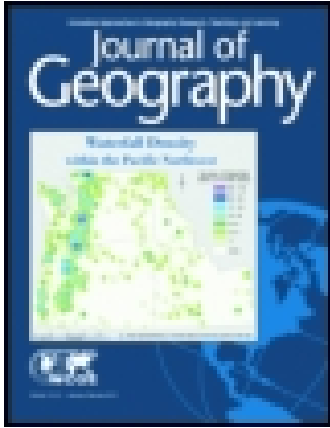


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### The Yukon and its Basin Compiled from the Report of the U. S. Geological Survey on the Geology and Geography of Alaska

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## THE YUKON AND ITS BASIN

COMPILED FROM THE REPORT OF THE U. S. GEOLOGICAL  
SURVEY ON THE GEOLOGY AND GEOGRAPHY OF ALASKA  
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FOR many centuries the rivers of Alaska were her only gateways. Indian hunters, Siberian fur-gatherers, Russian explorers, American miners and engineers, all made use of the great water-ways.

Knowledge of the interior of Alaska has been gained chiefly within the last twenty years, and is unknown to text-books. Statements concerning it must therefore closely follow government reports, which contain accounts of preliminary surveys of all but three of the large rivers.

The main topographic features of Alaska are similar to those of the western United States. The highlands of Alaska, like those of the United States and Canada, are in general parallel to the coast line, and the investigations of Dr. Dawson and others have shown that the four topographic provinces of the United States are fairly well defined through western Canada and continue into Alaska.

Each of these provinces is of a dominant topographic type. Along the Pacific Coast of Alaska and British Columbia, the western-most province is a mountainous belt from 50 to 200 miles wide. The ranges of this Pacific mountain system are distinct, often separated by broad valleys or indentations of the coast line, forming in some cases large basins like that of the Copper River. A section of the inner slope drains into the Yukon and Kuskokwim. Otherwise its waters reach the Pacific through streams running transverse to the axis of the mountains.

East and north of the Pacific mountain system is the Central Plateau region. This is not strictly a plateau. For the most part this region is a gently rolling upland, in which the rivers have trenched broad channels. The interstream areas are the remnants of a former plateau surface, dis-

sected by erosion, whose rolling surface slopes gently to north and west. A number of mountains and mountain groups rise above the general level.

This belt is drained largely by the Yukon and Kuskokwim into Bering Sea. It includes a number of lowland areas of considerable extent. Among these are the flats of the middle Yukon and upper Kuskokwim and the lowlands which extend along Bering Sea adjacent to the deltas of these rivers.

East and north of the plateau is a broad cordillera, the northern extension of the Rocky Mountain system. The southern slopes drain chiefly into the Yukon; the northern into the Arctic Ocean.

The Great Plain east and north of the Rockies forms the fourth province. This region is dissected, more or less rolling, and its waters reach the Arctic.

The southern and higher range of the Rocky Mountain system of Alaska forms the watershed between the Yukon and the Arctic waters. In Alaska the drainage belongs to three divisions; its southern part, about one-fifth of its area, drains into the Pacific Ocean; the great interior region, covering nearly one-half of Alaska, drains into Bering Sea; and the rest of its territory, its northern part, drains into the Arctic Ocean.

The Yukon, flowing into Bering Sea, is the master stream. This mighty river, the fifth in size in North America, springs from head-waters in British Columbia, far to the southeast of Alaska, where it fights for supremacy on the one hand with water-courses flowing into the Pacific, and on the other with those belonging to the Arctic watershed. The Yukon flows northwest as far as the Arctic Circle, then sweeps around to the southwest, and finally pours its great volume of muddy waters into Bering Sea, over 2,000 miles from the source of its longest tributary.

The basin of the Yukon is outlined in a general way by the boundaries of the Central Plateau province, of which its valley occupies nearly the medial line, and makes with it the same great bend to the southwest, parallel to a similar swing of the two mountain systems on the south and north.

Near the northern boundary of British Columbia the plateau has an altitude of about 5,000 feet at its western margin, slopes downward toward the center, and probably rises again toward the Rocky Mountain front. It also declines northward to an altitude of about 4,000 feet, near the intersection of the 63rd parallel with the Yukon.

The plateau extends northward as far as the great bend of the Yukon, then encircling the broad lowland known as the Yukon Flats, it falls off still more to the southwest until it has an altitude of less than 2,000 feet near the Lower Ramparts.

At the great bend of the middle Yukon is the depressed area known as the Yukon Flats. Roughly speaking, this lowland is a rectangle about 200 miles long and from 40 to 100 miles wide, nearly bisected by the Arctic Circle. It has an altitude of about 500 feet, and as the name implies, is a monotonous lowland.

Within these flats the river changes its course from northwest to southwest.

No surveys have been made of this part of the river, but in places the stream broadens to 10 and possibly 20 miles, and includes an intricate system of water-ways, with some channels having a perceptible if not strong current; while others are sloughs, with almost stagnant water. The shifting water-ways form many oxbow lakes. These channels are separated by sand-bars and islands, for here, where the river is ever changing, new courses are constantly being cut, and old ones abandoned and filled up by the silts of the heavily burdened waters.

This action of the river makes navigation an ever-changing problem to the steamboat pilots, who, on account of the absence of charts, are entirely dependent on knowledge acquired by experience. During the rush to the Klondike, Indian pilots steered most of the steamers, but these have now been largely replaced by white men trained on the Mississippi under similar conditions.

From the steamer deck the Yukon Flats present a monotonous expanse of sand-bars and low, densely-forested spruce islands, through which the boat follows a tortuous channel among a bewildering maze of tributary and distributary water-courses, with an occasional glimpse of the distant rim of the plateau which surrounds the lowland.

The presence of man in this dreary tract is seen only in the clearings from which the spruce has been cut for fuel, or in an occasional Indian settlement, or in the huts of the wood-choppers.

At low water 10 or 15 feet of frozen silt bank is exposed, while during floods the river is almost even with the surface of the islands.

Near the 66th parallel of latitude the flats end abruptly at a scarp which forms the northern boundary of a part of the plateau. This stands between 1,800 and 2,000 feet above sea level, and is often called the Lower Ramparts of the Yukon.

The Yukon traverses this upland by a narrow, somewhat winding valley, whose walls often rise, rampart like, either directly from the water or from a narrow terrace. The stretch of the valley, between 110 and 130 miles long (measuring around the bends), and from one-half mile to three miles wide, continues unbroken from the Yukon Flats to the mouth of the

Tanana. The general course is southwesterly, but it has many windings, which strongly suggest incised meanders, the relics of a former flood-plain condition.

The Rampart region with the broad sweeping curves of the river and the steep valley walls, clothed with spruce, cottonwood, and birch, varied by bare cliffs, is the most picturesque part of the Yukon.

The Russian Lieutenant Zagoskin, in 1848, reported the Yukon as unnavigable above the lower end of the Ramparts, though its ascent and descent by steamer is attended by much less difficulty than in any other part of the river, for the current probably does not exceed 5 or 6 miles per hour, and there are few shifting sand-bars to contend with. In this region a few streams are confluent from both north and south, but none is large enough to be called a river, though one, Ray River, passes as such. All of these water-courses flow in normal valleys, broad, gravel-filled near their mouths, narrowing up-stream to sharply trenched, rock-floored canyons toward their head-waters.

Under the name of Lower Yukon is included the portion of the river which is between the Ramparts and the sea, and which, measured along the bends, has a length of about 800 miles.

The Ramparts end at the mouth of the Tanana, where there is an abrupt change in the contour of the valley. The gorge suddenly opens to a broad lowland, which along the Yukon is 15 to 20 miles in width. To the head of the delta the width of the valley varies, while the river itself flows through many channels and is broken by numerous islands and sand-bars.

The delta begins near the 63rd parallel of latitude, where the river divides into a number of divergent channels which find their way to the sea, with general northerly and northwesterly courses. The most northern and southern of these water-ways reach the open sea at points about 75 miles apart in an air line, and 40 or 50 miles from the head of the delta. A maze of water-ways lies between the two channels, some of which flow chiefly into Bering Sea. Others connect with such channels, but many are blind sloughs, affected only by the ebb and flow of the tide. The inter-stream areas, not more than 10 feet above low tide, are swampy, and dotted with innumerable small lakes.

Here, as in the flats, the Yukon is constantly shifting its channels. The changes are brought about largely by the current and tides, but are aided by the scouring of the ice, which accumulates in the delta after the break-up in the spring, and which forms dams that cause new channels to be cut and old ones to be silted up.

Throughout its course the Yukon is a mud-laden stream, but it is more heavily charged with sediment above the flats than below, for during its comparatively sluggish course throughout this lowland belt, it drops part of its load.

The silt-laden waters of the lower river are making rapid inroads on the sea by extending the delta. In the winter the waters are said to be perfectly clear.

Though the Yukon delta properly includes only that part of the coastal plain between the distributaries of the river, the broad lowland which embraces the deltas of the Yukon and Kuskokwim has an extreme breadth of upward of 200 miles, and might well be grouped with the delta flats. There can be no doubt that at some time a part of the Yukon waters found its way across these lowlands, and deposited the sediments by which they were made to encroach upon the sea. At low tide this low coastal plain is extended a long distance seaward by mud-flats.

The lower Yukon offers no serious menace to navigation by river-steamers, but like the upper river it is uncharted, and except in the delta mouth its channels are unbuoyed. The current is estimated at from  $1\frac{1}{2}$  to 4 miles per hour, and the influence of the tide reaches to the head of the delta.

In the delta, steamers usually follow the northernmost waterway called Apoon Pass, for this has a well-defined though shifting channel, through which 4 feet can be carried at mean low water. At the mouth of the pass the water shoals to  $1\frac{1}{2}$  feet at low water, and steamers are forced to take advantage of high tide to cross the bar.

From the Apoon mouth the river steamers make their way across a stretch of about 60 miles of open sea to St. Michael Island, which possesses the only harbor, and that a poor one, along many hundred miles of the coast, and here the transfer to ocean steamers is made. The passage from the mouth of the river to St. Michael in the flat-bottomed river steamers can be made in safety during calm weather, but at other times is not without danger.

The scenery of the lower Yukon offers but little of interest to the traveler. The mighty river, with its dark yellow waters, is not without its grandeur, and the rounded slopes of the valley, dotted with spruce and deciduous trees, are not without picturesqueness, but for hundreds of miles there is almost no change in the aspect of the landscape. The upper reaches of the lower Yukon are heavily forested, but as the sea is approached, the trees become more scattering, and finally, a few miles above the delta, give way entirely to the tundra, with its dreary, monotonous view.