

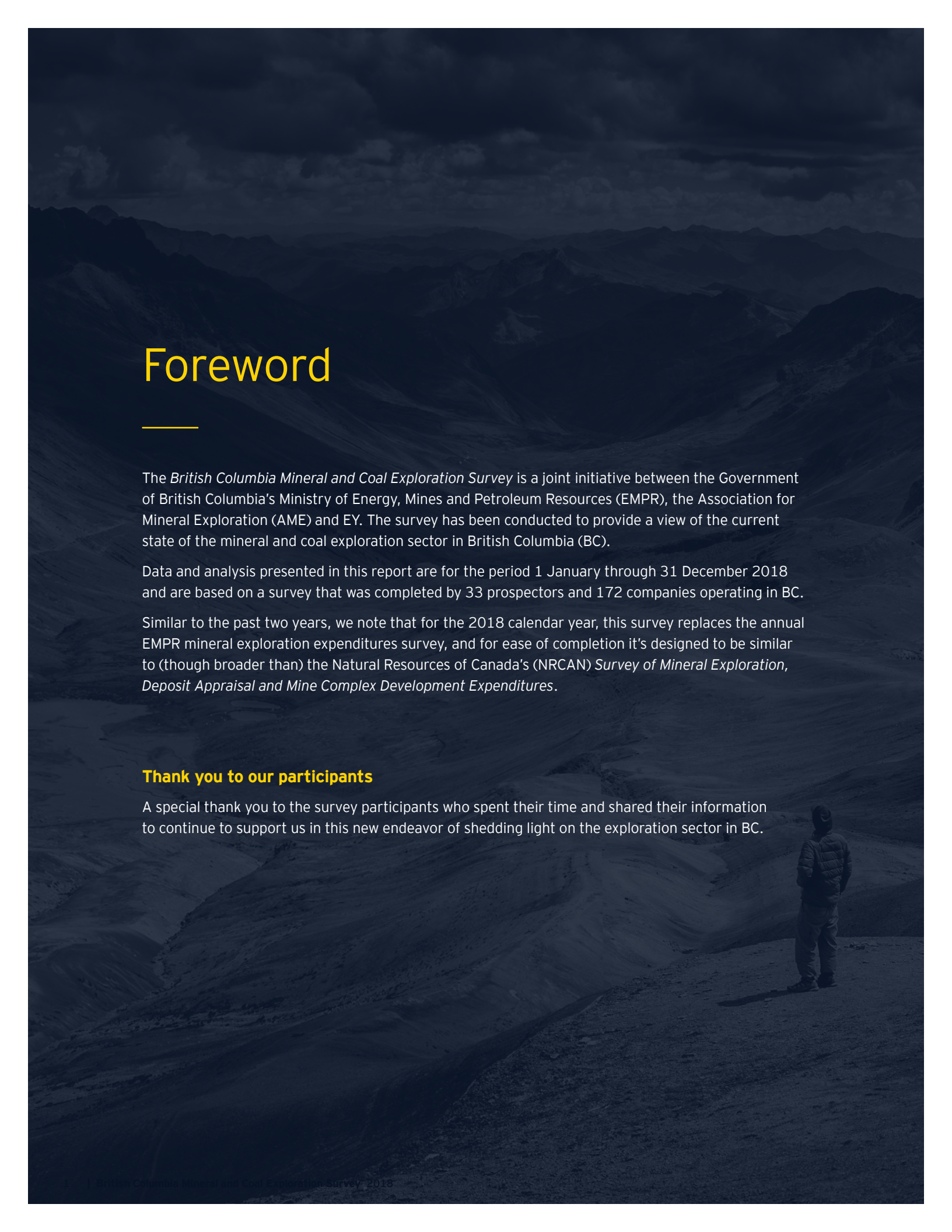
British Columbia Mineral and Coal Exploration Survey

2018



Ministry of
Energy, Mines and
Petroleum Resources





Foreword

The *British Columbia Mineral and Coal Exploration Survey* is a joint initiative between the Government of British Columbia's Ministry of Energy, Mines and Petroleum Resources (EMPR), the Association for Mineral Exploration (AME) and EY. The survey has been conducted to provide a view of the current state of the mineral and coal exploration sector in British Columbia (BC).

Data and analysis presented in this report are for the period 1 January through 31 December 2018 and are based on a survey that was completed by 33 prospectors and 172 companies operating in BC.

Similar to the past two years, we note that for the 2018 calendar year, this survey replaces the annual EMPR mineral exploration expenditures survey, and for ease of completion it's designed to be similar to (though broader than) the Natural Resources of Canada's (NRCAN) *Survey of Mineral Exploration, Deposit Appraisal and Mine Complex Development Expenditures*.

Thank you to our participants

A special thank you to the survey participants who spent their time and shared their information to continue to support us in this new endeavor of shedding light on the exploration sector in BC.

About the collaborators

EMPR

EMPR is the provincial government agency responsible for overseeing mineral and coal exploration activity in BC. Ministry staff helped in the design of the survey, facilitated response generation, and collected additional information about exploration expenditures from companies and prospectors that did not complete the online survey. These expenditure data were either solicited directly from the companies and prospectors or estimated by the EMPR regional geologists and British Columbia Geological Survey (BCGS) staff under the direction of the BC Mineral Development Office.



AME

AME is the lead association for the mineral exploration and development industry based in BC. Established in 1912, AME represents, advocates, protects and promotes the interests of thousands of members who are engaged in mineral exploration and development in BC and throughout the world. AME encourages a safe, economically strong and environmentally responsible industry by providing clear initiatives, policies, events and tools to support its membership. AME's participation has facilitated the collection of previously unavailable insight into the industry.



EY

EY is a global leader in assurance, tax, transaction and advisory services. The insights and quality services we deliver help build trust and confidence in the capital markets and in economies the world over. We develop outstanding leaders who team to deliver on our promises to all of our stakeholders. In so doing, we play a critical role in building a better working world for our people, for our clients and for our communities.

The sector is returning to growth, but mining and metals (M&M) companies face a transformed competitive and operating landscape. The need to improve shareholder returns will drive bold strategies to accelerate productivity, improve margins and better allocate capital to achieve long-term growth. Digital innovation will be a key enabler but the industry must overcome a poor track record of technology implementations. If M&M companies are to survive and thrive in a new energy world, they must embrace digital to optimize productivity from market to mine.

EY takes a whole-of-value-chain approach to support each client to help seize the potential of digital to fast-track productivity, balance portfolios and set a clear road map for their new energy future.



Contents

1

Foreword

2

About the collaborators

4

Executive summary

6

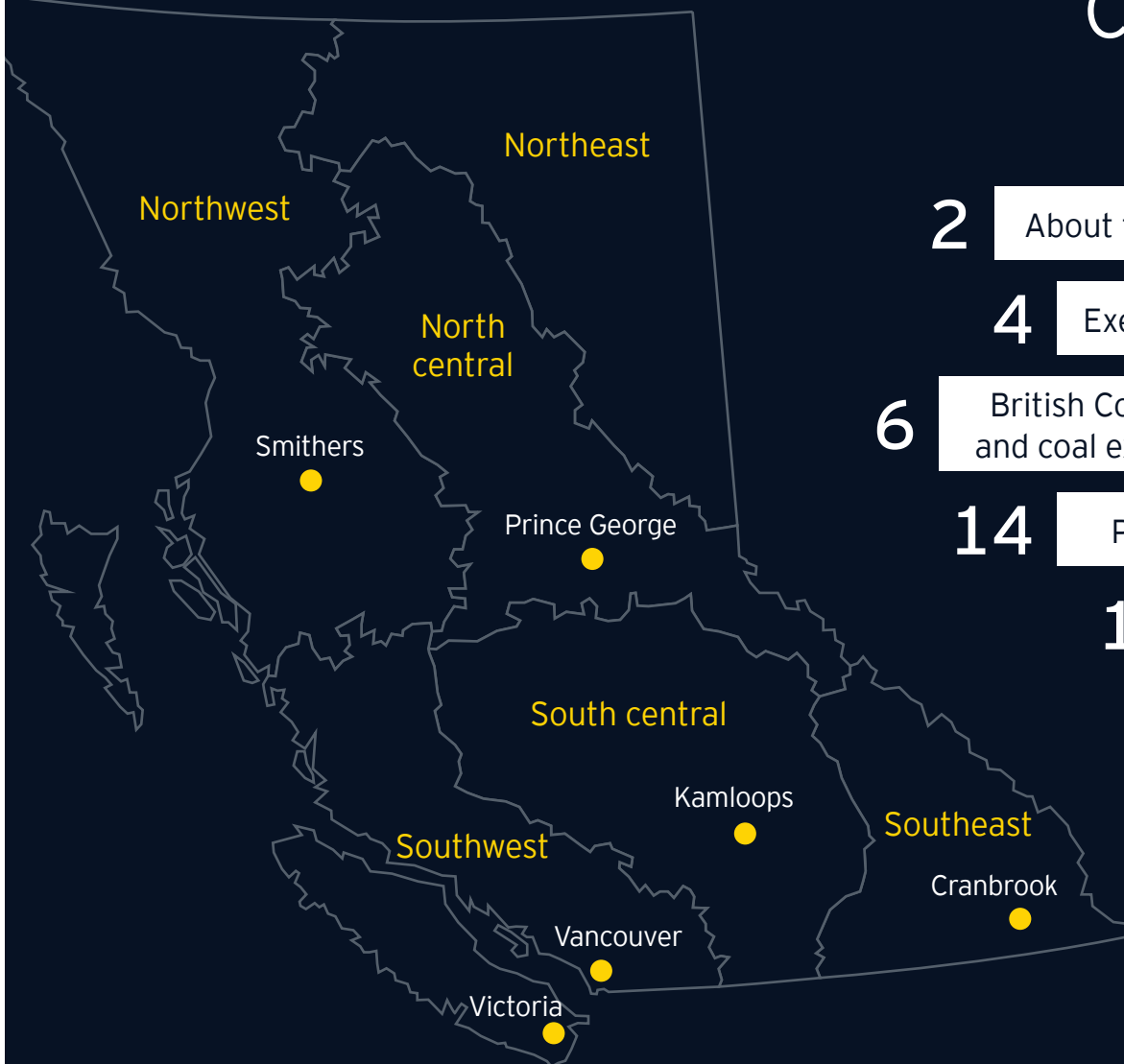
British Columbia's mineral
and coal exploration sector

14

Prospecting in BC

15

Contacts



Disclaimer

- ▶ EY has relied upon unaudited financial information provided by mineral and coal exploration companies and prospectors in BC, third party research, and information provided by other data sources and relevant associations and bodies. EY has not audited, reviewed or otherwise attempted to verify the accuracy or completeness of such information.
- ▶ Financial information referred to in this report was prepared based on figures provided by entities, estimates and assumptions. As such, readers are cautioned that variations between estimations and actuals could be material.
- ▶ Unless otherwise stated all monetary amounts contained herein are expressed in Canadian dollars.
- ▶ EMPR staff assisted in the collection of survey data and information. Specifically, where a response was not received directly from a company through the online survey, key points of data were either solicited directly from the companies and prospectors themselves or estimated by the EMPR regional geologists and British Columbia Geological Survey (BCGS) staff under the direction of the BC Mineral Development Office and through use of professional opinion and experience.

Executive summary

For the third year, we are pleased to present the findings of the 2018 *British Columbia Mineral and Coal Exploration Survey*. Data and analysis presented in the survey are based on information collected from 33 prospectors and 172 mineral and coal exploration companies operating in BC. Collectively, they represent 294 exploration projects across the province.

2018 marked the second consecutive annual increase in exploration expenditure in BC following several years of decline. The positive momentum that began in the sector in late-2016 accelerated in 2018, with year-on-year growth in exploration across all major commodities and geographic regions in the province. This broad-based growth produced a total exploration spend among companies of \$330.2 million – up 34% on the prior year and 62% greater than in 2016.

The growth rate of BC exploration expenditure also far exceeded the global average of 20%.¹ Nationally, Canada's exploration growth exceeded Australia, Chile, Mexico, Peru and South Africa² – with BC being the greatest contributor to this growth. What's more, the \$84 million increase in BC exploration spend exceeded that of Quebec and Ontario, despite both jurisdictions being more than double the size of BC as measured by total 2018 exploration expenditure.³

The increase in BC's exploration sector was led by the modern-day gold rush underway in the province's northwest, increased exploration diversity, a rebound in coal exploration and a continued shift to grassroots and early-stage exploration.

Modern day gold rush

We're seeing a resurgence of exploration activity in the northwest of BC owing to new discoveries, infrastructure and higher commodity prices. The historic "Golden Triangle" in the northwest has been the site of three gold rushes over the past century, with industry observers suggesting a fourth is underway as juniors search for the next major discovery. Survey results reveal the region incurred \$165 million in exploration expenditure in 2018. That's a 66% increase over the prior year and is almost double 2016 levels. The northwest also accounted for 50% of total exploration spend in the province in 2018.

Exploration diversity

In 2017, gold accounted for almost 90% of the increase in exploration spend in BC. Last year, however, gold's share of growth declined to 15% as investors broadened their focus to copper, silver and nickel. The investment made exploring for these three commodities more than doubled from \$49 million in 2017 to \$102 million in 2018. In total, copper, silver and nickel accounted for the majority (64%; \$53.7 million) of the year's increase in provincial exploration expenditure. Much of this increase can be attributed to exploration projects in the Golden Triangle; however, there were also many large investments in copper and silver projects in the province's southeast and north central regions.

¹ S&P Global Intelligence measure of exploration budgets, non-ferrous metals only.

² S&P Global Intelligence measure of exploration budgets, non-ferrous metals only.

³ Note that NRCan estimated a \$33 million increase in BC exploration, which is less than 50% of the \$84 million in growth identified in the survey.

Coal rebounds

Prior to 2018, investment in coal exploration in the province had decreased for five consecutive years. This changed in 2018 as existing coal producers increased their exploration budgets and new players entered the market. Notably, exploration activity increased not only in BC's traditional coal fields but also in the province's northwest and north central regions. Exploration spend for coal ultimately increased by 58% in 2018, to \$50 million. This increase accounted for 22% of the growth in total exploration spend across the province in 2018, reaffirming the importance of the commodity to the BC mining and exploration industry.

Shift to grassroots and early-stage exploration

The outlook for the mining and metals sector in BC is largely influenced by the success of early-stage exploration. Five years ago, the prospects for discoveries leading to new mines in the province appeared bleak, with limited investment being made in early-stage exploration. But as we've seen over the last two years of producing this survey, the sector is undergoing a reset. 2018 marks the fifth consecutive year that early-stage exploration increased as a share of total exploration. Grassroots and early-stage exploration accounted for 44% of total exploration in 2018 compared with just 14% in 2014.

Looking forward

The convergence of many positive developments led to a sharp increase in both exploration project numbers and expenditure in BC last year. Whether these trends continue in 2019 remains to be seen, and may ultimately be determined by external forces such as current global trade tensions, economic growth projections and commodity price volatility.

Figure 1 below highlights key statistics and figures for 2018 across all BC regions and shows the growth (or otherwise) when compared with the 2017 survey findings.

Figure 1: Exploration in BC summary statistics

		BC	Northwest	Northeast	North central	Southwest	South central	Southeast
Regional centre			Smithers	Prince George	Prince George	Vancouver	Kamloops	Cranbrook
Projects								
2018 projects	#	261	81	8	36	18	47	71
2017 projects	#	219	61	4	29	21	43	61
% year-on-year change	%	19%	33%	100%	24%	-14%	9%	16%
Share of 2018	%		31%	3%	14%	7%	18%	27%
Expenditure								
2018 expenditure	\$m	330	164	6	33	8	56	64
2017 expenditure	\$m	246	99	2	31	9	61	43
% year-on-year change	%	34%	65%	217%	5%	-16%	-9%	49%
Share of 2018	%		50%	2%	10%	2%	17%	19%
Drilling								
2018 total drilling	m	730,500	293,467	15,103	69,095	39,791	186,616	126,429
2017 total drilling	m	626,897	274,077	2,830	32,353	10,600	237,591	69,446
% year-on-year change	%	17%	7%	434%	114%	275%	-21%	82%
Share of 2018	%		40%	2%	9%	5%	26%	17%

British Columbia's mineral and coal exploration sector

Exploration is a key driver of the BC economy

The mining and metals industry plays a significant role in the health of the economy of BC. Each year, the sector directly invests billions of dollars in local goods and services – which induces further spending. Overall, gross revenues are estimated to approach \$9 billion per annum for the province, and of the 206 companies which reported on the distribution of their spending, 128 spent 50% or more within local communities. Future investment depends on a healthy exploration industry – the source of new mine development opportunities.

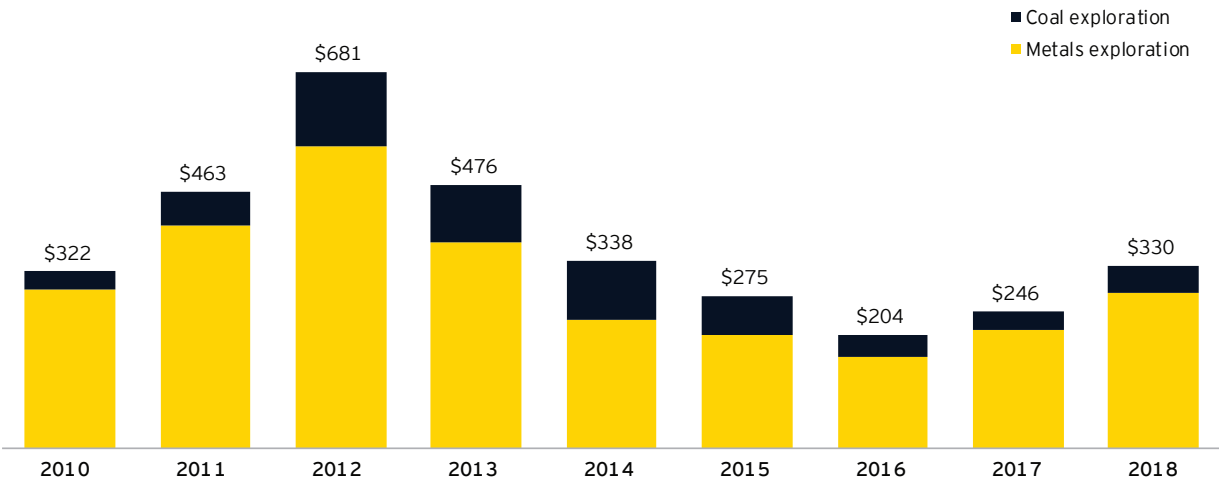
Exploration expenditure grew by 34% in 2018

The survey shows exploration expenditure among companies increased for the second consecutive year – up 34% over 2017 to \$330.2 million.

Figure 2: Exploration projects by total expenditure by primary commodity



Figure 3: Annual exploration expenditure in BC 2010-18 (\$ millions)⁴



⁴2010 to 2015 data per MEM. Note industrial minerals included in metals.

A strong year for Canadian exploration generally, and BC especially

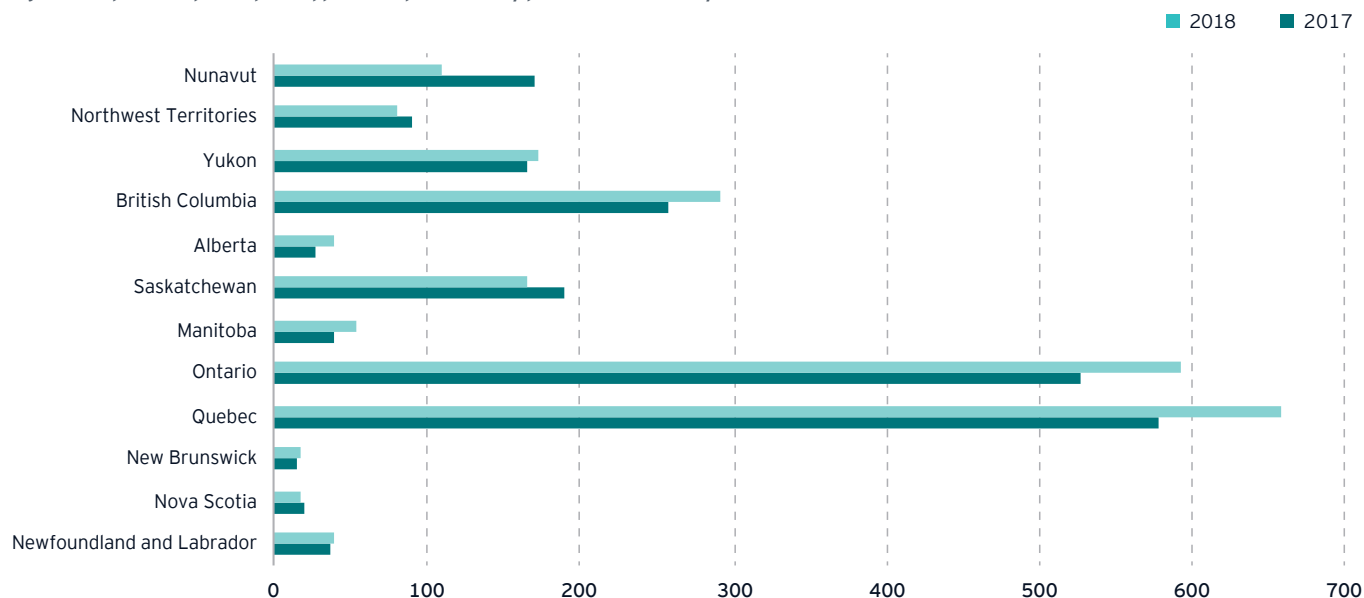
Exploration budgets for non-ferrous metals in Canada increased 31% year over year in 2018 to \$1.9 billion. This increase exceeded the growth rate of other major mining jurisdictions, including Australia, Chile, Mexico, Peru and South Africa. With this rapid growth in exploration, Canada accounted for 15% of the global non-ferrous exploration budget in 2018, the country's largest share in six years.⁵

Within Canada, BC was the standout performer in 2018. Exploration expenditure in Ontario and Quebec,

Canada's two largest mining jurisdictions by production value, increased by 13% and 14%, respectively.⁶ Meanwhile, growth in BC totaled 34%. The survey found that the \$84 million increase in exploration in BC exceeded the increases of \$80 million in Quebec and \$67 million in Ontario, despite these two jurisdictions being more than double the size of BC.⁷

Using Natural Resources Canada (NRCan) data, BC's share of exploration increased in 2018 from 12.2% to 13% of national mineral exploration and deposit appraisal expenditures.

Figure 4: Exploration plus deposit appraisal expenditures by province and territory (\$ millions)



Source: National Resources Canada (2018) Table 27 - Exploration Plus Deposit Appraisal Expenditures, by Province and Territory, 2014-2017 Annual and 2018 Revised Spending Intentions (current as of October 2018).

⁵ S&P Global Intelligence. CES 2018 – Canada exploration budget increases most among countries.

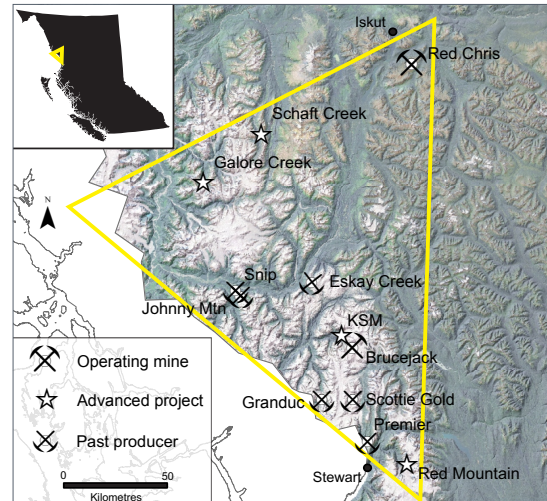
⁶ Annual and Revised Spending Intentions Statistics of Mineral Exploration report, 2018.

⁷ As measured by 2018 total exploration spend. Note that NRCan estimated a \$33 million increase in BC exploration, which is less than 50% of the \$84 million in growth identified in the survey.

The modern day gold rush in the Golden Triangle

Situated inland from the Alaska panhandle, the Golden Triangle has a strong mining legacy. Many believe the area is experiencing a modern day gold rush now. The region has been the site of three gold rushes, including the Stikine gold rush of 1861, followed by the Cassiar (1873) and Atlin (1898) gold rushes. Productive mining and some very significant discoveries occurred in the region up until the late 20th century, when mining and exploration activity went dormant. This decline stemmed from the expense of operating in areas isolated from major infrastructure, limited accessibility due to the challenging winters and weak commodity prices.

Figure 5: The Golden Triangle

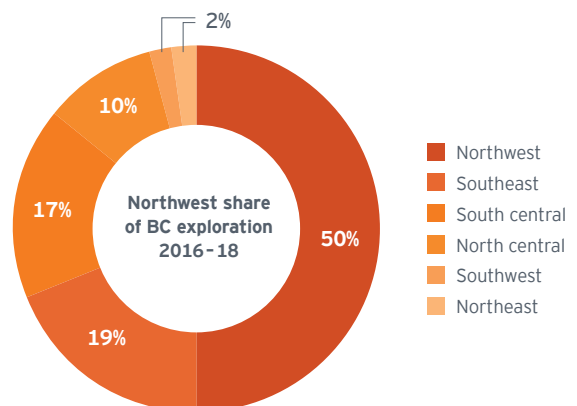
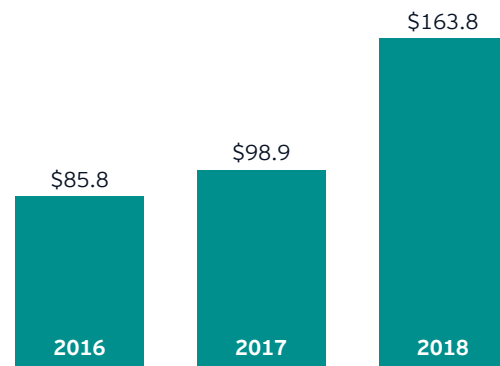


In recent years, however, several factors have triggered a resurgence of exploration and mining activity in the region, including:

- ▶ The discovery of high-grade, potentially economically viable deposits and two new mines (Imperial Metals' Red Chris mine and Pretium Resources' Brucejack mine)
- ▶ New infrastructure, including the paving of the Stewart-Cassiar Highway, the opening of ocean port facilities for export of concentrate at Stewart and the completion of a \$700 million high-voltage transmission line to bring power into the region
- ▶ Support from First Nations for sustainable resource development that will bring jobs and economic opportunities
- ▶ Higher gold prices

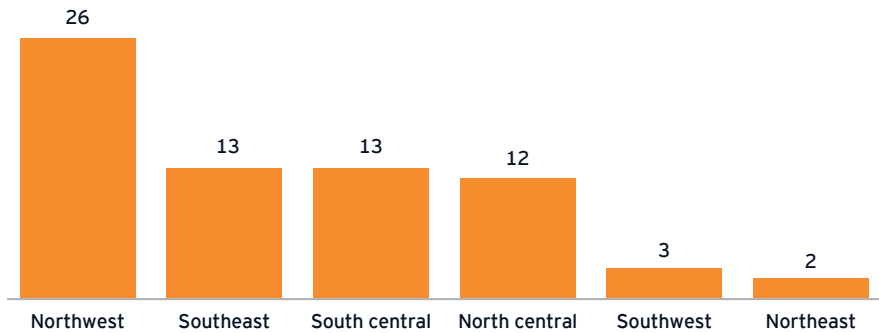
Survey results reveal \$163.8 million of exploration expenditure was incurred in the region throughout 2018 – a 66% increase over the prior year (\$98.9 million) and almost double 2016 levels (\$85.8 million). Notably, the northwest accounted for 50% of total exploration spend in the province in 2018.

Exploration expenditure in the northwest region 2016 - 18 (\$ millions)



There are projects in the northwest region that have environmental assessment certificates but require investment to advance toward production. The number of exploration projects (26) in the northwest with investment in excess of \$1 million in 2018 was more than twice as many as the number of such projects located in other regions in the province.

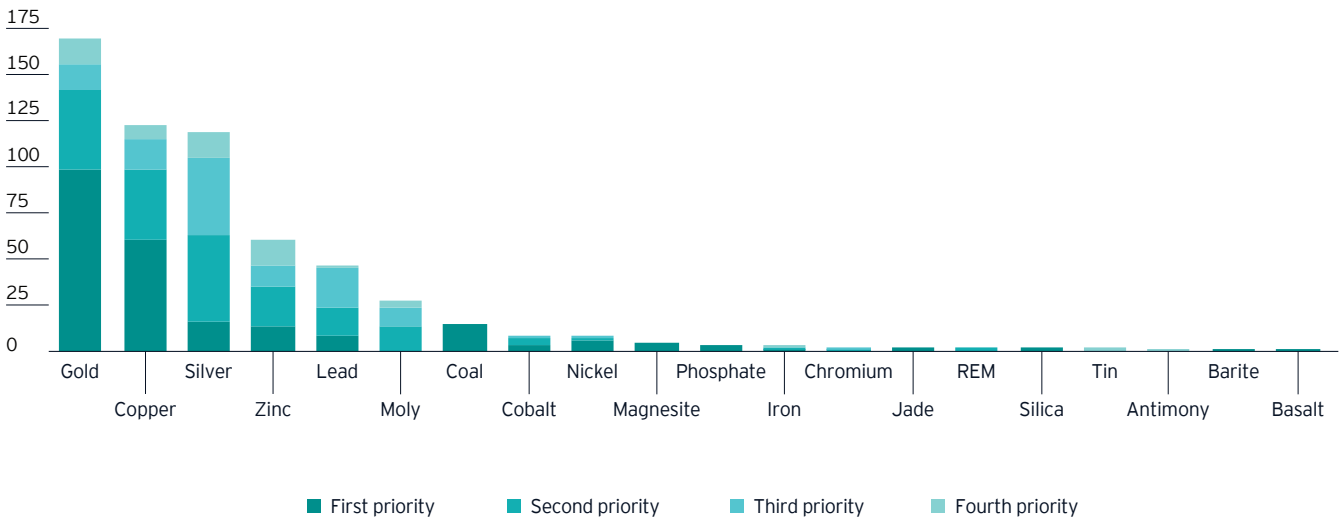
Figure 6: Number of exploration projects with expenditure exceeding \$1 million in 2018 by region



Diversified growth

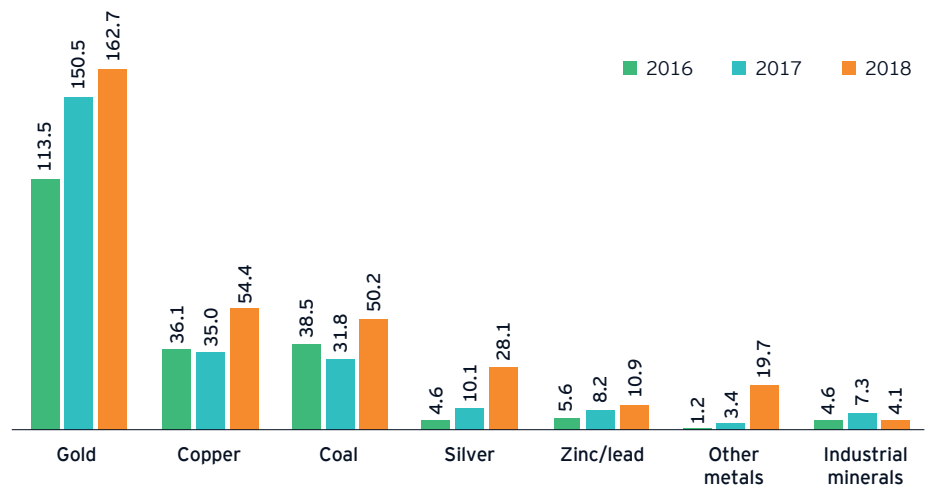
Survey respondents identified a wide variety of commodities of interest. Exploration expenditure was incurred at 261 projects reported by survey respondents in 2018 – a 37% increase over 2017. Exploration targeted coal and 36 different metals and industrial minerals. Gold, copper and silver continued to be the most targeted commodities in BC in 2018.

Figure 7: Prioritization of ores related to project



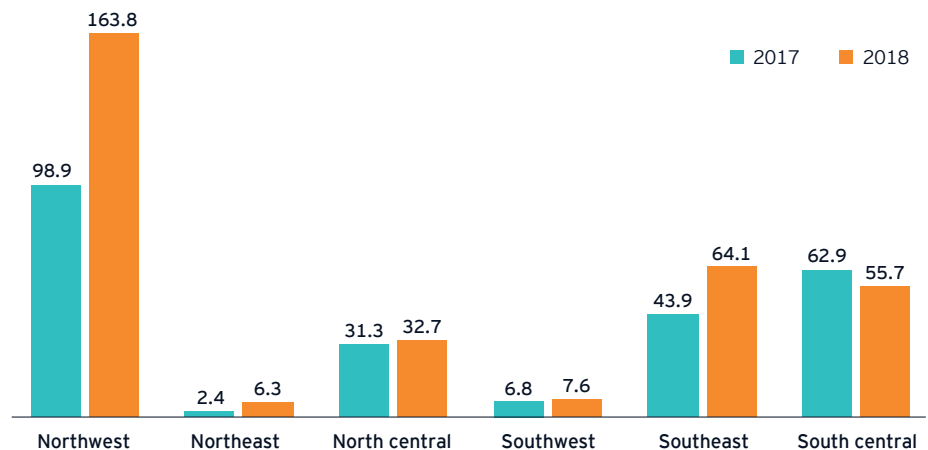
In 2017, gold led the way in terms of exploration expenditures, accounting for almost 90% of the increase in exploration spending compared to 2016. In 2018, gold's share of growth declined to 15% as investors broadened their focus to copper, silver and nickel. The investment made exploring for these commodities more than doubled, from \$49 million in 2017 to \$102 million in 2018. These three commodities accounted for the majority (64%; \$53.7 million) of the year's increase in provincial exploration expenditure.

Figure 8: Exploration investment by commodity 2016-18



Much of this increase can be attributed to exploration projects in the Golden Triangle. However, there were also many large investments in copper and silver projects in the province's southeast and north central regions. A regional comparison of exploration expenditure in 2017 and 2018 is presented in Figure 9.

Figure 9: Exploration investment by geographic region 2017 vs. 2018



Coal rebounds

Since peaking in 2012, annual investment in coal exploration in BC has trended downward in an environment of mixed global economic conditions and price volatility. However, for the first time in six years, expenditure on coal exploration in the province increased in 2018 by 58% to \$50 million. This increase accounted for 22% of the growth in total exploration spend across the province in 2018 and reaffirms the importance of the commodity to BC’s mining and exploration industry.

Figure 10: Annual coal exploration expenditure in BC 2012–18 (\$ millions)

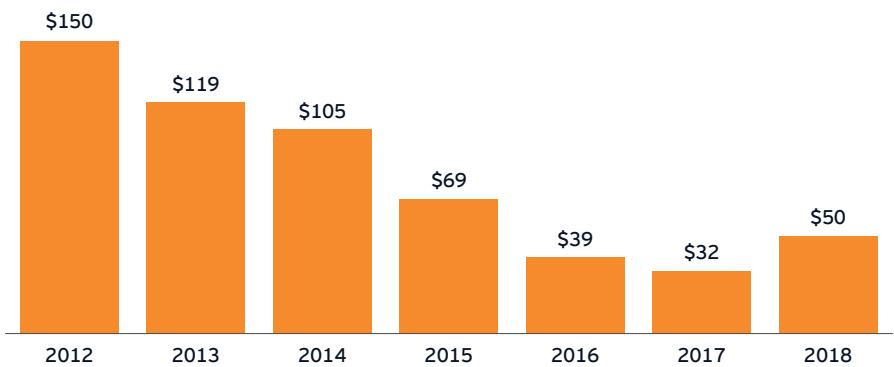
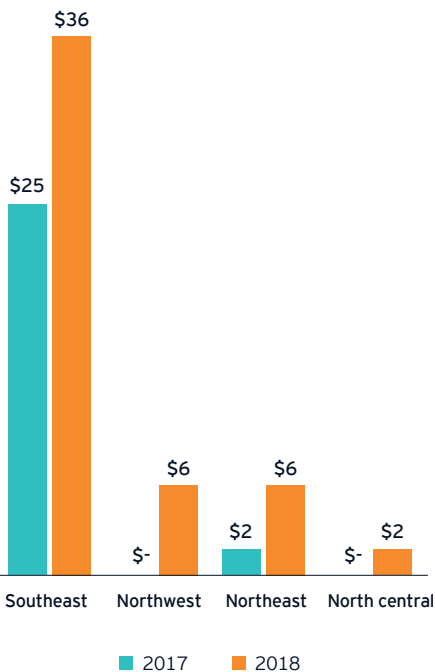


Figure 11: Annual coal exploration expenditure by region 2017–18 (\$ millions)



Notably, exploration activity increased not only in BC’s traditional coal fields but also in the province’s northwest and north central regions. Select coal projects active in 2018 include the following:

- | | |
|----------------------|--|
| Southeast | <ul style="list-style-type: none">▶ Teck Resources Limited - multiple projects▶ Michel Creek (Loop) Project of North Coal Limited (formerly CanAus Coal Ltd.)▶ The Crown Mountain property of NWP Coal Canada Ltd., a wholly owned subsidiary of ASX listed Jameson Resources Limited.▶ Elko project of Pacific American Coal Limited |
| <hr/> | |
| Northeast | <ul style="list-style-type: none">▶ Conuma Coal Resources Limited’s former Walter Energy projects Brule, Wolverine and Willow Creek▶ Colonial Coal International Corp’s Flatbed project |
| <hr/> | |
| North central | <ul style="list-style-type: none">▶ Atrum Coal Limited’s Panorama North |
| <hr/> | |
| Northwest | <ul style="list-style-type: none">▶ Tenas project joint venture between Allegiance Coal Limited and Japanese commodity trading company Itochu |

Shift to grassroots and early-stage exploration

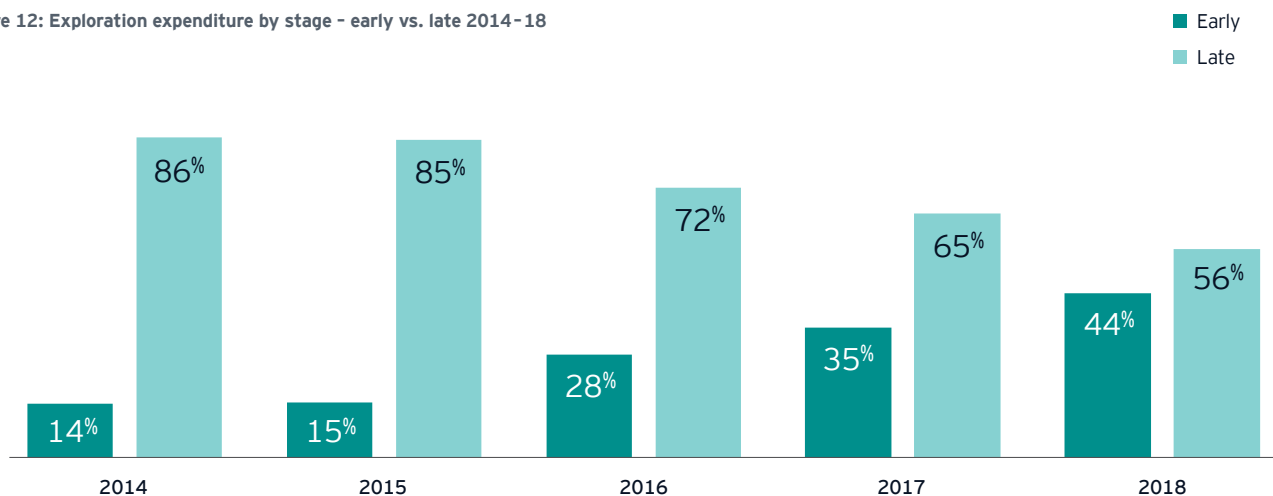
The outlook for BC's mining sector is largely influenced by the success of early-stage exploration. Five years ago, the prospects for new discoveries leading to new mines in the province appeared bleak given the limited investment that was being made in early-stage exploration at the time.

The exploration lifecycle consists of five core stages as demonstrated in the graphic below.



In 2014, only 14% of exploration in the province could be characterized as grassroots (prospecting, sampling, airborne geophysics) or early stage (geophysics, geochemistry, trenching and drilling), compared with 86% late-stage (advanced stage, mine evaluation) and mine lease exploration. Starting in 2016, there has been a continual shift towards more grassroots and early stage exploration. In 2018, grassroots and early stage exploration accounted for 44% of expenditures.

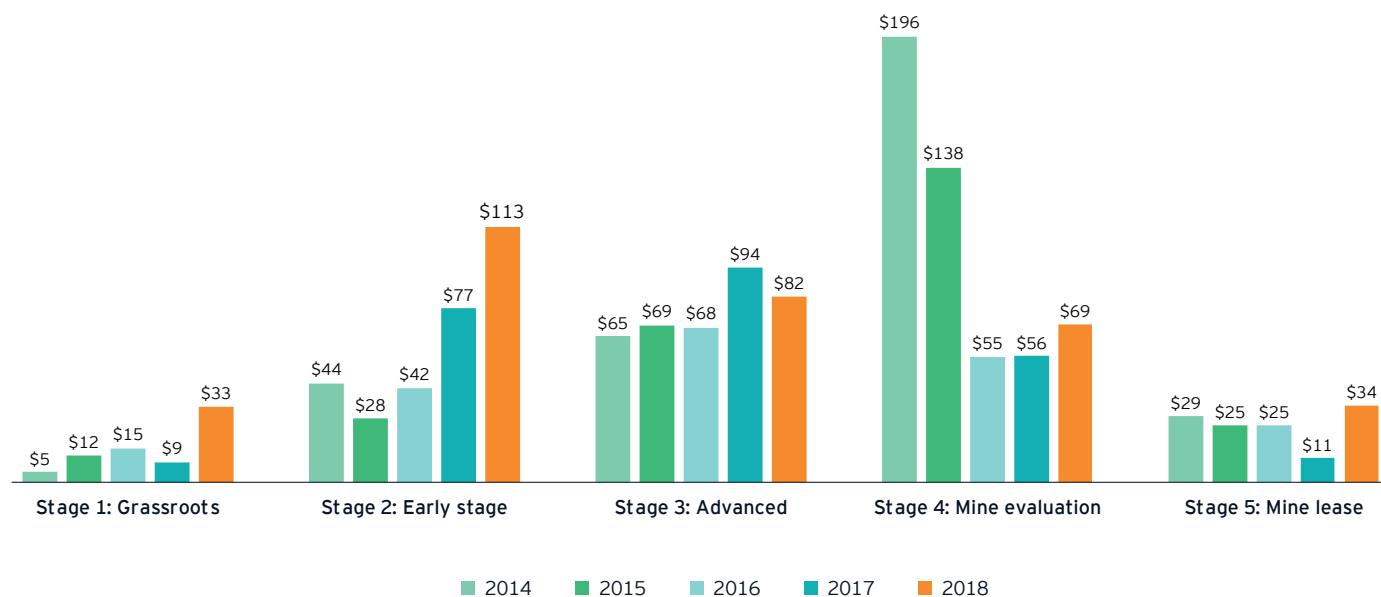
Figure 12: Exploration expenditure by stage - early vs. late 2014-18



As highlighted in the 2016 *British Columbia Mineral and Coal Exploration survey*, and reinforced in last year's survey, the sector has embarked on a mining lifecycle reset in BC. Consistent with improving macroeconomic conditions and financial markets further opening to the junior sector, grassroots and early-stage exploration has increased for five consecutive years, reaching 44% of total exploration expenditure in 2018.

The graph below shows the changing pattern in expenditures across the stages and is consistent with last year's result of a resetting sector that continues to see projects progress through the main stages of the exploration cycle each year. Namely, a bulk of growth was seen in the early stage, with growth also being seen in the mine evaluation stage. Growth in the latter stage, however, may be explained by the increasing market sentiment and the resulting decision made by producers to invest in or reevaluate proposed mines.

Figure 13: Distribution of exploration expenditure by stage 2014-18 (\$ millions)



Prospecting in BC

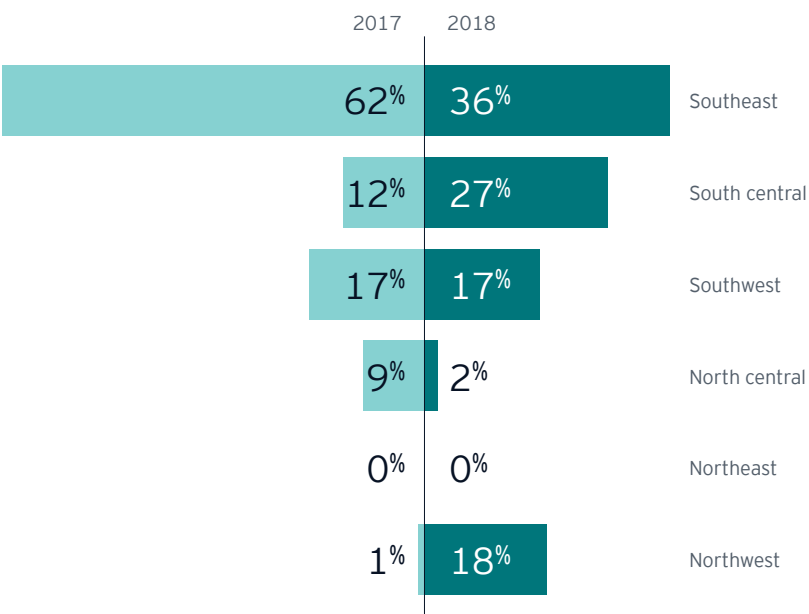
Prospectors spent \$1.2 million collectively across the province in 2018

Information was collected from 33 prospectors in this year's survey – an increase of 13 over last year.

Each prospector spent, on average, \$36k prospecting in 2018 for a total of \$1.2 million. Total identified prospector spend was \$300k in 2017 at an average of \$18k per prospector – although it's likely this number may have understated actual spend given a limited sample size. As highlighted in last year's survey, tracking prospectors is notoriously difficult, since many prefer not to disclose work.

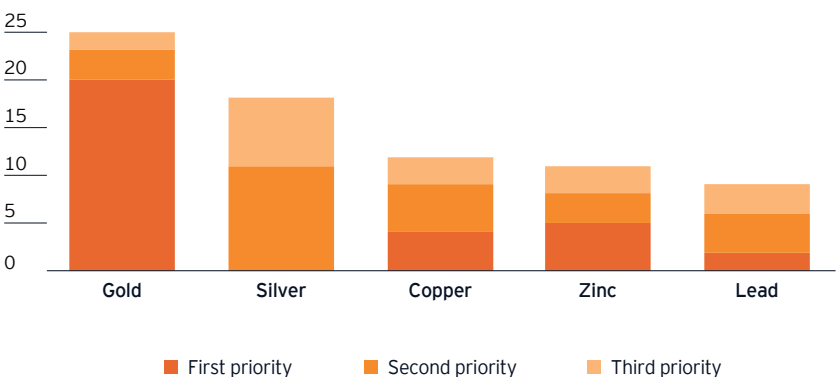
Last year, prospectors' focus was on the province's southeast. This year, prospectors have operated more broadly, with a number of regions attracting increased prospector activity.

Figure 14: % of expenditure by prospectors by region 2017-18



With regard to commodities, gold remains the most searched-for commodity, followed by silver, copper, lead and zinc.

Figure 15: Top prospected commodities in 2018 by number of responses



Contact us

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