valley, with willowbrush following small drainageways.

Flood plains and cutbanks have the vegetation features previously described in the generalized section (p. 25), including barren flood-plain bars with scattered plants, willow woods, alderbrush, willowbrush, and niggerhead meadows.

At Umiat the aquatic vegetation in 20 oxbow lakes, averaging about one-eighth mile in length and 2 to 6 feet in depth, was compared and found to be highly variable. *Sparganium hyperboreum*, *Hippuris vulgaris*, *Menyanthes trifoliata*, and *Potentilla palustris* were found in about two-thirds of the lakes, all but the last forming pure stands. The following plants grew in only one-tenth of the lakes:

Ranunculus pallasii
gmelini yukonensis
Utricularia macrorhiza
Equisetum limosum
Caltha palustris arctica
Arctophila fulva

Concentric zonation was evident in all lakes, but the patterns were variable. No submerged rooted aquatics were observed, though *Potamogeton* was collected from other lakes near Umiat. The free-floating *Utricularia* grows in shallow water. *Sparganium*, with floating leaves, is in the deepest water—about 3 feet. At 2-foot depth *Menyanthes*, *Equisetum*, and *Arctophila* occur in various combinations; at 1 foot, *Potentilla* and *Hippuris* dominated. *Carex aquatilis* and *Eriophorum angustifolium* grow around all the lakes. This zonation suggests an order of succession, with the lake eventually changing to a *Carex-Eriophorum* wet sedge meadow.

Wet sedge meadows occur on the river terraces, especially between lakes along old meander scars. They are divided into polygonal areas 10 to 50 feet across by small ridges as much as 1 foot high formed by frost action. A few inches of water stands within the polygons, usually fairly uniform in depth within individual polygons. Few plant species grow in any one polygon. *Carex* is most abundant in the centers of the polygons, whereas *Salix* is most important along the intervening ridges.

Three miles north of Umiat, as well as locally elsewhere in this area, sandstone is exposed along high ridges. Certain plants of alpine affinity grow here:

Anemone patens multifida
Arctostaphylos alpina rubra
Betula gladulosa
Cystopteris fragilis
Diapensia lapponica obovata
Kobresia myosuroides
simpliciuscula
Loiseleuria procumbens
Lycopodium selago adpressum
Tofieldia coccinea
Woodsia glabella

Solifluction slopes poorly covered with vegetation occur on Red Hill. Species growing here include:

Dryas integrifolia
Elymus innovatus
Minuartia macrocarpa
Saxifraga oppositifolia
Silene acaulis
Spirea beauverdiana

Silty erosion slopes along Bearpaw Creek had scattered *Descurainia sophioides*. Owing to the activities of the white man and earth-moving machines, scattered areas near Umiat have been stripped of their natural vegetative cover or burned. The area of the airstrip has had an interesting development. The soil here is fine sand, pH 6.2. In 1947, I saw only two plants of *Senecio congestus* near Umiat; in 1950 both sides of the airstrip were lined with a vigorous weedy growth 3 feet high, of this species.

MOUNTAINS

KILLIK RIVER NEAR EASTER CREEK[1]

On a steep south-facing slope along a tributary stream, at an elevation of 3,000 feet, is a small grove of *Populus tacamahacca*. The average height of the trees was 8 feet, the maximum 12; the diameter 1½ to 2 inches. This is the highest elevation at which balsam popular has been found on the Arctic Slope.

On the north face of a summit ridge, on quartzite, shale, and sandstone rubble at 6,100 feet elevation—the highest elevation from which higher plants have been collected thus far on the Arctic Slope—sparse growth of the following species was found.

Luzula confusa
Potentilla elegans
Saxifraga bronchialis funstonii
serpyllifolia
Selaginella sibirica
Smelowskia calycina integrifolia

[1] Observations by Arthur Lachenbruch in 1949.

ANAKTUVUK PASS NEAR TULUGAK LAKE

Situation.—The pass (elev 1,800 ft) was studied along the north side around Tulugak Lake (fig. 8) where the valley is about 46 miles wide, with mountains rising 3,000 to 4,000 feet higher on both sides. Alluvial fans occupy about one-third of the valley on either side, with the central third occupied by the Anaktuvuk River and its flood plain, plus moraine and outwash deposits containing many pit lakes. Anaktuvuk River, which has a bed of fine sand, is shallow and turbid. Small dunes and blowouts (pl. 12) have developed especially on the north side of stream meanders. Mountains along the sides of the valley are limestone of the Lisburne group and conglomerate and sandstone of the Noatak formation. Tulugak is a deep lake about 1 mile long and ½ mile wide and is fed by the large perennial Tulugak Springs along its east side.

Vegetation.—The most widespread plant community at lower elevations in Anaktuvuk Pass is the *Dryas*-lichen dry meadow, which is found on rubble slopes, alluvial fans, and well-drained outwash. This vegetation is usually about 1 inch high, and about 90 percent of the higher plant cover is *Dryas octopetala*. Other species found are as follows:

Anemone parviflora
Arnica spp.
Bupleurum americanum
Carex capillaris
rupestris
scirpoidea
Hierochloe alpina
Kobresia myosuroides
Lupinus arcticus
Oxytropis maydelliana
nigrescens
Pedicularis capitata
Polygonum viviparum
Silene acaulis
Tofieldia coccinea

True niggerhead meadow is not extensive at these higher elevations; it occurs only locally on alluvial slopes with seepage. The following species were found in association:

Carex aquatilis
bigelowii
membranacea
Dryas integrifolia
Eriophorum angustifolium
vaginatum spissum
Salix reticulata

Many areas intermediate in moisture conditions between the *Dryas*-lichen dry meadows and moist niggerhead meadows, such as well-drained alpine slopes and river terraces, support a low woody growth

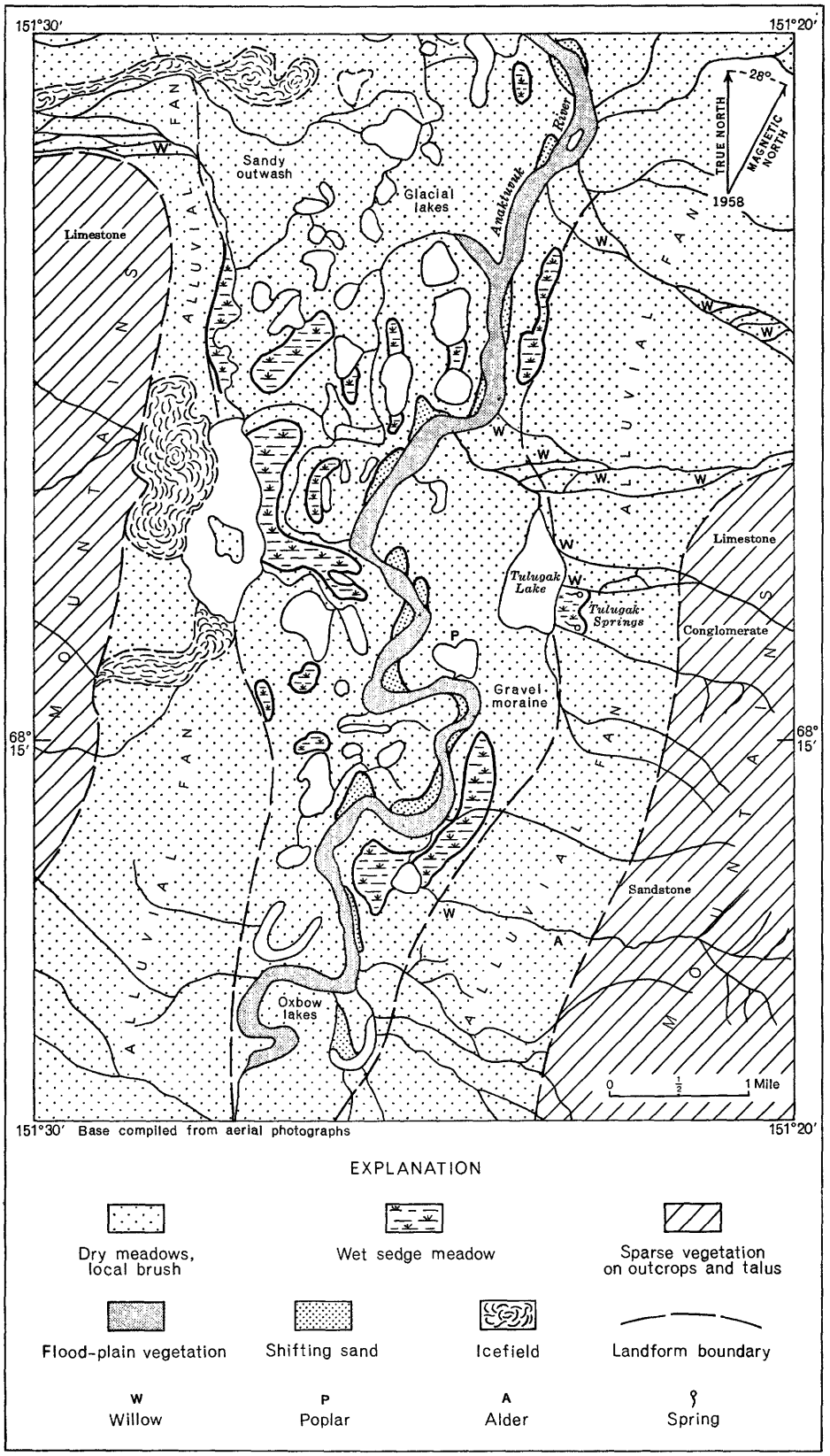

FIGURE 8.—Mountain vegetation at Anaktuvuk Pass.

of willow, birch, and heath shrubs, with herbaceous undergrowth.

Willow, birch, and heath shrubs:

Arctostaphylos alpina rubra
Betula nana exilis
Cassiope tetragona
Dryas integrifolia
Rhododendron lapponicum
Salix arctica
reticulata

Herbaceous undergrowth:

Anemone parviflora
Astragalus umbellatus
Equisetum palustre
Hedysarum alpinum americanum
Polygonum viviparum
Tofieldia pusilla

Near the base of the alluvial fans, where seepage occurs, there is tall brush of feltleaf willow, *Salix alaxensis*, and some alder *Alnus crispa*, the former with an undergrowth of common horsetail, *Equisetum arvense*. Near the southwest end of Tulugak Lake, on a south-facing bank, is a small stand of *Populus tacamahacca* 10 feet tall, 3 inches in diameter, and about 30 years old. The flood-plain habitat is poorly developed along Anaktuvuk River in the pass, for the river is incised with few bars on which plants can become established.

In the lowlands along the river are scattered wet sedge meadows, where the soil had a pH range from 4.3 to 6.5. *Carex aquatilis* was the most common species; the following were also growing:

Andromeda polifolia
Carex chordorrhiza
membranacea
misandra
rariflora
rotundata
Equisetum palustre
Eriophorum scheuchzeri
Juncus biglumis
triglumis
Pedicularis sudetica
Rubus chamaemorus
Salix reticulata
richardsonii

No higher aquatic plants were found in Tulugak Lake. However, in a shallow lake, about 1 mile southwest of Tulugak Lake, two concentric zones occurred; in the deepest water *Arctophila fulva* with some *Sparganium hyperboreum* formed a zone about 75 feet wide; next to shore was a zone about 20 feet wide of *Eriophorum angustifolium* with some *Hippuris vulgaris*, *Alopecurus alpinus*, and *Caltha palustris*. On the shore were willows, *Salix alaxensis* and *S. richardsonii*, as much as 10 feet high.

Vegetation on outcrops and talus showed some variation correlated with type of rock. The vegetation on limestone and on sandstone differed considerably, though *Dryas octopetala* was important on both. On sandstone and conglomerate the vegetation is noticeably denser than on limestone. Late snow areas were, as usual, characterized by *Cassiope tetragona;* other heaths were sometimes found with it.

LAKE SCHRADER AND LAKE PETERS

Situation.—Lake Schrader and Lake Peters south of it are two large connected lakes in a deep glacial trough. They are separated from one another by a glaciofluvial fan formed by Snake Creek, which flows into the lakes from the west. The lakes are at an elevation of about 3,500 feet, and each lake is about 7 miles long and 2 miles wide. Mountain streams fed by melting snow and small glaciers flow into the lakes, and the lake fork of the Sadlerochit River flows northward out of Lake Schrader. The water of Lake Peters is opaque from glacial rock flour; Lake Schrader is clear, its bottom is covered with clean boulders, and along its margin are ice-push ridges, as much as 6 feet high, containing boulders as large as 2 feet in diameter. In 1948 ice covered parts of these lakes until July 18.

Mountains surround the lakes on all but the north side; the highest is Mount Chamberlin, 9,131 feet high, a few miles southeast. Around Lake Peters most of the mountains are of schist of the Neruokpuk formation, but around Lake Schrader there is also limestone of the Lisburne group. Lateral moraine deposits form low hills along the sides of the lakes, and a moraine dam establishes the north end of Lake Schrader.

In 1948 the terminus of the glacier on Mount Chamberlin was at about 4,500 feet, and along Glacier Creek, the valley below the glacier, there is a series of moraines containing boulders as large as 10 feet in diameter.

Vegetation.—The vegetation of these mountains is very complex, with local variation due to bedrock, soil accumulation, slope exposure, drainage, and difference in elevation.

From an elevation of 3,500 to 4,000 feet the vegetation cover, made up of about 150 species of higher plants, was in most places complete. Dry meadows were most extensive, with minor amounts of niggerhead meadow, lake-margin wet sedge meadows, and flood-plain communities. Over the rocky glacial moraines, a thin soil has formed on which there was no general dominance, but local concentrations of *Dryas*, *Salix*, *Cassiope*, *Minuartia*, and heath shrub communities. Alluvial flood plains and fans supported vegetation similar to the generalized flood-plain community previously described but with fewer species. *Salix alaxensis* was 6 feet high near Lake Peters. It was not found above

4,000 feet; at this elevation it grew about 2 feet high.

Between 4,000 and 5,000 feet most of the vegetation, consisting of about 80 species is confined to rock crevices and the borders of small mountain streams. Many of the stream-margin species are sparsely represented along a few streams, and some streams have bare bedrock channels. On north-facing slopes with late snow patches *Cassiope tetragona* is the dominant species, but, in general, the most widespread genus in this elevational zone is *Saxifraga*. Slopes on these mountains, facing in various directions, are as steep as 30° or more, and little soil accumulates. Permafrost is absent in the thin layer of soil and rock fragments overlying the bedrock, and drainage is excessive. Many plant communities are localized around seepage from snowfields at higher elevations. The important species of *Saxifraga* in this zone are—

Saxifraga bronchialis funstonii
caespitosa sileneflora
davurica grandipetala
eschscholtzii
flagellaris
oppositifolia
punctata nelsoniana
reflexa
serpyllifolia
tricuspidata

Other common species include—

Androsace chamaejasme lehmanniana
Arctostaphylos alpina
Artemisia glomerata
Betula sp. (dwarf)
Bupleurum americanum
Cardamine bellidifolia
Cassiope tetragona
Cystopteris fragilis
Dianthus repens
Dryopteris fragrans
Empetrum nigrum
Erysimum pallasii
Festuca brachyphylla
Geum glaciale
rossii
Hierochloe alpina
Luzula confusa
Lycopodium selago adpressum
Minuartia macrocarpa
Oxytropis mertensiana
nigrescens
Pedicularis capitata
lanata
Phlox sibirica
Potentilla biflora
uniflora
Salix reticulata
Selaginella sibirica
Smelowskia calycina
Therofon richardsonii
Trisetum spicatum
Vaccinium uliginosum
vitis-idaea

Above 5,000 feet on the northwest side of Mount Chamberlin there are a few flowering plants, but none grow above 6,000 feet. The only common higher plant species in this zone are *Luzula confusa, Potentilla elegans,* and *Selaginella sibirica;* rock lichens are extensive.

ANNOTATED LIST OF PLANTS GROWING ON THE ARCTIC SLOPE OF ALASKA

Table 2 is based on about 3,000 plant specimens collected by the writer from 1946 through 1951; collections reported by Hultén (1941–50) from this area; and the following additional material:

Name of collector	*Year*	*Number of plants*
Robert Black	1946, 1947, 1950	284
Robert Chapman	1946, 1949	85
Robert Champan and Robert Fellows.	1945	35
Robert Chapman, Richard Olson, and William D'Olier.	1950	60
Paul Emerson	1950	52
Clare Gudim	1949	40
Lawrence Irving	1947	19
George Gryc and Allen Kover	1950	29
Arthur Lachenbruch	1949	50
Arthur Lachenbruch and Milton Lachenbruch.	1950	42
Richard Olson	1950	8
Peter Scholander	1947, 1948, 1950	295
Peter Scholander and Walter Flagg	1948	225
Lloyd Spetzman and Russell McGregor.	1947	160
Ray Thompson	1947	30
Robert Thompson	1950	17
Irvin Tailleur	1949, 1950	115
		1,546

TABLE 2.—*Annotated list of plants growing on the Arctic Slope of Alaska*

[A, indicates abundant; C, common; S, scarce; L, local; ×, collections seen by the writer; H, collections recorded by Hultén (1941–50), not seen by the writer; asterisk (*), indicates species that occur in areas adjacent to the Arctic Slope, either in Canada or on the south slopes of the Brooks Range]

Botanical name	Common name	Distribution (See fig. 4)									Elevation range (feet above sea level)	Abundance	Flowering period (ordinal numbers of months)	Habitat
		Arctic Slope								Noatak drainage				
		Coastal plain			Foothills			Mountains						
		West	Central	East	West	Central	East	West	Central	East				
Equisetaceae:	Horsetail family:													
Equisetum arvense L.	Common horsetail	×	×	×	×	×	×		×	×	×	0–3,500	C	7–8	Wet sandy flood plains.
limosum L.	Swamp horsetail					×						350	L	7–8	Umiat, around oxbow lakes in shallow water.
palustre L.	Marsh horsetail			×		×	×		×	×	×	350–3,500	S	7–8	Wet meadows.
pratense Ehrh.	Meadow horsetail		×		×	×			×	×		50–3,000	C	7–8	Wet grassy drainage slopes.
scirpoides Michx.	Little horsetail				×	×	×		×	×	×	350–3,500	C	6–9	Damp mossy stream margins.
variegatum Schleich.	Northern horsetail		×	H	×	×	×		×	×	×	50–3,500	C	6–9	Damp sandbars and gravel alluvial fans.
Lycopodiaceae:	Clubmoss family:													
Lycopodium annotinum L. var. *pungens* (Lapylaie) Desv.	Stiff clubmoss									×	×	3,500	L	7–8	Dry rocky mountain saddle, east side of Canning River at 69°20′ N.
selago L. var. *adpressum* Desv.	Fir clubmoss			H	×	×	×		×	×	×	300–5,000	C	6–9	Moist crevices in outcrops of limestone, shale, conglomerate, schist, and basalt; mossy slopes.
Selaginellaceae:	Spikemoss family:													
Selaginella sibirica (Milde) Hieron.	Northern spikemoss				×		×		×	×	×	2,000–6,000	C	6–9	Dry alpine crevices in outcrops of sandstone, limestone, conglomerate schist, and basalt.
Polypodiaceae:	Fern family:													
Cystopteris fragilis (L.) Bernh.	Fragile fern				×	×	×		×	×	H	500–4,000	C	7–8	Alpine crevices in outcrops of sandstone, limestone, conglomerate, and schist; also gravel slopes.
Dryopteris fragrans (L.) Schott.	Fragrant shield fern					×	×		×	×	×	500–5,000	C	7–8	Alpine crevices, especially in massive sandstone, also limestone, shale, schist and basalt.
Woodsia alpina (Bolton) S. F. Gray	Alpine woodsia						×					1,500	L	8	Sandstone crevices, Sadlerochit River valley.
glabella R. Br.	Smooth woodsia					×	×		×	×	×	400–5,000	C	7–8	Alpine crevices in sandstone, limestone, and schist; also gravel slopes.
**ilvensis* (L.) R. Br.	Rusty woodsia										×	1,500	L	7	Gabbro crevices, Nimiuktuk River.
Pinaceae:	Pine family:													
Juniperus communis L. var. *montana* Ait.	Low juniper						×			×	×	1,000–2,000	L	6–9	Moist rocky alpine slopes of sandstone, schist, or gravel; Shaviovik and Canning Rivers; also mountain slope 4,000 ft, John River at Hunt Fork.
**Picea glauca* (Moench) Voss.	White spruce										×	500–1,100	L	6–9	There are no natural spruce on the Arctic Slope except perhaps near the Mackenzie River, but a few seedlings transplanted to Umiat have survived several years. Sandy flood plains and south-facing slopes; poor growth in bogs; in Noatak drainage spruce extends from a few miles above Kotzebue to Noaktak-Kugururok junction, from here 13 miles east along Noatak and 24 miles north along Kugururok. Along the John River south of Anaktuvuk Pass from Hunt Fork junction spruce extends 7 miles north along John River, to 2,000 ft elev, and 10 miles along Hunt Fork, to 2,500 ft elev.
Sparganiaceae:	Bur-reed family:													
Sparganium hyperborum Laest.	Northern bur-reed		?		×	×	×		×		×	0–2,500	S	7–8	Pond margins in 2–3 ft of water. Sterile collection from Point Barrow.
Najadaceae:	Pondweed family:													
Potamogeton alpinus Balb. ssp. *tenuifolius* (Raf.) Fern.	Northern pondweed					×						350	L	8	Submerged aquatic in sandy-bottomed streams and ponds east of Umiat.
filiformis Pers.	Filiform pondweed					×	×					350–1,500	L	8	Submerged aquatic in shallow sandy-bottomed ponds; Umiat and Sadlerochit River.
pectinatus L.	Fennel-leaved pondweed				×	×				×		350–2,000	L	8	Submerged aquatic in shallow sandy-bottomed ponds.
Scheuchzeriaceae:	Arrowgrass family:													
Triglochin maritima L.	Seaside arrowgrass			×		×	×				×	350–1,000	S	7–8	Emergent aquatic in wet sedge meadows.
palustris L.	Marsh arrowgrass										×	500	S	7	Wet sedge meadow margins in shallow standing water, Noatak River.
Gramineae:	Grass family:													
Agropyron alaskanum Scribn. and Merr.	Alaska wheatgrass					×	×			×		350–1,500	S	7–8	Bare sandbars.
latiglume (Scribn. and Smith) Rydb.	Wheatgrass		×		×	×	×		×	×		0–3,500	C	7–8	Do.
sericeum Hitchc.	do					×	×				×	350–2,000	C	7–8	Do.
trachycaulum (Link) Malte	do						×					2,500	L	7	Sandbars along Sadlerochit River.
Alopecurus alpinus Sm.	Mountain foxtail	H	×	×	×	×	×		×	×		0–3,500	C	6–7	Wet sedge meadows; lake and stream margins.
Arctagrostis latifolia (R. Br.) Griseb.	Arctagrostis	×	×	×	×	×	×		×	×	×	0–4,000	A	7–8	Moist meadow slopes; sandbars and cutbanks.
Arctophila fulva (Trin.) Rupr.	Arctophila	×	×	×	×	×	×		×	×		0–3,000	C	8	Margins of silty- or sandy-bottomed lakes, or slowly moving streams; brackish coastal wet meadows; in water to 4 ft deep or wet soil.
Bromus pumpellianus Scribn.	Arctic bromegrass				×	×	×		×	×	×	300–3,500	C	7–8	Bare sandbars, cutbanks, lake shores, and rubble slopes.

TABLE 2.—*Annotated list of plants growing on the Arctic Slope of Alaska*—Continued

Botanical name	Common name	Distribution (See fig. 4)										Elevation range (feet above sea level)	Abundance	Flowering period (ordinal numbers of months)	Habitat
		Arctic Slope									Noatak drainage				
		Coastal plain			Foothills			Mountains							
		West	Central	East	West	Central	East	West	Central	East					
Gramineae—Continued	Grass family—Continued														
Calamagrostis canadensis (Michx.) Beauv.	Bluejoint					×						1,000	L	7	Moist meadow, Maybe Creek.
inexpansa A. Gray	Northern reedgrass					×	×			×		350–3,000	S	7	Moist meadows.
neglecta (Ehrh.) Gaertn.	Narrow reedgrass	×	×		×	×			×	×	×	0–3,500	S	7–8	Wet meadows, sandbars, and silty slopes.
purpurescens R. Br.	Purple reedgrass					×	×		×	×	×	350–3,500	S	7–8	Dry alpine meadows; talus of limestone, sandstone, and gabbro; sandbars.
Colpodium wrightii Scribn. and Merr.	Colpodium					×						500	L	7	Silt slope, south face of Red Hill at Umiat.
Deschampsia caespitosa (L.) Beauv.	Tufted hairgrass		×			×				×	×	350–3,000	C	7–8	Bare sandbars; limestone and shale talus slopes.
ssp. *orientalis* Hult.		H	×				×		×						
var. *glauca* (Hartm.) Sam.					×		×	×	×						
Dupontia fischeri R. Br.	Dupontia	×	×	×								0–100	C	7–8	Wet meadows, with sedges or in pure stands.
ssp. *psilosantha* (Rupr.) Hult.		H	×	H	×	×	×		×			0–2,500	C	7–8	Wet sedge meadows, thinly scattered in *Carex aquatilis* stands.
Elymus arenarius L. ssp. *mollis* (Trin.) Hult.	Beach ryegrass	×	×	H							H	0–50	L	8	Pure patches on coastal sand dunes above the strandline.
innovatus Beal	Downy ryegrass			×		×	×		×	×	×	350–2,500	S	7–8	Sandbars, silty slopes, common on sandstone cutbank outcrops south side of Colville River at Umiat.
Festuca altaica Trin.	Rough fescue		×	×	×	×	×		×	×	×	350–3,500	C	7–8	Dry sandy river terraces.
brachyphylla Schult.	Alpine fescue	H	×	×	×	×	×		×	×	×	0–5,000	C	6–7	Cutbanks, dry meadows, rubble slopes of sandstone, shale, and limestone.
rubra L.	Red fescue		×		×	×	×		×	×	×	0–3,500	C	7	Sandy flood plains and cutbanks.
Hierochloe alpina (Sw.) R. and S.	Alpine holygrass	×	×	H	×	×	×		×	×	×	0–5,500	C	6–7	Dry meadows, cutbanks, rubble slopes, and alpine crevices in sandstone, limestone, shale, and chert.
odorata (L.) Wahl.	Holygrass					×						350	L	7	Flood-plain sands along Colville River at Umiat.
pauciflora R. Br.	Arctic holygrass		×	×	×	×				×		0–3,000	C	7	Wet sedge meadows and oxbow lake margins.
Phippsia algida (Soland.) R. Br.	Phippsia	H	×		×							0–2,200	L	7	Disturbed silty soil along coast; bare silty flood-plain and barc area under very late snowfields along upper Colville River.
Poa alpigena (Fr.) Lindm.	Bluegrass	H	×	H		×	×		×	×	×	0–3,000	C	7–8	Sandy flood plains; dry meadows and slopes.
alpina L.	Alpine bluegrass		×		×			×	×	×		100–5,000	S	7	Sandy alpine rubble slopes.
arctica R. Br.	Arctic bluegrass	×	×	×	×	×	×		×	×		0–4,000	A	7–8	Dry meadows and alpine slopes.
brachyanthera Hult.					×			×	×			2,000–6,000	L	7	Rocky alpine situations.
glauca Vahl	Glaucous speargrass	H	×	H	×	×	×		×	×		0–5,000	C	7–8	Flood-plain sands, cutbanks, alpine rubble slopes.
hispidula Vasey	Hispid bluegrass				×							2,200	L	7	Dry south-facing slope along Nuka River.
komarovii Roshew.			H												Habitat unknown; Point Barrow.
lanata Scribn. and Merr.	Lanate bluegrass				H				×			2,500	L	7	Dry alluvial fan, east side of Anaktuvuk pass; also Point Hope area.
paucispicula Scribn. and Merr.	Bog bluegrass				×			×	×			2,000–4,000	L	7	Wet bare late-snow areas.
stenantha Trin.						×						350	L	7	Habitat unknown, probably flood-plain sandbar, Umiat.
sp					×			×	×	×		2,500–4,000	S	7	Tufted, 4–6 in. high, basal leaves 1–2 in. long from tan papery sheaths, panicle of 5–15 small spiklets. Dry sandy alpine meadows and slopes.
Puccinellia angustata (R. Br.) Rand and Redfield.		H													Habitat unknown, Point Lay.
hauptiana (Krecz.) Kit.	Alkaligrass					×	×					350–2,000	S	7–8	Bare wet silty flood-plains and lake shores. (See *P. interior* in Hultén 1941–50.)
paupercula (Holm) Fern. and Weath.	Arctic alkaligrass	H	×	×						×		0–3,500	S	7	Wet silty soil. (See *P. langeana* in Hultén 1941–50.)
phryganoides (Trin.) Scribn. and Merr.	Creeping alkaligrass	×	×	×								0–10	L	7	Silty tidal-zone flats along Arctic coast.
Trisetum spicatum (L.) Richt.	Downy oatgrass	H	×	×	×	×	×		×	×		0–4,500	A	6–7	Flood-plains, cutbanks, dry meadows; crevices in limestone, sandstone and shale.
sibiricum Rupr.				H									L		Habitat unknown; King Point, Arctic coast of Yukon Territory.
Cyperaceae:	Sedge family:														
Carex albo-nigra Mack.										×		4,000	L	7	Sunny silty slopes west of Lake Schrader.
aquatilis Wahl.	Water sedge	×	×	×	×	×	×	×	×	×	×	0–3,500	A	7–8	Wet sedge meadows; stream and lake margins; very abundant.
atrofusca Schk.						×						500	L	7	Dry slopes at Umiat.
aurea Nutt.				×								800	L	7	Sagavanirktok River forks wet meadow; also along John River south of Anaktuvuk Pass.
bicolor All.						×	×		×		×	350–3,000	S	7	Wet silty soil; wet sedge meadow margins.
bigelowii Torr. and Schwein.		×	×	×	×	×	×		×	×	×	0–3,500	C	7–8	Niggerhead tundra meadows.
capilloris L.	Hairlike sedge				×	×	×		×	×	×	350–3,000	C	7–8	Dry meadows, knolls, slopes.

capitata L.	Capitate sedge					×	×			×	H	1,000–2,500	L	7	Dry river-terrace meadows.
chordorrhiza Ehrh.	Creeping sedge		×	×	×	×	×		×	×		0–3,000	C	7–8	Wet sedge meadows; wet river terraces.
concinna R. Br.				×							×	1,000	S	7	Wet meadow, Sagavanirktok River; mossy floor of white spruce woods, Noatak River terrace.
garberi Fern. ssp. *bifaria* Fern.										×			L	7	Habitat unknown, probably dry mountain slope, Canning River.
glacialis Mack.						×							L	7	Habitat unknown, Umiat area.
glareosa Wahl.			H	×	×	×	×			×		2,000–3,500	S	7–8	Stream and wet sedge meadow margins; late-snow areas.
gynocrates Wormsk.			×												Habitat unknown; Price River.
krausei Boeckl.				×		×	×		×	×		350–3,500	S	7–8	Dry river-terrace meadows.
lachenalii Schk.			×		×	×	×		×	×		0–3,000	C	7–8	Margins of small streams and wet sedge meadows; in some areas in shallow water.
lugens Holm						×	×				×	350–2,000	S	7–8	Sedge meadows along river terraces.
maritima Gunn.	Seaside sedge	H	×	×	×		×		×			0–3,000	S	7–8	Sandy shores of lakes and streams.
membranacea Hook.	Fragile sedge		×	×	×	×	×		×	×	×	0–3,500	C	7–8	Wet sandy stream margins; in some areas in wet sedge meadows.
microglochin Wahl.	Northern uncinia					×	×		×			350–2,000	S	7	Wet sedge meadows.
misandra R. Br.	Short-leaved sedge		×	×	×	×	×		×	×	×	0–4,000	C	7–8	Dry meadows; rocky slopes of sandstone and limestone; a few in wet sedge meadows.
montanensis L. H. Bailey	Mountain sedge			×	×	×	×		×	×		500–3,500	C	7–8	Cutbanks and moist valleys of small mountain streams.
nardina Fr.			×	×			×		×	×		0–3,500	S	7–8	Dry slopes and meadows; limestone slopes.
neurocleana Holm						×						350		7	Habitat unknown.
obtusata Lili.					×	×	×		×	×	×	350–3,500	C	7	Dry meadows and south-facing rubble slopes.
physocarpa Presl				×	×	×	×		×	×	×	350–3,500	C	7–8	Stream-margin sands.
podocarpa R. Br.	Long-awned arctic sedge			×		×	×		×	×		2,000–4,000	C	7–8	Sedge meadows; damp rocky alpine slopes.
ramenskii Komarov		×	×										L	7	Coastal wet sedge meadows.
rariflora (Wahl.) Smith	Loose-flowered alpine sedge.	H	×	×	×	×	×		×	×	×	0–3,500	C	7–8	Higher parts of wet sedge meadows out of standing water.
rotundata Wahl.	Round-fruited sedge	×		×	×	×			×		×	0–2,500	S	7–8	Wet sedge meadows in shallow standing water.
rupestris All.	Rock sedge			×	×	×	×		×	×	×	350–3,500	C	7–8	Dry alpine meadows; rubble slopes of limestone and sandstone.
scirpoidea Michx.	Single-spike sedge		×	×	×	×	×		×	×	×	0–5,000	A	6–7	Dry meadows, alpine rubble slopes of limestone, sandstone, conglomerate, shale, and chert; also on river sands and gravels.
stylosa C. A. Mey.						×							S	7	Sedge meadows, Colville and Ftivluk Rivers.
subspathacea Wormsk.			×	×								0–800	L	7	Coastal wet sedge meadows around Point Barrow and Sagavanirktok River forks.
supina Willd. ssp. *spaniocarpa* (Steud.) Hult.						×						500	L	7	Dry south-facing gravel slope at Umiat.
tenuiflora Wahl.						×							L	7	Habitat unknown; Umiat area.
ursina Dewey			×	H									L	7	Coastal; habitat unknown; Point Barrow eastward.
vaginata Tausch					×	×			×		×	350–2,500	S	7–8	Dry meadows.
williamsii Brit.					×	×	×			×	×	350–2,500	S	7–8	Do.
Eriophorum angustifolium Honck.	Tall cottongrass	×	×	×	×	×	×	×	×	×	×	0–4,000	A	7–8	Emergent hydrophyte of lake margins, stream margins, and wet sedge meadows.
brachyantherum Trautv.				×	×	×					H	350–2,200	S	7	Sedge meadows.
callitrix Cham.	Arctic cottongrass	×		×			×	×	×	×		0–3,500	S	7	Wet sedge meadows; usually in standing water.
medium Anders.		H													Habitat unknown; probably wet sedge meadows; Cape Lisburne.
russeolum Fries var. *leucothrix* (Blomgr.) Hult.			×	×	×	×			×	×		0–3,500	S	7	Wet sedge meadows and wet sand along streams.
scheuchzeri Hoppe	White cottongrass	×	×	×	×	×	×		×	×	×	0–3,500	C	7	Do.
vaginatum L. ssp. *spissum* (Fern.) Hult.	Niggerhead	×	×	×	×	×	×	×	×	×	×	0–4,000	A	6–7	Niggerhead meadows; rolling moist foothills; most abundant plant on the Arctic Slope.
Kobresia myosuroides (Vill.) Fiori and Paol.	Bellard kobresia		×	×	×	×	×	×	×	×	×	0–5,000	C	6–7	Dry slopes and hilltops; sandstone and conglomerate outcrops.
simpliciuscula (Wahl.) Mack.	Many-headed kobresia		×	×	×	×	×		×	×		0–3,500	C	6–7	Dry slopes and alpine meadows.
Scirpus caespitosus L. ssp. *austriacus* (Palla.) Asch. and Graebn.	Tufted club-rush			×		×	×		×			350–3,000	S	7–8	Wet sedge meadows; usually in shallow standing water.
Juncaceae:	Rush family:														
Juncus arcticus Willd. ssp. *alaskanus* Hult.	Arctic rush		×	H		×	×		×	×	×	0–3,500	C	7–8	Wet sandy margins of streams and lakes.
biglumis L.	Two-flowered rush		×	×	×	×	×		×	×	×	0–3,500	C	7–8	Margins of wet sedge meadows; silty frost boils in niggerhead tundra.
castaneus Smith	Chestnut rush			×	×	×	×		×	×	×	350–3,500	C	7–8	Sandy margins of streams and lakes.
triglumis L.	Three-flowered rush				×	×	×		×	×	×	350–3,500	C	7–8	Margins of wet sedge meadows.
Luzula confusa Lindb.	Northern woodrush	×	×	×	×	×	×	×	×	×	×	0–6,000	C	7–8	Dry meadows, stream terraces, rocky slopes, and crevices.
multiflora (Retz.) Lej. var. *frigida* (Buch.) Sam.						×			×	×	×	500–3,500	S	7–8	Rocky alpine meadows.
nivalis (Laest.) Beurl. var. *latifolia* (Kjellm.) Sam.	Snow woodrush	×	×	H	×	×	×	×	×	×	×	0–4,000	C	7–8	Dry meadows and river terraces.
parviflora (Ehrh.) Desv.	Small-flowered woodrush.					×			×			350–2,000	L	7–8	Moist sedge meadows, Umiat and Anaktuvuk Pass.
wahlenbergii Rupr.						H									Umiat; habitat unknown.
Melanthaceae:	Bunchflower family:														
Tofieldia coccinea Rich.	Northern asphodel			×	×	×			×	×		500–3,000	S	7	Dry rocky alpine slopes and hilltops.
pusilla (Michx.) Pers.	False asphodel			×		×	×		×	×	×	350–3,500	C	7	Margins of wet sedge meadows.
Zygadenus elegans Pursh	Glaucous zygadenus			×	×	×	×		×	×	×	350–2,000	C	7	Dry slopes, cutbanks, and sandbars.
Liliaceae:	Lily family:														
**Allium sibiricum* L.	Wild chives										×		S	7	Habitat unknown; Noatak River valley.
Lloydia serotina (L.) Reich.	Alp lily	H	×	×	×	×	×		×	×		0–4,500	C	6–7	Moist rocky open slopes.

TABLE 2.—*Annotated list of plants growing on the Arctic Slope of Alaska*—Continued

Botanical name	Common name	Distribution (See fig. 4)										Elevation range (feet above sea level)	Abundance	Flowering period (ordinal numbers of months)	Habitat
		Arctic Slope									Noatak drainage				
		Coastal plain			Foothills			Mountains							
		West	Central	East	West	Central	East	West	Central	East					
Orchidaceae:	Orchid family:														
Corallorhiza trifida Chat.	Coralroot	----	----	X	----	----	----	----	----	X	----	800–2,000	L	7	Mossy damp slope, Ikiakpuk valley and Sagavanirktok River forks.
Lysiella obtusata (Pursh) Reich.	Northern bog orchid	----	----	X	----	X	X	----	----	----	X	350–2,000	L	7	Wet sedge meadows on Arctic Slope; mossy floor of white spruce woods along Noatak River.
Salicaceae:	Willow family:														
Populus tacamahacca Mill.	Balsam poplar	----	----	----	X	X	X	----	X	X	X	1,000–3,000	S	6–7	Flood plains of major rivers along mountain front south of the Colville River and Ignek valley; generally 10–20 ft high; largest along Canning River drainage, 30–40 ft high, 6–12 in. diameter. Along the south side of the Brooks Range the balsam poplars extend along valleys several miles farther north than white spruce.
Salix alaxensis (Anderss.) Cov.	Feltleaf willow	----	X	X	X	X	X	X	X	X	X	[0–4,000	A	6–7	Along major stream valleys; sandy or silty soil near running water; 2–6 ft high on coastal plain, 10–25 ft high in foothills; 2–5 ft high above 3,000 ft elevation. Chief source of firewood on Arctic Slope.
anglorum Cham.	Arctic willow	----	----	X	X	X	X	----	X	X	----	0–4,000	C	6–7	River terraces and rocky alpine meadows; to 6 in. high.
var. *antiplasta* Schn.		----	X	----	X	X	----	----	----	X	----				
var. *araioclada* Schn.		----	----	----	----	X	----	----	----	----	----				
arbusculoides Anderss.		----	----	X	----	X	X	----	X	X	X	350–3,500	C	6–7	Terraces, sandbars, and cutbanks along major rivers; 3–8 ft high.
arctica Pall.	Arctic willow	----	X	H	X	----	X	----	X	X	X	0–3,500	C	6–7	Moist rocky meadows, river terraces, rubble slopes of sandstone and limestone; to 6 in. high.
arctolitoralis Hult.		H	----	----	----	----	----	----	----	----	----	------	----	------	Habitat unknown, Point Lay.
barclayi Anderss.		----	----	----	----	X	X	----	----	X	----	350–2,000	S	6–7	Gravel bars along major rivers; to 4 ft high.
barrattiana Hook. var. *angustifolia* Anderss.		----	----	----	----	----	X	----	----	X	----	2,500–3,500	S	6–7	Moist alluvial fans from limestone and schist mountains; found from Canning River east; forming patches 2 ft high.
brachycarpa Nutt. var. *meziae* Ball.		----	----	----	----	X	X	----	----	X	----	350–4,500	S	6–7	Rocky slopes of shale and limestone; 1–2 ft high.
chamissonis Anderss.		----	----	----	X	----	X	----	----	X	----	1,500–2,500	S	6–7	Wet sedge meadows and along valleys; to 1 ft high.
desertorum Rich.		----	----	H	----	X	X	----	----	X	----	350–2,500	C	6–7	Flood-plain sands; 1–3 ft high.
flagellaris Hult.		----	H	----	----	----	----	----	----	----	----	------	----	------	Habitat unknown, Colville delta.
fuscescens Anderss.		H	----	----	----	X	X	----	----	----	----	350–2,500	S	6–7	Wet sedge meadows and river terraces; to 1 ft high.
var. *reducta* Ball.		----	----	----	X	X	----	----	----	----	----				
glacialis Anderss.		----	H	H	----	----	----	----	----	----	----	------	----	------	Habitat unknown, Point Barrow to Mackenzie River.
glauca L.		H	----	----	----	X	----	----	----	----	----	350–3,000	C	6–7	Sandbars along major streams; about 3 ft high.
var. *acutifolia* (Hook.) Schn.		----	X	----	X	X	X	----	X	----	X				
var. *glabrescens* Anderss.		----	----	----	----	----	X	----	----	----	X				
mackenziana (Hook.) Barratt var. *macrogemma* Ball.		----	----	----	----	X	----	----	----	----	----	3,000	L	------	Sandy shore of Shainin Lake.
myrtillifolia Anderss.		----	----	----	----	X	----	----	----	----	----	1,800	L	------	Gravel alluvial fan east side of Tulugak Lake, Anaktuvuk Pass.
niphoclada Rydb.		----	X	X	X	X	X	----	X	X	X	0–3,500	C	6–7	Sandbars, cutbanks, small stream valleys; 2–4 ft high.
ovalifolia Trautv. var. *camdensis* Schn.		X	X	----	H	----	X	----	----	X	----	0–2,000	S	6–7	Flood-plain and coastal sands; vinelike growth a few inches high.
phlebophylla Anderss.		H	X	H	X	X	X	----	X	X	----	0–4,000	C	6–7	Dry rocky slopes of sandstone, limestone, and shale; mat shrub to in. hign.
polaris Wahl. var. *selwynensis* Rupr.		X	X	----	----	X	X	----	X	X	----	0–5,000	C	6–7	Late-snow areas; limestone crevices; mat shrub to 1 in. high.
pulchra Cham.		X	X	H	X	X	X	----	X	X	X	0–4,000	C	6–7	Coastal beaches, sandbars and terraces, small stream valleys, sedge meadows, and sandstone talus; 1–3 ft high.
var. *palmeri* Ball.		X	X	----	X	X	----	----	X	----	----				
var. *yukonensis* Schn.		----	----	----	----	X	----	----	X	----	----				
reticulata L.	Reticulate-leaved willow.	X	X	X	X	X	X	----	X	X	X	0–3,500	A	6–7	Moist tundra meadows; 1–3 in. high.
var. *gigantifolia* Ball.		----	----	X	X	X	X	----	X	----	----				
var. *subrotunda* Ball.		----	----	----	----	----	----	----	----	X	----				
richardsonii Hook.		----	X	X	X	X	X	----	X	X	X	0–3,000	C	6–7	Sandbars, late-snow areas, and wet sedge meadows along frost polygon ridges; 2–6 ft high.
rotundifolia Trautv.		X	X	X	X	X	X	----	X	X	----	0–4,000	A	6–7	Dry meadows, late-snow areas, alpine outcrops of schist, sandstone, limestone, and shale; mat shrub ½–1 in. high.
setchelliana Ball.		----	----	----	----	----	----	----	X	----	----	------	----	------	Habitat unknown, Itkillik River.
walpolei (Cov. and Ball) Ball.		----	----	X	X	X	X	----	X	X	X	350–3,500	C	6–7	Sandy flood plains of major streams; 1–4 ft high.
Betulaceae:	Birch family:														
Alnus crispa (Ait.) Pursh	Green alder	----	----	----	----	X	X	----	X	----	X	350–2,500	L	6–7	Green alder follows the valley of the Colville River from Umiat west to the mouth of the Ipnavik River with a few small stands farther west. There is one isolated stand on a sandstone outcrop across the Canning River from Shublik Springs; 3–8 ft high.

Betula glandulosa Michx.	Glandular birch			H		×	×		×	×		500–3,500	C	6–7	Alpine meadows, cutbanks, and crevices in sandstone, schist, and shale; 1–3 ft high; very similar to dwarf birch.
nana L. ssp. *exilis* (Sukatch.) Hult.	Dwarf birch	×		×	×	×	×	×	×	×	×	0–2,500	C	6–7	Niggerhead meadows, river terraces, brush covered cutbanks; 1–2 ft high. Locally forms "birch heath." Along mountain passes hybrid birch, probably one of the above × *Betula resinifera*, are common shrubs.
Polygonaceae:	Buckwheat family:														
Koenigia islandica L.		H													Habitat unknown, probably wet; Point Lay.
Oxyria digyna (L.) Hill	Mountain sorrel	×	×	×	×	×	×		×	×		0–4,000	C	6–7	Disturbed and eroded coastal silt; alpine late-snow areas; damp cool rock crevices.
Polygonum bistorta L. ssp. *plumosum* (Small) Hult.	Bistort	×	×	×	×	×	×		×	×	×	0–4,000	A	7	Moist river terraces, niggerhead meadows, and flood-plain sands.
viviparum L.	Alpine bistort	×	×	×	×	×	×		×	×	×	0–4,500	C	7	Moist stream valleys, wet sedge meadows, and alpine slopes.
Rumex acetosa L. ssp. *alpestris* (Scop.) Love.	Green sorrel					×			×			2,000–3,000	L	7	Dry, usually south-facing, eroding slopes.
arcticus Trautv.	Arctic dock		×	×	×	×	×		×	×		0–4,000	C	7	Moist rolling meadows; in some places on bare silty soil exposed by frost action.
Chenopodiaceae:	Goosefoot family:														
Monolepis nuttalliana (Schult.) Greene	Povertyweed						×					1,000	L	8	Dry south-facing sandstone outcrop and rubble slope, Sadlerochit River.
Portulacaceae:	Purslane family:														
Claytonia acutifolia Pall. ssp. *graminifolia* Hult.	Spring beauty				×							2,400	L	7	South-facing wet meadow below sandstone ridge south side of Lake Noluck.
sarmentosa C. A. Mey.	Alaska spring beauty				×	×	×	×	×	×		1,000–3,500	C	7–8	Wet soil; commonly below late-snow areas in alpine valleys.
tuberosa Pall.	Tuberous spring beauty						×₄			×		2,500–3,500	L	7	Wet meadows in alpine valleys in Lake Schrader area.
Caryophyllaceae:	Pink family:														
Arenaria capillaris Poir.	Beautiful sandwort				×		×		×			1,000–3,000	S	7	Alpine sandy rubble slopes.
dicranoides (C. and S.) Hult.					×			×				2,000–4,000	L	7	Dry alpine rubble slopes around Noluck Lake and Thunder Mountain.
Cerastium arcticum Lange		H		H											Habitat unknown, Point Barrow and Collinson Point in Camden Bay.
beeringianum C. and S.	Beering chickweed	H	×	×	×	×	×		×	×	×	0–4,000	C	7–8	Sandbars, lake shores, sandy coastal beaches, and dry meadows.
maximum L.	Great chickweed				×	×	×					1,000–2,500	S	7	Bare sandy rubble slopes.
Dianthus repens Willd.	Northern pink				×		×			×		2,000–4,500	S	7–8	Alpine crevices and rubble slopes of sandstone and limestone.
Honckenya peploides (L.) Ehrh.	Seabeach sandwort	×	×	H								0–10	L	7–8	Sandy seashore beaches.
Melandrium apetalum (L.) Fenzl	Nodding lychnis	×	×	×	×	×	×		×	×	×	0–3,500	C	7	Dry meadows, slopes, and sandbars.
furcatum (Raf.) Hult.	Arctic lychnis	×	×	H	×	×	×		×	×		0–3,500	C	6–7	Dry alpine slopes and sandbars.
taylorae (Robins.) Tolm.					×	×	×			×		350–2,500	S	7	Moist flood-plain sands.
Merckia physodes (Fisch.) Fisch.	Merckia		×		×	×	×		×	×	×	0–2,500	C	7	Sandy flood plains of major streams.
Minuartia arctica (Stev.) Asch. and Graebn.	Arctic sandwort	×	×	×	×	×	×		×	×	×	0–3,500	C	6–7	Dry alpine meadows and sandbars.
biflora (L.) Schinz and Thell.							H								Habitat unknown; Sadlerochit River.
elegans (C. and S.) Schisch.	Ross sandwort		×	×	×	×	×		×	×	×	0–3,500	C	6–7	Sandy flood plains.
laricifolia (L.) Schinz. and Thell.	Larch-leaved sandwort			H			×		×	×		2,000–4,000	S	7	Dry rocky alpine slopes.
macrocarpa (Pursh) Ostenf.	Long-podded sandwort	H			×	×	×		×	×		350–5,000	C	6–7	Dry meadows and alpine slopes.
obtusiloba (Rydb.) House							H								Habitat unknown; Sadlerochit River.
rubella (Wahl.) Graebn.		H	×		×	×	×		×	×	×	0–3,000	C	7	Sandbars and dry slopes.
Moehringia lateriflora (L.) Fenzl						×						350	L	7	Flood-plain sands, terrace meadows, at Umiat.
Sagina intermedia Fenzl	Snow pearlwort	H	×	H								0–10	L	7	Coastal sandy beaches at Point Barrow.
Silene acaulis L.	Moss pink	×	×	×	×	×	×		×	×	×	0–4,000	C	6–7	Dry open slopes, hilltops, alpine meadows, and crevices in limestone, sandstone, and basalt.
repens Patrin.	Pink campion						×			×		1,000–5,000	L	7	Alpine crevices in sandstone and limestone; Canning River eastward.
Stellaria crassifolia Ehrh.	Fleshy starwort	H	×	H	×	×						0–2,500	S	7	Wet grassy lake margins.
humifusa Rottb.	Low chickweed	H	×	H		×			×			0–2,000	S	7	Sandy coastal beaches and lake shores.
laeta Rich. (including *ciliatosepala* Trautv.).	Shining starwort	×	×	×	×	×	×		×	×	×	0–3,500	C	7	Sandy flood-plains, coastal sandy beaches, and alpine meadows.
laxmannii Fisch.						×									Habitat unknown, Umiat.
longipes Goldie						×									Do.
monantha Hult.					×					×		2,000–4,000	S	7	Dry alpine rubble slopes.
Ranunculaceae:	Buttercup family:														
Aconitum delphinifolium DC.	Monkshood		×	×	×	×	×		×	×		0–5,000	C	7–8	Moist alpine slopes, usually growing with grasses.
Anemone drummondii Wats.	Anemone				H	×	×		×	×		350–3,500	C	6	Moist sandbars, terrace meadows, rubble slopes; eastern part of mountain front.
multiceps (Greene) Standl.	Alaska blue anemone	×			×						×	1,000–2,500	L	6	Dry rubble slopes; western part of mountain front.
narcissiflora L.	Narcissus-flowered anemone.					×			×		×	1,500–3,000	L	7	Dry alpine meadows; central part of mountain front.
parviflora Michx.	Northern anemone	×	×	×	×	×	×		×	×	×	0–3,500	C	6–7	Moist alpine meadows and valley slopes; sandbars.
patens L. ssp. *multifida* (Pritzel) Zamels.	Pasqueflower			H		×						500–1,500	L	6–7	Dry hilltops; central part of foothills.
richardsonii Hook.	Yellow anemone	×	×	×	×	×	×		×	×		0–4,000	C	7	Stream margins in sun or shade, moist alpine meadows.
Caltha palustris L. var. *arctica* (R. Br.) Huth.	Yellow marsh marigold		×	×	×	×	×		×	×	×	0–3,500	C	7	Emergent aquatic in shallow, slowly moving water; with floating leaves at Point Barrow.
Delphinium brachycentrum Ledeb.	Dwarf larkspur	H	×	×	×	×	×	×	×	×		0–4,000	C	7–8	Alpine meadows, small damp stream valleys, rocky slopes.
glaucum Wats.	Glaucous larkspur									×		1,500–3,000	L	7	Moist alpine stream margins; Canning River eastward.

TABLE 2.—*Annotated list of plants growing on the Arctic Slope of Alaska*—Continued

Botanical name	Common name	Distribution (See fig. 4)										Elevation range (feet above sea level)	Abundance	Flowering period (ordinal numbers of months)	Habitat
		Arctic Slope									Noatak drainage				
		Coastal plain			Foothills			Mountains							
		West	Central	East	West	Central	East	West	Central	East					
Ranunculaceae—Continued	Buttercup family—Con.														
Ranunculus aquatilis L. var. *eradicatus* Laest.	White water-buttercup					×						350	L	7	Aquatic in small oxbow lakes around Umiat (*R. reptans* in Hultén 1941–50).
flammula L. var. *filiformis* Michx.	Creeping buttercup					×						350	L	7	Semiaquatic in mud; west end of Umiat airstrip.
gelidus Kar. and Kir.					×							2,000	L	7	Dry hilltops; Nuka River.
glacialis L. var. *chamissonis* Schlecht.								×				4,000	L	7	Rubble slope; Thunder Mountain.
gmelini DC.					×		×					0–3, 500	C	8	Emergent or submerged aquatic of lake margins.
var. *yukonensis* (Brit.) Benson		×	×	×	×	×				×					
hyperboreus Rottb.			×		×							1, 000–2, 500	S	8	Semiaquatic of sandy lake margins.
lapponicus L.	Lapland buttercup		×		×	×	×				×	100–2, 500	S	7	Moist mossy valleys and gullies.
nivalis L.	Snow buttercup	H	×	×	×	×	×			×		0–3, 000	C	6	Late-snow areas, damp margins of small streams. (*R. nivalis* and *R. sulphureus* are very similar, and intermediate forms occur.)
pallasii Schlecht.	Pallas buttercup	×	×	H	×	×	×					0–2, 500	C	7–8	Emergent aquatic in lake margins.
pedatifidus J. E. Smith var. *affinis* (R. Br.) Benson.	Northern buttercup		×	×	×	×	×		×	×		0–3, 500	C	6–7	Dry slopes.
pygmaeus Wahl.	Pygmy buttercup	×	×		×		×			×		0–3, 500	C	6–7	Late-snow areas, coastal disturbed areas, and sands.
sabinei R. Br.			×												Habitat unknown; Point Barrow.
sulphureus Soland.	Sulphur buttercup		×	H	×	×	×			×		0–3, 500	C	6–7	Late-snow areas, wet valleys of small alpine streams. (See *R. nivalis* note above.)
**turneri* Greene				H											Habitat unknown; Arctic coast of Yukon Territory.
Thalictrum alpinum L.	Arctic meadowrue			×	×	×	×		×	×	×	1, 000–4, 500	S	7	Moist alpine crevices in sandstone and limestone; wet terrace meadows.
Papaveraceae:	Poppy family:														
Papaver alboroseum Hult.		×	×							×		0–3, 500	L	7–8	Sand mounds at Alaktak; glacial moraine and outwash at Lake Schrader.
macounii Greene	Macoun poppy	H	×	×	×	×		×	×	×	×	0–5, 000	C	7	Sandbars, dry alpine meadows, crevices and rubble slopes of sandstone and shale.
radicatum Rottb.	Arctic poppy	×	×	×	×	×	×		×	×		0–5, 000	C	7–8	Dry meadows, hilltops, sandbars, and outcrops.
Fumariaceae:	Fumewort family:														
Corydalis pauciflora (Steph.) Pers.	Few-flowered corydalis			×	×	×	×		×	×	H	500–3, 500	S	6–7	Damp mossy valleys of small alpine streams.
Cruciferae:	Mustard family:														
Arabis lyrata L.	Rockcress					×						350–500	S	6–7	Sandbars.
ssp. *kamchatica* (Fisch.) Hult.						×	×								
Braya purpurescens (R. Br.) Bunge		H	×	×		×				×		50–2, 000	L	7	Sandy flood plains at Alaktak; limestone talus, Katakturuk River.
Cardamine bellidifolia L.	Alpine cress	×			×		×	×	×	×		0–4, 500	S	7	Moist alpine meadows, sandbars.
microphylla Adams					H		×			×		1, 500–3, 500	S	7	Moist alpine meadows east of Canning River.
pratensis L.	Cuckoo flower	×	×	×	×	×	×		×	×		0–3, 500	C	7–8	Wet meadows and lake margins.
purpurea C. and S.	Purple bittercress				×	×						1, 000–2, 500	S	7	Open wet soil, north-facing alpine slopes; western mountain front.
richardsonii Hult.		×	×	×	×	×	×		×	×		0–4, 000	C	6–7	River terraces, grassy slopes, sedge meadows.
Cochlearia officinalis L.	Scurvygrass	H	×	×								0–100	L	6–7	Ocean beaches and sandy flood plains near the coast.
Descurainia sophioides (Fisch.) Schulz	Northern tansy mustard		×	×		×	×		×			0–2, 500	L	7–8	Shale outcrops and freshly eroded cutbanks.
Draba alpina L.	Alpine whitlowgrass		×	×		×	×		×	×		0–3, 500	S	7	Dry alpine meadows and dry slopes. Material partly with white flowers and partly with yellow flowers.
chamissonis G. Don					×	×			×			2, 000–3, 500	S	7	Dry alpine slopes and hilltops. (*D. caesia* in Hultén 1941–50.)
cinerea Adams		H	×		×							1, 000–3, 000	S	7	Dry slopes and hilltops.
crassifolia Grah.				×		×	×					350–3, 000	S	7	Dry slopes.
exalata E. Ekm.				H											Habitat unknown; Icy Reef.
fladnizensis Wulfen					×	×			×	×		350–3, 500	S	7	Dry alpine slopes.
glabella Pursh		H	×	H	×	×	×		×	×		0–3, 500	C	7	Moist sandy cutbanks (also called *D. hirta* L.).
lactea, Adams		×	×	H	×							0–3, 000	S	7	Coastal sandy beaches and dry alpine slopes.
lanceolata Royle			×	×		×	×					50–2, 000	S	7	Silty mounds along coast, cutbanks.
longipes Raup				×	×		×		×	×		500–3, 500	S	7	Cutbanks and dry alpine slopes.
macrocarpa Adams		H	H												Habitat unknown; Point Barrow and Camden Bay.
nivalis Lilj.			×				×		×	×		0–4, 000	S	7	Coastal sandy beaches, dry slopes, and crevices in limestone. (Several other doubtful species of *Draba* occur in Arctic Alaska.)
Ermania borealis (Greene) Hult.					×	×				×		2, 500–4, 500	L	7	Barren eroding slopes of shale, and course limestone talus.
Erysimum inconspicuum (Wats.) MacM.	Narrow-leaved wallflower.			×		×	×					350–2, 000	S	7	Shale and gravel cutbanks; Umiat and Sadlerochit and Shaviovik Rivers.
pallasii (Pursh) Fern.	Pallas wallflower			H	×	×	×		×	×		350–4, 500	C	6–7	Dry sandbars, cutbanks, and rubble slopes.
Eutrema edwardsii R. Br.		H	×	×	×		×		×	×		0–4, 000	C	6–7	Arctic and alpine meadows.

Lesquerella arctica (Wormsk.) Wats.	Arctic bladderpod						X		X			1,000–3,000	L	6–7	Well-drained limestone pebble alluvial fans east of Canning River.
Parrya nudicaulis (L.) Regel		X	X	X	X	X	X		X	X	X	0–4,500	C	6–7	Moist meadow slopes, sandbars, and rock crevices.
Rorippa palustris (L.) Bess.	Yellow watercress					X	X			X		350–1,500	L	7	Sandy stream and lake margins.
Smelowskia calycina (Steph.) C. A. Mey.	Siberian smelowskia														Coarse dry alpine rubble slopes and crevices in sandstone, limestone, and conglomerate.
var. *integrifolia* Drurey					X	X			X		X	2,000–6,000	C	6–7	Var. *integrifolia* all along mountain front; var. *media* along eastern mountain front; var. *porsildii* in central mountain front near Anaktuvuk Pass.
var. *media* Drurey							X			X					
var. *porsildii* Drurey						X			X						
Thlaspi arcticum Pors.	Arctic pennycress						X					1,500	L	8	Only a few plants found; Sadlerochit River terrace.
Torularia humilis (C. A. Mey.) Schulz.	Northern rockcress			X		X					X	350–800	S	7	Sandbars, Umiat and Sagavanirktok River.
Crassulaceae:	Orpine family:														
Sedum roseum (L.) Scop. ssp. *integrifolium* (Raf.) Hult.	Rose root			X			X					0–2,000	L	8	Dry coastal meadows and dry sandstone ridges; Sadlerochit River to Barter Island.
Saxifragaceae:	Saxifrage family:														
Chrysosplenium iowensis Rydb.	Water-carpet		X	X						X		0–2,000	L	7–8	This species is yellowish and has 8 stamens. Silty mounds at Alaktak; coastal wet sedge meadow at Barter Island, Katakturuk River.
tetrandrum Th. Fries	Northern water-carpet	X	X	X	X	X	X		X	X		0–4,000	C	6–7	Semiaquatic, margins of ponds, slowly moving streams, and seepage areas.
wrightii Franch. and Sav.	Bering Sea water-carpet				X	X			X	X		350–5,000	S	5–7	Moist alpine outcrops of shale and sandstone; silty frost boils in niggerhead meadows.
Parnassia kotzebuei C. and S.	Kotzebue grass of parnassus.	X	X	X	X	X	X		X	X	X	0–4,000	C	7	Moist soil along streams.
palustris L.	Northern grass-of-parnassus.					X	X		X	X	X	350–3,000	C	7	Sandy and silty flood plains.
Saxifraga bronchialis L. ssp. *funstonii* (Small) Hult.	Spotted saxifrage		H	X	X	X	X		X	X	X	350–6,000	C	7	Dry alpine meadows, ridges, rubble slopes, and crevices in sandstone, limestone, and shale.
caespitosa L. ssp. *sileneflora* (Sternb.) Hult.		H	X	H	X	X	X		X	X		0–5,000	C	7	Coastal sandy beaches, sandbars, late-snow areas, and crevices in sandstone and limestone.
cernua L.	Nodding saxifrage	X	X	X	X	X	X		X	X		0–3,500	C	7	Wet soil along streams; wet sedge meadows.
davurica Willd. ssp. *grandipetala* (Engl. and Irm.) Hult.	Purple saxifrage				X	X	X		X	X		1,000–5,000	C	7	Alpine moist rocky slopes; crevices in sandstone, shale, and schist.
eschscholtzii Sternb.	Ciliate saxifrage				X		X		X	X		2,000–5,500	C	7	Alpine crevices in limestone, sandstone, shale, conglomerate, and basalt.
flagellaris Willd.	Flagellate saxifrage		X	H	X		X		X	X	X	0–5,000	C	7	Dry alpine meadows, mountain slopes of limestone, sandstone, shale, conglomerate, and basalt.
foliolosa R. Br.		X	X	X	X			X		X		0–3,000	S	7	Wet meadows, late-snow areas.
hieracifolia Waldst. and Kit.	Hawkweed-leaved saxifrage.	X	X	X	X	X	X		X	X	X	0–4,000	C	7	Moist valleys and moist rolling meadows
hirculus L.	Yellow marsh saxifrage	X	X	X	X	X	X		X	X	X	0–4,000	C	7	Wet sedge meadows.
nivalis L.	Alpine saxifrage		X		X			X		X	X	0–4,000	S	7	Dry meadows and rubble slopes.
oppositifolia L.	Purple mountain saxifrage.	H	X	X	X	X	X		X	X		0–6,000	C	6–7	Moist rocky alpine slopes, crevices in sandstone, limestone, shale, schist, and basalt; late-snow areas, silty frost boils in niggerhead meadows.
punctata L. ssp. *nelsoniana* (D. Don) Hult.	Brook saxifrage	X	X	X	X	X	X	X	X	X	X	0–4,000	C	6–7	Valley and upland meadows, river terraces, and cutbanks.
radiata Small		H		H											Habitat unknown; coastal.
reflexa Hook.	Yukon saxifrage			X	X	X	X		X	X	X	350–5,000	C	6–7	Dry rubble slopes, cutbanks, and crevices in sandstone, conglomerate, schist, and gabbro.
rivularis L.	Alpine brook saxifrage	X	X	X	X	X	X		X	X		0–4,500	S	6–7	Coastal sandy beaches, late-snow areas in small alpine valleys.
serpyllifolia Pursh	Thyme-leaved saxifrage				X	X	X		X	X	X	2,000–6,000	C	7	Moist alpine rubble slopes of sandstone and shale.
**spicata* D. Don	Spiked saxifrage											2,000	L	8	Tundra meadow John River at Hunt Fork.
tricuspidata Retz.	Three-toothed saxifrage		X	X	X	X	X		X	X	X	350–4,500	C	7	Cutbanks, ridges, dry rubble slopes, and crevices in sandstone, conglomerate and limestone.
unalaschensis Sternb.	Unalaska saxifrage				X										Habitat unknown; Cape Lisburne.
Therofon richardsonii (Hook.) Kze.	Richardson saxifrage			X	X	X	X		X	X	X	300–4,000	C	7	Moist rocky alpine slopes, usually along base of north-facing slopes.
Grossulariaceae:	Gooseberry family:														
Ribes triste Pallas	Red currant					X	X		X		X	350–2,000	L	6–7	South-facing brush slopes; Umiat Mountain; Tulugak Springs in Anaktuvuk Pass.
Rosaceae:	Rose family:														
Dryas integrifolia Vahl.	Entire-leaved mountain avens.	X	X	X	X	X	X		X	X		0–4,000	C	6–7	Moist to wet meadows, niggerhead tundra, and clay slopes.
octopetala L.	Eight-petaled mountain avens.		X	X	X	X	X	X	X	X		350–5,000	A	6–7	Dry alpine meadows and rubble slopes of sandstone, limestone, and conglomerate. Most abundant plant along mountain front.
Geum glaciale Adams	Glacier avens			X	X	X	X		X	X		1,000–5,000	C	6	Moist alpine meadows and talus, especially on north-facing slopes.
rossii (R. Br.) Ser.	Alpine avens				X		X		X	X		1,500–4,000	C	6–7	Moist mossy river terraces.
Potentilla biflora Willd.	Two-flowered cinquefoil				X		X		X	X		2,000–4,000	C	6–7	Dry rocky slopes and crevices in sandstone and limestone.
elegans C. and S.	Pretty cinquefoil						X		X	X		3,000–6,000	L	7	Moist crevices in sandstone and limestone on high mountaintops.
emerginata Pursh	Arctic cinquefoil	X	X	X	X	X	X		X	X		0–4,000	C	7	Moist meadows, cutbanks, and talus slopes.
fruticosa L.	Tundra yellow rose		X	X	X	X	X		X	X	X	0–4,000	C	7	Cutbanks, brush slopes, and wooded flood plains.
hookeriana Lehm.					X	X	X		X	X		350–3,500	S	7	Cutbanks and rubble slopes.
multifida L.	Cut-leaved cinquefoil									X		1,500–3,500	L	7	Dry cutbanks, Canning River eastward.
nivea L.	Snow cinquefoil		X	X	X	X	X		X	X	X	1,000–4,500	C	7	Cutbanks and rubble slopes.
palustris (L.) Scop.	Purple marsh cinquefoil			X	X	X	X		X	X	X	0–3,000	C	7–8	Wet sedge meadows and lake margin emergent aquatic.
pulchella R. Br.		X	X	X								0–50	S	7	Dry coastal meadows.
uniflora Ledeb.	One-flowered cinquefoil				X	X	X		X	X		0–3,500	C	7	Dry meadows and rubble slopes.
vahliana Lehm.			X	X	H	X	X	X	X	X		0–3,500	C	7	Dry cutbanks, alluvial fans, and rubble slopes.
virgulata A. Nels.						X	X					350–1,500	S	7	Gravel cutbanks; Umiat and Sadlerochit River.

TABLE 2.—*Annotated list of plants growing on the Arctic Slope of Alaska*—Continued

Botanical name	Common name	Distribution (See fig. 4)										Elevation range (feet above sea level)	Abundance	Flowering period (ordinal numbers of months)	Habitat
		Arctic Slope									Noatak drainage				
		Coastal plain			Foothills			Mountains							
		West	Central	East	West	Central	East	West	Central	East					
Rosaceae—Continued	Rose family—Con.														
Rosa acicularis Lindl.	Prickly rose	----	----	----	----	×	----	----	----	----	----	500	L	7	South-facing sandstone talus slopes at Umiat.
Rubus arcticus L.	Arctic dwarf raspberry	----	----	----	----	----	×	----	×	----	----	1,000–2,000	L	7	Wet meadows around Shublik Springs in Canning River valley and Tulugak Springs in Anaktuvuk Pass.
chamaemorus L.	Cloudberry	H	×	×	×	×	×	----	×	×	×	0–3,500	C	6–7	Frost mounds in wet meadows, usually with sphagnum moss.
Spiraea beauverdiana Schneid.	Beauverd spiraea	----	----	----	----	×	×	----	----	×	----	350–3,000	L	7–8	Bare silty landslides on Red Hill at Umiat; south-facing mountain slopes between Canning and Sadlerochit Rivers.
Leguminosae:	Pea family:														
Astragulus alpinus L.	Alpine milk vetch	×	×	×	×	×	×	----	×	×	×	0–3,500	C	7	Sandbars, dry slopes.
eucosmus Robin.	Pretty milk vetch	----	----	×	×	×	×	----	×	----	----	350–2,500	S	7	Flood plains in sun or shade.
lepagei Hult.	Lepage milk vetch	----	----	×	×	×	×	----	×	×	×	350–3,000	C	6–7	Dry rubble slopes and sandbars.
nutzotinensis Rousseau	Sicklepod milk vetch	----	----	×	----	----	----	×	----	×	----	1,500–3,500	S	7	Sandbars and rubble slopes.
umbellatus Bunge	Hairy arctic milk vetch	H	×	×	×	×	×	----	×	×	----	0–3,500	C	6–7	Sandbars in sun or shade and damp slopes.
Hedysarum alpinum L. ssp. *americanum* (Michx.) Fedtsch.	American hedysarum	----	----	×	×	×	×	----	×	×	×	350–4,000	C	7	Sandbars in sun or shade and alpine rubble slopes.
H. mackenzii Rich.	Wild sweet pea	----	H	×	×	×	×	----	×	×	×	0–3,000	C	7	Sandy flood plains.
Lathyrus maritimus (L.) Bigel.	Beach pea	H	----	H	----	----	----	----	----	----	----	----------	------	------	Habitat unknown; coastal.
Lupinus arcticus Wats.	Arctic lupine	×	×	×	×	×	×	----	×	×	×	0–2,500	C	7	Moist sandbars and cutbanks; in patches in some places.
Oxytropis deflexa (Pall.) DC.	----------	----	----	----	----	×	×	----	----	×	×	350–2,000	S	7	Sandbars.
gracilis (Nels.) Schum.	Northern yellow oxytrope.	----	----	×	×	×	×	----	×	×	----	350–3,500	C	7	Sandbars, cutbanks, and alpine rubble slopes.
jordalii Pors.	----------	----	×	----	----	----	----	----	×	----	----	1,800	L	7	Valley meadows in Anaktuvuk Pass.
kokrinensis Pors.	Kokrines mountain oxytrope.	----	----	----	----	×	----	----	×	----	×	1,000–2,500	L	7	Dry meadows, Oolamnagavik River and Howard Pass.
koyukukensis Pors.	----------	----	×	----	----	×	----	----	----	----	×	350–1,500	S	7–8	Flood-plain sands.
leucantha (Pall.) Bunge	----------	H	×	----	×	×	×	----	×	×	----	0–3,500	C	7	Sandy flood plains and dry slopes.
maydelliana Trautv.	----------	H	----	×	×	----	×	----	×	×	----	500–3,500	C	7	Sandbars and alpine rubble slopes.
mertensiana Turcz.	----------	----	----	----	×	----	×	----	----	×	----	2,000–3,500	S	7	Damp alpine meadows, alluvial fans, and shale outcrops.
nigrescens (Pall.) Fisch.	Black oxytrope	----	----	----	----	----	----	----	----	----	----	----------	------	------	----------
ssp. *pygmaea* (Pall.) Hult.	----------	H	----	H	×	----	----	----	×	×	----	350–5,000	C	6–7	Dry alpine meadows, river terraces, and sandbars.
ssp. *bryophila* Hult.	----------	----	----	×	×	×	×	----	×	×	×				
scammaniana Hult.	----------	----	----	----	----	----	----	----	×	----	----	3,100	L	7	Rocky west-facing slope, east side of Kurupa Lake.
viscida Nutt.	Viscid oxytrope	----	----	----	----	----	----	----	----	×	----	1,500–2,500	L	7	Alluvial sands, Sagavanirktok and Shaviovik Rivers.
Linaceae:	Flax family:														
Linum perenne L. ssp. *lewisii* (Pursh) Hult.	Wild flax	----	----	----	----	×	----	----	----	----	----	500	L	7	South-facing sandstone talus at Umiat.
Empetraceae:	Crowberry family:														
Empetrum nigrum L.	Crowberry	×	----	×	×	×	×	----	×	×	×	0–5,000	C	6–7	Moist rocky alpine slopes and crevices in sandstone, shale, schist, gabbro, and chert; also in moist meadows.
Violaceae:	Violet family:														
Viola epipsila Ledeb. ssp. *repens* (Turcz.) Beckr.	Northern marsh violet	----	----	×	----	----	----	----	----	----	----	700	L	6–7	Moist meadow, stream margin beneath willow shrubs, Shaviovik River.
Elaeagnaceae:	Oleaster family:														
Shepherdia Canadensis (L.) Nutt.	Soapberry	----	----	----	----	×	×	----	×	×	×	350–2,000	C	6	River sandbars, usually in willow thickets.
Onagraceae:	Evening-primrose family:														
Epilobium anagallidifolium Lam.	Pimpernel willow-herb	----	×	----	×	----	----	----	----	----	----	0–2,500	S	7	Bare damp silt of frost boils in niggerhead meadows.
angustifolium L.	Fireweed	----	----	×	----	×	×	----	×	×	×	350–4,500	S	7–8	Cutbanks, sandy lake shores and, alpine slopes of shale and sandstone.
latifolium L.	Sandbar fireweed	----	×	×	×	×	×	----	×	×	×	0–5,000	A	7	Moist open sandbars and dry slopes.
leptocarpum Hausskn.	----------	----	----	----	----	----	×	----	×	----	----	1,000–2,000	L	7	Wet soil around Shublik Springs in Canning River valley and Tulugak Springs in Anaktuvuk Pass.
palustre L.	Swamp willow-herb	----	----	----	----	×	×	----	×	----	×	350–2,500	S	7	Margins of wet meadows.
Halorrhagidaceae:	Mare's tail family:														
Hippuris tetraphylla L.	Mare's tail	×	----	H	----	----	----	----	----	----	----	----------	------	------	Habitat unknown, probably a lake margin.
vulgaris L.	Common mare's tail	H	×	×	×	×	×	----	×	×	H	0–3,000	C	7–8	Emergent aquatic of lake margins.
Umbelliferae:	Parsley family:														
Bupleurum americanum Coult. and Rose.	Through-wax	----	----	×	×	×	×	----	×	×	×	0–5,000	C	7	Rocky slopes and talus of sandstone, limestone, shale, conglomerate, and chert; also alluvial sands.
Conioselinium cnidiifolium (Turcz.) Pors.	Dawson hemlock-parsley.	----	----	×	×	×	×	----	×	×	×	350–2,500	S	7	Dry slopes, cutbanks, high parts of sandbars.
Pyrolaceae:	Wintergreen family:														
**Moneses uniflora* (L.) Gray	Waxflower	----	----	----	----	----	----	----	----	----	×	500	L	7	Mossy floor of white spruce forest on Noatak River terrace; and John River at Hunt Fork.

Pyrola grandiflora Radius	Large-flowered wintergreen.	×	×	H	×	×	×	----	×	×	×	0–4,000	C	7	Damp mossy meadows along river valleys.
secunda L. var. *obtusata* Turcz.	One-sided wintergreen	----	----	----	×	×	×	----	×	×	×	350–3,500	S	7	Do.
Ericaceae:	Heath family:														
Andromeda polifolia L.	Bog rosemary	----	×	×	×	×	×	----	×	×	×	0–3,500	C	7	Wet sedge meadows along river valleys.
Arctostaphylos alpina (L.) Spreng. ssp. *rubra* Hult.	Alpine bearberry	×	×	×	×	×	×	----	×	×	×	0–4,000	C	7	Dry alpine slopes, dry bevel along river terraces, sandbars, and crevices in sandstone and limestone.
uva-ursi (L.) Spreng.	Kinnikinnick	----	----	----	----	----	----	----	----	×	----	3,500	L	7	Grassy alpine meadow, northeast side of Canning River 69°20′ N.
Cassiope tetragona (L.) D. Don	Four-angled mountain heather.	×	×	×	×	×	×	×	×	×	×	0–5,000	A	6–7	Snow accumulation areas in depressions and on north-facing slopes; moist meadows; alpine crevices in sandstone, and limestone.
Chamaedaphne calyculata (L.) Moench	Leatherleaf	----	----	----	----	×	----	----	----	----	×	350	L	7	Wet sedge meadows along Colville River at Umiat.
Ledum palustre L. ssp. *decumbens* (Ait.) Hult.	Narrow-leaved labrador tea.	×	×	×	×	×	×	----	×	×	×	0–4,500	C	6–7	River-terrace meadows and brush-covered slopes.
Loiseleuria procumbens (L.) Desv.	Alpine azalea	----	×	----	----	×	×	----	×	×	----	500–3,500	S	7	Dry rocky alpine slopes and glacial moraine knolls.
Oxycoccus microcarpus Turcz.	Swamp cranberry	----	----	----	----	×	----	----	----	----	----	350	L	7	Sphagnum wet meadow at Umiat.
Rhododendron lapponicum (L.) Wahl.	Lapland rhododendron	×	×	----	×	×	×	----	×	×	×	0–4,000	C	6–7	Well-drained brush slopes.
Vaccinium uliginosum L.	Bog blueberry	×	×	×	×	×	×	----	×	×	×	0–5,000	A	6–7	Cutbanks, shrub meadows, wet sedge meadows, and rocky alpine slopes.
vitis-idaea L. ssp. *minus* Lodd.	Mountain cranberry	×	×	×	×	×	×	----	×	×	×	0–4,000	A	6–7	Moist niggerhead meadows, damp rocky slopes, and river-terrace meadows.
Diapensiaceae:	Diapensia family:														
Diapensia lapponica L. ssp. *obovata* (Schmidt) Hult.	Diapensia	----	----	----	×	×	----	----	×	----	×	500–3,500	S	7	Rocky alpine slopes and sandstone ridges.
Primulaceae:	Primrose family:														
Androsace chamaejasme Host. ssp. *lehmanniana* (Spreng.) Hult.		----	×	×	×	×	×	----	×	×	----	0–3,500	C	6–7	Dry barren slopes and rocky alpine meadows.
ochotensis Willd.	Pink androsace	----	----	----	×	×	×	----	----	×	×	1,000–4,500	C	6	Alpine rubble slopes of shale, sandstone, and conglomerate.
septentrionalis L.		----	----	×	×	×	×	----	----	----	×	350–2,500	S	6–7	Dry cutbanks and shale outcrops.
Dodecatheon frigidum C. and S.	Shooting star	----	×	×	×	×	×	----	×	×	----	1,000–3,000	C	6–7	Moist shady slopes along small alpine streams.
**Douglasia arctica* Hook.		----	----	H	----	----	----	----	----	----	----	----------	----	------	Habitat unknown; Arctic coast of Yukon Territory.
Primula borealis Duby	Northern primrose	H	----	×	----	----	----	----	----	----	----	0–25	L	7	Coastal sea cliffs and silty cutbanks near Barter Island.
egaliksensis Wormsk.	Greenland primrose	----	----	×	----	×	----	----	×	----	----	350–2,000	L	7	Silty stream margins in shade at Umiat; lakeshore sands in Anaktuvuk Pass.
tschuktschorum Kjellm.		----	----	----	H	----	----	----	----	----	----	----------	----	------	Habitat unknown, Cape Lisburne.
Plumbaginaceae:	Leadwork family:														
Armeria maritima (Mill.) Willd.	Sea pink	H	×	----	H	----	----	----	----	----	×	----------	L	7	Dry coastal meadows east of Point Barrow; Noatak River sandy terrace.
Gentianaceae:	Gentian family:														
Gentiana glauca Pall.	Glaucous gentian	×	----	----	×	×	----	----	----	×	----	0–4,000	S	7	Arctic and alpine silty erosion slopes and gullies.
propinqua Rich.	Four-parted gentian	----	----	×	×	×	×	----	×	×	×	350–3,500	C	7	Dry slopes and alluvial sands.
prostrata Haenke	Moss gentian	----	----	----	----	----	×	----	×	×	----	1,500–3,500	S	7	Dry alpine slopes and flood-plain sands; Anaktuvuk Pass eastward.
**Lomatogonium rotatum* (L.) Fries	Marsh felwort	----	----	----	----	----	----	----	----	----	----	2,000	L	7	Collected south of Anaktuvuk Pass at John River and Hunt Fork junction in grassy meadow.
Menyanthes trifoliata L.	Buckbean	----	----	×	----	×	----	----	----	----	×	350–1,500	L	7–8	Emergent aquatic in shallow pond margins around Umiat and Sagavanirktok River.
Polemoniaceae:	Phlox family:														
Phlox sibirica L.	Siberian phlox	----	----	×	×	×	×	----	×	×	----	300–4,000	C	6–7	Dry alpine slopes, cutbanks, and sandbars.
Polemonium acutiflorum Willd.	Jacob's ladder	×	×	×	×	×	×	----	×	×	×	0–4,500	C	7	Grassy meadows.
boreale Adams	Northern Jacob's ladder	----	----	×	×	×	×	×	×	×	----	0–4,000	C	6–7	Dry sandy slopes, cutbanks, and sandbars.
Boraginaceae:	Borage family:														
Eritrichium arctioides Cham.	Mountain forget-me-not	----	----	×	H	×	×	----	----	×	×	500–1,500	S	6	Dry hilltops, rubble slopes, and clay slopes.
chamissonis DC.		----	----	----	×	----	----	----	----	----	----	2,500	L	6	Dry hilltops and rubble slopes around Lake Noluk.
Mertensia maritima (L.) Gray	Sea lungwort	H	×	H	----	----	----	----	----	----	----	0–10	L	7–8	Coastal sandy beaches.
paniculata (Ait.) Don	Tall lungwort	----	----	H	----	----	----	----	----	----	×	----------	L	7	Floor of balsam poplar woods, Noatak River terrace.
Myosotis alpestris Schmidt ssp. *asiatica* Vesterg.	Forget-me-not	H	----	×	×	×	×	----	×	×	----	500–4,500	C	7	Seepage areas and along mountain streams.
Scrophulariaceae:	Figwort family:														
Castilleja hyperborea Pennell		----	----	----	×	×	----	----	×	----	----	500–3,000	S	7–8	Dry alpine meadows and rubble slopes.
pallida (L.) Spreng.	Pale paintbrush	----	----	----	----	----	----	----	----	----	----	----------	----	------	
ssp. *caudata* Pennell		----	----	----	----	×	×	----	×	×	×	} 0–3,000	C	7	Sandbars and dry rubble slopes.
ssp. *elegans* (Ostenf.) Pennell		H	×	H	H	×	×	----	----	×	----				
Lagotis glauca Gaertn. var. *stelleri* (C. and S.) Trautv.		----	H	×	×	×	×	----	×	×	----	1,000–4,000	C	6–7	Moist valley meadows, seepage areas, and moist rubble slopes.
Pedicularis capitata Adams	Few-flowered lousewort	×	×	×	×	×	×	----	×	×	×	0–4,000	C	6–7	Moist to dry meadows and flood plains.
labradorica Panzer	Labrador lousewort	----	----	----	×	×	×	----	×	×	----	350–3,500	C	7	Mossy slopes and river terraces.
lanata C. and S.	Woolly lousewort	H	×	H	×	×	×	----	×	×	----	0–4,500	C	6–7	Dry arctic and alpine meadows and hilltops and rubble slopes.
langsdorfii Fisch.	Arctic lousewort	×	×	×	×	×	×	----	×	×	----	0–3,500	C	6–7	Moist meadows and river terraces.
lapponicum L.	Lapland lousewort	----	×	----	×	×	×	----	×	----	----	350–2,500	S	7	Damp meadows.
oederi Vahl		----	----	----	----	×	----	----	×	----	----	2,000	L	7	Wet sedge meadows in Anaktuvuk Pass.
pennellii Hult.		----	----	×	----	×	----	----	×	----	×	350–2,000	L	7	Wet sedge meadows and wet soil; Umiat and Anaktuvuk Pass.
sudetica Willd.	Bog lousewort	H	×	×	×	×	×	----	×	×	×	0–3,500	C	7	Sedge bogs, commonly an emergent aquatic in 3–6 in. of water
verticillata L.	Verticillate-leaved lousewort.	----	×	×	H	×	×	----	----	×	×	0–2,000	C	7	Sandbars and river terraces; from Umiat eastward.
Lentibulariaceae:	Bladderwort family:														
Pinguicula villosa L.	Hairy butterwort	----	----	----	----	×	----	----	----	×	×	350–1,500	S	7	Silty soil at pond margins.
vulgaris L.	Common butterwort	----	----	----	----	×	×	----	×	----	×	1,000–2,000	S	7	Wet bare silty soil next to small lakes and wet sedge meadows.
Utricularia macrorhiza LeConte	Bladderwort	----	----	----	----	×	----	----	----	----	×	350	L	------	Submerged aquatic in about 3 ft of water in small oxbow lakes around Umiat.
Orobanchaceae:	Broomrape family:														
Boschniakia rossica (C. and S.) Fedtsch.	Poque	----	----	----	----	×	----	----	----	----	×	350	L	7	Parasitic on shallow roots of *Alnus crispa* and probably with same distribution (which see).
Plantaginaceae:	Plantain family:														
Plantago canescens Adams	Plantain	----	----	×	----	×	----	----	----	----	----	500	L	7	Gravel cutbanks; Umiat and Shaviovik River.

TABLE 2.—*Annotated list of plants growing on the Arctic Slope of Alaska*—Continued

Botanical name	Common name	Distribution (See fig. 4)										Elevation range (feet above sea level)	Abundance	Flowering period (ordinal numbers of months)	Habitat
		Arctic Slope									Noatak drainage				
		Coastal plain			Foothills			Mountains							
		West	Central	East	West	Central	East	West	Central	East					
Rubiaceae:	Madder family:														
Galium boreale L.	Northern bedstraw	----	----	×	----	×	----	----	----	----	×	300–500	L	7	Gravel flood plains and cutbanks; Umiat and Sagavanirktok River.
trifidum L.	Small bedstraw	----	----	----	----	×	----	----	----	----	----	350	L	7	Wet sedge meadow, Umiat.
Caprifoliaceae:	Honeysuckle family:														
Linnaea borealis L.	Twinflower	----	----	----	----	----	×	----	----	----	×	1,000	L	7	Habitat unknown; Shublik Springs in Canning River Valley.
Viburnum edule (Michx.) Raf.	Highbush cranberry	----	----	----	----	----	×	----	----	----	×	1,000	L	7	Wet rocky slopes around Shublik Springs; sandstone slope along Noatak River.
Valerianaceae:	Valerian family:														
Valeriana capitata Pall.	Capitate valerian	×	×	×	×	×	×	----	×	×	×	0–3,500	C	7	Moist to wet valley meadows.
Campanulaceae:	Bluebell family:														
Campanula lasiocarpa Cham.	Mountain hairbell	----	×	----	×	×	----	×	----	----	×	1,000–3,000	C	7–8	Moist slopes; Anaktuvuk River westward.
uniflora L.	Arctic hairbell	----	×	----	×	----	----	×	×	×	----	0–3,500	S	7	Dry rocky or sandy slopes and dry meadows.
Compositae:	Composite family:														
Achillea borealis Bong.	Northern Yarrow	----	×	×	----	×	×	----	----	----	----	350–1,500	S	7–8	Valley meadows; from Umiat eastward.
lanulosa Nutt.		----	----	----	----	×	----	----	----	----	----	350	L	----	Habitat unknown, Umiat.
Antennaria alaskana Malte		----	----	×	×	----	×	----	×	----	×	1,000–4,000	C	7	Rubble slopes and crevices in limestone, sandstone, and conglomerate.
angustata Greenm.		H	×	----	×	----	----	×	----	----	----	0–3,500	L	7	Dry slopes and shale outcrops around Noluck Lake.
compacta Malte		----	----	----	----	×	----	----	----	×	----	500–4,000	S	7	South-facing silty slopes of Red Hill at Umiat; rocky mountaintop at Lake Peters.
ekmaniana Pors.		----	----	----	----	×	----	----	×	----	----	500–3,000	S	7–8	Dry sandy slopes and alpine meadows.
isolepis Greene		----	----	----	----	×	----	----	----	----	----	350	L		Habitat unknown; Umiat.
philonipha Pars.		----	----	----	----	×	----	----	----	----	----	350	L	----	Do.
subcanescens Ostenf.		----	----	----	----	×	----	----	----	×	----	350–4,000	S	7	Dry rocky mountain slope at Lake Peters; Umiat.
Arnica alpina Olin. var. *augustifolia* Fern.	Arnica	----	×	×	----	×	----	----	×	×	×	350–3,500	C	7	Dry ridges and slopes, open willow woods along flood plains.
lessingii (T. and G.) Greene		----	----	----	×	×	×	----	×	×	----	350–3,500	C	7	Dry slopes, cutbanks, and flood plains.
louiseana Farr ssp. *frigida* (Mey.) Mag.		----	----	×	×	×	×	----	×	×	×	0–3,500	C	7–8	Rubble slopes, dry alpine meadows, flood-plain sands.
Artemisia alaskana Rydb.	Wormwood	----	----	----	----	×	----	----	----	----	----	350	L	7–8	Sandbars along Colville River at Umiat.
arctica Less.		----	----	----	×	H	----	----	----	×	----	0–4,000	C	7	Sandy cutbanks, sandbars, moist meadows.
ssp. *comata* (Rydb.) Hult.		×	×	×	×	×	×	×	×	×	----				
borealis Pallas		----	×	----	×	×	×	----	----	----	×	50–2,500	S	7	Sandbars and sand dunes.
frigida Willd.		----	----	----	----	----	×	----	----	----	----	1,500–2,000	L	8	Shale and outcrop-cutbanks along Sadlerochit River.
globularia Cham.		----	----	----	×	----	----	----	×	----	----	2,000–3,500	L	7–8	Crevices in sandstone and limestone, dry alpine meadows, and alluvial fans; Noluck Lake to Anaktuvuk Pass.
glomerata Ledeb.		H	----	----	×	----	×	----	×	×	----	1,500–5,000	C	7–8	Alpine rocky slopes, alluvial fans, and dry alpine meadows.
tilesii Ledeb.		×	----	H	×	×	×	----	×	×	×	0–4,000	C	7	Cutbanks, sandbars, sand dunes, and alpine rubble slopes of sandstone, shale, chert, and conglomerate.
Aster sibiricus L.	Siberian aster	----	×	×	×	×	×	----	×	×	×	0–3,500	C	7–8	Alluvial sands, cutbanks, dry slopes.
Chrysanthemum arcticum L. ssp. *polaris* Hult.		H	----	H	H	----	----	----	----	----	----	----------	----	------	Habitat unknown; coastal.
huronense (Nutt.) Hult.	Lake Huron tansy	----	×	----	----	----	----	----	----	----	----	50	L	7–8	Flood-plain sands, Ikpikpuk River delta. Also known from lower Colville River.
integrifolium Rich.		×	×	×	×	----	×	----	×	×	----	0–3,000	C	7–8	Coastal dry ridges and dry alpine meadows.
Crepis nana Rich.		----	----	×	×	×	×	----	×	×	×	350–5,000	C	6–7	Shale outcrops and dry sandy flood plains.
Erigeron eriocephalus J. Vahl	Arctic erigeron	H	×	×	×	×	×	----	×	×	----	0–3,500	C	7	Dry meadows, cutbanks, and sandbars.
grandiflorus Hook.		----	----	H	×	----	----	----	----	×	----	1,000–2,500	L	7	Canning River, Noluck Lake south-facing rubble slope.
humilis Grah.		×	----	×	×	×	×	----	×	×	×	0–3,500	C	7–8	Sandbars, cutbanks, and dry meadows.
hyperboreus Greene		----	----	----	×	----	----	----	----	----	----	2,500	L	6–7	Dry rubble slopes, Noluck Lake.
muirii Gray		----	----	----	----	×	----	----	×	----	----	2,000–3,500	L	7	Dry limestone alluvial fans and rubble slopes.
purpuratus Greene		----	----	----	×	×	----	----	----	----	×	350–2,500	S	7–8	Sandbars.
**yukonensis* Rydb.		----	----	----	----	----	----	----	----	----	×	----------	----	------	
Matricaria ambigua (Ledeb.) Kryl.	Arctic camomile	----	H	×	H	----	----	----	----	----	----	10	L	8	Moist meadow at Anderson Point in Camden Bay.
Petasites frigidus (L.) Fries	Arctic bog rhubarb	×	×	×	×	×	×	----	×	×	×	0–3,500	A	6–7	Poorly drained lowlands, wet sedge meadows, seepage areas, and along tundra streams.
hyperboreus Rydb.		----	----	----	----	H	----	----	----	----	----	----------	----	------	Habitat unknown, probably wet, Umiat.
Saussurea angustifolia DC.		×	×	×	×	×	×	----	×	×	×	0–3,500	C	7–8	Moist meadows and river terraces.
viscida Hult. var. *yukonensis* (Pors.) Hult.		----	H	H	----	----	----	×	----	----	----	4,000	L	7	Sandstone crevices; Thunder Mountain.

Senecio alaskanus Hult.				X			X			X		0–3,500	L	7–8	Moist meadows; Canning River eastward.
atropurpureus (Ledeb.) Fedtsch. ssp. *frigidus* (Rich.) Hult.	Arctic senecio		X	X	X	X	X		X	X	X	0–3,500	C	7	Moist meadows and flood plains.
var. *tomentosus* (Kjellm.) Hult.					X	X		X	X	X		1,000–3,500	C	7	Damp rocky alpine meadows and rubble slopes.
congestus (R. Br.) DC.	Marsh fleabane	X	X	H		X					X	0–1,000	L	7–8	Sandbars and wet meadows; weed on disturbed soil at Umiat airstrip.
fuscatus (Jord. & Fourr.) Hayek				H	X				X			1,500–2,500	L	7	Dry meadows; Noluck Lake and Anaktuvuk Pass.
hyperborealis Greenm.						X	X					350–1,200	L	7	Cutbanks; Umiat and Canning River.
lugens Rich.		H	X	X	X	X	X		X	X	X	0–3,500	C	7–8	Cutbanks, sandbars, and open willow woods along major streams.
resedifolius Less.				X	X	X	X		X	X		0–3,500	C	7–8	Moist meadows and cutbanks.
Solidago multiradiata Ait.	Northern goldenrod			X		X	X		X	X	X	300–3,000	C	7–8	Cutbanks, flood plains, and open willow woods.
Taraxacum alaskanum Rydb.	Dandelion		X			X			X	X		0–3,000	S	7	Silty seacliffs southwest of Barrow; silty dry slopes inland.
eurylepium Dahlst.				H			X					2,500	L	7	Flood plain, Sadlerochit River.
festivum Hagl.			X											7	Habitat unknown; Point Barrow.
hyperarcticum Dahlst.					X							2,500	L	7	Dry hilltop rubble; Noluck Lake.
lacerum Greene			X			X	X		X			0–3,000	C	7	Sandy flood plains and sandstone outcrops.
lateritium Dahlst.		H	H		X	X						350–2,500	S	7	Dry ridges and rubble slopes.
maurolepium Hagl.						X			X	X		350–3,500	S	7	Flood-plain sands.
phymatocarpum Vahl					X							2,500	L	7	Dry rubble slopes; Noluck Lake.

Plants collected by the writer were distributed as follows: The first set is deposited at the herbarium of the University of Minnesota; sample sets of duplicates were sent to the U. S. National Herbarium, Washington, D. C.; the National Herbarium of Canada, Ottawa; the National Museum of Sweden, Stockholm; Iowa State College, Ames; and the University of Alaska, Fairbanks.

Botanical names, in general, follow Hultén's flora (1941–50). Several botanists assisted in determining plant species of the following groups:

Botanist	*Determination*
J. P. Anderson	General determinations
C. R. Ball	*Salix*
L. Benson	*Ranunculus*
W. H. Drury	*Smelowskia*
G. Haglund	*Taraxacum*
C. L. Hitchcock	*Draba*
E. Hultén	General determinations
A. E. Porsild	*Antennaria*
C. O. Rosendahl	*Chrysosplenium*
J. R. Swallen	Some grasses

Common names, in general, follow Anderson's flora (1943–52). Final selection of all names, botanical and common, was made by the writer.

As of 1951 there were known to be 439 species (table 2), representing 154 genera, and 53 families, of higher plants on the Arctic Slope. The largest families are—

Families	*Genera*	*Species*
Composites	14	51
Sedges	4	49
Grasses	16	41
Mustards	15	31
Pinks	11	28
Willows	2	27
Buttercups	6	24
Saxifrages	4	24
Roses	6	20
Peas	5	20

The largest genera are—

Genera	*Species*	*Genera*	*Species*
Carex	38	*Draba*	12
Salix	26	*Oxytropis*	11
Saxifraga	18	*Poa*	11
Potentilla	12	*Pedicularis*	9

The "Distribution" column in table 2 is designed to compare the kind and number of species within each of the three physiographic provinces, and from west to east. The distribution list of the Noatak drainage basin was added merely because scattered collections were made from this relatively unknown area.

The coastal plain contains 284 species, the foothills 390, and the mountains 316. Thus, the foothills have the richest flora, for two principal reasons: first, the foothills climate is warmer and better suited for plant growth than the other two provinces, and second, within the foothills there are local habitats similar to most of those found in both the coastal plain and the mountains.

In the western part of the Arctic Slope there are 288 species, in the central part 382, and in the eastern part 356. The western part is relatively poor in species, partly because of its limited mountain environment. The central part is richest, as it contains a considerable overlap of species from east and west and also from the south, for species seem to have migrated north through low passes, such as Anaktuvuk. It also contains the Colville River valley with its highly developed flora. The eastern part is relatively rich because of its well-developed mountain flora.

As shown on the table, elevation range includes the known range of all species. Abundance is relative in terms of "abundant," "common," "scarce," or "local" for each species as it occurs on the Arctic Slope.

The flowering period is described in terms of numbered months. The growing season for most plants on the Arctic Slope is from mid-June to mid-August, although several kinds of plants are actively growing a few weeks before or after this period in favorable locations. The growing season is shortened locally where the climate is more severe, as along the coast cooled by the Arctic Ocean, in places where snow persists late into summer, and high in the mountains. Mild freezing during the growing season has little visible effect on the plants, but occasional severe frosts in midsummer cause injury to many kinds of flowering plants. In August 1948 the effects of mild frost, severe frost, and snow cover on plants were observed at about 1,000 feet elevation along the Sadlerochit River. During the middle of the month, snow accumulated to a depth of 6 inches, accompanied by temperatures a few degrees below freezing. The snow persisted on tundra-covered lowlands but soon melted on sandbars and rocky slopes. This mild freezing had no noticeable effect on lichens, grasses, and the leaves of woody plants. Snow protected dense low vegetation, but on snow-free sandbars and outcrops there was frost wilting of flowers and leaves of plants, such as epilobium, artemisia, aconitum, saxifrage, and ferns. Plants in bud or gone to seed showed less frost damage than plants in full bloom. Later in the month the temperature dropped to 14°F on a clear cold night. The snow continued to protect much of the dense low vegetation, and in wet places the water protected emergent aquatic plants from freezing. However, practically all herbs on sandbars were killed or severely wilted, and even the young leaves of willows were wilted.

Habitat includes the various kinds of places where the plants have been found growing.

TABLE 3.—*Important and conspicuous lower plants on the Arctic Slope*

Botanical name	*Common name*	*Habitat*
Algae:		
Nostoc sp		Green gelatinous layer over small tundra pools.
Fungi:		
Lycoperdon sp	Puffball	Moist meadows; erosion slopes.
Russula sp		Alpine meadows.
Lichens:		
Alectoria bicolor	Pale-tipped main lichen	Rocky hilltops; dry meadows.
nigricans	Black main lichen	Do.
ochroleuca	Yellow main lichen	Do.
Cetraria cucullata	Curled lichen	Tundra meadows.
islandica	Iceland moss	Do.
juniperina	Yellow cedar lichen	Rocky hills; bark.
nivalis	Snow lichen	Moist alpine slopes.
richardsonii	Brown shield lichen	Do.
Cladonia amaurocraea	Quill lichen	Moist slopes.
coccifera	Cup lichen	Do.
fimbriata	Trumpet lichen	Do.
gracilis	Spoon lichen	Alpine meadows.
rangiferina	Reindeer lichen	Do.
sylvatica	Woodland reindeer lichen	Alpine slopes.
Dactylina arctica	Brown finger lichen	Tundra meadows.
Haematomma sp	Blood lichen	Sandstone talus.
Lobaria linita	Lung lichen	Tundra slopes.
Nephroma arcticum	Arctic kidney lichen	Do.
Parmelia spp	Boulder shield lichen	Rocky slopes.
Peltigera aphthosa	Spotted leather lichen	Do.
canina	Dog lichen	River terraces.
Physcia spp	Blister lichen	Rocky slopes.
Solorina spp	Dimpled lichen	Moist soil.
Sphaerophorus globosus	Coral lichen	Tundra meadows.
Stereocaulon tomentosum	Brittle lichen	Sandbars, dry meadows.
Teloschistes spp	Orange lichen	Bird perch rocks.
Thamnolia vermicularis	Worm lichen	Alpine meadows.
Umbilicaria spp	Rock tripe	Rocky slopes; mountain tops.
Liverworts:		
Marchantia polymorpha		Wet bare soil.
Mosses:		
Aulacomnium spp		Tundra meadows.
Bryum spp		Do.
Ceratodon purpureus	Red-stemmed moss	Moist sandy soil.
Climacium spp	Tree moss	Moist meadows.
Dicranum spp	Windblown moss	Do.
Drepanocladus spp	Sickle-branch moss	Do.
Hylocomium splendens		Do.
Hypnum spp	Christmastree moss	Do.
Mnium spp	Oval-leaved moss	Moist stream valleys.
Polytrichium juniperinum	Hair-cap moss	Tundra meadows.
Rhacomitrium lanuginosum	Rock moss	Dry rocky slopes.
Sphagnum spp	Chinking moss	Very acid bogs.

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