

LEGEND

- JURASSIC AND/OR CRETACEOUS**  
UPPER JURASSIC AND/OR LOWER CRETACEOUS  
COAST INTRUSIONS
- 6 Granite, granodiorite, diorite, quartz diorite; minor spengite, apatite, and micropegmatite.
- TRIASSIC AND (?) JURASSIC**  
UPPER TRIASSIC AND (?) LATER
- 4 Andesitic lavas, agglomerates, tuffs and breccias; basaltic, trachytic, and dacitic lavas; minor, intercalated limestone.  
5 Similar to 4, but may include some undifferentiated 3.
- TRIASSIC**  
UPPER TRIASSIC
- 3 Thin-bedded argillite, tuffaceous argillite, impure limestone, and tuffaceous limestone; agglomeratic limestone and quartzite; numerous, thin, intercalated andesitic lavas and associated pyroclastic rocks.
- 2 QUATSINO FORMATION: crystalline limestone, with minor volcanic rocks.
- UPPER TRIASSIC AND (?) EARLIER**  
KARMUTSEN GROUP
- 1 Basaltic and andesitic lavas, agglomerates, breccias, and tuffs; minor intercalated limestone.

Heavily drift-covered area  
Bedding (horizontal, inclined, vertical)  
Schistosity (inclined)  
Fault (arrow indicates direction of dip)  
Shear zone  
Glacial striae  
Small locality  
Mineral prospect  
Adit

- LIST OF MINERAL PROSPECTS**
- |                       |                                   |
|-----------------------|-----------------------------------|
| 1 Beano group (gold)  | 5 Vivian group (gold)             |
| 2 Friend group (gold) | 6 Head Bay magnetite group (iron) |
| 3 Harlow group (gold) | 7 Ubell Creek showings            |
| 4 Mohawk group (gold) | 8 Ubell showings                  |

Geology by J. W. Howley, 1947, 1948, 1949

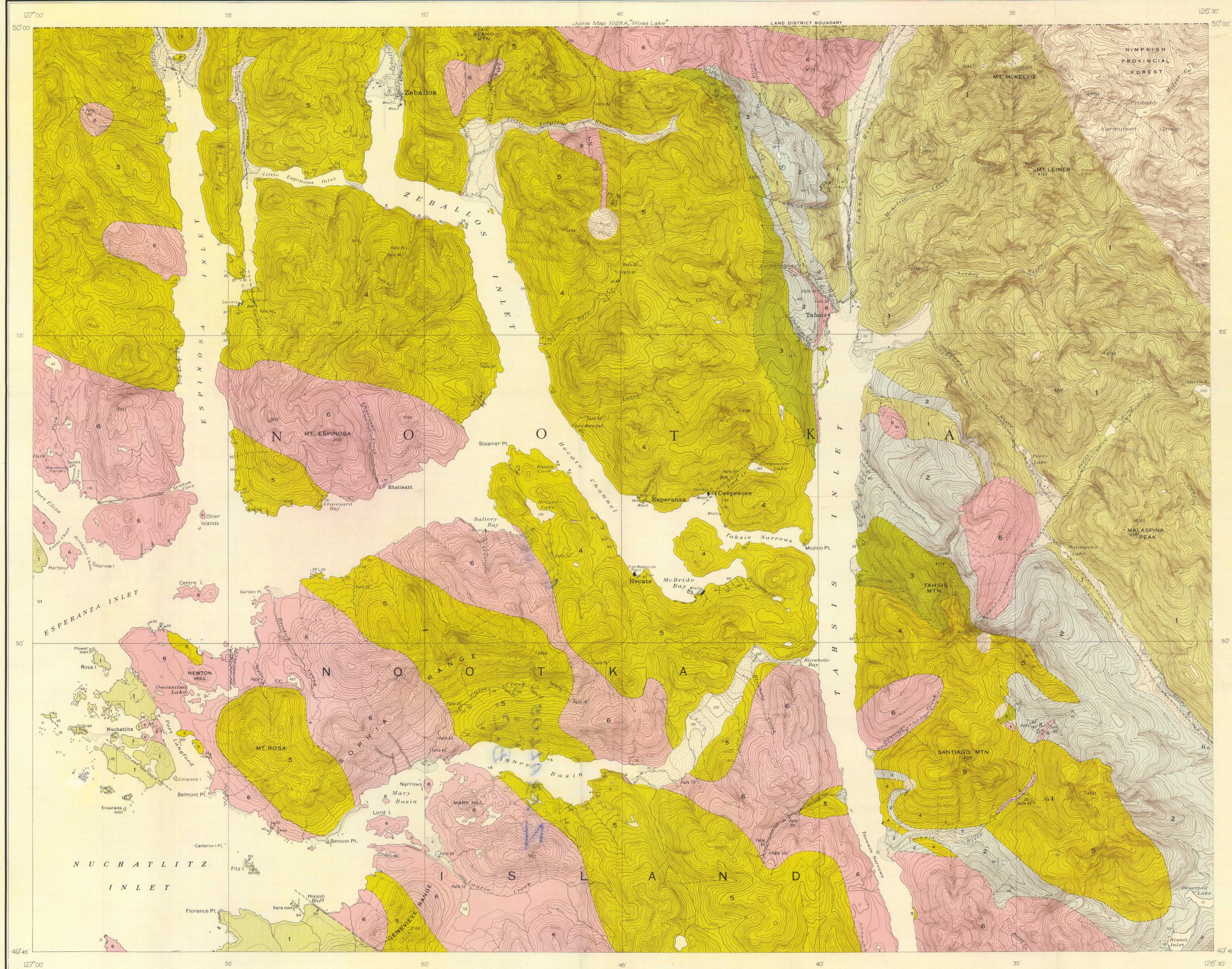
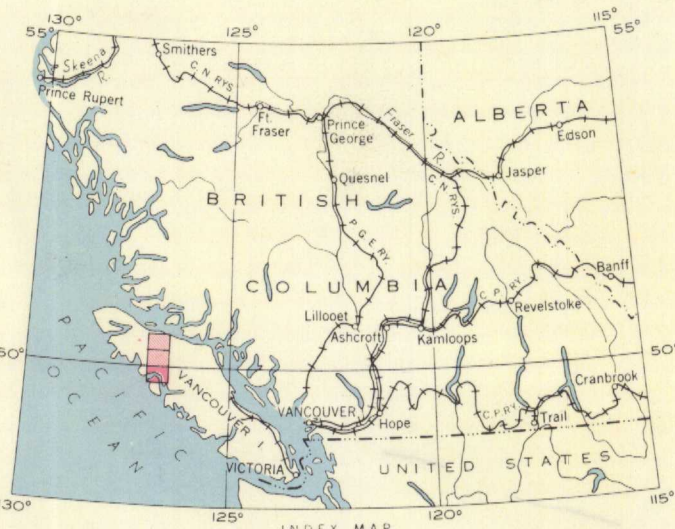
Cartography by the Geological Cartography Division, 1953

Road  
Trail  
Building  
Church  
School  
Post Office  
Cemetery  
Navigation light  
Indian Reserve  
Triangulation station  
Provincial forest boundary (approximate)  
Glacier  
Stream (position approximate)  
Intermittent stream  
Marsh  
Sand bar or mud flat  
Reef or small island  
Rocks  
Contours (interval 100 feet)  
Contours (position approximate)  
Height in feet above mean sea-level

Base map surveyed by the Topographical Survey, 1939, with control supplied by the Department of Lands, British Columbia and by the Hydrographic Service. Compiled by the Topographical Survey, 1946

Air photographs covering this map-area may be obtained through the National Air Photographic Library, Topographical Survey, Ottawa, Ontario

Approximate magnetic declination, 24° 00' East



DESCRIPTIVE NOTES

The map-area occupies part of the island archipelago and fiord-land of the west coast of northern Vancouver Island. Much of it is difficult to explore because of the extremely heavy forest cover, which effectively masks the precipitous rock faces so characteristic of the region. Below an elevation of 2,000 feet and within 1 mile to 3 miles of tide-water, the underbrush is exceedingly thick, and in many places is almost impenetrable. The Karmutsen group (1) consists of a great thickness of basaltic and andesitic lavas, agglomerates, breccias, and tuffs, with minor intercalated sedimentary strata. With the exception of the tuffs, the volcanic rocks are generally massive and dark green or black, and are characteristically amygdaloidal. In some places pillowed lavas are common. Much of the group has undergone regional metamorphism where the rocks are well removed from intrusive bodies, the principal changes have been due to induration, some recrystallization, chloritization, and epidolization, but in the immediate vicinity of intrusions, the processes of dynamic and thermal metamorphism have resulted in complete obliteration of most of the original textures.

The Karmutsen group is conformably overlain by the Quatsino formation (2), which consists of crystalline limestone intercalated with thin volcanic flows. Its apparent stratigraphic thickness, where exposed in the relatively undisturbed area along Arliss River in the adjoining Woss Lake map-area to the north, varies from about 2,000 to 5,000 feet. Its true thickness may, however, be considerably less, although no definite evidence of over-thickening by faulting or folding was noted in that particular region. The limestone is fine to coarsely crystalline, and ranges in colour from pure white to black. Towards the base, it tends to be exceedingly fine grained, and grey and brownish or buff types are characteristic. Midway of the formation the predominant colours are white and grey, but towards the top they change to dark grey or black, due to the presence of carbonaceous matter. In places where the limestone has been cut by Coast intrusions, it has been much altered, and in part has been converted to a variety of contact metamorphic silicate minerals. Some of these metamorphic zones contain varying amounts of magnetite and of copper, lead, and zinc sulphides. Elsewhere little alteration was noted beyond simple recrystallization.

The Quatsino formation is conformably overlain by rocks of the Bonanza group (3-5). The lower 400 to 500 feet of the group consists of thin-bedded argillite, tuffaceous argillite, impure limestone, quartzite, and numerous, thin, intercalated, andesitic lava flows (3). Above this lower, predominantly sedimentary, part, the rocks of the group consist of a great thickness of andesitic lavas, agglomerates, tuffs, and breccias, with lesser amounts of basaltic, trachytic, and dacitic lavas and minor intercalated lenses of limestone (4). The top of the group has nowhere been recognized either in this or nearby map-areas. In general, the rocks are much altered by induration and regional metamorphism so that original textures are largely obliterated.

Primary structures within this conformable series of volcanic and sedimentary rocks (1-5), which in earlier accounts have been generally referred to the widespread Vancouver group, have been largely preserved, and over large parts of the area the strata occupy a seemingly simple monocline striking northwest and dipping at angles of from 30 to 60 degrees to the southwest. In the vicinity of large bodies of Coast intrusions, however, the rocks are commonly greatly contorted and are intersected by faults of varying magnitude. This condition is illustrated in the region between Tahsis and Little Zeballos River Valleys, and at many places on Nootka Island, in all of which vertical or very steep dips and, less commonly, abrupt, radical changes in strike are prevalent. North and northwest striking faults have further complicated the general monoclinical structure. Reappearance of Karmutsen group rocks in fault contact with the upper Bonanza group, in the southwest part of the area, may be entirely due to faulting, but is more probably due to a combination of faulting and folding, in which case the monocline would in effect be the northeastern limb of a major syncline. Fossils found in an upper sedimentary zone within the volcanic rocks of the Karmutsen group, on the northeasterly trending ridge leading to Mount Leiner, have been established as Upper Triassic in age. No other diagnostic fossils have been found in the area, but fossils of late Upper Triassic age, including *Monotis subcircularis*, were collected by Gunning from the lower, sedimentary part of the Bonanza group in Nimkish map-area. It would, therefore, seem probable that much, if not all, of the entire series of pre-batholithic sedimentary and volcanic rocks in this and adjoining map-areas is Upper Triassic in age.

The Coast intrusions (6) provide a variety of rock types, the commonest being granite, granodiorite, and diorite. A pronounced northwest trend of the masses may be noted, and for the most part they exhibit intrusive contacts. Basic border phases containing a high percentage of included material are common except where the intruded rocks are Quatsino limestone. The area contains several known lode-gold vein deposits similar to, but smaller than, those occurring in the Zeballos mining camp of the adjoining Woss Lake map-area to the north, but as yet none has proved to be commercial. Evidence of contact metamorphic copper mineralization was noted on the high ridge just west of the headwaters of Nomsah River. The Head Bay, the only known magnetite deposit in the area, is currently being explored.

MAP 1027A

**ZEBALLOS**  
VANCOUVER ISLAND  
BRITISH COLUMBIA

Scale: One Inch to One Mile =  $\frac{1}{63,360}$

1/4 1/2 3/4 0 1 2 3 Miles

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