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DEPARTMENT OF MINES AND RESOURCES
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GEOLOGICAL SURVEY OF CANADA

Paper 48-25

Preliminary Map

McQUESTEN

YUKON TERRITORY

(Descriptive Notes)

By
H. S. Bostock

OTTAWA

1948

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DESCRIPTIVE NOTES

TOPOGRAPHY

McQuesten map-area lies in the Yukon Plateau, a region characterized by uplands exhibiting an accordance of summit levels and evenness of skyline surmounted here and there by isolated mountains and ranges. These upland areas are separated by a net of main valleys entrenched 1,500 feet or more below their surface.

Tintina Valley, the main feature of the area, forms a great, broad, tapering groove crossing the area diagonally from northwest to southeast. The valley is floored by broad terraces of drift in which Stewart and McQuesten Rivers and the larger creeks have entrenched their courses, exposing outcrops in places along the bases of their cutbanks.

Northeast and southwest of this valley, respectively, lie the Stewart and Klondike Plateaux, subdivisions of the Yukon Plateau. The general elevation of the upland surface of the Klondike Plateau is around 3,500 feet, but much of it is below that level. It is an area of rolling timbered hills surrounding broad hollows through which the creeks flow in open valleys fringed by terraces of drift. The rocky humps of White Mountains form a landmark visible from all directions. Much of the plateau is drift covered, and outcrops are mainly on steep, south-facing slopes and on the tops of ridges.

Stewart Plateau rises steeply along the northeast side of Tintina Valley. South of McQuesten River it is cut into individual upland areas or plateaux by the net of wide, drift-filled valleys. Outcrops are scarce except in the vicinity of Ethel Lake, northwest of Minto Lake, and on the summits and steep faces of the uplands.

North of McQuesten River, Stewart Plateau is characterized by long ridges separated by deep, narrow, branching valleys with steep sides and headwalls. The general level of its surface is around 4,000 feet, but the high mountainous areas, which include Syenite Range, West and East Ridges, and Red Mountain, appear to be remnants of higher upland surfaces. In general, outcrops are more frequent in this part than elsewhere in the map-area.

TRANSPORTATION AND ROUTES OF TRAVEL

The chief means of transport in the area during summer is by steamboat on Stewart River. In normal summers canoes with outboard motors may be used on McQuesten River and its main, or north, branch. The winter roads in all parts of the area have fallen into disuse and in places are impassable and the bridges unusable.

All roadhouses shown on the map are in ruins, but are useful landmarks. An all-year road is, however, under construction along the valleys of Willow and Crooked Creeks, and is intended to connect with Mayo, Carmacks, and ultimately Whitehorse and Dawson.

In several places gravel roads are used by trucks in summer and autumn. Those along Haggart, Minto and Highet Creeks, in the northeast part of the area, connect with Mayo, and that up Clear Creek connects the Airport to the dredge camp at Barney Creek. A branch of this road extends from Barlow to Barlow Lake.

Clear Creek Airport has been in steady use in recent years; Clear Creek also provides two short landing strips, one a mile or more north of Barney Creek, and one, seldom used, near the ruined Clear Creek roadhouse. The emergency landing strip near Crooked Creek is not kept in repair.

All trails marked on the map are serviceable, many being abandoned winter roads. The best route into the headwaters of Little South Klondike River is by the trail leading northwest from Ortell cabin. Losthorses Creek and the valleys to the east of it are easy to travel, but those on the west are more difficult. A good route to the heads of Fortymile and Boulder Creeks and the adjacent ridges is up the south fork of Clear Creek. In the southwest part of the map-area the abandoned winter roads lead southeastward to Pelly Farm on Pelly River, 4 miles above Fort Selkirk. Pelly Farm is 12 miles south of the area by the trail past Coldspring Mountain, and 23 miles southeast of the Grand Valley roadhouse by the winter road.

In general, after the middle of June travel is better along the ridges than the valleys. During the summer, feed for horses may be found in most parts of the area.

GLACIATION

At least twice during Pleistocene time glacial ice spread over the low-lying eastern parts of the map-area. The earlier advance was the more extensive, but little record of it remains. However, deposits of drift and erratics attributed to this earlier glaciation, much modified since their deposition, have been found between Lake Creek and White Mountains and west of Little South Klondike River near the east head of Parker Creek.

The last major advance of the ice is believed to have taken place in the Wisconsin stage, and its limits are shown on the map. The ice crept in from the east along the main valleys, filling them to elevations of more than 3,500 feet near that edge of the area. It moved westward as a number of great valley glaciers, splitting and coalescing around the hills, into and down the valleys of Stewart and McQuesten Rivers, and the tributary valleys between them, to Tintina Valley. There it met similar tongues of ice from Pelly River Valley that moved northwest along Tintina Valley and Willow Creek Valley. These bodies combined and then spread northwest along Tintina Valley to near Barlow, and westward down to Stewart River Valley and along the valleys of Reid Lakes and Lake Creek to the border of the map-area. Subsidiary tongues of ice projected into upper Lake Creek Valley at Grayling Lakes and through the gaps in Willow Hills. The ice thinned out along its course westward. Evidence of this glaciation has not been found north of the main McQuesten Valley except as isolated local alpine glaciers that existed in places along the East and West Ridges, and on Syenite Range. The ice was an active agent of erosion only in the valleys parallel with its direction of movement. Transverse tributary valleys, such as those of Highet, Rodin, and Boulder Creeks and many others, escaped erosion but much drift was deposited in some of them.

GEOLOGY

Sedimentary and Volcanic Rocks

The oldest known rocks in McQuesten area belong to the Yukon group (1).¹

1

Numbers or letters, in parentheses, are those of map-units in map-legend.

Although there is a recognizable uniformity throughout the group, Tintina Valley apparently marks an important geological boundary, for there is a noticeable difference in the components of this group on either side of the valley.

Southwest of Tintina Valley the group consists of hornblende, mica, quartz, and feldspar paragneiss interbedded with mica quartzite, quartz-mica schist, and lenses of limestone. Southwest of Rosebud Creek gneiss predominates, but the intensity of metamorphism diminishes towards the east where mica quartzite, blue-grey quartzite, and quartz-mica schist are the principal rocks, and include some slate.

Northeast of Tintina Valley, the Yukon group consists predominantly of interbedded quartz-mica schist and quartzite. Schist is the more abundant rock, but the siliceous members form most of the outcrops. The lowest known beds occur in an upfaulted area east of Seattle Creek, where beds of quartzite with a characteristic blocky fracture are interbedded with mica schist and overlain by mica and graphite schist enclosing some lenses of crystalline limestone. West of Seattle Creek, above these beds, schist and quartzite form a thick section dipping southward and striking about parallel with McQuesten Valley. These rocks are characteristically brown, and contain small scattered pebbles and grains of quartz. Some limestone is present in places. Near Johnson Creek these limestone-bearing zones are faulted down on the west. North of Bear Creek, the beds dip south but are flatter between Bear Creek and Stewart River. Higher zones than those described above occur south of Bear Creek. Rocks in these are predominantly grey, and pebble-bearing beds are generally absent. South of Stewart River, on each side of Ethel Lake, the brown rocks appear again, and south of the lake contain limestone lenses. East of North McQuesten River the rocks of the Yukon group (1) resemble those west of Seattle Creek, but dip to the north. West of North McQuesten River, quartzite and schist similar to those west of Johnson Creek occur in a broad anticline whose axis follows an irregular line parallel and 3 to 6 miles north of, McQuesten River Valley from

the North McQuesten to Vancouver Creek. West of Partridge Creek, the strata of the Yukon group strike in a general easterly direction and dip north at nowhere more than 30 degrees and over large areas at less than 15 degrees.

The Ordovician (?) or earlier group (2) consists mainly of quartzite and slate. In general it is conformable with the Yukon group (1), but its rocks are less metamorphosed. Characteristic of this group are two or more zones of varicoloured, red, green, and purple slate, in places associated with grey limestone. These early Palaeozoic rocks (2) dip more steeply and are generally more fractured than those of the Yukon group.

The Ordovician (?) or later group (3) overlies both the Yukon group and the earlier Palaeozoic group (2) unconformably; some members of the latter are commonly missing between it and the Yukon strata. The basal member of this group consists of lenses of grey to white limestone interbedded with a limy, siliceous rock having a cherty texture and, commonly, a slaty cleavage. This member is missing north of Sprague Creek. It is overlain by grey, cherty quartzite and black slate interbedded with coarse, pebbly quartzite and finer grained sandstone, which characteristically exhibits current ripple-marks and crossbedding. Strata of this group have been much faulted and overturned in places, and in general its structure is so complicated that the sequence of its members is doubtful. The highest beds, however, appear to be light-coloured, massive, cherty quartzite, slate, brown sandstone, and shale; north of Parker Creek they are in faulted contact with a small body of conglomerate composed mainly of rounded pebbles of varicoloured chert up to 4 inches long.

In the southeast corner of the map-area a group of dark brown quartzites and slates (4) is exposed over a small area. Little is known about these rocks in the map-area, but they are believed to be the northwestward continuation of strata of Triassic or earlier age that occur in the adjoining Mayo map-area to the east.

A group of rocks (5) consisting of faulted, fractured, and sheared chert, tuffs, and conglomerate outcrops in disconnected areas between the lower part of Crooked Creek and Reid Lakes. The rocks resemble some of Mesozoic age to the southeast of the map-area, and have been tentatively correlated with them.

A group of volcanic rocks (6) forms the northern part of the Willow Hills, and is believed to overlie the Mesozoic sedimentary strata (5). The rocks consist of greenish grey andesite and resemble members of the Mount Nansen group of the Carmacks area, which are believed to be of late Mesozoic age. Small areas of light pink felsite are exposed among them.

A group of rocks (7) consisting of slightly consolidated sandstone, arkose, conglomerate, silt, and clay is exposed in bluffs west of lower Clear Creek. The beds are tilted at angles up to 15 degrees and are believed to be the southeast continuation of the Eocene sedimentary strata that occur in Tintina Valley northeast of Dawson.

In several places isolated patches of volcanic rocks (8) resembling the Carmacks group of the adjoining map-areas to west and south are exposed. They consist mainly of light-coloured trachyte and brown and grey andesite. In the other map-areas they overlie Eocene sediments and are regarded as younger. They are tilted and truncated by erosion.

Bodies of quartz porphyry and coarse, drusy syenite and granite (9) occur in the southeast corner of the map-area. These rocks are tentatively correlated with similar bodies in the adjoining map-areas, where they include volcanic rocks and have been called the 'acid volcanics'. They are considered to be younger than the Carmacks group (8).

In the southwest corner of the map-area, patches of basalt and andesite lava of the Selkirk group (10) lie interbedded in the gravel deposits of several of the valleys tributary to Rosebud Creek. Some of the streams have cut through these lavas and the underlying gravel to expose the older rocks. The lava of the Selkirk group in McQuesten area was extruded from several vents: one was Volcano Mountain, a few miles south of the area; another lay near the north end of the White Mountains; and a third is thought to be on Rosebud Creek near the west edge of the map-area. North of Red Mountain, a small body of lava and volcanic breccia caps the summit and west slope of an adjoining mountain and probably forms part of the Selkirk group (10).

All unconsolidated superficial deposits are included in a Pliocene (?) and later group (11). They comprise a succession of gravels, sands, silts, clays, and tills whose sequence is partly exhibited in exposures. Some gravels in Rosebud Creek Valley underlie lava of the Selkirk group (10) and are among the older of these deposits, but isolated occurrences on the uplands in the vicinity of Arizona Creek and others west of White Mountains are regarded as probably the oldest and together with the 'White Channel Gravels' may be of Pliocene age. Others are of early and late Pleistocene age, and the youngest are those of the present streams.

The oldest gravels on the uplands are poorly exposed, but the 'White Channel gravels' show well in the bottom of an old hydraulic mining cut northeast of Barlow. These gravels consist almost entirely of well-rounded, white vein quartz pebbles and cobbles, and are identical in appearance with the 'White Channel gravels' of the Klondike district. They exhibit horizontal stratification but no distinct beds.

In the same cut, deposits referred to here as the 'older gravels' overlies the 'White Channel gravels' disconformably. The 'older gravels' consist in their lower part of rounded, horizontally stratified pebbles and cobbles. They include an assortment of foreign, tough rock types such as chert, quartzite, etc. In the upper part here, and in most areas where the 'older gravels' lie at the surface, coarse gravel and scattered boulders of these foreign types are also present. The 'older gravels' are spread over much of the floor of Tintina Valley northwest of Barlow, on the slopes of the hills around Partridge, Barlow, Zinc, Florence, and Parker Creeks, as well as in isolated deposits in scattered localities beyond the limit of the last glaciation north of McQuesten Valley. Great masses of unconsolidated material, apparently largely gravel, west of the upper valley of Lake Creek, on the slopes and saddles of the White Mountains up to an elevation of 3,700 feet, and in Rosebud Creek Valley and those of its tributaries are of similar character and grouped with the 'older gravels'.

On the east slopes of the White Mountains up to 3,500 foot elevation, and at the east head of Parker Creek at 3,100 feet, large erratics are associated with the 'older gravels'. In the Parker Creek area the erratics are syonite and are numerous. Some buried in glacial till are deeply weathered in contrast with those of the same rock in the moraines attributed to the last glaciation. In addition, the 'older gravels' are overlain by fresh glacial till of the last glaciation in several places along the road north of Clear Creek bridge. It is, therefore, concluded that the 'older gravels' antedate the last glaciation and probably had its origin in an earlier and more extensive glacial advance.

Intrusive Rocks

Intrusive rocks are many and varied in McQuesten map-area. They range in age from Tertiary to Palaeozoic (?), and have been subdivided into four groups as follows: the first and most abundant (A) consists of acidic rocks, mainly granite and granodiorite; the second (B) comprises rocks low or lacking in quartz, mainly syonite; the third (C) is represented by basic rocks; and the fourth (D) by the Klondike group of highly siliceous schists, believed originally to have been acidic intrusions.

Among these four groups, the members of the first (A) generally intrude those of the second (B), but in places the contacts are gradational and phases intermediate between the two groups were observed. Intrusions of the first group (A) also invade members of the third group (C) in some places, and this group (C) too is regarded as older than the second (B). The Klondike group (D) is schistose and is, therefore, considered older than the other three intrusive groups.

Along Tintina Valley and near its northeast flank are many bodies of coarse, light grey granite (A) commonly containing abundant feldspar phenocrysts. The larger stocks on Vancouver and Boulder Creeks are of similar rock, but the smaller bodies to the north are finer grained and vary more in composition, as they include granodiorite and varieties approaching monzonite and diorite.

Syenite Range is formed of a composite stock of granitic (A) and syenitic (B) rocks arranged in concentric zones. The range's rugged circle of summits is carved from a coarse-grained, porphyritic syenite forming the outer zone. This rock is composed of large tabular crystals of feldspar that exhibit carlsbad twinning and are crowded together with a minimum of groundmass. In the eastern rim, the phenocrysts form more than 80 per cent of the rock. The groundmass contains hornblende, biotite, quartz, and feldspar in variable proportions. Titanite is a common accessory mineral, and black tourmaline, massive in places, is a common constituent of small dykes associated with this stock. Towards the centre of the stock the proportion of groundmass to phenocrysts increases, and the rock at the core approaches that of a normal porphyritic granite, the phenocrysts losing their tabular form and becoming more stubby. The tabular habit of the feldspar phenocrysts is also notable in many of the smaller bodies of acidic intrusions (A) to the east of Syenite Range.

Southwest of Tintina Valley and on North Crooked Creek, the acidic intrusions (A) are mainly coarse-grained, light grey or pale pink granite in which chunky feldspar phenocrysts are common. The bodies of syenite (B) north, south, and southwest of Lake Creek are all low or lacking in quartz, but differ widely in other respects. On each side of lower Lake Creek they consist of a coarse, porphyritic, foliated and sheared rock mainly composed of pink feldspar, mica, and hornblende, and generally low in quartz. South of Reid Lake they are medium, uniform-grained syenite. Others are composed of a medium-grained dioritic rock rich in hornblende.

The group of basic rocks (C) consists of a wide variety of types, including diorite, quartz diorite, hornblende-rich diorite, hornblendite, gabbro, peridotite, and serpentine, as well as intermediate forms, all of which are intruded by the granitic rocks (A and B) where they are in contact. Except for a few dykes and sills the basic intrusions (C) are confined to the country southwest of Tintina Valley. In particular, the bodies of serpentine are concentrated in the White Mountains and north of the Grand Valley roadhouse.

The rocks of the Klondike group (D) in the southwest and west parts of the map-area are the southeast extension of areas of those rocks in Ogilvie map-area. Here they are mainly quartz-mica schists and more quartzose than to the northwest, but near the head of South Rosebud Creek they contain, in addition to quartz and mica, feldspar, hornblende, and chlorite. They truncate the strata and structures of the Yukon group (1), and are believed to have originally been granitic intrusions. In turn, they are cut by granitic intrusions (A).

PROSPECTING

The first important placer gold production in Yukon came from the bars of Stewart River below the mouth of McQuesten River map-area. Gold was discovered in 1885, and by the end of the following year \$100,000 worth had been recovered. Since then fine gold has been found in many bars on Stewart and McQuesten Rivers and coarse gold on creeks north and east that drain into these rivers. The important bars are on those rivers that have reworked quantities of glacial drift and outwash material brought by ice and streams from gold-bearing areas to the northeast. Bars are still worked sporadically on McQuesten River from Tenmile Cabin to its mouth, and on down Stewart River to the Yukon. During and after the Klondike rush of 1898, the map-area was prospected for placer deposits, and gold has been recovered every year since from some of its creeks. Later, when silver-lead mining began on Galena and Keno Hills, which lie 20 and 25 miles east of the map-area, a wave of lode prospecting spread over the northern parts, but, although many discoveries have been made, no productive deposit has yet been developed.

From the point of view of prospecting, the map-area may be considered in five sections. One includes the part of the area north of Bear Creek, McQuesten River, and Tintina Valley. It contains most of the lode prospects and placer creeks in the area. In it gold has been discovered on more than thirty creeks, the two most important being Clear and Hight Creeks. The former was worked

for many years by primitive methods, and, since 1943, the Clear Creek Placer Company Limited has worked it by dredge. Reserves sufficient to continue this operation for many years are reported to exist along the upper half of the creek. Much of Highet Creek has been worked by old methods. Two dredges were built on it, but the area worked by each was small and it is probable that a considerable yardage remains from which gold might be extracted profitably by improved methods with better ~~access~~.

In the better known parts of this section a distinct concentration of lode and placer discoveries may be observed around small granodiorite stocks (A). Gold, and tungsten and tin minerals are nearly everywhere associated with these stocks and, in addition, deposits of stibnite, arsenopyrite, chalcopyrite, galena, sphalerite, and barite may occur. A particularly good illustration is furnished by the small acidic stock at the head of Highet Creek. Gold, and tungsten and tin minerals have been found in both Highet and Johnstone Creeks, which drain the area in vicinity of this stock; contact deposits carrying scheelite and chalcopyrite occur near the stock; and veins carrying stibnite and others containing arsenopyrite and gold have been found within a few miles of it. Scheelite occurs with gold on Gem Creek, and gold, and tungsten and tin minerals, with much barite, on Arizona Creek. Some parts of the placer deposits on Clear Creek carry gold, and tungsten, and tin minerals associated together, and other parts carry arsenopyrite and pyrite with gold. Gold-bearing quartz veins have been discovered on the east face of Red Mountain and along the south part of the southern summits of East Ridge. Vein float carrying galena was found in three places on this ridge 2 miles west of the acidic intrusions (A) west of Boulder Creek. Contact metamorphic silicate minerals, containing patches of sphalerite, were also found on the east contact of the western part of this intrusion. Farther south along the same ridge, vein material carrying copper was found, and galena was panned from the surface gravel where it enters McQuesten Valley. Farther north, on East and West Ridges, discoveries of galena-bearing veins are reported.

The second section includes the area southwest of Gravel Creek and west of

Lake Creek. Deep and widespread drift, largely of foreign origin, interbedded in places with lava of the Sellkirk group (10), will probably prevent the discovery of extensive, workable placer deposits in the lower parts of the branches of Rosebud Creek, although a little gold has been found there and the bedrock geology resembles that of the Klondike district to the northwest. However, the gold in Rosebud Creek may have a source in one or other of the tributaries at higher levels where the drift is not so deep and the prospect of workable gold placer more favourable. Placer gold has also been discovered on Independence Creek, but there is no report of its having been worked. Platinum has been reported from an unidentified creek in this part of the area, and may be derived from the basic intrusions (G) that outcrop in the White Mountains. The scarcity of outcrops discourages lode prospecting in this section. A few small fragments of chrysotile asbestos, with fibre 1 inch long, were found in the talus on the west side of the serpentine body that forms the 5,340-foot summit in the White Mountains.

The third section lies south of Reid Lakes between Lake Creek and the winter road. It, like the last section described, is deeply covered with drift, and no mineral discovery has been reported. The bedrock formations are, however, favourable for mineralization, and perhaps the area has not received the attention it deserves.

The fourth section lies in the southeast corner of the area east of the area east of the winter road from Willow Creek to Mayo. It contains parts of three large acidic intrusions (A) that have in places effected high temperature alteration of the adjacent rocks, with the development of much andalusite and other metamorphic silicate minerals, and, east of Crystal Lake, accompanied by much pegmatite. Several large quartz veins outcrop on the top of the ridge south of Ethel Lake, and gold is reported in one of the gulches running north from there to the lake. In the canyon of Crooked Creek, 2 miles east of the winter road, contact metamorphism is evident in the rocks adjacent to a large acidic intrusion, with the development of pyrite and tourmaline.

The fifth section embraces the area between McQuesten River and Bear Creek and Stewart River. A few dykes and the granite at the mouth of Moose Creek are the only intrusive rocks. Except for reports of gold in Bear and Upper Moose Creeks no mineral discovery is known to have been made in it. The gold in these creeks is judged to have been carried there from the east by ice and stream action.

