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The Keys Project in Northern Alaska, 1951–53

INTRODUCTION

In the years following World War II, the U.S. Government was concerned with the paucity of information available about terrain features surrounding the Arctic Basin. To provide a better understanding of polar conditions, the U.S. Air Force authorized the Physical Research Laboratories, Boston University, to conduct a three-year study. The study, known as the Keys Project, was funded by the Wright Air Development Center, Wright Patterson Air Force Base, Ohio. Its objective was to identify various terrain conditions on the North Slope of Alaska and correlate these features with multi-spectral, aerial photographic mosaics. It was hoped that the annotated mosaics could then be used not only to identify terrain conditions in northern Alaska, but also to evaluate tundra conditions in similar Arctic regions.

The project director was F.C. Erickson, who also served as the chairman of the Geography Department at Boston University. Project headquarters were at Umiat, Alaska (69°23′ N, 152°10′ W; Fig. 1). Umiat, located on a gravel terrace along the Colville River, had served as a base of operations for assessing oil, gas, and oil-shale potentials in Naval Petroleum Reserve No. 4 (Reed, 1958). The base consisted of a gravel airstrip with the capacity to handle larger aircraft, a small radio tower–weather station, diesel-powered electrical generators, a cluster of deteriorating Quonset huts, and a vacated repair shop. Umiat had no running water, and potable water had to be trucked in from the nearby Colville River. The Colville, the largest river in northern Alaska, could accommodate float planes at Umiat and elsewhere, and broad gravel bars and terraces served as landing strips for wheeled aircraft.

The project was classified at that time, so very little public information is available. Since this project provided an important step for many subsequent bioenvironmental research projects on the North Slope, it is important to document this particular period of early field observations. The following account of the Keys Project is based on recollections and personal notes of the author, who joined the project in 1953.

THE 1951–52 FIELD SEASONS

F.C. Erickson was in charge of the 1951 fieldwork, with C.M. Matthews as assistant director. Apparently few, if any, of the personnel had previous Arctic experience. Preliminary field investigations were confined to the Umiat area. No records have been found as to names of investigators other than those mentioned above, nor have I been able to find any other records of that first field season.

Before the 1952 field season, there were discussions with United States Geological Survey (USGS) personnel in Washington about where the most important sites for the field investigations should be located. A south-north transect across the North Slope of Alaska was suggested. It was decided to work mainly along the Kurupa River drainage basin from Kurupa Lakes northward to Umiat (Fig. 1). Camping gear included A-frame tents (Fig. 2), Coleman stoves, and canvas-covered Kalamazoo boats. Food supplies and related items were flown in and cached during the winter months. Some food stores were sealed in 55-gallon drums, but barren-ground grizzly bears ripped open some inadequately secured drums and destroyed much of the contents. Several weasels (tracked vehicles) were also driven to the campsite from Umiat. The first field camp (Cache I) was established just north of Kurupa Lakes. The Air Force provided an aircraft (L-20) for resupply and mail drop. A helicopter was initially assigned to the camp to ferry personnel to and from sites of the field studies, but mechanical breakdowns were encountered and helicopter support was withdrawn. A portable drill rig was also flown in for soil coring, but broken parts rendered the equipment largely inoperable.

Investigators and support personnel assembled at Cache I consisted of F.A. Hearn, engineer; D. Duncan, engineer; C. Eastman, pedologist; F.C. Erickson, director; R.S. Fellows, geologist; R. Feuer, pedologist; D. Frazier, engineer; J. Frey, mechanic; J.F. Gamble, pedologist; A.J. Gogan, cook; A. Hodgden, botanist; M.J. Hvorslev, engineer; H. Lawrence, engineer; C.H. Matthews, assistant director; J. Maxwell, geologist; D. Patterson, geologist; R. Reidman, botanist; W.C. Steere, botanist; and L. Warner, geologist (on leave from the USGS).

Following studies at Cache I, a second campsite (Cache II) was established about 14 miles farther downstream along the Kurupa River. Later, a few of the investigators moved still further downstream along the Kurupa River (15 miles by Kalamazoo boats) and set up a new campsite (Cache III). During the 1952 field season, an accidental brush fire located immediately north of Cache I burned four acres.

THE 1953 FIELD SEASON

Except for veterans F.C. Erickson and several of his assistants, nearly all of the 1953 personnel, including the author, joined the project for the first time.

In early 1953, J.E. Cantlon, botanist at George Washington University, joined the project as senior ecologist and consulted with the USGS personnel in Washington, D.C. to gain further knowledge about operating in northern Alaska. He received good advice on aspects of fieldwork in polar regions such as selecting areas of study, the size of field parties, methods of travel, locating campsites, and other general field information. The USGS again

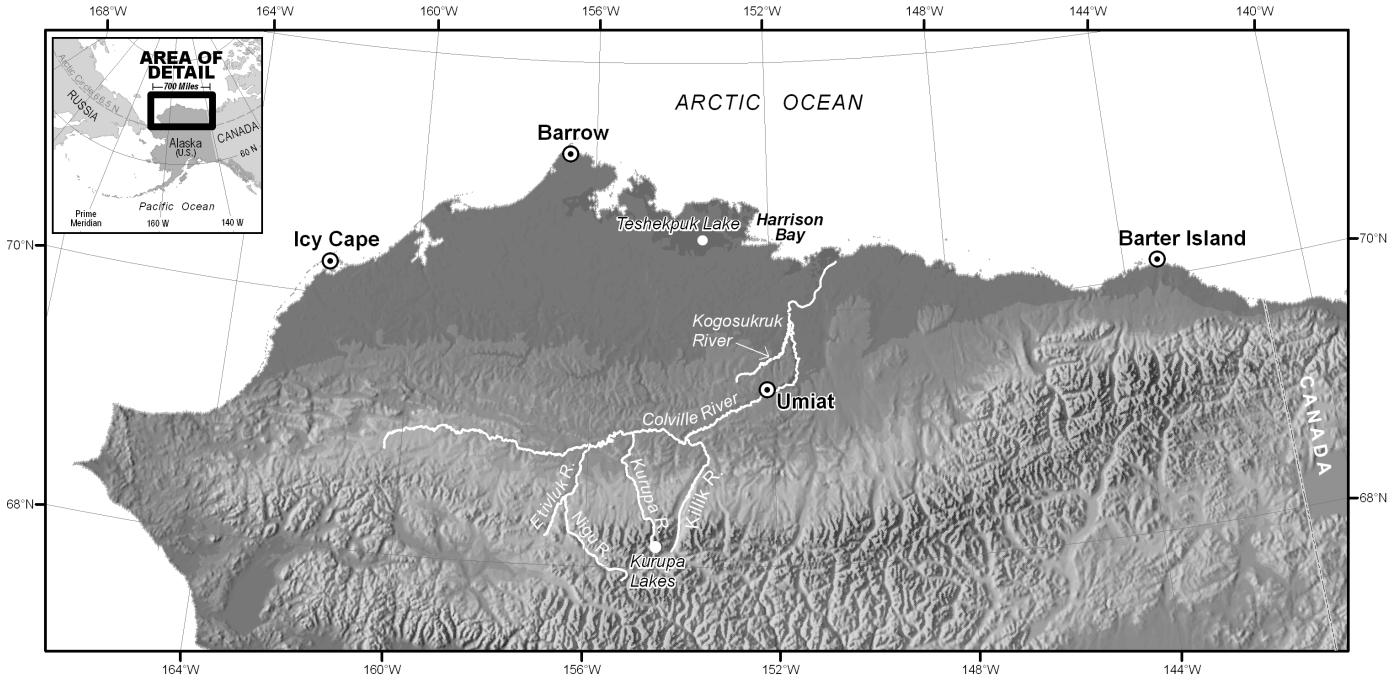

FIG. 1. Map of northern Alaska showing locations of major field sites.

FIG. 2. Cache I camp area in 1952, showing kitchen and mess tents. Note "flys" on tents. (Photograph courtesy of J.F. Gamble)

suggested establishing a transect from the northern edge of the Brooks Range northward to the Arctic Ocean. Such a transect would provide a good cross section of various soils, permafrost conditions, geology, plant ecology, and climate. The field party departed from the Westover Air Station by military aircraft in early June and flew directly to the west coast. The party continued by air to Umiat, Alaska, where headquarters were established for the field season. Personnel consisted of A.N. Altieri, cook; L.C. Bliss, ecologist; F.H. Bormann, ecologist; D.E. Butler, Jr., assistant; J.E. Cantlon, ecologist; F.C. Erickson, director; R.E. Fadum, engineer; A.J. Gogan, cook; L.D. Hawley, geologist; D.E. Hill, pedologist; C.M. Matthews, assistant director; J. Maxwell, geologist; C.R. McCullough, engineer; J.W. Merrick, geologist; P. Morrow, geologist; A.L. Rebuck, ecologist; S.R. Stearns, engineer; P.B. Swensen, photographer and J.C.F. Tedrow, pedologist, as well as several military personnel who served as weasel drivers and mechanics (Fig. 3).

After settling down in a Butler building, a three-room structure measuring 20 × 60 feet, all hands worked at storing supplies and getting equipment ready for the field camps. Four or more weasels were available at Umiat, left there from previous seasons (Fig. 4). A weasel is a tracked overland vehicle about the size of a small automobile with caterpillar treads and a friction steering system. The weasels were supposed to float in deep water, but our heavy loads made such an undertaking inadvisable for safety reasons. A number of Kalamazoo boats left over from the 1952 season were repaired and made ready for river travel.

During the latter part of June, the first reconnaissance studies were made in the Umiat area along the north side (left upper terrace) of the Colville River and on the piedmont above the river valley (a. k. a. Cache X).

In early July, a field party consisting of Butler, Cantlon, Hawley, Matthews, McCullough, Tedrow, and two U.S. Army weasel drivers was ferried across the Colville River at Umiat in an LCT (landing craft tank). The weasel party then proceeded SSW approximately ten miles to the Umiat Lakes area (69°16′ N, 152°25′ W). The investigators observed bedrock, surficial geology, engineering properties of soils, pedological characteristics of soils including thaw depth, and plant cover as far south to the Kutchik River (68°30′ N, 154°05′ W). Particular attention was given to the physical features of the landscape. Good aerial photographs of the study areas were available and were used to locate sampling sites. Photographs were 9 × 9 inch stereo pairs, and for a few locations, they were in color. The

FIG. 3. Photograph of the Keys field party at Umiat, August 1953. Front row (left to right): Bliss, Fellows, Reid, Jones (USAF), Tedrow, Hill, Bormann, and Butler. Back row (left to right): Merric, Hawley, McCullough, Cantlon, Morrow, Matthews, Rebuck, Emerson (USAF), Erickson, Hausman (USAF), Maxwell, Swenson, and Stearns. (Members not shown: Fadum, Grogan, Altieri, and pilots C. Hayes and E. Hallett)

deeply frozen loess deposits over the area gave a "softness" to the landscape.

Following investigations in the Umiat Lakes area, the field party moved by weasel westward across the Killik River to the Kurupa River drainage basin and studied terrain features at the Cache I, II, and III sites established in 1952. The transect crossed several geologic formations, most of which were mantled with till. The field party next moved westward to the Nigu Bluffs area (68°30′N, 156°22′W), where there is a prominent gabbro intrusion (Fig. 1).

Early in July, a second field party was assembled at Umiat to conduct studies along the northern reaches of the Colville River. Some members of the party first proceeded downstream from Umiat by Kalamazoo boats, others traveled overland by weasels, and still others traveled by air. The party set up camp along the Colville Bluffs near where the Kogosukruk joins the Colville River (69°48′N, 15°57′W). Members were Altieri, Bliss, Bormann, Cantlon, Erickson, Fadum, Fellows, Hawley, Hill, Morrow, McCullough, Rebuck, Reid, Stearns, Tedrow, and military support personnel. A transect encompassing geology, soils, thaw depth, and plant ecology was made from the lower reaches of the Kogosukruk River overland to the Colville Bluffs. After five to seven days at the Colville Bluffs, the party divided. Altieri, Bormann, Hill, Stearns, and others moved northward to investigate the flat, poorly drained Gubik sands near Harrison Bay (70°05′N, 151°35′W). The other members (Cantlon, Hawley, McCullough, and Tedrow) formed a reconnaissance team and traveled by aircraft to make observations at other locations throughout the North Slope of Alaska. Brief stops were made at Barrow, Barter Island, Icy Cape, and numerous other locations.

Those of us engaged in pedological studies found digging soil pits in frozen soil and permafrost a new experience. Not only was it nearly impossible to excavate soil by hand, but each blow showered the digger with frozen soil, ice chips, and meltwater. As hand digging progressed below the seasonally thawed soil (active layer), the wall of the pit thawed and began to accumulate a film of water, thus obliterating structural details. In order to develop a better method of excavating frozen soil pits, we tried a small, gasoline-driven portable jackhammer. The jackhammer had some potential for excavating soil pits, but there were also a number of mechanical problems in keeping the equipment functioning. A few soil cores were also collected by driving a pipe into the frozen soil.

The most successful method of excavating pits in the frozen soils was to use explosives. Mud-capping the charge was a slow, ineffective process of soil sampling because each charge generally would fracture the frozen soil only to a depth of a few inches. A modified technique was then

FIG. 4. The "weasel," the main mode of ground transportation, shown moving to a new campsite along the gravelly floodplain of the Kurupa River. (Photograph courtesy of J.F. Gamble)

used. An iron pipe with a sharpened end, one inch in diameter and some 30 inches long, was driven into the soil using a sledgehammer. The pipe was then twisted out of the soil with Stilson wrenches. A springer charge was then inserted into the newly excavated hole and detonated. This method was effective in enlarging the hole. A 3–5 pound charge of C-4 explosives with blasting caps was inserted into the hole and detonated. This method fractured the frozen soil to a depth of 3+ feet. The blocks of frozen soil could then be easily removed with a shovel and one face cleaned for describing soil and permafrost characteristics.

Field activities were largely terminated during early September 1953. Butler, however, went to Barrow to conduct meteorological and snow observations for several months. Matthews and Merrick also went to Barrow to make observations for an extended period (Reed and Ronhovde, 1971:264–265).

Field personnel returned to Boston University in early September. Erickson continued as director along with Matthews. Cantlon worked full time on the project until August 1954, and Tedrow worked part time on the project. Geologists L.D. Leet (Harvard University) and P.E. Wolfe (Rutgers University) were retained to advise on report preparation.

Reports were written by Cantlon (1961) on plant ecology, by Tedrow and Hill (1954a) on pedology, and by Matthews on water supply. It is unknown whether other reports were also written. D.E. Hill later completed his Ph.D. thesis (1957) concerning pedology of the numerous sites. Several soils papers were published in journals (Tedrow and Hill, 1954b; Tedrow et al., 1958; Hill and Tedrow, 1961). A paper was also published on river vegetation zonation (Bliss and Cantlon, 1957).

A final classified report was prepared for the Air Force sponsors by Cantlon and Matthews, but its present location and accessibility have not been determined. Supporting annotated multi-spectral aerial photographs, ground photographs, and sampling data were last seen by the authors at the Physical Research Laboratories, Boston University, and their final disposition is unknown.

POSTSCRIPT

In the years following the 1953 field season, the Office of Naval Research, through the Arctic Institute of North America, funded Tedrow and Cantlon to continue the soil and plant ecological investigations begun under the Keys Project. Those projects were operated from the Naval Arctic Research Laboratory in Barrow, Alaska (see Cantlon, 1961; Reed and Ronhovde, 1971).

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