NEVADA BUREAU OF MINES AND GEOLOGY

NEVADA MINERAL AND ENERGY RESOURCE EXPLORATION SURVEY

TRAVIS FISHER

MAY 2023









NEVADA BUREAU OF MINES AND GEOLOGY EXPLORATION SURVEY ES-2022

NEVADA MINERAL AND ENERGY RESOURCE EXPLORATION SURVEY 2021/2022

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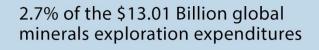
NEVADA EXPLORATION TRENDS

targeting precious

metals

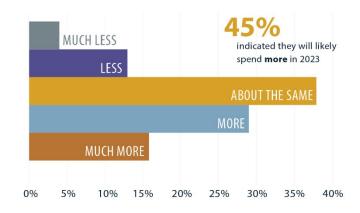
2022

\$350 Million



2023 Expenditures Outlook

Survey response* is provided to the question: "Do you expect your company to spend more or less in 2023 on Nevada exploration?"



*70 respondents

		9%
\bigcirc	4	targeting lithium

Headquarter Location	U.S. \$Billion	Change ¹
Nevada	0.35	+13%
U.S. ²	0.97	-24%
Global	13.01	+16%

¹Change is versus 2021 budget; ²Including Nevada

#1 **Fraser Institute**

in 2022 Global Investment Attractiveness (Nevada ranked #3 in 2021)



12%

metals

targeting base

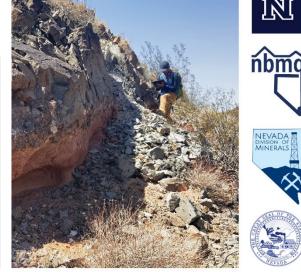
29



Factors Affecting Exploration in Nevada



Uncertainty over U.S. Mining Law Reform (3.1)



2

EXECUTIVE SUMMARY

The Nevada Bureau of Mines and Geology (NBMG) carried out its biennial online survey of companies exploring for new metal, industrial mineral, geothermal, and hydrocarbon resources in Nevada. The Nevada Commission on Mineral Resources and the Nevada Division of Minerals supported the survey. The impact of mineral and energy production on the Nevada economy is well known. However, the impacts of exploration activities in Nevada, which focus on discovering new resources for future mines and energy extraction, is poorly understood due to limited data. In contrast to the majority of the sectors driving the Nevadan economy, exploration activity is primarily focused in rural areas and can have a substantial impact on the local economies. Research done by S&P Global Market Intelligence (2021, 2022) shows that Nevada remains the state with the largest mineral exploration budgets in the United States with budget gains outpacing global averages. Coinciding with Nevada's top tier status with regards to exploration budgets, the Fraser Institute's annual survey ranked Nevada as the 1st best jurisdiction in the world for mineral investment attractiveness, a factor which considers policies and regulations affecting exploration and mining activities alongside a region's geologic potential.

Exploration activities are commonly known to be high risk, as investments are not guaranteed to result in success, but can have significant rewards. When companies achieve the rare success of discovering an ore deposit, considerable time and financing is required to put the deposit into production. Despite the unknowns that affect exploration, exploration is a crucial process in sustaining natural resource industries in Nevada and the growing demands of industrial society both nationally and globally.

The goal of this survey is to assess the impact of exploration on Nevada's economy in 2021 and 2022, with the primary focus on expenditures and employment. The survey asks participants to break down their expenditures by category, helping understand where the money goes, and to rate the external factors that contribute to their exploration company's decision to work in Nevada. Companies surveyed are primarily junior explorers followed by midsize and major mining companies. The geothermal, oil and gas, and industrial mineral industries are underrepresented in this survey based on response rates.

The NBMG requested surveys from 169 companies, of which 142 explore for metals, 16 for geothermal, and 11 for oil and gas. Of these companies, 70 responded to the survey. Another 58 active companies were researched using financial disclosures in the public domain. Thus, the data from 128 companies exploring in Nevada are presented in this report.

The results regarding expenditures and number of employees showed:

- A minimum of \$309,103,098 was spent on exploration in Nevada in 2021. Exploration for precious metals accounted for 93% of the total. In 2022, a minimum of \$350,041,568 was spent on exploration, a 13% increase from the expenditures recorded for 2021. Lithium and base metal expenditures were significantly higher in 2022 while precious metal budgets saw a small decline, likely a result of the pullback of gold prices influencing the junior exploration markets.
- Employment showed similar year-over-year improvements with a minimum of 524 employees in 2021 growing to a minimum of 619 in 2022, a 15% annual increase.

The breakdown of expenditures shows:

On a cumulative cash basis in 2021 and 2022, expenditures were broken out by the 70 reporting companies as followed: 71.3% for actual exploration (mainly drilling), 8.9% for land holding (primarily claim and lease payments), 6.4% for permitting, 6.3% corporate costs, and 7.1% for other costs. For junior exploration companies that were researched online, land costs were

significantly higher, with a monetarily weighted percentage of 61.5%. This contrast shows the significant impact that land costs have on junior explorers when compared to mid-tier or major companies with higher expenditures.

On a similar cash basis, 60% of expenditures went to resource expansion with the remaining 40% expended on grassroots exploration.

Responses to the factors influencing exploration showed:

- The potential for discovery in Nevada alongside the state's favorable geology remained positive influences on exploration budgets. The potential for discovery in Nevada was rated with the highest recorded score since the question began being asked in 2011.
- Access to public lands in Nevada and the influence of commodity prices were viewed ambivalently.
- The cost of claim fees/leases, uncertainty surrounding mining laws and regulations, and the time and/or cost of permitting were viewed as factors with negative impacts.

Explorer's views on exploration expenditures in 2023 show:

45% of respondents expected to spend more, with 18% expecting to spend less and 37% expecting to spend about the same. Thus, exploration budgets and employment are expected to improve into 2023.

INTRODUCTION

From August of 2022 to April of 2023, the Nevada Bureau of Mines and Geology (NBMG) conducted the 22nd Nevada Exploration Survey of exploration expenditures in the minerals and energy industries during 2021 and 2022. As in prior surveys, the purpose of this survey was to assess the current and projected levels of exploration activity and to determine factors influencing these levels. The rationale for doing this survey is to provide information to elected officials, government agencies, private companies, and citizens in general, so they better understand the impact of exploration on the Nevada economy and the factors that influence exploration.

The last NBMG administered survey was in 2019/2020 (Muntean, 2021), and was proceeded by surveys in 2017/18 (Ressel, 2019), 2015/2016 (Ressel and Davis, 2017), and in 2011 (Muntean et al., 2013). Prior to these, the surveys were conducted by the Nevada Division of Minerals (NDOM) on an annual basis. A total of 17 surveys were conducted by NDOM in 2011 the Nevada Commission on Mineral Resources and NDOM supported the NBMG to conduct the survey. They charged NBMG with increasing the population size and the response rate of the survey. In addition to companies exploring for metals and industrial minerals, NBMG was asked to send the survey to companies exploring for geothermal energy and oil and gas. The survey form was simplified to emphasize the amount of money companies spent on exploration and the number of people companies employed in exploration.

SURVEY METHODOLOGY

The 2022 exploration survey was administered online; it is included here as Appendix A and is referenced online at <u>https://docs.google.com/forms/d/e/1FAIpQLSedreRuD_4UCKJvq-</u>

<u>dAd8NqVxrxDnVwyAFONh9zvJsxfsGWEQ/viewform</u>. Information requested included 1) company exploration expenditures in Nevada for 2021 and 2022, 2) the number of people companies directly employed in 2021 and 2022, 3) an estimated percentage breakdown of the expenditures by category, including actual expenditures (e.g., drilling, geology, geochemistry, geophysics), land holding costs, permitting and compliance, and corporate costs, 4) the percentage of the expenditures spent on the type of exploration being conducted, either grass roots or resource expansions, 5) the relative impact of common factors that influence exploration including the presence of favorable geology, potential for new discoveries, commodity prices, access to land, land holding costs, time and cost of permitting, and uncertainty over U.S. mining laws, with an additional category where companies could indicate which factors negatively impacted Nevada exploration.

The NBMG contacted a total of 169 companies directly via e-mail or phone, of which 142 explore for metals, 16 for geothermal, and 11 for oil and gas. Of the 169 emails directed to companies, 122 were addressed to individuals and 47 were sent to general e-mail accounts for the individual companies. Companies were first e-mailed in August of 2022 with a final period of activity in March to April of 2023 (table 1). In March of 2023, an email bulletin that invited participation in the survey was sent out to members of the Geological Society of Nevada (GSN), a scientific society with a significant portion of its membership working in exploration and mining within Nevada. In total, 70 companies answered the survey, which amounted to a response rate of 41%. Additionally, the NBMG researched the corporate

financial filings of 54 exploration companies that operated in Nevada during 2021 and 2022. For researched companies, generally only land costs, permitting costs, and actual exploration were included in the totals. For the international companies whose financials were researched online, the totals were generally in foreign currencies, and in those cases, the average yearly exchange rates posted by the Internal Revenue Service were used to convert them to USD. When researched companies are combined with companies that answered the survey, the response rate of the survey was 76%. Due to researched companies contributing a total of 42% of the total response rate, employment is significantly underestimated with total exploration expenditures likely slightly underestimated.

The exploration expenditures towards industrial minerals, geothermal, and oil and gas companies are underrepresented based on survey responses, and since they are primarily privately owned, there is a lack of publicly available financial data. The lack of financial data on privately held metal companies also contributed to an underestimation. For major metal and geothermal companies that are publicly held, financial categories often aren't itemized on the state-by-state, or project, level required for this survey, which prohibits them from being included when they do not respond to the survey.

ΑCΤΙVΙΤΥ	DATES
E-mailed companies and received a total of 47 responses (3 duplicates)	August 2022 to February 2023
E-mailed non-respondents and additional companies, received an additional 28 responses (2 duplicates)	March to April 2023
Researched expenditures in public domain for 58 non- reporting companies	April 2023
Assessed a total of 128 companies	April 2023

Table 1. Summary of data acquisition

TRENDS IN NEVADA EXPLORATION: 2011 THROUGH 2022 SURVEY YEARS

Since the COVID-19 pandemic in 2020, the exploration industry in Nevada has remained strong even with the global and national headwinds affecting markets. A minimum of \$350.4 million in exploration expenditures were accounted for in 2022, up from \$309.1 million in 2021 (figure 1). Employment also improved with a minimum of 524 employees in 2021 growing to 619 by 2022. While the major companies working the precious metal sector contributed to some of the employment gains, major contributors to the annual gains in both categories were surprisingly not driven exclusively by precious metals. Lithium explorers made a substantial impact on expenditure and employment improvements while large property acquisitions in vanadium and uranium had a sizable influence in the base metal sector. When employment is compared to prior surveys (figure 3), the numbers suggest employment has worsened even during the resurgence of commodity prices. However, this is undoubtedly partly a result from the large proportion of results from research of companies versus companies responding directly to the survey. Employment by company size has shown approximately similar patterns for the last six years, with 2016

marking the last year when the largest employers (\geq 50 employees) exceeded the next lowest bracket (figure 4).

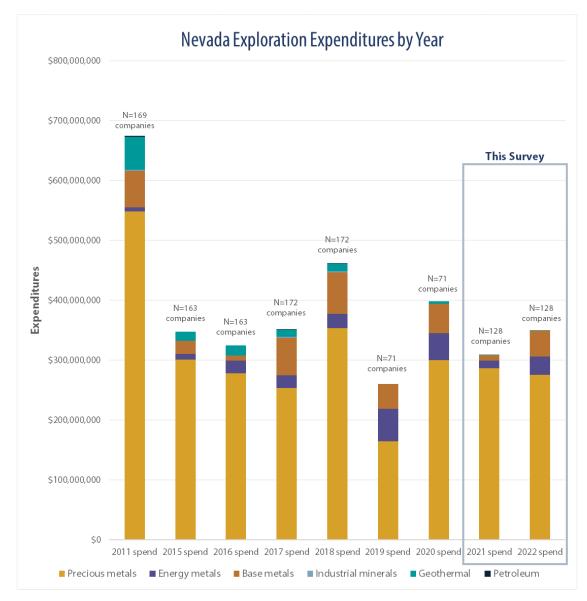
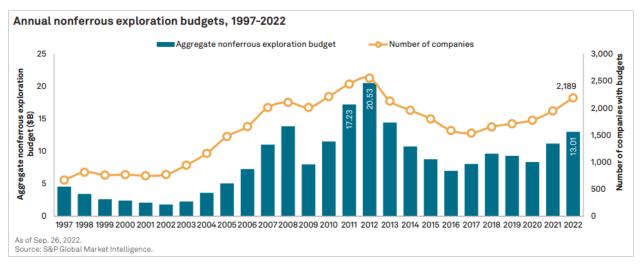


Figure 1. Stacked histogram showing the influence of various sectors on exploration expenditures in Nevada in 2011, and 2015 through 2022

Nevada remains the jurisdiction with the highest nonfuel exploration expenditures in the United States. S&P Global Market Intelligence (2021, 2022, 2023), in their annual summaries of global exploration activity, reported a stunning 82% increase in nonfuel exploration budgets in Nevada from \$360 million in 2020 to \$655.7 million in 2022, outpacing a 50% increase in global budgets (figure 2). The positive factors that contribute to Nevada's tier-one status among explorers are their views on the favorable geology and potential for discovery (figure 13). Respondents to this survey view the potential for discovery with the most optimism ever recorded. Recent discoveries of precious metals, base metals, and lithium are encouraging workers to stay in the Silver State.





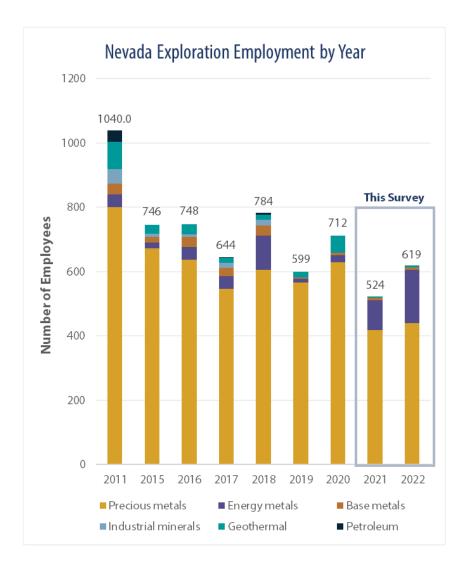


Figure 3. Surveyed number of workers by sector in Nevada exploration during 2011, and 2015 through 2022. Number is for direct employment only and does not include third-party contractors or the employees of companies researched via financial documents in the public domain.

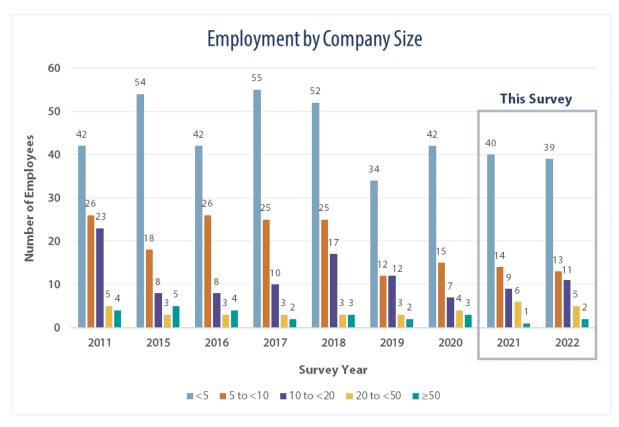


Figure 4. Graph showing the distribution of employees by company size. Number is for direct employment only and does not include third-party contractors.

2021 EXPENDITURES

A total of \$309,103,098 was expended on exploration in Nevada in 2021. This represents a minimum estimate based on the 127 companies responded to the survey or were researched. The mean expenditure was \$2.41 million, and the median was \$0.5 million. Figure 5 shows that the precious metals sector accounted for 93% of the expenditures (\$286.5 million), followed by lithium companies at 4% (\$12.6 million), the base metal sector at 3% (\$9.7 million), and geothermal with <1% (\$0.3 million). The ten companies with the highest expenditures all explored for precious metals and accounted for 56% of the total expenditures documented in 2021. The \$9.7 million spent on base metals is the lowest total since 2016 and is likely partially an artifact of reporting and researched companies, as lead, zinc, and, specifically, copper prices had rebounded from their lows at the beginning of the COVID-19 pandemic. As observed in prior surveys, companies with annual expenditures between \$1.0 and \$2.5 million are the second most numerous, which results from this being the typical budget range for the numerous junior exploration companies in the survey (figure 6).

A total of 524 employees were reported for 2021, which is the lowest number ever recorded in the nine years of data between 2011 and 2022. This is a minimum based on the responses of the 70 companies who responded to the survey (figure 7). The average number of employees per company was 7.5, and the median was 3, which is similar to past results. Employment numbers in this survey are vastly underestimated due to the lack of representation in industrial metals, oil and gas, and geothermal

industries alongside the absence of reporting from several of the major mining companies. On top of this, as noted in a prior survey by Ressel (2019), third-party contractors and consultants who act as geologists, consultants, drillers, geophysical technicians, assayers, claim stakers, and numerous other positions are not included in this survey. For example, junior exploration companies, the most common company type included in this survey, commonly use contract geologists for their projects. The low total number of employees in comparison to prior surveys is also explained by other factors including: 1) the lack of employment numbers from the 58 companies that were researched online and 2) the merger of Barrick and Newmont's operations into Nevada Gold Mines in 2019 resulting in the reduction of exploration staff.

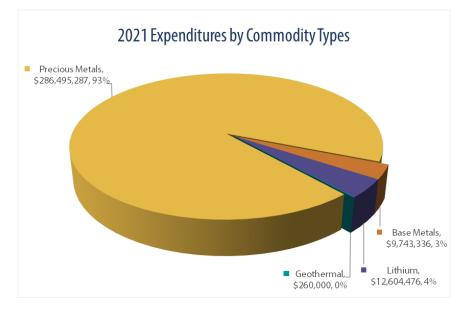


Figure 5. Total 2021 expenditures broken into sectors.

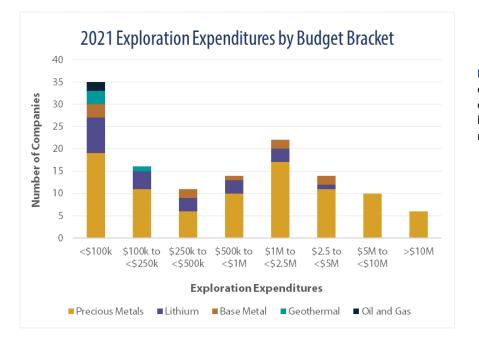


Figure 6. Total 2021 expenditures broken down by the budget brackets of individual respondents.

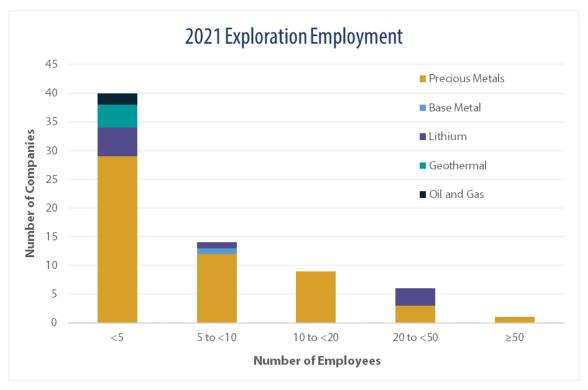


Figure 7. Stacked histogram showing the distribution of employees in 2021 by company size and sector. Data comes from the 70 self-reporting companies. Third-party contractors are not included.

2022 EXPENDITURES

While 2022 was a year marked by global uncertainty surrounding international conflicts, inflation, and economic uncertainty, the exploration market in Nevada remained on a positive track with year-over-year increases in expenditures and employment. A minimum of \$350,041,568 was spent on exploration in Nevada during 2022, a 13% increase from the expenditures recorded for 2021 (figure 8). The mean expenditure was \$2.73 million, and the median was \$0.6 million. The precious metals sector accounted for \$275 million of total expenditures, a year-over-year decrease of 4% likely resulting from a drop of gold prices mid-way through 2022 and the tempering of junior's exploration budgets involved in the sector. S&P Global Market Intelligence (2023) documented a 43% decrease in fundraisings for the junior and intermediate companies from 2021 to 2022. Base metals accounted for 12% of the total expenditures (\$43.8 million), which is in the range of expenditures documented in 2019 and 2020 and was buoyed by several large property acquisitions. Lithium reached 9% of total expenditures (\$30.4 million), a 141% increase from 2021, and was supported by the dramatic increases in lithium prices beginning in late 2021.

Employment rebounded from the low in 2021 to a total of 619 employees. Every sector either remained stable or reported a net gain in employees. The average number of employees per company was 9.1, and the median was 4. Despite the 4% reduction in precious metal expenditures from 2021, employment in the sector increased by 5% with most of the hires coming from the top ten highest spenders. The lithium industry recorded a record-high of 164 employees, 53% more than the previous high of 107 in 2018, showing the growing importance of this sector on Nevada's exploration industry. Alongside this, the

range of lithium budgets (figure 9) and company size (figure 10) show a broader distribution than in previous surveys suggesting a maturing and active industry, where companies are advancing to later stages of exploration requiring higher budgets, and new companies are forming to work on fresh prospects.

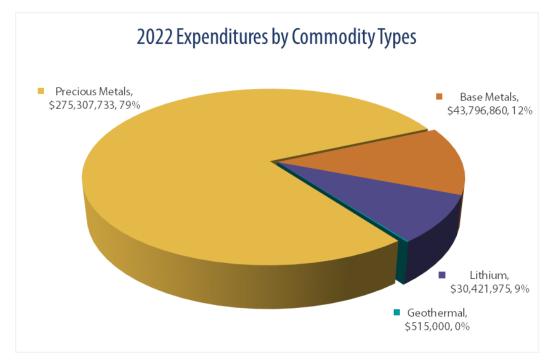


Figure 8. Total 2022 expenditures broken into sectors.

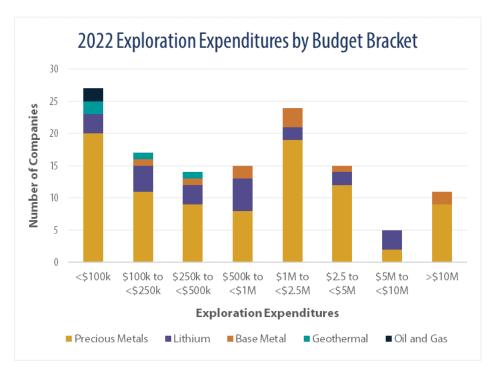


Figure 9. Total 2022 expenditures broken down by the budget brackets of individual respondents.

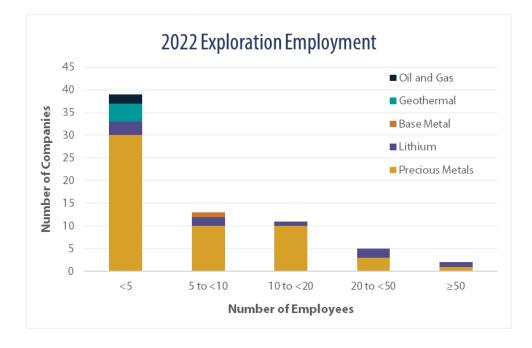


Figure 10. Stacked histogram showing the distribution of employees in 2022 by company size and sector. Data comes from the 70 self-reporting companies. Third-party contractors are not included.

RELATIONSHIP BETWEEN EXPENDITURES AND EMPLOYEES

Figure 11 shows a weakly positive relationship between companies' exploration expenditures in 2021 and 2022 and their respective number of employees. The graph shows a similar trend to that produced by Muntean (2021). An average of \$397,709 was spent per employee with a median of \$187,500. Companies exceeding annual budget amounts of \$5 million exhibit an average of \$1.0 million of expenditures per employee, while companies with budgets below \$5 million exhibit an average of \$0.2 million of expenditures per employee. A few factors governing this contrast include: 1) the lower budgets of smaller companies in relation to the number of employees, 2) the emphasis on expansion (discussed below) over grassroots exploration for larger companies, and 3) the differing use of contractors. The amount of manpower required by an exploration program is highly variable and governed by the industry,

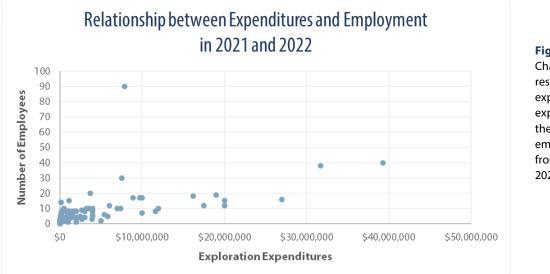


Figure 11.

Chart showing a respondent's exploration expenditures versus their corresponding employee total. Data from both 2021 and 2022 are included. technology, methods, and stage of the project. Some exploration programs require extensive field work by numerous people. Programs with larger budgets could require less manpower because of the techniques and methods applied to the exploration.

2023 OUTLOOK

The survey asked participants whether they expected to spend more, less, or about the same in 2023 compared to 2022. Of the 69 responses to this question, 45% of respondents expected to spend more in 2023 with 17% expecting to spend less and 38% expecting to spend about the same (figure 12). Since the majority of explorers are judging their future expenditures optimistically or neutrally, it suggests relatively similar views on such factors as the ability to obtain financing, commodity price stability, and the enduring possibility of discovery in Nevada.



Figure 12. Pie chart showing the answers of companies reporting their outlook on expenditures in 2023.

EXPENDITURES BY CATEGORY

To better understand where exploration expenditures are directed, companies were asked to break down their expenditures into the following categories: (1) actual exploration, which includes drilling, geology, geochemistry, and geophysics, (2) land costs, including claim staking, maintenance fees, and lease payments, (3) permitting and compliance, including environmental studies, bonding, and reclamation, (4) corporate overhead costs, which includes overhead, legal expenses, and taxes, and (5) other costs. The averages of the percentages provided by the 60 reporting companies were 50.7% to actual exploration, 25.2% to land holding costs, 9.0% to permitting costs, 9.0% to corporate costs, and 6.1% to other costs.

When the individual percentages were multiplied by the company's expenditures, the monetarily weighted percentages became 71.3% for actual exploration, 8.9% for land holding, 6.4% for permitting,

6.3% corporate costs, and 7.1% for other costs. The large increase in the percentage of total expenditures directed toward actual exploration and the corresponding decrease on land reflect the strong influence of companies that had higher expenditures. To highlight this observation, 47 of the companies researched online, almost all junior exploration companies, with itemized land expenditures had an average land cost of 48.3% with the monetarily weighted percentage of 61.5%. These numbers are elevated by several companies that recently acquired properties with large lease payments and others that have stepped back exploration but are maintaining their property leases and claim fees. Despite this, the percentages show the significant impact that land payments have on exploration budgets for junior explorers.

EXPANSION VERSUS GRASSROOTS EXPLORATION

Respondents were asked to estimate the percentage of their exploration expenditures directed toward resource expansion versus grassroots exploration. Based on a total of 63 responses, the average percentage was 34% on resource expansion and 66% on grassroots exploration. If the individual company's percentages are multiplied by their respective expenditures, the cumulative cash proportions shift to 60% on resource expansion and 40% on grassroots exploration. These percentages are consistent with the results of the biennial surveys dating back to the 2015/2016 survey showing that the forces governing them are relatively unchanged. The preponderance of the weighted percentages towards resource expansion highlights a few factors including: resource expansion being generally performed by major companies with stable financing and larger budgets, expansion having a higher success rate compared to grassroots work, and that successful expansion of a resource at an existing mine can have large impacts such as longer mine lives with lower startup costs compared to a grassroots discovery. The fact that the unweighted average percentage shows a higher weight towards grassroots exploration likely results from the prevalence of junior exploration companies, without producing mines, dedicating 100% of their expenditures to making grassroots discoveries.

FACTORS THAT IMPACT EXPLORATION

The survey asked companies to rate on a scale from 1 to 5, how seven factors influenced their exploration. The averages for the 69 companies that responded were 4.76 for favorable geology, 4.59 for potential for new discoveries, 4.12 for access to public lands, 3.94 for time and costs required to permit, 3.46 for commodity prices, 3.41 for claim fees/leases, and 3.13 for uncertainty over U.S. mining laws (figure 13). High ratings suggest the factor has a large impact on decision making but does not imply whether it has a positive or negative influence.

The presence of large producing mines, tracts of federally managed public lands, and a history of mineral wealth and discovery drives explorers to Nevada. Favorable geology and the potential for new discoveries continues to have major positive influences on exploration expenditures in Nevada with ratings that are remarkably consistent with the 2015/2016 and 2019/2020 surveys. Other ratings are more ambiguous in terms of their positive or negative perception among explorers. In particular, access to public land and reform of the U.S. Mining Law are more difficult issues to gauge, as only proposed changes to these are viewed by explorers negatively, whereas more explorers regard public lands and the U.S. Mining Law as important factors leading to Nevada's top ranking among places to explore in the U.S. Based on the Fraser

Institute's Annual International Survey of Mining Companies in 2022, Nevada regained the top 1st jurisdiction for investment in the world up from the 3rd place ranking in 2021.

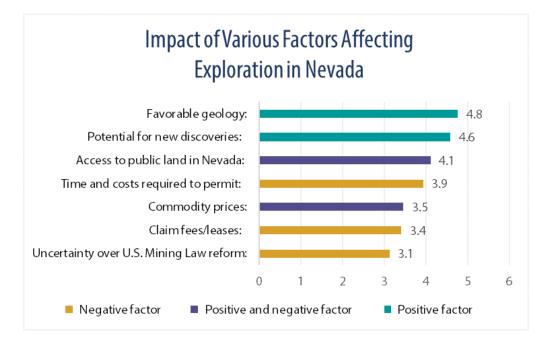


Figure 13. Bar graph showing the impact and perspective on six factors influencing exploration in Nevada. A "5" score represents the highest impact, "1" represents the lowest impact.

To help gauge explorer's views, participants were asked to clarify what factors negatively affected their decisions to explore in Nevada relative to other regions in the world. The three factors that respondents frequently listed as having a negative impact include the time, cost, and unpredictability of permitting (24 responses), uncertainty over US mining law (11 responses), and access to public lands and proposed land withdrawals due to sage grouse habitat or federal needs (5 responses). Permitting had a score of 3.48 in the 2019/2020, which when compared to the 3.92 of this survey shows a rising effect on more explorers. Factors that were also noted as contributing negatively to exploration decisions were the increasing costs of exploration programs particularly with regards to drilling (4 responses) and the aspects of workings in a mature terrain such as competition in areas with favorable geology (2 responses). Oil and gas and geothermal explorers noted the influence of commodity prices on their programs (2 responses). Negative factors that had one response included a lack of labor, water rights as applicable to the exploration for lithium brines, and the distance to refiners for oil and gas production.

ACKNOWLEDGMENTS

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APPENDIX

Nevada Division of Minerals Nevada Bureau of Mines and Geology 2022 Minerals Exploration Survey

Company Name:		
Contact Person:		
Email:	Phone:	

The first two questions are critical. Please answer the rest if you can.

1. What were your company's exploration expenditures in Nevada in 2021 and in 2022?

2021 exploration expenditures in Nevada:	<u>\$</u>
2022 exploration expenditures in Nevada:	<u>\$</u>

2. How many people did your company employ in exploration in Nevada in 2021 and in 2022? Include geologists and support staff, both company employees and individual contractors and consultants.

2021 number of employees involved in Nevada exploration:

2022 number of employees involved in Nevada exploration:

3. If you can, please ESTIMATE the percentage of your company's total Nevada expenditures in 2021 that went toward the following categories, including salaries and benefits.

Actual exploration (drilling, geology, geochemistry, geophysics, etc.):	%
Land holding costs (claims staking and maintenance, lease payments, etc.):	%
Permitting and compliance (environmental studies, bonding, reclamation, etc.):	%
Corporate costs (overhead, legal, taxes, etc.):	%
Other (please specify):	<u>%</u>

4. Please ESTIMATE the percentage of your Nevada 2021 exploration expenditures dedicated to expansion around existing operations and to grassroots efforts.

Expansions: <u>%</u>

Grassroots exploration: _____%

5. Pertaining to Nevada, please rate how the following factors impact your exploration activity, with 1 being insignificant and 5 being very significant.

Favorable geology:	1	2	3	4	5
Potential for new discoveries:	1	2	3	4	5
Commodity prices:	1	2	3	4	5
Access to public land in Nevada:	1	2	3	4	5
Claim/lease fees:	1	2	3	4	5
Time and costs required to permit:	1	2	3	4	5
Uncertainty over U.S. Mining Law reform:	1	2	3	4	5
Other (please specify):	1	2	3	4	5

6. Which, if any, of the factors in item 5 above negatively impact Nevada's attractiveness for exploration relative to other regions in which your company explores?

7. Compared to 2022, do you expect your company to spend more or less in 2023 on Nevada exploration?

Much more	More	About the same	Less	Much Less

Thank you. All individual responses will be held confidential.

Link to Google Form: <u>https://forms.gle/Gp48NMzCg6bEfLqN8</u>