

Exploration and mining in the Northwest Region, British Columbia



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Recommended citation: Tombe, S.P., 2021. Exploration and mining in the Northwest Region, British Columbia. In: Provincial Overview of Exploration and Mining in British Columbia, 2020. British Columbia Ministry of Energy, Mines and Low Carbon Innovation, British Columbia Geological Survey, Information Circular 2021-01, pp. 47-64.

1. Introduction

The Northwest Region (Fig. 1) has long been known for its history of mining and for its vast endowment of precious and base metals. The region is prospective for a wide range of deposits: large bulk-tonnage porphyry Cu-Au-Mo, high-grade Au-Ag precious metal, Ag-Pb-Zn polymetallic, ultramafic-hosted Ni-Co-Pt-Pd, anthracite coal, placer gold, and jade. Projects this year were again concentrated in a loosely defined area in the northern part of the region popularly known as the 'Golden Triangle'; several other projects were underway to the southeast. High metal prices in 2020 encouraged financing of many projects.

Estimates for exploration expenditures, drilling programs, and other metrics were captured in the British Columbia Mineral and Coal Exploration Survey, a joint initiative of the Province of British Columbia Ministry of Energy, Mines and Low Carbon Innovation, the Association for Mineral Exploration in British Columbia, and EY LLP. For the Northwest Region, exploration expenditures were estimated at \$225.3 million and exploration drilling was estimated at 470,060 m (Clarke et al., 2021; EY LLP, 2021).

The Northwest Region contains two operating metal mines (**Brucejack** and **Red Chris**). The **Silvertip** mine produced in the first quarter then went into care and maintenance. The region also contains six proposed metal mines (**Dome Mountain**, **Galore Creek**, **KSM**, **Kutcho**, **Premier**, and **Red Mountain**) and one proposed coal mine (**Tenas**). More than 100 early- to advanced-stage projects were tracked, of which 30 are discussed herein. Large industrial projects in the region are driving demand for aggregate, and placer gold and jade mining continues throughout the region.

Several projects advanced with Preliminary Economic Assessments (PEA; **Dome Mountain**, **Turnagain**), Prefeasibility Studies (PFS; **KSM**), and Feasibility Studies (FS; **Premier**; **Red Mountain**). Updated mineral resources were published for **Brucejack** and **Snip**, and a maiden resource estimate was filed for **Tatogga** (Saddle North). Many purchases and acquisitions were completed this year, most notably the **Snowfield** deposit (Measured and Indicated resources of 25.9 Moz Au, 75.8 Moz Ag, 2.98 Blbs Cu, 258.3 Milbs Mo,

and 22.5 Moz Re), which Seabridge Gold Inc. purchased from Pretium Resources Inc. for \$100 million US.

Several companies reported preliminary results from grassroots and early-stage fieldwork, and others reported positive drill results from advanced-stage exploration projects moving towards the feasibility stage. Infill drilling by Skeena Resources Ltd. at the **Eskay Creek** project continues to return high-grade intersections including highlights of 35.42 m grading 21.90 g/t Au and 235 g/t Ag at the 21A zone. Tudor Gold Corp. reported mineralized drill intervals at their **Treaty Creek** project, with highlights including 348 m grading 2.04 g/t Au and 4.13 g/t Ag within 930 m grading 1.06 g/t Au and 2.80 g/t Ag. At Eskay Mining Corp.'s **Corey** project, drilling returned 11.24 m grading 1.23 g/t Au and 201 g/t Ag. At their **E&L** property, Garibaldi Resources Corp. expanded the zone of mineralization from 200 to 650 m and drilled highlights of 151.6 m grading 0.56% Ni and 0.61% Cu.

2. Geological overview

The Northwest Region has an immense mineral wealth that is directly tied to its tectonic evolution (e.g., Nelson et al., 2013). Mineral deposits formed during protracted (Neoproterozoic to Cambrian) breakup of the supercontinent Rodinia, accretion of allochthonous terranes to the western flank of Ancestral North America, and post-accretion deformation and magmatism. The Canadian Cordillera is commonly subdivided into five morphogeologic belts (from east to west, Foreland, Omineca, Intermontane, Coast, and Insular; Fig. 1) across which the Northwest Region extends. Late Triassic to Early Jurassic island arc volcanism, plutonism, and tectonics in the Stikine terrane were particularly important to the Northwest Region, generating many porphyry Cu-Au-Mo and Au-Ag vein deposits.

3. Mines and quarries

In 2020, three metal mines operated in the Northwest Region (**Brucejack**, **Red Chris**, and **Silvertip**). One industrial mineral mine and three jade projects operated this year, and numerous aggregate operations supplied large-scale industrial projects and local townships throughout the region. Placer mining is ongoing, predominantly in the Atlin and Turnagain areas.

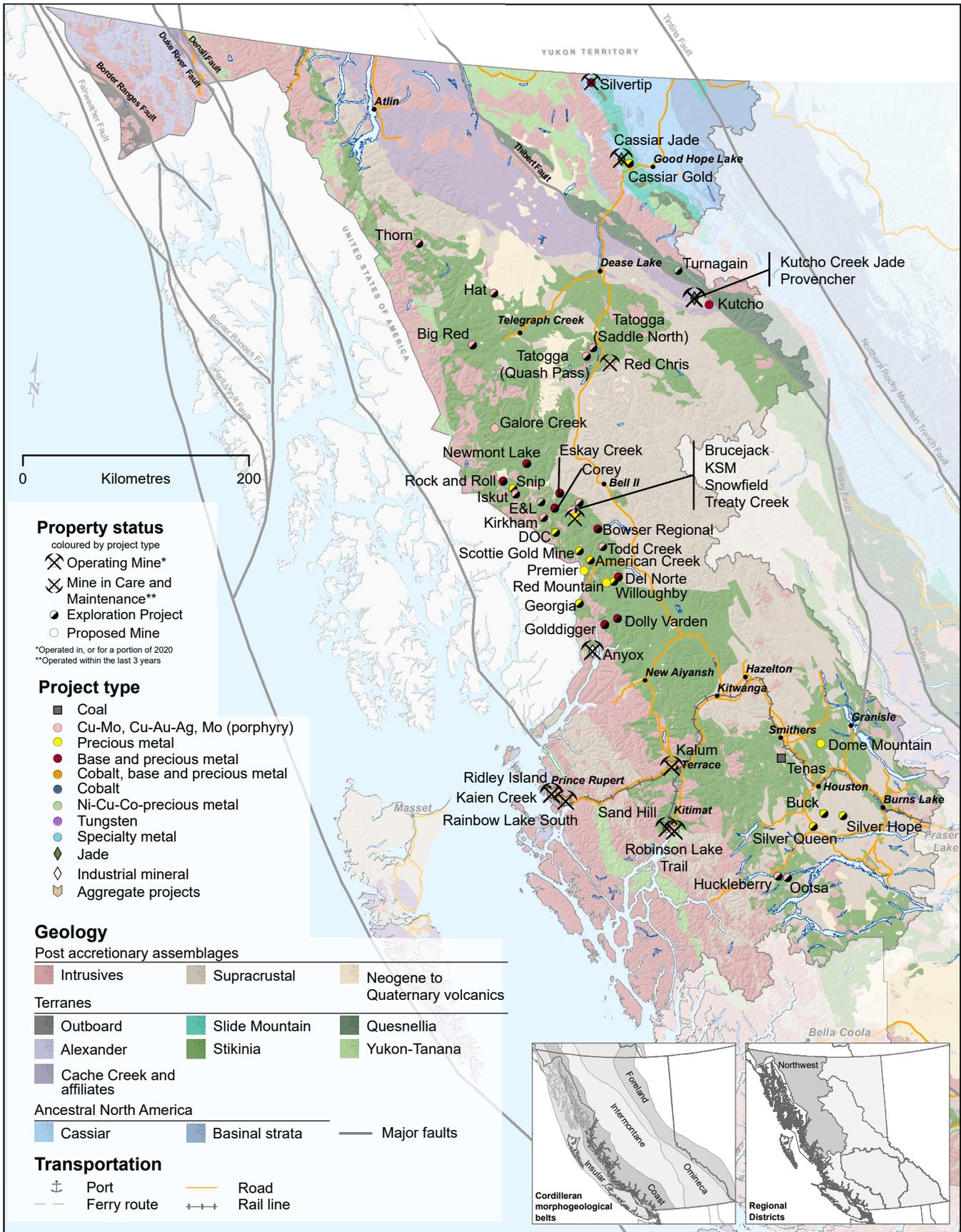


Fig. 1. Mines, proposed mines, and selected exploration projects, Northwest Region, 2020. Terranes after Nelson et al. (2013).

3.1. Metal mines

The **Brucejack** and **Red Chris** mines operated continuously in 2020; the **Silvertip** mine operated at the start of the year but was put into care and maintenance in February (Fig. 1; Table 1).

3.1.1. Brucejack (Pretium Resources Inc.)

The **Brucejack** gold-silver mine operated throughout 2020. Access to the underground mine is via a 75-km all-season mining road off of Highway 37, where the last 16 km is travelled over glacier ice. Power for the site is supplied by a 57 km-long transmission line that was built and commissioned for the mine. Production for the first three quarters totalled 259,443 oz of Au at a head grade of 8.4 g/t Au and 364,233 oz Ag. The mill throughput in the first nine months of the year totalled 3642 tpd for a total of 997,821 t milled. In March, the company filed a technical report with Indicated and Measured mineral resources totalling 23.2 Mt grading 10.1 g/t Au and 65.5 g/t Ag, and Proven and Probable mineral reserves totalling 15.7 Mt grading 8.4 g/t Au and 59.6 g/t Ag.

The Brucejack deposit incorporates the Valley of the Kings (VOK) and West zones. Several other mineralized zones in phyllic altered rocks extend across an area 5 by 1.5 km (from south to north: Bridge, Waterloo, Shore, SG, Gossan Hill, Golden Marmot, and Hanging Glacier). Interpreted

as an intermediate-sulphidation epithermal Au-Ag deposit, mineralized sheeted veins, breccia veins, and vein stockworks cut Lower Jurassic metasedimentary and volcanic rocks of the Hazelton Group. Gold and silver at both the VOK (Fig. 2) and West zones is contained mainly as electrum and lesser



Fig. 2. Gold (present as electrum) in quartz-sericite-pyrite altered fine-grained lapilli tuff at Brucejack.

Table 1. Metal mines, Northwest Region.

Mine	Operator (partner)	Commodity; deposit type; MINFILE	Forecast 2020 Production (based on Q1-Q3)	Reserves	Resource	Comments
Brucejack	Pretium Resources Inc.	Au, Ag; Intermediate-sulphidation epithermal; 104B 193	345,000 oz Au 485,000 oz Ag	P+Pr: 15.7 Mt at 8.4 g/t Au, 59.6 g/t Ag	M+I: 23.2 Mt at 10.1 g/t Au, 65.5 g/t Ag Inf: 9.4 Mt at 10.3 g/t Au, 44.3 g/t Ag	April 2020 updated mineral reserves and resources; based on VOK and West zone deposits.
Red Chris	Newcrest Mining Ltd. (70%), Imperial Metals Corp. (30%)	Cu, Au, Ag; Hybrid calc-alkalic to alkalic porphyry; 104H 005	66.4 Mlbs Cu and 53,700 oz Au	P+Pr: 301.5 Mt at 0.36% Cu, 0.27 g/t Au	M+I: 1.034 Bt at 0.35% Cu, 0.35 g/t Au, 1.14 g/t Ag Inf: 787.1 Mt at 0.29% Cu, 0.32 g/t Au, 1.04 g/t Ag (These resource figures do not consider any mining since the start-up in 2014)	Infill drilling beneath East Zone intersected discrete high-grade Au-Cu pods of mineralization with highlights including 514 m grading 1.3 g/t Au and 0.77% Cu including 166 m grading 3.0 g/t Au and 1.5% Cu (from hole RC634).
Silvertip	Coeur Mining Inc.	Ag, Pb, Zn; Manto carbonate-replacement; 104O 038	139,000 oz Ag 2.46 Mlbs Zn 2.18 Mlbs Pb	P+Pr: 1.61 Mt at 289 g/t Ag, 5.6% Pb, 8.24% Zn	M+I: 1.18 Mt at 222.73 g/t Ag, 4.09% Pb, 8.58% Zn Inf: 0.53 Mt at 271.04 g/t Ag, 5.02% Pb, 9.31% Zn	Mining operations temporarily suspended at the end of February. Exploration included 60,000 m of drilling; early results indicate potential for resource growth along a 3.5 km north-south strike length.

P = Proven; Pr = Probable; M = Measured; I = Indicated; Inf = Inferred

sulphosalts. Chalcopyrite, galena, and sphalerite are also common. Gold-silver mineralization appears to have been mainly transported as colloidal suspensions in hyper-enriched gold-bearing hydrothermal fluids. Board et al. (2020) suggested that epithermal veins developed during waning stages of Early Jurassic sinistral transpression when gold-silver colloids may have precipitated due to fluid mixing. Although a possible link between the epithermal-style deposits and an intrusion has not yet been demonstrated, 2019 drilling that targeted a conductive magnetotelluric anomaly beneath the West zone discovered anomalous copper and porphyry-style alteration; follow-up drilling is currently being conducted.

3.1.2. Red Chris (Newcrest Mining Ltd. 70% and Imperial Metals Ltd. 30%)

The **Red Chris** open-pit copper-gold mine is 17 km east-southeast of the community of Iskut. The Northwest Transmission Line powers the site and access is from Highway 37. The area was first explored in 1956, but it wasn't until 2015 that the first copper concentrate was produced. Production to the end of the third quarter of 2020 totalled 40,275 oz Au and 49.8 Mlbs Cu. As of 2014, open pit/block cave Measured plus Indicated resources total 1.034 Bt with grades of 0.35% Cu, 0.35 g/t Au, and 1.14 g/t Ag. Additional Inferred resources total 787.1 Mt with average grades of 0.29% Cu, 0.32 g/t Au, and 1.04 g/t Ag.

The deposit is hosted by the Red stock (U-Pb zircon 203.8 Ma; Rees et al., 2015), which intrudes and alters Upper Triassic Stuhini Group rocks and is faulted against Middle Jurassic rocks of the Bowser Lake Group. Rees et al. (2015) described multiple igneous phases, alteration, and controls on mineralization.

This year, brownfield exploration drilling was carried out at the East, Main, and Gully zones following up on historic drilling along a 3 km porphyry trend. Electromagnetic and gravity surveys were completed to generate future targets. Resource definition infill drilling was also completed and confirmed several discrete high-grade pods in the East zone. Highlights from this infill drilling included 514 m grading 1.3 g/t Au and 0.77% Cu including 166 m grading 3.0 g/t Au and 1.5% Cu (from hole RC634).

3.1.3. Silvertip (Coeur Mining Inc.)

The **Silvertip** property is 8 km south of the British Columbia-Yukon border. Access to the mine is via a 26 km long all-season access road from Highway 1, and power is produced by diesel and liquified natural gas fueled generators stored onsite. At the end of February, Coeur Mining Inc. announced a temporary suspension of mining and processing at the **Silvertip** mine, placing the project on care and maintenance. In the first quarter of 2020 the mill produced 139,000 oz Ag, 2.46 Mlbs Zn, and 2.18 Mlbs Pb from 29,240 t milled. In February 2019, Coeur released an updated mineral resource and reserve estimate. The company reported Proven plus Probable reserves of 1.61 Mt grading 289 g/t Ag, 5.6% Pb, and 8.24% Zn. Measured plus

Indicated resources were reported at 1.18 Mt grading 222.73 g/t Ag, 4.09% Pb, and 8.58% Zn. Additional Inferred resources were reported at 0.53 Mt grading 271.04 g/t Ag, 5.02% Pb, and 9.31% Zn. The property is underlain by the Cassiar terrane, including Neoproterozoic-Middle Devonian marine platform carbonate and siliciclastic rocks that were deposited on the western flank of Ancestral North America and overlying Devonian-Mississippian rift-related clastic rocks. Mineral resources and reserves are only reported from bioclastic limestones of the McDame Formation that host manto-style Ag-Pb-Zn-Au in which mineralizing fluids replaced limestone and syngenetic karst structures. Overlying siliciclastic rocks of the Earn Formation host sedimentary exhalate Pb-Zn deposits.

Exploration this year was directed at expanding the resource and extending the mine life. Early drill results indicate the potential for resource growth along a 3.5 km north-south strike length, prompting the company to spend \$1 million US towards underground development to facilitate follow-up drilling.

3.2. Coal mines

In 2020, no coal mines operated in the Northwest Region; the **Tenas** project is listed below as a proposed mine.

3.3. Industrial mineral mines and quarries

Tru-Grit Abrasives (Table 2) is recycling the slagheap at the historic **Anyox** site, where slag was created from smelting copper. The slag is mined, cleaned, separated, and barged south and used for making roofing shingles and sand for sand blasting; the material is also used to add iron into Portland cement. The operation has been active for more than 30 years and more than 2.5 Mt has been reclaimed from the 4.5 Mt abandoned by smelting operations in the 1930s. This year, 80,000 t of material was removed from the site, a 30-year mining extension was granted to the company, and \$1 million was spent for wharf rehabilitation.

3.4. Nephrite jade

Jade is the provincial gemstone of British Columbia and it is mined from both hard rock and placer deposits north and east of Dease Lake (Fig. 1; Table 2). Operations this year were limited to **Cassiar Jade**, **Kutcho Creek Jade**, and **Provencher** because road closures restricted access to other remote projects and the demand for jade was comparatively low. In May, an executive order from provincial Lieutenant Governor in Council was signed, whereby the issuance or amendment to placer jade permits would not be made. This order indefinitely suspends placer jade operations in the north half of the province.

3.5. Aggregate and industrial rock quarries

Numerous aggregate and quarry operations supply sand and gravel and blasted stone for large-scale industrial projects and towns throughout the region (Table 2). Several large aggregate pits operate near Kitimat (**Robinson Lake** and **Sandhill Pit**) and others operate near Prince Rupert (**Kaen Creek**, **Ridley Island**, and **Rainbow Lake South**). Owned by

Table 2. Selected industrial mineral and aggregate mines and quarries, Northwest Region.

Mine	Operator (partner)	Commodity; deposit type; MINFILE	Forecast 2020 Production (based on Q1-Q3)	Reserves	Resource	Comments
Anyox	Tru-Grit Abrasives	Slag steel	80,000 t	na	na	Slag is mined, cleaned, and barged for roofing and sand for sand blasting.
Cassiar Jade	Dynasty Jade Ltd.	Nephrite jade; Gems and semi-precious stones; 104P 005	unknown	na	na	Placer production; reclaiming jade from Cassiar mine asbestos stockpiles.
Kaien Creek	Terus Construction Ltd.	Industrial rock; Crushed rock	unknown	na	na	Drilling, blasting, and crushing.
Kalum	Kalum Quarry Ltd.	Industrial rock; Crushed rock	unknown	na	na	Drilling, blasting, crushing, production for CN Railway and others.
Kutcho Creek Jade	Continental Jade Ltd.	Nephrite jade; Gems and semi-precious stones; 104I 078	unknown	na	na	Mining and trenching.
Provencher	Glenpark Enterprises Ltd.	Nephrite jade; Gems and semi-precious stones; 104I 092	unknown	na	na	Mining and trenching.
Rainbow Lake South	Spring Creek Aggregates Ltd.	Industrial rock; Crushed rock	unknown	na	na	Drilling, blasting, crushing, production for CN Railway and LNG projects.
Ridley Island	Terus Construction Ltd.	Industrial rock; Crushed rock	unknown	na	na	Drilling, blasting, crushing, production for CN Railway and LNG projects.
Robinson Lake Trail	Haisla & Progressive Ventures Construction Ltd.	Industrial rock; Crushed rock	unknown	na	na	Drilling, blasting, crushing, production for CN Railway and LNG projects.
Sand Hill	Terus Construction Ltd.	Industrial rock; Crushed rock	unknown	na	na	Crushing for CN Railway and LNG projects.

P = Proven; Pr = Probable; M = Measured; I = Indicated; Inf = Inferred

the Kitsumkalum First Nation's, **Kalum** is an industrial rock quarry. It is the only pit in the region with a rail spur and it supplies the Canadian National Railway Company with ballast.

4. Placer operations

Placer mining operations have been ongoing for more than a century in the Northwest Region and continue today with a focus in the Atlin and Turnagain areas and, to a lesser extent, north of Dease Lake and near Cassiar. Due to the large number of mines and difficulty in obtaining information, these projects are not tracked.

5. Mine development

When a project acquires the necessary permits (Mines Act permit from the Ministry of Energy, Mines and Low Carbon Innovation and an Environmental Management Act permit from the Ministry of Environment) and secures the working capital to begin mine construction, the mine development stage is reached. There were no mine development projects in the Northwest Region in 2020.

6. Proposed mines or quarries

Proposed mines are feasibility-stage projects for which proponents have begun or completed the environmental

certification process (generally for late-stage projects) or have submitted or received approvals for Mines Act permits (for projects below British Columbia Environmental Assessment Act thresholds). The Northwest Region contains six proposed metal mines and one proposed coal mine (Fig. 1; Table 3).

6.1. Proposed metal mines

The Northwest Region contains six proposed metal mines. **Galore Creek, KSM,** and **Red Mountain** have been granted an Environmental Assessment Certificate and the **Kutcho** project has begun the environmental assessment process with the Environmental Assessment Office. **Dome Mountain** and **Premier** both have Mines Act permits and are seeking amendments that would enable them to begin development and production.

6.1.1. Dome Mountain (Blue Lagoon Resources Inc.)

The **Dome Mountain** project contains an Indicated resource of 227,276 t grading 10.71 g/t Au and Inferred resources of 530,183 t grading 7.52 g/t Au (with a cut and fill method at 3.42 g/t Au cut-off; Blue Lagoon Resources Inc., 2020). Gold was discovered on the property in the late 1800s and considerable surface and underground mining was conducted in 1923-24. Exploration resumed in the 1980s and led to the discovery of the Boulder Vein. From 1991 to 1993, 43,900 t of ore grading 12.0 g/t Au was mined from shrinkage stopes. The project currently holds both an Environmental Management Act Permit and a Mining Permit, providing for an annual production of up to 75,000 t. The company entered into a milling agreement with Nicola Mining Inc. in which ore will be trucked for processing at a mill west of Merritt.

Orogenic-style gold-silver mineralization, is mainly in two zones (the Boulder vein and Argillite vein systems) in fragmental volcanic rocks of the Telkwa Formation and basalts and altered volcanic rocks of the Nilkitkwa Formation. In addition to the larger vein systems, more than a dozen other mineralized veins are on the property, mostly striking east-west and northwest-southeast. Veins (0.7 to 4.5 m wide) contain quartz±calcite±ankerite with lesser sulphide mineralization (Fig. 3). Alteration, consisting of abundant carbonate-sericite-pyrite, envelopes veins and is positively correlated with gold.

Property-wide radiometric, electromagnetic, and magnetic airborne geophysical surveys were completed this year and identified several anomalies. Approximately 3700 m of drilling was used to upgrade Inferred resources to the Indicated category. Drilling the upper and eastern margins of the Boulder vein system was also completed.

6.1.2. Galore Creek (Galore Creek Mining Corporation)

The **Galore Creek** Cu-Au project is operated by the Galore Creek Mining Corporation and is jointly owned by Teck Resources Limited and Newmont Corporation. The project is 70 km west of the Bob Quinn airstrip adjacent to Highway 37, where a mine access road has been partially constructed.

The Galore Creek alkalic complex includes multiphase syenite,



Fig. 3. Ore-grade 'Boulder' quartz vein with disseminated sulphides and Fe-carbonate stringers at Dome Mountain.

monzonite, and monzodiorite dikes and stocks that cut volcanic and sedimentary rocks of the Stuhini Group. Mineralization is thought to be at the endmember of the silica-undersaturated porphyry Cu-Au deposit type. Novagold Resources Inc. (2011) considered that two periods of hydrothermal activity resulted in gold-copper mineralization in potassium-enriched volcanic rocks and vertical breccias adjacent to syenite intrusions. At the Central zone (the principal economic resource) initial potassic alteration and gold-copper and sulphide mineralization formed from highly oxidized fluids. Hydrothermal processes during the second period generated calcic alteration and brecciation, followed by potassic alteration and mineralization of bornite and chalcopyrite (Micko et al., 2014).

The Galore Creek project contains a Measured plus Indicated resource of 1.103 Bt grading 0.47% Cu, 0.26 g/t Au, and 4.2 g/t Ag, with an additional Inferred resource of 198 Mt grading 0.27% Cu, 0.21 g/t Au, and 2.7 g/t Ag (Teck Resources Limited, 2020). Although environmental baseline sampling continued, the company did not conduct exploration in 2020 because of the Covid-19 pandemic.

6.1.3. KSM (Seabridge Gold Inc.)

The **KSM** project consists of four porphyry Cu-Au deposits: Kerr, Sulphurets, Mitchell, and Iron Cap. It is the largest undeveloped gold project in the world by resources: the total KSM Measured and Indicated resource is 3.04 Bt grading 0.52 g/t Au, 0.21% Cu, 2.8 g/t Ag, and 0.0048% Mo and an Inferred resource of 4.59 Bt grading 0.38 g/t Au, 0.32% Cu, 2.4 g/t Ag, and 0.0029% Mo (Seabridge Gold Inc., 2020). A Preliminary Economic Assessment published in April proposes a mine life of 44 years producing 27.6 Moz Au and 17.0 Blbs Cu. The initial capital for mine construction and development is \$5.2 billion, with a four-year payback period.

KSM is part of the Sulphurets district, which contains abundant porphyry Cu-Au and related systems along a 200-km-long north-northwest trending corridor in northwestern Stikinia (Febbo et al., 2019). Four phases of calc-alkaline porphyry Cu-Au-Mo mineralization at KSM are genetically related to

Table 3. Selected proposed mines, Northwest Region.

Project	Operator (partner)	Commodity; deposit type; MINFILE	Reserves	Resource	Comments
Dome Mountain	Blue Lagoon Resources Inc.	Au, Ag; Au-quartz veins; 093L 276	na	I: 227 kt at 10.09 g/t Au Inf: 530 kt at 7.52 g/t Au (resource based on cut and fill)	Preliminary Economic Assessment filed in July 2020; 3700 m drilling; property-wide airborne radiometric, electromagnetic, and magnetic surveys completed.
Galore Creek	Galore Creek Mining Corp. (Teck Resources Ltd. 50%, Newmont Corporation 50%)	Cu, Au, Ag; Alkaline porphyry; 104G 090	P+Pr: 528 Mt at 0.59% Cu, 0.32 g/t Au, 6.02 g/t Ag	M+I: 1.103 Bt at 0.47% Cu, 0.26 g/t Au, 4.2 g/t Ag Inf: 198 Mt at 0.27% Cu, 0.21 g/t Au, 2.7 g/t Ag	Baseline environmental sampling continued. Exploration deferred because of Covid-19 pandemic.
KSM	Seabridge Gold Inc.	Cu, Au, Ag, Mo; Calc-alkalic porphyry; 104B 191	P+Pr: 2.198 Bt at 0.55 g/t Au, 0.21% Cu, 2.6 g/t Ag, 42.6 g/t Mo	M+I: 3.04 Bt at 0.52 g/t Au, 0.21% Cu, 2.8 g/t Ag, 0.0048% Mo Inf: 4.60 Bt at 0.38 g/t Au, 0.32% Cu, 2.2 g/t Ag, 0.0029% Mo (Total for KSM deposits)	Prefeasibility Study and Preliminary Economic Assessment update filed in April 2020. 4000 m of geotechnical drilling completed on Mitchell Treaty tunnels.
Kutcho	Kutcho Copper Corp.	Cu, Pb, Zn; Noranda/Kuroko VMS; 104I 060	Pr: 10.4 Mt at 2.01% Cu, 3.19% Zn, 34.61 g/t Ag, 0.37 g/t Au	M+I: 17.26 Mt at 1.85% Cu, 2.72% Zn, 0.49 g/t Au, 33.9 g/t Ag Inf: 10.71 Mt at 1.18% Cu, 1.76% Zn, 0.26 g/t Au, 21.5 g/t Ag	Reserves collected from 2017 Prefeasibility Study and resources updated separately in 2019. Feasibility Study has begun and will be completed by the second quarter in 2021.
Premier	Ascot Resources Ltd.	Au, Ag; IS-epithermal; 104B 054	P+Pr: 3.63 Mt at 5.45 g/t Au, 19.11 g/t Ag	I: 4.14 Mt at 8.01 g/t Au, 35.1 g/t Ag Inf: 5.06 Mt at 7.25 g/t Au, 28.7 g/t Ag	Feasibility Study filed in May 2020. 12,000 m of drilling tested Premier West, Day, Silver Hill, and Woodbine zones. Company targeting construction beginning in 2021.
Red Mountain	Ascot Resources Ltd.	Au, Ag; Subvolcanic and precious metal veins; 103P 086	P+Pr: 2.54 Mt at 6.52 g/t Au, 20.60 g/t Ag	M+I: 3.19 Mt at 7.63 g/t Au, 21.02 g/t Ag Inf: 0.41 Mt at 5.32 g/t Au, 7.33 g/t Ag	Feasibility Study filed in May 2020.
Tenas	Allegiance Coal Ltd. 95%, Itochu Corp. 5%	PCI; Bituminous coal; 093L 156	P+Pr: 62.9 Mt coal	na	Entered provincial environmental assessment in November of 2018 proposed to produce about 775,000-825,000 t of metallurgical coal annually, with a mine-life of 22 years.

P = Proven; Pr = Probable; M = Measured; I = Indicated; Inf = Inferred
HCC = hard coking coal; PCI = pulverized coal injection; TC = thermal coal

dioritic intrusions of the Sulphurets suite (Febbo et al., 2015), with the deposits distributed along a 12 km-long north-striking linear array. The intrusions cut volcanosedimentary rocks of the Stuhini Group (Upper Triassic) and sandstones, conglomerates, and andesitic rocks of the Jack Formation, a basal unit of

the Hazelton Group (Upper Triassic to Lower Jurassic). Mineralization is found disseminated in sheeted quartz veinlets and clustered quartz-vein stockworks, and is open at depth.

Exploration late in 2019 using ZTEM and 3D IP geophysics identified four targets with signatures similar to those of the

known deposits. These anomalies are below the Sulphurets thrust and, unlike the other KSM deposits, are not exposed at surface. This year no exploration was done on the project, although 4000 m of geotechnical drilling was completed along the proposed route of the Mitchell Treaty tunnels, which will serve to supply consumables and electricity to the mine and transfer ore to the mill.

6.1.4. Kutcho (Kutcho Copper Corp.)

The Kutcho project is accessible by a 100 km-long seasonal gravel road suitable for off-highway vehicles and an airstrip 10 km from the deposit. Kutcho Copper Corp. (then Desert Star Resources Ltd.) acquired 100% interest in the project in 2017. The company entered the environmental assessment process late in 2019 and has received a Section 11 Order that defines the scope of the assessment and the Indigenous Nations that the company will engage with. The project is not required to undertake a federal environmental assessment.

The project includes three main zones of mineralization: Main, Esso, and Sumac. Considered to be Kuroko-type volcanic massive sulphides, the Cu-Zn-Au-Ag deposits are in felsic and largely fragmental volcanic rocks in the upper part of the Kutcho Formation, a Permian-Triassic unit of bimodal volcanic rocks (MINFILE 1041 060). The absence of lead and barite is anomalous and may be due to the low potassium content of the volcanic host rocks (Kutcho Copper Corp., 2017).

A Prefeasibility Study completed in 2017 proposed a mine life of 12 years, processing 2500 tpd with a life-of-mine production totalling 378 Mlbs Cu and 473 Mlbs Zn. A mineral resource was published in 2019 with Measured and Indicated resources of 17.3 Mt grading 1.85% Cu, 2.72% Zn, 0.49 g/t Au, and 33.9 g/t Ag and with an Inferred resource of 10.7 Mt at 1.18% Cu, 1.76% Zn, 0.26 g/t Au, and 21.5 g/t Ag. The average annual production is expected to be 33 Mlbs of Cu and 42 Mlbs of Zn. A Feasibility Study has begun.

6.1.5. Premier (Ascot Resources Ltd.)

The **Premier** underground mine operated between 1918 and 1952 and was one of the largest gold mines in North America, producing 2 Moz Au and 45 Moz Ag. Mineralization is hosted by andesitic tuffs, lapilli tuffs, and andesitic flows of the Unuk River Formation (Hazelton Group) that are cut by early Jurassic calc-alkaline plutons of the Texas Creek suite. Electrum is the principal gold-bearing mineral and is in quartz breccias, veins, and stockworks generally surrounded by an alteration envelope of quartz-sericite-pyrite. Base metal mineralization, as sphalerite and galena associated with argentite and freibergite, is also in quartz veins. The nature of mineralization and metal composition suggest an intermediate-sulphidation epithermal genesis.

The focus of exploration this year was prospecting, geophysics, and approximately 12,000 m of diamond drilling. Drilling tested the Premier West, Day, Silver Hill, and Woodbine zones. Seventeen diamond-drill holes were completed at Premier West to test the western extension of mineralization.

Highlight results included 6.0 m grading 40.78 g/t Au. Nine drill holes were completed at Woodbine to test mineralization across the Cascade Creek fault, and the Day zone was drilled to test extensions of the Province zone and Big Missouri zone to the west. Results included 4.0 m grading 20.62 g/t Au. An IP anomaly at the Silver Hill target was tested with 1767 m of drilling. Results included 1.0 m grading 1320 g/t Ag.

Ascot is targeting construction to begin as early as 2021. Major projects will include mill refurbishment, construction of a tailings dam and water treatment plant, and underground development. Recently a SAG and Ball mill was bought for \$6.5 million and is expected to be delivered to site at the end of the second quarter of 2021. In the last two years, the company completed additional environmental baseline monitoring and collected data for supporting permit amendments to the Mines Act (originally issued in 2018), the Environmental Management Act, and several ancillary permits. Construction depends on receiving these approvals. The company targeted permit amendments and submission to the province in the fourth quarter of 2020.

6.1.6. Red Mountain (Ascot Resources Ltd.)

Red Mountain is a proposed underground mine 18 km east-northeast of Stewart. The deposit was first discovered in 1989 and has been extensively explored since, with 466 diamond-drill holes and more than 2000 m of underground development. A provincial and federal Environmental Assessment Certificate was received in 2018. The project was purchased by Ascot Resources from IDM Mining in 2019 for \$45 million. Earlier this year a Feasibility Study was completed. Red Mountain is estimated to contain Measured and Indicated resources of 3.19 Mt grading 7.63 g/t Au and 21.02 g/t Ag and an additional Inferred resource of 405,000 t grading 5.32 g/t Au and 7.33 g/t Ag (reported at 3.0 g/t Au cut-off for long hole stoping; Ascot Resources Ltd., 2020).

The property is underlain by Upper Triassic-Lower Jurassic metasedimentary and volcanic rocks that were intruded by a multi-phased intermediate intrusive complex. Gold is in pyrite-rich brecciated bodies and stockworks along the margins of the intrusive rocks, with low-temperature quartz-sericite-pyrite (phyllic) alteration containing high-grade gold and high-temperature K-feldspar alteration.

Environmental baseline monitoring continued this year, although no exploration work was done. An application for road access from Highway 37A to the site, which will first be used for exploration and an underground bulk sample.

6.2. Proposed coal mines

There is currently one proposed coal mine, Allegiance Coal Limited's **Tenas** project.

6.2.1. Tenas (Allegiance Coal Ltd. 95%, Itochu Corp. 5%)

Telkwa Coal Ltd., a subsidiary of Allegiance Coal Ltd., is proposing to develop the **Tenas** project, which is road accessible, approximately 17 km south of Smithers. The project entered

the provincial environmental assessment process in 2018 and the project proposes to produce approximately 775,000-825,000 t of steelmaking coal annually with a mine-life of 22 years. In 2017, Allegiance Coal Ltd. released a reserve estimate of Proven plus Probable reserves of 62.9 Mt of coal.

At least 14 coal seams have been recognized in the Skeena Group (Lower-Upper Cretaceous) with individual seams up to 7.6 m thick (MINFILE 093L 156). Currently there are four conceptual pits (from south to north: Tenas, Goathorn West, Goathorn East, and Telkwa North) on approximately 1050 ha. The current environmental assessment application is only for production of metallurgical coal from the Tenas pit.

This year, no exploration was completed. In June, Allegiance Coal Ltd. and the Environmental Assessment Office held a virtual open house to explain the environmental assessment process and to answer questions from the public.

7. Selected exploration activities and highlights

Exploration projects are described on a continuum from early to advanced stages. The earliest stages are considered grassroots. Typically, where the collection of rock and soil samples are collected for geochemical analysis, commonly in conjunction with regional mapping and geophysical surveys. This preliminary work is predominantly benign and is used to generate targets to test, usually by drilling. At these early stages it is a common practice to establish base-line environmental testing and engage with communities and First Nations. As a project progresses, drilling may delineate a mineral resource and establish baseline economics. Later stages of exploration generally coincide with mine evaluation, feasibility, and economic studies, which include environmental, social, engineering, and financial considerations.

7.1. Selected precious metal projects

The Northwest Region has numerous precious metal deposits (Fig. 1; Table 4), many of which are in the area popularly known as the Golden Triangle.

7.1.1. American Creek (Mountain Boy Minerals Ltd.)

The **American Creek** project is approximately 22 km north of Stewart, immediately adjacent to the past-producing Premier mine. This year more than 2000 m of drilling targeted three areas (MB Silver, Wolfmoon, and Dorothy) and tested the extent of epithermal mineralization. Drilling at the MB Silver target was designed to test a high-grade silver intersection (5.18 m grading 5258 g/t Ag) drilled in 2006. The Maybee zone and untested Upper Ruby zone at Dorothy were drilled to better understand mineralized structures that extend from the MB Silver veins to the south. Grab samples collected in 2019 from a structurally controlled alteration zone that coincides with an IP anomaly at Wolfman yielded assays of 28 g/t Au and 1200 g/t Ag; drilling this year tested this zone.

7.1.2. Buck (Sun Summit Minerals Corp.)

Sun Summit Minerals Corp. (previously San Marco Resources

Inc.) is exploring the 15,000 ha **Buck** property, which lies on an all-season access road 12 km south of Houston. The property is underlain by andesitic to rhyolitic tuffs, flows and breccias of the Hazelton Group (Upper Triassic to Lower Jurassic). Sulphides are in veinlets, disseminations, or coarse fracture fillings, mainly in rhyolitic breccias (MINFILE 093L 009). In preparation for drilling, early season fieldwork included geological mapping, rock sampling, and IP geophysics. Highlights from grab samples include 13.3 g/t Au and 44.1 g/t Ag at the Trench zone. Drilling (1806 m) completed earlier this year targeted potential depth extensions from a known mineralized zone and yielded highlights including 91 m of 0.75 g/t Au. Later in the year the company drilled an additional 4200 m to test the lateral extent of epithermal mineralization at the Buck breccia. In later drilling, most holes intersected vein pyrite-sphalerite-marcasite ±chalcopyrite±galena mineralization, which appear spatially related to pervasive silica-sericite-carbonate-clay alteration.

7.1.3. Cassiar Gold (Cassiar Gold Corp.)

Margaux Resources Inc. changed its name in September to Cassiar Gold Corp. and operates the **Cassiar Gold** project. Historical workings along a 15 by 10 km trend produced approximately 350,000 oz Au between 1979 and 1997; tailings at Table Mountain (approximately 600,000 t) have an estimated grade of 1 g/t Au. The tailings can contain large fragments of vein material (Fig. 4). Exploration this year focussed on Taurus and Table Mountain and included geological mapping, sampling, and drilling. Approximately 5000 m of drilling was used for infill and extension at the Taurus resource (Inferred: 21.83 Mt grading 1.43 g/t Au with a 0.7 g/t Au cut-off) and highlights include 32.79 m grading 1.78 g/t Au. Exploration targets were also drilled to test the lateral and vertical continuity of gold-bearing veins.



Fig. 4. Gold-bearing quartz vein with pyrite and tourmaline stylolites; from tailings at Table Mountain, Cassiar Gold project.

7.1.4. DOC (Hanstone Gold Corp.)

The **DOC** project is underlain by deformed and metamorphosed Upper Triassic volcanic rocks of the Stuhini Group that are locally cut by coeval intrusions of the Bronson

Table 4. Selected exploration projects, Northwest Region.

Project	Operator (partner)	Commodity; deposit type; MINFILE	Resource (NI 43-101 compliant unless indicated otherwise)	Comments
American Creek	Mountain Boy Minerals Ltd.	Ag, Pb, Zn, Au; Polymetallic veins; 104A 011	na	2000 m of drilling at MB Silver, Wolfmoon, and Dorothy zones.
Big Red	Libero Copper & Gold Corp.	Cu, Au; Alkalic porphyry; 104G 208	na	Mapping and sampling with a grab sample highlight of 104 g/t Au at the Ridge zone and 19.1 g/t Au at ME-18; 3500 m drilling.
Bowser Regional	Pretium Resources Inc.	Au, Cu, Pb, Zn; Epithermal vein and VMS	na	More than 25,000 m of drilling to test A6, Hanging Glacier, Koopa, Snowfield East, Haimila. Hanging Glacier highlight: 13 m with 9.5 g/t Au in 102 m with 2.1 g/t Au.
Buck	Sun Summit Minerals Corp.	Au, Ag, Zn, Pb, Cu; Polymetallic veins; 093L 009	na	6000 m of drilling. Highlights from early drilling included 91 m of 0.75 g/t Au.
Cassiar Gold	Cassiar Gold Corp.	Au; Precious metal veins; 104P 012	Inf: 21.83 Mt at 1.43 g/t Au (0.7 g/t Au cut-off)	5000 m of infill and extension drilling at Taurus resource; exploration targets also drilled.
Corey	Eskay Mining Corp. (80%) and Kirkland Lake Gold Ltd. (20%)	Au, Ag, Cu, Zn; Noranda/Kuroko massive sulphide; 104B 385	na	Drilling (4000 m) at the TV and Jeff targets; highlights at TV include 11.24 m of 1.23 g/t Au and 201 g/t Ag. Airborne and ground-based geophysics.
Del Norte	Decade Resources Ltd.	Ag, Zn, Pb; Polymetallic veins; 104A 176	na	Drilling 5975 m in 31 holes at the Argo and Eagle Nest zones.
DOC	Hanstone Gold Corp.	Au, Ag; Intrusion-related, mesothermal; 104B 014	na	Drilling (2724 m) to test six of twelve prospective zones.
Dolly Varden	Dolly Varden Silver Corporation	Cu, Pb, Zn, Ag, Au; Kuroko VMS with polymetallic veins; 103P 188	I: 3.42 Mt at 299.8 g/t Ag Inf: 1.29 Mt at 277.0 g/t Ag	Resource expansion and step-out drilling (10,000 m). Step-out drilling intersected 2.70 m of 1083 g/t Ag in 12.75 m of 351 g/t Ag.
E&L	Garibaldi Resources Corp.	Ni, Cu, Co, Pt, Pd, Au; Tholeiitic intrusion hosted; 104B 006	na	Drilling extended the strike length of the mineralized E&L intrusion from 200 to 650 m and to 578 m at depth.
Eskay Creek	Skeena Resources Limited	Au, Ag, Cu, Pb, Zn; VMS and precious metal veins; 104B 008	I: 12.7 Mt at 4.3 g/t Au, 110 g/t Ag (pit constrained) Inf: 14.4 Mt at 2.3 g/t Au, 47 g/t Ag (pit constrained) I: 819 kt at 6.4 g/t Au, 139 g/t Ag (underground) Inf: 295 kt at 7.1 g/t Au, 82 g/t Ag (underground)	The company exercised its option to acquire 100% of the project; Barrick Gold Inc. expected to still own 12.4%. Highlights from drilling include 56.34 m grading 2.17 g/t Au and 234 g/t Ag. Company raised \$46 million late in 2020.

Table 4. Continued.

Georgia	AUX Resources Corporation	Au, Ag, Pb, Zn, Cu; Intrusion-related Au pyrrhotite veins; 103O 013	na	Area of past producing Georgia River mine tested by 3700 m in 24 diamond drill holes.
Golddigger	Goliath Resources Limited	Au, Cu, Pb, Zn; Polymetallic veins	na	Channel sampling (179 m); highlights, 10.0 m of 14.11 g/t Au.
Hat	Doubleview Capital Corp.	Cu, Au; Alkalic porphyry; 104J 021	na	4000 m of follow-up drilling to test Cu and Au mineralization.
Huckleberry	Imperial Metals Corporation	Cu, Mo, Ag, Au; Calc-alkaline porphyry; 093E 037	M+I: 180 Mt at 0.32% Cu, 0.01% Mo Inf: 48 kt at 0.46% Cu (for Main Zone; resource published 2011)	Drilling (~2500 m) to test mineralized extent below the East zone pit. Highlights include 361 m at 0.35% Cu.
Iskut	Seabridge Gold Inc.	Cu, Au; Porphyry; 104B 694	na	Anomalous surface samples and coincident IP and magnetic anomalies guided 8961 m of drilling. Preliminary results of 158 m at 0.16 g/t Au, 0.16% Cu.
Kirkham	Metallis Resources Inc.	Cu, Au; Porphyry; 104B 209	na	Field mapping, drill core relogging, an IP survey, and short-wave-infrared analysis guided 3820 m of drilling.
Newmont Lake	Enduro Metals Corporation	Au, Cu, Ag; Intrusion-related Au pyrrhotite veins; 104B 126	na	IP geophysics, hyperspectral, geochemical surveys, lithological and alteration mapping, and 6000 m of drilling.
Ootsa	Surge Copper Corp.	Cu, Au, Ag, Mo; Calc-alkaline porphyry; 093E 105	M+I: 224 Mt at 0.22% Cu, 0.15 g/t Au, 0.021% Mo, 2.8 g/t Ag Inf: 5.2 Mt at 0.18% Cu, 0.09 g/t Au, 0.019% Mo, 2.6 g/t Ag (2016 Prefeasibility Study)	Late-season drilling included 10,000 m to test IP chargeability anomaly on the Seel trend. Highlights include 176.1 m grading 0.35% Cu, 0.40 g/t Au, 1.7 g/t Ag including 126.0 m grading 0.43% Cu, 0.50 g/t Au, 2.0 g/t Ag.
Rock and Roll	Etruscus Resources Corp.	Cu, Zn, Pb, Au; Besshi VMS and intrusion-related precious metal veins; 104B 377	Inf: 2.02 Mt at 0.71 g/t Au, 87.1 g/t Ag, 0.23% Cu, 0.23% Pb, 0.98% Zn	Mineralization around the Black Dog deposit was drilled (~2000 m).
Scottie Gold Mine	Scottie Resources Corp.	Au, Ag, Cu; Intrusion-related and polymetallic veins; 104B 034	na	Drilling (>7000 m) focussed on the Blueberry and Bow veins, Domino zone and the Scottie Gold mine. Highlights from the O-zone at the Scottie Gold mine include 2.53 m of 109.4 g/t Au, 32.4 g/t Ag.
Silver Hope	Finlay Minerals Ltd.	Cu, Ag, Au, Zn, Pb, Mo; Subvolcanic Cu-Ag-Au (As-Sb); 093L 056	na	700 soil and rock samples collected above a magnetic anomaly. Drilling (900 m) tested the Main horizon.

Table 4. Continued.

Silver Queen	Equity Metals Corporation	Ag, Pb, Zn, Au; Transitional porphyry-epithermal; 093L 002	I: 815 kt at 6.35% Zn, 3.24 g/t Au, 201.4 g/t Ag, 0.26% Cu, 0.96% Pb Inf: 801 kt at 5.21% Zn, 2.49 g/t Au, 184.3 g/t Ag, 0.31% Cu, 0.88% Pb (resources at NSR cut-off of C\$100/t)	Drilling (3000 m) tested epithermal-style mineralization. Highlights of 56,115 g/t Ag across 0.3 m were intersected.
Snip	Skeena Resources Limited	Au, Ag; Intrusion-related Au pyrrhotite veins; 104B 250	I: 539 kt at 14.0 g/t Au Inf: 942 kt at 13.3 g/t Au	An independent Technical Report was filed September 2020. 5000 m was drilled for resource expansion.
Tatogga; Quash Pass	GT Gold Corp.	Cu, Au, Ag, Pb, Zn; Polymetallic veins; 104G 161	na	Drilling (4841 m) tested Au and Cu geochemical trends coincident with IP chargeability anomalies.
Tatogga; Saddle North	GT Gold Corp.	Cu, Au, Ag; Porphyry; 104G 432	I: 298 Mt at 0.28% Cu, 0.36 g/t Au, 0.8 g/t Ag Inf: 543 Mt at 0.25% Cu, 0.31 g/t Au, 0.7 g/t Ag	A maiden resource was filed in August.
Thorn	Brixton Metals Corporation	Ag, Au, Cu, Zn, Pb; Subvolcanic Cu-Ag-Au (As-Sb); 104K 031	Inf: 7.4 Mt at 35.54 g/t Ag, 0.51 g/t Au, 0.13% Cu, 0.32% Pb, 0.59% Zn (2014 Technical Report)	Drilling (>5000 m), rock (1200) and soil (5000) sampling. Land size of project increased by optioning adjacent properties.
Todd Creek	P2 Gold Inc. (70%), ArcWest Exploration Inc. (30%)	Cu, Au, Pb, Zn; Porphyry, volcanogenic, hydrothermal; 104A 001	na	Drilling (1027 m) with near-surface intersections of 1.8 m grading 4.19% Cu, 0.19 g/t Au, 4.90 g/t Ag. Airborne magnetic and radiometric surveys.
Treaty Creek	Tudor Gold Corp. (60%), Teuton Resources Corp. (20%), American Creek Resources Ltd. (20%)	Cu, Au; Porphyry; 104A 004	na	Drilling (~40,000 m) focussed on Goldstorm zone and newly discovered Perfect Storm zone. Highlights of 348 m of 2.04 g/t Au, 4.13 g/t Ag within 930 m of 1.07 g/t Au, 2.80 g/t Ag.
Turnagain	Giga Metals Corporation	Ni, Co, Pt, Cu, Mo; Alaskan-type, magmatic; 104I 014	M+I: 1.073 Bt at 0.220% Ni, 0.013% Co Inf: 1.142 Bt at 0.217% Ni, 0.013% Co	A Preliminary Economic Assessment (PEA) was completed in October.
Willoughby	Strikepoint Gold Inc.	Au, Ag, Zn, Pb; Precious and polymetallic veins; 103P 006	na	Surface sampling of newly exposed mineralization; results included up to 37.3 g/t Au and 263 g/t Ag; 1700 m drilling.

M = Measured; I = Indicated; Inf = Inferred

stock. The most significant gold and silver grades are in sulphide-bearing quartz veins. This year, 2724 m was drilled to test six of twelve prospective areas. Prospecting, geological mapping, and satellite analysis were also completed.

7.1.5. Georgia (AUX Resources Corporation)

The **Georgia** project is at tidewater, approximately 16 km south of Stewart. The property is prospective for intrusion-

related gold deposits because several areas are close to rocks of the Texas Creek plutonic suite (Bulldog Creek pluton, Colling Ridge porphyry, and Outram Lake porphyry). This year, 3600 m of drilling was completed in 24 diamond-drill holes to test the mineralized system around the past-producing Georgia River mine and to assess previous non-compliant resource estimates. Preliminary observations indicate that historic Southwest vein mineralization extends beyond the known historic limits and

remains open in both directions. Drilling was also used to test newly developed targets outside of the known deposit.

7.1.6. Newmont Lake (Enduro Metals Corporation)

The 55,000 ha **Newmont Lake** project contains four main zones (Burgundy, McLymont, Cuba, and Chachi) and is prospective for epithermal Au-Ag, skarn Cu-Au-Ag, and alkalic porphyry Cu-Au deposits. This year, exploration included IP geophysics, hyperspectral, and geochemical surveys in conjunction with lithological and alteration mapping. Previously unsampled core from a former operator was also assayed and returned 144 m grading 3.18 g/t Au and 3.66 g/t Ag. Approximately 6000 m of diamond drilling was also completed to test for new gold mineralization. Step-out drilling at the newly discovered NE extension assayed 8.85 m grading 31.09 g/t Au and 1.07% Cu.

7.1.7. Scottie Gold (Scottie Resources Corp.)

The **Scottie Gold** project is 35 km north of Stewart and is assessable from the Salmon Glacier road. The project is centred on the past-producing Scottie Gold mine, which operated from 1981 to 1985, producing 95,426 oz of Au at 16.2 g/t Au. The property is transected by north-striking and locally abundant east-striking faults (MINFILE 104B 034). Gold is in steeply dipping pyrrhotite-pyrite-quartz-calcite veins that cut the Unuk River andesite unit in the lower part of the Hazelton Group adjacent to the Summit Lake stock, which is part of the Texas Creek plutonic suite (Early Jurassic). More than 7000 m of diamond drilling was completed this year, focussing on the Blueberry vein, Scottie Gold mine, and Domino zone. At the Scottie Gold mine, the O-zone is one of six parallel mineralized structures; the drilling was used to test interpreted orientations. Highlights from the O-zone include 2.53 m grading 109.4 g/t Au and 32.4 g/t Ag. Airborne magnetic and electromagnetic surveys and IP geophysical surveys were also completed.

7.1.8. Silver Queen (Equity Metals Corp.)

The **Silver Queen** project is on an all-season road 43 km south of Houston. Since its discovery in 1912, the property has seen more than 500 drill holes and 9 km of underground workings. Although the current focus of exploration is on epithermal veins, porphyry Cu-Mo-Ag-Au and epithermal Au-Ag-(Cu-Pb-Zn) deposits have been identified. This year, approximately 3000 m of core was drilled; step-out drilling intersected a pyrrhotite (ruby-silver), quartz-barite vein containing 0.3 m grading 56,115 g/t Ag. An additional 1500 m of late-season drilling was used to test lateral and down-dip step-outs from this mineralization.

7.1.9. Snip (Skeena Resources Ltd.)

The **Snip** deposit is another past-producing mine with renewed exploration interest. Between 1991 and 1999 the mine produced at an average grade of 27.5 g/t Au. The deposit is a southwest-dipping vein system in Upper Triassic metasedimentary rocks of the Stuhini Group that are cut by

Early Jurassic stocks and plutons. An independent technical report was filed in September containing an Indicated resource of 539,000 t grading 14.0 g/t Au (containing 244,000 oz Au). The company began a 5000 m drill program in the fall that could be used to expand the resource.

7.1.10. Willoughby (Strikepoint Gold Inc.)

The **Willoughby** project is on a mountain peak surrounded by glaciers. The east side of the property is underlain by Triassic volcanoclastic rocks of the Stuhini Group, the western half by Hazelton Group rocks. Between 1989 and 1996, more than 12,000 m of drilling was completed and 110 m of underground workings were excavated. This year, 1700 m of drilling was used to test disseminated gold and silver mineralization identified from previous drilling and surface sampling, and to improve continuity of high-grade mineralization. Surface sampling focussed on outcrops newly exposed by glacier retreat; results included up to 37.3 g/t Au and 263 g/t Ag.

7.2. Selected porphyry projects

The Northwest Region hosts many significant porphyry deposits (Fig. 1; Table 4), and the region is highly prospective for Au-Cu-Mo bulk-tonnage mineralization related to Triassic-Jurassic island arc assembly and post accretionary intrusive complexes.

7.2.1. Big Red (Libero Copper & Gold Corp.)

The **Big Red** project is 45 km southwest of Telegraph Creek along the Barrinton Tote road. Porphyry Cu-Au-Mo, epithermal Au-Ag, and VMS-style mineralization have all been recognized on the property. This year, exploration focussed on three main zones: Ridge, ME-18, and Terry. The Ridge zone is 1 km long and has anomalous gold, silver, and copper that coincides with a ZTEM conductivity high. At ME-18, altered Stuhini Group volcanic rocks have been intruded by a diorite plug containing crosscutting gold-bearing quartz veins. The Terry zone is a previously identified porphyry Cu-Au target. Detailed mapping and geochemical sampling was continued from the previous year and surface sampling returned assays of 104.0 g/t Au at Ridge and 19.10 g/t Au at ME-18. A 3500 m drill program tested these targets.

7.2.2. Hat (Doubleview Capital Corp.)

The **Hat** project is prospective for alkalic porphyry Cu-Au mineralization. Since 2014, the property has been explored by magnetic and IP surveys, soil and rock geochemistry, geological mapping, and drilling (300 drill holes totalling 10,281 m). The property is underlain by porphyritic andesites and bedded tuffs of the Stuhini Group (Upper Triassic) that are cut by a dioritic-monzonitic stock. Approximately 4000 m of drilling was used to test gold and copper mineralization identified at surface and coincident with a 3D induced polarization anomaly at the Lisle-North zone and to expand known deep mineralization at the Lisle zone. The final drill hole in 2019 intersected 612 m grading 0.19 g/t Au, 0.25% Cu, and 84 ppm Co including 235 m

grading 0.51 g/t Au, 0.51% Cu and 105 ppm Co. Follow-up drilling this year intersected an interval containing visible gold.

7.2.3. Huckleberry (Imperial Metals Corporation)

Huckleberry was an open-pit mine until shutting down in 2016 (Fig. 5), and has since been on care and maintenance status. This year, 2491 m of exploratory drilling to test the extent of copper mineralization below the East zone pit was completed. Initial results include 361 m grading 0.35% Cu from 368-729 m below surface.



Fig. 5. Huckleberry mine looking south at the Main zone pit; East zone pit can be seen in the top left, along with the mill and other infrastructure.

7.2.4. Iskut (Seabridge Gold Inc.)

The **Iskut** project contains the former Johnny Mountain mine and the Bronson Slope copper-gold deposit. Previous drilling below the Quartz Rise lithocap discovered a mineralized diatreme containing clasts of veined diorite porphyry with copper-gold mineralization. This year, anomalous surface gold and copper concentrations and a large IP anomaly coincident with magnetic anomalies have guided the drilling of 8961 m in 11 holes to test 750 m of strike and greater than 800 m of vertical extent below and west of the lithocap. Initial results include intervals up to 158 m grading 0.16 g/t Au and 0.16% Cu. Higher grade (31.8 m grading 0.62% Cu) intersections were also recovered.

7.2.5. Kirkham (Metallis Resources Inc.)

The **Kirkham** property is on the western margin and adjacent to the Eskay rift. Metallis acquired the project in 2013 and has since conducted regional mapping and sampling, geophysics (IP, EM, Magnetics, Radiometric, VTEM), and greater than 10,000 m of drilling. Work early in the year included field mapping, drill core re-logging, an IP survey, and short-wave-infrared analysis. Late-season drilling (3820 m) tested the depth potential along the 4 km strike-length Cliff porphyry system, which was first highlighted by resistivity highs outlined in recent IP surveys. Early results from this drilling indicate continuous Cu-Au mineralization from surface to 850 m depth.

7.2.6. Ootsa (Surge Copper Corp.)

The **Ootsa** project is at the southeast end of a southeast-trending belt of porphyry Cu-Au deposits and prospects including (from northwest-southeast) the Lucky Ship, Berg, Whiting Creek, Huckleberry, Ox, and Seel deposits. Similar to other deposits in the region, mineralization at Ootsa is temporally associated with the Bulkley suite intrusive rocks (Cretaceous). Calc-alkaline mineralization is reported as mineral resources for three separate deposits: Ox, East Seel, and West Seel. This year a 3D deep-penetrating IP geophysical survey was first conducted over the Seel trend that provided a new chargeability anomaly, which in part was drilled with 10,000 m of core. The upper portion of hole S20-218 intersected the East Seel deposit as it progressed towards the deeper chargeability target. Assays for the portion of the hole in the East Seel deposit included 176.1 m grading 0.35% Cu, 0.40 g/t Au and 1.7 g/t Ag including 126.0 m grading 0.43% Cu, 0.50 g/t Au, and 2.0 g/t Ag. Drilling was also completed to test expanding the East and West Seel deposits.

7.2.7. Tatogga (GT Gold Corp.)

This year work was completed at **Tatogga** on the Saddle North deposit and Quash Pass zone. A maiden resource was completed for Saddle North and fieldwork was done at Quash Pass. Saddle North includes an Indicated resource containing 1.81 Blbs Cu and 3.47 Moz Au and an Inferred resource containing 2.98 Blbs Cu and 5.46 Moz Au (combined open-pit and underground mining methods). A Preliminary Economic Assessment is currently being completed for Saddle North and is targeted for release in the first quarter of 2021. Quash Pass is 7 km south of known mineralization at the Saddle North and South deposits. This year 4841 m of drilling was completed in nine diamond-drill holes that tested two anomalous geochemical trends spanning 6 km. District-scale west-northwest trending faults and coincident IP chargeability anomalies also guided exploration. Greig et al. (2021) summarize the results of recent geologic mapping, new U-Pb zircon and Re-Os molybdenum geochronology, and intensive drilling to establish the geologic framework of both the Saddle North porphyry Cu-Au deposit and the nearby older Saddle South epithermal Au-Ag vein system.

7.2.8. Thorn (Brixton Metals Corporation)

Approximately 5291 m of drilling was completed in 19 holes at the **Thorn** project. Drilling focussed on the West and Central Outlaw gold targets and several deep holes were drilled at the Camp Creek porphyry copper-gold target. More than 5000 soil and 1200 rock samples were collected for geochemical analysis and early results from rock samples yielded highlights of 68.8 g/t Au from West Outlaw and 7.21% Cu from Camp Creek. Additionally, the company increased the overall land package of Thorn by optioning adjacent properties from Stuhini Exploration Ltd. (Metla) and Kodiak Copper Corp. (Trapper). Prospecting this year at Trapper yielded five rock samples assaying greater than 20 g/t Au.

7.2.9. Treaty Creek (Tudor Gold Corp. 60%, Teuton Resources Corp. 20%, American Creek Resources Ltd. 20%)

The **Treaty Creek** project is hosted by Jurassic volcanic and intrusive rocks that also host the KSM deposits 5 km to the southwest. The Sulphurets thrust fault continues along trend from KSM to Treaty Creek and is considered a reactivated basin structure (Kyba and Nelson, 2015) that may have influenced the emplacement of mineralization. The area has been explored for almost 40 years, during which several high-grade gold and silver surface samples were found and more than 190 diamond-drill holes were completed. The project is now uncovering potential for large-scale porphyry mineralization. Highlights from drilling include near-surface intersections of 348 m grading 2.04 g/t Au and 4.13 g/t Ag within 930 m of 1.07 g/t Au and 2.80 g/t Ag (drill hole GS-20-65) and 229.5 m grading 1.34 g/t Au and 11.94 g/t Ag within 775.5 m of 0.84 g/t Au and 5.47 g/t Ag (drill hole GS-20-73). It is anticipated that more than 40,000 m of core will be drilled by the end of 2020, focussing on the Goldstorm zone and the newly discovered Perfect Storm zone.

7.3. Selected polymetallic base and precious metal projects

Many polymetallic base and precious metal projects are active throughout the Northwest Region (Fig. 1; Table 4). Base metals are explored for primarily as polymetallic vein and VMS deposits and to lesser extent SEDEX and manto-style replacement deposits.

7.3.1. Bowser Regional (Pretium Resources Inc.)

In 2020, more than 25,000 m of core was drilled on the **Bowser** claims, which are prospective for epithermal Au-Ag, porphyry Cu-Au, and volcanogenic massive sulphides. At Hanging Glacier (4.5 km NW of the Brucejack mine), 9800 m of drilling tested anomalous surface samples. A highlight includes 13 m with 9.5 g/t Au in an interval of 102 m with 2.1 g/t Au. Work continued at A6 (14 km NE of the mine) with 11,900 m of drilling in search of volcanogenic massive sulphides. The remaining 3980 m of drilling followed up epithermal Au and porphyry Cu-Au mineralization at Koopa, Snowfield East, and Haimila.

7.3.2. Corey (Eskay Mining Corp. 80% and Kirkland Lake Gold Ltd. 20%)

Eskay Mining Corp. is the operator at the **Corey** project. This year, approximately 4000 m of core was drilled at the TV and Jeff prospects and almost all of the 20 holes intersected VMS mineralization. A review of historic diamond drill core from various prospects across the greater land tenure also revealed VMS mineralization: stratiform sulphide mineralization (TV and Jeff prospects), feeder-style mineralization (Cumberland, Red Lightning, SIB, and Lulu prospects), and sulphate mineralization (indicative of white smoker origin; C10 prospect). The TV and Jeff targets are approximately 1.5 km apart and historically have been interpreted to be isolated VMS targets.

However, recent geophysical data (SkyTEM, magnetotelluric, and IP) suggest these prospects form a single, larger VMS system. Airborne and ground-based geophysics completed this year suggest several other VMS targets. Highlight drill results from this year include 11.24 m grading 1.23 g/t Au and 201 g/t Ag and 1.32 g/t Au and 0.99 m of 507 g/t Ag.

7.3.3. Del Norte (Decade Resources Ltd. 55% and Teuton Resources Corp. 45%)

The **Del Norte** property was optioned to Decade Resources Ltd. early in the year. In the 1930s, a creek that transects the property was mined for placer gold. Recent exploration has led to the discovery of several prospects along a minimum strike length of 4 km. Exploration this year focussed on drill testing the Argo and Eagle Nest zones with 5975 m of drilling in 31 holes; intervals of pyrite, sphalerite, galena, and tetrahedrite were recorded.

7.3.4. Dolly Varden (Dolly Varden Silver Corp.)

The immediate area of the **Dolly Varden** property has a long history of mining. The Dolly Varden mine, discovered by four prospectors in the early 1900s, produced more than 20 Moz of Ag between 1910 and 1959. The property is underlain by Hazelton Group volcanic and volcanoclastic rocks and historic and recent exploration suggest the potential for epithermal precious metal and volcanogenic massive sulphide deposits. This year more than 10,000 m of core was drilled focussing on resource expansion and step-out targets. Step-out drilling intersected highlights that included 2.70 m of 1083 g/t Ag within 12.75 m of 351 g/t Ag.

7.3.5. Eskay Creek (Skeena Resources Ltd.)

Since 1932, **Eskay Creek** has been the focus of considerable exploration. In 1988, the news of drilling intersecting stratiform stibnite-realgar rich mineralization (Roth, 1989) in 21A zone sparked a staking rush throughout the region. An underground mine operated from 1994 to 2008 and produced 3.3 Moz of Au and 160 Moz of Ag (average grades of 45 g/t Au and 2224 g/t Ag). Barrick Gold Inc. has owned mineral rights to the project since 2002, and this year Skeena exercised its option to acquire 100% of the property. Barrick is expected to retain 12.4% of the project and has waived its back-in right on the project. This year, six to twelve ground-based and helicopter-supported drills focussed on infill drilling (approximately 88,000 m) at the 21A, 21B, and 21C zones and will be used for the Preliminary Feasibility Study resource category conversions. Highlights from infill drilling include 42.59 m grading 7.19 g/t Au and 665 g/t Ag in 21C zone, 35.42 m grading 21.90 g/t Au and 235 g/t Ag in 21A zone, and 56.34 m grading 2.17 g/t Au and 234 g/t Ag in 22 zone. Exploration drilling was also completed to test the Water Tower and Lower Mudstone zones. The company raised \$46 million late in 2020 enabling financing for a Prefeasibility and Feasibility Study. The company is also permitting 137,000 m of exploratory drilling to test both brownfield and greenfield targets.

7.3.6. Golddigger (Goliath Resources Ltd.)

The **Golddigger** property, which extends across 18,658 ha, is 7 km west of the Dolly Varden mine access road. At the Sure Bet and Main zone, stratabound massive sulphide mineralization (galena-sphalerite-pyrite) and silica alteration are in highly folded Hazelton Group sedimentary rocks along northwest-trending faults. The 2020 exploration program focussed on delineating the full extent of mineralization identified in the previous year. A total of 179 m of channel samples were taken from outcrops containing massive and semi-massive sulphide mineralization at the Sure Bet zone; one channel sample returned 10.0 m grading 14.11 g/t Au.

7.3.7. Rock and Roll (Etruscus Resources Corp.)

The **Rock and Roll** property is approximately 7 km northwest of the past-producing Snip mine. Access to site is by helicopter from the Forest Kerr hydroelectric facility. The property includes the Black Dog VMS deposit and the SRV zone. Early season exploration consisted of sampling, prospecting, mapping, and a VTEM survey, which guided generating targets and drill planning. The company drilled approximately 2000 m to test new areas, the depth potential of the Black Dog deposit, and mineralization surrounding Black Dog. Three separate intervals of massive and semi-massive sulphide were intersected.

7.3.8. Silver Hope (Finlay Minerals Ltd.)

The **Silver Hope** mineral claims surround the past-producing Equity Silver mine, which operated from 1980 to 1994, producing 33.8 Mt grading 0.4% Cu, 64.9 g/t Ag, and 0.46 g/t Au (MINFILE 093L 001). In 2006, Finlay Minerals Ltd. purchased 100% interest in the property and since then have generated several targets through coincident ZTEM, IP, and gravity anomalies, drilling, prospecting, mapping, and sampling. The Main Deep horizon is considered the southern extension of the copper-silver Equity Silver system, containing (from north to south) the Hope, Superstition, and Gaul zones. A copper-molybdenum-mineralized monzonite (West horizon) was discovered southwest of the mine. This year a 4 km north-northeast trending magnetic anomaly was identified east of the Equity Silver mine, and 700 reconnaissance soil and rock samples were taken to geochemically test the new target. A 900 m drill program was also completed and tested the Main horizon, where drilling in 2016 intersected 10.25 m grading 319 g/t Ag, 0.88% Cu, and 0.19 g/t Au.

7.3.9. Todd Creek (P2 Gold Inc. 70% and ArcWest Exploration Inc. 30%)

The **Todd Creek** property is east of and adjacent to Pretium Resources Inc.'s Bowser mineral claims. It is prospective for VMS, epithermal, and porphyry deposits. A 12 by 3 km alteration zone on the western side of the property has at least four zones of copper-gold mineralization (Fall Creek, Yellow Bowl, Ice Creek, and South). Previous field programs completed by ArcWest Exploration Inc. identified copper-gold

mineralization from rock chip and soil samples collected along an IP chargeability anomaly at the Yellow Bowl zone. This year, 1027 m of drilling tested a prominent gossan at Yellow Bowl, which hosts a number of structurally controlled copper-gold showings. Near-surface drill intersection highlights include 1.8 m grading 4.19% Cu, 0.19 g/t Au, and 4.90 g/t Ag within 3.3 m grading 3.03% Cu, 0.20 g/t Au, and 7.15 g/t Ag (TC-002). An additional drill hole tested closely spaced copper-gold showings 5 km south of Yellow Bowl. Airborne magnetic and radiometric surveys were also flown over the property and a satellite hyperspectral survey was completed.

7.4. Selected mafic- and ultramafic-hosted projects

The Northwest Region contains only a few mafic- and ultramafic-hosted prospects (Fig. 1; Table 4).

7.4.1. E&L (Garibaldi Resources Corp.)

The **E&L** property is one of only two known high-grade magmatic Ni-Cu-(PGE) massive sulphide projects in the Canadian Cordillera. The property is in the Eskay rift (Jurassic), approximately 80 km northwest of Stewart. Vandenburg (2020) considered that combined trace element and Pb isotopic signatures are consistent with post-collisional decompression melting of a metasomatized mantle source that was tapped during rift development. The deposit contains pyrrhotite, pentlandite, and chalcopyrite in an olivine gabbro stock that intrudes Lower Jurassic sedimentary and volcanic rocks. Drilling in 2020 extended the strike length of the E&L intrusion from 200 to 650 m to a depth of 578 m. Highlights from this drilling included 151.6 m grading 0.56% Ni and 0.61% Cu (EL-20-89).

7.4.2. Turnagain (Giga Metals Corp.)

The **Turnagain** nickel-cobalt project is hosted in an Alaskan-type Pt-(Os-Rh-Ir) ultramafic hosted deposit. The zoned deposit has maximum dimensions of 3 by 8.2 km and displays a dunite core surrounded by peripheral peridotites, pyroxene-rich peridotite, wehrlite, and olivine pyroxene (MINFILE 104I 119). Sulphide mineralization includes pyrrhotite, pentlandite, chalcopyrite, and trace bornite. In October, a Preliminary Economic Assessment was completed. The project is expected to produce 37,149 t of Ni per year (years 6-20) and, during its 37-year mine life, produce 1.2 Mt Ni concentrate. A resource estimate was completed in 2019 with Measured plus Indicated resources of 1.073 Bt grading 0.22% Ni and 0.013% Co, and an Inferred resource of 1.142 Bt grading 0.22% Ni and 0.013% Co.

8. Geological research

Nelson and van Straaten (2020) described how repeatedly reactivated and long-lived deep structural corridors controlled sedimentation, intrusions, and mineralization in the Late Triassic to Early Jurassic, particularly in the northern part of the region. A series of papers were written about the KSM deposits including those by: Savell and Campbell (2020), who described

fault-bounded panels of wall rocks and narrow intrusions at the Sulphurets deposit; Rosset et al. (2020) who described the giant porphyry Cu-Au Kerr deposit and the associated alteration complexity; Febbo et al. (2020) who detailed the thrust fault-bounded Mitchell deposit; and Campbell et al. (2020) who summarized the Early Jurassic Iron Cap deposit. The Snowfield porphyry Cu-Au-Mo deposit was detailed by Laycock et al. (2020). Board et al. (2020) discussed the multi-stage porphyry-epithermal alteration, mineralization, and deposit formation of the Brucejack Au-Ag deposit and Peddle and Johnston (2021) reviewed the structural geology of the deposit. Greig et al. (2021) detailed the geological framework, including new geochronologic data, of the Saddle North porphyry Cu-Au deposit and the Saddle South epithermal Au-Ag vein system at the Tatogga property.

9. Summary

The Northwest Region has several producing mines and an abundance of proposed and advanced-stage projects. In 2020, the region saw numerous early- to advanced-stage projects that focussed mainly on precious, base metal, and porphyry deposits. Exploration activity increased for the fourth consecutive year in the region and expenditures this year represent close to half of British Columbia's total. Many companies reported positive exploration results, and many new targets were generated.

Acknowledgments

The author acknowledges with thanks the industry personnel who provided information and displayed an enthusiastic willingness to engage on their projects. This generous cooperation helped ensure that the information presented herein is accurate. Staff at the regional office in Smithers are especially thanked for their support and contributions towards this publication. All errors and omissions are the responsibility of the author.

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