



Mineral Exploration

Navigating the Ever-Increasing Complexity of Notice of Work Permits

February 6, 2020
CoalSMART, Vancouver



Michael Keefer & Jessica Lowey

Presentation Overview

- Who is Keefer Ecological Services?
- Part 1: Planning Considerations
 - Explore by Location Tool
 - BEC Mapping
 - Soil & Terrain
 - Wildlife Habitat
 - Stream Crossings
 - Provincial Guidance Document for NOW Applications
- Part 2: Cumulative Effects Case Study
 - Elk Valley Cumulative Effects Management Framework
 - Coal Exploration NOW

PART 1: Planning Considerations for NOW



Explore by Location

Determine if your area of interest (AOI) is available for your purpose by researching what is currently happening on the land. You can customize the map view by selecting the appropriate Category of Interest from the dropdown menu in Step 1. If you arrived at this map from an activity page, Step 1 will be pre-selected for you. The information most relevant to your selection will then be displayed on the map. You may further customize the map view by using the Map Layers icon located in the top right corner of the map.

A report based on pre-selected layers can be generated for each of the Categories of Interest however these reports are not customizable – changes made in the map view will not affect the report. A summary report can be generated that will identify overlaps but will not provide details of those overlaps. A detailed report can be generated that will elaborate on the overlaps contained in the summary report. Both the Summary and Detailed reports will only report on the primary AOI, which is identified by a red outline.

Follow the steps on the left to begin exploring by location. View the [map help page](#) for instructions on how to use the map functions. **QUICK TIP:** In order to get accurate reporting results, only use the Rectangle, Polygon or Circle tools to create your shape. The Line tool will not provide a proper report as there is no 'area' associated with it.

[VIDEO TUTORIAL](#) | [MAP HELP](#)

Step 1 : Category of Interest

Select your Category of Interest

Step 2 : Find Your Location

Skip this step if importing geometry in step 3.
 Zoom into your location using the search below, or by using the [zoom](#) and [pan](#) features on the left side of the map.

Step 3 : Define your Area of Interest

Use the rectangle , polygon or circle tools to draw a boundary around your area of interest to a maximum of 10,000 hectares (100km²) OR import a geometry file using the 'Import AOI' option on the top of the map.
 Note the line tool will not provide a proper report as it there is no 'area' associated with it



Step 4 : Evaluate your Area of Interest

Generate a summary report that interacts with the map:

Generate a detailed report in the form of a PDF. This report will not interact with the map. The report will take several minutes to generate:

No Area of Interest (AOI) has been entered. Please enter one now.

Summary Report

When you follow Steps 1-4 to create a Summary Report, the table below will list the overlaps most relevant to your Category of Interest. Each Type of Overlap can be expanded by clicking on the arrows in the left column—a description, guidance, and a list of the individual overlaps will appear.

Choose Download Report to save or print the summary report, or generate a more detailed report using the Step 4 options.

[Download Report](#)

Type of Overlap
To populate this table, generate a Summary Report

Planning

Explore by Location Tool

<https://portal.nrs.gov.bc.ca/web/client/explore>



Explore by Location Tool

- Category of Interest
 - Mining
 - Fish and Wildlife
- Find your Location
- Define your Area of Interest (AOI)
 - Draw
 - Upload file
- Evaluate
 - Summary report (interactive)
 - Detailed report (PDF)

Step 1 : Category of Interest

Select your Category of Interest

All

Step 2 : Find Your Location

Skip this step if importing geometry in step 3.




Zoom into your location using the search below, or by using the [zoom and pan](#) features on the left side of the map.


Any

Enter a location



Step 3 : Define your Area of Interest

Use the rectangle , polygon  or circle  tools to draw a boundary around your area of interest to a maximum of 10,000 hectares (100km²) OR import a geometry file using the 'Import AOI' option on the top of the map.

Note: the line tool  will not provide a proper report as it there is no 'area' associated with it

Step 4 : Evaluate your Area of Interest

Generate a summary report that interacts with the map:

Generate Summary Report

Generate a detailed report in the form of a PDF. This report will not interact with the map. The report will take several minutes to generate:

Generate Detailed Report

Section 3: Details of All Overlaps

- First Nations Consultative Area
 - Represents the approximate boundary of traditional territories
 - Many activities may be compatible
 - Government conducts consultation on a deeper level
- Forest Recreation Sites
 - Activities are allowed but must be consistent with the objectives set for the site



Section 3: Details of All Overlaps

- **Trapline Areas**
 - Designated for licensed trappers to trap furbearing animals
 - Compatible with many activities
- **Guide Outfitter Areas**
 - Designated for licensed guide outfitters to guide clients to hunt big game species
 - A range of activities are compatible

Section 3: Details of All Overlaps

- Crown Land Reserves
 - Designation placed on sites reserved from disposition
 - Generally not available for Land Act tenures
- Forest License
 - Agreement which grants the right to harvest in a specified area under cutting permits
 - Area is compatible with many activities
 - Contact tenure holder

Section 3: Details of All Overlaps

- Forest Service Road
 - Constructed, modified or maintained by the Ministry
 - Industrial use and joining up to these roads are allowed via a Road Use Permit or Junction Permit
- Road Permits
 - Agreement that authorizes the construction or modification of a forest road to facilitate access
 - Activities are compatible if quality, safety and use of road are not impacted
 - Road maintenance agreement may be required

Section 3: Details of All Overlaps

- Terrain Mapping
 - Review report associated with terrain mapping project to identify potential impacts/hazards
 - Slopes above and below 30%
 - Terrain classes IV and V
- Old Growth Management Areas (OGMAs)
 - Areas that are recommended for or have been granted legal designation to maintain existing old growth forest or protection of future old forest and retain associated values
 - Avoid timber harvesting and road building
 - Where unavoidable, mitigation activities may be requested

Section 3: Details of All Overlaps

- Grazing Tenures
 - Authorization providing grazing area for livestock
 - Compatible with many activities
 - Exceptions: holes and trenches, fences, removal of timber around riparian areas
 - Where unavoidable mitigation activities may be requested
- Ungulate Winter Ranges (UWRs)
 - Legally designated area that meets winter habitat requirements of an ungulate species
 - Activities are managed to protect or conserve habitat
 - Certain activities may be prohibited or limited

Role of a Qualified Person (QP)

- Possesses the specified knowledge, skills, training, experience and other requirements to perform a specified type of work
- Provide knowledge and expertise to support decision-making and operational activities
- Must hold an accreditation bestowed by a professional association constituted under an Act (e.g., P.Eng, P.Geo, P.Ag, R.P.Bio)



Planning

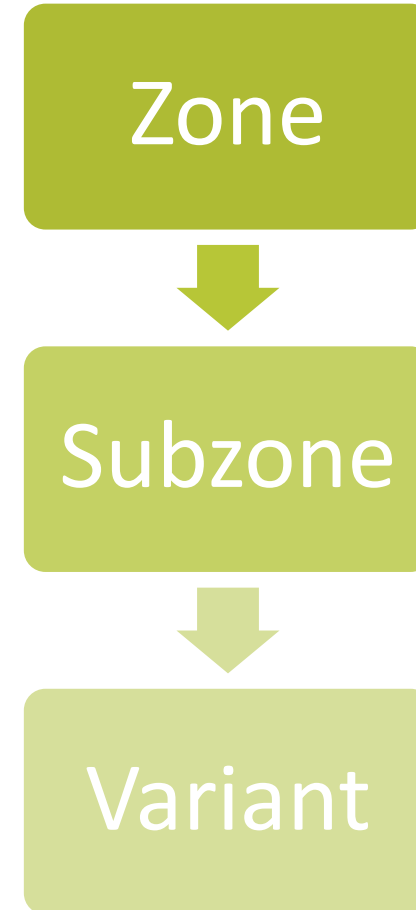
Provincial Biogeoclimatic Mapping

<https://catalogue.data.gov.bc.ca/dataset/bec-map>



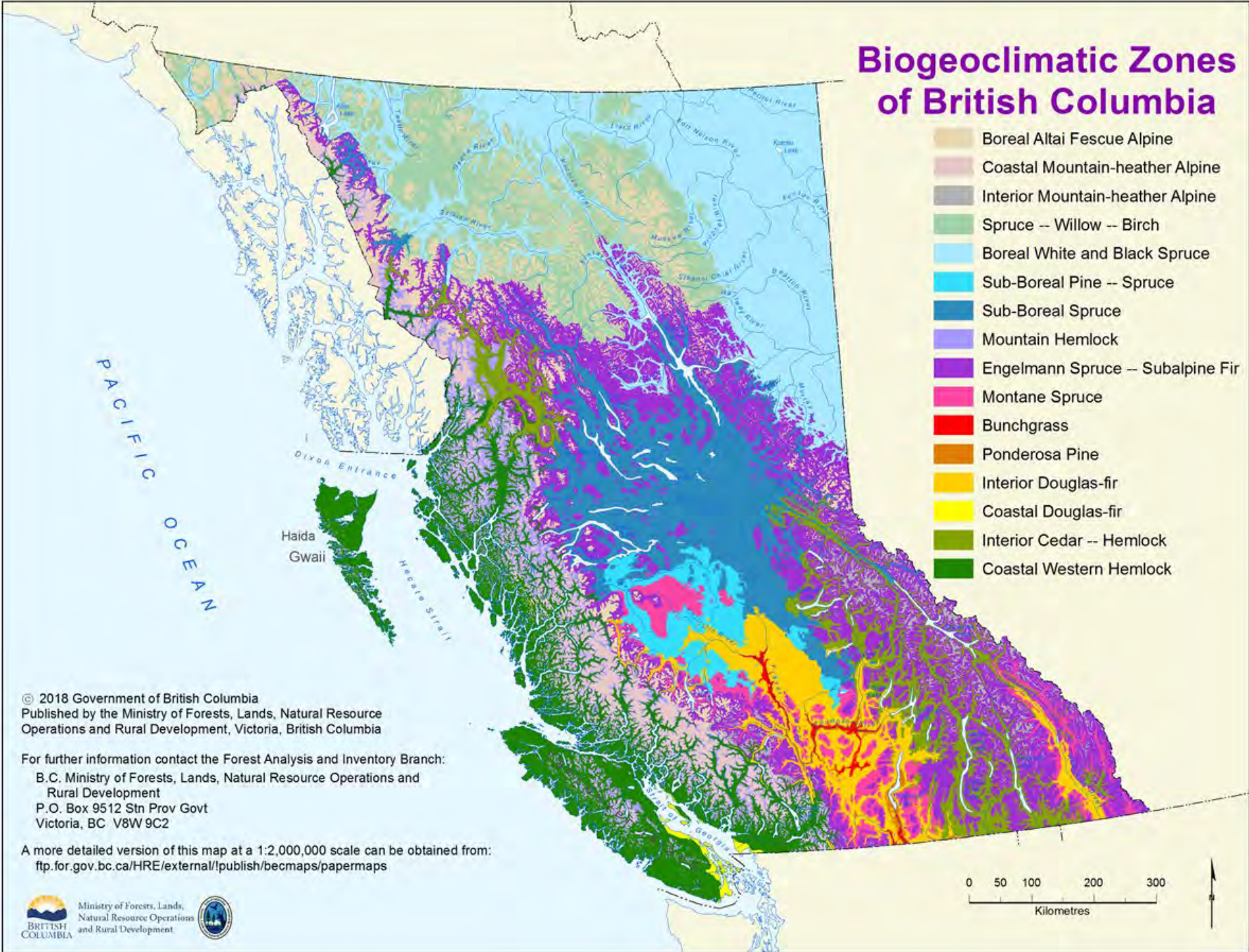
Biogeoclimatic Mapping (BEC)

- Hierarchical classification scheme that combines climate, vegetation and site classifications
- Ecosystems range in scale from regional to local
- Defined by zonal (climatic) concepts and the vegetation of the climax or near-climax ecosystem



Biogeoclimatic Zones of British Columbia

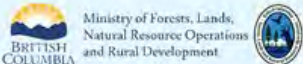
-  Boreal Altai Fescue Alpine
-  Coastal Mountain-heather Alpine
-  Interior Mountain-heather Alpine
-  Spruce -- Willow -- Birch
-  Boreal White and Black Spruce
-  Sub-Boreal Pine -- Spruce
-  Sub-Boreal Spruce
-  Mountain Hemlock
-  Engelmann Spruce -- Subalpine Fir
-  Montane Spruce
-  Bunchgrass
-  Ponderosa Pine
-  Interior Douglas-fir
-  Coastal Douglas-fir
-  Interior Cedar -- Hemlock
-  Coastal Western Hemlock



© 2018 Government of British Columbia
 Published by the Ministry of Forests, Lands, Natural Resource
 Operations and Rural Development, Victoria, British Columbia

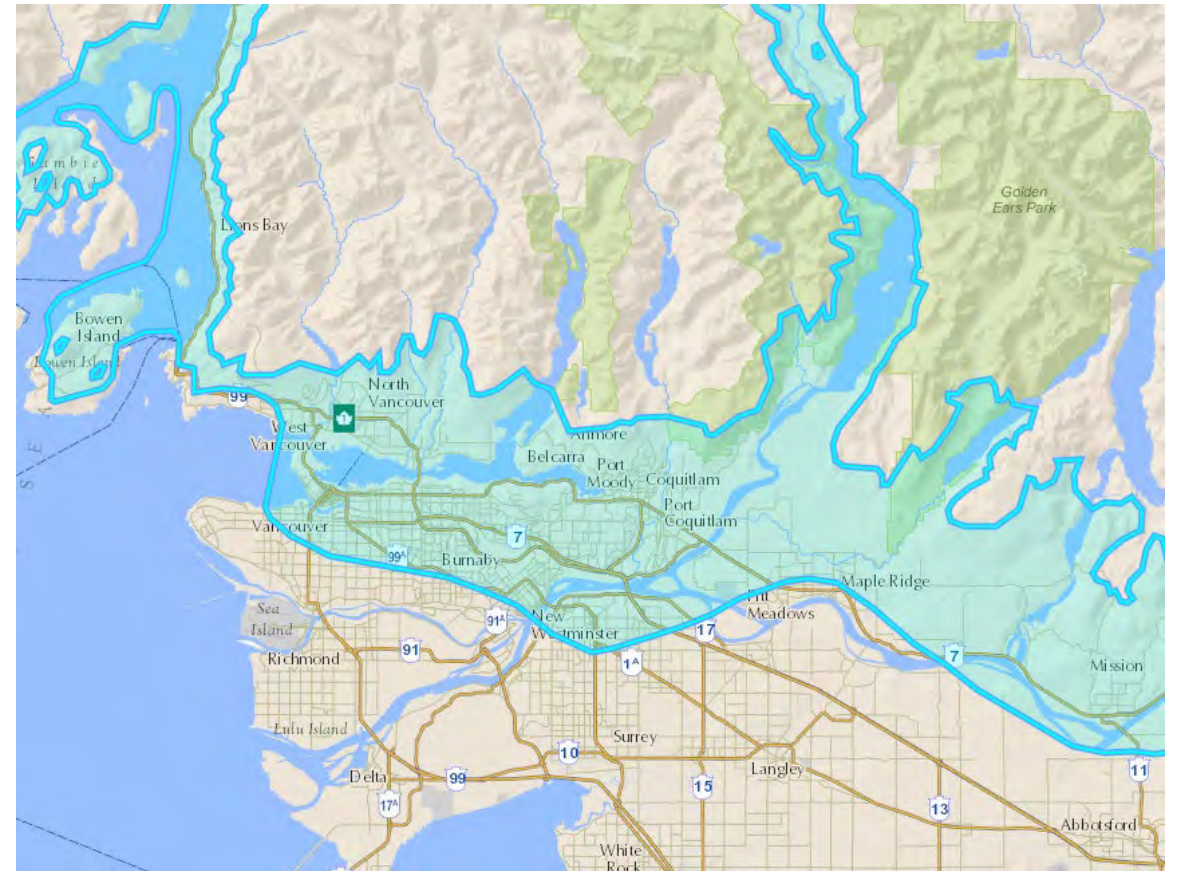
For further information contact the Forest Analysis and Inventory Branch:
 B.C. Ministry of Forests, Lands, Natural Resource Operations and
 Rural Development
 P.O. Box 9512 Stn Prov Govt
 Victoria, BC V8W 9C2

A more detailed version of this map at a 1:2,000,000 scale can be obtained from:
<ftp://ftp.for.gov.bc.ca/HRE/external/publish/becmaps/papermaps>



Biogeoclimatic Mapping (BEC)

- Subzones are denoted using lowercase letters behind the capital letter zone code
- BEC zones in metro Vancouver:
 - CWHdm (Coastal Western Hemlock dry maritime)
 - CWHxm1 (Coastal Western Hemlock very dry maritime)
- Variants are indicated by alphabetical or numerical values following subzone code



Biogeoclimatic Mapping (BEC)

RECOMMENDED TREE SPECIES		GENERAL SITES			
Grid No. 2					
CWHdm	Dry Maritime	CWH Subzone			
Soil nutrient regime					
Actual Relative	Very Poor	Poor	Medium	Rich	Very Rich
	A	B	C	D	E
VD 0	02	Pl Fd			
MD 1	03	Fd(Cw)		04	Fd(Cw)
MD 2					(Pw)
SD 3	01	Fd(Cw)		05	FdCw
F 4		Hw(Pw)			(Pw)
M 5	06	HwCw		07*	FdBgCw
VM 6		(Fd)			ActDr
W 7	11	Pl(Cw)	12**	Cw(Hw)	(PwSa)

See comments on facing page
 * See grid # 28 for site series 08 - 10
 ** See grid # 32 for site series 13 - 15

Site series

01 Hw - Flat moss	06 HwCw - Deer fern
02 FdPl - Cladina	07 Cw - Foamflower
03 FdHw - Salal	11 Pl - Sphagnum
04 Fd - Swordfern	12 CwSa - Skunk cabbage
05 Cw - Swordfern	

- Within each zone, further site-specific characteristics are denoted
- Common vegetation of climax or near-climax ecosystem
- Informs stocking standards
 - Species selection and stocking standard varies depending on site series for each BEC zone
- Stocking standards required for reclamation planning

Invasive Plant Management

- Management as part of the reclamation requirements in the Code
- Baseline understanding to monitor occurrences against
- Vegetation management plan to avoid introduction, prevent establishment



Planning

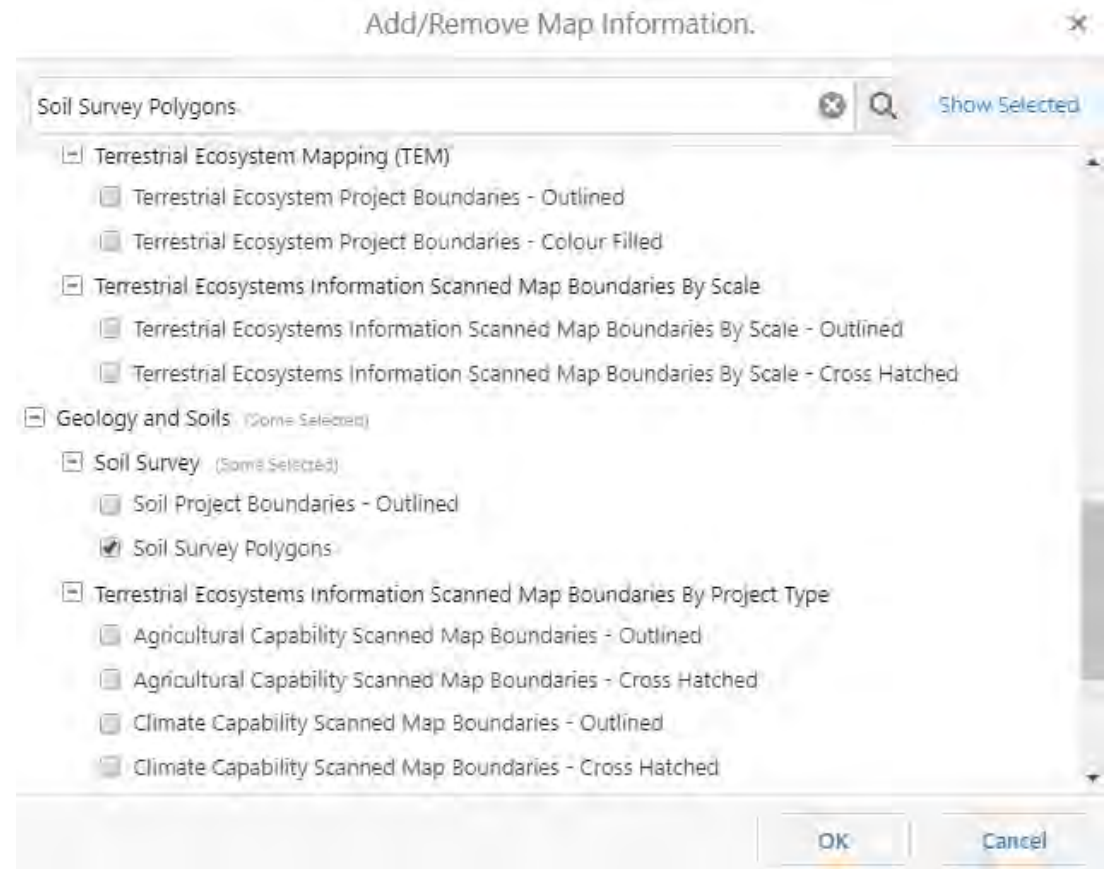
Soil and Terrain Mapping

<https://maps.gov.bc.ca/ess/hm/imap4m/>



Soil and Terrain Mapping

- 1:50,000 soil and terrain mapping database
- Soil survey information:
 - Soil texture
 - Drainage
 - Coarse fragment content
 - Parent material
 - Soil classification & links to field observations
- Terrain survey information:
 - Often sparse
 - Surficial material (i.e., parent material)



Reclamation Considerations



- Topsoil (A and B soil horizons)
 - Effective stripping of topsoil materials for use in rough and loose surface prep
- Preservation of coarse woody debris (CWD)
- Slope stability
- Erosion and sediment control

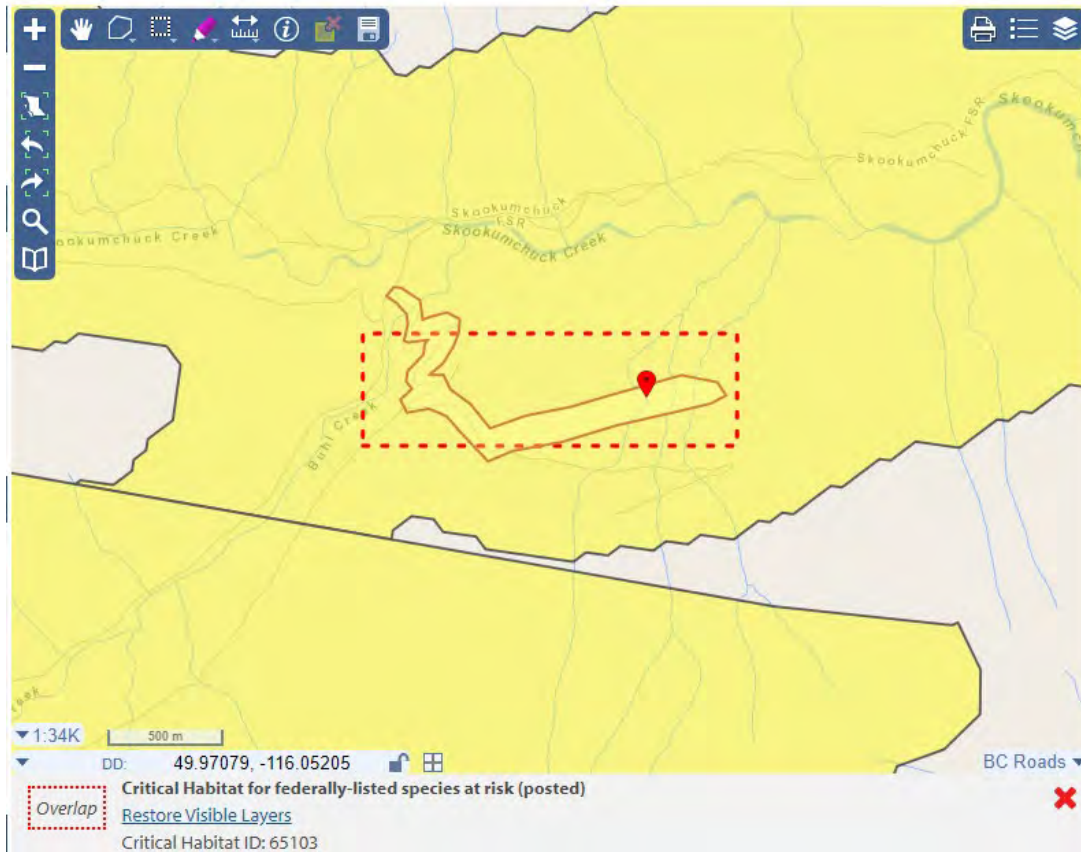
Planning

Terrestrial Wildlife Considerations

<https://portal.nrs.gov.bc.ca/web/client/explore>



Terrestrial Wildlife Habitat



- Explore by Location Tool
 - Category of Interest: Mining
 - Ungulate Winter Range (UWR)
 - Category of Interest: Fish and Wildlife
 - Critical habitat for federally-listed species at risk

Reclamation Considerations

- Ungulate Winter Range (UWR)
 - May require stand stocking and retention of forest cover (e.g., snow retention, mature cover)
 - Mineral exploration may be exempt from General Wildlife Measures in UWR Order
- Caribou Critical Habitat or Legal UWR
 - Notice of Work (NOW) permit conditions
 - Full reclamation of trails and pads
 - Rough and loose surface prep
 - Coarse woody debris (CWD)
 - Seeding with alder
 - Planting to stocking standards

Rough & Loose with CWD (Year 1)



Rough & Loose with CWD (Year 2)



Rough & Loose with CWD (Year 3)



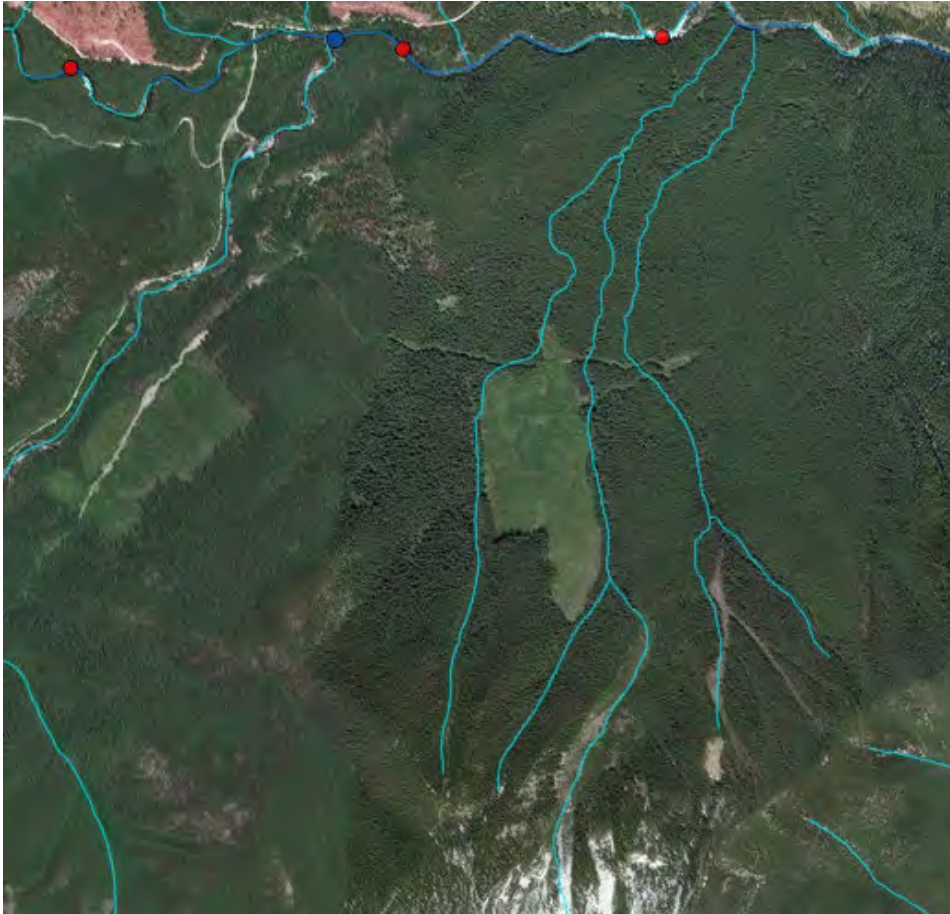
Planning

Fisheries Information

<https://maps.gov.bc.ca/ess/hm/imap4m/>



Stream Crossings



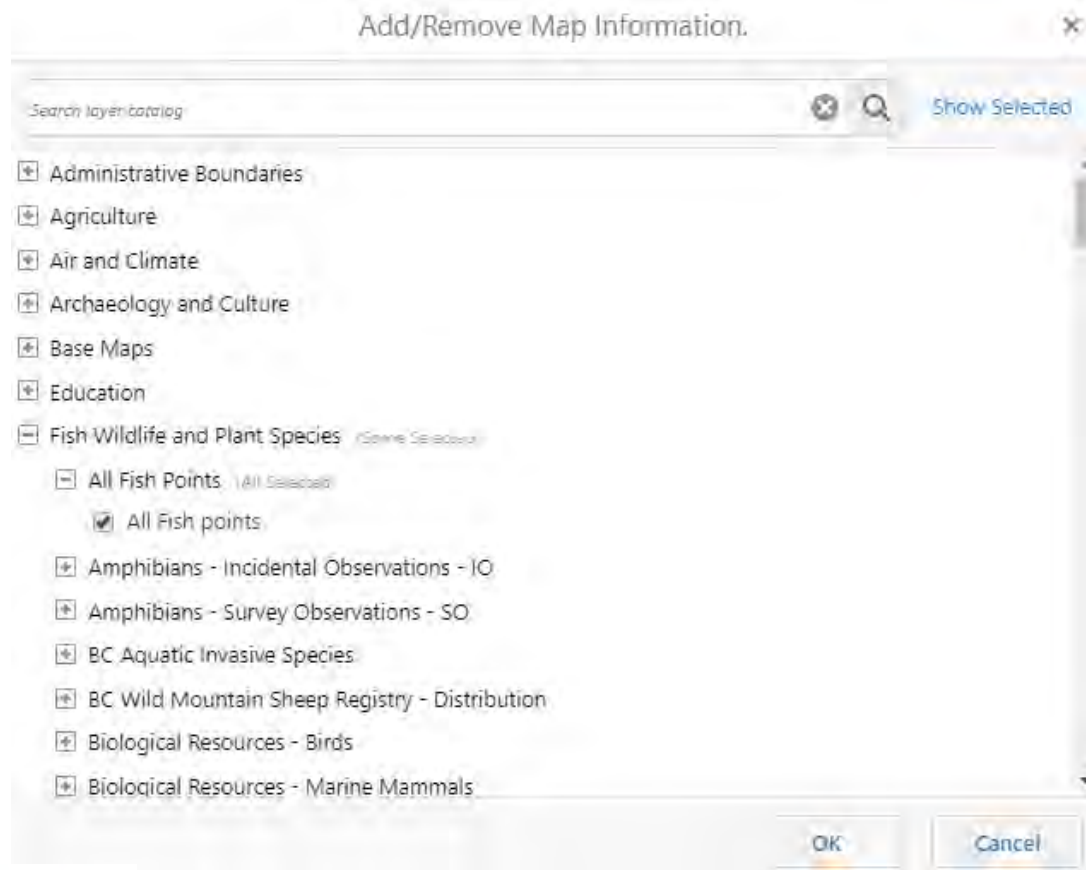
Add/Remove Map Information. ×

FWA - Stream Network - Lines × Q [Show Selected](#)

- [-] Base Maps (Some Selected)
 - [-] Freshwater Atlas (Some Selected)
 - FWA - Obstructions - Labels
 - FWA - Stream Network - Labels
 - FWA - Stream Network - Lines
 - FWA - Rivers - Outlined
 - FWA - Wetlands - Labels
 - FWA - Wetlands - Outlined
 - FWA - Named Watersheds - Labels
 - FWA - Named Watersheds - Outlined
 - [-] Fresh Water and Marine
 - [-] Water Resource Management - Water Allocation Restrictions
 - Water Allocation Restrictions - Labels

OK Cancel

Fish-Bearing Streams



- Publicly available data may show no fish observations, assume fish-bearing until proven otherwise
- Importance of ground-truthing project site
- Different construction and reclamation requirements under section 9 of the Code

Fish-Bearing Streams

Table 1. Highest (dark shaded) and Lowest (un-shaded) Risk Periods for Lower Mainland Fish Species

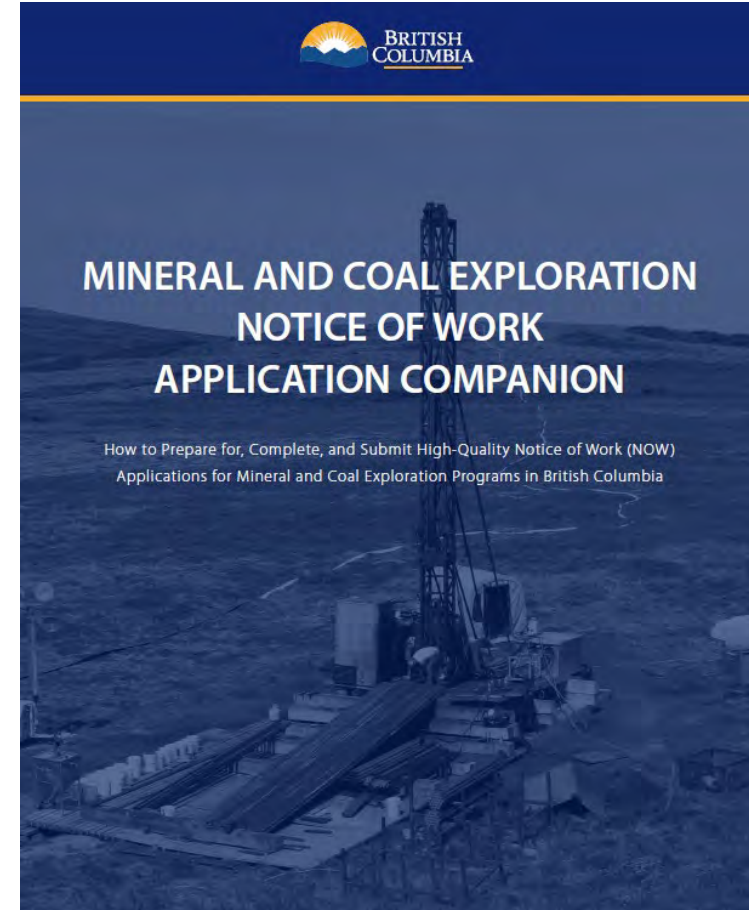
	Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct	Nov	Dec
Rainbow, Steelhead, Cutthroat	Dark	Dark	Dark	Dark	Dark	Dark	Dark	Unshaded	Unshaded	Unshaded	Dark	Dark
Dolly Varden, Bull trout	Dark	Dark	Dark	Dark	Dark	Unshaded	Unshaded	Unshaded	Dark	Dark	Dark	Dark
Kokanee	Dark	Dark	Dark	Dark	Dark	Unshaded	Unshaded	Unshaded	Dark	Dark	Dark	Dark
Pacific salmon	Dark	Dark	Dark	Dark	Dark	Dark	Unshaded	Unshaded	Unshaded	Dark	Dark	Dark

Reclamation Considerations

- Stream crossings must be constructed, maintained, deactivated and reclaimed in a manner that allows safe fish passage and protection of fish habitat at, above and below the crossing
- Different requirements for reclamation vs. deactivation
- Reclamation must result in:
 - Restoration of drainage patterns
 - Removal of structures (bridges or culverts)
 - A stable surface that minimizes erosion
 - The establishment of self-sustaining vegetation appropriate for the site

Guidance Document: March 2020

- Provincial guidance document for Notice of Work exploration permitting
- In draft form, expected to be released March 2020
- Provides helpful guidance to ensure all required information is contained within a permit application
- Includes consideration of reclamation and bond calculator

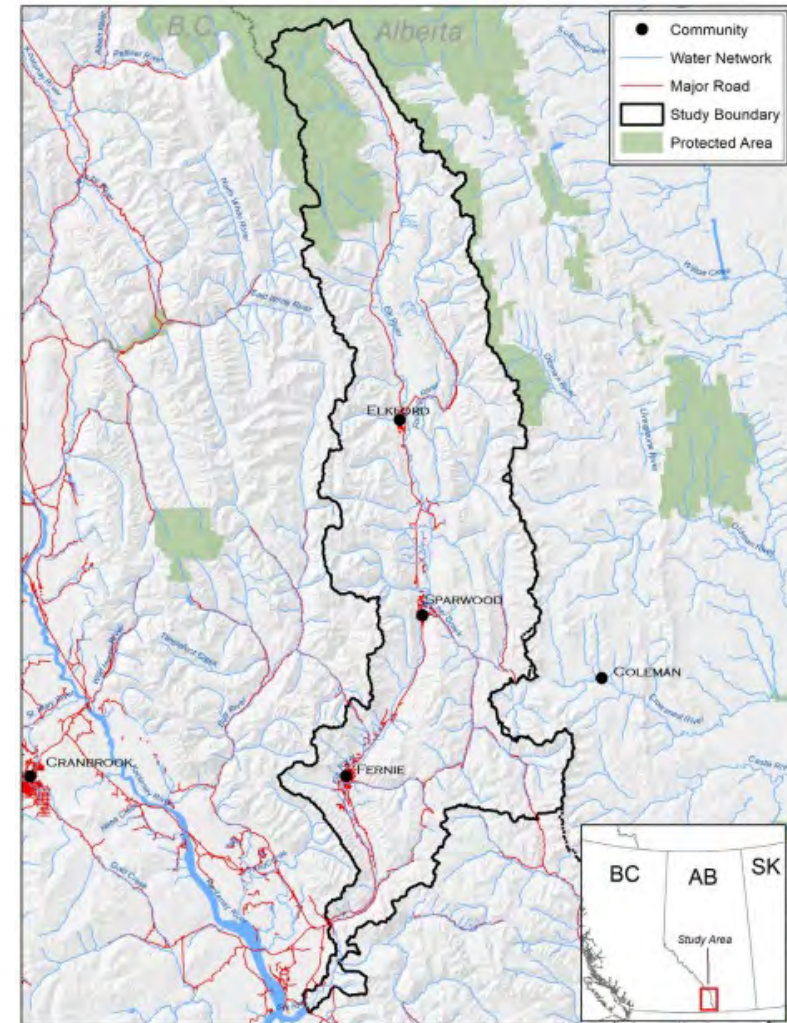


PART 2: Cumulative Effects Case Study



Cumulative Effects Case Study

- Elk Valley NOW permit application (multi-year area-based)
- Elk Valley Cumulative Effects Management Framework (CEMF) model used to predict impacts associated with development of access trails, roads and drill pads
- Impacts considered for 5 CEMF VCs (grizzly bear, bighorn sheep, westslope cutthroat trout, riparian habitat, old and mature forests)



Cumulative Effects Case Study



- Collaborative review team including First Nations, proponent, government agencies and private consultants
- Developed mitigation/management plans in response to predicted cumulative effects
- Consideration of mitigation measures reduced or maintained hazards for VCs (minimal impact)

Cumulative Effects Case Study

- Implement road deactivation and reclamation
- Re-establishment of native ecosystems, reduce erosion and sedimentation, realign roads in steep terrain and/or in proximity to riparian areas or wildlife habitat features
- Facilitated a thorough understanding of each others' perspectives



Questions?



Keefeer Ecological Services Ltd.

Cranbrook, BC

250-489-4140  www.keefereco.com