

Exploration and mining in the Skeena Region, British Columbia



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1. Introduction

The Skeena Region covers approximately 263,213 square kilometres of northwestern British Columbia, roughly 25% of the province. The region transects all of the physiographic belts of the Canadian Cordillera (Fig. 1). There are 2,951 documented MINFILE occurrences distributed through all of the geologic terranes of the Skeena Region. Current exploration and mining activities are predominantly hosted in the Stikine terrane of the Intermontane tectonic province.

At least 92 projects remained active in the Skeena Region in 2015. Of which, 52 were monitored by the author. Thirty-two grassroots, early and advanced staged projects, five mine evaluation stage projects, two mine development stage projects, three producing metal mines and seven industrial mineral quarries were also monitored.

Mineral exploration expenditure in 2015 totalled approximately \$117 million, down 27% from 2014 (Fig. 2). Despite the decrease in expenditure, significant exploration and mining activity was carried out in the region. The previous four years of strong activity have yielded six permitted metal mines including the Red Chris copper-gold mine, now in production, and the Brucejack gold-silver mine now in construction. Remaining permitted mine projects including Kitsault, KSM, Tulsequah Chief and Silvertip all require critical capital investment prior to commencing construction.

Regional exploration drilling metres totalled 103,000 (Fig. 3). Grassroots and early stage exploration projects were responsible for 23,830 metres and represent roughly 21% of the overall regional exploration expenditure (Fig. 4). Mine development investment totalled approximately \$347.5 million and is attributed to mine construction and expansion costs. Mining related infrastructure investment totalled at least \$460 million which includes construction and expansion expenditures of marine port facilities and power projects.

Significant events in the Skeena Region during 2015 include:

- Pretium Resources Inc. received provincial and federal permits and started construction of the underground high-grade gold **Brucejack** mine
- Imperial Metals Corporation shipped the first copper-gold concentrate from the **Red Chris** mine and declared

commercial production

- Seabridge Gold extended boundaries of known copper-gold mineralization of the Deep Kerr and Mitchell deposits of the fully permitted **KSM** project
- JDS Silver received a Mines Act permit for the **Silvertip** silver-zinc-lead project
- Banks Island Gold produced over 9,500 ounces of gold in the first half of 2015 at **Yellow Giant**
- Alloycorp Mining Inc. started pre-construction activities at **Kitsault**
- Colorado Resources Ltd. discovered new copper-gold porphyry mineralization at the **KSP** project.

Producing metal mines in the region included the **Huckleberry** copper-gold-silver-molybdenum mine which produced concentrate for the duration of 2015. The **Red Chris** copper-gold mine started producing concentrate in February and declared commercial production in July. Lastly, the **Yellow Giant** gold-silver mine maintained production status until July. Seasonal placer mining for gold and jade was carried out between May and October but not comprehensively monitored.

Exploration projects focussed on porphyry copper-gold and vein hosted gold-silver veins predominantly focussed in the geographic and geological areas of the Stikine Arch, Eskay-Stewart and the Skeena Arch. In the northern areas, Atlin and Goodhope, limited exploration work and desktop evaluations were conducted on carbonate hosted, manto replacement and volcanogenic massive sulphide projects. Exploration for ultra-high-rank anthracite coal in the Bowser Basin slowed to minimal levels.

1.1. Exploration and mining activity overview

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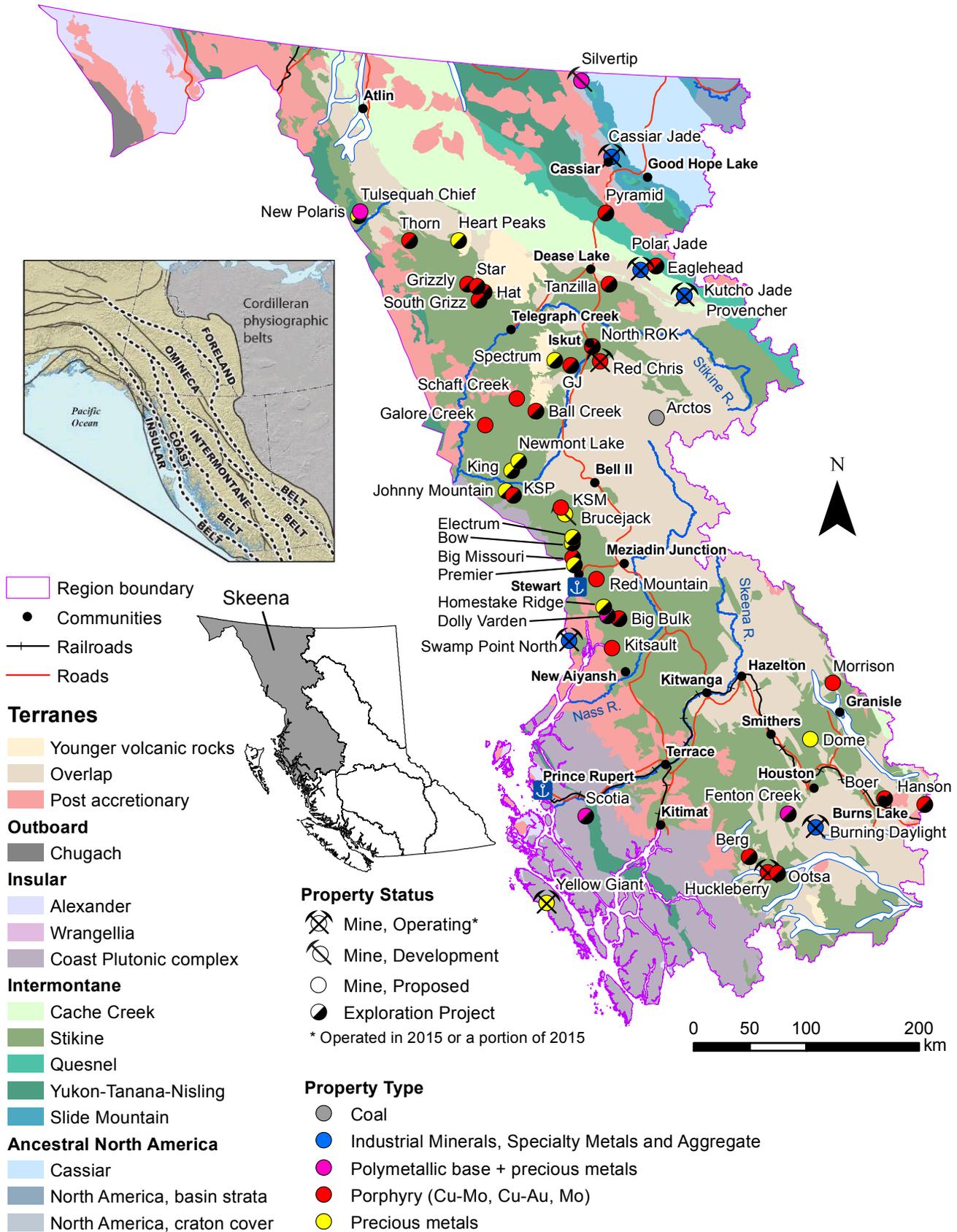


Fig. 1. Mines, proposed mines and selected exploration projects in the Skeena Region, 2015.

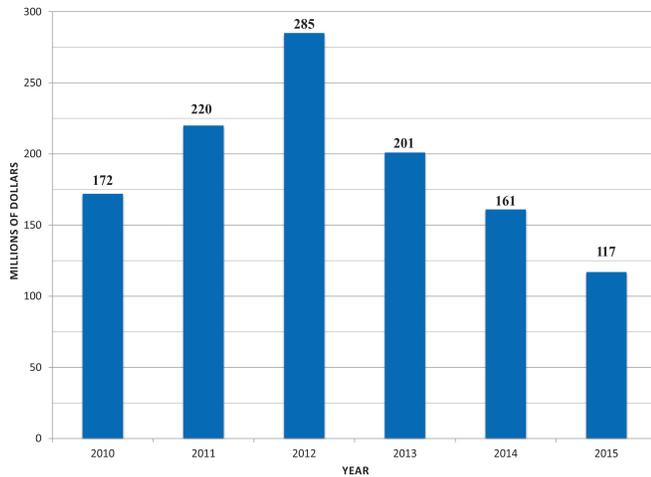


Fig. 2. Annual exploration expenditures in millions of dollars for the Skeena Region from 2010-2015.

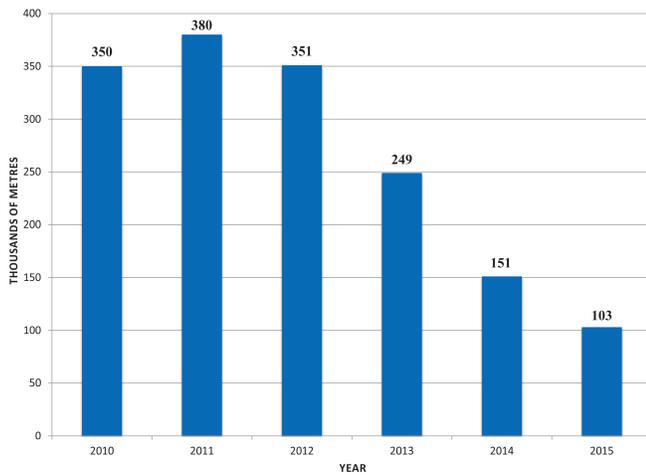


Fig. 3. Annual exploration drilling estimates in thousands of metres for the Skeena Region from 2010-2015.

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2. Geological overview

Metallogeny in British Columbia is intimately linked to the tectonic evolution of the Canadian Cordillera, first as an accretionary orogen consisting of allochthonous terranes that were welded to and deformed with the western margin of ancestral North America primarily during the Jurassic and then as the site of post-accretionary tectonism and magmatism (e.g. Nelson et al., 2013, Clarke, this volume). The Skeena Region

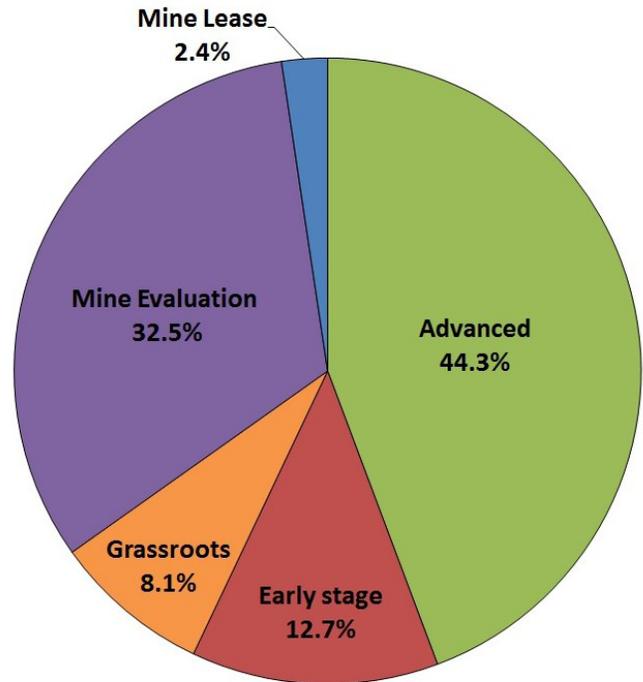


Fig. 4. Percentage of exploration expenditures in 2015 by exploration stage for the Skeena Region.

spans a transect of the Cordilleran orogen (Fig. 1). From west to east it is underlain by:

1. autochthonous and parautochthonous carbonate and siliclastic strata of ancestral North America (Laurentia)
2. terranes of the Intermontane tectonic province: the Slide Mountain terrane marginal (back-arc) basin; the Yukon-Tanana terrane, a rifted Devonian pericratonic arc terrane; the Quesnel and Stikine volcanic arc terranes, which formed outboard of ancestral North America starting in the Late Paleozoic and were accreted in the Middle Jurassic; and the late Paleozoic-early Mesozoic accretionary complex of the Cache Creek oceanic terranes, which intervenes between Quesnellia and Stikinia and represents their fore-arcs.
3. the Alexander terrane, part of the Insular tectonic province;
4. post-accretionary rocks; and
5. younger cover rocks (Fig. 1).

All of the allochthonous terranes initially accreted to each other and to western North America in the Jurassic. Since then, the mosaic has been intruded by post accretion plutonic suites and covered in part by Jurassic and younger syn- and post-accretionary siliclastic deposits.

2.1. Ancestral North America

Carbonate platformal rocks of the Laurentian realm are limited to the northeastern corner of the Skeena Region and mark the ancient margin of the North America. Platform and deep water sediments host favorable environments for

stratiform barite and set the stage for later polymetallic manto development. Sedimentary exhalative prospects also occur and are better developed to the east in the Kechika basin in the Omineca Region (see Jago, this volume).

2.2. Intermontane tectonic province

2.2.1. Slide Mountain terrane

The Slide Mountain terrane is exposed in the Sylvester allochthon, a complex klippe that structurally overlies Cassiar platform near Cassiar, British Columbia. It contains imbricated marginal ocean basin lithosphere, including ultramafic upper mantle, gabbro, basalt and pelagic sedimentary strata. Extensively serpentinized ultramafites host nephrite jade. Placer gold of the Cassiar camp was derived from orogenic gold-quartz veins such as at past producing Cusac and Taurus deposits.

2.2.2. Yukon-Tanana terrane

The Yukon-Tanana terrane records a Devonian-Mississippian volcanic arc founded on a pericratonic rifted block. The terrane hosts volcanogenic massive sulphide such as the **Scotia** prospect located in the Ecstall belt near Prince Rupert.

2.2.3. Quesnel terrane

The Quesnel terrane is a multi-phase late Paleozoic-early Mesozoic volcanic arc assemblage that is extensively exposed in central (Omineca Region) and southern British Columbia. Its northern extension in the Skeena Region contains stratigraphic equivalents of the Takla Group, intruded by the Eagle granodiorite, which is considered a faulted extension of the northern Hogen batholith (Gabrielse, 1985). Two porphyry copper-gold-molybdenite prospects, the **Eaglehead** deposit and the grassroots **Pyramid** prospect are located within Quesnellia and the Skeena Region.

2.2.4. Stikine terrane

The Stikine terrane generally trends northwest spanning over 1,500 km across the length of the province and varies in width from over 300 km wide to less than 100 km. It is the largest terrane in the Skeena Region and the most metallogenetically significant. It hosts a new major producing mine, **Red Chris**, and the majority of the economic mineral potential is in the form of porphyry and associated copper-gold-silver-molybdenum deposits such as **KSM** and **Brucejack**. The Philippine microplate with complex, opposite-facing arcs is considered a present day analog (Marsden and Thorkelson, 1992).

The Stikine terrane is a complex volcanic arc assemblage built during three episodes of island arc formation between the late Paleozoic and early Mesozoic. Each is represented by an unconformity-bounded volcanic-sedimentary sequence and coeval intrusive suite: 1) Devonian to Permian Stikine assemblage and Asitka Group and Forrest Kerr and More Creek plutons, (Logan et al., 2000; Gunning et al., 2006); Middle to Upper Triassic Stuhini and Takla groups and accompanying intrusions such as the Hotailuh and Hickman batholiths

(Souther, 1977; Monger, 1977; Dostal et al., 1999); and Lower to Middle Jurassic Hazelton Group and related high-level intrusions such as the Texas Creek suite (Barresi et al., 2015). Much of the porphyry related metal endowment is contained within sub-volcanic intrusive complexes related to the Stuhini and Hazelton groups. The unconformity between the Hazelton and Stuhini groups has been identified as an important regional targeting feature for porphyry and related deposits (Northern Miner, 2015). More importantly, fault systems located near, or which cross cut the Stuhini-Hazelton boundary and are inferred to have early origins such as the Sulphurets Fault, have been shown to influence emplacement of mineralized intrusions as observed at **KSM** and **KSP** properties (Kyba and Nelson 2015, Nelson and Kyba, 2014). The Eskay rift is also inferred to be influenced by a pre-existing basement structure, the Unuk River shear zone. The Middle Jurassic rift trends over 300 km at a high angle to the arc front and contains prolific past producing mines including **Eskay Creek**, **Granduc** and **Anyox**.

2.2.5. Cache Creek terrane

The Cache Creek terrane is an oceanic fore-arc assemblage that formed outboard of the combined Stikine-Quesnel arc terranes, and now lies structurally between them. It contains blueschist belts, remnants of oceanic primitive arc crust and ultramafic upper mantle and structural blocks of ocean island crust with exotic fossils of Tethyan (Asian) affinity (Nelson et al., 2013). Serpentinized ultramafite bodies host nephrite jade now mined in as placer boulders in till and alluvium. Placer gold deposits are associated with the Cache Creek terrane and its bounding faults, notably the Thibert fault. Bedrock sources of the gold are not well known.

2.3. Insular tectonic province

2.3.1. Alexander terrane

The Alexander terrane underlies most of north coastal British Columbia. It comprises Neoproterozoic and Cambro-Ordovician primitive arc sequences (Gehrels et al., 1983) that probably accreted to pericratonic crust in the Devonian (Nelson et al., 2013). In coastal British Columbia, small VMS-style occurrences are associated with Ordovician rhyolites. Farther north in southeastern Alaska and far northwest British Columbia, the Alexander terrane hosts Neoproterozoic (Nibleck) and Triassic (Greens Creek, Windy Craggy) volcanogenic deposits. The Alexander terrane accreted to the western margin of the Intermontane terranes during the Middle Jurassic (Gehrels et al., 1992; van der Heyden, 1992; McClelland and Mattinson, 2000; Saleeby, 2000; Gehrels, 2001).

2.4. Post-accretionary overlap strata and intrusions

2.4.1. Bowser basin and Skeena clastic overlap sequences

Middle-late Mesozoic Bowser Lake Group and Skeena Group rocks formed in syn- post-accretionary basins and cover much of the north-central part of the Stikine terrane. The Bowser Lake Group sedimentary sequence spans the former basin between the Stikine Arch and Skeena Arch and contains

significant anthracite coal deposits in the Groundhog-Klappan Coalfield. The Bowser Lake Group consists of nine different sedimentary assemblages; of which, five are known to be coal bearing and three of those are deltaic facies containing high ranking anthracite coal and include the **Arctos** project and the **Groundhog** project in the Omineca Region (see Jago, this volume). The coal-bearing sequences of the Groundhog coalfield reach approximately 1,100 metres in thickness, with 33 identified coal horizons up to 12 metres thick interbedded with mudstone, siltstone and sandstone.

2.4.2. Coast Plutonic Complex

The Coast Plutonic Complex underlies the Coast Mountains of western British Columbia and extends into the islands and lowlands to the west. It is a vast batholith, with component plutons ranging in age from Late Jurassic in the west, through to mainly Cretaceous in its centre, to Eocene outliers in the east. It overlaps the suture between the Intermontane and Insular terranes; it developed as the roots of the subsequent arc that formed as Pacific Ocean plates subducted under the new western margin of North America. Economic mineralization is generally limited to polymetallic vein deposits; however porphyry-style mineralization has been identified at the Ike project in the Thompson–Okanagan–Cariboo Region (see Britton, this volume).

2.4.3. Bulkley and Babine porphyries and Ootsa Lake Group

Late Mesozoic to Cenozoic intrusive rocks formed in an intracontinental setting, after the outboard host arc and related terranes accreted to the western margin of North America. These deposits are interpreted to occur in continental back arc settings and individual deposits are hosted by a variety of older country rocks. In the Skeena Region, deposits are generally hosted within the Hazelton Group and show a spectrum of metal associations; copper-molybdenum at **Huckleberry**, **Morrison** and **Berg**; copper-gold at past producing Bell and Granisle mines; molybdenum at **Kitsault** (McMillan et al., 1995). Coeval and younger volcanic rock such as the Ootsa Lake Group host polymetallic precious metal veins such as the past producing **Captain** mine. Similar aged intrusions are mapped throughout the Skeena Arch and as far north as the eastern margin of the Cassiar batholith. Here, a 72 Ma intrusion is interpreted to be related to polymetallic manto development at **Silvertip** hosted in the Cambrian-Devonian carbonate rocks of the Cassiar platform.

2.4.4. Post-accretionary faults

Braided sets of post-accretionary, northwest trending, strike-slip faults, transect the mosaic of terranes and set the overall structural grain of the Cordillera in the Skeena Region. Faults record mainly dextral displacement from mid Cretaceous to Eocene and with a cumulative offset up to 800 km (Gabrielse et al., 2006).

2.5. Younger rocks

Youngest cover rocks are comprised of volcanic rocks of the Mt. Edziza complex (Pleistocene). Some of the oldest quarries of obsidian mined by First Nations peoples are hosted in the Mt Edziza volcanics (MINFILE 104G 101).

3. Mines and quarries

3.1. Metal mines

There were three producing metal mines (Table 1) in the Skeena Region in 2015. **Huckleberry** remained in operation for the duration of the year but by the end of 2015 low metal prices had triggered an internal review. In early January of 2016, Imperial Metals Corporation announced it had suspended pit operations. **Red Chris** started commissioning in late 2014 and declared commercial production in July. **Yellow Giant** maintained production status until July.

3.1.1. Huckleberry

Imperial Metals Corporation and Japan Group's co-owned (50-50) **Huckleberry** copper-gold-silver-molybdenum mine continued through year four of the main zone optimization mine plan (Fig. 5). Production by the end of the third quarter totalled 15,244 tonnes (33.6 million pounds) copper, 81 kilograms (2,616 oz) gold and 4,924 kilograms (158,339 oz) silver from 5,025,638 tonnes of ore. Forecasted annual production was on target to produce 19,958 tonnes (44 million pounds) of copper and 7,464 kilograms (240,000 oz) silver. Mill throughput averaged 18,409 tonnes per day. Average head grade was 0.338% copper with 89.6% recovery. Low metal prices resulted in a review of operations and in early January 2016 pit operations were suspended. Milling of stockpiled ore will continue. Exploration activities included diamond drilling of three holes totalling 1,194 m at the nearby Whiting Creek project.



Fig. 5. Looking west-southwest over the **Huckleberry** Main Zone Extension pit. Year four of the Main Zone Optimization plan continued to remove formerly deposited tailings to recover ore below and around the former Main Zone Pit (former Main zone pit outline highlighted by dotted red line). Photo courtesy of Justin Schroff, Huckleberry Mine geologist.

Table 1. Metal mines, Skeena Region.

| Mine | Operator | Commodity; deposit type; MINFILE | 2015 Q1-Q3 Production | Reserves (Proven + Probable) | Resource (Measured + Indicated) | Comments |
|---------------------|------------------------------------------|----------------------------------------------------------------------------|---------------------------------------------------------------------------------|--------------------------------------------|-----------------------------------------------------------|--------------------------------------------------------------------------------------------|
| Huckleberry | Huckleberry Mines Ltd. | Copper, gold, silver, molybdenum; Porphyry Cu-Mo- Au; 093E 037 | 15,244 t (33.6 Mlbs) Cu, 81 kg (2,616 oz) Au, 4,924 kg (158,339 oz) Ag | 42 Mt at 0.33% Cu and 0.01% Mo | 180.7 Mt at 0.32% Cu, 0.01% Mo | Main Zone Optimization Plan in year 4; under review due to low metal prices |
| Red Chris | Red Chris Development Company Ltd. | Copper, gold; Porphyry Cu-Au; 104H 005 | 17,282 t (38.1 Mlbs) Cu, 495 kg (15,925 oz) Au | 301.5 Mt at 0.36% Cu and 0.27 g/t Au | 1,034.7 Mt at 0.35% Cu, 0.35 g/t Au, 1.14 g/t Ag | First eight months of production (Feb.- Sept.) |
| Yellow Giant | Banks Island Gold Ltd. | Gold, silver; Au-quartz veins; 103G 024, 103G 026 | 279 kg (9,555 oz) Au, 866 kg (27,846 oz) Ag | n/a | 78,000 t at 23 g/t Au, 43 g/t Ag (2013) | Temporarily shut down |

The Huckleberry deposit is located 123 km south of Houston and is hosted in and around two Late Cretaceous (~82 Ma) intrusions of the Bulkley Plutonic Suite, the Main and East Zone stocks. Both are granodiorite in composition and intrude volcanic tuffs of the Lower Jurassic Hazelton Group Telkwa Formation (MacIntyre et al., 1994). Most of the copper mineralization occurs within the margins of the stocks and on the eastern hornfelsed selvages around them. The Main Zone ore body measures approximately 1400 x 400 m in a crescent shaped plan with an arc open to the west and extends to at least 380 m deep. Reserves total 42,157,300 tonnes grading 0.327% copper and 0.01% molybdenum.

3.1.2. Red Chris

Eight years after being purchased and after three years of construction and strong community support, Imperial Metals Corporation's **Red Chris** copper-gold mine shipped their first load of concentrate to Asia in April. Community support, tested via referendum, showed 87% in favor of the project and resulted in an Impact Benefit and Co-Management Agreement between the Tahltan Nation and Red Chris Development Company Ltd., the operating company. Commissioning activities started in late 2014 and commercial production was achieved on July 1st 2015 when mill throughput surpassed the designed capacity of 30,000 tonnes per day. By the end of the third quarter, average mill throughput was 23,668 tonnes per day. Copper production totalled 17.2 tonnes (38.1 million pounds) and 495 kg (15,925 oz) gold from 5.3 million tonnes of milled ore. Higher grade ore (Fig. 6) mined from the East Zone was blended with Main Zone ore, resulting in an average grade of 0.482% copper and 0.25 g/t gold. Metal recoveries averaged 67% for copper and 37% for gold; both of which should improve with installation of additional launders in the roughing circuit. Construction activities on the North dam of the tailings facility finished for the year in early October and will resume in April 2016.

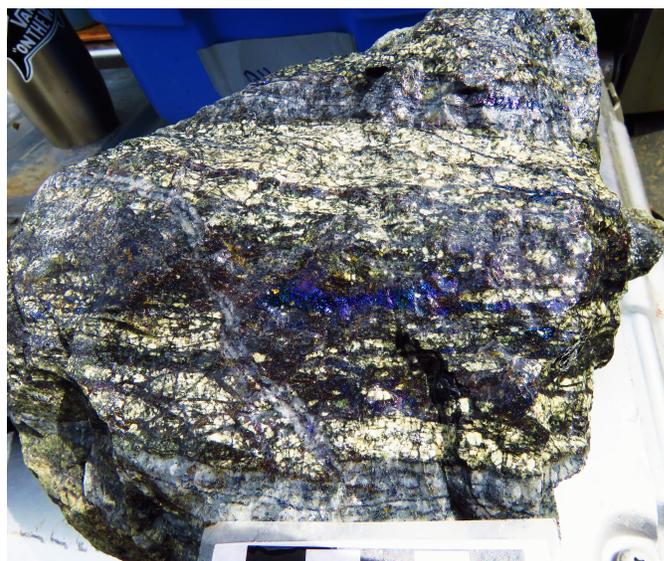


Fig. 6. High grade quartz-bornite-chalcopyrite-magnetite 'A' veins cutting 'P2' porphyry from the East Zone of the **Red Chris** mine.

Permitting for the South dam of the tailings facility is scheduled to be completed in time for the 2016 construction season.

The **Red Chris** copper-gold porphyry deposit is located 16 km southeast of Iskut and is hosted in the 204 Ma diorite-monzonite Red Stock which intrudes late Triassic Stuhini Group rocks. The 6.5 x 1.5 km crowded porphyry is comprised of four main intrusive phases. The second phase (P2), contains most of the copper and gold and measures greater than 2 km x 650 m in plan and has been proved to be over 1.5 km deep. The syn-mineral P2 intrusive phase is high-potassic, calc-alkalic in composition and contains abundant "A" type quartz-chalcopyrite-magnetite ± bornite veins (Rees et al., 2015).

Proven reserves total 301.5 million tonnes, with an average grade of 0.36% copper and 0.27 g/t gold. Forecasted mine life

is 28 years at a 30,000 tonne per day milling rate. Measured plus indicated resources total 1,034.7 million tonnes with an average grade of 0.35% copper, 0.35 g/t gold and 1.14 g/t silver. Additional inferred resources total 787.1 million tonnes grading 0.29% copper, 0.32 g/t gold and 1.04 g/t silver. Investigations are under way to expand the open pit design and incorporate underground block cave mining methods to access resources not included in the current mine plan (Fig. 7).

3.1.3. Yellow Giant

Banks Island Gold Ltd. produced gold-silver concentrate from their **Yellow Giant** mine located approximately 70 km southeast of Prince Rupert. Production continued until July and totalled 297 kg (9,555 ounces) gold and 866 kg (27,846 ounces) silver. Processing rates averaged 223 tonnes per day with an average grade of 9.25 g/t gold and 31.3 g/t silver. Underground mining occurred at the Tel, Bob and Discovery deposits. Ore was processed on site utilizing both a dense media separation plant and a grinding and flotation circuit. Metal recoveries

averaged 87% for gold and 73% for silver. Operations shut down in July due to compliance related issues which require an amendment to their Mines Act permit before operations can resume.

Near mine exploration activities included 4,143 m of diamond drilling in 16 holes at the Kim zone and Quartz Hill. Four diamond drill holes targeted deposit extensions at the Bob and Tel zones. A lake sediment geochemical orientation survey showed elevated gold-arsenic-bismuth values around known prospects. A larger, property-scale survey was not completed due to the halt of mine operations.

Gold and silver are contained within massive to semi-massive veins of pyrite, chalcopyrite, arsenopyrite, sphalerite and galena hosted in fault bounded quartz veins. Veins are steeply dipping and trend northwest proximal to an intrusive-metasedimentary lithologic contact and are widest at the intersection with east-northeast trending faults.

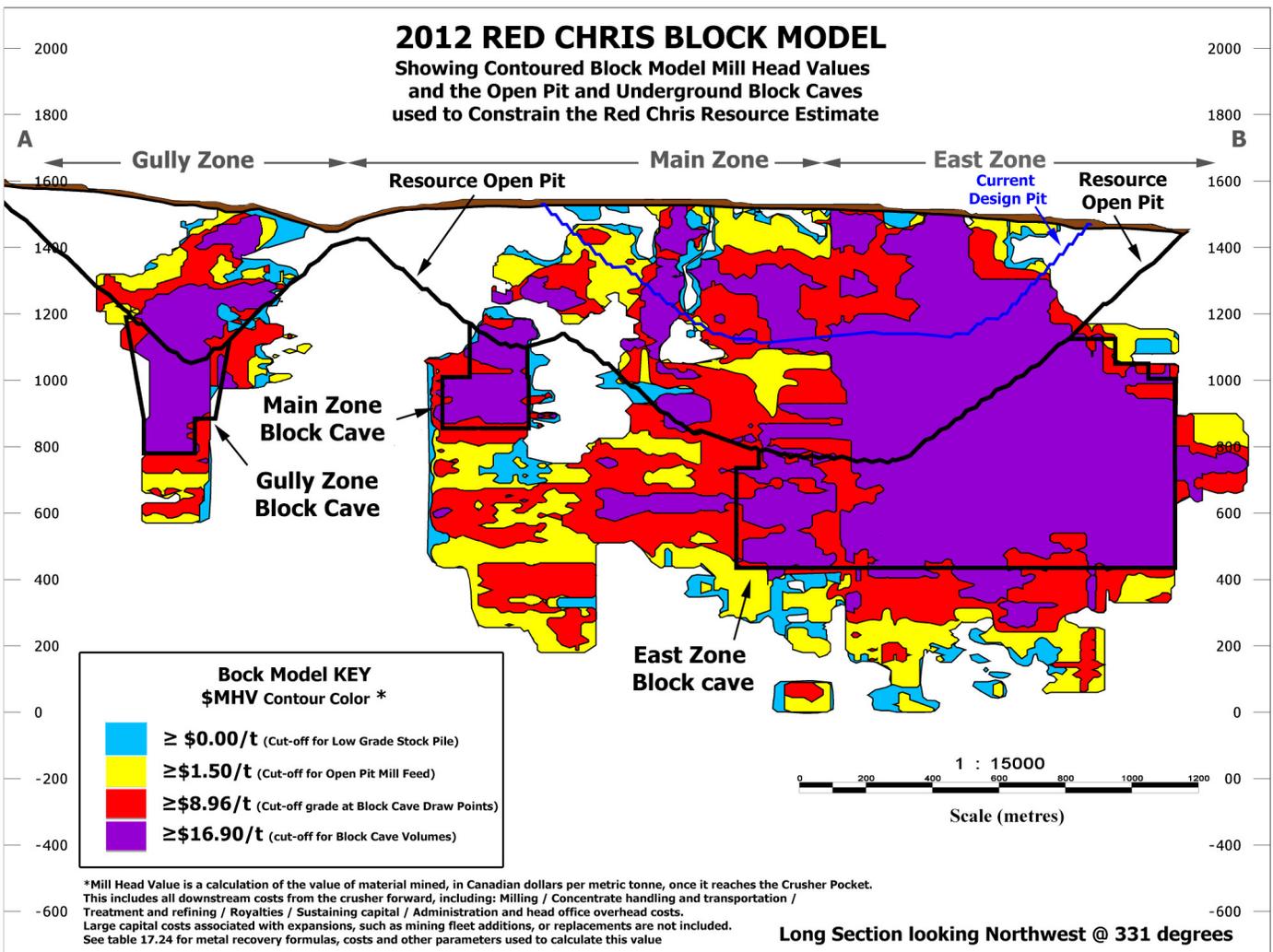


Fig. 7. Long section of for the Red Chris copper-gold mine. Section illustrates current pit design and possible pit extension and underground block cave areas. <http://www.imperialmetals.com/our-operations-and-projects/operations/red-chris-mine/reserve-and-resource>.

3.2. Industrial mineral mines and quarries

Several aggregate pits and quarries supplied mainly local construction requirements throughout the region and were not monitored by the author. Monitored projects include one new aggregate operation at **Swamp Point North**, one dimension stone basalt quarry, **Burning Daylight**. Several Jade quarries east of Dease Lake in the Turnagain River area and in the Cassiar area carried out seasonal mining activities (Table 2).

3.2.1. Swamp Point North

Highbank Resources Ltd. developed their tidewater accessible **Swamp Point North** aggregate mine and shipped their first 4,000 tonnes off site. Located on the east side of the Portland Canal and 51 km south of Stewart, the project site is positioned to supply ongoing and future construction projects around Prince Rupert. Aggregate is mined by excavator, crushed, washed and loaded onto barges by conveyor. Sand and gravel occur in horizons within a medial moraine.

3.2.2. Burning Daylight

Columnar basalt was mined approximately 35 km south of Houston at the **Burning Daylight** dimension stone quarry. Stone Ridge Quarries Limited mined approximately 700 tonnes of basalt columns. Processed product is marketed for architectural and landscaping uses.

3.2.3. Nephrite Jade

Several operators explored for placer nephrite jade and to a lesser degree, in-situ lenses at **Cassiar, Kutcho, Polar and Provencher Lake** areas. Within these areas, at least thirteen jade properties were active with varying degrees of exploration and mining activities. Production values were largely not available.

In one case, Pacific Bay Minerals Ltd. and joint venture partner reported 56.7 tonnes of jade from the around Wolverine Lake. Individual boulders varied in size from 0.18 to 10.3 tonnes. Nephrite Jade is found in sheared serpentinitized ultramafic rocks in the Cache Creek and Slide Mountain terranes. Placer boulders and quarried stones are generally trucked to Vancouver and auctioned mainly to international markets.

4. Mine development projects

The mine development stage is achieved when a project receives the required permits and begins mine construction. The main permitting processes include provincial and federal environmental assessment certificates. For smaller (less than 75,000 tonnes per year) operations, a Mines Act permit and environmental Management Act permit. There were two mine development projects active in the Skeena Region in 2015 and include the **Brucejack** and **Silvertip** projects (Table 3). Permitted mine development projects, KSM, Kitsault, and Tulsequah Chief are described later in the proposed mine section as construction activities are not scheduled in the foreseeable future.

4.1. Metal mine development

4.1.1 Brucejack

Pretium Resources Inc. received an initial \$540 M (US) tranche of construction financing for their underground, **Brucejack** high-grade gold project located 65 km north of Stewart. Provincial and Federal environmental assessment certificates were issued by the end of July and were followed by Mines Act and Environmental Management Act permits by September. A positive production decision was made and the company is aiming to achieve commercial production by 2017. The timeline of discovery of the Valley of the Kings Zone, reserve delineation and now construction has spanned approximately six years. Various aspects of site construction including access roads, camps and site infrastructure have been ongoing during the past four years and are now increasing capacity to host the required workforce and final mine-site layout (Fig. 8). The initial tranche of construction financing represents approximately 70% of the total forecasted capex of \$747 M (US) detailed in their 2014 feasibility study. The Brucejack mine will consist of a 2,700 tonne per day mill and recover gold and silver via gravity and sulphide floatation circuits. Gold-silver dore will be produced on site.

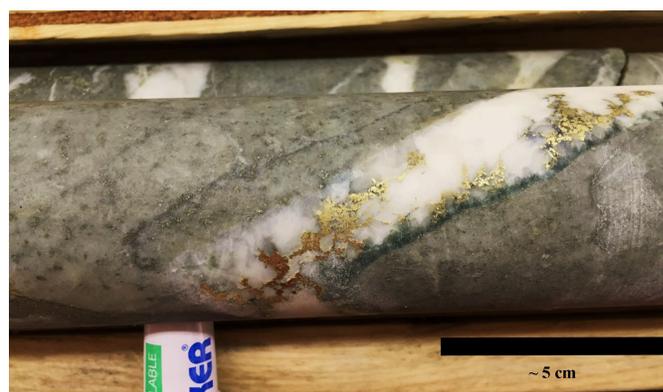
Underground mine development and the balance of approximately 40,000 m of infill drilling will continue through the winter. Additional underground drilling throughout the year increased confidence in gold distribution of the first stopes scheduled to be mined. By the end of October, underground 2015 development totalled 1,573 m of lateral workings and

Table 2. Selected producing quarries, Skeena Region.

| Mine | Operator | Commodity; deposit type; MINFILE | 2015 Q1-Q3 | Reserves (Proven + Probable) | Resource (Measured and Indicated) | Comments |
|--------------------------|---------------------------|----------------------------------|------------|------------------------------|-----------------------------------|---------------------------------------------------|
| Burning Daylight | Stone Ridge Quarries Ltd. | Columnar basalt; dimension stone | 700 t | n/a | n/a | Seasonal production |
| Swamp Point North | Highbank Resources Ltd. | Sand and gravel; medial moraine | 4,000 t | n/a | 71.7 Mt | Awaiting aggregate contracts around Prince Rupert |

Table 3. Mine development projects, Skeena Region.

| Project | Operator | Commodity; Deposit Type; MINFILE | Reserves (Proven + Probable) | Resource (Measured and Indicated) | Work Program | Comments |
|------------------|------------------------|-------------------------------------------------------------------------|-------------------------------------|----------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------|
| Brucejack | Pretium Resources Inc. | Au, Ag; Au-quartz veins; Quartz stockwork breccia; Epithermal; 104B 193 | 16.5 Mt at 14.1 g/t Au, 57.7 g/t Ag | 15.3 Mt at 17.6 g/t Au, 14.3 g/t Ag | 40,000 m underground infill drill program, 20,000 m surface exploration drill program, underground mine development: 1,573 m of lateral workings and 239 m of raise workings. | Mine construction underway; aiming for commercial production by 2017 |
| Silvertip | JDS Silver | Ag, Pb, Zn, Au; Polymetallic manto; 104O 038 | n/a | 2.455 Mt at 315 g/t Ag, 5.88% Pb, 6.28% Zn, 0.413 g/t Au | Road reconditioning, pre-construction earthworks, mill and process plant acquisition | Fully permitted, construction dependant on financing |

**Fig. 8.** Mine construction at Pretium Resources Inc.'s **Brucejack** gold project. Photo courtesy of Pretium Resources Inc.**Fig. 9.** Drillhole Su-666 intercepted 0.5 m grading 8,600 g/t gold at 1,267.7 metres depth under the Flow Dome zone located over 1 km away from known reserves at the Valley of the Kings zone. Photo courtesy of Pretium Resources Inc.

239 m of raise workings.

Nearly 20,000 m of surface exploration drilling in 38 holes focussed on nearby geological and geophysical targets including the Flow Dome, Kitchen View, Hanging Glacier, Nip and the Lookout zones. The Flow Dome prospect located over 1 km laterally from the Valley of the Kings zone, returned the most significant results including 0.5 m grading 8,600 g/t Au from drillhole Su-666 at 1267.45 m depth (Fig. 9).

At the Kitchen View zone, drilling intercepted a sheared massive sulphide unit and returned 4.5 m grading 2 g/t gold, 43.8 g/t silver and 0.09% copper. Follow up ground based geophysics is planned for 2016. Lower grade gold-silver mineralization was intercepted at the Lookout and the Hanging Glacier zones resulting in relative decreased follow up priorities.

The Brucejack deposit is a transitional epithermal gold silver occurrence hosted in stockwork veining located up stratigraphy from several large porphyritic intrusions. Gold and silver mineralization occurs as coarse electrum in several generations of quartz-carbonate veins and vein breccias. Background vein-

hosted mineralization also includes pyrite, sphalerite, galena, chalcocopyrite, and pyargyrite.

4.1.2. Silvertip

JDS Silver received their Mines Act Permit in June to mill up to 75,000 tonnes per year from their underground **Silvertip**, silver-lead-zinc mine located approximately 190 km northeast of Atlin and 8 km south of the Yukon border. The company refurbished the access road into the project site from the Alaska Highway and purchased a used mill which is being stored 90 km away at Watson Lake. Re-assembly of the mill and mine site construction is planned upon completion of project financing.

Precious and base metal mineralization occur in massive sulphide and unconformably overlying exhalite zones, both hosted in carbonate and clastic sediments of the Cassiar terrane. A Late Cretaceous intrusion (~72 Ma, Nelson and Bradford, 1987) proximal to the Cassiar batholith, intrudes the

carbonate sequence nearby and is inferred to be related to the mineralizing fluids responsible for the manto-style massive sulphide replacement of the limestone; the exclusive focus of the project.

5. Proposed mines

The proposed mine (mine evaluation) stage involves all aspects pertaining to the planning of a profitable, environmentally and socially responsible mine operation. In general, this stage is achieved after successful completion of an advanced exploration program and delineation of a mineral resource. Key milestones include application for an Environmental Assessment certificate and/or a Section 10 permit which states that a project is reviewable by the Environmental Assessment Office (EAO); or the direct submission of a Mines Act permit application for smaller scale projects (milling rates less than 75,000 tonnes per year) not meeting the criteria for review by the EAO. The Skeena Region hosts nine proposed mine projects which are listed in (Table 4).

5.1. Proposed metal mines

5.1.1. KSM

Seabridge Gold Inc. continued to expand their fully permitted **KSM** copper-gold porphyry deposit and identify higher average grades than those for the presently defined 2.16 billion tonnes of Reserves. 2015 was the third successful year of testing deeper, higher grade cores of the Texas Creek intrusive suite hosting the Kerr, Sulphurets and Mitchell deposits. The KSM porphyry deposits are associated with the Mitchell intrusions of the Texas Creek plutonic suite. High level diorite to monzonite plugs and dikes intrude along the Sulphurets fault into the volcanic and sedimentary rocks of the Hazelton and Stuhini groups.

At the Deep Kerr deposit, nine holes tested the down-dip continuity of higher copper-gold grades for zones amenable to underground block-cave mining. Results indicate the west limb of the deposit extends over 450 m along strike and 400 m down dip and remains open. Highlight intercepts include 483 m (from 1,272 m to 1,755 m downhole) grading 0.43g/t gold and 0.56% copper in hole K-15-49 and 340 m (from 1,304 m to 1,644 m downhole) grading 0.53 g/t gold and 0.60% copper in hole K-15-49A. Future exploration efforts are being considered to be staged from an underground exploration adit, located near valley bottom elevation. An updated resource estimate for the Deep Kerr zone is expected in early 2016.

At the Mitchell deposit, two drillholes targeted the down plunge projection of the highest copper-gold grades centrally exposed at surface. Results returned up to 174.4 m averaging 0.55 g/t gold and 0.28% copper from 1,207.4-1381.8 m in hole M-15-130 and 167 m averaging 0.81 g/t gold and 0.25% copper from 1,190.5-1357.5 m in hole M-15-131. Drillholes were collared over 200 m apart and encountered magnetite-copper rich intervals located above the Mitchell Fault (and current reserves) including 191.5 m grading 0.14 g/t gold and 0.39% copper. This zone of mineralization has the potential to convert planned in-pit waste into a definable resource. Below

the Mitchell fault, the broad zones of higher than average gold and copper grades correlate with abundant quartz veins and pervasive hydrothermal altered intrusive rock. Alteration assemblages grade from intense quartz-sericite-pyrite to chlorite-magnetite-potassium feldspar indicating increasing temperature with depth.

Activities included the successful evaluation of a new water treatment plant process to remove selenium; a key condition of the 2014 issued environmental assessment. Engineering studies continued to optimize mine designs with a particular focus on underground mining options which would likely have significant positive impacts to overall project economics. The current permitted project is forecast to have a 52 year mine life and expected to cost approximately \$5.3 billion to construct.

5.1.2. Kitsault

The past producing **Kitsault** molybdenum-silver mine is fully permitted and requires project financing to start construction for a new mining operation. Alloycorp Mining Inc. completed pre construction earthworks for a new mill site (Fig. 10), upgraded the critical Nass River bridge and increased camp capacity to house several hundred construction workers. A front end engineering study completed in November detailed a re-designed process plant to support a 45,500 tonne-per-day throughput which will recover both molybdenum and silver. The study also forecasted an increase of pre-production costs now totalling \$1.2 billion. The company has sourced approximately half of the capex from a syndicate of lending facilities including a life of mine off-take agreement with ThyssenKrupp.

The Kitsault deposit is hosted in the Eocene Lime Creek multi-phase intrusive complex which intrudes the Jurassic argillite and greywackes of the Bowser Group sediments. Molybdenite is hosted in aplite dikes and quartz-molybdenite stockwork.



Fig. 10. Alloycorp Mining Ltd. completed pre construction earthworks for the planned mill site of their proposed Kitsault molybdenum-silver mine.

Table 4. Selected proposed mine and mine evaluation projects, Skeena Region.

| Project | Operator | Commodity; deposit type; MINFILE | Reserves (Proven +Probable) | Resource (Measured and Indicated) | Work Program | Comments |
|------------------------|----------------------------------------|---------------------------------------------------------------|-------------------------------------------------------------------|----------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------|
| Arctos | Fortune Minerals Limited | Anthracite coal; 104H 021 | 125 Mt | 192.8 Mt | Baseline monitoring | Project sold to BC Rail with buy back rights in 10 years |
| Dome Mountain | Dome Mountain Resources of Canada Inc. | Au, Ag; Au-quartz veins; 093L 276 | 135,131 t at 11.2 g/t Au | 144,144 t at 17.7 g/t Au | Corporate negotiations between Metal Mountain Resources Inc., Gavin Mines Inc. and Grace Mining Inc.; winter drill program preparation. | Awaiting Mines Act permit amendment to allow mill construction on site |
| Galore Creek | Galore Creek Mining Corp. | Cu, Au, Ag; Alkalic porphyry; 104G 090 | 528 Mt at 0.59% Cu, 0.32 g/t Au, 6.02 g/t Ag | 814.7 Mt at 0.50% Cu, 0.31 g/t Au, 5.21 g/t Ag | Baseline monitoring | Targeted studies; minimizing expenditure |
| Kitsault | Alloycorp Mining Inc. | Mo, Ag; Porphyry Mo (Low F-type) | 228.2 Mt at 0.083% Mo, 5.0 g/t Ag | 321.8 Mt at 0.071% Mo, 4.8 g/t Ag | Pre-construction earthworks, Nass River Bridge upgrade, construction finance negotiations | Fully permitted, additional inferred Mo Resources at Bell and Roundy Creek deposits |
| KSM | Seabridge Gold Inc. | Au, Cu, Ag, Mo; Calc-alkalic porphyry; 104B 103 | 2,164 Mt at 0.55 g/t Au, 0.21% Cu, 2.74 g/t Ag, 44.7 g/t Mo | 2,779.9 Mt at 0.55 g/t Au, 0.21% Cu, 2.9 g/t Ag, 55 g/t Mo | 11,018 m drilling in 11 holes at Deep Kerr and Mitchell deposits, 1,579 line km airborne geophysics | Fully permitted; investigating viability of underground exploration portal |
| Morrison | Pacific Booker Minerals Inc. | Cu, Au, Mo; Calc-alkalic porphyry; 93M 007 | 224.2 Mt at 0.33% Cu, 0.163 g/t Au, 40 g/t Mo | 265.9 Mt at 0.35% Cu, 0.17 g/t Au, 50 g/t Mo | Re-submitted environmental assessment application | Ordered to undergo further assessment |
| Red Mountain | IDM Resources | Au, Ag; Porphyry-related gold; 103P 086 | n/a | 1.45 Mt at 8.15 g/t Au, 29.57 g/t Ag | Entered environmental assessment review | Initiated Feasibility study |
| Schaft Creek | Teck Resources Limited | Cu, Mo, Au, Ag Calc-alkalic porphyry; 104G 015 | 940.8 Mt at 0.27% Cu, 0.018% Mo, 0.019 g/t Au, 1.72 g/t Ag | 1,228.5 at 0.26% Cu, 0.017% Mo, 0.19g/t Au, 1.69 g/t Ag | Drilling at La Casse zone, optimization of mine plan | Limited targeted studies |
| Tulsequah Chief | Chieftain Metals Inc. | Au, Ag, Cu, Pb, Zn; Noranda/Kuroko massive sulphide; 104K 002 | 4.435 Mt at 2.85 g/t Au, 104 g/t Ag, 1.46% Cu, 1.29% Pb, 6.94% Zn | 6.575 Mt at 2.82 g/t Au, 104.76 g/t Ag, 1.34% Cu, 1.33% Pb, 6.71% Zn | Construction financing negotiations | Fully permitted; substantially started (EA certification is valid for life of project) |

5.1.3. Tulsequah Chief

Chieftain Metals Corp.'s **Tulsequah Chief** zinc-copper-gold Kuroko type massive sulphide project was deemed "substantially started" in early 2015 by the Minister of Environment for the Province of British Columbia. That means the environmental assessment certificate will remain in effect for the life of the project. The proposed mine is located 95 km south of Atlin and permitted for construction. A 2014 feasibility and optimization study reduced the pre-production expenditure to \$198 million. Further optimization is ongoing as well as desktop review of exploration targets. The 30,547

hectare property hosts several targets surrounding known mine reserves and untested geophysical and geochemical anomalies.

The Tulsequah deposit is underlain by Devonian-Mississippian to Permian volcanic arc rocks of the Stikine assemblage; the oldest and lowest stratigraphic assemblage of the Stikine terrane. The deposit consists of several stacked massive sulphide lenses within rhyolite flows and fragmental rocks which overlie a thick sequence of basalt. Mineralization consists of massive pyrite, chalcopyrite, semi-massive sphalerite and galena and minor amounts of tetrahedrite-tennantite and rare native gold.

5.1.4. Red Mountain

IDM Mining Ltd. began the Environmental review process for their **Red Mountain** gold-silver project located 18 km east of Stewart. Their project description was submitted in August followed by initiation by the British Columbia government in November. Baseline environmental studies continued for the second year and were the only groundwork on the property completed by the company during 2015. Engineering studies continued to detail various aspects of the mine design as well as initiate a feasibility study in late 2015. An updated resource estimate will include drill results from 2014 as well as historic drilling data in order to upgrade resource confidence of the 141 zone. The proposed 1,000 tonne per day mine plans to operate on a seasonal basis during nine months of the year over a forecasted five year mine life. Anticipated capital expenditure is \$97.4 million.

Gold mineralization occurs within stockwork pyrite veining associated with the youngest of three intrusive phases of the Hillside intrusive suite; the Hillside porphyry. Less mineralization is hosted in the later intrusive phases Goldslide porphyry and surrounding Upper Stuhini Group and Lower Hazelton Group sediments. Veins vary in widths from sub-millimetre scale to over 80 cm and can occur as breccia matrix-fill. Gold occurs as native gold, electrum and various gold telluride and sulphosalts (Rhys et al., 1995).

The British Columbia Geological Survey conducted preliminary field investigations in the area as part of future studies of the metallogeny of western Stikinia (Fig. 11).



Fig. 11. British Columbia Geological Survey staff in front of the Hillside intrusive suite hosting IDM Mining Ltd.'s **Red Mountain** gold deposit (photo looking northwest).

5.1.5. Dome Mountain

Metal Mountain Resources Inc. and subsidiary Gavin Mines Inc. partnered with Grace Mining Inc. to keep the **Dome Mountain** gold mine poised for construction upon receipt of an amended Mines Act Permit expected before 2016. The amendment will allow a 250 tonne per day mill to be constructed

on site. Over the winter months, an infill drill program will aim to define additional inferred resources and extend the mine life to 7 years. Drilling targets include near-mine extensions of the Boulder vein as well as deeper drilling on the Argillite vein.

Gold-silver mineralization mainly occurs as electrum inclusions within pyrite that is hosted in quartz- carbonate veins that are in folded fragmental volcanic rocks of the Lower Hazelton Group. Veins occur within deformation zones typically less than 10 m thick which parallel penetrative foliation that is most pronounced at vein margins. Bleached vein alteration selvages of carbonate and sericite extend for several metres into the wall rock. Alteration intensity generally correlates with higher gold values.

5.1.6. Schaft Creek

Teck Resources Limited completed a comprehensive geological program at their 75% owned (25% Copper Fox Metals Inc.) **Schaft Creek** copper-molybdenum-gold-silver porphyry project located 135 km southeast of Dease Lake. The program included exploration drilling, re-logging, regional mapping and optimization studies on the 2013 feasibility study. Mineralization identified at the LaCasse zone during 2014 was followed up with 2,634 m of diamond drilling in five drillholes. Drilling tested the volcanic-intrusive contact with the Discovery zone and depth extension of surface mineralization. Results returned broad low grade copper values in hydrothermal and intrusive breccias containing disseminated and vein concordant chalcopyrite and bornite within granodiorite and quartz monzonite. The longest intercept was 182 m grading 0.20% copper from drillhole SCK-15-444. In addition, nearly 12,000 m of historic drill core was re-logged so that it can be incorporated into a revised geologic model and aid overall optimization of the Liard and Paramount resource areas. Regional mapping around the deposit was conducted to identify additional targets and gain a better understanding of district scale metallogeny of the Hickman batholith and Stuhini Group volcanic rocks. Investigations during the past two field seasons have included studies up to 40 km away, including the **Galore Creek** alkalic copper-gold porphyry deposit also partially owned by Teck. Work at the Galore Creek project, which is 50% owned by Novagold Resources Inc., was limited to baseline monitoring and targeted engineering studies.

5.1.7. Morrison

Pacific Booker Minerals Inc.'s **Morrison** copper-gold-molybdenum-silver porphyry project resumed the Environmental Assessment process in June after being halted to incorporate recommendations of the panel report on the causes of the Mount Polley mine tailings dam breach. One month later, a letter from the British Columbia Minister of Environment and Minister of Energy and Mines stated that concerns still remained surrounding the fundamental aspects of the project design and level of certainty that mitigation measures will succeed as modelled. The project is now undergoing further review of several project components including mine design

alternatives.

The Morrison deposit is hosted in a biotite-feldspar-porphyry; part of the Eocene Babine Intrusions which cut the Late Jurassic Bowser group sediments. The semi-circular plug bifurcates and diffuses into dikes of variable width trending roughly parallel to the regional north-northwest structural fabric.

6. Exploration activities and highlights

Thirty selected 2015 exploration stage projects in the Skeena Region are summarized (Table 5). Eight (28%) grassroots projects, eleven (38%) early stage projects and twelve (34%) advanced stage projects. Targets varied between porphyry copper-gold \pm molybdenum (18 projects) gold \pm silver bearing stockwork veins and breccias (10 projects) and volcanogenic massive sulphide deposits (3 projects). Exploration stage activities undertaken by more advanced projects are reported in previous sections of this report.

6.1. Precious metal projects

6.1.1. Premier

Ascot Resources Ltd. explored for a high grade gold deposit near the past producing **Premier** mine, approximately 13 km north of Stewart. Two company owned diamond drills completed 40,892 m in 198 holes aiming to define a 43-101 compliant resource to support selective high-grade underground mining. Results returned several intercepts grading between 250 and greater than 1,000 g/t gold over 0.9-1.0 m. Broader high grade gold zones were also intercepted, in particular at the Lunchroom subzone where hole P15-914 returned 14 m averaging 113.53 g/t gold. A revised option agreement with Boliden Group extends terms and timelines for Ascot to keep developing the project. New terms of the agreement include partial payment of \$13 M by the start of 2016 and the remaining balance to be fully paid by the end of June, 2017.

Gold occurs in quartz veins and silicified breccias (Fig. 12) spatially associated with porphyritic dykes hosted in Lower Hazelton volcanic rocks. Aldrick (1993) interprets the dykes to radiate from a parasitic vent on the flank of a major strata volcano centred near the **Dilworth**, **Big Missouri** and **Martha Ellen** deposits.

Approximately 25 km north, American Creek Resources Ltd. conducted an eight drill-hole program at the past producing **Electrum** gold property. The company targeted approximately 309 m of drilling at structures proven to host high-grade gold at surface and previously mined by hand. Drill results are pending.

6.1.2. Spectrum

Skeena Resources Limited completed an aggressive exploration program at their **Spectrum** gold project (Fig. 13) located 34 km southwest of Iskut. A total of 17,350 m of drilling in 61 holes was carried out. Results are expected to define a maiden resource estimate planned for release in early 2016. Geological mapping, prospecting and sampling complimented the program and resulted in several new showings. Gold occurs in steeply dipping quartz-breccia zones roughly parallel to



Fig. 12. Silicified breccia zone with interstitial, blebby auriferous pyrite intersected in drilling at Ascot Resources Ltd.'s **Premier** gold project.



Fig. 13. Skeena Resources Limited completed 17,350 m of drilling in 61 holes at the **Spectrum** gold project (foreground) and acquired the **GJ** copper-gold porphyry (background ridge). The expanded mineral claim package now exceeds 41 km².

the contact of a north trending monzonite intrusion hosted in Stuhini Group greywacke and tuff. Highlight results include two m grading 75.5 g/t gold and 8.5 g/t silver. Porphyry-style mineralization is also present and returns copper grades up to 0.93%, 7.95 g/t gold and 35.5 g/t silver over 7 m; part of a broader, 209 m intercept grading 1.22 g/t gold, 4.8 g/t silver and 0.17% copper from drillhole S15-014. Mineralization occurs in pyrite and minor electrum. Bench scale metallurgical tests indicate several viable options for processing including, floatation, cyanide leaching and gravity. The company also acquired the nearby **GJ** copper-gold project in November which adds a defined mineral resource to their inventory as well as contiguous mineral tenures to highway 37.

6.1.3. Hearts Peaks

Colorado Resources Ltd. partnered with Centerra Gold Inc. and conducted a late season exploration program at the **Hearts Peaks** gold prospect located 120 km west of Dease Lake. The fall program completed collection of over 400 combined rock, silt and soil samples, 46 km² of drone aerial photography, 13 line km of IP geophysics and 70 km² of geological mapping.

Table 5. Selected exploration projects, Skeena Region.

| Project | Operator | MINFILE | Commodity; Deposit type | Resource (tonnes) | Work Program 2015 |
|------------------------|---------------------------------|----------|-------------------------------------------------|-------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------|
| Ball Creek | Evrin Resources Corp. | 104G 072 | Cu, Au, Mo; Porphyry | n/a | Geological mapping, rock sampling |
| Berg | Berg Metals Limited Partnership | 093E 046 | Cu, Mo; Porphyry | Measure + Indicated: 506 Mt at 0.30% Cu, 0.037% Mo, 3.8 g/t Ag | Geological mapping, rock (92), soil (46) and silt (1,763) sampling |
| Big Bulk | LCT Holdings Inc. | 103P 291 | Au, Cu; Subvolcanic | n/a | Geological mapping, rock sampling, channel sampling, petrography |
| Boer | KGE Management Ltd | 093K 114 | Cu, Mo; Porphyry | n/a | Soil sampling, prospecting |
| Bow | Decade Resources Ltd. | 104B 132 | Au, Ag; Intrusion-related pyrrhotite veins | n/a | Trenching, prospecting |
| Dolly Varden | Dolly Varden Silver Corporation | 103P 188 | Ag, Zn, Pb, Au; Noranda/Kuroko massive sulphide | Indicated: 3.07 Mt at 321.6 g/t Ag; Inferred: 898,500 t at 373.3 g/t Ag | Diamond drilling (2,037 m in 10 holes), mapping, prospecting, rock (264) & soil (1,728) sampling |
| Eaglehead | Carmax Explorations Ltd. | 104I 008 | Cu, Mo; Porphyry | Inferred: 102.5 Mt at 0.29% Cu, 0.01% Mo, 0.08 g/t Au | Diamond drilling, (2 holes, 1183 m), re-logging |
| Electrum | American Creek Resources Ltd. | 104B 033 | Au, Ag; Stockwork quartz veins | n/a | Diamond drilling (309 m, 8 holes), rock (100) sampling |
| Fenton Creek | Similco Mines Ltd. | 093L 248 | Au, Ag, Zn, Pb; Epithermal related | n/a | Geology, geophysics, geochemistry |
| GJ | Skeena Resources Limited | 104G 034 | Cu, Au; Porphyry | Measured + Indicated: 153.3 Mt at 0.321% Cu, 0.369 g/t Au; Inferred: 23 Mt at 0.26% Cu, 0.310 g/t Au | Corporate, change of ownership |
| Grizzly | Garibaldi Resources Inc. | 104J 063 | Au, Cu; Porphyry | | Diamond drilling (1,000 m, 5 holes), prospecting, geological mapping, geophysics (IP) |
| Hanson Lake | Stone Ridge Exploration Corp. | 093K 078 | Cu, Mo; Porphyry | | Geology, geochemistry, auger drilling |
| Hat | Doubleview Capital Corp. | 104J 021 | Au, Cu; Porphyry | | Diamond drilling, geology, geochemistry |
| Heart Peaks | Colorado Resources Ltd | 104K 084 | Au; Epithermal high sulphidation | | Rock, soil, silt sampling, geological mapping, 13 line km IP, drone photography |
| Homestake Ridge | Homestake Resource Corporation | 103P 216 | Au, Ag; Intrusion-related pyrrhotite veins | Indicated: 604,000 t at 6.4 g/t Au, 48.3 g/t Ag, 0.18% Cu; Inferred: 6.76 Mt at 402 g/t Au, 93.6 g/t Ag, 0.11% Cu | Optioned to Banks Island Gold Corp. |

Table 5. Continued.

| | | | | | |
|------------------------|----------------------------|-----------|----------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------|
| Johnny Mountain | Snip Gold Corporation | 104 B 107 | Au, Ag; Intrusion-related pyrrhotite veins | 24,000 t at 11.3 g/t Au, 22 g/t Ag, 0.23% Cu | 14.7 line km of ground VLFEM geophysics targeting near mine extensions and the McFadden float zone source |
| King | Ram Explorations Ltd | 104B 338 | Au; Stockwork quartz veins | | Prospecting, rock sampling |
| KSP | Colorado Resources Ltd. | 104B 116 | Au, Cu; Porphyry | | Channel sampling, geological mapping |
| New Polaris | Canarc Resource Corp. | 104K 003 | Au, Ag; Shear hosted quartz veins | Measured + Indicated: 1.67 Mt at 10.62 g/t Au; Inferred: 2.06 Mt at 10.5 g/t Au | Metallurgical testing |
| Newmont Lake | Romios Gold Resources Inc. | 104B 335 | Cu, Au, Ag, Zn; Porphyry, Intrusion-related skarn | n/a | Burgundy Ridge zone, Rock chip sampling, prospecting, geological mapping |
| North ROK | Colorado Resources Ltd. | 104H 035 | Cu, Au; Porphyry | Inferred: 142.3 Mt at 0.22% Cu, 0.26 g/t Au | Corporate |
| Ootsa | Gold Reach Resources Ltd. | 093E 105 | Cu, Au, Mo, Ag; Porphyry | 153.97 Mt at 0.21% Cu, 0.11 g/t Au, 0.016% Mo, 1.89 g/t Ag; Inferred: 223,570,000 @ 0.18% Cu, 0.075 g/t Au, 0.021% Mo, 1.8 g/t Ag | Initiated PEA; prospecting, soil sampling |
| Premier | Ascot Resources Ltd. | 104B 054 | Au, Ag; Stockwork quartz veins and breccia | n/a | Diamond drilling (40,892 m drilling in 198 holes), geology, geochemistry; evaluation high grade underground mining |
| Pyramid | Ore Vista | | Au, Cu; Porphyry | n/a | Geology, rock and soil sampling, prospecting, geophysics (IP) |
| Scotia | Glenmark Capital Corp. | 103I 007 | Zn, Pb, Ag, Au; Noranda/Kuroko massive sulphide | Measured + Indicated: 802,000 t at 4.9% Zn, 13.9 g/t Ag, 0.2 g/t Au; Inferred: 702,000 t at 4.5% Zn, 13.7 g/t Ag, 0.2 g/t Au | Drilling, rock sampling |
| South Grizz | Divitae Resources Ltd. | 104J 059 | Cu, Au; Porphyry | n/a | Prospecting |
| Spectrum | Skeena Resources Limited | 104G 036 | Au, Cu; Stockwork quartz veins; Porphyry | n/a | Diamond drilling (17,350 m in 61 holes), mapping, prospecting, rock (387) and soil (2,992) sampling |
| Star | Prosper Gold Corp. | 104J 035 | Cu, Au; Porphyry | n/a | Prospecting, soil sampling |
| Tanzilla | Kaizen Discovery Inc. | 104I 023 | Cu, Mo, Au; High sulphidation epithermal; Porphyry | n/a | Diamond drilling, mapping |
| Thorn | Brixton Metals Corp | 104K 031 | Ag, Au, Cu; Subvolcanic; Porphyry | Inferred: 7.4 Mt at 35.54 g/t Ag, 0.51 g/t Au, 0.13% Cu, .032% Pb, 0.59% Zn | Corporate; targeted studies |

Results indicate gold mineralization correlates with a two km, northwest trending corridor and a four km, north trending corridor. Several zones within the mineralized trends returned high grade gold values over 151 g/t gold and 195 g/t silver from the Midas zone.

6.2. Porphyry (Cu-Au, Cu-Mo, Mo) projects

6.2.1. Stikine terrane

Porphyry copper projects include copper-gold and copper-molybdenum prospects and are hosted almost entirely within the geographic footprint of the Stikine terrane. The Stikine Arch hosts most of the copper-gold deposits and includes the **Red Chris** mine, **Galore Creek** and **Schaft Creek** deposits. These Mid-Triassic to Early Jurassic intrusions are related to the Stuhini and Hazelton Group volcanic arcs which define the two younger assemblages of pre-accretionary Stikine terrane architecture.

Copper-molybdenum deposits such as the **Huckleberry** mine and **Morrison** deposit are located within the geographic footprint of the Stikine terrane, however they are related to post accretionary intrusive suites occurring along the northeast trending fault network separating the Bowser and Netchako basins; named, the Skeena Arch.

Exploration activity continued with some interruptions from protests in the Sheslay area located approximately 100 km west of Dease Lake. Doubleview Capital Corp. resumed drilling in early July at their **Hat** copper-gold project and was blockaded and forced to stop activity soon after. Drilling resumed over the fall months to test extensions of the Lisle zone. Garibaldi Resources Corp. completed the first drill program on the **Grizzly** property totalling five holes and approximately 1,000 m. Assay results are pending. However, similar mineralogical features to surrounding gold-copper bearing prospects have been reported. Limited prospecting and soil sampling were completed at the nearby **South Grizz** property by Divitae Resources Ltd., and at the **Star** property by Prosper Gold Corp.

Kaizen Discovery and joint venture partner Freeport McMoRan of Canada Limited continued to explore the **Tanzilla** prospect located 23 km southeast of Dease Lake. Drilling followed up 2014 results and further validated the presence of a multi-phase porphyry system beneath the seven kilometre hydrothermal alteration footprint (Fig. 14). Three drillholes totalled 1,877 m and tested three different high chargeability anomalies. The most significant results were returned from hole TZ15-01 where the top 288 m intercepted an advanced argillic and phyllic altered lithocap overlying a suite of high-level, variably altered diorite porphyries and hydrothermal breccias to the end of hole at 840 m. The intrusive suite contained widespread quartz-sulphide-chlorite and anhydrite / gypsum veining including 20 m of dense stockworks with minor bornite and chalcopyrite. Metal values were elevated over hundreds of metres in both the lithocap and porphyry bodies but were overall, sub-economic. However, much of the alteration system remains to be drill tested.

Colorado Resources Ltd. continued exploring their 33,593



Fig. 14. The advanced argillic and phyllic altered lithocap of the **Tanzilla** prospect that was tested with 3 drillholes by Kaizen Discovery and Freeport-McMoRan of Canada Limited.

hectare **KSP** property located approximately 85 km northwest of Stewart and 12 km from road access at the Altagas McLymont power project. Follow up prospecting from 2014 work conducted by the company and the BCGS, led workers to discover abundant quartz-magnetite-pyrite-chalcopyrite stockwork veins (Fig. 15) hosted in monzodiorite in a recently deglaciated cirque; now termed the Never Give Up (NGU) porphyry. One metre channel samples results returned up to 0.93% Cu and 0.28 g/t Au. The NGU showing is less than 2 km from the Pins prospect which includes a 2 x 3 km alteration footprint partially masked by recent volcanic air-fall vitric tuff. In addition, ~6.5 km to the northwest, Colorado validated and expanded the Tami prospect with geological mapping, channel sampling, prospecting and a ground magnetometer survey. Channel sample results returned 15 m grading 2.94 g/t Au and 0.51% Cu (Fig. 16). A substantial follow up program is planned



Fig. 15. Discovery outcrop of the Never Give Up porphyry; quartz-magnetite-pyrite-chalcopyrite stockwork veins cutting pyritic monzodiorite discovered on the **KSP** project area owned by Colorado Resources Ltd. and joint venture partner Snip Gold Corporation.



Fig. 16. Channel sampling by Colorado Resources Ltd. on the **KSP** project near the Tami showing which returned 15 m grading 2.94 g/t Au and 0.51% Cu.

for 2016 to meet option commitments with joint-venture partner Snip Gold Corporation.

On adjoining claims to the north, Snip Gold Corporation completed 14.7 line km of very-low-frequency electromagnetic ground surveys near the historic **Johnny Mountain** mine. The source of high-grade gold boulders in the McFadden zone is a target of interest. Interpretations and hand sample assay results are pending.

In September, Gold Reach Resources Ltd. commenced a Preliminary Economic Assessment of their **Ootsa** copper-gold molybdenum-silver project located 6 km southeast of the producing Huckleberry copper mine. Ground activities during 2015 were limited to prospecting, soil sampling, and environmental baseline monitoring. Several prospects acquired in 2014 remain to be investigated on the 67,937 hectare property.

The Ootsa project contains two main mineral resource areas: The Ox and Seel deposits which are further subdivided into east and west zones. Copper, gold, molybdenum and silver mineralization are related to the Late Cretaceous Bulkley Intrusive suite.

Berg Metals Limited Partnership, a wholly owned subsidiary of Thompson Creek Metals Company Inc., conducted property

scale reconnaissance on the **Berg** copper-molybdenum-silver porphyry project located 84 km southwest of Houston. Ground crews completed geological mapping, rock, soil and silt sampling across eight zones outside of the main Berg deposit.

North of Fraser Lake, on the border of the Skeena and Omineca regions, Stone Ridge Exploration Corp. undertook a 45-hole auger drilling program at the **Hanson** property to explore for porphyry copper-molybdenum mineralization beneath glacial till and sandy alluvium cover. The area of drilling is underlain by the Hanson Lake (Early Cretaceous) phase of the Endako batholith and features an enclosed aeromagnetic low anomaly coincident with a moderate-strong airborne ZTEM conductivity anomaly.

6.2.2. Quesnel terrane

The **Eaglehead** project is owned by Copper Fox Metals Inc. and Carmax Mining Corp. and is located 52 km east of Dease Lake. Efforts were focussed mainly at the Pass zone located northwest of the Bornite and East zone mineral resource areas. The 2015 work program included two exploration drillholes and re-logging of nine historic drillholes. Drilling totalled 1,182 m and targeted Titan-24 high chargeability anomalies. Copper-molybdenum-gold and silver mineralization at the Pass zone occur within strong potassic and phyllic altered intermediate intrusive rocks.

Grassroots exploration at the **Pyramid** prospect expanded copper-gold anomalies for the third consecutive year. Gold Jubilee Capital Corp. analysed over 400 combined rock and soil samples and extended a Volterra-3D IP geophysics survey at the MT and Central zones. The project area is underlain by a multi-phase intrusive complex ranging from ultramafic pyroxinites? to megacrystic diorite and equigranular quartz diorite (Fig. 17). Pervasive, weak to moderate epidote-chlorite-magnetite alteration extends across the property. Disseminated



Fig. 17. Boulder illustrating the contact between mega-crystic diorite and equigranular quartz diorite with interstitial blebby disseminated magnetite, pyrite and trace chalcopyrite at Gold Jubilee Capital Corp.'s **Pyramid** prospect.

chalcopyrite occurs in zones quartz stockwork veining within the equigranular diorite intrusive phase. Copper-gold-silver grades appear to correlate with higher silica concentrations and pyrite.

6.3. Polymetallic base and precious metal projects

In August, Dolly Varden Silver Corporation delivered a maiden mineral Resource estimate for the **Dolly Varden** silver project located approximately 140 km northwest of Terrace. The project area encompasses several past producing mines and mineral occurrences which were explored in two phases of exploration during 2015. Phase one consisted of extensive groundwork and included geological mapping, prospecting, litho-geochemical rock sampling and soil sampling. Data acquired during phase one helped define drill targets for the second phase. Drilling totalled 2,037 m in ten diamond-drill holes. Three holes targeted the VMS prospective Trout Horizon at the Ace-Galena showing, MINFILE 103P 208 (Fig. 18). All holes intercepted stratiform silver-lead-zinc mineralization. Best results include 3.15 m grading 591 g/t silver from drillhole DV15019 from 46.35 m depth. Three drillholes followed up 2014 results at the Kitsol vein and returned up to seven metres grading 21.6 g/t silver and 0.16% zinc. One drillhole tested a multi-element geochemistry anomaly along a geological contact between volcanic and sedimentary rocks but failed to return significant results.

The Dolly Varden area is underlain by Upper Triassic Stuhini Group sediments and Lower Jurassic Hazelton Group volcanic rocks. High-grade silver and base metals occur in massive sulphide horizons and as meso-epithermal veins.

To the northwest, adjoining mineral claims are held by Homestake Resource Corporation and have been optioned to Banks Island Gold Ltd. Preliminary investigations are underway to evaluate small-scale mining at the **Homestake** deposit and transport mined material by barge to the mill established at the Yellow Giant gold mine on Banks Island.

Grassroots exploration at the **Big Bulk** gold-copper prospect (Fig. 19) included extensive channel sampling, geological



Fig. 18. Hand sample of massive sulphide from the Ace-Galena showing of Dolly Varden Silver Corporation's **Dolly Varden Silver** project. Photo courtesy of Chris Sebert, Dolly Varden Silver Corporation.



Fig. 19. Looking northeast over Kinskuch Lake and LCT Holdings Inc.'s **Big Bulk** gold project.

mapping and drone orthophotography. A private company, LCT Holdings Inc. acquired the 26 km² property in early 2015 and is exploring the high level intrusive complex as well as following up high-grade gold at surface discovered in 2003. Big Bulk is centrally located within the surrounding 625 km² **Kinskuch** project area located approximately 130 km northwest of Terrace.

Between Terrace and Smithers, prospecting activities identified several unmapped intrusions. Quartz vein hosted, polymetallic, copper-gold-silver-lead-zinc mineralization was identified along with epidote-magnetite-chlorite altered diorite. Bedrock exposure in moderate to steep terrane has improved due to recent logging activity.

7. Coal projects

7.1. Bowser Basin

The Bowser Basin contains the Middle Jurassic to Lower Cretaceous Bowser Lake Group sedimentary sequence located between the Stikine Arch and Skeena Arch and contains significant anthracite coal deposits in the Groundhog-Klappan Coalfield.

Fortune Minerals Limited and joint venture partner POSCO Canada Limited sold the 61 coal licences containing the **Arctos** anthracite project to the Province of British Columbia and The British Columbia Railway Company. Both joint venture partners have exclusive rights to re-purchase the licenses for the same price after 10 years. The agreement allows time for the Province and the Tahltan First Nation to resolve complex issues surrounding the area.

8. Current research

Geological research in the region was completed by the British Columbia Geological Survey, Geological Survey of Canada and Geoscience BC. Focus areas included Sheslay, Tanzilla, King Mountain, Kinskutch Lake, the western Skeena Arch and the Nechako Plateau.

8.1. British Columbia Geological Survey (BCGS)

van Straaten and Nelson (2016) examined an unusual late Early to Middle Jurassic volcano-sedimentary succession (newly named Horn Mountain Formation) exposed on the northeastern margin of Stikinia, approximately 25 km southeast of Dease Lake. The volcano-sedimentary sequence is host to several early-stage mineral exploration projects, including the **Tanzilla** porphyry system.

Investigations included lithochemical, and geochronological studies as well as a revised regional structural interpretation. Results indicate volcanic rocks and related subvolcanic intrusions are quartz deficient, K-feldspar-rich and alkaline in composition. A U-Pb zircon age of 174 Ma is reported for the calc-alkaline plagioclase porphyry associated with the **Tanzilla** system. A Re-Os analysis of molybdenite mineralization age is pending (van Straaten and Nelson, 2016).

The alkaline Horn Mountain Formation, calcalkaline Tanzilla intrusions, and nearby Three Sisters Plutonic suite and Snowdrift Creek Pluton are interpreted to have formed due to remelting of subduction-modified lithosphere during Stikine-Quesnel arc-arc collision (van Straaten and Nelson, 2016). The protracted late Early to early Late Jurassic syncollisional magmatic event represents a potential new metallogenic epoch for the Canadian Cordillera and is prospective for calc-alkalic to alkalic porphyry- and epithermal-style mineralization.

8.2. British Columbia Geological Survey and Geological Survey of Canada (GEM-2)

The geomapping for Energy and Minerals II program (GEM-2) supported British Columbia Geological Survey and Geological Survey of Canada collaborative Porphyry Transitions and Cache Creek projects. The Porphyry Transitions activity aims to modernize the Triassic and Jurassic magmatic and sedimentary framework of northwestern Stikinia through regional framework mapping. This year, Porphyry Transitions activity supported regional mapping in the Inklin River area, detailed mapping of ultramafic volcanic rocks around the Hickman batholith and reconnaissance sampling of plutonic suites in the Tatsamenie Lake areas (Zagorevski et al., 2015a; Milidragovic et al., 2016). The Cache Creek activity aims to improve the understanding of the tectonostratigraphy of the northern Cache Creek terrane through framework mapping. This year, the Cache Creek activity supported detailed mapping in the Letain Creek, Menatatlune Range, Peridotite Peak and Atlin areas (Zagorevski et al., 2015b).

8.3. Geoscience BC

Geoscience BC launched their \$2.4 million multi-year Search project in September 2015 to help explorers to focus their efforts in west central British Columbia. By November 2015, a 6,700 square kilometre airborne magnetic survey between Terrace, Kitimat and Smithers was completed at a 250 metre line spacing providing new, detailed data. The magnetic survey data will be released to the public in early 2016, and planning is underway for 2016 activities which will include more airborne surveying, community outreach and possible fieldwork.

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