Mineral exploration in the

Yukon Territory

Placer gold occurrences along the tributaries that flow from both sides of the watershed divide which hosts the Top of the World Highway and eventual correlations among their sources.

June - September 2019

by Sandro Frizzi, geologist and prospector of Dawson City.

Top of the World Highway seen from South (Twelve Mile Ridge)

Introduction:

During the summer of 2019, our placer-exploration team dedicated an extensive prospecting and testing campaign to the creeks that flow from both sides of the watershed divide between Sixty Mile, Forty Mile and Swede Creek orographic basins.
The divide consists in a long sequence of ridges composed by an assemblage of different rocks packed in bands with a NE-SW general trend. Those rocks are metasedimentary, metavulcanic and volcanic, with different types of intrusions.
The hillcrest of the divide hosts the world-famous Top of the World Highway: 106 kilometers of unpaved road with its course parallel to Tintina Trench, the great fault located few kilometers north. This highway runs from Dawson City through the Alaskan borders and carries on for 20 kilometers to Jack Wade.

The purpose of our research is to locate the sources and possibly to understand the dynamics of the placer gold occurrences exposed along the majority of the tributaries of Sixty Mile River, Forty Mile River and also along some part of Swede Creek.
All these creeks have in common the location of their headwaters which are springing from both sides (south- and north-facing) of the Top of the World, the directions of their valleys (≈ N-S), and the fact that they all carry placer gold in different concentrations.

Our hope is also to find out if those hills that form the watershed divide are somehow structurally related with the presence of the gold found in the area.

Between June and September of 2019 we jumped all over this large mining district to collect gold samples, concentrates and rocks to analyze for a better understanding of the geochemistry of these areas and to trace eventual veins and veinlets.

Gold samples have also been sent to professor Robert Chapman of Leeds University (several of his publications could be found at http://virtua.gov.yk.ca:8080), a well-known British researcher specialized in tracking down the origins (primary deposits) of placer gold through the analysis of the micro-inclusions trapped in each specimen. Beside the determination of its genesis, the information produced by the analysis of professor Chapman could help us to locate the principal gold–feeders of the area, which is the ultimate goal of every placer explorer.

Thanks to the many test-pits dug during this past summer along the goldfields of this western part of the Yukon (see map on page 10) we discovered promising concentrations of gold in areas that haven't been previously considered. These finds are of great importance and will help us to develop new targets for the booming placer industry of the Yukon.

***Important note**: this report is not intended to be an academic treatise and some of our basic observations regarding the former glacial activities occurred along these areas together with our interpretation of the geology of these valleys are still open to further debates. The main purpose of our work has always been to provide practical and useful information regarding our gold finds to placer miners in search for new ground.*

Sandro Frizzi

Mining at California Creek

1- Brief history of Forty Mile, Sixty Mile and Swede Creek districts and our reasons to explore those areas

…"Arthur Harper and his partner Mr. Bates located the first gold-rich gravel on the Forty Mile River in 1881 but he was unable to locate the spot in the following year…
…Howard Franklin and five other prospectors left the gravel bars of the Stewart River to prospect on the Forty Mile River in September 1886. About 150 metres on the Alaskan side of the boundary they found exposed bedrock and panned out coarse, flattened fragments of gold, the first of its kind found in the Yukon River drainage….
…Frank Buteau and others were attracted by the rich Forty Mile strike and 115 men were working on the river in the summer of 1887. Buteau staked midway between the two bars and became the "King of the Forty Mile" when he took out 150 ounces of gold that year….
…Those who did not strike it rich were compelled to look elsewhere and gold strikes on the Sixty Mile River (1892)"… (Tr'ondek Hwech'in Heritage, 2011)

…"Since the second half of 1800, the Sixty Mile mining district has been known for been one of the best producer of placer gold among the entire Yukon. Up to these days more than 1,000,000 ounces have been recovered, for the most part after 1975"… (Le Barge, 2006).

Aside Sixty Mile and Forty Mile River itself, the most prospected and exploited creeks of this area have been: Glacier, Miller, Bedrock, Little Gold, Walkers Fork, Poker, Davis and Moose. On the other side, many creeks located in these same districts have been neglected (Browns, Bruin, Swede, California, Twelve Mile, etc.) because considered "not rich enough" when the gold price was much lower than what is on these days.

Since the rising of the gold demand started by the beginning of this century (2002), the perspective of a new global gold-rush pushed our group to reconsider all those goldfields classified as "low-grade" placer deposits by the previous generations of geologists and abandoned when the price touched its lower peak (1982-2001).
When we decided to start testing these abandoned placers, the mining districts of Forty Mile and Sixty Mile were the most neglected areas among the historical goldfields with records of proven gold: Browns, Bruin (except for its lower end), California, Swede, Twelve Mile Creek and a bunch of other minor tributaries, were in oblivion since decades and open for us to be re-staked and explored with modern equipment.
In 2005 we started a first approach with a small-scale exploration on Browns Creek. We staked 2 miles of lease where in the following year we exposed very decent quantities of coarse placer gold from few upper benches with shallow bedrock.
In 2007 we recovered similar amounts of medium-fine gold along central Bruin Creek.
In 2009 we dug few specimens of medium-coarse gold along the upper part of Swede Creek and we finally decided to start a serious exploration campaign by acquiring 10 miles of leases starting from its headwaters.

In 2014-15 we staked few leases along California Creek, Twelve Mile Creek, and Five Mile Creek, where we exposed different quantities of gold, not always substantial.
Our persistent activities in the area attracted attentions and induced the beginning of a local staking rush: in short time those three orographic basins of Forty Mile, Sixty Mile and Swede Creek witnessed a series of frantic prospecting activities and today this region is literally covered by placer properties and active mining operations.

Among the now-called “Top of the World Goldfields” in short time we created 5 fully licenced mining properties and three of those are already in production: “Eos” at California Creek, “Ra” at Twelve Mile Creek and “Nyx” at Bruin Creek.
We are also indirectly responsible for the mining activities started at Browns, Bruin and Moose Creek, where different enterprises decided to mine on properties staked by others after the positive results of our prospecting campaigns of 2005-09.

Mining at Bruin Creek

2- Our placer exploration system

The many years dedicated to explore for placer gold helped us to develop a simple though efficient 'standard exploration procedure' which allow us to perform exhaustive testing campaigns in short time and with reasonable budgets.
Here below are described the main steps followed by our crew:

1) **Collection of historical information**: for this purposes the web-site of the Yukon Mining Recorder (yukonminingrecorder.ca) with his section "EMR Mining Assessments" is by far the most important source of data available online: geology, exploration reports, mining activities, historical facts, actual and former claim owners, legislation, etc. etc. can be easily found under this link.
   The on-line research for new targets is mostly done during the winter.

2) **Preliminary airborne exploration (drone)**: after individuating a target to explore we perform a first macroscopic examination of the area of interest by analyzing the aerial pictures provided by our drone Mavic 2 Pro.
   These exceptionally-detailed aerial views are providing fundamental information regarding the morphology of the entire area, which help us to locate the most suitable sections of the valleys to test for placer gold deposits. The aerial maps are also indispensable to search for an eventual presence of old roads or trails to reach those targets in a quick way, without the necessity of building new routes with costs of time and money.

Engineer Joerg Lotz preparing his drone for survey

3) **Field exploration**: no new technology could possibly bypass the field-work of a geologist, …but it will certainly help to reduce his long journeys, thanks to the possibility to precisely outline 'areas of interest' to be prospected (step 1-2).
   The direct observation of geological and geomorphological conditions is the only way to obtain information which are fundamental in placer mining, like the composition of the bedrock and its alluvium, the existence of minor structures or hidden benches, the frozen levels of the ground, the types of vegetation, etc..
   It's hard to replace the validity of those information achieved by panning, digging, or collecting rocks directly in the field!

4) **Geophysical survey**: in 2014 our group discovered the advantage to perform geophysical surveys (in our case by using two geo-radars) before start digging

Sandro with the GPR Oerad Scudo-500 at 12 Mile

with heavy equipment. At that time we were testing the floodplain of Big Creek (map 115P15), which is today one of the major active placer gold mine in the Territory, an alluvium complicated by a series of past glacial activities.
After digging a bunch of useless test pits in areas where the bedrock was too deep, we decided to hire a geophysicist for a quick geo-radar survey aimed to locate spots where the alluvium was shallow enough for our excavator.
The geophysicist produced a map which indicated the profile of the bedrock on determined cross-section of the valley: by following those indications we managed to successfully dig new test-pits in shallow ground, and we finally reached the bedrock where we exposed good gold!
After that experience our company invested in two different models of geo-radar (Oerad Scudo 500 and Oerad Dipole 300) which are today helping Sandro to decide where to start digging new pits on virgin ground.
Beside those geophysical devices, in order to locate the bedrock's depth when the geological conditions are limiting the use of the geo-radar (presence of groundwater or layers of clay are reducing the penetration of EM waves!), or when the bedrock is too deep for it (the geo-radar can barely reach 25 feet of depth) our company acquired an hydraulic auger-drill Hydra-hammer, mounted on a tracked Bombardier Muskeg.
The drill operate with rods of 6 and 8 inches and can easily reach depths of more than 40 feet.

5) **Mechanical digging**: on these modern days hand-digging is becoming more and more an useless waste of time. The legendary "juicy and shallow" placers have been almost completely exploited during more than a century of mining activities. The available goldfields left in the Yukon are for the most part low- to medium-grade type of deposits (1 oz per 80 to 200 m^3) with bedrocks lying at depths > 15-20 feet. Mostly with deeply frozen overburden or complicated by the presence of groundwater right below the surface. For all these mentioned reasons those placers have been carefully avoided by the old-timers and are now available for us to be found and exploited, mostly thanks to an exceptional gold price.
In order to test new ground our company acquired two excavator with different technical characteristic and manoeuvrability in the field: Hitachi 200 Ex (19 tons) strong enough to perform some serious digging, and Komatsu PC 138 (14 tons) , light and compact to walk through rough ground toward distant targets. **Both of them weight less than 20 tons, as required by the current legislation in order to operate under Class 1 Mining Permit**.

The best advantage of these medium-size excavators is the possibility to be easily carried around with a semi-truck: in placer exploration the logistic is probably the major source of expenses!
After digging to bedrock, the gravel is washed onsite through a towable shaker equipped with 8 feet of conventional sluices and able to process up to 20 cubic meters of material per hour. In remote expedition we use smaller high-bankers.

6) **Analyzing gold and concentrates and mapping the data**: after sluicing the gravel collected from the test-pits, all the samples of gold and concentrates are separated and labelled, then analyzed under the microscope.
An attempt classification of the gold-features, together with the identification of the heavy minerals present in the concentrates, will help the geologist to determine the origins of the placer gold and help to locate the areas with better concentrations.

In placer exploration the equipment is constantly on the move

3- Location of prospected and tested areas

In the next pages there are three maps with different views (topographic and satellite) of the areas prospected by us during this summer of 2019.
Those maps are revealing the great extension of those three orographic basins that captured our attentions (outlined in red on map at page 12): the portion belonging to the right limit tributaries of Forty Mile Creek (775 km^2); the ones belonging to the left limit tributaries of Sixty Mile River (540 km^2); and part of the basin of Swede Creek (510 km^2). Together the explored area is measuring 1,825 km^2 and represents a serious placer gold resource for the modern mining industry of the Yukon.

Thanks to the mining-related activities occurred in that region during more than a century of history (Forty Mile and Sixty Mile goldfields were discovered before the first Gold Rush) big part of the watercourses present in the area are today reachable by an extended network of roads and trails of different ages. Some of those are in excellent condition and well maintained by the Yukon Highways Department (Top of the World Highway, Clinton Creek Road, Sixty Mile Road), other have been lately upgraded by the mining companies active in those areas (Browns-Bruin access road, California Creek roads and trails, Glacier and Bedrock Creek roads), and some are just abandoned paths in rough condition, barely driveable with good 4x4 vehicles or just with ATVs.

Top of the World roads could be quite busy during the summer

1-2...
= areas prospected and tested in 2019
scale 1 : 320,000
watershed divide
(Top of the World Highway)
Fortymile
Sixty Mile
Dawson City
Forty Mile
Swede Ck.
California Ck.
Twelve Mile Ck.
Five Mile Ck.
Big Gold Ck.
Glacier Ck.
Miner Ck.
Bedrock Ck.
Pat Murphy Ck.
Little Gold Ck.
Moose Ck.
Browns CK.
Bruin Ck.
Poker Ck.
Davis Ck.
Walker Ck.
ALASKA
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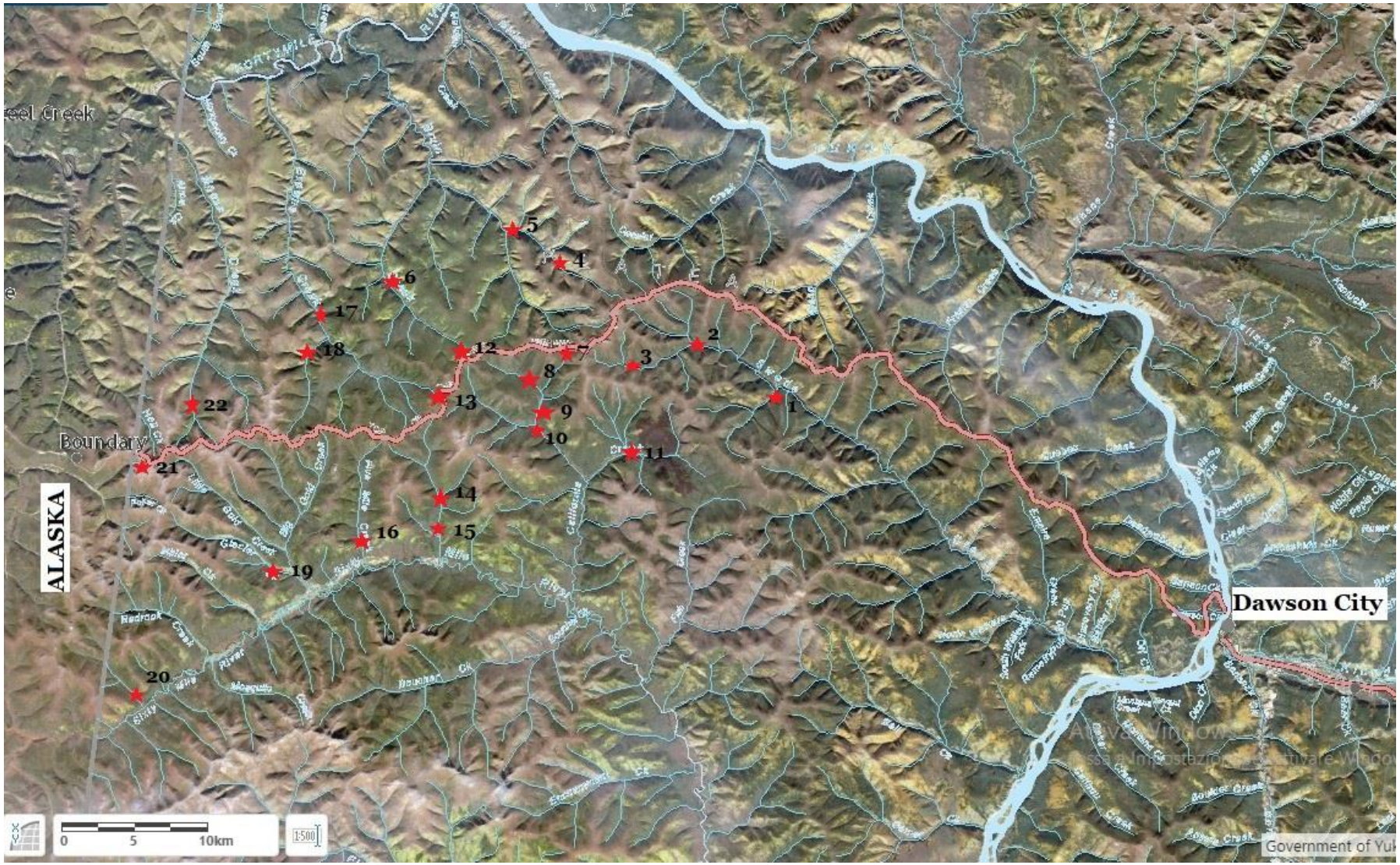
Boundary
ALASKA
Dawson City
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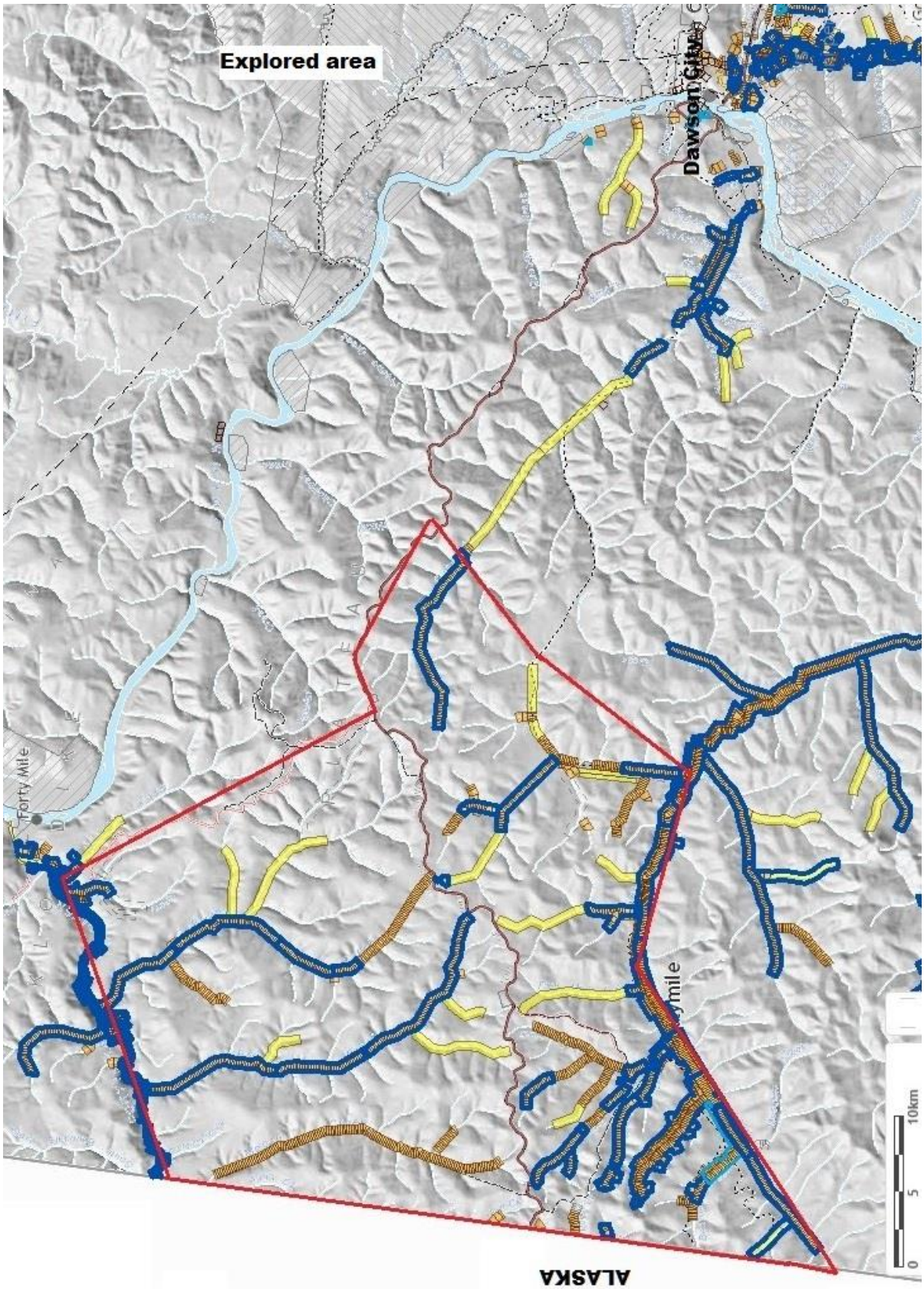

Explored area
Dawson City
Forty Mile
ALASKA
10km
5
0

UTMs

Location#	Easting	Northing
1	543452	7116797
2	537510	7119156
3	540553	7118635
4	525757	7124589
5	523345	7125160
6	515274	7121549
7	527621	7117177
8	526720	7114849
9	527462	7113804
10	527150	7112086
11	533209	7110637
12	522260	7115783
13	520657	7113641
14	521559	7105837
15	521704	7103727
16	516065	7103126
17	510196	7119004
18	511665	7115720
19	511416	7099818
20	502209	7089846
21	500059	7105825
22	503278	7111252

4- Fieldwork done between June and September

Here below are listed all the creeks prospected and tested by our team between the end of May and the end of September of 2019.
The locations (UTM) of our activities are marked and numbered in the previous maps.

Swede Creek (1-2-3)

We started the season by returning to the lower part of Qi Property (**#1**), where the creek makes a 90 degrees sharp bend on a strike-slip fault and where in 2009 we dug and exposed the first gold (UTM 543452-7116797).
This ground was never mechanically mined.
By the confluence of Swede Creek with a short (3km) left-limit tributary, with the headwater located on the south slope of the watershed divide, there are few remains of cabins dating back to the first Gold Rush and surrounded by piles of washed material which make us believe that we are looking for gold in the right spot: those old-timers couldn't afford to waste time to build cabins and to dig for nothing!
During this last exploration we obtained the impression that part of the gold could be possibly come from the tributary, as suggested by the location of some piles of tailings. The fault which here is crosscutting the main valley could also be a gold feeder (is it related with the Pika fault?). Thanks to an epic down-hill trip from the Top of the World Highway, in 2018 we managed to walk our excavator Komatsu Pc138 right to the creek where we exposed only a limited amount of bedrock (≈ 50m^2) from three pits dug on the right side of the floodplain. The extremely frozen condition of the ground (we arrived too early in the season) together with the presence of big slabs of rock-debris fallen from the surrounding cliffs and scattered along the bottom, drastically limited the performances of our 14 tons excavator.
The bedrock lies between 3.5 and 4.5 meters of depth.
The gold recovered by using a portable high-banker equipped with a 2" pump, is mostly composed by medium size flakes (≥ 18 mesh) and seems to be fairly travelled (see picture on chapter 7). From our tests we didn't produce enough gold to justify a mining operation, probably because we were forced to dig on the external margins of the alluvium, in the 'side-pay zone'.
Accordingly with the sharp V-profile of Swede Creek Valley, the main pay-streak should be quite narrow and could easily be missed.
For 2020 we are now planning to crosscut the entire floodplain with a bigger excavator, in order to possibly intercept and expose a better concentration of gold.

In August, after flying a drone along the upper half of our Qi claims (from Qi 17 to Qi 55), we chose a potentially-good area (#**2**) where to drive our biggest excavator: the Hitachi 200 EX.

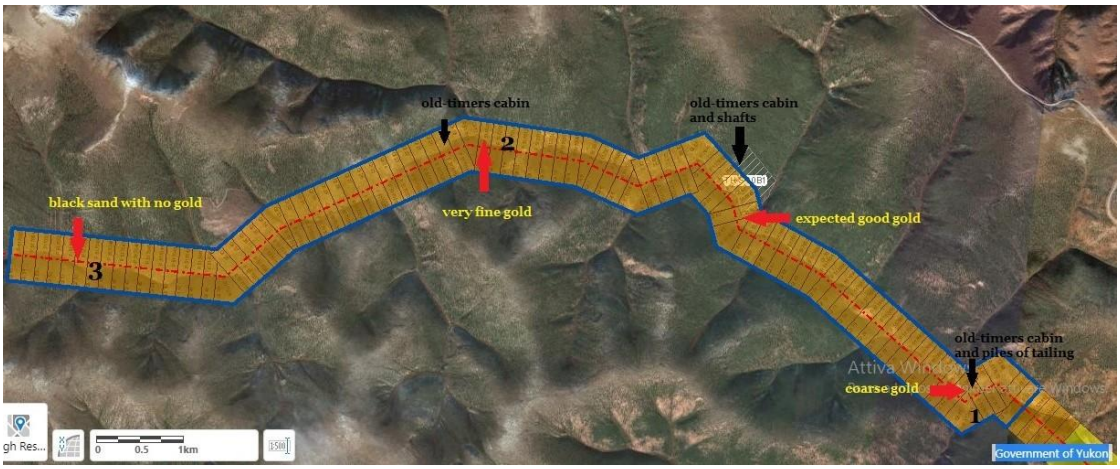
Here we dug a bunch of trenches crosscutting the narrow valley of a left limit tributary, right above its confluence with Swede Creek (UTM 537510-7119156). We recovered very poor gold: that tributary is not a good gold carrier!

Then we excavated along the main valley, also with modest results: ounce again fine gold and not enough.

We now suspect that the only good gold deposition of our Qi Property is probably occurring downstream from here, as testified by the presence of another old cabin (UTM 540553-7118635) surrounded by a bunch of production-shafts and located by the mouth of a short left-limit tributary (3 km) which could be responsible for the presence of the gold in that area. Those three miles tract of property enclosed between #**2** and #**1** (claims Qi 60 and Qi 90) will be bulk-sampled during the mining season of 2020, hopefully with positive results.

*Only fine gold has been recovered at #**2***

To complete this 2019 testing-campaign at Swede Creek, on location #**3** we dug few trenches with our Hitachi 200 EX and tested that gravel: no gold has been recovered by the proximity of the headwaters, just a huge quantity of black sand composed for the most part by magnetite and garnets (see chapter 6).



Qi Property on Swede Creek

Marble bands crossing the valley

Bruin Creek (4-5-6)

In 2016 at Bruin Creek our company created the Nyx Property (#**6**): 13 claims staked on the upper part of the creek along the mile where in 2007 we found good gold in virgin ground and at shallow depth. Since 2018 this property has been optioned to Taiga Ventures Ltd., a small family-owned enterprise which is mining it with good results.

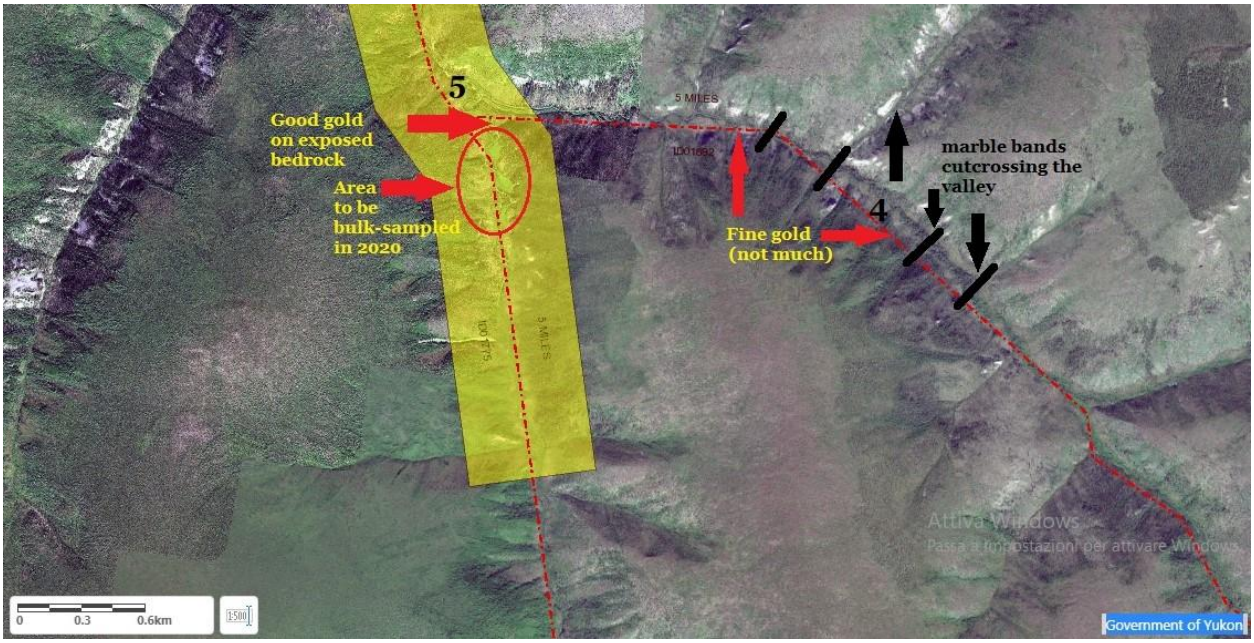
On the left branch of Bruin two years ago we staked the 5 miles of prospecting lease ID01775, explored by our crew during this past summer.

In July, while scouting and testing the upper part of this branch (#**4**), we found and recorded traces of fine gold, but also an unfavourable (for placer mining purposes) geological situation due to the presence of sequences of karst marble bands which are crossing the narrow valley with the typical NE-SW trend. This fractured geological formations are intercepting the placer gold which runs downstream and this will complicate its recovering for the miners: the gold will settle deep in the fractured marble and the extraction will become very hard on the equipment.

*Exposed bedrock with good gold at #**5***

For these reason we decided to quit exploring this upper part of the creek and we moved a bit down, along this same branch (#**5**) where we found a nice bench with exposed bedrock and alluvial gravel on it. By washing that gravel and a small portion of bedrock through a portable sluice, we recovered a good quantity of fine gold (18<mesh<35): enough to determine that these 5 miles of lease have the potential to host profitable gold concentrations.

For the exploration season of 2020 we are now planning an extended sampling campaign which will cover the entire length of our prospecting lease ID01775.



The upper portion of the left branch of Bruin Creek tested during summer 2019

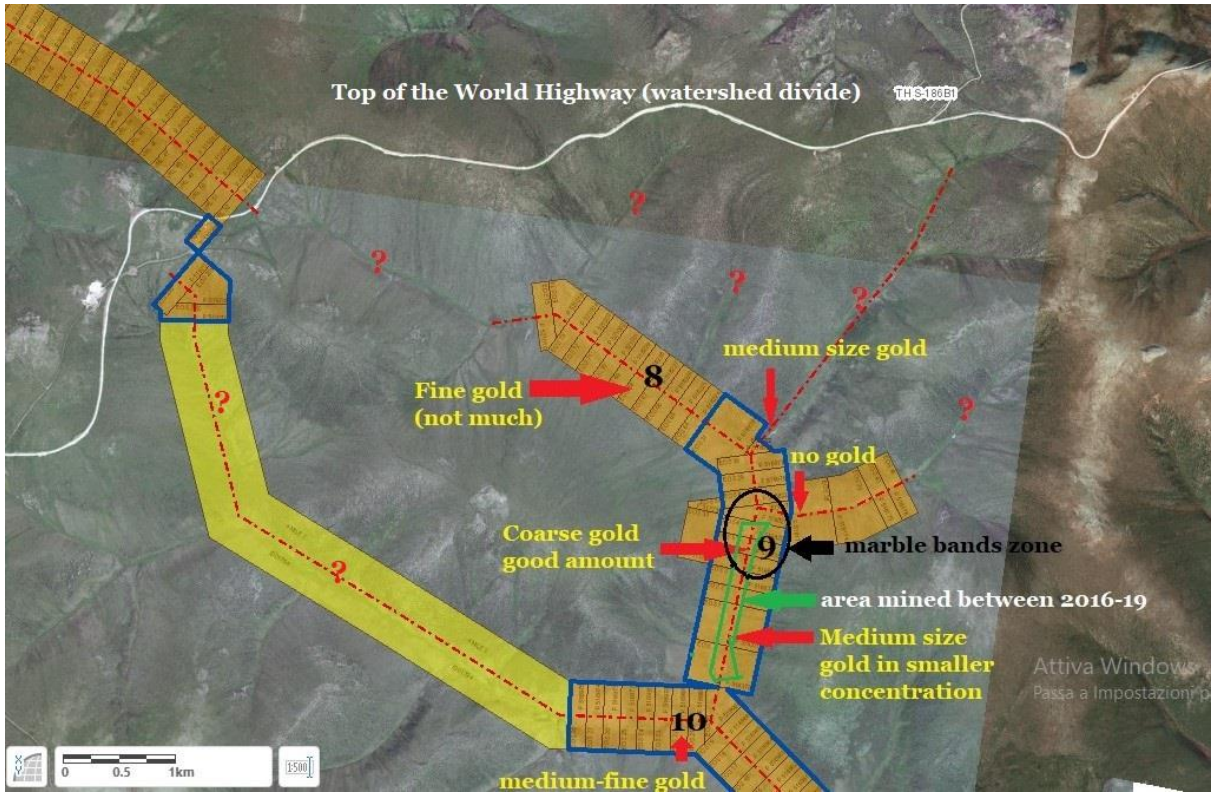
UNRLT of California Creek (8-9-10)

On the right limit tributary of California Creek lies the Eos Property (#**9** and #**10**): 77 claims staked in 2015, licenced the same year and in active gold-production since 2016. After the first summer of mining we noticed that the size of the recovered gold (see pictures on chapter 7) was drastically increasing inside those marble bands (#**9**) located north of claim Eos 4 and this year we decided to test two kilometers upstream, close to the watershed divide. During June and July we dug 5 pits between claims Eos 65 and Eos 68 (#**8**) but to cool down our big excitement we only recovered an extremely modest amounts of fine gold.

Testing again in the middle of a karst marble band

Beside a huge disappointment, that campaign left us with a complicate mystery to solve: where that coarse gold is coming from?

After the cold shower we decided to test by the mouths of the two left limit tributaries visible on map between #**8** and #**9**. We recovered a better amount of medium-coarse gold (≥ 18 mesh) on the one located upstream, and zero gold by the one below. Still nothing comparable with the nuggets recovered from that marble bands 200m down!
Later on we tested the ancient (upper Pliocene?) bench lying more than 20 meters above the actual floodplain. From 10m^3 of selected gravels collected above the bedrock of 3 different trenches (UTM 527305-7113817 and surroundings) we recovered ≈1 gram of fine (≤ 35 mesh) and flattened gold. The value of 0.1 gr/m^3 is definitely a lousy result!
While the mystery of the provenience of the coarse gold at Eos Property is still unsolved, the production is actually going well: from less than 1.5 month of sluicing in 2016, 2 months in 2017, only 2 weeks in 2018 and 1.5 month in 2019, a total of almost 900 ounces of crude gold have been recovered from an area included between claims Eos 1 and Eos 6! Those are significant numbers, especially considered that the enterprise mining on Eos Property is a young company of excellent workers (Hardclay Ltd. from Lloydminster, Alberta), but with a very limited experience in gold mining. On top of that, in the last two years those guys had to deal with an horrific/negative series of major mechanical failures. In spite of the hard-time and the misfortunes that they had to face each summer, those brave workers kept stubbornly going and fixing equipment with a smile on their face; in the meantime they are learning very fast about the right way to mine and we are betting that such of determination will be rewarded very soon!



Prospected and mined areas at Eos Property and stretches still to explore

Upper California Creek (11)

After testing the UNRLT of California Creek (# **8**, **9** and **10**) we had to drive our excavator along the upper section of this creek (#**11**) where our company holds two prospecting leases: ID01608-09. We wanted to check the gold occurrences on areas located far away from the watershed divide where our research is mostly focused.
Our short expedition has been complicated by the harsh conditions of the existing trails, abandoned for decades (the last explorations of this area are dating back to the '80s) and by the frozen ground which frustrated our digging attempts.
Fortunately at UTM 533204-7110619 we found an old bench where the creek cut through exposed bedrock. A layer of gravel has been successfully tested by panning on site. The gold recovered is fine, grinded and quite travelled. At this time we cannot determine if this deposit could be considered profitable for a future mining operation.

Area with exposed bedrock and fine gold on it

Twelve Mile Creek (14-15)

The Ra Property (29 claims and 4 miles of prospecting leases) is by far the most enigmatic among all our mining concessions. Claims and leases have been staked along Twelve Mile Creek after a couple of years spent to explore all over its watershed. The mining history of this creek is controversial: prospected several times and then abandoned during the first Gold Rush, then explored again with heavy equipment by the end of the '70s and abandoned in 1982 when the gold price dropped drastically. Finally prospected and drilled by geologist Angus Woodsend in the late '90s.

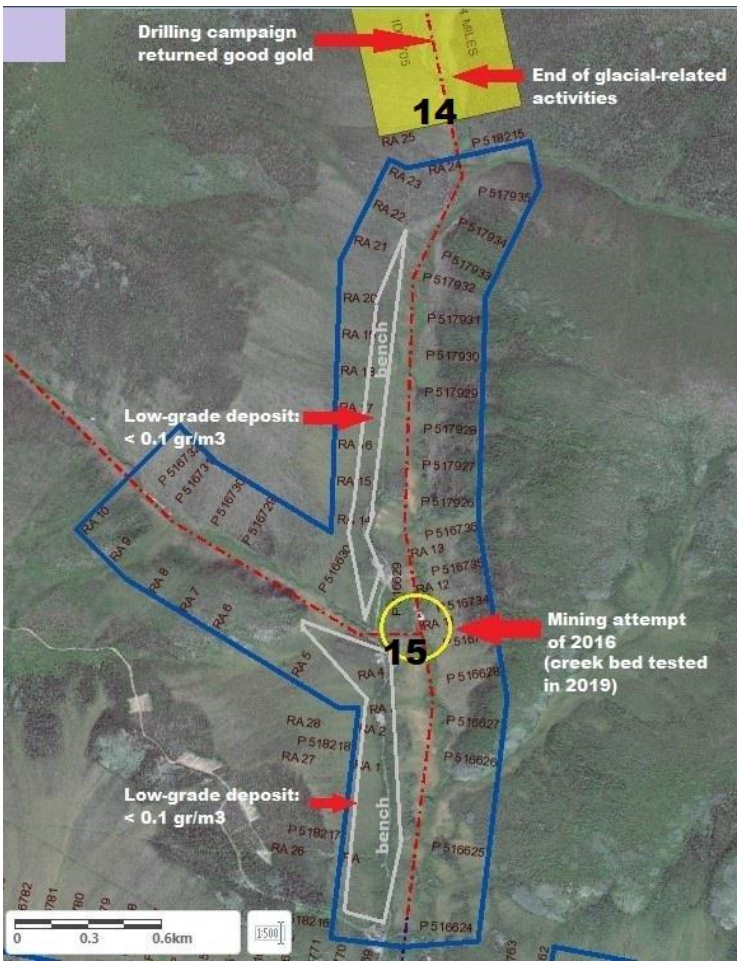
The creek lies in a wide, rounded valley which show signs of some kind of glacial activities along its last 3 kilometers, basically where the Ra claims are located.
Along its right limit, close to its mouth, there is one-mile-long bench, up to 200 meters wide and few meters thick, made by layers of unsorted and poorly-sorted gravel, related to glacio-fluvial events. This bench contains placer gold along its entire extension, but unfortunately the gold is scattered here and there at different depths and very inhomogeneous concentrations: we roughly estimated an average of an ounce per > 4-500 cubic meters. The gold is mostly fine and flattened (18<mesh<35), with some exceptional rounded/sub-crystalline grain and very few small nuggets (+12 mesh).
After the last ice age this package of loose materials has been cut through and eroded by the actual watercourses; these actions re-mobilized those gold specimens from the original gravel and re-concentrated them along the modern floodplain.
Since the beginning or our testing campaigns (#**15**) performed by panning, digging with excavators and drilling with an 8 inch auger drill mounted on a tracked Bombardier, we noticed that the gold deposition along the bench was extremely uneven and spotty. Our tests randomly performed on different layers at different depths or along the same layer but at different distances, always produced unpredictable results: some area returned appealing values close to > 1 gr/m^3, but less than a meter away those values dropped to a lousy < 0.1 gr/m^3 !

Testing at Twelve Mile Creek

As just written, the gold is definitely increasing along the modern floodplain, thanks to the re-concentration induced by the actual watercourses.
In 2016, a small mining enterprise decided to 'give a try' to our Ra Property, contrariwise to our advices (at the time that miner was still too 'green' and 'undersized' for such of low-grade ground!).
That mining attempt didn't return any profit and was actually a waste of money and efforts for the owner of the company, who decided to take a break from mining.
Then, during this past summer of 2019 the same enterprise decided to try it again.
At this time our group decided to help the miner to move as much dirt as possible by merging part of our equipment and men power, until a profitable pay streak would have been eventually located. Then he would have continued alone.

Few pits returned excellent results

Under the direct surveillance of our geologist the crew sluiced few cubic meters of gravel right upstream from the confluence of Twelve Mile Creek with its main right limit tributary (#**15**). The first test returned an average of 0.5 gr/m^3 of fine and flattened gold, with some few roundish grains in it: definitely a not-too-bad result, considered that the bedrock along this creek lies at shallow depth: ≤ 4 meters. After that, we decided to strip the surrounding area and start sluicing as much gravel as possible in short time.
Unfortunately since the beginning of its mining adventure, this small enterprise experienced the usual endless sequence of equipment failures typical of those new miners that are buying old equipment as a (wrong!!) solution to reduce the mining expenses. By the end of August, after breaking down the third water-pump in a week (!), the unlucky miner decided to surrender and quit.
In September we received some (unexpected) important information from Angus Woodsend, the geologist who in the '90s spent few years drilling 90 holes along this entire floodplain: accordingly with the field-notes of Angus, never previously released, the area with the best concentration of gold should be located right upstream from claim Ra 25, where he individuated a terminal moraine, by the end of those glacial-related activities derived from the Sixty Mile Valley. We drove our Dozer back to Twelve Mile Creek, with the intention to strip the lower part (#**14**) of lease ID01705.

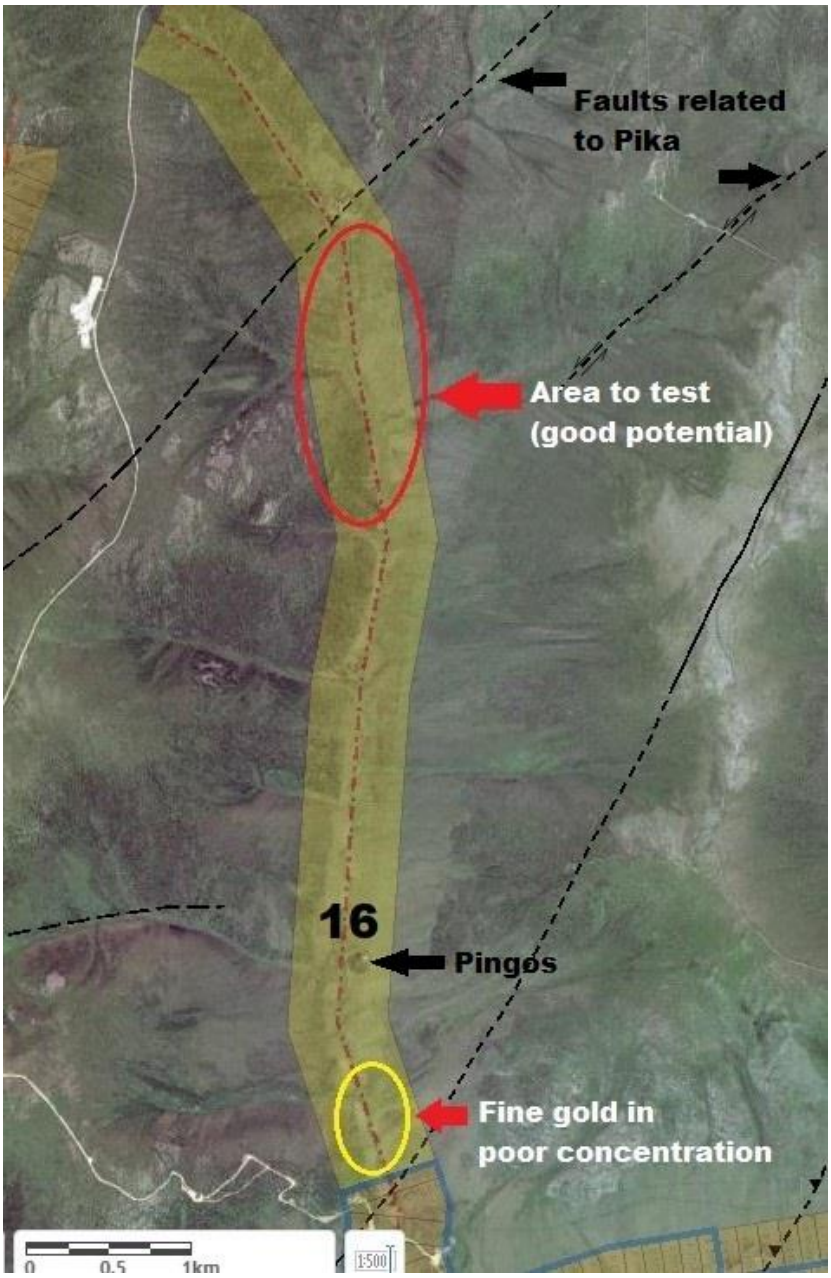


The stripping done by the Dozer at UTM 521548-7105898 exposed that glacial limit (terminal moraine?) to confirm the observations recorded by Angus Woodsend. We also tried to dig the heavily frozen soil without any success due to the presence of an high level of backwater produced by the seasonal melt of the surficial permafrost (as usually happens toward each end of the summer).
After several failed attempts we decided to strip a vast area for next year, to let the ice melt.
In the mean time we performed a geophysical survey (GPR) which confirmed the presence of bedrock at shallow depth (< 4m).

Ra Properties with the tested areas

Five Mile Creek (16)

In 2018 we dedicated to this creek a serious exploration campaign, later described in a public final report (see YMEP 18-033).
In spite of our optimism that campaign didn't return the results we were hoping for: very fine gold (-35 mesh) was recovered here and there, mostly in poor concentrations. On top of that, the floodplain revealed one of the worst deeply-frozen ground we ever experienced. During this summer of 2019 we decided to go back to Five Mile Creek to scout the area proximal to its headwaters, where a bunch of structures related to the Sixtymile Pika Fault are running SW-NE to crosscut the valley. These extensive faults and fractures have the potential to host good mineralization with gold. Unfortunately, as soon as we located the section to test, we found out that our planned access to that area was too difficult to walk through with our excavator. So we traced an 'alternative southern passage' but the regulations of Class 1 Permit didn't allow us to ford the many little tributaries which are cross-cutting that potential route. Frustrated by that intricate and sometime contradictory bureaucracy we decided to leave the area.



Prospected area with potential for placer gold

Browns Creek (17-18)

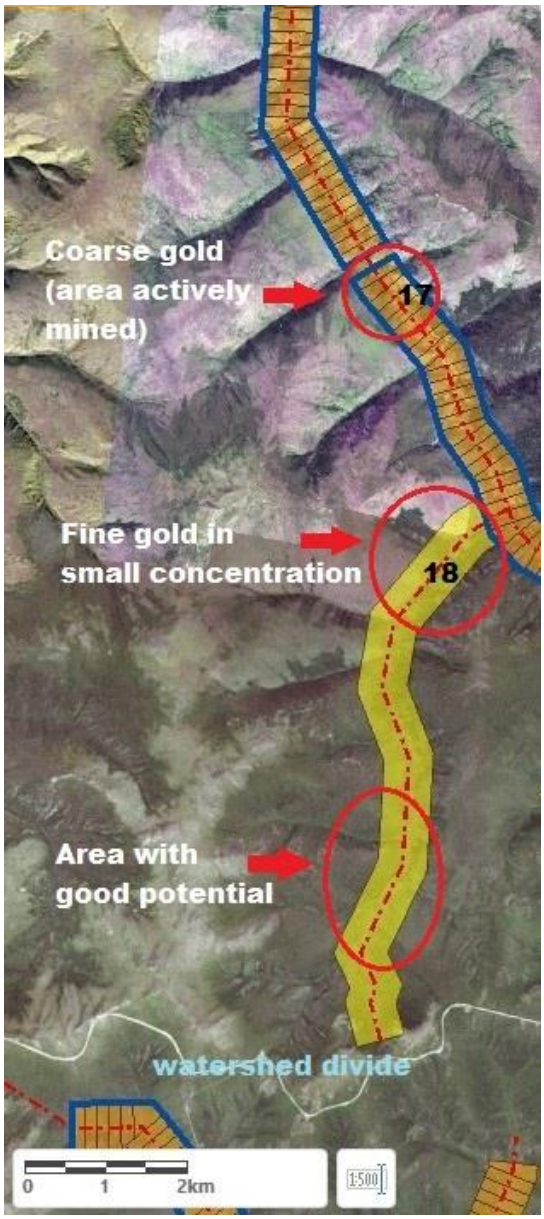
The first time we prospected Browns Creek was 2005 with a gold price four times lower than today. At that time many of these low/medium-grade goldfields were neglected since decades, after been disproved by rough exploration campaigns or by sceptical mining attempts. During a summer of prospecting and hand-digging along virgin ground we recovered good quantities of gold specimens from different benches located in the central part of Browns Creek (**#17)** and also three kilometers above its mouth.

Sluicing on the upper bench

Today thanks to that effort this creek is in active gold production: a small enterprise is operating along its upper end and one more company will start mining by 2020.

During this 2019 exploration season we dedicated our attention to the big left-limit tributary (**#18**) which headwater flows from the watershed divide, where our lease ID 01717 is located. After building a new access road to its junction with Browns Creek, we walked our excavator to the lower part of the lease (the Class 1 permit doesn't allow the fording of a creek and for this reason we couldn't test further up!), where we dug 5 pits along the floodplain and a trench on an upper bench.

The gold recovered from each one of the tested pits is very fine (≤ 35 mesh) grinded, flattened and definitely well-travelled (see picture on chapter 7). We didn't recover enough quantities to justify a mining operation but we still believe that better discoveries could be done few kilometers upstream, close to the watershed divide. We will return in 2020.

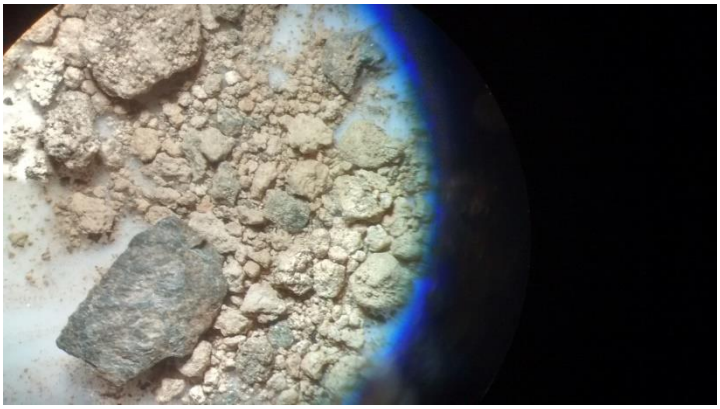


Glacier Creek

Glacier is a tributary of Big Gold Creek and one of the major historical gold producer of the entire Klondike: between 1892 and 2005, the recorded ounces produced by this placer were more than 50,000 (*Le Barge 2006*)!
Glacier Creek is one of the few medium-/high- grade placers of this region, together with Big Gold, Miller (the richest), Bedrock, Walker Forks, Poker and Davis.
Today is still actively mined by the McDougall family (the upper part) and since the last two years by Mark Burkhardt (the lower end).
Mark is an newcomer with a still limited experience in placer mining. In August of this year we went to check out his operation and to collect some gold-sample to analyze under the microscope. The wide area where his property lies has been heavily mined in different times …but there are always corners left behind!
At this time Mark and his crew are working on the very right limit of the valley (UTM 511216-7099779), where under a pile of pushed-over tailings seems to be hiding a small portion of floodplain left in place. When the gold price was at its lower peak those 'side-pay' were considered uneconomical, but today could represent a very good catch. In the meantime Mark is reworking old tailings and recovering decent quantities of fine-medium gold (12<mesh<35) escaped from the sluices of previous miners.

Pat Murphy Creek (20)

This creek probably represent our biggest frustration in years of explorations!
In 2015 we decided to dedicate attentions to it for its particular location, peripheral to all those medium-/high- grade left-limit tributaries of Sixty Mile River (it's on the right side of Bedrock Creek and south of Walkers Fork).
Pat Murphy Creek also lies in a remote area (right along the Alaskan borders), very hard to reach. By the end of the 80's the creek has been interested by a quick mining attempt and then abandoned. No information have been released by that mysterious mining enterprise which disappeared right after few months of operation.



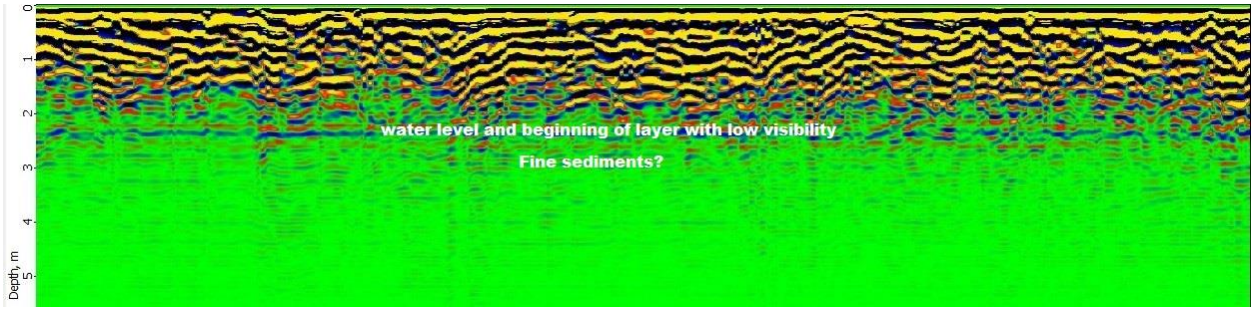
Weathered bedrock (till?) under microscope (x 65)

In 2017 we prospected its floodplain several time and one year later we walked here our excavator, after an exhausting journey through the nasty swamps that are covering the Sixty Mile Valley.

The testing campaign of 2018 didn't return a single flakes of gold from the 3 pits (over a total of 7) dug to bedrock (?). During the winter of the same year, while analyzing under the microscope the samples collected in the summer, we found out that what at the time we considered hard-packed weathered bedrock could instead be the product of a glacial-related event (till?) which buried a probably much deeper valley bottom.
By the beginning of September of 2019 we returned to Pat Murphy Creek to perform a geophysical survey with a ground penetrating radar (#**20**), in order to confirm the eventual existence of a layer of glacial till underlying the very shallow, modern alluvium.
Here below is the graphic of line 7 (the most indicative among all), which is crosscutting the valley and passing beside the most representative among all the pits dug in 2018:

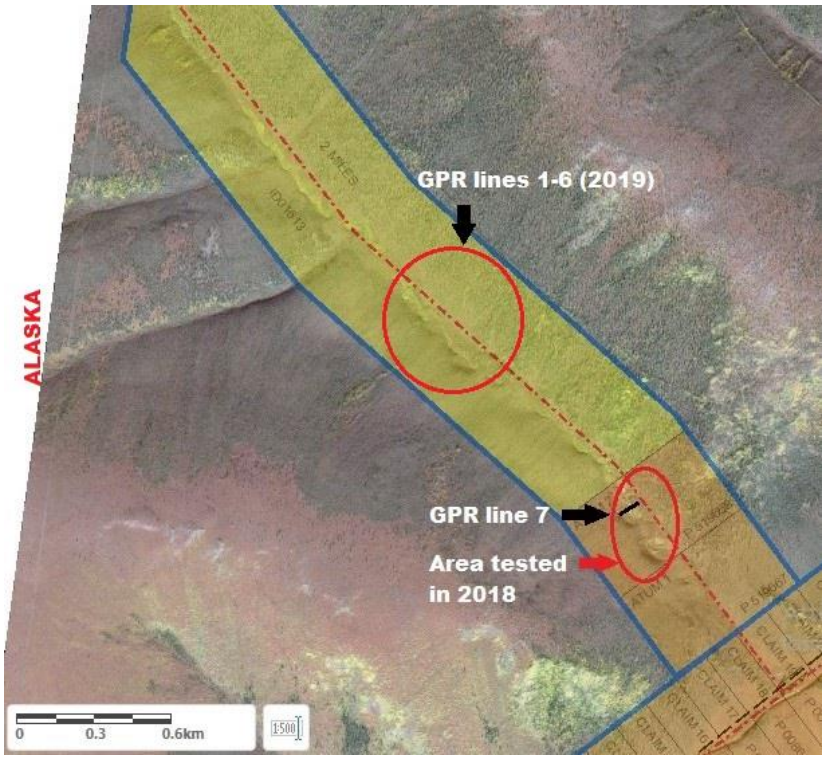
West *East*

502202-7089787 502222-7089803



GPR representation of bedrock-profile across the lower Pat Murphy

The radargram is clearly showing the groundwater level at -2.3m (confirmed by the digging of 2018) and the existence of a package of loose material under that level. This 'hardly-penetrable' material could only be fine gravel impregnated by water. This result is supporting our hypothesis about the existence of a package of a glacial-related deposition which covered the bottom of this lower part of the valley …and maybe a paleo-placer!
For the next year we are now preparing a drilling campaign across the valley, right along this GPR line.



Areas explored and tested in 2018 and 2019 at Pat Murphy

Davis Creek (21)

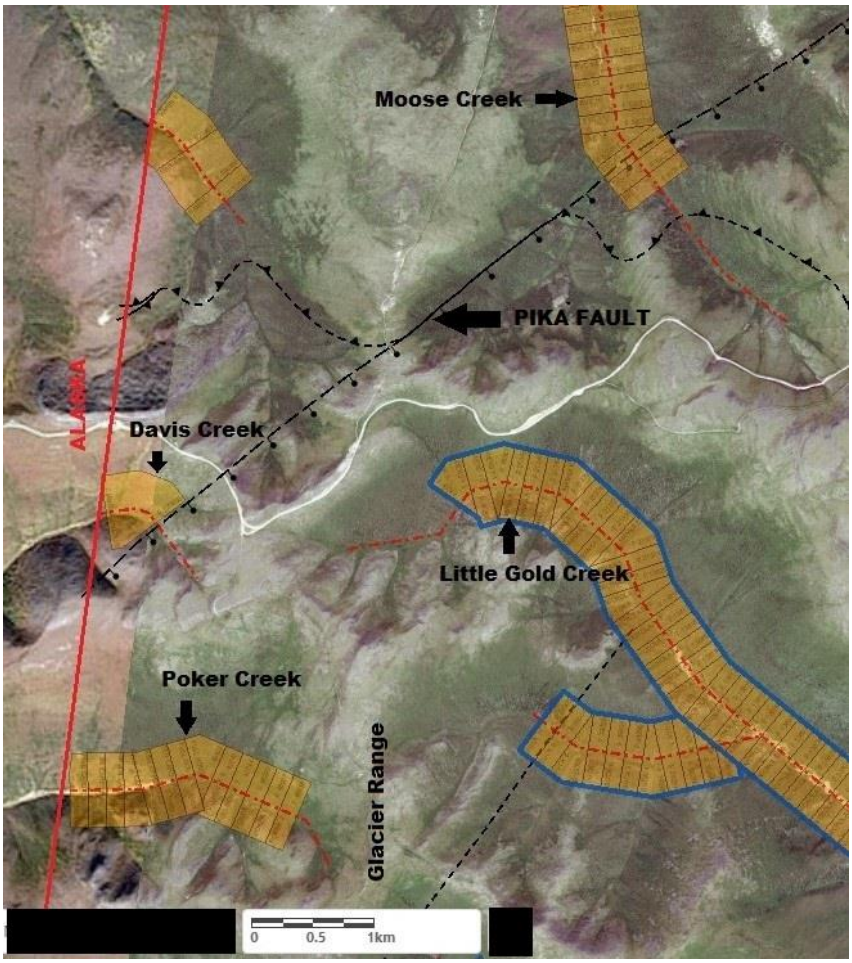
This interesting creek is located few hundred meters on the southern side of the Top of the World Highway, right across the Alaskan borders. It's flowing for the most part in Alaska while few hundred meters are located in Canadian territory (#**21**).
It's a small tributary of Walker Forks which flows into Forty Mile River. Placer gold was discovered here in 1888 in enough quantity to be mined since then.
Davis Creek together with Poker Creek and Walkers Fork (which are springing from the same mountainside and are flowing into Alaska) could be considered a medium-grade type of placers. The concentration of their gold deposits were locally conspicuous and the gold itself has a fineness greater than 885/1000.
In 2018, two adventurous young men, Andrea Besio and Ivan Sala, staked a discovery claim on the Canadian side, where the creek has never been mined (only the American side was exploited several time, up to year 2000, but just until the border). During a modest hand-digging campaign they managed to expose enough gold to encourage the planning of a further mechanical exploration to take place in the near future.
In September we visited this creek with the hope to find useful information about the genesis of the gold found around this south-western side of the watershed divide.
This area is located at high elevation (1,300 meters), in an alpine-type of environment characterized by the absence of vegetation and by a lots of exposed rocks: the dream of any prospector!

Quartz veins crosscutting the valley are well visible right beside Ivan

The surrounding geology is made by an assemblage of metavolcanic and metasedimentary rocks (quartzite, dark carbonaceous schist, metachert, green-schist).
On the surface are running few quartz veins striking along the usual NE-SW direction and sub-parallel to the Sixtymile-Pika-fault-secondary. These are normal faults, sometime crossed by perpendicular veinlets which are also part of extensional episodes. **Most likely this network of structures is the direct responsible for all the gold distributed along the creeks flowing from this mountain range** (we call it Glacier Range)**.** This gold seems to be of epithermal origins.
We now need to explore the north-facing side of these mountains, right across the Top of the World Highway, where the watershed of Forty Mile starts.

Moose Creek (22)

Our journey on the upper part of Moose Creek occurred by the end of September and concluded our exploration season dedicated to the placers surrounding of that incredibly-long watershed divide known as "Top of The World".
The headwaters of Moose are located just three kilometers away (toward north-east) from the ones of Davis Creek and less than one kilometer away (straight north) from Little Gold Creek. All these watercourses, together with Poker, Walkers Fork, Bedrock, Miller and Glacier Creek have in common the location of their headwaters that are springing from different sides of the same mountain range (the Glacier Range). These are the highest crests (≈1300m) of the Canadian portion of Top of the World Highway, right beside the Alaskan borders. All these watercourses also have another common characteristic: to be medium- to medium-/high- grade placer deposits (which simply means: fairly rich!).
For decades Moose Creek has been a decent gold producer (just on its upper half) and could easily be classified as 'medium-grade' (≥ 1 oz per 100m^3 of sluiced gravel).
Here the gold deposition is 'spotty' and distributed right on the contact with a shallow bedrock (or few feet into it, when the bedrock is weathered or fractured).
The alluvium is way thicker on its lower end, where the gold seems to be decreasing.
Coarse gold specimens could be found just few hundred meters downstream from its headwaters. During few prospects done between 2007 and 2009 we recovered good gold at UTM 503278-7111138, in previously mined ground.
The little nuggets found along this upper side of the creek are in many cases partially crystalline and often interested by inclusion of quartz (see pictures on pages 48 and 49), to confirm that same original lode deposition already observed in other creeks surroundings this same mountain range.



IKIR: the Indian River Formation (7-8-12-13)

Since the beginning of our explorations along the watercourses surrounding the Top of the World Highway, we recorded among the usual coarse placer gold recovered from some of these creeks, the presence of a minor fraction of fine and ultrafine specimens (≤35 mesh) which shows different features compared with the rest of the gold: those flakes are extremely flattened, more bright in color and apparently way more travelled. This fine and ultra-fine fraction under the microscope reminds that grinded gold of glacial origins recovered from the gravel-bars of McQuesten and Stewart rivers.
Together with that fine gold we also noticed in the tailings the presence of a small percent of perfectly rounded white or black quartz-pebbles. Later on we found out that those well rounded quartz-rocks were part of that conglomerate named 'Indian River Formation' (IRF) which is mapped as IKIR regional unit: an Albian (≈100 Ma) sedimentary deposition easily found in small remains scattered along the top ridges of the watershed divide, right beside the Top of the World Highway.
After reading an interesting report written in 2007 by two geologists of Leeds University, David P.G. Bond and Robert J. Chapman: "*Evaluation of the origins of gold hosted by the conglomerates of the Indian River formation, Yukon, using a combined sedimentological and mineralogical approach*", we decided to test that conglomerate for gold. In 2017 we conducted a small-scale test, performed by the beginning of old Browns/Bruin Road, on the top of the ridge at km 77 (#**13**), and at km 74 (#**12**). On these two patches the sizes of the gravel forming the conglomerate are considerably coarser (5 to 20 cm) than along other areas where it mostly measures around 1 to 5 cm. We collected and sampled 5 buckets (5 gallons each) of a selected gravel mixed with scraped bedrock, and we recovered just few barely visible specs of flattened gold.
These small gold samples under the microscope are very similar to the specimens recovered a year later (2018) from pit #4 dug along Five Mile Creek at UTM 516067-7103186 (see YMEP 18-033 report: "Target evaluation campaign at Five Mile Creek").

During this summer of 2019 we conducted a second testing campaign along three different areas where that old conglomerate is still preserved at #7, #**12** and #**13**. The main purpose was to verify the reliability of the test-results of 2017 and to eventually recover more specimens to be analyzed under the microscope.

Conglomerate IKIR, solid and weathered

The testing consisted in digging trenches with our excavator, then selecting the gravel to be tested by hand-shovelling in well-cleaned containers, to avoid any possible contaminations. Later on we washed the material in an 'easy-to-clean' plastic sluice-box.

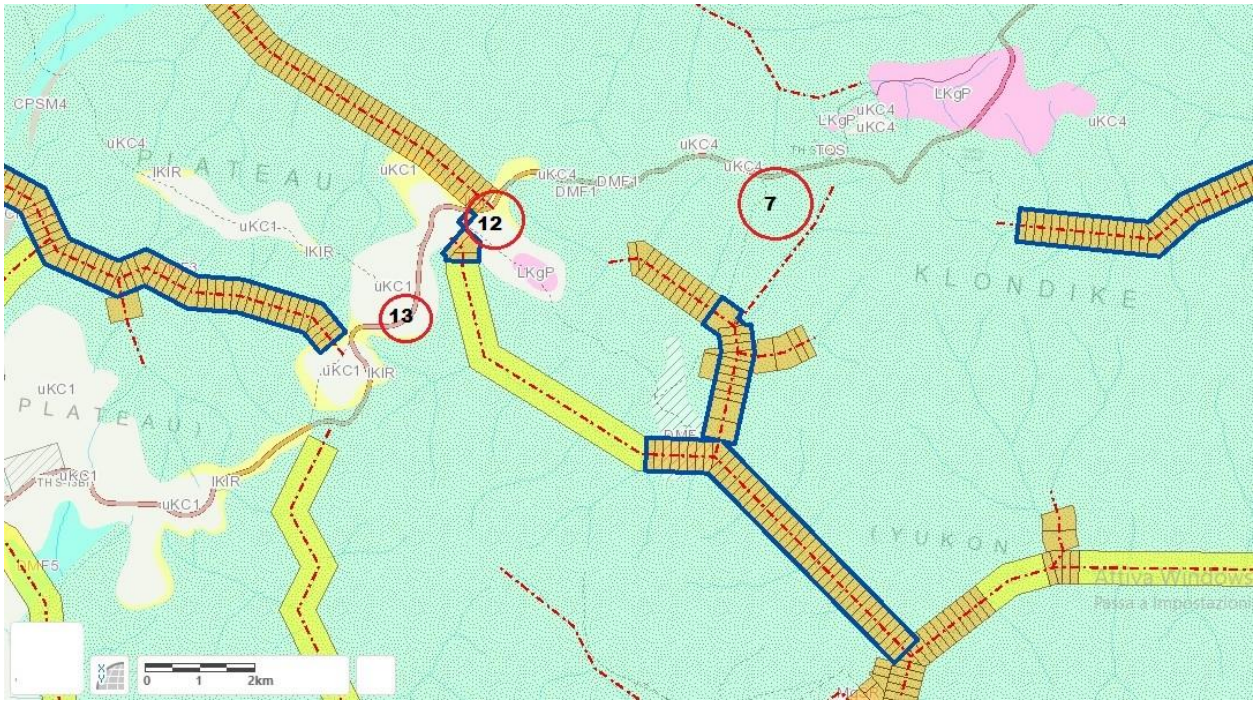
Geologist Heiko Muller helps to screen the gravel

This time after washing a couple of cubic meters of gravel extracted from three different areas located few kilometers away from each other (see map below), we didn't recover any single specimen of gold!

So: if our test-results are reliable, that conglomerate is not representing a source of placer gold!

In spite of that negative response, we still have the suspect that IKIR is playing a rule as minor gold-feeder for all those tributaries which are flowing through this unit.

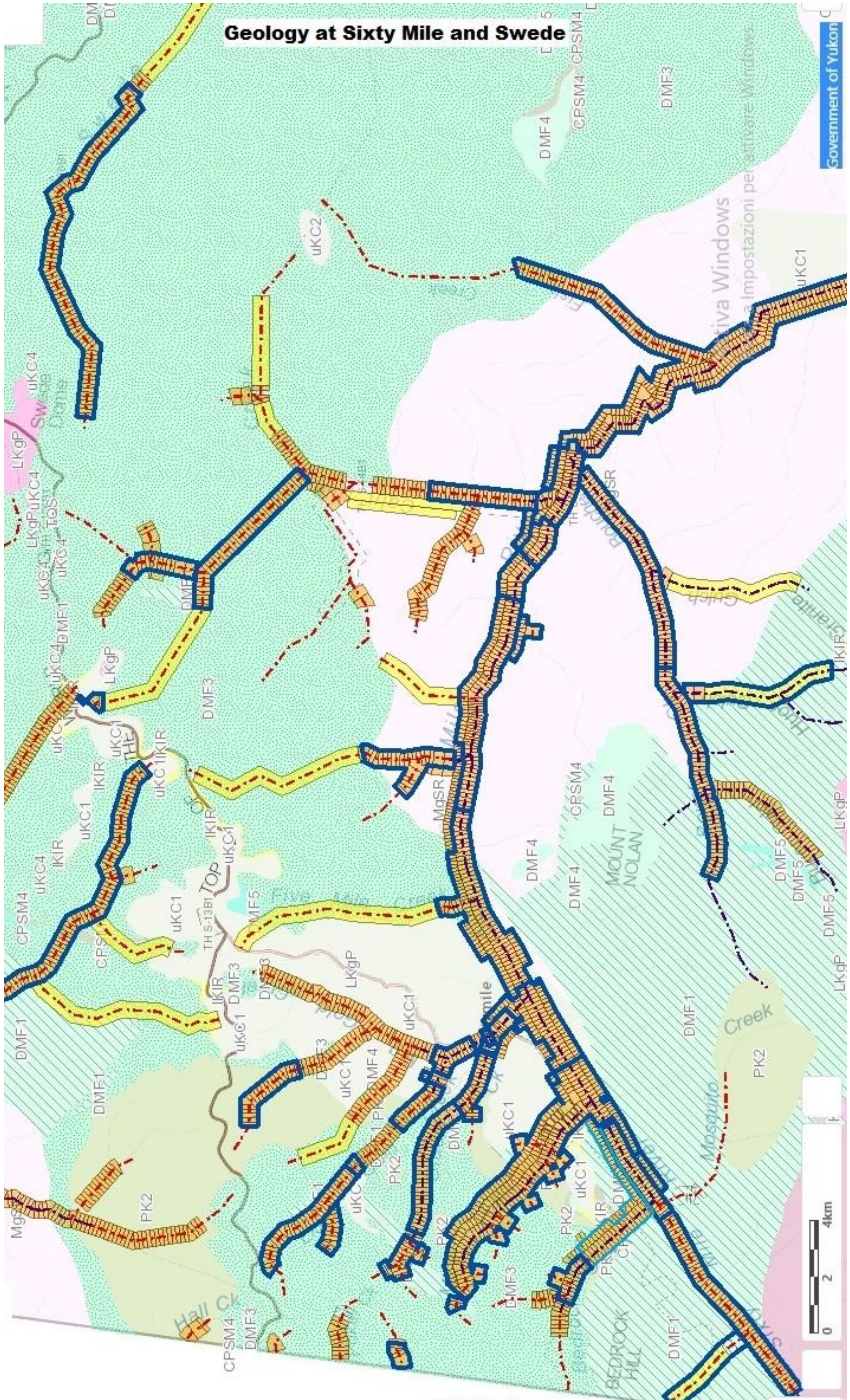
Maybe, as suggested by Bond and Chapman in 2007: "*...The gold resulted from in situ epithermal mineralization, related to the Carmacks volcanism (ca. 70 Ma)...*". Which means that **the fine gold could be part of that volcanic unit uCK1-4 which covers IKIR**. This option would confirm our field observations. For the moment the origin of that fine, flattened gold found along some of the creeks surrounding the Top of the World Highway, mixed together with the local coarser and sub-angular gold, is still an open chapter!

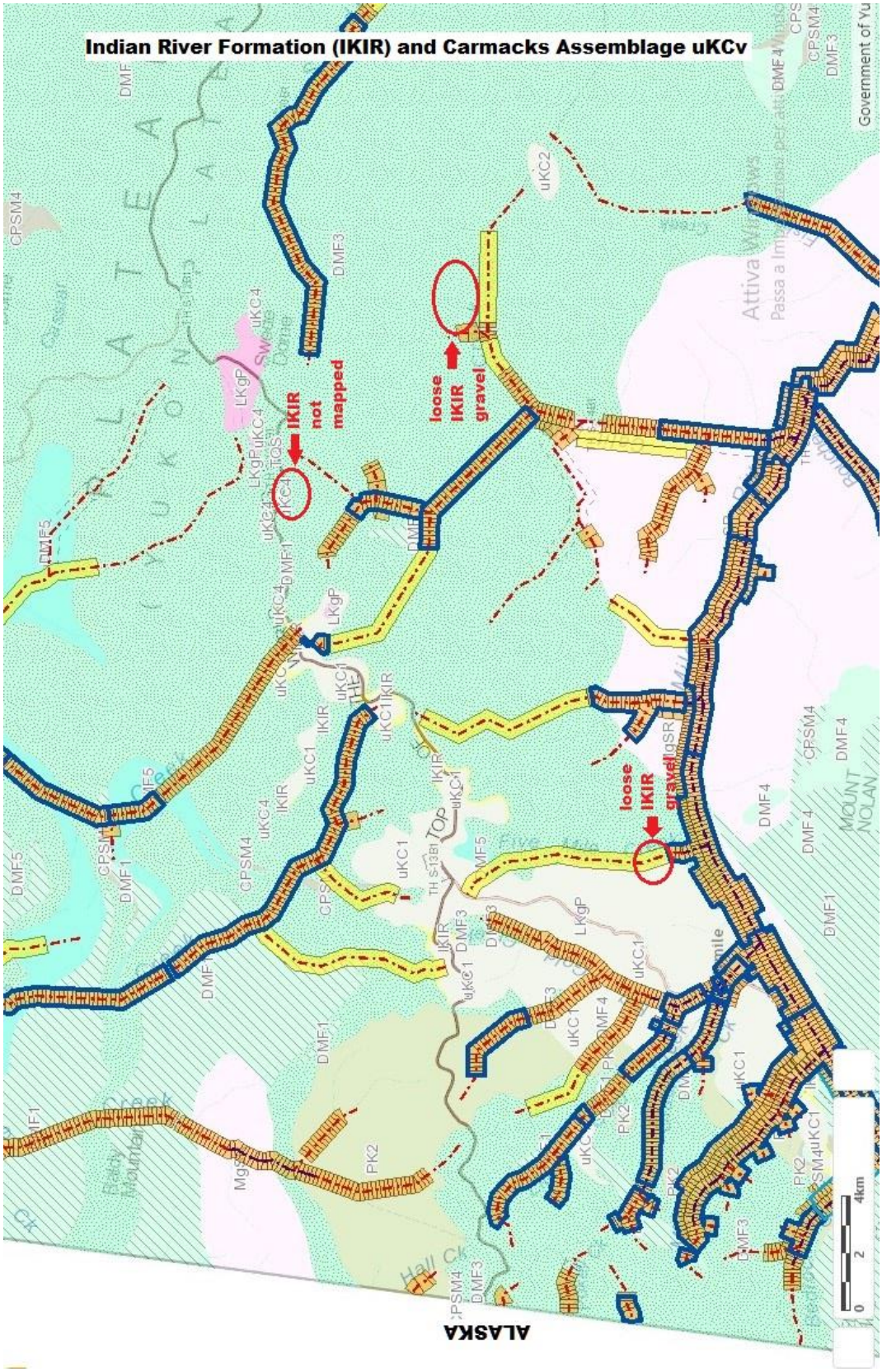


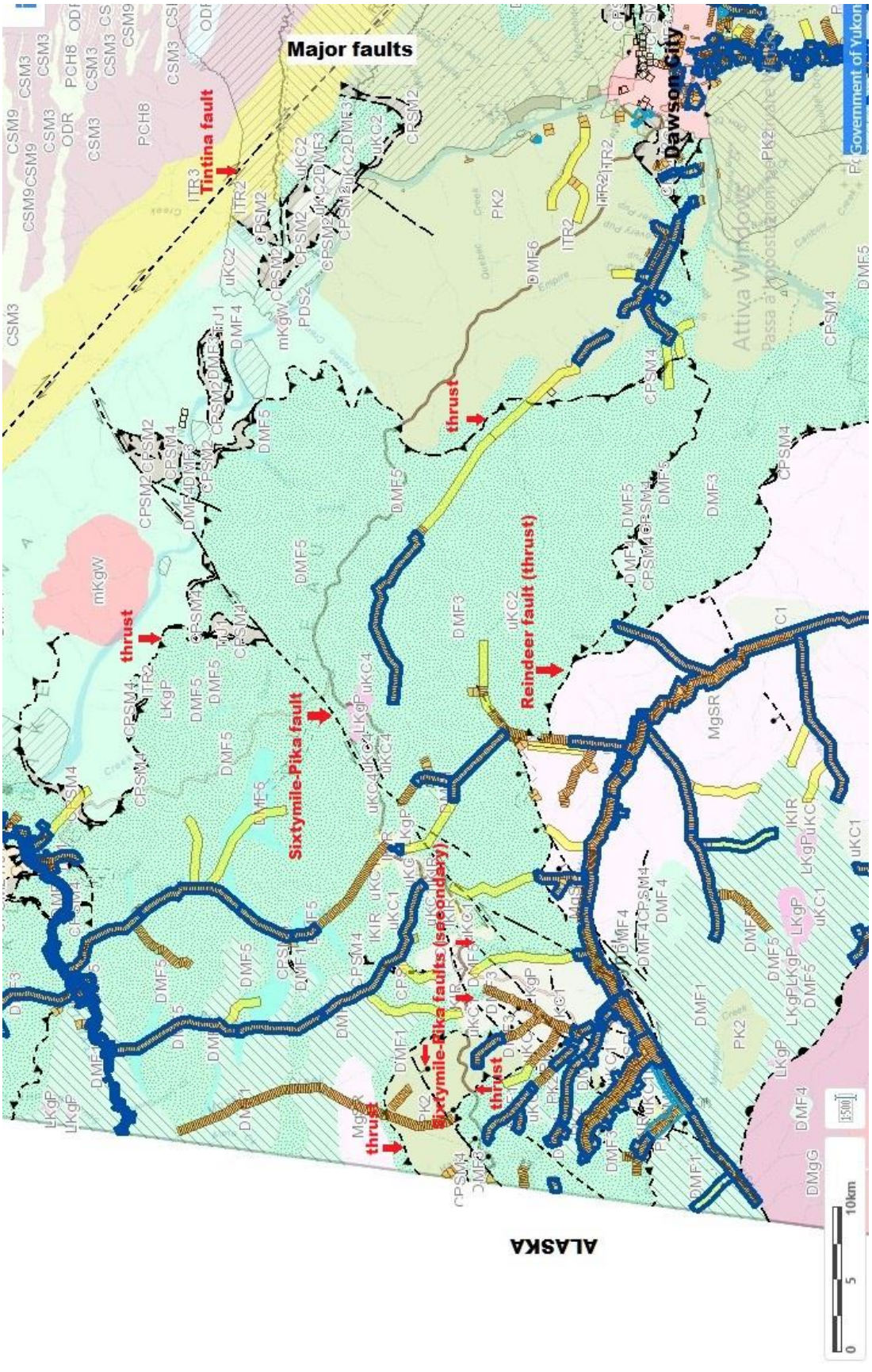
Locations of tested IRF gravel (gravel patch #7 hasn't yet been recorded on official maps)

5- Geology


Geology at Forty Mile
Tools
Government of Yukon
mKgW
DMF4
CPSM4
LKgP
DMF5
DMF3
uKC4
uKC1
lKIR
CPSM4
DMF1
PK2
uKC2
Creek
Moose
Alma Ck
Hall Ck
Montgomery Ck
4km
ALASKA


Geology at Sixty Mile and Swede
Government of Yukon
MOUNT NOLAN
BEDROCK HILL
Hall Ck
Creek
Mosquito
0
2
4km
ALASKA


Indian River Formation (IKIR) and Carmacks Assemblage uKCv
IKIR not mapped
loose IKIR gravel
loose IKIR gravel
ALASKA
4km


Major faults
Tintina fault
Dawson City
thrust
Sixtymile-Pika fault
Reindeer fault (thrust)
Sixtymile-Pika faults (secondary)
ALASKA
10km
0
5

Legend:

- DMF1: Upper Devonian – Mississippian (365 – 345). Meta-volcanic, mafic. Amphibolite, cl-schist, gneiss, phyllite.

- DMF3: Upper Devonian – Mississippian (365 – 345). Meta-sedimentary, clastic. Chert, black carbonaceous rocks, meta-chert.

- DMF4: Upper Devonian – Mississippian (365 - 345). Meta-sedimentary and meta-volcanic. Quartzite, cl-schist.

- DME5: Upper Devonian – Mississippian (365 - 345). Meta-sedimentary. Light grey to white marble, locally crinoidal.

- MgSR: Mississipian (355 – 345). Metaplutonic. Orthogneiss (metagranodiorite, metadiorite, metatonalite).

- CPSM4: Mississippian – Guadalupian (359 - 260). Metamorphic, ultramafic. Dunite, peridotite, diabase, serpentinite.

- PK2: Guadalupian – Lopingian (271 – 251). Metamorphic clastic and meta-volcanic mafic. Phyllite, micaceous quartzite, gneiss, amphibolite, cl-scist.

- IKIR: Lower Cretaceous (112 – 99). Sedimentary, clastic. Clast supported pebble to cobble conglomerate.

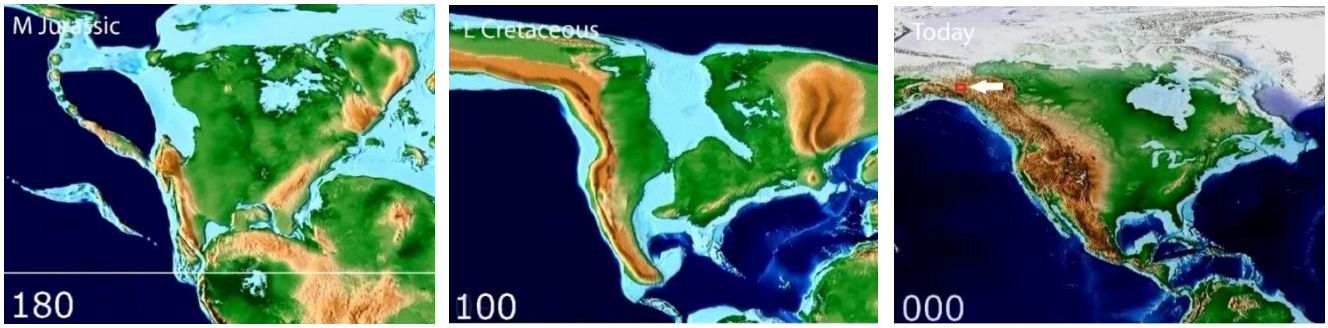
- uKC1: Lower Cretaceous (73 – 68). Carmacks assemblage. Volcanic. Basalt, breccia, porphyry, andesite, dacite, trachyte.

- LKgP: Late Cretaceous (72 – 68). Plutonic. Granodiorite, diorite, quartz-Monzonite.

The Top of the World Highway runs from Dawson City to the Alaskan borders and it's crossing the northern ends of the Klondike Plateau, which geologically lies in the paleozoical Province of Yukon-Tanana (YTT).
"…The YTT is a tectonic terrane that extends from central Alaska through central Yukon and into northern British Columbia. Consists of polymetamorphosed and polydeformed metasedimentary, metavolcanic, and metaplutonic rocks of Upper Paleozoic and older ages that were deposited or emplaced near the edge of the North American continental margin…" (see picture below).

In the surrounding of the Top of the World Highway the oldest outcrops are dating back to the Upper Devonian - Mississippian (365 – 345 Ma).
From the petrographic point of view, the most common rocks forming those hills are: orthogneiss, cl-schist, amphibolite, talc-schist, and serpentinite for the metavolcanics and quartzite, quartz-mica-schist, and marble for the metasedimentarian.
All these formations could be found assembled in alternated bands of different lithologies stacked one after the other along a common NE-SW pattern (which is also the direction of Pika fault). Well exposed (by the miners) sequences of many different units can be admired along the valley-bottom of our Eos Property (#**9**), on the upper UNRLT of California Creek, or along the Nyx Property, on Bruin Creek (#**6**).

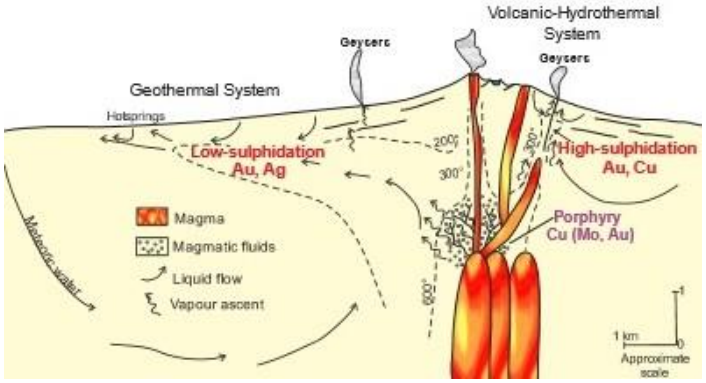
The different rocks found around the Top of the World Highway have quite different origins and are the result of millions of years (≈ 200) of accumulation of materials belonging to beaches, lagoons, shelf, ocean bottom and volcanic islands, all packed along the coast during the tectonic evolution of North-America.
The Mississippian (365-345 Ma) packages of metavolcanics and metasedimentary units



are definitely the most common ones among all the rocks found in this part of Klondike and are overlain here and there by the remains of a Lower Cretaceous (112 – 99 Ma) sedimentary deposition called Indian River Formation (IKIR on map) which in turn has been covered by the volcanic extrusions occurred during the Upper Cretaceous (73 – 68) and belonging to the Carmacks Group (marked as unit uKC1-4 on geological map).
Our orogenic belt (the Top of the World) has been successively intruded (Upper Cretaceous: 72 -68 Ma) by injections of plutonic rocks indicated on maps as unit LKgP (one of this intrusions could be located under the Glacier Range) and composed for the most part by granodiorite, diorite and quartz-monzonite. These hot bodies played a fundamental rule in the process of segregation, concentration and mobilization of the gold present in these areas and could be considered the engine of this mineralization, while the fault system is its distribution chain.
The most important tectonic structures (for our purposes of gold-diggers) in the area are those extensional (normal) faults with NE-SW trend. According with professor Jim K. Mortensen the trust (compressional) faults present in this region could also be related with gold occurrences.

The major fault of this mining district is definitely the Sixtymile–Pika: a 140 kilometer-long fracture which starts from the eastern fork of Forty Mile River and runs toward north-east until the Tintina Trench on a pretty straight line.
The Sixtymile-Pika fault is a strike-slip type of tectonic structure which produced 15 km of sinistral offset.
A bunch of secondary fractures, all related with Pika, are running almost parallel to it but are of much modest extension: < 30 km. The majority of these secondary faults are normal instead strike-slip, and derived from extensional episodes occurred along the Sixty Mile basin.
Part of these structures have been lately interested by an intense circulation of hot fluids raised from depths and filled with quartz and metallic minerals, gold included. These system of vein and veinlets of different size, all correlated with the Sixtymile-Pika fault seems to be the main responsible for the distribution of minerals along that area which starts in the surrounding of the Alaskan border (including few kilometers of American portion) and possibly goes all the way to the upper part of the UNRLT of California Creek, where our Eos property is located (we're still not sure about Swede Creek).
This past summer we gained the impression that wherever a vein belonging to the Sixtymile-Pika system was crosscutting a valley, there was some placer gold to be found!
To conclude: the geological scenario that we encountered this summer support the hypothesis of an environment of lode gold originated from epithermal events, as already observed by other researchers:

"A Late Cretaceous epithermal and intrusion-related mineralization event has been previously recognized in the Sixtymile area (Glasmacher and Friedrich, 1992), supported by recent exploration activities by Rackla Metals Inc. and recently recognized in the Pika area of Full Metal Minerals Ltd. in eastern Alaska (Allan and Mortensen, 2012).



Simplified model (Hedenquist and Lowenstem 1994)

The Sixtymile and Pika areas are considered to be part of a single continuous structural and metallogenic regime with faulting, magmatism, and mineralization contemporaneous in the latest Cretaceous (Allan and Mortensen, 2012)".

6- Surficial geology

Our explorations dedicated to the placers deposits of this part of the Yukon revealed unexpected complications caused by past glacial, periglacial or interglacial activities occurred in the surroundings. Most of the tested creeks in fact revealed a surficial geology re-worked or at least influenced by glacial-related events that took place during different ages, possibly starting from the late Pliocene.
We must say that around these mining districts the glacial activities must have been mostly modest and local, according with the scarves left on the morphology: only small sections of few valleys are (mildly) recalling typical glacial features.
However, the actions of those glaciers, although peripheral and modest, in most cases have been strong enough to completely or partially sweep off the original alluviums with portions of bedrock, together with the eventual gold content.
To confirm the limited extensions of those glacial occurrences, the surficial geology reveals gravels mostly composed by local rocks (autochthons), with the exception for a minor percent of well-rounded quartz-pebbles and cobbles originally belonging to that conglomerate called Indian River Formation (IKIR unit on map).

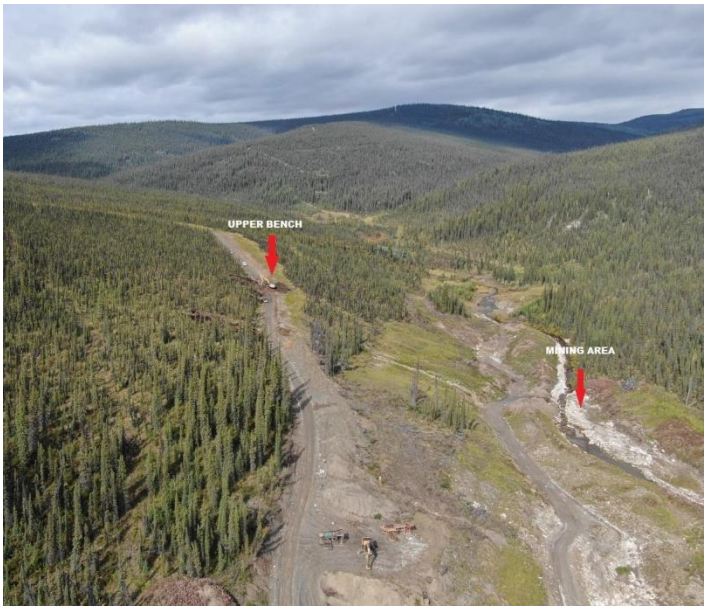
For what is concerning our work of placer prospectors, the negative consequence of bumping into goldfields affected by glacial-related events is represented by a series of drastic changes in the depositional pattern of the original placers.
As mentioned above, under glacial flows the alluvium get typically pushed away and the gold grinded into fine, flattened flakes which could float around with violent flows, and lately are randomly re-deposited mixed (and diluted) with unclassified materials.
This is what's happened to the right-limit bench of Twelve Mile Creek (#**15**), to upper California Creek (#**11**) and maybe to the lower end of Pat Murphy (#**20**) .
The exploration campaigns performed within goldfields influenced by external activities are always a big challenge and should be carried out in a different way than the ones occurring on non-glaciated areas. When the gold get swept away sometime is re-deposited still in profitable concentrations and it could end up hidden in unexpected corners, accordingly with the new dynamics created by the glaciers. In order to be able to track down those valuable pockets the prospector should have a clear understanding of the movements occurred during that specific event!
Up to these days the glacial dynamics along this side of the Territory are still partially unclear: this entire area was considered unglaciated until 1999 when PhD Alejandra Duk-Rodkin individuated the remains of pre-Reid glacial activities around Twelve Mile and California Creek. In 2005 Lionel E. Jackson individuated and mapped glaciofluvial terraces along the Sixty Mile Valley, especially upstream from Bedrock Creek and in 2006 William LeBarge dated and divided the loose deposits in "Modern (Holocene)

Alluvial Deposits", "Interglacial (Pre-McConnell) Deposits" and "Pre-Reid and Older Deposits" and created correlations among them.
Today the research is progressing and hopefully soon enough somebody will produce a detailed map of all the glacial events occurred in the area.
For the moment we can only report few basic observations recorded by our team along the creeks of the three orographic basins of Sixty Mile, Forty Mile and Swede Creek where our research has been focused:

Sixty Mile

Among the mining districts surrounding the Top of the World Highway, the Sixty Mile orographic basin has definitely been the most interested by different glacial, periglacial or interglacial episodes.
Beside its historically rich goldfields (Miller, Bedrock, and Glacier Creek) where the surficial geology has been exhaustively analyzed and described by excellent geologists, almost each one of the left limit tributaries prospected and tested by us during these years of placer gold exploration revealed the signs of glacial interferences:

- The very upper part of California Creek (#**11**) definitely shows an ice-influenced type of morphology with few gently U-shaped portions of the main valley and the presence of fine and ultrafine, very flattened gold randomly scattered along its (too) wide floodplain.
- The high benches of UNRLT of California Creek where Eos Property lies (#**9**) could possibly have been formed during an ancient pre- or interglacial phase of higher water-level (late Pliocene? Early Pleistocene?).
  In July we dug few trenches, washed the gravel and recovered very fine gold (description on page 17).
  Note: the upper portions of all the left limit tributaries that flow from the Top of the World into the Sixty Mile River, are not showing signs of drastic



Testing the upper benches on Eos claims

events (beside some local alpine ice) and their alluviums are quite preserved. Those areas close to the watershed divide should all be checked for gold!

- The lower part of Twelve Mile Creek (# **15**) also shows an U-shaped valley where our Ra Property is located. This is an area that clearly shows the effects of modest (still powerful) glacial activities occurred around the Sixty Mile area.
  Its right limit bench, which extends for almost 2 kilometers, starting from its mouth, is definitely the product of glacial-related flows. At UTM 521542-7105848 there is a terminal moraine to confirm the hypothesis of geologist Angus Woodsend about a glacier tongue which came upstream from Sixty Mile, along 3 km of this valley. During the past September we worked to expose that moraine which is now accessible to whoever is interested in further examinations.
  According with an extensive drilling campaign (more than 90 holes!) performed by mr. Woodsend with an auger drill mounted on a tracked Nodwell by the end of the '90s, the best gold deposit of this entire valley should be located immediately upstream from that moraine. This late September we stripped part of this area to be tested during the next mining season (2020), hoping for better results than what we achieved until these days on the lower part of Twelve Mile creek.
- At Pat Murphy Creek in 2018 we conducted a testing campaign (described on pages 24 and 25) which returned extremely poor results. After exposing the signs of glacial activities occurred in this area (the suspects arise during a satellite analysis of the local morphology) we decided to go back to the creek to perform a geophysical survey which suggested the possibility of the existence of a 'false -bedrock' made by a thick layer of hard-packed glacial till. Next year we will drill a grid of holes across the entire floodplain to search for eventual buried paleoplacers.

Glacial till (?) at Pat Murphy Creek

Forty Mile

This orographic basin seems to have been mildly touched by glacial events. Here we recorded traces of presence of small alpine-type of glaciers only on two creeks:

- On the lower part of the major left limit tributary of Browns Creek, during our testing campaign (#**18**) we recovered a disappointing small quantity of extremely fine and flattened gold (see chapter 7) but we also exposed in the bottom of our tested-pits, right at the contact with bedrock, a layer of unclassified materials mixed with a substantial amount of that same fine, light-brown matrix previously

encountered on those areas interested by glacial occurrences of Sixty Mile district (similar to the material visible in the picture on previous page).
Above this anomalous deposition starts a younger succession of layers of classified gravels which are indubitably part of the modern creek deposition.
A certain amount of loose, well-rounded rocks seems to testify a significant transportation in an environment of high-energy water flows, and the fine gold seems to be grinded.
Those rocks and that anomalous sandy layer suggested the past presence of a glacier in the area, suspect which has been later confirmed by geologist/glaciologist Jeff Bond from the Yukon Geological Survey. After analyzing the satellite images of this area, Jeff individuated the scarves of a former small-size glacier existed in the proximities of the headwaters of this long tributary.
In spite of the supposed modest dimensions of that alpine glacier, the actions exerted on this small creek seems to have been strong enough to affect the alluvium as suggested by our test-results.

Rocks variety at UNLLT of Browns

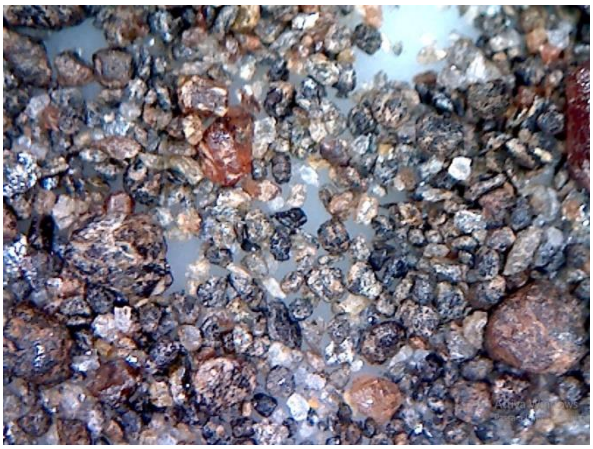
After that disappointing discovery we decided to change strategy and we started to prospect the entire valley with the use of a drone, to locate sharp corners or morphological traps where the gold could have potentially been packed. During the next mining season we are hoping to expose eventual gold pockets.

- Along the lower claims of our Nyx Property, on the central part of Bruin Creek, a family-owned Albertan enterprise (Taiga Ventures) is conducting a successful mining operation. On claim Nyx1, upstream from a natural bottleneck, the valley is becoming much wider and is showing a morphology that somehow recalls ice-related landscapes. In fact, when the miners operating on this property stripped the floodplain, the left right limit of the valley revealed the existence of a portion with the alluvium totally removed (meltwater outwash?) and substituted by a depositional package similar to the ones found in glacier-affected areas, included that type of till showed in the previous page. Remains of eradicated trees stumps have also been recovered right above the bedrock, mixed with muck. Significant amounts of fine and flattened gold were surprisingly still lying right on bedrock!

Swede Creek

The orographic basin of this creek hasn't been interested by any kind of glacial activity. Its deep, sharply V-shaped valleys are typically fluvial and its alluvium is composed by mildly rounded, subangular and angular allochthonous rocks that perfectly reflect the surrounding bedrock geology.

Black sands (heavy minerals) under the microscope (x 65)



*Upper Swede Creek (#**3**)*

*Bruin Creek (#**6**)*

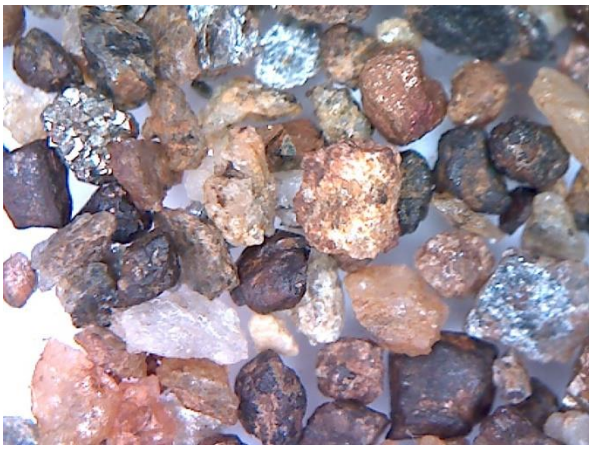
*California Creek (#**9**)*

*Browns Creek (#**17**)*

*UNLLT of Browns Creek (#**18**)*

*Twelve Mile Creek (#**15**)*

*Five Mile Creek (#**16**)*



*Glacier Creek (#**19**)*

*Moose Creek (#**19**)*

*Indian River Formation IKIR (#**12**)*

Descriptions of above pictures:

Swede Creek: magnetite, garnet, pyrite, quartz.

Bruin Creek: big quantity of garnet, abraded magnetite, topaz, rutile (rare)

California Creek: garnet, abraded magnetite, euhedral pyrite, octahedral magnetite

Browns Creek: magnetite, pyrite, garnet, scheelite (?)

UNLLT of Browns Creek: garnet, magnetite, pyrite

Twelve Mile Creek: mostly mica-schist and quartz, magnetite (anhedral), garnet

Five Mile Creek: garnet, magnetite (after euhedral), pyrite, limonite, topaz

Glacier Creek: garnet, magnetite, pyrite

Moose Creek: pyrite (with limonite coating), magnetite euhedral

Indian River Formation (IKIR): quartz, feldspar, broken pyrite, magnetite, garnet, topaz

These concentrates (heavy minerals) have been obtained by sluicing the gravels of all those creeks explored during the campaign of 2019 and are well representative of geological environments that seem to be quite similar along the entire watershed divide of the orographic basins of Sixty Mile, Forty Mile and Swede Creek.
Almost all the minerals are originally belonging to igneous (extrusive and intrusive), metavolcanic and metasedimentary rocks: euhedral magnetite should be associated with a mafic environment, topaz with more felsic intrusions and big part of those garnets are the product of regional and contact metamorphism of calcareous rocks.
The analysis of these concentrates could help us to find common features among different goldfields: Bruin (#**6**) and California Creek (#**9**) are almost identical, while the level of sulphides (mostly pyrite) seems to be increasing from Browns (#**17**) to Moose Creek (#**22**). Twelve Mile Creek (#**15**) shows a scarcity of heavies, to confirm the glacial history of its lower end, with the elimination and the re-location of its original heavy deposition, gold and black sand included. The lower Five Mile (#**16**) is also similar to Bruin Creek but its black sand is much smaller in size and greater in mineral variety: it seems to be part of a river deposition more than a small creek one and that enrichment could be possibly related to invasions effectuated by the Sixty Mile River during glacial events or during interglacial high-water phases.
Glacier Creek (#**19**) is very similar to Moose (#**22**). Swede Creek (#**1-2-3**) has a limited mineral variety, with magnetite as major component and a minor fraction of garnets.
The Indian River Formation is part of a different chapter for its geological history which has nothing to do with local surficial geology and shows an extreme scarcity of heavies.

7- Gold

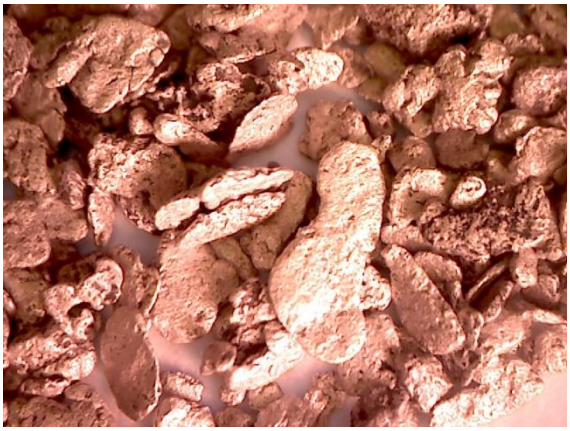
Swede Creek (#**1**):

Gold recovered on claim Qi 85

Bruin Creek (#**6**):

Size of gold commonly found along Nyx claims

Flattened, larger specimens



Microscope view (x65)

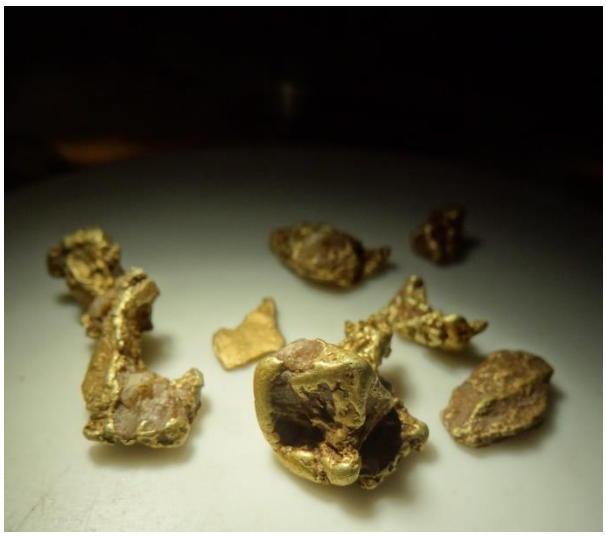
Gold from Bruin compared with the California one

California Creek (#**9**):

Typical gold from Eos Property

Microscope view (x65)

Nuggets mostly found around karst marble bands



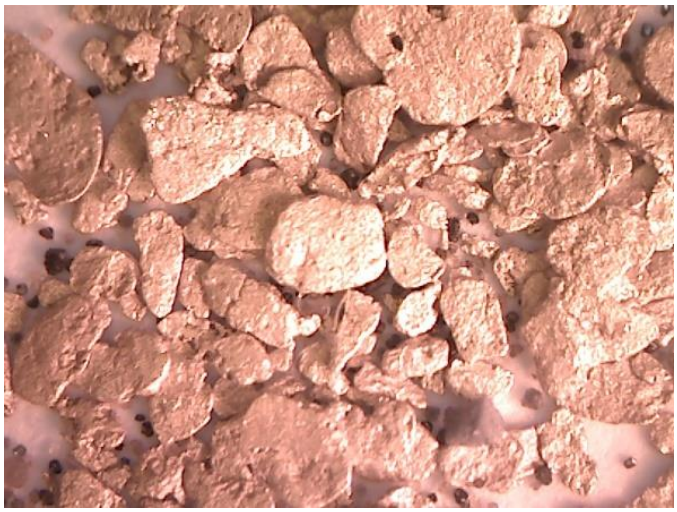
Particular of nuggets

Different features among gold nuggets

Fine gold from the upper bench on Eos 6

Twelve Mile Creek (#**15**):

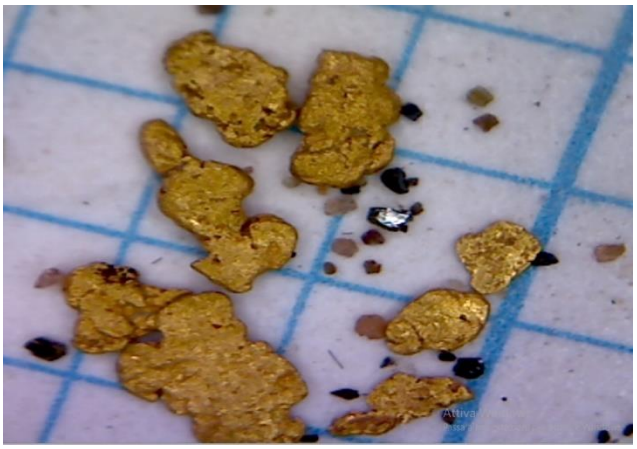
Fine, flattened gold from lower Ra Property



The same gold under the microscope (x65)

Five Mile Creek (#**16**):

Poor recovery of very fine, flattened gold



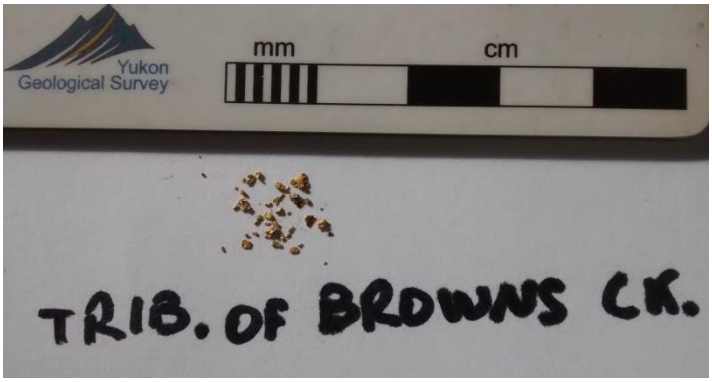
The same specimens under the microscope (x65)

Glacier Creek (#**19**):

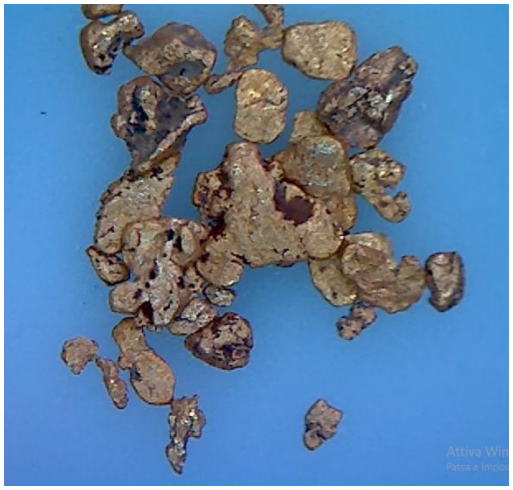
Browns Creek (#**17-18**):

*Gold mined on Browns (#**17**)*

Under the microscope (x65)



*Specimens collected along the UNLLT of Browns (#**18**)*



Under the microscope (x65)

Moose Creek (#22):

Gold mined along BVC claims

Microscope view (x65)

Nuggets from the upper end of Moose Creek, not too far from its headwaters. On the right picture, particular of the quartz core.

Observations:

- Swede Creek on claim Qi 85 (#**1**) revealed a coarse gold deposition. During a testing campaign crippled by several factors (too small excavator, frozen ground, difficult access) we exposed the bedrock only on the very side of the floodplain. In spite of it, the results of our explorations are suggesting the possible existence of better gold concentrations in the central part of the valley (these types of sharply V-shaped valleys could have extremely narrow, though rich pay-streaks!).
  For the moment we can only have vague ideas about where the gold is coming from and what its genesis could possibly be (epithermal, related to Swede Dome intrusion? To the Sixtymile-Pika fault system?). We will hopefully find it out after the preliminary mining operation already scheduled for next year (2020).

- Since a mining operation started on Nyx Property (# **6**) in 2018, Bruin Creek confirmed our expectations of been a good medium/low-grade producer (averaging ± 1 oz per 100-200 cubic meters). At this current gold price and with its favourable ground conditions (bedrock lies at ≤ 4meters!) this is definitely an easy-to-work property.
  The gold coming out from this mine is extremely similar to the one produced on Eos Property (#**9**), except for the fact that is a bit smaller and flattened (see picture on page 44); bedrock geology and mineralogical composition of the black sands are also almost identical. Gold fineness on both properties is: 790 to 810.

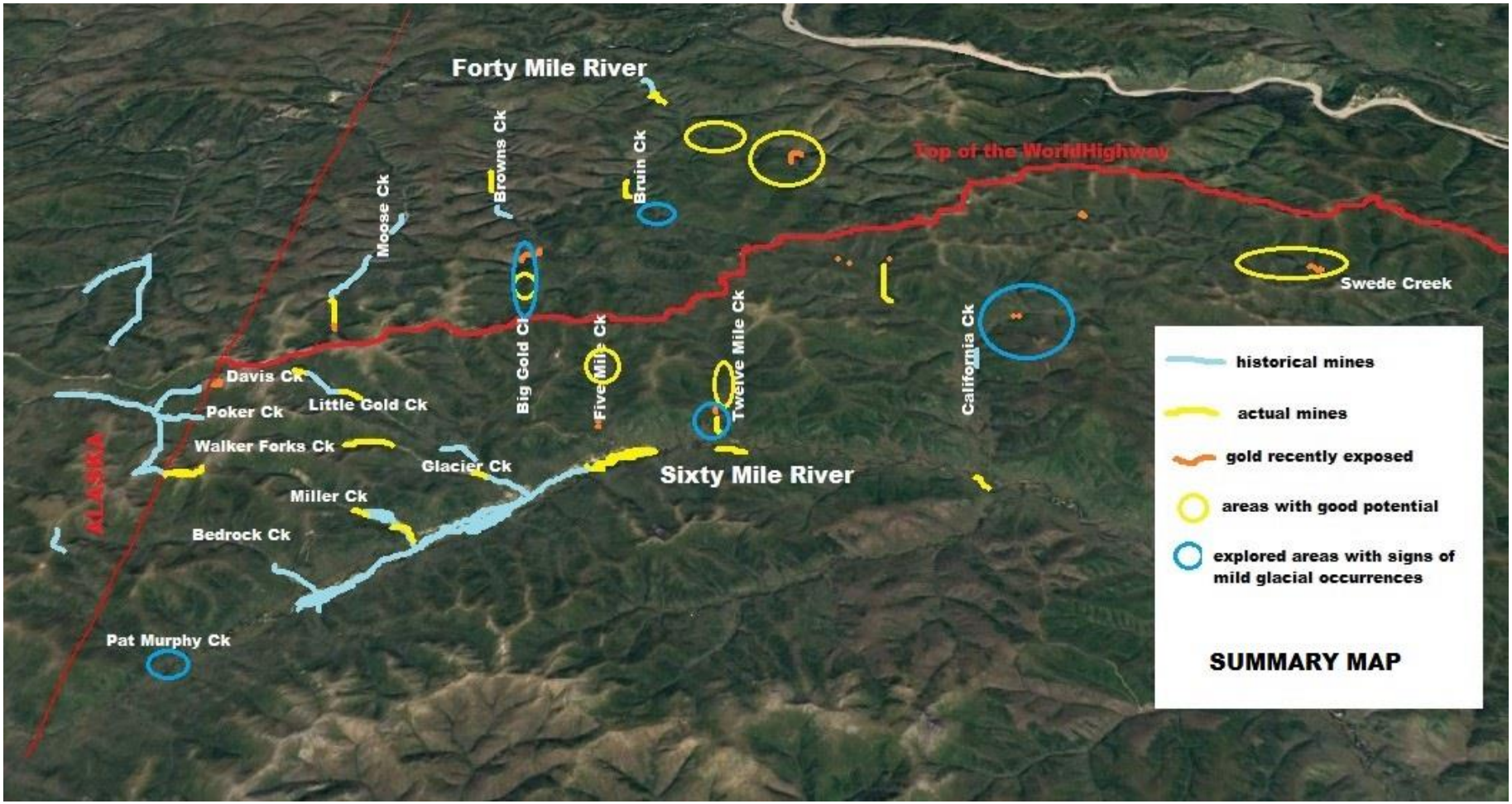
- The exploitation of our Eos placer gold mine on UNRT of California Creek (# **8**,**9** and **10**) started in 2016 and since then few hundreds ounces of raw gold have been produced. The gold varies from coarse to fine, with a substantial number of small nuggets (from 0.5 to 2.5 cm) mostly recovered from karst marble bands which are crosscutting the valley with a NE-SW trend on claims Eos4-7 (#**9**). Part of those nuggets are still showing dendritic or cubic crystallizations to confirm a short transportation (probably in the order of very few hundred meters) and half of them (see central pictures at page 45) are coated with a black patina of manganese oxide, while the other half are definitely bright and shining. The reasons for this black coating are still debated by researchers who are divided between micro-biotical origins and the effects of a particular geochemistry (Mn, Cu) occurred in environment of shallow/stagnant water.
  The fineness seems to be common to all those nuggets: from 790 to 810.
  Many of the larger gold specimens are also hosting milky-quartz inclusions to witness their provenience from gold-bearing quartz veins. In regards of the locations of the primary deposits, we must say that at this time we have not been able to locate the presence of those veins. This is a mystery that we're hoping to solve in short time, as mining progresses.
  The gold recovered from that ancient upper bench (late Pliocene?) located 20m uphill from the marble bands shows different features: all the specimens are ultrafine (≤ 35 mesh) and flat. At this time we cannot determine the origin of it.

- The gold recovered along Ra Property, at Twelve Mile Creek (# **14** and **15**) is quite heterogeneous: the majority of specimens are fine and flattened, apparently grinded or well-travelled, while a minor fraction is represented by crystallized, grainy and much bigger specimens which seems to be very 'local'.
  The most logical explanation could be associated to the presence in the area of glacial-related activities that remobilized part of the original placer, causing the grinding and flattening of the gold specimens pushed around by the ice.
  Some peripheral area has evidently been missed by those same events and the original deposition was probably left in place.

- At Five Mile Creek (# **16**) the gold situation is similar to what encountered at Twelve Mile Creek except that here the gold specimens are finer, more flattened and much scarcer. In fact, unlike Twelve Mile, along Five Mile Creek we didn't recover any coarse or rounded specimen. The reason of it could be related to the fact that at Five Mile Creek we only explored and tested its lower part which could have been affected by high-water phases of Sixty Mile River. A further exploration campaign is strongly recommended along its upper part, in the area indicated on page 22.

- Disputing the fact that Browns Creek (# 17) has been neglected for decades, under the current gold-price this creek can be considered a 'good gold producer'. Its bedrock is located at shallow depths (≤ 4m), it's mostly unfrozen and its placer gold is generally coarse (≥ 18 mesh), with presence of several small nuggets, for some reason easy to be recovered with a conventional sluice.
  An characteristic of Browns Creek is exactly the size of its gold, which seems to be identical all the way from the headwaters to the mouth (it actually seems to be increasing toward the end, a couple of kilometers upstream from the confluence with the Forty Mile River!). The reason of it should be due to the presence of several 'gold-feeders' intermittently located along its valley.
  From the geological point of view **Browns Creek shows substantial signs of the existence of a 'subduction zone', with some of the deepest lithology present in this entire region**.
  Contrariwise to Browns Creek, its left limit tributary (#**18**) tested by us during this past summer, along its lower part revealed the presence of a very fine gold (see pictures on page 47) with completely different features from the one recovered along the main creek!

- The gold of Moose Creek (# **22**) also shows interesting marks (see pictures on pages 46 and 47): its fineness is > 850/1000, it's mostly course, with presence of decent-size nuggets (1 to 2.5 cm) and many crystallized specimens, mostly dendritic. Some of the nuggets are still enveloped around a milky-quartz core to prove their original provenience from gold-bearing veins (those veins are well visible across the rocky valley-bottom, especially on the very upper section of the creek, above and below its headwaters).
  Here the features of the gold combined with the local geology are suggesting better than everywhere else genesis related with epithermal type of environments.
  The gold specimens recovered at Moose Creek are closely resembling the ones recovered at Glacier Creek (see page 46), to confirm that all the placer gold deposited along the many creeks which are flowing from this bunch of higher hills called "Glacier Range" and located in the proximity of the Canada/Alaska borders (Little Gold, Glacier, Bedrock, Walker Forks, Poker, Davies, and Moose creeks) is probably related with that network of veins and veinlets related to the Sixtymile-Pika fault system and well visible all along those ridges.
  Once again: this seems to be lode gold of epithermal genesis.


Forty Mile River
Moose Ck
Browns Ck
Bruin Ck
Top of the WorldHighway
Swede Creek
Big Gold Ck
Five Mile Ck
Twelve Mile Ck
California Ck
Davis Ck
Poker Ck
Little Gold Ck
Walker Forks Ck
Glacier Ck
Sixty Mile River
Miller Ck
Bedrock Ck
Pat Murphy Ck
historical mines
actual mines
gold recently exposed
areas with good potential
explored areas with signs of mild glacial occurrences
SUMMARY MAP

8- Conclusions

This season of 2019 has been dedicated to the exploration of the creeks which are flowing from both sides of that long sequence of ridges which goes from Dawson City to the Alaskan borders and hosts the Top of the World Highway.
Those ridges are forming the watershed divide among the orographic basins of Forty Mile River toward north, and Sixty Mile River and Swede Creek toward south.
Between May and September we prospected and tested the upper part of Swede Creek, four left limit tributaries of Sixty Mile River (UNRT of California Creek, upper California, Twelve Mile, Five Mile and Pat Murphy Creek) plus the upper parts of three right limit tributaries of Forty Mile River (Moose Creek, Browns Creek, and Bruin Creek). We also visited Davis Creek (trib. of Walker Fork and Forty Mile River), Glacier Creek, Little Gold and Bedrock Creek.
The purpose of this campaign was to test all those goldfields considered low grade (non-profitable) when the gold-price was more than four time less than today (before 2005).
In fact, after the exploitation of the historical rich creeks present in these surroundings (Forty Mile and Sixty Mile rivers, Miller, Glacier, Bedrock and Little Gold creeks), by the end of the '80s this entire region was rapidly abandoned (only very few mining enterprises were left to 'scrap the barrel' along the best goldfields) and all the prospecting activities suddenly left.
In 2005, after the rising of the gold price started, our company decided to dedicate attention to this part of the Territory by testing the most neglected creeks present in the surroundings of the Top of the World Highway, where the presence of "some gold" has been known for a century, but never properly considered.
After several summers of patient work we re-discovered and mapped interesting concentrations of gold along shallow areas which have been abandoned for decades (at Browns, Bruin, California, Twelve Mile, Swede). Then we focused our attention on the best discoveries which are today productive gold mines: California, Bruin and Browns.
Thanks to the positive results of this simple strategy, five new mining operations become operative in these areas between 2016 and 2019 and three more will start in 2020. Not all these enterprises will operate on our ground, but all of them are a direct consequence of our successful prospects: three will be on Bruin, two on Browns, one on California, one on Moose and one on Twelve Mile creeks.
This year we extended the testing campaign to new areas by using all the tools in our possession: two excavators (Hitachi Ex 200 and Komatsu PC138), a medium-size dozer (Cat D6c), an auger drill (Hydra-Hammer) mounted on a Bombardier Muskeg, two portable washplants, water pumps, jack-hammers, georadars, drones, etc. etc. We also used the help of more workers, divided between geologist (Sandro Frizzi) equipment operators/mechanics (Matthias Brunnmayr, Jerry Unrau and Brandon Clayton) , technicians and field helpers (Joerg Lotz, Rocco Frizzi), plus the usual, priceless,

voluntary help of many good friends (Robert Farr, Max Mikhailychev, Heiko Mueller, Joel Famularo, Greyson Unrau and others).
This summer of passionate and hard work we managed to expose gold from new sections never been previously tested: on the upper part of Swede Creek (# **1**), along the UNRLT of California Creek (# **8**), along upper California (# **11**) and on the upper left branch of Bruin Creek (# **5**), along the ULLT of Browns Creek (# **18**) and in the middle of the floodplain at Twelve Mile Creek (# **15**). Not all the gold finds are profitable for mining purposes but all of them are encouraging us to invest into further explorations.
At Swede Creek and on the left fork of Bruin the substantive gold recovered induced our company to apply for a new water licence (Bruin, # **5**) or to schedule a preliminary mining operation for 2020 (at # **1** on Swede) an on upper Twelve Mile Creek (# **14**).
We also produced new observations about the geological history of these areas.

A portion of each recovered sample has been sent to professor Robert J. Chapman, a researcher of University of Leeds specialized in tracking back the original depositional environment of the placer gold from the examination of the inclusions contained in each specimen. The purpose of this analysis is to determine with an excellent margin of reliability the possible location of the primary deposits. This will be a great help for explorers and miners, to individuate future areas where this placer gold has been originated and consequently where to exactly focus the future exploration campaigns.
Unfortunately at this time, for technical reasons, the results of the analysis of professor Chapman haven't been yet completed and we cannot add these precious information to this report as we were hoping: as soon as we will receive these results and relevant we are committed to immediately publishing a separate appendix, accessible to everyone.

...we will always dream to build the perfect gold-machine!

9- Professional qualification of Sandro Frizzi

Sandro Frizzi is an Italian citizen and permanent resident of Canada since 2009, born in Italy the 28th of August 1961. He lives in Dawson City since 2011 (1342, 4th Ave.).
In 1993 Sandro obtained the University degree in Geological Sciences at the "University di Bologna" with specialization in hydrogeology, aquifers and alluvial deposits.
As geologist he worked as a consultant for several companies in Italy (1993-2004), in Canada (1997-2017), in Bolivia and Argentina (2009), and in Mexico (2010-11).
Starting from 2005 Sandro worked in Yukon as geological consultant in hard-rock exploration (2005-2009) and successively as self-employed explorer for the placer mining industry (2009-today).
Since 2013 he's co-founder and director of Yukon Exploration Green Gold Inc., a placer exploration enterprise. This company today holds several fully licensed properties, some of those already in active gold production (Big Creek, California Creek, Bruin Creek and Twelve Mile Creek).
In 2018 he created Gold Pan Corp, a small placer exploration company specialized in low-impact technologies (Sandro always dedicated big part of his time to test and to promote non-invasive and eco-friendly exploration techniques, like ground penetrating radars, magnetometers, gravimeters, etc.).

Joerg and Sandro pre-exploring remote areas with a georadar and a drone

10- References

- *"Geological, geochemical and trenching assessment report on the Fifty Mile Project. Sixtymile area, Yukon Territory" Jean Pautler, P.Geo, 2015.*

- *"Placer geology and prospective exploration targets of Sixtymile river area, west-central Yukon" William LeBarge, 2006.*

- *"Application of placer and lode gold geochemistry to gold exploration in western Yukon" Jim K. Mortensen, Rob Chapman, William LeBarge, Lionel Jackson, James K, 2004*

- *"Cirque forms and alpine glaciation during the Pleistocene, west-central Yukon" by Faye E.N. Nelson and Lionel E. Jackson, Jr. 2002.*

- *"Compositional studies of placer and lode gold from western Yukon: Implications for lode sources" by Jim K. Mortensen, Rob Chapman, William LeBarge, Evan Crawford.2005.*

- *"Evaluation of the origins of gold hosted by the conglomerates of the Indian River formation, Yukon, using a combined sedimentological and mineralogical approach / by David P.G. Bond and Robert J. Chapman. 2006.*

- *"Oro Alto Venture auger drill programs" Angus Woodsend, 2001.*

- *"Field guide to quaternary research in central and western Yukon" Edited by D.G. Froese, A. Duk-Rodkin and J.D. Bond. 2001.*

- *"Gold placers of the historical Fortymile River region, Alaska" Warren Yeend, 1936.*

- *"Placer Yukon Territory 1979" by George W. Gilbert 1979.*

- *" Tectonic assemblage map of Yukon-Tanana and related terranes in Yukon and northern British Columbia (1:1,000,000 scale), Yukon Geological Survey, M. Colpron, 2006.*

11- List of expenses:

YMEP Expense Claim - Client Copy

Yukon

YMEP no:	19-026	project name:	Top of the World divide	applicant name:	Sandro Frizzi (Gold Pan Corp)
expense claim no:	1	program type:	placer	program module:	target evaluation
date submitted:		phone:	604 500 4109	email:	sandrofrizzi@hotmail.com
address:		p.o.box 1178, Dawson City, Yukon, Y0B 1G0			
start/end dates of fieldwork for this claim:		29 MAY 19 (start)	15 SEPT 19 (end)	no. of field days/this claim:	66

eligible expenses item	Please refer to rate guidelines. Provide photocopy of receipts.	unit/days	rate	total
daily field expenses	no persons: 3	118	$100/day	$11,800.00
personnel	*Name (supply statement of qualifications)*			
	Sandro Frizzi (geologist)	58	400/day	$23,200.00
	Matthias Brunnmayr (oper./mech.)	60	250/day	$15,000.00
	Joerg Lotz (field-helper/oper.)	26	0	$0.00

equipment (rental)	private or commercial	unit/days	rate	total
Excavator Hitachi 200 Ex	private	10	500/day	$5,000.00
Excavator Komatsu PC 138	private	30	400/day	$12,000.00
Dozer Cat D6 c	private	5	400/day	$2,000.00
Semi-truck with low-bed	private	30 hrs	130/hr	$3,900.00
Washplant (shaker) 20yd/hr	private	3		$0.00
Washplant (higbanker) 5yd/hr	private	8		$0.00
ATV Argo 8x8 TDI 750	private	40		$0.00
ATV Honda 500 4x4	private	30		$0.00
ATV Honda 350 4x4	private	30		$0.00
Generator 15,000 Watt	private	60		$0.00
Water pumps Honda 4" and 2"	private	11		$0.00
other	*Please provide details.*			
Gold analysys (by Rob Chapman)				not yet determined
Report compilation				$ 2,000.00
Ground penetrating radar (Oerad)				$0.00
Drone Mavic Pro 2				$0.00
			Total this claim:	$ 74,900.00