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REPORT ON THE PLACER DEPOSITS OF THE GOODNEWS-AROLIC GOLD FIELD

MR-101-02

I N T R O D U C T I O N

The gold placer area herein considered lies in the southern half of the Kilbuck range, a seeming southerly extension of the Kuskokwim Mountains, approximately between longitudes 161°05'W. to 161°35'W., and latitudes 59°15'N. to 59°35'N. The area covers about 425 square miles and includes the northern drainage of the middle portion of the Goodnews River and most of the headwaters drainage of the Arolic River. It is about 20 miles by trail northeast up the valley of the Goodnews River to the southern portion of the area from ^mMuktrak, and about the same distance to the northern portion of the area southwest up the valley of the Arolic River from Kwinak.

The general characteristics of the country are broad, smoothly rolling or flat intermontane areas, surrounded by very steep and rather rugged mountains. As in the area south of Goodnews Bay, the main drainage lines have a tendency to lie in a northeasterly-southwesterly direction.

This area was surveyed and the geology examined in 1919 by George L. Harrington of the U.S. Geological Survey with R.H. Sargent as topographer, the results being published in Bulletin 714, pages 207-228. In 1927, F.W. Holzheimer made an examination of the northern portion of the area for the Territorial Mining Department.

The writer was alone, except for an Eskimo guide, on the present examination. He left ^mMuktrak on June 30, 1931, in a poling boat with outboard motor, arriving at the mouth of slate



M.S. "MORAVIAN" in Goodnews Bay.



The native villge of QUINHAK

Creek on July 1st. After examining Slate, Wattamoos, Olympic and Bear Creeks, a return was made to Mun^mtrak on July 3rd. The northern portion of the area was examined by way of the Arolic River. The writer left Kwin^mhak in an outboard motorboat with an Eskimo guide on July 5. On account of extremely low water, the boat had to be left a short distance above the old native village on the Arolic River and food and bedding backpacked nine miles to the relief cabin just below the, so-called, Arolic River canyon. On July 6, food was backpacked to the cabin on Butte Creek. From there, Butte, Kowkow, Fox, Deer, Snow, and lower Keno Creeks, and the Arolic River, were examined. A return was made to Kwinhak on July 8. Both trips were necessarily cut short in order to make connections with the Moravian Mission motorship Moravian, which furnishes the only means of transportation between Mun^mtrak, Kwin^mhak and Bethel. No other trip of the Moravian would be made to Mun^mtrak in 1931, except the one taken on July 4 to Kwin^mhak, and a wait of over a month would have ensued if the trip to Bethel on July 9 had not been taken. Every assistance possible was rendered by the white inhabitants and miners at Muntrak and Kwin^mhak and on the creeks, and the writer wishes to express his appreciation of their help.

G E O G R A P H Y

DRAINAGE

The southern part of the area is drained to the southwest by the Goodnews River, while the northern part is drained to the northwest by the Arolic River, the first emptying into Goodnews Bay, the second directly into Kuskokwim Bay. Most of the drainage in the southern part of the area flows into Barnum Creek or Slate Creek, which in their turn empty into the Goodnews River. With the exception

of these two creeks, all the creeks in this part of the area are small and flow in comparatively narrow and confined valleys with steep grades. Almost all of the headwaters of the Arolic River lie in the northern part of the area. The streams are large and have, except near their headwaters, comparatively low gradients. The valley of the Arolic River lies from 200 to 400 feet higher in elevation than that of the Goodnews River. In consequence the Arolic River is a much swifter-flowing stream through the greater part of its length than the Goodnews River.

RELIEF

In the southern part of the area is a region of low, rounded and rolling hills between flat, poorly-drained valleys containing many lakes. This lowland is terminated on the northwest by a range of mountains which rises abruptly and steeply from the lower ground. From the Goodnews River this mountain range appears a continuous wall. However, it is cut through by several creeks, the widest pass being at Barnum Creek. North of this mountain range in the northern part of the area is another lowland embracing the headwaters drainage of the Arolic and lying from 200 to 400 feet in elevation above the Goodnews River lowland. This Arolic River lowland is defined on the west by a group of mountains separating it from the coastal plain of Kuskokwim Bay, and on the north by another group of mountains separating it from the wide, flat plain which skirts the Kilbuck Mountains on the northwest. These two groups of mountains may be considered as constituting one range, breached in several places by broad low passes. On the east the Arolic River lowland is defined by a group of steep mountains, which, however, were not visited. The Arolic River lowland in its lower part is composed of rounded rolling hills

and surrounds an isolated group of steep-sided mountains, known as the Island Mountains. The eastern and southern parts of the Arolic River lowland, so far as seen, are flat and poorly drained, and contain many lakes. The higher peaks in all the foregoing various groups of mountains are fairly uniform in elevation, rising from 2000 to 3000 ft.

GLACIATION

At the present time there are no glaciers known to the writer in this part of Alaska south of the Kanektok River and north of the Alaska Range. However, during the Pleistocene period, the area was buried under a regional or piedmont glacier, only the higher peaks rising above the surface of the ice.

E C O N O M I C S

POPULATION

The Goodnews-Arolic gold fields at one time supported from 50 to 150 men. At present all the miners have left for the platinum workings south of Goodnews Bay, with the exception of one man prospecting on Kowkow Creek, one man mining on Wattamp^{oo}s Creek and one man mining on Bear Creek. A few natives from Kwinhak trapping in the winter, and an occasional reindeer herder from Muntrak, constitute the only other human beings in the area.

TRAVEL AND TRANSPORTATION

Airplanes equipped with pontoons in summer or skis in winter, make regular mail trips from Anchorage every week to the town of Bethel on the Kuskokwim River, alternating via Nushagak or Tacotna. Arrangements can be made with an airplane company for stopping at Mun^{tr}trak, a small native village on the north shore of Goodnews Bay, or at Kwinyak, a slightly larger village at the mouth

of the Kanektok River. A small steamer makes two trips every summer from Seattle to Bethel with freight and passengers. Or a traveller may go down the Tanana and Yukon Rivers from Nenana to Russian Mission and there take passage on the mail launch across the Yukon-Kuskokwim portage and then on down the Kuskokwim River to Bethel. From Bethel, unless passage can be secured on some sailing boat belonging to a native or miner, the only means of transportation is on the Moravian Mission's diesel motorship, Moravian, which generally makes one trip to ^MMuntrak and two trips to Kwinak each summer.

From ^MMuntrak a small outboard motorboat may be taken up the Goodnews River as far as the mouth of Slate Creek, even at the lowest stage of water. From Kwinak, a small outboard motorboat may be taken along the coast and up the north mouth of the Arolic River as far as the mouth of Bessie Creek in the lowest stage of water. In high water it is possible to take a boat up the Arolic to the mouth of Faro Creek.

At the time of mining activity in the area, most of the supplies were freighted by way of ^MMuntrak or Kwinak in the winter by dogteam or reindeerteam. Such other accessory supplies as were needed during the summer were taken in by poling boat up the Arolic or Goodnews River. At present the few miners and prospectors take all their freight in by dogteam in the winter.

In case of future, large-scale operations in the area, freight would have to be lightered ashore at ^MMuntrak from ocean-going boats lying just inside the North Spit in Goodnews Bay. From ^MMuntrak heavy machinery and supplies would have to be taken by tractor in the winter up the Goodnews River. For the Arolic River the tractor trail would leave the Goodnews River at the mouth

of Barnum Creek and extend over the low divide between Barnum Creek and the head of Faro Creek. It also might be possible to lighter freight ashore about 1 mile south of the south mouth of the Arolic River, and pick a summer tractor trail to the mouth of Faro Creek. Light supplies and perishables could be taken in summer up the Goodnews and Arolic Rivers by the old method of outboard motorboat or poling boat. Navigation on the Arolic River could be insured for such small boats at all times during the summer months by damming off the south mouth, a very easily accomplished undertaking.

At present freight rates from Seattle to Bethel are \$22 a ton, and from Bethel to ^{Mun}trak or Kwinkak about \$20 a ton.

CLIMATE

The average temperature of the Goodnews-Arolic Goldfield is higher than farther north in the interior of Alaska. The snowfall in the winter is comparatively light, averaging not over 2 feet. Warm spells during the winter are very liable to melt off most of the snow, adding greatly to the difficulties of winter freighting. The snow drifts badly, packing into the narrow gulches in the mountains to such depth as not to entirely melt away until August. The summers are inclined to be foggy and rainy, although there is much variation ^{from year to year} ~~in different years~~ in this respect. The summer of 1931 was exceptionally dry, only one bad thunder and hail storm being encountered in the area. High winds are liable to occur at ^{any} ~~all~~ times and during all seasons of the year.

VEGETATION

A luxuriant growth of grass and reindeer moss at one time covered all the hills and lower mountainsides of the area. However, over-grazing by reindeer has much reduced this growth, in some places even leaving the subsoil exposed. In the lowlands of

the Goodnews River are sections of marsh and poorly drained areas supporting sedge and tussock growth resembling very closely the typical "niggerhead" growth of the tundras farther north. There is no spruce or birch timber. In the valley of Barnum Creek, near its mouth, were a few small groves of cottonwood, which, however, have been almost destroyed by the miners and natives. This is the only timber growing in the area. At the head of Goodnews and Kanektok Rivers there is said to be much cottonwood and possibly some spruce timber. Possibly in the course of centuries the area will become timbered. Small willows grow all along the smaller creeks and some alder in favorable spots on the mountainsides. Along the Goodnews and Arolic Rivers, the larger-leaved "water-willow" grows to a large size, in places up to 20 feet high and 4 inches in diameter. On the whole, to a person familiar with the tundras of Seward Peninsula and northward, the vegetation has a much more southern aspect.

ANIMAL LIFE

Ptarmigan in great numbers and a few hares constitute the only game in the area. Ground squirrels seem to be scarce, probably due to too intensive trapping by the natives. Fox and otter with a few mink and lynx comprise all the furbearers in the area. A constant supply of fresh meat may be bought from the Eskimos owning the many reindeer which roam over all of this section of Alaska. Salmon, trout and salmon-trout run up both the Arolic and Goodnews Rivers. Mosquitoes and flies are not in such intensely annoying swarms as in other parts of Alaska.

G E O L O G Y

QUATERNARY AND RECENT HISTORY



On Goodnews River - old land surface in distance



On Goodnews River - old land surface in distance

Following the geological history outlined by Harrington, and in which the writer concurs, the base level of this part of Alaska was several hundred feet lower than it is at present. The valley of Goodnews River was then a broad, mature and normal river valley whose position had been determined by the northeasterly-southwesterly structural lines of the underlying rocks, the whole area seemingly being on the western limb of a syncline. The Arolic River, or rather its predecessor, may have followed this same structural trend and have discharged by way of Cripple Creek or Indian River. At or just after the period of maximum glaciation, the base level seems to have risen, according to Harrington at least 300 ft. From aspects of the muck in the interior of Alaska and other considerations too extensive to go into in this report, the writer is inclined to consider that this subsidence of the land surface may have been as much as 800 feet below the present base level. However, local warping so may have changed conditions in any one place that no absolute figures can be given for all of western Alaska. Each locality will have to be separately studied. The only fairly certain supposition is that such a subsidence occurred after the period of maximum glaciation.

After the time of maximum subsidence and during the close of the period of glaciation, there was a gradual lowering of the base level up to and including the present time. During the period of maximum glaciation the whole area was covered with a glacier of the piedmont type. This piedmont glacier discharged directly into the sea by way of Goodnews Bay. If no ice-tongues extended down them, then at least glacial waters flowed through Jacksmith Creek, Cripple Creek and Indian River. It is also possible that during the period of subsidence the ice reached

the sea by way of the Arolic River.

After the retreat of the glacier it is thought that the Goodnews River lowland was occupied at least in part by a shallow estuary. It is probable that at no time did the sea occupy the upper Arolic River basin, but that this part of the area was occupied continuously by a glacier until the base level had lowered to within one or two hundred feet of its present position.

After cessation of glaciation in the region and further elevation of the land surface, the streams began removing and resorting a vast amount of glacial outwash material. On the Goodnews River remnants of old land surfaces rise 20 to 50 feet above the present surface. This cutting process due to the lowering of the base level has proceeded so far on some creeks which do not occupy pre-glacial channels, as for instance, Slate Creek, ~~as~~ as to cause a trench to be eroded in the original bedrock and low rock bluffs to line the sides of the valley. On the Arolic River below Keno Creek, the gravel from drilling reports, has been worked over and filled in by tributaries to a depth of approximately twenty feet.

E C O N O M I C G E O L O G Y

HISTORY OF MINING

KN 61-18
In Bulletin 714, pages 220-222, Harrington has given what is known of the early history and discovery of the creeks in the Goodnews-Arolic goldfield. The only creek not mentioned by him is Olympic Creek which was discovered by George Wickert between the years 1920 and 1922. At about the same time gold was discovered on upper Slate Creek by a native named Ivan Oldtrader. Bear Creek was discovered in 1914 or 1915 by ~~George~~ Charles Danielson.

The subsequent history of all these creek is the same-



Up ^WWattampoo Creek



Down Cascade Creek from mouth ^WWattampoo Creek

a gradual diminution in production until they are abandoned, except by a few prospectors, for a more profitable field.

DESCRIPTION OF VARIOUS CREEKS.

Wattamöös Creek *Y-1101-16*

This creek is a small right limit tributary of Cascade Creek which in its turn is a right limit tributary of Slate Creek. According to Harrington it was ^{discovered} in 1917 by a native reindeer herder named Wattamöös.

It is about $2\frac{3}{4}$ miles by trail from the boat landing near the mouth of Slate Creek to the cabin on Wattamöös Creek. The creek has been practically worked out so far as groundsluicing and shovelling-in operations can work ground. Most of the work at present in evidence has been done on Discovery Claim, situated upstream from the confluence of the creek with Cascade Creek. For about $\frac{1}{2}$ mile above Discovery Claim there is evidence of mining. Farther up the creek, however, all open cuts or ditches must have been obliterated by detritus brought down by spring freshets. On Discovery Claim the grade of the ~~bedrock~~ surface is about $2\frac{1}{2}$ percent. The valley where it opens out into the valley of Cascade Creek is about 300 feet wide from rim to rim. However this rapidly ~~widens~~ narrows between steep mountain walls to about 150 feet from rim to rim, which width is maintained as far upstream as was examined. On Discovery Claim the ground is from 5 to 7 feet deep, practically all gravel. The gravel contains many subangular boulders, mostly granitic, up to 2 feet in diameter. The bedrock, examined megascopically in hand specimens on Discovery Claim, appears to be, at least in part, an altered and weathered basalt. From the evidence of the ditches, when the creek was mined only local (creek) water under no head, was used for groundsluicing. The creek appears to ~~have~~ have quite a lot of water for its size, the minimum ~~head~~ amount being approximately 120 miners inches.

Cascade Creek *Y-1101-17*

12-10-17 This creek is a right limit tributary of Slate Creek which is a right limit tributary of Goodnews River. About 1 mile above its mouth, Cascade Creek is joined on the right limit by Wattamoos Creek. The only other named tributary of Cascade Creek, so far as could be ascertained, is Bull Creek, a small right limit tributary running through a swale in the gravel and tundra outwash plain of the Goodnews River lowland. Its confluence is about $\frac{1}{4}$ mile above the mouth of Cascade Creek.

Above the mouth of Wattamoos Creek, the valley of Cascade Creek is about 200 feet wide from rim to rim. Below the mouth of Wattamoos Creek, the valley of Cascade Creek is from 400 to 500 feet wide from rim to rim. The gravel is coarser but finer than ~~xxxx~~ that on Wattamoos Creek. No granite wash and boulders such as occur on Wattamoos Creek, were seen. The depth to bedrock on upper Cascade Creek above the mouth of Wattamoos Creek cannot be over 6 feet. The amount of water in upper Cascade Creek is approximately the same as in Wattamoos Creek, about 120 miners inches.

Upper Cascade Creek has been prospected and small "one man" shovelling-in operations attempted, but no ground that would pay for mining has been found.

Below the mouth of Wattamoos Creek, the depth to bedrock on lower Cascade Creek is from 8 to 10 feet. The grade of the entire creek averages less than on Wattamoos Creek, being about one per cent. The bedrock appears in the field to be an uniform-textured blocky basalt.

The only man working on either Wattamoos or Cascade Creek is Edward "Slim" Smith, who was absent on a trip to Hagemester Island during the months of June and July, 1931. On the right limit of Cascade Creek and just below the mouth of Wattamoos Creek, Smith groundsluiced and shovelled-in a pit approximately 500 feet by 25 feet, 6 feet deep. Though in the valley of Cascade Creek, this pit is probably on



Down Olympic Creek from Cabin



Lower Slate Creek looking south from right limit Olympic Creek

Discovery Claim on Wattamoos Creek. The paystreak appears to be an ~~old~~ old channel of Wattamoos Creek entering Cascade Creek downstream from the present mouth. Though lower Cascade Creek has been prospected and "sniped" below this pit, the only work at present visible are two bed-rock drains to lower Wattamoos Creek, one about 500 feet long, the other about 1000 feet long.

Values on Cascade Creek just below the mouth of Wattamoos Creek probably run about 15 cents a "bedrock foot" or approximately 67 cents a cubic yard. Values not quite good enough to ~~be~~ pay by hand methods, are said to be below the mouth of Wattamoos Creek in lower Cascade Creek all the way to the mouth.

Olympic Creek ¹²⁻¹⁰⁻¹⁶

This creek is a small right limit tributary of Slate Creek about one mile above the mouth of Cascade Creek. About $1\frac{1}{2}$ miles above its mouth Olympic Creek forks. The right hand fork (east fork) is a narrow-valleyed, steep-graded stream. It was not examined. Just below the forks and for about $\frac{3}{4}$ mile above on the main or north fork, Olympic Creek narrows to almost a canyonlike ~~proportions~~ proportions. Above this canyon the valley is broad and U-shaped and may have been, after the time of piedmont glaciation, the site of a small alpine glacier. Or, again, the valley may have been shaped by nivation, though why the same condition did not extend all the way down the valley nor affect the east fork is hard to explain. Below the canyon the valley widens rapidly and in about $\frac{3}{4}$ mile opens out into the outwash-filled Goodnews River lowland through which Slate Creek flows.

There is a minimum of about 80 miners inches of water in Olympic Creek. The grade of the creek below the forks is about 2 per cent. The depth to bedrock on Discovery Claim averages about 6 feet. The bedrock appears to be a basalt similar to that on Cascade Creek.



Up Slate Creek from near mouth Bull Creek



Down Slate Creek from near mouth of Bull Creek

The gravel is coarse and subangular and contains many granitic boulders up to 2 feet in diameter, though these are not so numerous as on Wattam-
oos Creek.

Most of the work on Olympic Creek has been done on Discovery Claim (where the cabin is situated). Claim No. 1 Above Discovery and claim No. 2 Above Discovery are reported to carry value which are slightly too low grade to work by hand methods. The upper end of the main pit on Olympic Creek is about 1500 feet below the forks. About 10,000 square feet of bedrock were cleared. About 500 feet below the main pit, a small pit comprising about 4000 "bedrock" feet, was worked. Only ^{water} local/was used without pressure from a small ditch about $\frac{1}{4}$ mile long on the right limit of the creek. The discoverer, George Wickert, took out about \$800 on the creek. During the years 1925, 1926, 1927 and 1928, Peter Roeser took out altogether about \$1600. The average value of the ground worked is about 17.15 cents a "bedrock foot" or 78 cents a cubic yard. The gold is distributed in a very spotted manner. It is rather whitish in color and is worth about \$17 an ounce. It is thought by the writer that the gold is of local bedrock origin or possibly from the canyon and that it has been scattered and reconcentrated by the action of a much larger, glacial, stream.

Slate Creek 12-10-20

This creek is a large right limit tributary of Goodnews River, 6 or 8 miles by trail above Barnum Creek. Slate Creek runs parallel to the mountains and receives practically all of the right limit tributaries of Goodnews River between Granite Creek and Canyon Creek. About 3 miles above the mouth of Olympic Creek, Slate Creek forks. The right-hand fork flowing from the northeast is the continuation of the valley of the main creek and should be called "Slate Creek". However the left-hand

fork flowing from the northwest has been named by the miners, "Slate Creek". This last was the only fork examined. It will be called in this report "Upper Slate Creek", in contradiction to "Lower Slate Creek" below the forks. ^{discontinuity} (2)

Upper Slate Creek, so far as seen, has a narrow V-shaped canyon-like valley down to within about $\frac{1}{8}$ mile of the mouth of Ivan Creek where it widens to about 300 feet from rim to rim. However the head of the valley may be wider and have supported a small valley glacier for a short while after the close of the main glacial period. Upper Slate Creek carries a minimum of about 1000 miners inches of water. The grade of the valley is about 2 per cent. As far down the creek as the mouth of Ivan Creek, the gravel in upper Slate Creek is very coarse and contains many large granitic boulders up to 5 feet in diameter. Below the mouth of Ivan Creek the gravel is finer and there are very few boulders. The depth to bedrock is from 6 to 8 feet.

On Discovery Claim about $\frac{1}{4}$ mile above the mouth of Ivan Creek, John O'Malley mined about 500 square feet of bedrock and also ran a small cut into the bench towards the right limit rim. About 1300 feet below the first cut, O'Malley took out another pit also about 500 square feet in area. At the mouth and a short distance up Ivan Creek, Ivan Old-trader and various other natives have sporadically done a little shoveling-in when in need of ready money. The gold on upper Slate Creek is said to be coarse and shotty but with no large nuggets. The creek is said to have good values in gold so far as known, but that the numerous and large boulders make mining unprofitable by hand methods.

Lower Slate Creek occupies a shallow, fairly wide valley intrenched into the Goodnews River lowland. this valley only corresponds roughly if at all with that of a preglacial stream. In places it has been



Down upper Slate Creek towards Ivan Creek



G-7 up Bear Creek from Cabin

Up Bear Creek from Cabin

cut down in post-glacial times entirely through the outwash deposit into the underlying bedrock. Rock bluffs 10 feet high outcrop on both limits of the flood plain near the mouth. On the right limit about $\frac{1}{4}$ mile below the mouth of Cascade Creek there is a rock bluff about 30 feet high. There is also a rock bluff about 10 feet high outcropping on the left limit opposite the mouth of Cascade Creek.

Just below the mouth of Cascade Creek the valley is about $\frac{1}{4}$ mile wide from rim to rim. From there on down the valley rapidly widens to about $\frac{1}{2}$ mile where it debouches into the Goodnews River floodplain. Above the mouth of Cascade Creek the valley is fairly uniform in width but gradually narrows at the upper end to 600 or 800 feet from rim to rim. The grade of the valley is very slight, averaging above the mouth of Cascade Creek about one per cent.

Below the mouth of Cascade Creek no holes have been sunk to bedrock. Between the mouth of Olympic Creek and the mouth of Cascade Creek, George Wickert sank a few holes to bedrock, though where these were located or how many there were is not known. It is said that the depth to bedrock is from 7 to 8 feet, and that good prospects were found. It is also said that several men have run trenches into the rims of the valley all along lower Slate Creek and found encouraging prospects.

There is much confusion in the naming of the claims on lower Slate Creek. From the markings on the stakes, it would appear that the claims were numbered from the mouth upstream. However, as nearly as can be found out, it appears that the original numbering was in reverse of this last method. The mouth of Cascade Creek was originally on the upper end of claim No. 5 Below Discovery.

Bear Creek *1-10-3*

This creek is a small right limit tributary of Canyon Creek

which in its turn is a right limit tributary of Goodnews River. Only 3 on Bear Creek have had work done on them. The width of the valley where this work was done is about 200 feet from rim to rim. This same width seems to be fairly constant for at least a mile upstream and as far as could be seen below the mouth of Gabrielson Creek. The depth to bedrock is from 5 to 7 feet. The grade of the valley is about 2 per cent. The gravel is a coarse subangular wash, but with no large boulders. There is apparently little or no overburden on the creek, the gravel lying directly under about 6 inches of moss and clay. The paystreak lies on the right limit side of the valley. The gold is reddish in color and is said to be worth about \$17.30 an ounce. The mouth of Gabrielson Creek is on the upper end of Discovery Claim and the cabin is on the upper third of claim No.1 Above Discovery. No values are found below Discovery Claim until near the mouth of Bear Creek where good prospects are said to have been obtained. At present the only man mining and prospecting on the creek is Peter Roeser.

About the middle of Discovery Claim, the discoverer of Bear Creek, Charles Danielson, mined out a small pit about 100 square feet in area in 1915 or 1916. This pit is said to have run about 4 cents a bedrock foot. From 1917 to 1919, Wilkins, Smith and Danielson mined a pit 800 feet upstream from the upper line of Discovery Claim, 50 feet wide and 5 feet deep. This pit is said to have run about 12 cents a bedrock foot. On claim No.1 Above Discovery continuing on from the last pit, Peter Roeser in 1929, 1930 and 1931, mined out a pit 100 feet long by 25 feet wide and 6 feet deep. This pit ran about 11 cents a bedrock foot. Beginning about 75 feet below the lower line of claim No.2 Above Discovery, James Ryan mined out a pit during the years 1918 to 1926, 1000 feet long upstream by 75 feet wide and about 7 feet deep. This pit is said to have

run about 10 cents a bedrock foot. Toward the right limit rim and slightly upstream from his present workings, Roeser claims to have sunk prospect holes that show ground running about 20 cents a bedrock foot.

It is thought that Bear Creek occupies part of an old preglacial channel which was much modified during the period of glaciation. The gold is probably of local bedrock origin and has been eroded out and concentrated since glacial times.

Gabrielson Creek ⁴⁻¹⁰⁻¹⁵

This creek is a small right limit tributary of Bear Creek, joining the latter on the upper end of Discovery Claim. The valley of Gabrielson Creek is not over 75 or 100 feet wide from rim to rim at the mouth. Roeser claims that very good prospects have been found on this creek.

Butte Creek ⁴⁻¹⁰⁻¹⁵

This creek is a small right limit tributary of Trail Creek. The valley of Butte Creek seems to be entirely incised in an outwash deposit, probably ~~originating~~ originating in the Island Mountains. The width of the valley floor averages about 800 feet. The average ^{grade} of the valley from aneroid readings, is about $1\frac{1}{2}$ per cent. The paystreak lies on a false bedrock and on the 3 claims worked, is about 7 feet deep. About 400 feet downstream from the upper end of claim No. 1 Below Discovery, there is said to be a limestone reef in place of the false bedrock for a distance of 50 feet. The gravel on Butte Creek is a fine, light ~~wash~~ argillaceous wash with a few large basaltic and other boulders in it. Three claims have been worked on Butte Creek, namely Discovery Claim, No. 1 Below Discovery and No. 2 Below Discovery. The cabin is ~~situated~~ situated at about the middle of claim No. 2 Below Discovery.

In 1929, Howard Kappler drilled for the Clarence Berry estate,

3 lines of drill-holes on Butte Creek. The first line, marked on the sketch map KB-1, consists of 7 holes, so far as could be found, and is situated just above the cabin on claim No.2 Below Discovery. The course of ~~this~~ of this line is approximately true S.7°E. The holes are 50 feet apart. Approximately 1000 feet below drill line KB-1, is line KB-2. This line consists of 7 drill-holes 50 feet apart. The course of the line is approximately true S.3°W. Approximately 660 feet below line KB-2 is line KB-3. This drill-line consists of 7 holes 50 feet apart, and has an approximate true course of S.17°E. A 4-inch Empire handdrill was used for all the holes.

Kowkow Creek *KB-10-14*

This creek is a left limit tributary of Trail Creek of which it constitutes the south or right-hand fork. Kowkow Creek heads in the Island Mountains. However, except for this headwaters portion, the valley of Kowkow Creek is incised into the outwash plain of the Arolic River basin the same as Butte Creek.

The floor of the valley is about 600 feet wide. The grade of the surface from aneroid readings is approximately 2 per cent. The workings on Kowkow Creek are from 100 to 150 feet in elevation above those on Butte Creek. The paystreak lies on a false bedrock from 6 to 8 feet deep where the ground was worked, but deepening to 10 feet in the line of drill-holes below the last workings. On the upper end of claim No.2 Above Discovery, the true bedrock is said to lie at a depth of 8 feet or 2 feet below the false bedrock. No values were found on the true bedrock. The paystreak was worked from 50 to 75 feet wide. It lay in the middle of the valley on the upper claims but showed a tendency to swing towards the left limit farther down stream. The ground is very rocky, the gravel being dark-colored and subangular. Many boulders up to 2 feet in

diameter lie near the surface but disappear towards bedrock where the gravel is said to be fairly fine.

Three claims were worked on Kowkow Creek, Discovery Claim by Charles Danielson, No.1 Above Discovery by Gabrielson, and No.2 Above Discovery by George Wickert. Besides the above men, other men worked on lays on the same ground. The worked ground begins on claim No.2 Above Discovery about 300 feet above the upper drill-line shown on the sketch map as KK-4. The workings then continue downstream to within about 700 feet of drill-line KK-1.

In 1928, H. C. Fohn-Hansen drilled a line of ~~dx~~ 6 holes (drill-line FHK-1), all apparently on the left limit and about 600 feet upstream from the mouth of the creek. At the drill-hole marked No.9, the total depth was 8 feet. The depth to the false clay bedrock was 6 feet and the water level from the surface was $2\frac{1}{2}$ feet.

At the drill-hole marked No.10, the total depth was 10 feet. The depth to false bedrock was $5\frac{1}{2}$ feet and the water level was at $1\frac{1}{2}$ feet.

At the drill-hole marked No.11, the total depth was 9 feet. The depth to false bedrock was $7\frac{1}{2}$ feet and the water level was at 2 feet.

At the drill-hole marked No.12, the total depth was 8 feet. The depth to false bedrock was $7\frac{1}{2}$ feet and the water level was at 2 feet.

At drill-hole marked No.13, the depth to false bedrock was 9 feet and the water level was at $1\frac{1}{2}$ feet.

On the left limit and at about the middle of Discovery Claim, Fohn-Hansen drilled a hole marked No.7 (FHK-2 on the sketch map). The depth to false bedrock was 6 feet and the water level was at 3 feet.

On the left limit and at about the middle of claim No.1 Above Discovery, Fohn-Hansen drilled a line of 3 holes, ~~XXXXXX~~ (drill-line FHK-3 on the

sketch map). At the drill-hole marked No.4, the depth to false bedrock was 6 feet and the water level was at 3 feet.

At the drill-hole marked No.5, the depth to bedrock was ~~xx~~ 6 feet and the water level was at 3 feet.

At the drill-hole marked No.6 , the depth to bedrock was 7 feet.

IN 1929, Howard Kappler drilled Kowkow Creek for the Clarence Berry estate. The lowest drill-line, KK-1, consists, so far as could be found, of 5 holes 50 feet apart. The course of drill-line KK-1 is approximately true S.53°W.

Drill-line KK-2 is upstream about 2000 feet from drill-line KK-1. It consists of at least 8 holes 25 feet apart. The course of drill-line KK-2 is approximately S.61°W.

Drill-line KK-3 is upstream about 1300 feet from drill-line KK-2. It consists of at least 7 holes 50 feet apart. The course of drill-line KK-3 is approximately S.40°W.

Drill-line KK-4 is upstream about 1000 feet from drill-line KK-3 and consists of at least 5 holes 50 feet apart. The course of drill-line KK-4 is approximately S.51°W.

At present the only man working on Kowkow Creek is George Wickert, who is attempting to run a small drain up the creek so as to mine the ground at drill-line KK-1 where very good pay (up to \$3 a bed-rock foot) is said to have been obtained.

Trail Creek

This creek is a right limit tributary of Fazo Creek about 4 miles above the mouth of the same. Trail Creek receives as tributaries both Butte and Kowkow Creeks. It heads into the Island Mountains, but outside of this headwaters portion, its valley is incised in the outwash

material covering the Arolic River basin.

The grade of Trade Creek above the mouth of Kowkow Creek (upper Trail Creek) is about $2\frac{1}{2}$ per cent. The width of the valley of upper Trail Creek is about 600 feet. The grade of Trail Creek below the mouth of Kowkow Creek (lower Trail Creek) is about $1\frac{1}{2}$ per cent. The width of the valley of lower Trail Creek is about 800 feet and gradually merges into the wide valley of Faro Creek.

Lower Trail Creek has been too deep and wet for the miners to prospect or work. Also much of the ground has been held in years gone by for speculative purposes.

In 1928, H. C. Fohn-Hansen drilled a line of 2 holes (drill-line FHT-1), situated about 1 mile below the mouth of Kowkow Creek. At the drill-hole on the left limit marked No.14, the total depth was 23 feet. The depth to false clay bedrock was 20 feet and the water level below the surface was 2 feet. At drill-hole on the right limit marked No.15, the total depth was 9 feet. The depth to false bedrock was 9 feet and the water level was at 2 feet.

Why Trail Creek above Kowkow Creek does not have pay on ~~xx~~ it, since it heads into Island Mountain and runs through the same outwash material as Kowkow Creek, is one of those peculiar enigmas of every placer field. Trail Creek prospects gold but the amount is not enough for mining. It may be that since the true bedrock lies near the surface on Trail Creek, and because the valley is much shallower than that of Kowkow Creek, there has not been enough material worked over to concentrate sufficient gold for economic mining. However only detail study bring out the true explanation.

At present George Wickert is doing a little prospecting during

his spare time on upper Trail Creek.

Faro Creek *101-16*

This creek is the largest left limit tributary of Arolic River. The grade of the creek is very slight being not over one per cent. The valley is incised, so far as seen, entirely in the outwash material covering the Arolic River basin. The width of the valley floor is from about $\frac{1}{2}$ mile at the mouth of the creek to about $\frac{1}{4}$ mile about the mouth of Trail Creek.

At the mouth of Faro Creek, Frank V. Smith sank for the Hammon interests of San Francisco, a line of drill-holes. These will be described later with those on the Arolic River.

Between August 16 and August 20, 1930, Smith sank a line of drill-holes (drill-line SF-1 on the sketch map) just above the mouth of Canyon Creek. This drill-line consists of 2 holes, one on each side of the creek, and about 600 feet apart.

Above the mouth of Trail Creek, George Wickert and John Haralan did some prospecting. This place was not visited as all traces had been obliterated. The description of the work done as obtained from Wickert is as follows: At the mouth of Station Creek (Dry Creek) found prospects of fine shotty gold. Between mouth of Trail Creek and mouth of Station Creek ran a drain about 500 feet long but could not reach bedrock because of lack of grade. However, panned $\frac{3}{4}$ ounce gold from bottom of drain. Sank 3-inch drill-hole 23 feet to true bedrock and obtained about 1 grain of gold from drillings - making the ground at that particular spot run about 96 cents a cubic yard.

Fox Creek *101-21*

This creek is a small left limit tributary of Arolic River about $1\frac{1}{2}$ miles above Faro Creek. It heads into the same rounded hills known as "The Buttes", as does Butte Creek. The grade of the valley of Fox Creek is fairly steep being about 2 per cent. All the upper end of Fox



Arolic River near mouth of Faro Creek



Drilling on Arolic River near mouth of Faro Creek

Creek is said to show good prospects. On Gully Gulch, a small right limit fork about $\frac{1}{4}$ mile from the head of Fox Creek, Wickert and McGary spent one season trying to mine but had to desist because of lack of water. The ground is said to have run 10 cents to the bedrock foot and to be 6 feet deep.

Deer Creek *KX101-21*

This creek is a left limit tributary of Arolic River about $3\frac{1}{2}$ miles above Fox Creek. Although steep and narrow, Deer Creek should have pay on it. However, so far as known at present, though fairly good prospects have been found, there is not enough concentration of gold to justify mining.

Keno Creek *KX101-21*

This creek is a large right limit tributary of Arolic River about 2 miles above Fox Creek. Because of lack of time and the difficulty in crossing Arolic River, it was not visited.

Quite a little prospecting and some mining near the head, has been done on Keno Creek. On lower Keno Creek, Haralson and Wickert sank a drill-hole 22 feet deep. No bedrock was reached but 3 grains of gold (about \$2.85 a cubic yard) are said to have been obtained from the drillings.

Snow Gulch *KX101-22*

This creek is a small right limit tributary of Arolic River, about one-half mile above Fox Creek. The valley of Snow Gulch lies entirely within the mountains enclosing the Arolic River basin on the north. The valley is about 300 feet wide and has a grade of about $2\frac{1}{2}$ per cent. Where the valley debouches into that of Arolic River the depth to true bedrock is said to be seven feet. Farther up the valley the depth to bedrock is about seventeen feet. There are many large



Smith's camp on Arolic River near mouth of Fox Creek



Drilling on Arolic River near mouth of Fox Creek

rocks near the surface on Snow Gulch, but the gravel near bedrock is said to be fairly fine.

Wickert, Haralsen and Gabrielson drilled and attempted for two seasons to mine on Snow Gulch, but had to quit because of boulders and lack of water. The ground is said to have run sixty cents a bedrock foot.

AROLIC RIVER 12+101-237

This is the main stream of the northern part of the Goodnews-Arolic Goldfield. At a minimum stage of water the Arolic River above the mouth of Faro Creek (upper Arolic River) is about 100 feet wide and 1 or $1\frac{1}{2}$ feet deep on the riffles. The valley of Arolic River is entrenched in the outwash material of the Arolic River basin. About $2\frac{1}{2}$ miles below the mouth of Faro Creek on the lower Arolic River, in the so-called canyon of the Arolic, the valley is confined between rock walls cut by glacial action. The grade of the valley is steeper than that of Goodnews River being from aneroid readings on the lower Arolic River about 0.4 per cent. The grade of the valley of the upper Arolic River is, from aneroid readings, about 0.7 per cent. There are many rocks up to $1\frac{1}{2}$ feet in diameter lying on some of the bars along the river. However, as a rule, the gravel is a coarse, angular wash, with no large boulders.

Just below the mouth of Keno Creek, Haralsen and Wickert drilled a line of three holes. The first drill-hole on the right limit was bedrocked at 19 feet. The second drill-hole towards Keno Creek, was sunk 47 feet with no bedrock. The third hole still further towards Keno Creek, was sunk 17 feet with no bedrock. No prospects were found below 17 to 19 feet.

In 1928, H. C. Fohn-Hansen and others drilled a line of five holes (drill-line FHA-1) about 1/8 mile above the mouth of Snow Gulch. Three of these drill-holes were on the left limit and two on the right limit. The depths of these holes were from 17 to 27 feet. About 300 feet below the mouth of Faro Creek, Fohn-Hansen drilled a line of three holes (drill-line FHA-2). The drill-hole marked No. 2 is situated on the left limit about 800 feet from the river. The total depth of the hole was 34 feet. The depth to false clay bedrock was 22. The waterlevel from the surface was at 6 feet. The drill-hole marked No. 16 is situated on the right limit of Arolic River about 100 feet from the river. The total depth was $31\frac{1}{2}$ feet. The depth to false clay bedrock was 21 feet. The water level from the surface was 2 feet. The drill-hole marked No. 17 is situated about 900 feet east of hole No. 16. The total depth was 25 feet. ~~The depth to false bedrock was 20 feet.~~ The depth to false bedrock was 20 feet. The water level from the surface was at 20 feet.

About 1/8 mile above the mouth of Boulder Creek, Fohn-Hansen drilled a line of 3 holes (drill-line FHA-3). The drill-hole marked No. 19 is situated on the left limit about 500 feet from the river. The total depth was 22 feet. The depth to false bedrock was 19 feet. The water level was at 4 feet. The drill-hole marked No. 1 is situated on the left limit about 100 feet from the river. The total depth to bedrock was 32 feet. The depth to false bedrock was 22 feet. The drill-hole marked No. 18 is situated on the right limit about 600 feet from the river. The total depth was 24 feet. The depth to false bedrock was 21 feet. The water level was at 20 feet. Fohn-Hansen also drilled one hole, marked No. 3, about 2.3 miles below the

mouth of Boulder Creek on the right limit. The total depth of this drill-hole was 25 feet. Between June 24 and July 6, 1930, Frank V. Smith drilled for the Hammond interests of San Francisco, a line of 3 holes 150 feet apart about 1 mile below the mouth of Keno Creek (drill-line SA-4). One drill-hole was on the left limit about 50 feet from the river. The other 2 holes were on the right limit. The course of drill-line SA-4 is approximately N. 17° E. The width of the valley floor at this place is about $1/4$ mile. About $1/2$ mile below the mouth of Snow Gulch, between August 5 and August 14, 1930, Smith drilled a line of 3 holes (drill-line SA-3) 300 feet apart on the left limit of the river. The course of drill-line SA-4 is approximately N. 27° E. Very good results are said to have been obtained in this drill-line. The valley floor at this place is about $1/2$ mile wide. Between July 14 and August 4, 1930, Smith drilled a line of 5 holes (drill-line SA-2), across Arolic River and Faro Creek just above the mouth of Faro Creek. Three drill-holes, about 500 feet apart, are on the left limit of Faro Creek. One drill-hole is between Arolic River and Faro Creek, and one drill-hole is offset just below the mouth of Faro Creek on the left limit about 100 feet from the river. The course of drill-line SA-2 is approximately N. 68° E. The width of the valley floor at this place is about $3/4$ mile. Between August 21 and August 31, 1930, Smith drilled a line of 3 holes (drill-line SA-1) about 600 feet below the mouth of Faro Creek. One hole was drilled about 300 feet from the river on the right limit, one hole about 75 feet from the river on the left limit and one about 500 feet from the river on the left limit. All holes were

sunk from 20 to 25 feet deep to the false clay bedrock, except the last hole of drill-line SA-2, which was sunk 40 feet - with no bedrock. A 4 inch Empire hand-drill was used for all of the holes.

FUTURE DEVELOPMENTS

Unless new creeks are discovered, the Goodnews-Arolic Goldfield is finished so far as the hand methods of mining of the past are concerned. It is possible that other creeks flowing from the Island Mountains may carry sufficient pay to mine on further prospecting. The same condition may also be found in some of the creeks heading into the mountains to the southeast of the Arolic River basin. So far as can be ascertained, only one man has prospected toward the head of the Goodnews River. Also no one seems to know of any prospecting having been done to the east and northeast of the Arolic River basin towards the heads of Tyone Creek and Flat Creek. However, the future of mining in this area, under the present status, seems to lie in dredging. The whole Goodnews-Arolic Goldfield is just south of the line of permanently frozen ground. Thawed ground and water, the two things which most hamper the prospector and "pick and shovel" man, are a boon to dredging.

In the Goodnews River lowland it may be possible, after carefully investigating and drilling, to find a dredging area for a small dredge on Slate Creek. In the Arolic River basin, Arolic River from about the "igloos" to about the mouth of Deer Creek, might possibly prove a dredging area. Faro Creek from the mouth to about Dry Creek (also taking in lower Butte, Trail and Kowkow Creeks) might possibly prove another dredging area. If these areas could be handled, along with a possible area south of Goodnews Bay, under one management, quite an attractive dredging field might present

itself.

In reviewing the foregoing data, a tentative explanation of the origin of the paystreaks in the Arolic River basin may be given as follows:- After the retreat of the great mass of ice from the area, there must have been, as stated before, many small alpine glaciers in the mountains. The discharging waters from these glaciers, after they had first dropped their load of outwash material, greatly raised the amount of water in the streams so that the outwash material previously laid down was actively eroded and sorted. Since that time the main streams have not been able to carry away all the detritus brought to them by their tributaries and have been slightly aggrading their beds. This applies especially to the streams in the Arolic River basin and not so much to the streams flowing into the Goodnews River where, due to few residual glaciers, a more normal and continuous type of erosion has taken place. In the Arolic River basin, therefore, the depth of the concentration is from 10 to 25 feet below the present surface.

Irving Reed

The creeks in this area that have produced gold are all right limit tributaries of the Goodnews River heading into one small group of mountains east of Barnum Creek.

The largest former producer is Wattamoos Creek (spelled on the map Wattamus Creek). This creek is a small right limit tributary of Cascade Creek, a tributary of Slate Creek, a right limit tributary of the Goodnews River. The creek has been practically worked out. It is at present owned by Edward "Slim" Smith, who every summer prospects and takes out a small amount of gold just below the junction of Wattamoos and Cascade Creek. At present Smith is on Hagemeister Island prospecting for quartz. However, he intended to come back later in the season and work on Wattamoos also.

The next creek above Wattamoos Creek and about one and one-half miles east, is Olympic Creek. This has produced a small amount of gold but is practically worked out. Peter Roexser lives on Olympic Creek in the winter. He does a little prospecting and work here in the early spring and late fall.

About 3 miles east of Olympic Creek is Slate Creek, the main creek of the section and to which the other pay creeks in the section, with the exception of Bear Creek, are tributary.

A little money has been produced along this upper section of Slate Creek. At present only a native named Ivan Oldtrader works here sporadically in the fall.

About 4 miles east of Slate Creek is Bear Creek which runs east instead of south like the other creeks in the district,

and is a tributary of Canyon Creek which is a right limit tributary to the Goodnews River. This creek still has quite a little ground unworked though so far all the virgin ground left has proven very low grade. Peter Roeser is mining and prospecting in the summer on this creek on No. 1 Above Discovery