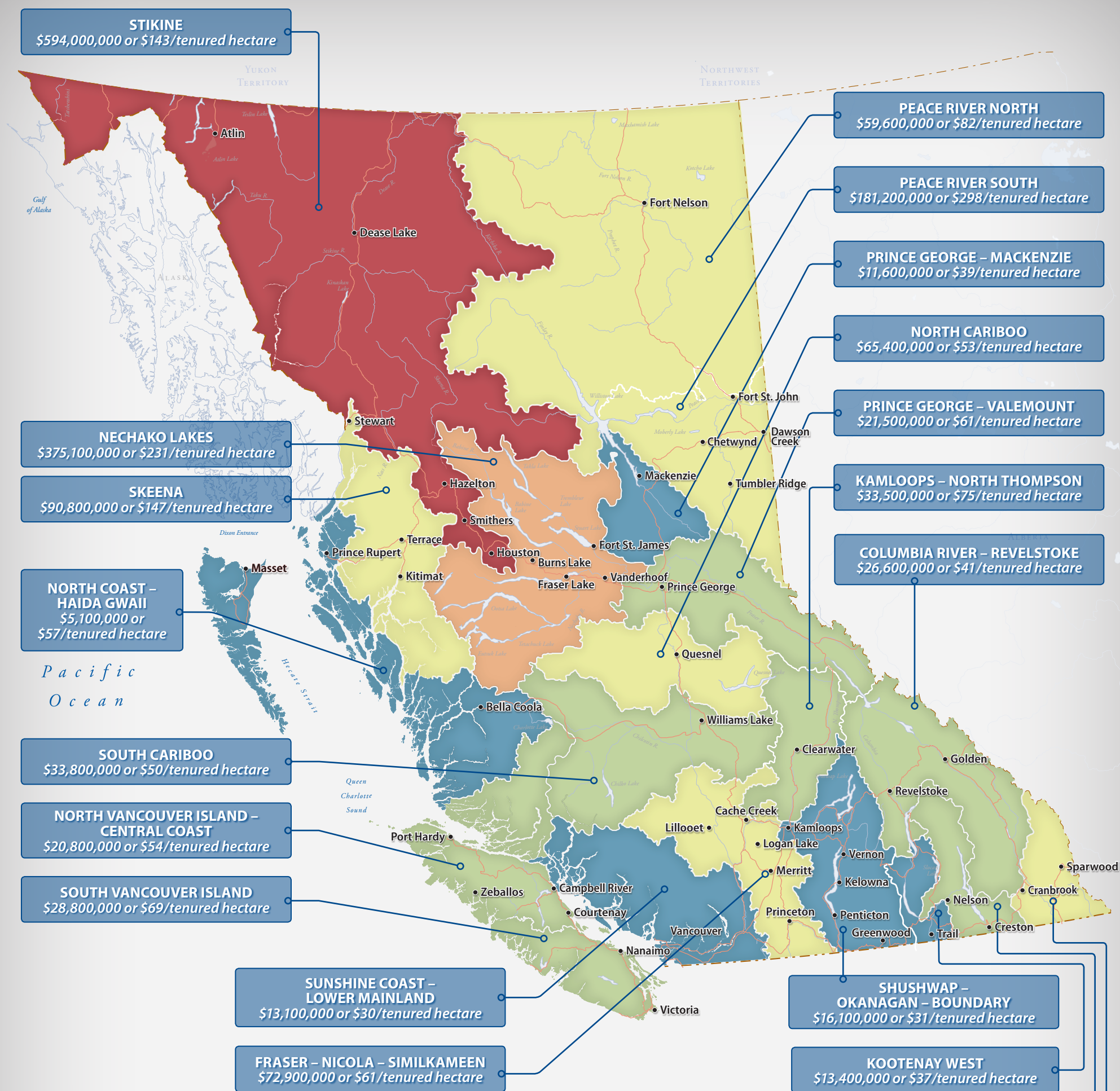
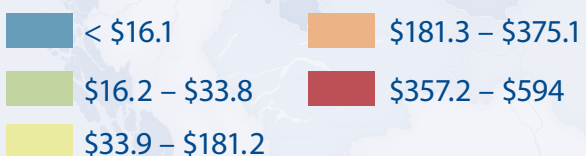


COMMUNITIES, MINERAL AND COAL EXPLORATION INVESTMENT



TOTAL EXPENDITURE 2010 – 2012 (MILLIONS \$ CDN)



See Ministry of Energy and Mines Open File 2013-7 for more information



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Communities, Mineral and Coal Exploration Investment

Regional distribution of exploration expenditure
2010 - 2012 and the communities that may benefit

Jim Britton; Robin Chu; Dave Grieve; Wesley Harman;
Paul Jago; Jeff Kyba; Bruce Madu; Bruce Northcote

Open File 2013 - 7

Regions	Total Expenditure
1 South Cariboo - Chilcotin	\$33,800,000
2 North Cariboo - Chilcotin	\$65,400,000
3 Columbia River - Revelstoke	\$26,600,000
4 Fraser - Nicola - Similkameen	\$72,900,000
5 Kamloops - North Thompson	\$33,500,000
6 Shuswap - Okanagan - Boundary	\$16,100,000
7 Kootenay East	\$61,900,000
8 Kootenay West	\$13,400,000
9 Nechako Lakes	\$375,100,000
10 Nelson - Creston	\$21,100,000
11 North Coast - Haida Gwaii	\$5,100,000
12 North Vancouver Island - Central Coast	\$20,800,000
13 Peace River North	\$59,600,000
14 Peace River South	\$181,200,000
15 Prince George - Mackenzie	\$11,600,000
16 Prince George - Valemount	\$21,500,000
17 Skeena	\$90,800,000
18 South Vancouver Island	\$28,800,000
19 Stikine	\$594,000,000
20 Sunshine Coast - Lower Mainland	\$13,100,000

2010 - 2012 Exploration ExpenditureTotal: \$1,746,000,000

Notes

The area-based expenditure shown on this map is derived from dollar amounts claimed for mineral tenure maintenance and Regional Geologists' exploration spending estimates. The regions reflect watershed groupings. For information on Mines and Exploration projects around British Columbia please see Open File 2013-1 and related ministry publications.

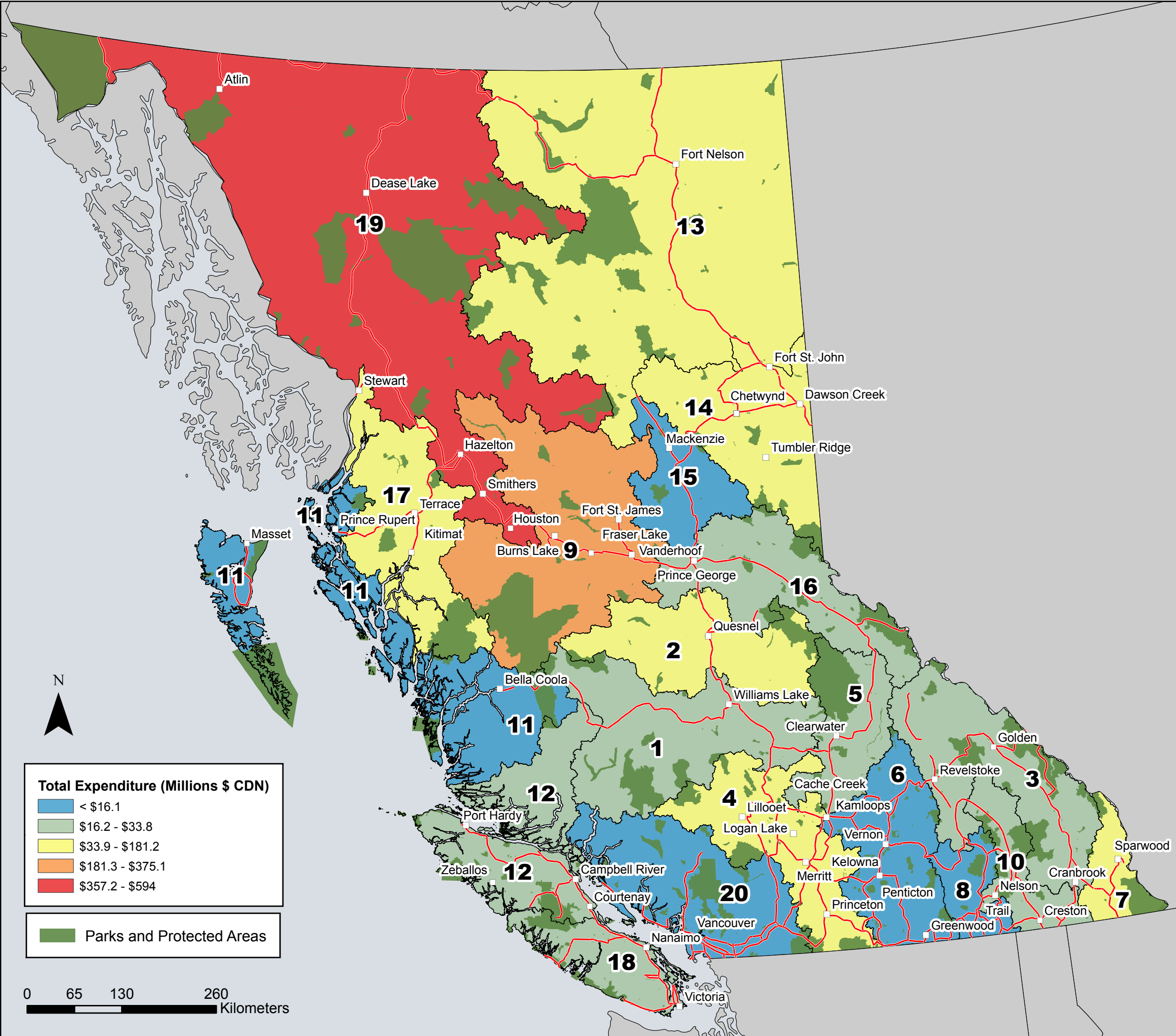
The data were compiled by Bruce Madu, Robin Chu and Wesley Harman of the British Columbia Geological Survey.



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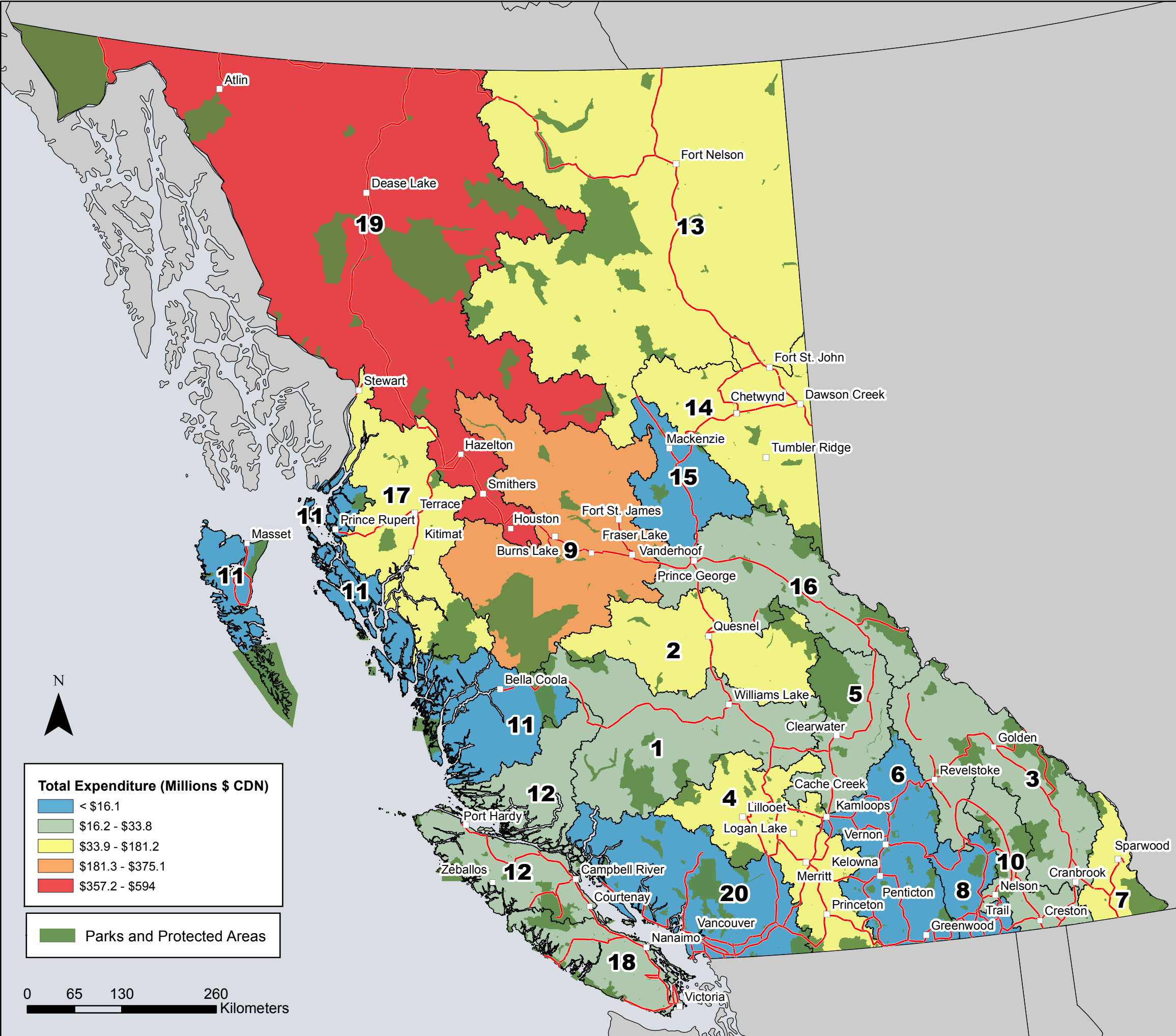
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Background Information and Methods: Map of Communities, Mineral and Coal Exploration Investment (2010-2012)

(To accompany British Columbia Geological Survey Open File 2013-7)

Introduction

Open File map 2013-7 provides a geographic representation of estimated expenditures by the mineral exploration industry across British Columbia, allowing local communities to visualize investment in their regions. The map, generated using Arc Map GIS software, is intended for anyone with an interest in mineral exploration activities, including government officials, political representatives, industry associations, students, resource planners, and the general public.

In contrast to previous versions (BCGS Open File 2010-02), Open File 2013-07 includes data from grassroots and early stage projects, recorded in the Mineral Titles database, in addition to expenditures from major projects. It also captures data from multiple years which, given the high annual variation in expenditures, may provide a better indication of mineral exploration interest.

Below we describe the methods used to generate the Map of Communities and Mineral Exploration Investment.

Designation of regions

The regions specified on the map were chosen to be easily recognizable to communities in British Columbia. They are based on MLA boundaries and the watersheds within these boundaries. A spatial join was performed on the datafiles, using watersheds as the target feature and MLA boundaries as the join feature.

Data import

The data for this map were provided by the Government of British Columbia Mineral Titles Database and the Regional Geologists of British Columbia.

Tenure expenditure data from the Mineral Titles Database contains both statements of work and cash-in-lieu data that were combined to create a single expenditure per-tenure file. This file was then joined with an existing Arc Map tenure polygon file based on the mutual tenure number field. The tenure data were then transformed into a point file using the toolbox function ("Feature to Point"). The Regional Geologists data were received as Excel files separated by year and by region; these files were combined to allow for easier import into Arc Map. After importing the Regional Geologists data into Arc Map it was then projected using the data management tool ("Project"). This tool allows selecting an existing projection for the file to be projected into. In this case, the existing tenure shape file projection was used.

Data amalgamation

The following summarizes how we avoided double counting expenditures from the two data sets. First we split the Regional Geologist data into expenditure levels and created a buffer distance around each point for each level (Table 1). The buffers were then merged into a single file and used to remove duplicates in the mineral tenure point file with the “Clip” tool in Arc Map (Fig. 1). We then combined the Regional Geologists point file with the mineral tenure point file (Fig. 2). Finally we selected the Regional Projects from the attribute table and performed a field calculation to insert the project expenditures into the tenures expenditure field.

region expenditures	buffer distance
< \$500,000	5 km
\$2,000,000	10 km
\$6,000,000	15 km
\$17,000,000	20 km
> \$17,000,000	25 km

Table 1. Region expenditures and buffer distances

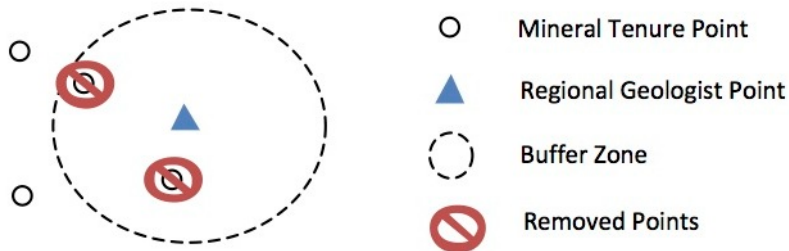


Fig. 1. Elimination of double counting

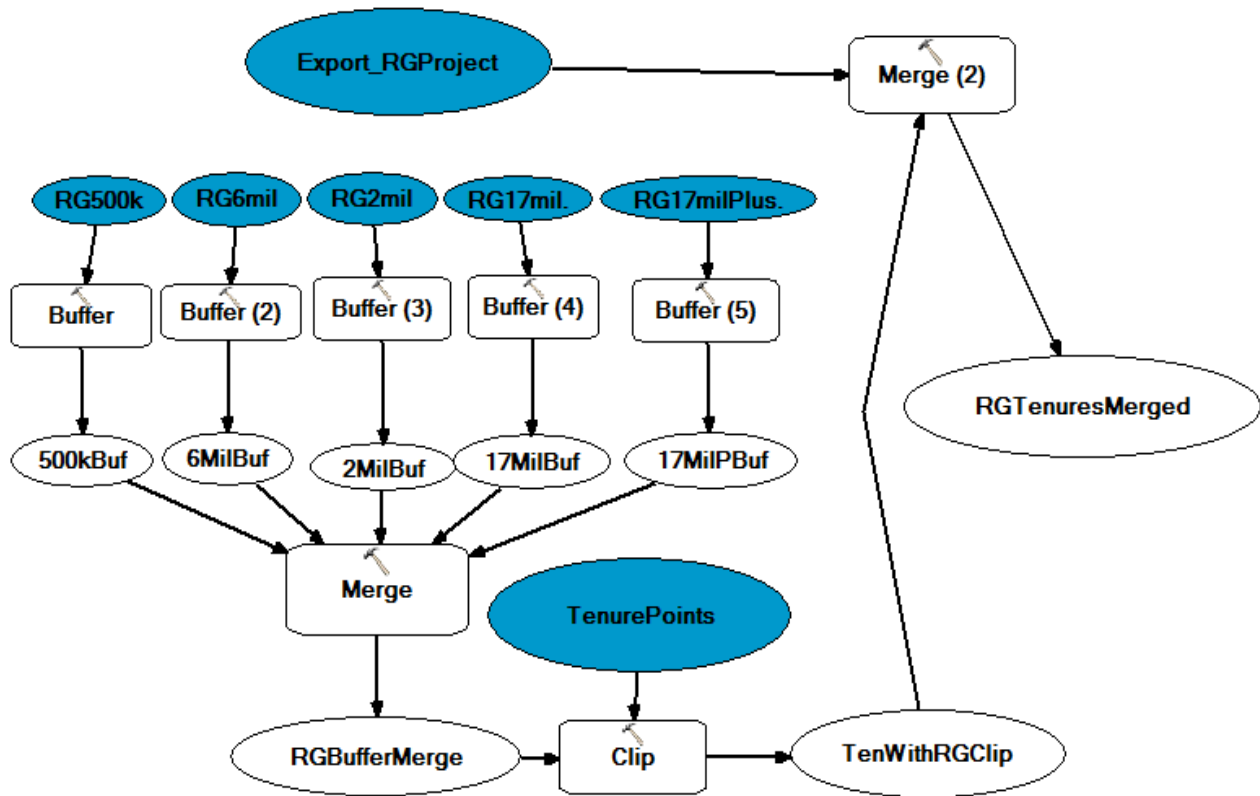


Fig. 2. Data model to derive final expenditure point file.

Joins and statistics

A spatial join was then performed on the watershed regions file and the expenditure point file. The target feature is the watershed regions file, the join feature is the points file, and the merge rule was selected as SUM, for both Area_in_Hectare and Expenditure. This added all expenditures and area of tenures within each watershed, allowing for statistical analysis.

Field Creation and Categorization

New fields were then appended to the spatial join file that includes total hectares, tenure percentage, expenditure per hectare, and expenditure per hectare of tenures within each watershed region. These fields were used to obtain the statistics (Table 2) used to display the data in a way the user can easily understand.

Calculations

Total Hectares = $[\text{Shape_Area}] / 10,000$. The shape area is given in m^2 , to obtain hectares we divide by 10000. This is used to find the total number of hectares in a region.

Tenure Percentage = $[\text{Area_in_Hectares}] / [\text{Total Hectares}]$. This calculation returns the percentage of land used for mineral exploration by region.

Expenditure per Hectare = $[\text{Total Expenditure}] / [\text{Total Hectares}]$. This calculation returns the expenditure per hectare for the entire region.

Expenditure per Hectare of Tenure = $[\text{Total Expenditure}] / [\text{Area_in_Hectares}]$. This calculation returns a value for spending based on the number of hectares used only for exploration within a region.

Table 2. Statistics (2010-2012)

	Region	Hectares of Tenure	Total Hectares	Total Expenditure	Exp/Hectare	Exp/Hectare of Tenure
0	South Cariboo - Chilcotin	680177.422	4708829	\$33,782,876.00	\$7.00	\$50.00
1	North Cariboo - Chilcotin	1239626.761	3324639	\$65,384,644.00	\$20.00	\$53.00
2	Columbia River - Revelstoke	649342.77	4209150	\$26,603,004.00	\$6.00	\$41.00
3	Fraser - Nicola - Similkameen	1191487.646	3471645	\$72,856,496.00	\$21.00	\$61.00
4	Kamloops - North Thompson	446477.133	2082876	\$33,516,398.00	\$16.00	\$75.00
5	Shuswap - Okanagan - Boundary	527926.114	3024923	\$16,145,661.00	\$5.00	\$31.00
6	Kootenay East	176844.922	971608	\$61,895,424.00	\$64.00	\$350.00
7	Kootenay West	365825.655	1003323	\$13,369,379.00	\$13.00	\$37.00
8	Nechako Lakes	1626251.18	6836773	\$375,060,512.00	\$55.00	\$231.00
9	Nelson - Creston	454267.458	1414741	\$21,091,228.00	\$15.00	\$46.00
10	North Coast - Haida Gwaii	89164.55	4663080	\$5,055,426.00	\$1.00	\$57.00
11	North Vancouver Island - Central Coast	384660.465	3533971	\$20,838,772.00	\$6.00	\$54.00
12	Peace River North	730894.852	16829660	\$59,625,300.00	\$4.00	\$82.00
13	Peace River South	608752.802	3759141	\$181,157,088.00	\$48.00	\$298.00
14	Prince George - Mackenzie	299353.935	1779229	\$11,557,240.00	\$6.00	\$39.00
15	Prince George - Valemount	349790.597	3558785	\$21,464,458.00	\$6.00	\$61.00
16	Skeena	619865.721	3943155	\$90,824,768.00	\$23.00	\$147.00
17	South Vancouver Island	414601.641	1577044	\$28,793,234.00	\$18.00	\$69.00
18	Stikine	4165526.574	20300315	\$594,031,680.00	\$29.00	\$143.00
19	Sunshine Coast - Lower Mainland	434713.105	3851201	\$13,058,503.00	\$3.00	\$30.00