

Introduction

U.S. Geological Survey personnel, in conjunction with Mark Weber, Geologic Consultant to Missoula and Powell Counties, are studying the water and earth resources of an area that extends from the Big Fork quadrangle on the north to the Avon quadrangle on the south (see index map). This map represents a product of that study, and is intended for the use of environmental and land-use planners. Maps of quadrangles, or parts of quadrangles, south of Highway 200, have been prepared by Weber.

The distribution of the alluvium was plotted in the office from aerial photographs. The areal distribution of all other geologic units was determined in the field.

Surficial deposits

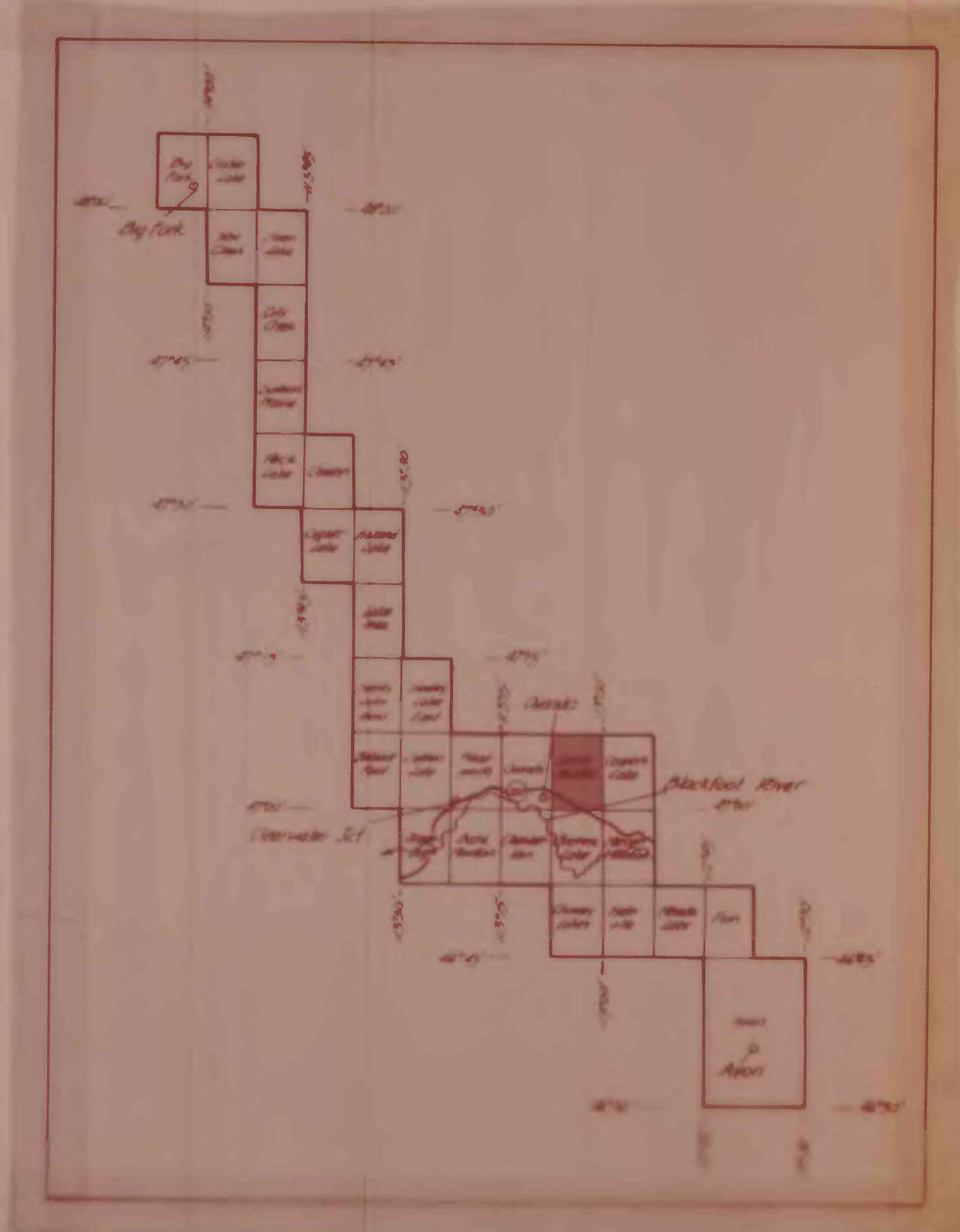
Surficial deposits in the northern part of the Big Fork-Avon area were formed primarily during the latter stages of the last ice age--the Pinedale glaciation of the Pleistocene. Glacial deposits mantle the lower flanks of the mountains and form the valley floors; they have been dissected somewhat by streams, but most still appear much as when they were formed. For ease of discussion, and to avoid the complexities of glacial nomenclature, these deposits have been grouped into two categories, older and younger. The "older" deposits were likely formed during early or middle Pinedale time, and the "younger" deposits during late Pinedale time. In some localities, deposits of more than one ice advance may have been included in one or the other category.

No "older" deposits are in this quadrangle; all glacial deposits mapped were formed during the younger glaciation. These "younger" deposits are identified on the map by the letter "y" added to the symbol: thus "Qey" is "outwash of younger glaciation."

DESCRIPTION OF MAP UNITS

- Qa1 ALLUVIUM (HOLOCENE)**--Stream-deposited, unconsolidated silt, sand, and gravel. Forms the floor of the North Fork Blackfoot River. Locally includes small deposits of colluvium and other mass-wasting debris. Overlies and masks outwash sand and gravel deposited by meltwaters of waning ice.
- Qcf COALESCED ALLUVIAL FANS (HOLOCENE AND PLEISTOCENE)**--Broad, fan-shaped, gently sloping, even-surfaced deposit consisting of several coalesced alluvial fans. Consists of poorly sorted angular to subangular fragments of argillite, siltite, sandstone, and limestone derived from bedrock exposed in mountains to the north.
- Qe EARTHFLOW(?) (HOLOCENE AND PLEISTOCENE)**--Small, even-surfaced fan-shaped deposit composed of poorly sorted, partly consolidated silt, sand, and gravel.
- PINEDALE GLACIATION (PLEISTOCENE)**
 - Qey Outwash of younger glaciation**--Outwash in the southeast corner of the quadrangle is part of the broad, even-surfaced Klein Schmidt Flat. In general, the outwash is light gray, unconsolidated, and consists of well-sorted and well-sorted silt, sand, gravel, and cobbles with a few interspersed small boulders, 25-26 cm (10-14 in.) in diameter. The clasts range in shape from subangular to well rounded; most are well rounded. About 79 percent of the unit is composed of clasts that range in size from about 5 mm to about 76 mm (1/4-3 in.) in diameter; about 20 percent consists of a fine to coarse sand with included small pebbles as large as 5 mm; and the remaining 1 percent is fine silt and clay. About 60 percent of the clasts in the outwash are green and gray argillite; about 20 percent are sandstone; and about 20 percent are purple argillite. Gray diorite fragments are common. The outwash was deposited by meltwaters that flowed southward in the valleys of the North Fork Blackfoot River and McDermott Creek (east of this quadrangle) from a waning piedmont glacier. Outwash in the center and along the west edge of the quadrangle forms pitted outwash plains composed of brown, unconsolidated, silt, sand, and gravel. The material is moderately well bedded and well-sorted. Clasts range in shape from angular to rounded; most are subrounded. In general, about 63 percent of the unit is composed of clasts that range in size from about 5 mm to about 76 mm (1/4-3 in.); about 30 percent consists of a fine to coarse sand with included small pebbles as large as 5 mm; and the remaining 5 percent is fine silt and clay. These deposits were formed when southwest-flowing meltwaters in McCabe Creek were diverted south and southeastward by younger ice which then occupied Hunter Valley (west of this quadrangle).
 - Qey Till of younger glaciation**--Characterized by a striking knob-and-kettle topography, and by many small kettle lakes and swamps. Consists of a heterogeneous, partly consolidated, unsorted mixture of gravel, cobbles, and boulders in a light- to dark-brown, sandy to clayey matrix. Clasts range in shape from angular to rounded; most are subrounded. Sizes range from 0.3-11 cm (1/8-12 in.); a few subrounded boulders 0.3-1 m (2-3 ft) in diameter are scattered throughout the till. About 30 percent of the clasts in the till are tan sandstone; about 30 percent are green and gray argillite; and about 20 percent are purple argillite.

- CONTACT**--Approximately located or inferred. In many places wholly or partly concealed by debris or dense foliage.
- FAULT**--Dashed where approximately located or inferred; dotted where concealed. U, upthrown side; D, downthrown side.
- EMBANKMENT(S)**--Delineated by hachures and probably form the margin(s) of a meltwater channel.



Index map showing quadrangles in the Big Fork-Avon area. The Ovando Mountain quadrangle is shaded. Preliminary surficial geologic maps of the following quadrangles, by I. J. Witkind, are available as U.S. Geological Survey Open-File Reports from the following offices:

Denver Public Inquiries Office
U.S. Geological Survey
1012, Federal Building
1961 Stout Street, Denver, CO 80202

Salt Lake City Public Inquiries Office
U.S. Geological Survey
8105, Federal Office Building
125 South State Street
Salt Lake City, UT 84111

Spokane Public Inquiries Office
U.S. Geological Survey
678, U.S. Courthouse Building
West 920 Riverside Avenue
Spokane, WA 99201

1. Coopers Lake 77-466
2. Cynnet Lake 77-198
3. Holland Lake (W. half) 77-199
4. Lake Inez 77-200
5. Ovando (N. half) 77-196
6. Ovando Mountain 77-463
7. Salmon Lake 77-197
8. Sealey Lake East 77-202
9. Sealey Lake West 77-201
10. Woodworth 77-203

Base from U.S. Geological Survey, 1968

Geology mapped in 1976. Fault from M. E. Hodge, U.S. Geological Survey, unpub. data

PRELIMINARY MAP SHOWING SURFICIAL DEPOSITS IN THE SOUTH HALF OF THE OVANDO MOUNTAIN QUADRANGLE, POWELL COUNTY, MONTANA

By
Irving J. Witkind
1977

U.S. Geological Survey
OPEN FILE REPORT
This map is preliminary and has not been edited or reviewed for conformity with Geological Survey standards or nomenclature.