

DEPARTMENT OF THE INTERIOR  
UNITED STATES GEOLOGICAL SURVEY

SUMMARY OF PLACER GOLD OF THE SEWARD AND BLYING SOUND QUADRANGLES, ALASKA

This section briefly describes the gold placers of the Seward and Blying Sound quadrangles, reviews the existing literature, and summarizes the geology of the placers. The formation of the placers of each drainage system is discussed separately under four main criteria: source of gold, process of concentrating gold, stream transport across bed-rock, and stream velocity.

Placer gold was first recovered from stream gravels of the Seward quadrangle about 1850 by P. P. Doroshin, a mining engineer employed by the Russian-American Company. He obtained a few ounces of gold from gravels of two streams that flow into the Kenai River below Kenai Lake (Moffitt, 1916, p. 81). Placer gold was found on Palmer Creek near Hope in 1868, and on several nearby creeks in 1894 and 1895, precipitating a rush of miners to the region in 1896 (Moffitt, 1906, p. 49, 33). Prospecting subsequently was carried on throughout the Seward and Blying Sound quadrangles, but production of placer gold was confined to the Seward quadrangle, hence, the map shows only the pertinent area of these quadrangles. Most of the gold was recovered from stream and bench gravels in the western part of the Turmagin Arm drainage system, the most productive gravels from Mills, Canyon, Bear, Resurrection, and Crow Creeks. Only a small amount of gold was recovered from gravels of the Kenai River drainage system, chiefly from Cooper Creek, and almost no production was recorded from the Resurrection River or its tributaries. (Resurrection River and Resurrection Creek are two different streams.)

Recovery of the gold was effected initially with sluice boxes and later by hydraulic mining methods (Martin and others, 1915, p. 186). Dredges were installed on Resurrection and Simitile creeks but never were operated successfully because of large boulders, and low flows (Paige and Knopf, 1909, p. 115-120; Brooks, 1916, p. 55; Luck, 1933, pp. 22-27). Dredging also proved unsuccessful on the Kenai River for the same reasons (Martin and others, 1915, p. 186-187).

PRODUCTION

Production of placer gold came entirely from the Seward quadrangle, which yielded nearly all of the placer gold recovered from the entire Kenai Peninsula and much of the gold recovered from the drainages of streams that flow southward into Turmagin Arm. No certain estimate of the total placer gold produced from the Seward quadrangle is possible because no accurate estimates of annual production are available for most of the years from 1800 through 1910 (Moffitt and others, 1915, p. 183). Some estimates (Moffitt, 1906, p. 35; Martin and others, 1915, p. 184; Gotsch, 1934, p. 96) have been made for these years, however, and production figures exist for most other years. My compilation shows that total gold production through 1959 for the Seward quadrangle was about 100,000 troy ounces. This figure compares with 100 troy ounces reported by Koschmann (1968) for the Kenai Peninsula and the south-flowing streams north of Turmagin Arm in the Seward quadrangle and a small area in the southwestern part of the Anchorage quadrangle. (These data are incomplete for the years 1931 through 1945.) Cobb (1927) recorded production of between 100,000 and 100,000 troy ounces of gold from the Kenai Peninsula and a few thousand ounces from the south-flowing drainage north of Turmagin Arm.

The maximum annual production from the quadrangle was reached in 1897, and most of the placer gold was won during the first 10 years of mining (fig. 1). Production was in general declining between 1805 and the start of World War I, but spurts of increased production occurred in the years just prior to and after World War I and in the early to mid-1930's. Production was low until about 1970 when increases in the price of gold rekindled interest in placer mining. No production data were available for the years after 1972, but some idea of activity can be gained from the claim maps of the U. S. Bureau of Mines (1973a, b). These maps show about 265 sites for placer claims in the map area, and the KRODEI (1976, p. 11) listed more than 160 of these sites as active (assessment work was done) in 1975. Another report (Carmes, 1976) showed only 12 placer operations that actively produced gold in 1975. These mines, shown by triangles on the map, largely consist of small stream segments that historically yielded gold. These exceptions, near the head of Quartz Creek and between Lynx and Silvertip Creeks, probably were not large producers. The largest mining operations in 1975 were along Resurrection Creek.

BEDROCK

The bedrock units of the map area are described only briefly here because a companion report (Tysdal and Case, in press) contains an extensive description of them. Bedrock in areas of gold placers consists of Precambrian granite, siltstone, and mudstone of turbidite origin. These strata, which are part of the Valdez Group of Upper Cretaceous age, contain metamorphic minerals indicative of the lower part of the greenschist facies. The rocks were subjected to intense deformation, and faulting. The strata later were intruded by Oligocene granite in the Port Wells area (Lanphere, 1966), by Eocene felsic dikes in the Hope district (Sillerman, oral comm., 1977), and by plugs and pipes of quartz diorite and associated felsic dikes at the headwaters of Crow Creek (Park, 1933) in the Anchorage quadrangle a few kilometers north of Turmagin Arm. Gold-bearing quartz veins occupy fracture zones in the sedimentary and igneous rocks (Johnson, 1914; Martin and others, 1915; Tuck, 1933; Tysdal, 1977).

GLACIATION

A brief glacial history of the region is summarized from Karlstrom's (1964) extensive report that dealt with glaciation of the Kenai Lowland (to the west) and adjacent mountains. Once gold placers were freed from bedrock, they became widely scattered constituents of the unconsolidated glacial debris of the quadrangle. As glacial ice melted, glacioluvial processes concentrated the gold particles into placers.

During the Pleistocene, the Kenai Mountains underwent at least five major glaciations: Mount Sinitka (more than 150,000 years ago), Caribou Hills (as much as 130,000 to 150,000 years ago; D. H. Hopkins, oral comm., 1974), Kuluina (about 42,000 to 60,000 years ago), Iktika (about 15,000 to 22,000 years ago), and Naptomee (about 10,000 to 14,000 years ago) (Hopkins, 1974, table 1). The distribution of moraines of different ages suggests that the main topographic and climatic elements that control the present distribution of glacial ice in the region were nearly the same for most of the Pleistocene (Karlstrom, 1974).

The distribution of glacial debris of different ages (not shown on map) suggests that each succeeding glaciation was less extensive than the preceding one. Mount Sinitka drift and erratic material are preserved only locally at high elevations south of the map area, and the Kuluina drift is preserved only in the western part of the mountains and extends from 300 to 600 m near the mouth of Turmagin Arm and at progressively higher elevations eastward, south of the arm. Eklutna material forms continuous moraines along the western front of the mountains as far south as the Clifton River and intermittently throughout the western part of the mountains and extends well into the lowlands beyond. Naptomee moraines occupy the same general areas but were not quite so extensive. During the Iktika and Naptomee glaciations, the western two-thirds of the Turmagin Arm drainage system was not predominantly covered by ice (Karlstrom, 1964, p. 1), whereas the remainder of the map area was covered. A marine transgression between the two glaciations deposited the Bootlegger Cove Clay, a sequence of clay, silt, and sand along Turmagin Arm and in the lowlands to the west (Scholl, 1972; Scholl, oral comm., 1977). Holocene glaciation is represented in the map area by local moraines of the Alaskan glaciation, present near the town of Tunnel in the upper reaches of the Placer River drainage.

FORMATION OF STREAM PLACER DEPOSITS

The formation of stream placer deposits of gold in the Seward quadrangle is discussed in terms of four main criteria, described by Jenkins (1935) in an extensive report on the characteristics of placer deposits.

1. A decrease in stream velocity: Gold is deposited when the stream velocity decreases, either by a change in the stream gradient or by a change in the volume of water.
2. Floilage of the stream over bedrock or false bedrock: The irregular surface of the bedrock acts as a sluice box and traps the gold. An extensive report by Luck (1968) on the characteristics of placer deposits in the Seward quadrangle, slate and sandstone from the bedrock of most placer deposits, but clayey false bedrock underlies some deposits (table 1).
3. A long period of time for decomposition and erosion of the source rocks and for reworking of the detritus by streams so concentrate the gold: The time available for these processes in the Seward quadrangle was dependent largely on climatic factors that differed widely across the quadrangle. The climatic regime of the Pleistocene and early Holocene was probably much the same as it is today, although its severity waned and warmed (Karlstrom, 1964). As indicated in the brief section on glaciation, the western part of the Turmagin Arm drainage system was consistently the least severely glaciated; hence, the time available for the above processes to operate decreased away from this area toward the high areas that today hold glacial icefields.
4. A source of gold: Gold in most of the placer deposits of the world was deposited not far from its original source (Jenkins, 1935), and in the deposits of the Seward quadrangle.

All of these conditions are met in several areas of the Turmagin Arm drainage system and, locally, in the Kenai River drainage system, but only some of them are met in the Resurrection River and Port Wells-Passage Canal drainage systems.

Turmagin Arm drainage system

The major placer gold deposits of the Turmagin Arm drainage system and of the Seward quadrangle were from six streams (Crow, Bear, Resurrection, Simitile, Mills, and Canyon Creeks and East Fork) that have estimated production of more than \$1 million worth of gold (at \$130 per troy ounce), 7,656 troy ounces (table 1). Two other streams (Gulch and Lynx Creeks) also may belong in this production category and are considered in this section.

Velocity of stream and flowage across bedrock

The gold placers of all eight streams were near the outlet of a drainage basin and were deposited where there is a decrease in the stream gradient. In six of the eight streams, the placers occurred immediately above the junction of the placer-bearing stream with another stream, whereas the placers of two streams (Resurrection Creek and the uppermost part of Simitile Creek) were immediately below the junction of two streams. Gold from placers upstream of the junction of two streams was generally coarser than that from placers below the junction, correlating with water velocity.

The placer gold-producing segments of all the streams, except for the uppermost part of Simitile Creek, flow across bedrock of slate and sandstone locally, false bedrock of glacial clay. The uppermost part of Simitile Creek is a trap for sediment from Canyon Creek and East Fork and contained fine particles of gold. The lower two-thirds of Simitile Creek flows mainly across bedrock but yielded little gold.

Decomposition, erosion, and reworking of sediments

The processes of decomposition and erosion of gold-bearing rock and the concentration of placer gold should have been most effective during the longest length of time. From the patterns of glacial deposition and erosion previously, it is evident that the western two-thirds of the Turmagin Arm drainage system underwent less extensive glaciation during glacial maxima than other parts of the map area, and it follows that the placer drainage system most likely melted before ice elsewhere in the quadrangle. The glacial meltwaters began reworking glacial outwash material earlier than in other parts of the map area and the ridges were exposed to processes of decomposition and erosion sooner.

Glacial outwash gravels in the drainage of Resurrection Creek may have been reworked for as long as 14,000 years. At the mouth of Resurrection Creek, the gravels overlain the Bootlegger Cove Clay (Kachadorian and others, 1977), a unit deposited during a marine transgression between the Iktika and Naptomee Glaciations. Marine fossils from the clay near Anchorage yielded radiocarbon dates of about 14,000 years before present (B.P.) (Scholl and others, 1972), and the same fauna occur in the correlative clay at the mouth of Resurrection Creek (Scholl, oral comm., 1977). The overlying outwash gravels probably were laid down not less than 12,000 years ago. They are partly overlain by a clay deposit formed when Resurrection Creek was dammed temporarily by a glacier in Turmagin Arm, and a radiocarbon date of 12,000 years B.P. was obtained from the top of a moraine near Anchorage that correlated with this short-lived glacial advance (Kachadorian and others, 1977). A similar length of time for reworking of outwash deposits along Simitile Creek may be assumed because correlative lake beds overlie outwash deposits there (Kachadorian and others, 1977).

Source of gold

Two ideas exist concerning the bedrock source of the gold, which subsequently was dispersed in the glacial debris and later concentrated into placers by glacioluvial processes: (1) the gold was derived locally from decomposed quartz veins, favored by Moffitt (1906), Johnson, and Grant (1915), and this writer; or (2) the gold was freed from rock transported into the stream drainages by glaciers, suggested by a few miners (Moffitt, 1906). In this section of the report, an association of placer deposits with lode gold mines and prospects in a source area is shown for East Fork, Lynx, and Gulch Creeks where no lode mines or prospects in their drainage basins.

Quartz veins are widespread in the Turmagin Arm drainage system and all of the gold lodes of the quadrangle are in quartz veins. Lode gold mines occur in the source area for five of the eight placer stream segments under discussion. The association of placer deposits with lode mines is well established, as discussed in the following section. The placer gold of Resurrection Creek was found mainly adjacent to the mouth of Palmer Creek, downstream from a few kilometers, and probably originated from lode mines and other quartz veins in the Palmer Creek drainage. Canyon Creek gold may have been derived partly from rocks in the Mills Creek drainage, which has no lode mines, but also partly from lode gold terrane west of the Seward Highway, from the rocks near Fresno and Colorado Creeks, and perhaps Summit and even Silvertip Creeks. A similar length of time for reworking of outwash deposits along Simitile Creek may be assumed because correlative lake beds overlie outwash deposits there (Kachadorian and others, 1977).

Mills, Lynx, and Gulch Creeks have no gold lode mines in their drainage basins. Not much is known about rocks of the Gulch Creek drainage, but Mills and Lynx Creeks flow across slate and sandstone country rock that is cut by abundant quartz veins that may carry gold. A large part of this area is covered by detritus from veins that were broken down, allowing the gold placer streams of the district. The gold was most probably derived from veins that were broken down, allowing the gold to be concentrated by streams.

The two publications listed here are used in conjunction with one another. The U.S. Bureau of Mines references, 1973a and 1973b, are maps of the Seward and Blying Sound quadrangles, respectively, showing the locations of mining claims. These maps were updated in 1976 and thus are current through 1975. They show only a number for each claim or block of claims and must be used in conjunction with KRODEI, 1976a and 1976b, which are Alaska mineral property reference files for the Seward and Blying Sound quadrangles, respectively. These files, available to the public, are maintained by the Alaska Division of Geological and Geophysical Surveys in Fairbanks and are computer listings of data for each of the numbered claims shown on the maps of the U.S. Bureau of Mines. The files used here were generated in January of 1976 and are current through 1975.

Local drainage basin

A source of gold within the same basin as occupied by a stream placer is demonstrable for some placer gold deposits. Placer gold from Bear Creek is associated with native silver veins that were more abundant than in any other placer deposit of the Turmagin Arm drainage system (Martin and others, 1915). The fineness of the gold is less (0.740 to 0.761, table 1) than that from any other placer source of Turmagin Arm (Becker, 1898, p. 81; Martin and others, 1915, p. 186), reflecting the high tenor of silver. The Cook and Ploman prospects (locality 9 on map of Tysdal, 1978) near the head of Bear Creek was staked originally as a silver lode (Tuck, 1933, p. 507), and "several other prospects reported valuable for their silver content" were located along Bear Creek (Martin and others, 1915, p. 179).

The placer gold of Crow Creek has the same physical characteristics as the gold of lode mines at the head of Crow Creek (Park, 1933, p. 404). Fineness of the placer gold commonly ranges between 0.720 and 0.730 (table 1), which corresponds with the 25 percent by weight of silver reported (Park, 1933, p. 408) for free gold of the lodes. Native silver veins observed in the bedrock of the placer gold occur in the same area (Moffitt, 1906, p. 46). Quartz diorite of the placers is like that which crops out near the head of Crow Creek, and pay gravel is associated everywhere with the quartz diorite (Park, 1933, p. 404). No source for quartz diorite is known in neighboring areas.

The placers of Lynx Creek yielded both gold and native copper. The only known vein of copper sulfide in the Turmagin Arm drainage system is in the headwaters of Lynx Creek (Tuck, 1933; Tysdal, 1978) described by Paige and Knopf (1907, p. 124-125). No native copper was reported at this copper prospect, but native copper probably formed as an alteration product of the lode (Moffitt, 1906). Pyrrhotite-impregnated diatase boulders occur in the stream gravels (Martin and others, 1915).

Glacial transport

In the early part of the century, it was suggested by some miners who worked streams in the Turmagin Arm drainage system that glaciers transported gold-bearing rock into the stream drainages and the gold later was freed and reworked into placers (Moffitt, 1906, p. 45). The idea probably came about because granite clasts in stream gravels on the south side of the arm have no source in the country rock of the same drainages. The argument is largely discounted in the preceding sections, which show local basin sources for some gold and a spatial association of lode mines and placer deposits. Nevertheless, some small amount of gold could have been glacially transported, and its possible sources are discussed.

Granitic clasts are in the gravels of Resurrection, Bear, Palmer, Simitile, Gulch, and Canyon Creeks and East Fork. They increase in abundance northward from East Fork to Turmagin Arm, and the clasts of Resurrection Creek are larger than those to the east (Moffitt, 1906, p. 24). Fineness of the placer gold commonly ranges between 0.720 and 0.730 (table 1) than that from any other placer source of Turmagin Arm, derived from intrusions at the head of Crow Creek. The clasts south of the arm probably came from the same source (Moffitt, 1906), moved on glaciers across the arm, and were reworked by streams.

Glaciers flowed south from the Matanuska Valley (north of the quadrangle) along the western front of the Chugach Mountains and gold-bearing glacial moraines overlain the western slopes of the mountains in the northwestern part of the Seward quadrangle (Karlstrom, 1964), and my observations show that they contain granitic clasts of types found in the Talkeetna Mountains and conglomerate of the glacial formation of the Matanuska Valley. The glacial moraine was deposited on the south side of the arm and could be reworked from glacial debris transported into the drainages by ice that moved eastward up the arm. Granite clasts of the Eklutna moraine are pink, unlike the gray granites of the stream gravels of the clasts of the stream gravels are described as slate and sandstone of local origin (Moffitt, 1906), but a source in the Matanuska Valley or Talkeetna Mountains would have contributed rock types foreign to the Chugach terrane.

There is no immediate source for the granite south of Turmagin Arm. The nearest outcrop is near the Harding Icefield, immediately to the west of the Seward quadrangle, about 30 mi south-southwest of Hope. Glaciers flowed north and west from the icefield during Naptomee time but, according to maps of Karlstrom (1964), did not expand into the drainage system of Turmagin Arm. In addition, the number of granitic clasts in the gravels decreases southward, and the increased number and size of the clasts are opposite to what would be expected.

Kenai River drainage system

In the eastern part of the Kenai River drainage system, a minor amount of placer gold was recovered from the flood plain of the lower part of Falls Creek, the benches along the lower segment of the stream, and at the mouth of the canyon below the head of Crow Creek (Park, 1933). The number of placer mines that produced abundant gold in the Kenai River drainage system, but the streams are short and generally contain only a small amount of gravel that has undergone little reworking. The gravel derived from the area not long ago, and unworked moraine material is present in some drainages (Johnson, 1914, p. 168).

In the northwestern part of the drainage system, no gold was produced from Quartz Creek, which flows across a bedrock floor. Lode mines that produced gold occur near Slate, Summit, and Colorado Creeks, which drain into Quartz Creek and are the source of the gold benches. The gold benches are thin, only 4 to 6 m thick, and the area had an extended period of time for reworking of the gravels.

Streams west of Kenai Lake yielded much of the gold recovered from the Kenai River drainage system, most of it from Stetson and Cooper Creeks, and a minor amount from the Kenai River (Moffitt, 1906; Martin and others, 1915). No gold lode mines or prospects were reported in the western part of the drainage system. Stream sediments from several creeks in the general area gave gold values of 70 to more than 800 parts per million (Tripp and others, 1978), values commonly found in known lode gold districts of the Seward quadrangle.

Gravels along the lower 1 km of Cooper Creek and downstream along the Kenai River are detritic deposits, as much as 60 m thick (formed at the margin of a glacial lake Martin and others, 1915). These sediments were not reworked, except for the volume of them removed during dune cutting by the present streams. Sediments along the upper reaches of Cooper Creek, upstream from the rock canyon cut by the creek, and along Stetson Creek are both moraine and glacioluvial in reworking. They are steeper, overlain by bedrock, and richer in gold (Johnson, 1912), but none was subjected to extensive reworking.

Resurrection River drainage system

The only record of placer gold production from the Resurrection River drainage system is a statement by Smith (1926, p. 12) that less than \$5,000 worth of gold (gold valued at \$20.67 per troy ounce) was recovered in 1924. Two lode gold prospects were located on the south side of the Resurrection River in 1920 (U.S. Bureau of Mines, 1973a, and KRODEI, 1976a), but no record of production is known. Gold values of 300 to more than 500 parts per million were detected in pan concentrates of stream sediments from the western part of the drainage system (Tripp and others, 1978), and in the bedrock and underlain by the gold particles. Sediments along the upper reaches of the drainage system Seward quadrangle, such values generally are not reported. The number of placer mines that produced abundant gold in the drainage basin, but the streams are short and generally contain only a small amount of gravel that has undergone little reworking. The gravel derived from the area not long ago, and unworked moraine material is present in some drainages (Johnson, 1914, p. 168).

Port Wells--Passage Canal drainage system

No significant amount of placer gold was produced from active stream or bench gravels in the Port Wells-Passage Canal drainage system even though gold-bearing quartz veins, as well as several lode gold mines, exist throughout the area. The veins and lodes supply the gold particles. The gravels of the drainage system are composed of slate and sandstone, and significant spectrographic analyses of pan concentrates of stream sediments reveal gold in gravels throughout the drainage basin, and only a few claims were recorded. Ice still covers part of the area, and the remainder of the drainage system was exhausted only recently from beneath ice. The streams are short, many of them contain little gravel, and the stream has low flow rates, and the glacioluvial material has not undergone extensive reworking to concentrate gold.

BEACH PLACER DEPOSITS

No productive beach placer deposits are known in the map area. The beach placer at Sniper's Point (A) near the mouth of Simitile Creek has not been worked (Johnson, 1914, p. 161; Martin and others, 1915, p. 187). The placer deposits of Harris Bay (B) and Johnston Bay (C) were listed as active claims in 1975 (U.S. Bureau of Mines, 1973b, and KRODEI, 1976b), but nothing is known about production.

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Map number and name

1. Indian Creek T. 1