Au+ Sn placers of the Rampart-Eureka-Tofty areas

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Placer gold in the Eureka-Tofty-Rampart area has even worse complications than that of Livengood. No one has identified significant lode sources in the immediate vicinity of the placers. The ridge-top gravels located north of the Victoria Creek fault and east of the Minook Creek fault (Fig. ET1) are almost certainly of Tertiary age, given their topographic location. Placer gold is present in modern streams draining the gravels. This gold shows evidence for considerable transport, based on shape and Ag-, Hg-depleted rims. However, we can't drive there and aren't going there.

In contrast, gravels of the Eureka area (Fig. ET1) are located well above the modern drainages but well below the tops of ridges. The typical elevation above modern drainages is perhaps 50 to 150 feet—much lower than the elevation of the Livengood bench gravels above Livengood Creek. That they are pre-Holocene is undeniable. But are they early, middle or late Pleistocene? Unknown. Reifenstuhl et al. (1998) refer to them as 'Qag: old, high-level alluvial gravels' (Fig. ET 2) in contrast to the ridge-top gravels to the north (QTg; Pinney, 1997). We'll look at them and you can decide for yourself…

Much of the placer gold in the immediate vicinity of 'Eureka' displays little rounding or flattening and lacks leached rims. This gold has not moved far. BUT WHERE ARE THE LODE SOURCES??? The best guess is related to the occurrence of gold prospects with most of the quartz monzonite intrusions in the region. These are of the same age and composition as the Livengood dikes and are part of the 'back arc' magmatism I mentioned in the introduction to the field trip. The Elephant Mountain intrusion (Fig. ET1) is one of those and does host a gold prospect…apparently not of a size worth messing with. It would be easy to argue that such deposits would be normally found in the upper portions of (as at Fort Knox) or above (as at Livengood) the intrusion and hence all that's left at Elephant Mountain is the roots of a hydrothermal system. Further, there are small quartz monzonite dikes and sills just north of Eureka (Figs. ET1; ET2)….The presence of bismuth with much of the Eureka placer gold (Fig. ET3) is also indicative of an intrusion-related source for this gold. (Dave Larimer would be happy to speak extensively to this subject). That no one has found any such lode prospects in the Eureka area could mean no one has looked sufficiently hard or that all this speculation is merely fairy tales designed to help geologists sleep at night. But at least it's plausible.

The degree of gold rounding and leached-rim development increases from east to west in the Eureka area (Fig. ET1). The elevation of the Qag deposits also decreases from east to west. Based on the decrease in elevation, Yeend (1990) proposed a much larger Pleistocene river system that was responsible for deposition of the old gravels in the Eureka area and all gold-bearing gravels in the Tofty area, to the west (Fig. ET4). (I don't know why the Yeend (1990) map of old gravels doesn't match that of Reifenstuhl et al. (1998), as shown on Fig. ET-2. Perhaps Deanne Stevens (nee Pinney) can give us some insights. And while we're on that topic, we'll notice that there are some problems with the bedrock map in this immediate area.)

But Yeend (1990) went farther: he proposed that ALL the gold-bearing placer deposits in the Eureka-Tofty area were part of the same Pleistocene drainage system and implied that the gold in the Tofty area was derived from Eureka-area sources (Fig. ET4). And these are our next major stop (Fig. ET5). [Along the way we'll do a teeny bit of bedrock that will help us with the Manley Hot Springs problem.] Why anyone would care is this: if the placer gold in the Tofty area comes from the Eureka region, don't bother to look for gold lodes in the Tofty region.

Several facts support the Yeend (1990) hypothesis. For example, two paleoflow directions (based on pebble imbrecation) indicate SW transport (Fig. ET5). Similarly, there is an increase in gold fineness (Fig. ET1) from the Eureka area (< 800) to the Tofty area (mostly 800-850 with a few at 850-900). Also, the degree of rounding and size of leached rims on gold grains indicates considerable gold transport in the Tofty area (Fig. ET1). So far, so good.

However, there are also significant problems with the Yeend (1990) hypothesis. For example, while the gold from Eureka and Rampart is associated with Bi, it's not present in the Tofty area (Fig.

ET3). Nor is there a progressive east-to-west increase in fineness in the Tofty area (Fig. ET1). This is in considerable contrast to the Livengood bench, where increase in fineness was consistent and progressive. Further, while the degree of rounding and rim formation on the Tofty gold supports considerable transport (Fig. ET1), it's 1-10 km, not 20-30 km. Finally, the gold from the Tofty area is (at least locally) much more Ag-rich and Hg-poor than is gold from the Eureka area (Fig. ET6).

There are rocks and minerals occasionally present in the placers that must have come from the NNW and cannot have come from the ENE. Most notably, pieces of carbonatite have been occasionally found in the Tofty placers. The carbonate dikes (Fig. ET2) can be traced along strike for kilometers and are significantly up hill from the placers (in the modern sense). There's an exposure we could have visited 10 years ago…but…sigh…the road's in terrible shape. I've brought along a bagful if anyone is interested. We'll also (probably) find some diorite pebbles at the Boy's pit—it also comes from the NNW. The Tofty area placer gold also occasionally contains inclusions of native nickel (Ni^o), as indicated on Fig. ET1. The ONLY PLACE that could have come from is the serpentinite on Serpentine Ridge (Fig. ET1).

Finally, there are the placer deposits themselves. In general, the placers and the 'pay' streaks in the placers are oriented closer to NNW-SSE than to ENE-WSW (Fig. ET7). That is, they parallel the modern drainages instead of lining up along Yeend (1990)'s hypothetical old master drainage. We'll spending considerable time at the 'Boy's pit' (Fig. ET5), which is both parallel to Miller Creek and at about the same elevation (NOT perched high above it). As in the Eureka district, the placer gold is pre-Holocene…but is it early, middle, or late Pleistocene? In other words, is it the same age as the high terrace gravels of the Eureka district? We'll spend several hours at the Boy's pit looking at such and similar problems.

Did I say 'finally' in the last paragraph? OK, REALLY REALLY finally, there's the tin problem. Cassiterite is relatively dense; it's hard; it can't be oxidized and it doesn't weather. Tin placers are of world-wide occurrence, but they clearly require a source. (And interestingly, there's very little gold in a lode tin deposit and very little tin in gold lode deposit). The Tofty area has been mined for tin (e.g., during WWII, when the US was shut out of SE Asian Sn) nearly as much as for gold (Fig. ET3). Where does that come from??? My best guess is from the Manley granite (Fig. ET1). Interior Alaska hosts several lode and placer tin deposits/prospects; all are associated with ~ 55 Ma, highly evolved, granites. They're typically present near the top or just above the roof of the pluton….in this case, it's been eroded away. If that's the case, then streams had to be flowing from the Manley granite area towards the Tofty area. But also…the Eureka area contains a little tin. For example, a placer concentrate from Doric Creek (Fig. ET2) contained 0.2% Sn. Again, if the Manley granite was the source, there was a complex drainage system.

Enough blather. Let's look and see what we can figure out.

References

Pinney, D.S., 1997, Surficial geologic map of the Tanana B-1 Quadrangle, central AK: ADGGS Report of Investigation 97-15C, 5 p., 1 sheet, scale 1:63,360.

Reifenstuhl, R.R., Dover, J.H., Newberry, R.J., Clautice, K.H., Pinney, D.S., Liss, S.A., Blodgett, R.B., and Weber, F.R., 1998, Geologic map of the Tanana A-1 and A-2 quadrangles, central Alaska: ADGGS PDF 98-37A ,19 p., 1 sheet, scale 1:63,360.

Wayland, R.G.,1961, Tofty tin belt, Manley Hot Springs district, AK. USGS Bull. 1058i, pp. 363-414.

Yeend, Warren, 1990, Gold Placers, Geomorphology, and Paleo-Drainage of Eureka Creek and Tofty areas, Alaska, in, Dover, J.H., and Galloway, J.P., eds., Geologic studies in Alaska by the U.S. Geological Survey, 1989: U.S. Geological Survey Bulletin 1946, p. 107-109.

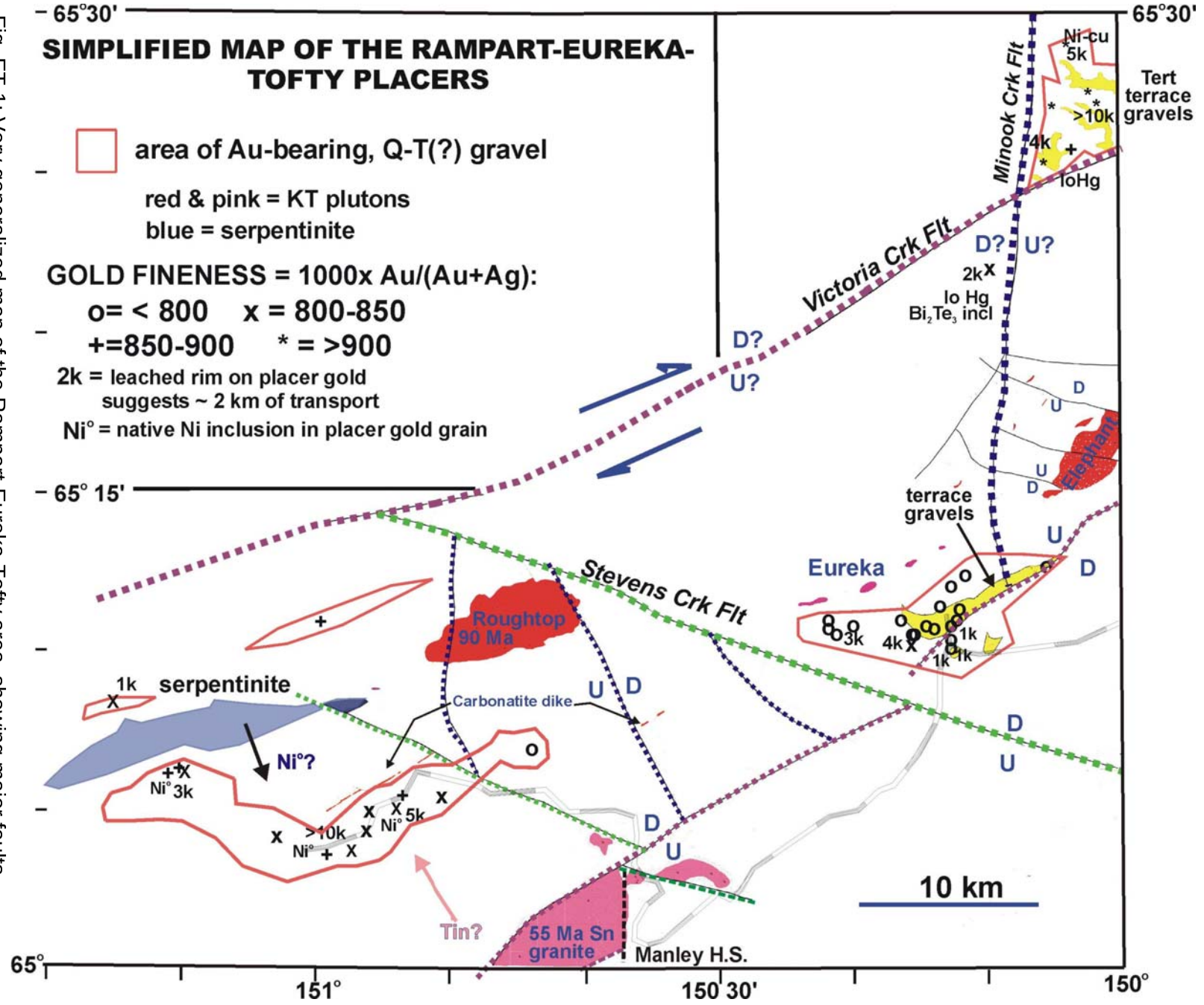

Fig. ET-1: Very generalized map of the Rampart-Eureka-Tofty area, showing major faults, placer deposits, roads, igneous intrusions, and some characteristics of the placer gold.

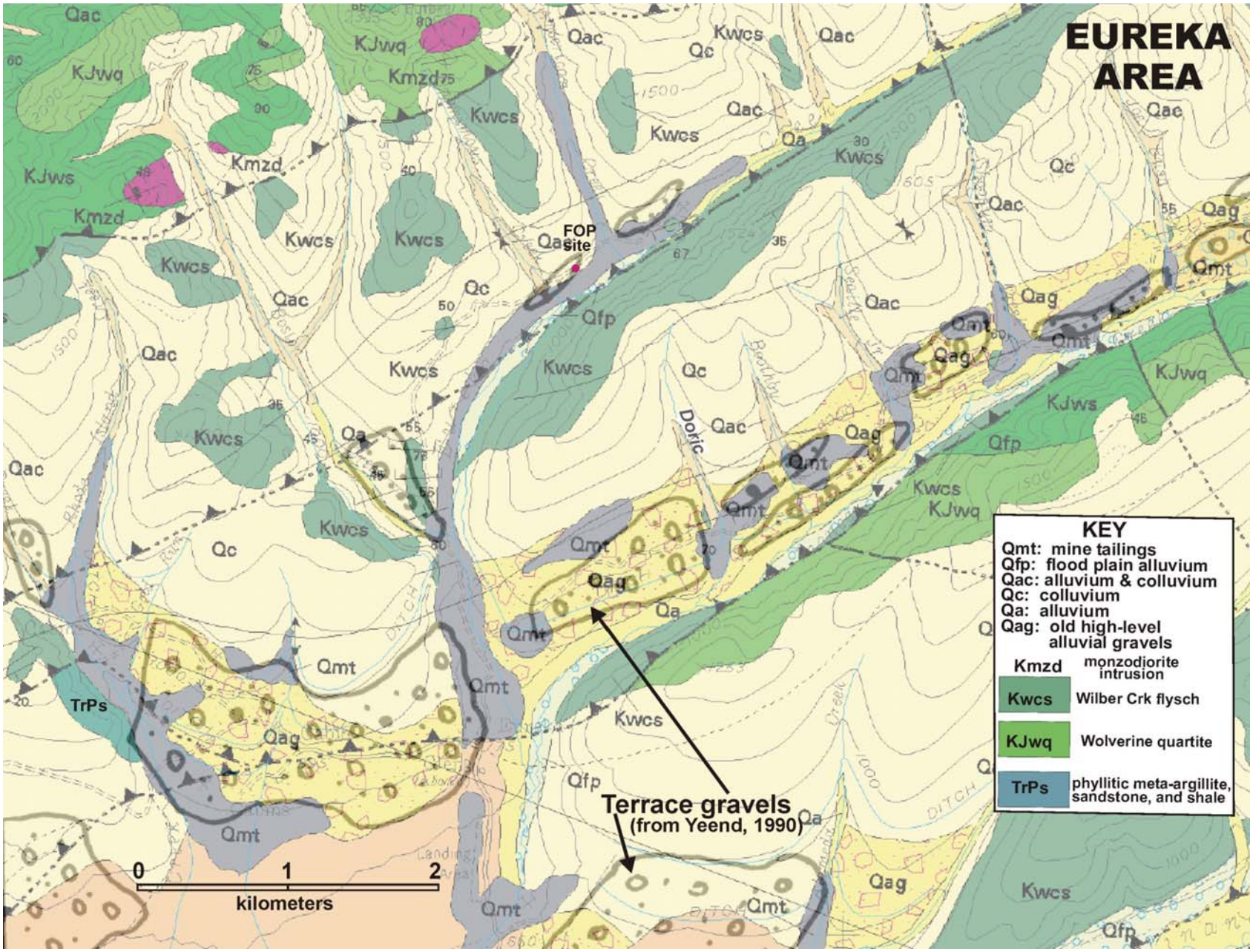

Fig. ET-2: Geology of the Eureka area, modified from Reifenstuhl et al. (1998)

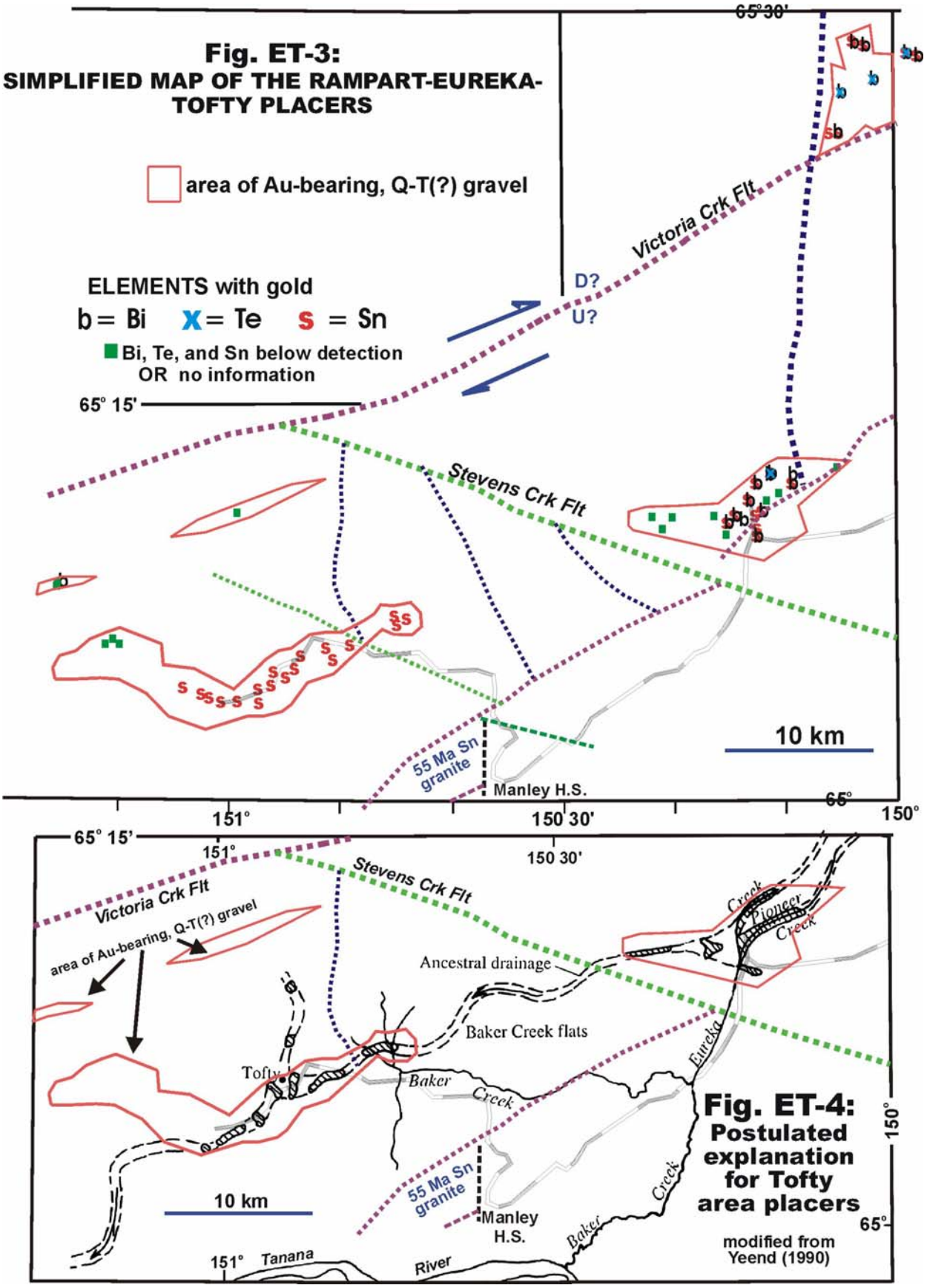
Fig. ET-3:
SIMPLIFIED MAP OF THE RAMPART-EUREKA-TOFTY PLACERS
area of Au-bearing, Q-T(?) gravel
ELEMENTS with gold
b = Bi x = Te s = Sn
Bi, Te, and Sn below detection OR no information
Victoria Crk Flt
D?
U?
Stevens Crk Flt
65° 30'
65° 15'
151°
150 30'
150°
65°
10 km
55 Ma Sn granite
Manley H.S.
Ancestral drainage
Baker Creek flats
Tofty
Baker Creek
Pioneer Creek
Eureka Creek
Tanana River
Fig. ET-4:
Postulated explanation for Tofty area placers
modified from Yeend (1990)

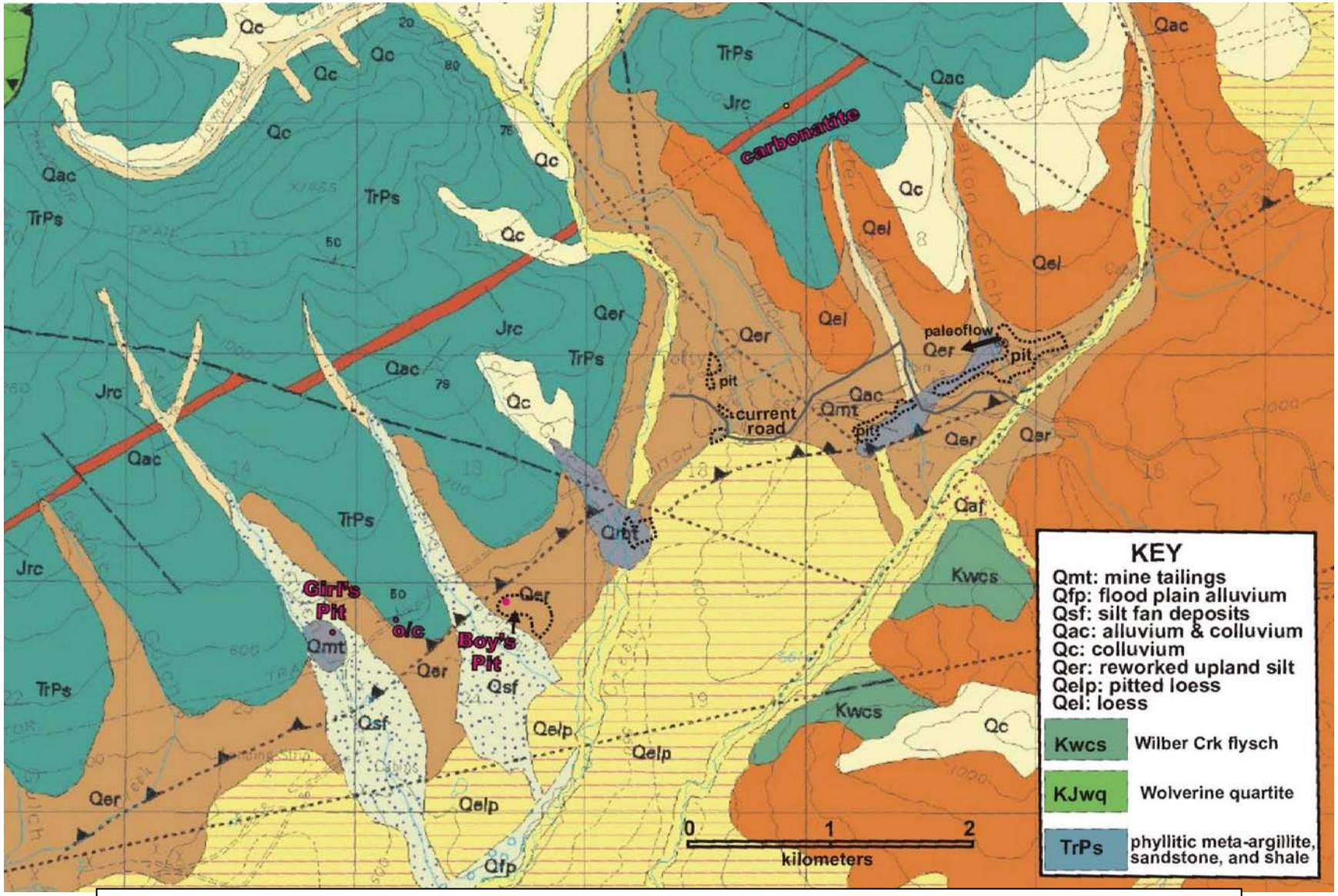

Fig. ET-5: Geology of the Tofty area, modified from Reifenstuhl et al. (1998). Pit outlines and revised road locations taken from recent remote images.

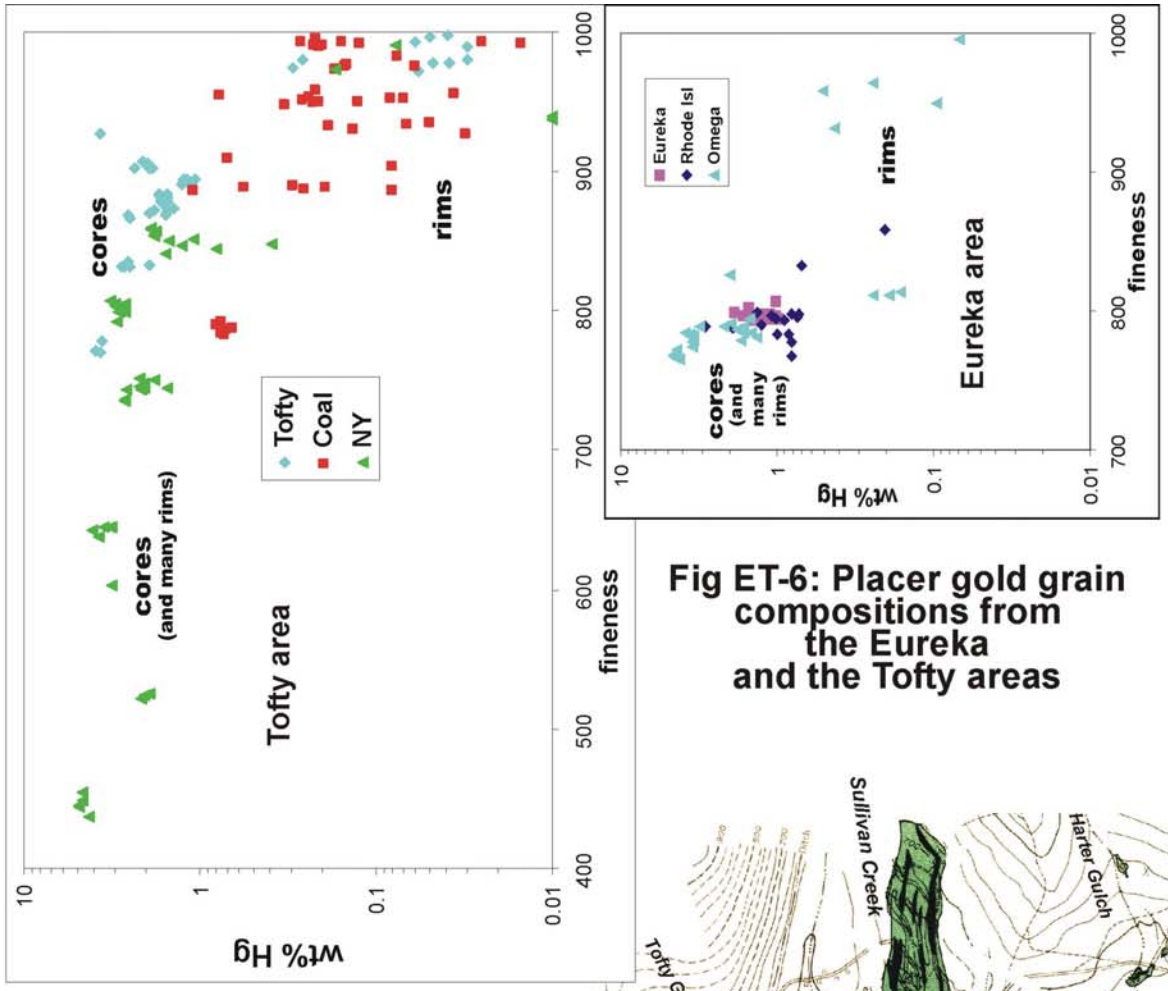

Fig ET-6: Placer gold grain compositions from the Eureka and the Tofty areas

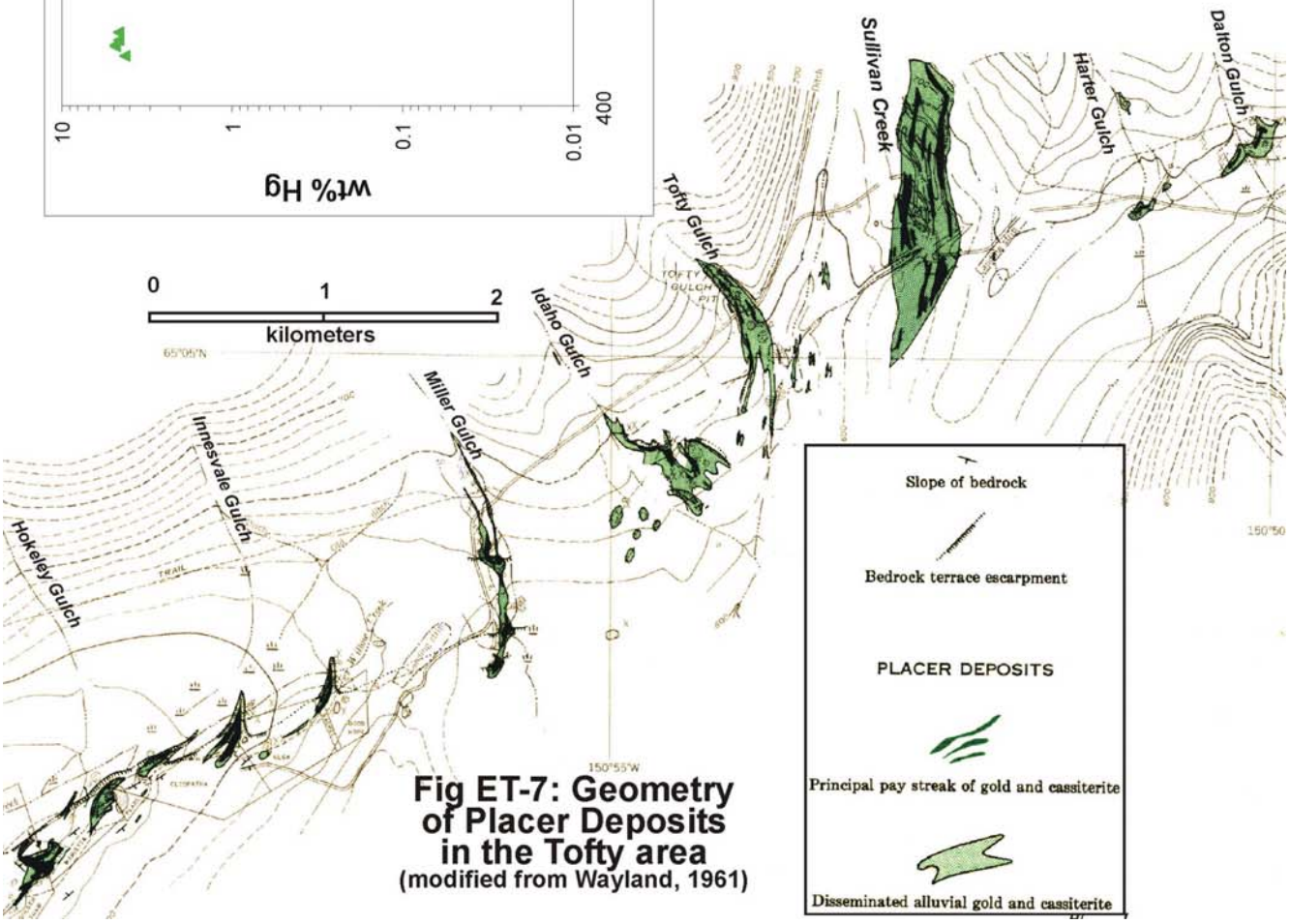

Fig ET-7: Geometry of Placer Deposits in the Tofty area
(modified from Wayland, 1961)