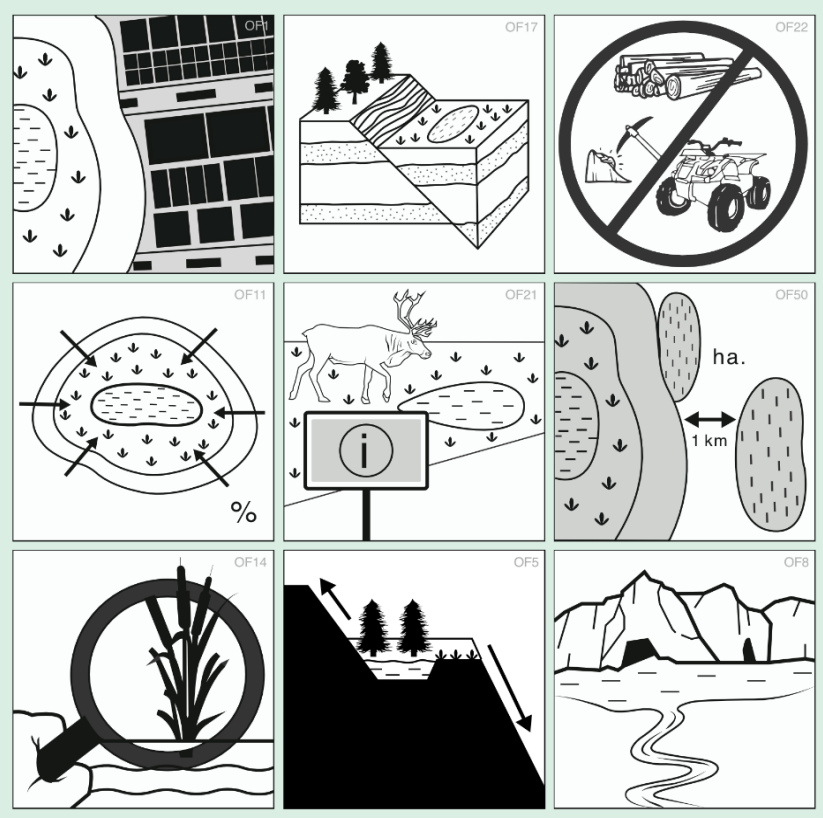
Desktop Assessment Guide

Wetland Ecosystem Services Protocol B.C.



BC Wildlife Federation

June 16, 2026

Citation:

BC Wildlife Federation 2026. Wetland Ecosystem Services Protocol: Desktop Assessment Guide. BC Wildlife Federation. Conservation Stewardship Department. Version 1.0 beta. Surrey, B.C

Table of contents

1 Introduction

This guide is a technical resource that enables users to complete the Wetland Ecosystem Services Protocol (WESP-BC) Desktop Assessment. Before beginning the Desktop Assessment, users should be familiar with the User Manual for WESP-BC and have completed the WESP-BC Field Assessment.

The Desktop Assessment requires interpreting satellite imagery and provincial spatial datasets to answer 44 questions. While this guide references publicly available province-wide datasets, users are encouraged to utilize higher-quality local data or superior imagery where available. Local knowledge and field notes should also be available while completing this assessment.

All datasets mentioned are intended as reference resources; final responses should be based on the most suitable answer using professional judgment. Observations made during the field assessment including defined boundaries, land use observations, field notes, and interpretation of recent imagery must be prioritized over spatial datasets, which may be outdated or contain inaccuracies or not appropriate for the area of assessment.

This guide provides step-by-step instructions to assist users when deciding between multiple options. It is designed with the following principles in mind:

- **Proportional Effort:** In many cases, all analysis steps listed here will not be necessary. For most sites, answers will clearly fall into the lowest or highest categories, and exact calculations of area or percent cover may not be required
- **Oversight:** The process encourages manual oversight of every question to mitigate issues arising from mapping inaccuracies or limited data
- **Optimization:** Users are encouraged to pursue opportunities for automation, provided that the integrity of the "best available data" is maintained

All final responses must be entered into the current **WESP-BC Desktop Survey123 Form** for each site. Once the desktop questions are submitted, the .csv outputs from both the Field and Desktop Assessments are used within the **wespr** tool to calculate the final function and benefit scores and ratings.

Most desktop-based questions described in this manual require the use of GIS. A variety of different software can be used to complete this analysis. In this guide, examples of GIS processes are written for ArcGIS Pro 3.6, although equivalent tools commonly exist for alternative GIS software. Some of the foundational skills to use the software have been described in Appendix A. The GIS instructions included in this guide assume a basic

working knowledge of GIS and the ability to utilize tools for analysis and data preparation including: the creation of buffers, erasing features, clipping features, calculating geometries, summarizing statistics, selecting intersecting features, etc.

In some cases, geospatial files used as input in the analysis may be outdated, and no longer reflect current conditions (for example, a new clearcut, fire, or adjacent development may have cleared adjacent land and could impact the corresponding questions regarding adjacent conditions). Higher-quality or more recent local datasets (for example, drone imagery, local mapping) should be used where available and may supersede province-wide datasets. Users are advised to use the highest-quality data and professional judgement to answer these questions.

Data preparation

To make the Desktop Assessment as efficient as possible, some preparatory processing should be completed first. To support repeatability of the results for peer review, auditing or other quality assurance purposes, the datasets created for the Desktop Assessment should be retained and accompany the other data collected and packaged with WESP-BC results. To simplify file names, it is recommended to save all layers within one folder with the suggested standardized naming scheme provided in quotations in Table 1.1 under the column Data Layer Name.

Prior to answering the Desktop Assessment Survey123 questions it is recommended to digitize features (polygons and polylines) collected specifically for your site and ideally have already digitized any field confirmed features of targeted areas ready. Field observations may require you to modify: your Assessment Area (AA), Contributing Area (CA), streams, and open water features. A full list of digitized features to prepare is recommended to facilitate your analysis in Table 1.1. Note that the buffers recommended may be useful to determine presence or absence of specific occurrences (for example, roads or lakes) within a certain distance of the AA. In some cases, buffers are used to clip other datasets to calculate areas or determine percent coverage.

Table 1.1 Recommended Features to Digitize and Naming Conventions for Desktop Assessment

Data Layer Name	Description	Relevant Question(s)
AA*	AA, based on AA guidance in the WESP-BC User Manual Attributes including area in Hectares (Ha)	All questions
wetland_entire	Entire estimated area of the wetlands if the AA is only a portion of the AA.	OF11
AA_OpenWater*	Open water observed in the field	
Streams_field_verified *	Streams mapped based on recent imagery or field observations	
Buffer_100m	100 m buffer including the AA	OF21, OF36
Buffer_100m_excluding_AA	100 m buffer around the AA with excluding the wetland	OF30
Buffer_1km	1 km buffer polygon around the AA	OF34
Buffer_2km	2 km buffer polygon around the AA	OF18, 19, 37
Buffer_2km_excluding_AA	2 km buffer around the AA with the AA polygon excluded	OF 31, 32, 33
Buffer_5km	5 km buffer polygon around the AA	OF 34
Buffer_10km	10 km buffer polygon around the AA	OF 4
Lakes_clipped_2km**	All mapped lakes clipped to a 2km buffer Hectares field calculated	OF 18, 19
Wetlands_clipped_2km**	Portions of mapped wetlands inside the 2 km buffer of the AA Hectares field calculated	OF 19
Wetland_100m_Buffer**	Wetlands within 100 m buffer	OF 12
CA_polygon*	Manually digitized polygon representing the full contributing area	OF 11
CA_excluding_AA	Contributing area polygon where AA is removed	OF 11
Disturbed_WAU**	Disturbance within the WAU boundary	OF 41
WAU**	Assessment Watersheds Unit (WAU) that wetland falls within	OF 12, 41, 42, 43
Forests_within2km**	Forests within 2 km buffer	OF 33
AA_Landcover**	Land cover features clipped to the AA	OF 35
Landcover_1km**	Land cover within 1 km buffer	OF 34
Landcover_5km**	Land cover within 1 km buffer	OF 34
Landcover_AA_100m**	Landcover within 100 m including AA	OF 36
Mature_OldGrowth_within2km**	Mature or old growth forests within 2 km buffer	OF 33
Roads_WAU**	Roads with the WAU boundary	OF 42
HumanDisturbance_2km**	Human disturbance layer clipped to within 2 km	OF 32

Data Layer Name	Description	Relevant Question(s)
AllRoads_100m**	All roads within 100 m buffer of the AA	OF 30
AA_DesignatedOverlap**	Portion of the AA intersecting designated conservation/ecological lands	OF 21
*- Digitization of this feature to incorporate observations from field ** - These layers will require supplementary data sets. See Table 1.2. for recommended data sources.		

Accessing publicly available datasets

Many questions in this assessment will require review of publicly available datasets. Table 1.2 provides a list of recommended datasets to consider as part of your analysis and are referenced along with the guidance for each office question in Section 2. Where available, both links to datasets and permalinks underneath for sources are provided that have provincial wide distribution in B.C. These datasets are suggested as a starting point but may be replaced by higher-quality locally available data. Most of these datasets can be viewed on iMap or downloaded from the BC Data Catalogue.

For user convenience, a package is available on GitHub[1] that contains a subset of layers that can be obtained using the package. This package can be run by a beginner in RStudio and only requires the AA to be input as a .gpkg file. The package then identifies the Assessment Watersheds Unit and a 10 km buffer as the Area of Interest (AOI), for which all layers available are downloaded to a single folder. Other options for viewing and downloading the required spatial datasets are described in Appendix A.

[1] https://bcwf-wetlands.github.io/wespr/articles/prepare_spatial_data.html

Table 1.2. Recommended datasets for Desktop Assessment

Dataset name	Question relevance	Not included in preparing spatial data package	Permalink	Reference
Aerial Imagery for the site and surrounding area	All	X	-	Select most appropriate for the area
Land Cover Mapping	OF 34, 35, 36, 37	X	-	Select most appropriate for the area
BC Wildfire Fire Perimeters – Historical	OF 15	-	https://catalogue.data.gov.bc.ca/dataset/22c7cb44-1463-48f7-8e47-88857f207702	Government of British Columbia 2025b
BC Cumulative Effects Framework - Human Disturbance	OF 31, 32, 41	-	https://catalogue.data.gov.bc.ca/dataset/7d61ff12-b85f-4aeb-ac8b-7b10e84b046c	Government of British Columbia 2023a
BC Cumulative Effects Framework – Integrated Roads	OF 2, 9, 30, 42	-	https://catalogue.data.gov.bc.ca/dataset/a489bc6a-f676-4503-8cd7-dcf0bdf2ae99	Government of British Columbia 2025a
BC Historical Fish Distribution – Points (50,000)	OF 20	-	https://catalogue.data.gov.bc.ca/dataset/3b723ef2-abd4-4722-abea-9a51258eae15	Government of British Columbia 2006
Conservation Lands	OF 21, 22	-	https://catalogue.data.gov.bc.ca/dataset/68327529-c0d5-4fcb-b84e-f8d98a7f8612	Government of British Columbia 2025c
Critical Habitat for Federally-Listed Species at Risk - Posted	OF 21	-	https://catalogue.data.gov.bc.ca/dataset/076b8c98-a3f1-429b-9dae-03faed0c6aef	Government of British Columbia 2024a
Designated Lands (GitHub File)	OF 21, 22	-	https://github.com/bcgov/designatedlands/releases/download/v0.1.0/designatedlands.gpkg.zip	-
Digital Road Atlas (DRA) – Master Partially – Attributed Roads	OF 2 (if applicable), 12, 30, 31, 42	-	https://catalogue.data.gov.bc.ca/dataset/bb060417-b6e6-4548-b837-f9060d94743e	Government of British Columbia 2025d
Ecoprovinces - Ecoregion Ecosystem Classification of British Columbia	OF 44	-	https://catalogue.data.gov.bc.ca/dataset/51832f47-efdf-4956-837a-45fc2c9032dd	Government of British Columbia 2004
Freshwater Atlas – Lakes	OF 3, 18, 19	-	https://catalogue.data.gov.bc.ca/dataset/cb1e3aba-d3fe-4de1-a2d4-b8b6650fb1f6	Government of British Columbia 2008b
Freshwater Atlas – Rivers	OF 6, 9	-	https://catalogue.data.gov.bc.ca/dataset/f7dac054-efbf-402f-ab62-6fc4b32a619e	Government of British Columbia 2025e

Dataset name	Question relevance	Not included in preparing spatial data package	Permalink	Reference
Freshwater Atlas – Stream Directions	OF 6, 8, 9, 10, 11	-	https://catalogue.data.gov.bc.ca/dataset/d7165359-52ef-41d0-b762-c53e3468ff3f	Government of British Columbia 2023b
Freshwater Atlas – Glaciers	OF 8	-	https://catalogue.data.gov.bc.ca/dataset/8f2aee65-9f4c-4f72-b54c-0937dbf3e6f7	Government of British Columbia 2008a
Freshwater Atlas – Stream Network	OF 6, 8, 9, 10, 11	-	https://catalogue.data.gov.bc.ca/dataset/92344413-8035-4c08-b996-65a9b3f62fca	Government of British Columbia 2024b
Freshwater Atlas – Assessment Watersheds	OF 5, 6, 9, 12	-	https://catalogue.data.gov.bc.ca/dataset/51f20b1a-ab75-42de-809d-bf415a0f9c62	Government of British Columbia 2008c
Freshwater Atlas – Watershed Boundaries	OF 11	-	https://catalogue.data.gov.bc.ca/dataset/ab758580-809d-4e11-bb2c-df02ac5465c9	Government of British Columbia 2025f
Freshwater Atlas – Wetlands	OF 19, 43	-	https://catalogue.data.gov.bc.ca/dataset/93b413d8-1840-4770-9629-641d74bd1cc6	Government of British Columbia 2025g
Geology Faults	OF 17	-	https://catalogue.data.gov.bc.ca/dataset/c94e0c13-5385-49c1-9922-822e10135fc6	Government of British Columbia 2018
Municipalities - Legally Defined Administrative Areas of BC	OF 1	-	https://catalogue.data.gov.bc.ca/dataset/e3c3c580-996a-4668-8bc5-6aa7c7dc4932	Government of British Columbia 2016
NGO Conservation Areas – Fee Simple	OF 22	-	https://catalogue.data.gov.bc.ca/dataset/a306e21b-58d6-4b71-bac7-f3b1c8a4c779	Government of British Columbia 2024c
Reconnaissance Karst Potential Mapping	OF 16	-	https://catalogue.data.gov.bc.ca/dataset/395568e1-d233-4217-9732-7afadb6f4265	Government of British Columbia 2002
Species and Ecosystems at Risk - Publicly Available Occurrences - CDC	OF 21, 22, 24	-	https://catalogue.data.gov.bc.ca/dataset/0e035e55-f257-458f-9a96-80c01c69d389	Government of British Columbia 2025i
TANTALIS – Wildlife Management Areas	OF 21, 22, 24	-	https://catalogue.data.gov.bc.ca/dataset/f3ece977-aa7f-4cb2-b7d0-de64155f6c83	Government of British Columbia 2025k
TANTALIS – Conservancy Areas	OF 21, 22	-	https://catalogue.data.gov.bc.ca/dataset/550b3133-2004-468f-ba1f-b95d0e281e78	Government of British Columbia 2025j
Ungulate Winter Range – Approved	OF 21	-	https://catalogue.data.gov.bc.ca/dataset/712bd887-7763-4ed3-be46-cdaca5640cc1	Government of British Columbia 2025l

Dataset name	Question relevance	Not included in preparing spatial data package	Permalink	Reference
VRI – Forest Vegetation Composite Polygons	OF 28, 29, 38, 39, 40	X	https://catalogue.data.gov.bc.ca/dataset/6ba30649-14cd-44ad-a11f-794feed39f40	Government of British Columbia 2024d
VRI – Relational Data Dictionary		X	https://www2.gov.bc.ca/assets/gov/farming-natural-resources-and-industry/forestry/stewardship/forest-analysis-inventory/data-management/standards/vegcomp_poly_rank1_data_dictionaryv5_2019.pdf	Government of British Columbia 2019
Old Growth Technical Advisory Panel (TAP) – Old Forests	OF 33	X	https://catalogue.data.gov.bc.ca/dataset/6f08c9d8-d6c0-4f08-ac64-54585c92ccb0	Government of British Columbia 2026a
Wildlife Species Inventory – Incidental Observations –Publicly Available	OF 24	-	https://catalogue.data.gov.bc.ca/dataset/7d5a14c4-3b6e-4c15-980b-68ee68796dbe	Government of British Columbia 2025o
Wildlife Species Inventory – Survey Observations - Publicly Available	OF 24	-	https://catalogue.data.gov.bc.ca/dataset/8f45a611-ce07-4e9f-a4b5-27e123972816	Government of British Columbia 2025n
Wildlife Species Inventory – Telemetry Points – Publicly Available	OF 24	-	https://catalogue.data.gov.bc.ca/dataset/6d48657f-ab33-43c5-ad40-09bd56140845	Government of British Columbia 2025p
Wildlife Habitat Features – Incidental Observations – Publicly Available	OF 24	-	https://catalogue.data.gov.bc.ca/dataset/50dc6ba5-8883-4bfc-b3aa-b420b190b45b	Government of British Columbia 2025m
Wildlife Habitat Features – Survey Observations – Publicly Available	OF 24	-	https://catalogue.data.gov.bc.ca/dataset/884c20fa-17c1-491a-b5cb-993be5dff8d3	Government of British Columbia 2025n
Secured Species at Risk Observations from Conservation Data Center (data request required)	OF 24	-	https://www2.gov.bc.ca/gov/content?id=302E3F5E951C40058683EA767135BA7B	Government of British Columbia 2026b

Additional information on reviewing provincially available datasets is available in Appendix A: 3.

Optimizing layer visualization

When visualizing data layers in a geographic information system (GIS), it may be advantageous to make each layer partially transparent to visually consider multiple layers at once. To optimize the mapping experience, it may be advantageous to strategically arrange the order of relevant layers (Appendix A: 2).

2 Desktop Assessment Survey123

How to interpret question guidance

Each Desktop Assessment question described below includes recommended datasets, analysis process, and in some cases additional guidance to consider when answering each question. The description for each question may not include every component, but generally follows a similar structure as shown in the pop-out box below.

OF#: The indicator that corresponds to the Survey123 question and other WESP-BC resources

Relevant layers and datasets:

- Links to layers that may be beneficial to consider
- Aerial Imagery – may also be listed if key to consider

"Exact question as described on the Survey123 form"

Notes:

- Additional hints or helpful information may be included in a note. This is typically also included in the Survey123 form

Question options including specification of answer format (select one, select multiple, integer, decimal etc.):

- Options or text data
- Formatted to match Survey123 form options
    1. Specific steps to complete analysis will be included,
        i. These steps may include links to specific appendix resources.
    2. If the answer is obvious from reviewing datasets and imagery these steps may not be required to complete for all sites

OF 1: Distance to community

Relevant layers and datasets:

- Assessment Area (AA)
- Aerial Imagery
- Municipalities - Legally Defined Administrative Areas of B.C.

"The distance from the AA's edge to the nearest settlement (>5 residences per square km) or legally recognized municipality or community is:"

Notes:

- Settlements can include clusters of homes, small communities, municipalities, or reserves. Use your judgment based on visible infrastructure and settlement patterns
- When there is a cluster of 5 or more residences within 1 km2, measure the distance to the nearest of those residences
- Use the most recent imagery to visually inspect the area. Apply buffers or the measure tool to determine the distance to the nearest residential area

Select one of the following:

- < 100 m
- 100 - 500 m
- 500 m - 1 km
- 1 - 5 km
- > 5 km

OF 2: Distance to frequently travelled road

Relevant layers and datasets:

- B.C. Cumulative Effects Framework – Integrated Roads – 2025
- Digital Road Atlas (DRA) – Master Partially – Attributed Roads
- Aerial Imagery

"The distance from the AA center to the nearest road with an average daytime traffic rate of > 1 vehicle/ minute is:"

Notes:

- Only consider paved roads, confirm with aerial imagery or the Digital Road Atlas for road classification. DO NOT include trails, ATV routes, or unmaintained roads

Select one of the following:

- < 10 m
- 10 - 25 m
- 25 - 50 m

- 50 - 100 m
- 100 - 500 m
- > 500 m

1. Add the relevant layers/datasets
2. Adjust the symbology for clarity
3. Measure the distance from the center of the AA to the nearest main paved road, or use the buffers to visually determine distance to the nearest road

OF 3: Distance to ponded water

Relevant layers and datasets:

- Aerial Imagery
- Freshwater Atlas – Lakes

"The distance from the AA edge to the closest (but separate) body of fresh water (wetland, pond, or lake) that is ponded all or most of the year:"

Notes:

- This is to determine the distance from the AA to the nearest ponded freshwater feature (**not** rivers or streams)
- Consider wetlands that may be separating ponded water and the AA such as: paved roads, bare ground, or impervious surfaces
- Focus on separate ponded features that do not appear to be part of the same continuous wetland
- You may count ponded areas obscured by vegetation if imagery, seasonal differences, or where persistent saturation indicators suggest they are present

Select one of the following:

- <100 m, and NOT separated by any width of paved roads, bare ground, or impervious surface
- <100 m, but completely separated by those features
- 100 m-1 km, and not separated
- 100 m-1 km, but separated by those features
- 1-5 km, and not separated
- 1-5 km, but separated by those features
- None of the above (the closest patches or corridors that are large, are more than 5 km away)

1. Add the **Freshwater Atlas – Lakes** layer.
2. Identify the AA and use the **Freshwater Atlas – Lakes** and ESRI imagery basemap or other aerial imagery to visually locate nearby ponded water

3. Measure from the edge of the AA to the nearest ponded feature:
    i. If separated by roads, bare ground, or impervious surfaces wider than 100 m, treat that body of water as being separate from the AA

OF 4: Distance to lakes

Relevant Layers and Datasets:

- Aerial Imagery
- Freshwater Atlas – Lakes

"The distance from the AA edge to the closest (but separate) ponded water body larger than 8 hectares during most of a normal year is:"

Notes:

- Ensure the lake is within the 10 km buffer (lakes smaller than 8 ha should be excluded)
- In ArcGIS Pro, the **Select Features by Location** tool may be used to highlight **Freshwater Atlas – Lakes** within 10 km of the AA. This list may then be filtered to lakes greater than 8 ha

Select one of the following:

- <100 m
- 100 m-1 km
- 1-5 km
- 5-10 km
- >10 km

1. Consider **Buffer_10km.**
2. Identify the AA and use the imagery basemap to visually locate the nearest lake (ponded water > 8 ha)
3. Measure from the edge of your AA to the nearest lake.

OF 5: Relative elevations in watershed

Relevant Layers and Datasets:

- Digital Elevation Model layer(s). Alternatively elevation data from visual inspection on Google Earth
- Freshwater Atlas – Assessment Watersheds
- Assessment Area polygon (AA_polygon)

"Relative elevation = (AA Elevation – Minimum Elevation)/Elevation Range of Watershed)"

Notes:

- Ensure usage of the **Freshwater Atlas – Assessment Watersheds** layer. Assessment Watersheds Units (WAUs) were designed for understanding elevation a local context

Input Decimal Value (0 to 1.0):

1. Add the Assessment Area and the **Freshwater Atlas – Assessment Watershe**ds layer.
   i. Use the **Select** tool on the **Assessment Watersheds** Layer and select the watershed that intersects the AA
   ii. Then create a separate shapefile of just that Assessment Watersheds unit. If multiple watersheds exist, choose the largest one
   iii. Add relevant DEM layer(s), by selecting all DEMs that overlap with the Assessment Watersheds unit. DEM layers are packaged in grids like a checkerboard, and you may need more than one to complete this task. This will require that you look up the appropriate reference map sheets to download the appropriate DEMs. Looking up the mapsheet reference numbers is possible on iMap BC by adding and viewing layers: **Basemaps – Mapsheet Grid 20K,** and then recording the alphanumeric numbers of the grids of interest. You can then download the associated DEM(s) from BC data warehouse
   iv. Use the **Mosaic to New Raster** tool to combine adjacent DEMs into one raster
   v. **Clip** or **Extract by mask** the aggregate DEM raster with your Assessment Watersheds unit to create a DEM just for the watershed of interest
   vi. Now you can use the **Attribute Table**, or **Get Raster Properties**, to record the minimum and maximum elevations of the watershed
   vii. Alternatively, to skip steps iii to step vi, you can save and then import a kml layer of your Assessment Watersheds layer and your AA into Google Earth. Determine the maximum and minimum elevation of the AA's watershed (not the AA's catchment). Then subtract the watershed minimum elevation from the AA's median elevation, divide by the watershed's elevation range (max-min) (see formula in number 2). Assessment Watersheds
2. Calculate relative elevation using the formula below:

$$\textbf{Relative Elevation} = \frac{\textbf{AA Elevation} - \textbf{Minimum Elevation in the watershed}}{\textbf{Elevation Range of Watershed}}$$

3. Input decimal value (0 to 1.00)

- This calculation expresses the AA's elevation relative to its watershed: whether it lies near the bottom, middle, or top (headwater) of the watershed

OF 6: Stream intersect

Relevant Layers and Datasets:

- Aerial Imagery
- Freshwater Atlas – Assessment Watersheds
- Freshwater Atlas – Stream Directions – Points
- Freshwater Atlas – Stream Network – Lines, Edge Type
- Freshwater Atlas – Rivers

"Do topographic maps or the Freshwater Atlas show a stream flowing out of the AA's wetland and into a downslope stream network, or does the AA abut a stream/river and is probably flooded by the stream/river periodically?"

Notes:

- In the Freshwater Atlas – Stream Network, the following line types should be ignored unless field observations indicate otherwise:
  - Flow Connector
  - Isolated Waterbody Skeleton
  - Underground Connector
  - Inferred Connector

Select one of the following:

- Yes
- No

1. Add the relevant layers/datasets.
2. To symbolize streams:
   i. In the **Contents** pane, right-select the layer (for example, Stream Network) > **Symbology** > set Primary Symbology = Unique Values.
   ii. In the **Field** drop-down, select EDGE_TYPE
   iii. **Add All Values** except for the above specified line types
3. Visually inspect whether the AA polygon intersects with valid streams or rivers
   i. Use aerial imagery and stream direction points to confirm flow direction
4. Interpret results:
   i. If a clear stream flows out of the AA and connects to the downslope network → Yes
   ii. If the AA abuts a river that can flood it periodically → Yes
   iii. Otherwise → No

OF 7: Aspect

Relevant layers and datasets:

- Elevation or slope and aspect raster (for example, RESULTS Openings Slope Aspect and Elevation)
- Topographic contours (for example, TRIM Contour Lines, Local Government mapping contour lines)

"The overland flow direction of most surface water (in streams, rivers, or runoff) that enters the AA is: N, NE, S, SE, E SE, W, NW, or flat"

Note:

- If flow direction is unclear or diffuse, consider the mean aspect of the surrounding watershed.

Select one of the following:

- Northward (N, NE), north-facing contributing area
- Southward (S, SW), south-facing contributing area
- Other (E, SE, W, NW), or no detectable uphill slope or input channel (flat)

1. Add the AA polygon and an elevation or slope/aspect raster
    i. For easier interpretation, add a Hillshade or Aspect raster (for example, BC DEM Hillshade)
    ii. Alternatively, use the Topographic basemap
2. Assess the surrounding terrain:
    i. Identify the dominant slope direction draining into the AA
    ii. Look for elevation patterns, flow channels, or upslope contributing areas
    iii. Use contour lines to confirm slope gradients in upland areas
3. Determine dominant flow direction entering the AA:
    i. Consider slope, stream direction, and landform orientation
    ii. If no clear slope or channel exists, treat the AA as "Flat"
4. Select the best category:
    i. If flow originates from a south-facing slope (flowing south), choose Southward (S, SW)
    ii. If flow originates from a north-facing slope (flowing north), choose Northward (N, NE)
    iii. If flow comes mainly from E, SE, W, NW, or terrain is flat, choose Other

OF 8: Glacier influence

Relevant layers and datasets:

- Freshwater Atlas – Stream Directions
- Freshwater Atlas – Stream Network

- Freshwater Atlas – Glaciers
- Glaciers

Notes:

- Consider whether the AA is in a glacial-influenced watershed or is located sufficiently downstream to experience negligible influence regarding temperature or turbidity from the glacier

Select the first true choice:

- No glacier capable of contributing surface flow to the AA is present upstream. If a glacier is present, there is no surface connection to the AA
- Glacier connected by streams to the AA is present upstream, but clarity or temperature of the AA's surface water is seldom or never affected (because it is too distant from glacier)
- Glacier connected by streams to the AA is present upstream and the clarity or temperature of the AA's surface water is regularly affected

1. Add the relevant layers/datasets
2. To check upstream of the AA, zoom to the AA polygon and pan upstream within the watershed
    i. Identify any mapped glaciers in the watershed
    ii. Use the "Freshwater Atlas – Stream Network" and "Freshwater Atlas – Stream Directions" to confirm if a surface water connection exists between the glacier and the AA
3. Interpret results:
    i. If no glacier is upstream or no surface connection exists, select Option 1
    ii. If a glacier is connected by streams but is too distant to affect water clarity or temperature, select Option 2
    iii. If a glacier is connected by streams and regularly influences AA water clarity/temperature, select Option 3

OF 9: Floodable infrastructure

Relevant layers and datasets:

- Aerial Imagery
- Freshwater Atlas – Rivers
- Freshwater Atlas – Stream Network
- Freshwater Atlas – Stream Directions
- BC Cumulative Effects Framework – Integrated Roads – 2025
- Freshwater Atlas – Assessment Watersheds

"Is there infrastructure that is at risk of flooding within 5 km of the wetland?"

Notes:

- Do **not** include agricultural fields, gravel pits, or other mined lands unless clearly built-up with public infrastructure
- Infrastructure is considered vulnerable if:
    - It has experienced flood damage in the past 100 years without protection
    - It lies within a mapped 100-year floodplain, or
    - It is in an alluvial floodplain and less than 3 m above the expected annual high water (for example, bankfull stage)
- Consider infrastructure features lying downstream or downslope within the same watershed. Consider whether upstream wetlands may mitigate flood risk; if none are relevant, record as "none"
- The "watershed" refers to the Freshwater Atlas - Assessment Watersheds layer
- Consider temporary damming effects from ice jams that could occur downstream in the vicinity of the AA

Select the first true choice:

- Within 1 km: Infrastructure vulnerable to river flooding is present downstream or downslope within 1 km of the AA and in the same watershed
- Within 5 km: Infrastructure vulnerable to river flooding is present downstream or downslope within 5 km of the AA in the same watershed
- >5 km: Infrastructure vulnerable to river flooding is present downstream or downslope at a farther distance but within the same watershed
- None: No infrastructure vulnerable to river flooding is present downstream or downslope in the AA's watershed

1. Consider **Buffer_5km** (Appendix-A)
2. Use the **Measure** tool to identify infrastructure within the buffer that is:
    i. Close to stream channels or rivers flowing downstream or out of the AA
    ii. Located on the floodplain or visibly near channels within low-lying areas
3. Look for indicators of potentially flood-vulnerable infrastructure, including:
    i. Buildings
    ii. Bridges
    iii. Actively used roads
    iv. Pipelines

OF 10: Internal flow distance

Relevant layers and datasets:

- Aerial Imagery
- Freshwater Atlas – Stream Directions
- Freshwater Atlas – Stream Network

"How long is the stream that is intersecting the wetland?"

Notes:

- This measurement represents the internal flow path through the AA
- If wetland has both an inlet and outlet, measure the distance between them. Use elevations to determine which are inlets and which are outlets and augment with field inspection
- If outlet only, measure the maximum straight-line distance within the wetland from that point
- If neither inlet nor outlet, measure wetland's maximum dimension (distance in a straight line from highest to lowest elevation).
- If wetland receives surface water only during annual flooding from an adjoining river, measure the distance along a line from wetland's upland edge extending perpendicular to the source channel.

Select one of the following:

- < 10 m
- 10-50 m
- 50-100 m
- 100 m-1 km
- 1-2 km
- > 2 km, or the wetland lacks an inlet or outlet

1. Add the relevant layers and datasets:
    i. Add the stream network layer prepared in OF 6 (with invalid EDGE_TYPE values removed)
    ii. Add aerial imagery for visual confirmation
2. Identify inlets and outlets by using stream directions and elevation/contours to determine inflow vs. outflow points
3. Open the **Measure** tool (consult Appendix A-8) to trace the channel path from inlet to outlet within the AA boundary, selecting along bends to capture curvature.
    i. If mapped streams differ from visible/field-observed channels, use the observed channel
4. If multiple streams exist, measure each candidate segment, and record the longest measure length as the internal flow distance

5. If no mapped stream is present, use elevation data/contour lines to estimate the straight-line distance between the highest and lowest points within the AA
6. Record the results length in meters and select the correct category

OF 11: Wetland as a percentage of its contributing area (catchment)

Relevant Layers and Datasets:

- wetland_entire polygon
- aerial imagery
- Freshwater Atlas – Stream Directions
- Freshwater Atlas – Stream Network
- Freshwater Atlas – Watershed Boundaries

"How big is the wetland relative to the contributing area?"

Notes:

- From a topographic map, aerial imagery, and field observations, estimate the approximate boundary of the area that is upslope from the lowest part in the wetlands, and that is likely to contribute surface or ground water to the wetland (i.e., the wetland's contributing area). No streams or ditches should cross that boundary. Adjust the boundary if necessary based on your field observations of the surrounding terrain
- When calculating area, if ponded deeper water abuts the wetland, include that in the wetland's area
- Wetlands that are located in areas with flat surrounding terrain and no inlet, or is entirely isolated by dikes, in an isolated basin (e.g., In flat, headwater areas or isolated basins, the wetland may be larger than its effective catchment

Select one of the following:

- <1%, or contributing area is unknown due to stormwater pipes that collect water from an indeterminate area
- 1-10%
- 10-100%
- >100%, wetland is larger than its contributing area (for example, headwater wetland with flat surrounding terrain and no inlet, or entirely isolated by dikes, or a raised bog). **Skip to OF13**

1. Check and calculate areas:
    i. Confirm area fields for both AA polygon and "wetland_entire polygon" (m^2 or hectares)

   i. If in m^2 convert to hectares (Shape_Area ÷ 10,000).
2. Calculate wetland % relative to the CA:
   i. Use formula below:

$$\text{Wetland \% relative to the CA} = \frac{\text{AA Area}}{\text{wetland\_entire polygon}}$$

   ii. Record results as a percentage and select the appropriate category

OF 12: Unvegetated Surface in the Wetland's Assessment Watersheds Unit (WAU):

Relevant Layers and Datasets:

- Aerial Imagery
- Freshwater Atlas Assessment Watersheds
- Digital Road Atlas (DRA) – Master Partially – Attributed Roads

"The proportion of the wetland Assessment Watershed comprised of buildings, roads, parking lots, other pavement, or bare soil at the time of peak annual runoff is about:"

Notes:

- The Assessment Watersheds unit (WAU), refers to the Freshwater Atlas Assessment Watersheds layer. The BC Data Catalogue states: "Assessment Watersheds are mesoscale aquatic units designed to replace the 3rd order 1:50K watersheds. Assessment Watersheds are based on groupings of fundamental watersheds using FWA watershed code and local code, with a target size of between 2,000 ha and 10,000 ha"

- Estimate the total area of unvegetated or impervious surfaces (for example, buildings, pavement, bare ground) within the WAU

Select one of the following:

- <10%
- 10-25%
- >25%

1. Scan the WAU for unvegetated/impervious surfaces by using aerial imagery
   i. Look for paved roads, parking lots, rooftops, bare soil, gravel, or rocky outcrops
   ii. Exclude temporary features (for example, cutblocks)
2. Use the Digital Road Atlas (DRA) layer to confirm paved and developed road segments
3. Visually estimate % of the WAU covered by impervious/unvegetated surfaces while considering the answer categories

i. If difficult to judge visually, use the **Measure** tool or digitized polygons around built-up areas to calculate

4. Record and select the appropriate answer category

OF 13: Conservation investment

Relevant Layers and Datasets:

- No layers required

"The AA is within or abuts a wetland on which public or private organizational funds were spent to preserve, create, restore, or enhance the wetland. If unsure, ask the property owner."

Notes:

- No review of spatial information required
- This question relies on local information and research on of the site. If not already known, contact the landowner or local authority to determine whether conservation, restoration, or enhancement funds were invested in the wetland

Select one of the following:

- Yes
- No

OF 14: Sustained Scientific Use

Relevant Layers and Datasets:

- No layers required

"Has there been sustained scientific use of the wetland?"

Notes:

- No review of spatial information is required
- This question relies on local information. Consider whether the AA has been monitored for more than 2 years (plants, animals, or water), with data available to the public and not tied to regulatory requirements. Also, check if the AA is part of a designated benchmark, reference, or status-trends monitoring area. If the wetland is within a park or conservation area, do a quick search to confirm whether monitoring or research has been conducted

Select one of the following:

- Yes
- No

OF 15: Burned

Relevant Layers and Datasets:

- BC Wildfire Fire Perimeters – Historical

"Has any part of the Assessment Area (AA) burned since 2010?"

Notes:

- The 100 m distance accounts for fire effects that may extend slightly beyond the mapped perimeter

Select one of the following:

- Yes
- No

1. Add the layer and ensure the AA polygon is visible
2. Visually inspect whether a fire perimeter overlaps the AA or extends within 100 m of the boundary
   i. If needed, check the burn year attribute to confirm whether the fire occurred within the last 25 years

OF 16: Karst geology

Relevant layers and datasets:

- Reconnaissance Karst Potential Mapping

"The AA's wetland is within a geologic unit having a significant karst (limestone, calcium carbonate) component."

Notes:

- Visual confirmation from local experts or detailed geological mapping is recommended where karst presence is suspected
- "Other information" may include advice of qualified geologists or other maps of local geology

Select one of the following:

- Yes
- No

1. Add the Reconnaissance Karst Potential Mapping layer
2. Arrange layers so the karst layer is displayed above the AA polygon

3. Check if the AA overlaps areas classified as High (H) or Medium (M) karst potential. Open **Attribute Table**, or identify results for any Karst polygon overlaying the wetland, and examine field KA_DEV_INT, if H (high) or M (medium), select "Y"
4. If no karst layer is available:
    i. Use regional geology layers or maps showing limestone-rich Paleozoic/Mesozoic formations

OF 17: Geologic faults

Relevant layers and datasets:

- Geology Faults

"The AA's wetland abuts or is intersected by a geologic fault."

Select one of the following:

- Yes
- No

1. Add the Geology Faults layer.
2. Compare with the AA:
    i. Ensure both the wetland (AA) and the fault line layer are visible
    ii. Arrange layers so the fault line layer is displayed above the "AA" polygon
    iii. Visually inspect whether any fault lines cross or touch the AA boundary
3. If difficult to determine by visual inspection (such as on very large sites) then consider using the intersect tool (Appendix A: 9)

OF 18: Lakes within 2 km of the AA

Relevant layers and datasets:

- Aerial Imagery
- Freshwater Atlas – Lakes

"Considering Freshwater Atlas-Lakes, consider the 2km buffer. Based on visual estimation or measurement, the percentage of that circle occupied by lakes is:"

Notes:

- Focus only on permanent open-water lakes
- Exclude wetlands, ephemeral ponds, and seasonal water bodies unless clearly mapped as lakes for this question (these other areas are considered in **OF19**)

Select one of the following:

- <2%

- 2-7%
- 8-17%
- 18-34%
- >34%

1. Consider the Freshwater Atlas – Lakes layer
   i. Visually inspect if there are any lakes within the 2km buffer
   ii. If it is difficult to determine the precise area coverage of these features, then follow steps 2- 5 to determine the areas
2. Clip wetland layers to buffer boundary (see Appendix A-12)
   i. ii. Save as **Lakes_clipped_2km** polygon
3. Calculate total areas using **Calculate Geometry** (see Appendix A-10).4. Calculate the total buffer area:
   i. In the **Attribute Table** of **Buffer_2km**, add a field for buffer area (for example, Buffer_Ha)
   ii. Use **Calculate Geometry** to populate the buffer area in hectares (see Appendix A-10)
4. Calculate the total buffer area using the formula below:

$$\text{Lake \% of Buffer} = \frac{\text{Total Lake Area}}{\text{Total Buffer Area}} \text{ X } 100$$

OF 19: Wetlands and lakes within 2 km of the AA

Relevant layers and datasets:

- Freshwater Atlas – Lakes
- Freshwater Atlas – Wetlands

"Also load this layer: Base Maps> Freshwater Atlas> Wetlands. Based on visual estimation, the percentage of that circle occupied by wetlands AND lakes combined is:"

Notes:

- You can combine the lakes and wetlands layers before measuring (for example, using the merge layers tool (See Appendix A-10), then calculate the combined area in a single step
- Consider permanent open water as well as mapped wetland areas within the buffer
- This value should be larger than the value of **OF 18** which only considered lakes within 2 km

Select one of the following:

- <2%

- 2.1-7%
- 8-17%
- 18-34%
- >34%

1. Consider the dataset created in **OF 18**.
    i. Visually inspect if there are any lakes or wetlands within the 2km buffer
    ii. If it is difficult to determine the precise area coverage of these features, then follow steps 2-4to determine the areas
2. Clip wetland layers to buffer boundary (see Appendix A-13)
    i. ii. Save as **Wetlands_clipped_2km**.
3. Calculate total areas using **Calculate Geometry** (see Appendix A-11).
4. Use the formula below to answer the question:

$$\text{Wetland + Lake \% of Buffer} = \frac{\text{Lake Area + Wetland Area}}{\text{Buffer Area}} \text{ X } 100$$

OF 20: Fish occurrence

Relevant Layers and Datasets:

- BC Historical Fish Distribution – Points (50,000)

The following iMapBC layer is required:

- Fish Wildlife and Plant Species > All Fish Points

"Score all the conditions below that are true based on your own observations, information from agency biologists, or this iMapBC layer: Fish Wildlife and Plant Species> All Fish Points (use the Identify tool and select on the points to see the species reported)."

Notes:

- Watershed connectivity and proximity determine the appropriate score option (within AA, within 8 km, or in connected parts of the watershed)
- Only wild, not stocked fish should be considered

Select all that are true:

- Chinook are present in AA
- Chinook in connected parts of same watershed within 8 km
- Chinook in other connected parts of the same watershed
- Chum are present in AA
- Chum are in connected parts of same watershed within 8 km
- Chum are in other connected parts of the same watershed
- Coho/Silver are present in AA
- Coho/Silver are in connected parts of same watershed within 8 km

- Coho/Silver are in other connected parts of the same watershed
- None of the above, but other fish species are likely present in AA. Or a stream connects the AA to other waters and is not known to be fishless
- Is known or likely to be fishless (for example, too small, dryor not accessible even temporarily, and not stocked)

OF 21: Ecological designation

Relevant layers and datasets:

- BC Parks, Ecological Reserves, and Protected Areas
- Conservation Lands
- Critical Habitat for Federally-Listed Species at Risk – Posted
- Designated Lands
- Species and Ecosystems at Risk - Publicly Available Occurrences - CDC
- Ungulate Winter Range – Approved
- TANTALIS – Conservancy Areas
- TANTALIS – Wildlife Management Areas

"Is the AA within or abuts a public or private area designated by government (public or First Nations), Nature Conservancy, or a conservation land trust for its heightened ecological importance?"

Notes:

- Ecological designations may include areas with legal protection, management restrictions, or recognized ecological value
- Designations vary by jurisdiction; confirm data sources are current before analysis

Select one of the following:

- Yes
- No

1. Add the relevant layers/datasets
2. Consider **Buffer_100m**
3. Use **Intersect** to compare **Buffer_100m** with the designated lands layer (see Appendix A-9) and save it as **AA_DesignatedOverlap** wherever a relevant layer overlaps with the 100 m buffer
4. Review the designation:
   i. Open the **Attribute Table** of **AA_DesignatedOverlap**
   ii. Locate the field indicating designation type (for example, park, ecological reserve)

iii. Confirm whether the wetland lies within or abuts a designated ecological area.

OF 22: Protection from Intensive Uses

Relevant Layers and Datasets:

- Designated Lands
- Conservation Lands
- NGO Conservation Areas – Fee Simple
- BC Parks, Ecological Reserves, and Protected Areas
- Species and Ecosystems at Risk - Publicly Available Occurrences - CDC
- TANTALIS – Wildlife Management Areas
- TANTALIS – Conservancy Areas

"Are new timber harvest, roads, mineral extraction, and intensive summer recreation (for example, off-road vehicles) permanently prohibited from the AA?"

NOTES:

- Consider any lands that contribute to conservation, such as those with legal protection, management restrictions, or excluded activities (for example, parks and protected areas, other protected areas). If such designations occur in or directly adjacent to the assessment area, record them here.

Select one of the following:

- Yes
- No

1. If any of the above layers intersect with the AA, then select "Yes"

OF 23: BGC protection percentage

The following iMapBC layer is required:

- Forest Grasslands and Wetlands > Percent BGC Subzone Variant Protected

"What percent of the wetland's biogeoclimatic subzone variant is protected?:"

Notes:

- Assign the AA to the BGC subzone variant covering the largest portion of the wetland
- In iMapBC, go to the folder titled: Forest, Grasslands and Wetlands; then select the layer titled Percent BGC Subzone Variant Protected (colour theme), the colours will display the percent breakdown
- The dataset reports the protected percentage in the Percent of Biogeoclimatic Unit Protected field

- This value reflects the percentage of the entire BGC subzone variant that is protected at the provincial scale, and not local conditions around your AA

Select one of the following:

- 0-1%
- 1-4%
- 4-8%
- 8-12%
- 12-20%
- > 20%

1. Use **Select Layer by Location** to select BGC polygons that intersect the AA:
   i. Open the **Attribute Table** of selected features
   ii. If multiple subzones overlap, determine which subzone covers the largest portion of the AA
2. Use **Calculate Geometry** if needed to measure overlap areas.
3. Determine the protection percentage:
   i. In the **Attribute Table** of the dominant BGC polygon, locate the field reporting the percent protected value, record the value, and select the appropriate category

OF 24: Species of conservation concern

Relevant layers and datasets:

- Species and Ecosystems at Risk - Publicly Available Occurrences - CDC
- Wildlife Species Inventory – Incidental Observations – Publicly Available
- Wildlife Species Inventory – Survey Observations – Publicly Available
- Wildlife Species Inventory - Telemetry Points – Publicly Available
- Wildlife Habitat Features – Incidental Observations – Publicly Available
- Wildlife Habitat Features – Survey Observations – Publicly Available

"Are there species of conservation concern (in the list below) that have been observed within a 500 m buffer of the AA?"

Notes:

- To identify species of concern near your wetland:
  - **If possible/relevant, Consult Experts:** Regional biologists, First Nations knowledge holders, and agency staff
  - **Check Public Databases:** List of provincial datasets as listed above

- Use the BC Species and Ecosystems Explorer to identify Red/Blue-listed and SARA species. Review the: BC Conservation Data Centre (CDC), also consider: eBird.org (bird records), iNaturalist.org (citizen-science observations)
    - **Request Restricted Data (if your project is eligible):** Submit assessment area polygon(s) with a 500 m buffer specified to the BC Conservation Data Centre to cdcdata@gov.bc.ca for masked/proprietary CDC records
    - Consult the BC Species and Ecosystems Explorer for the current conservation status of each species that has occurrences within or nearby your wetland. Red, Blue, and SARA listed species should be considered as of conservation concern for this question
    - Identify species of conservation concern from the relevant layers within 500 m of the AA

Select all the species of conservation concern that have been observed within a 500m buffer of the AA:

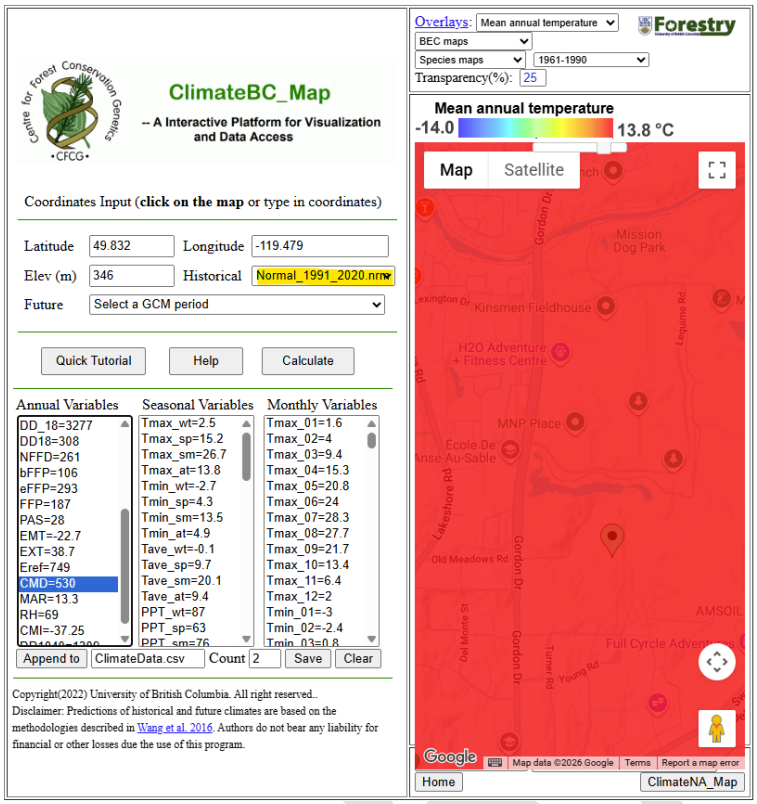
- Any plant species or community of conservation concern
- Any amphibian listed as being of conservation concern
- Either of these waterbird species of conservation concern: American Bittern, Eared Grebe
- Raptor or wetland songbird species of conservation concern: Broad-winged Hawk, Swainson's Hawk, Northern Goshawk, Peregrine Falcon, Prairie Falcon, Long-billed Curlew, Western Screech-owl, Short-eared Owl, Black Swift, Olive-sided Flycatcher, Barn Swallow, Cape May Warbler, and/or Rusty Blackbird
- Caribou

1. Use the **Explore** or **Identify** tool to obtain latitude/longitude coordinates.
2. Copy these coordinates for use in species databases
3. Review species records in available project-specific wildlife observation, eBird, iNaturalist, and any other available and relevant sources such as municipality datasets etc. Refer to notes above
4. Confirm species presence, conservation status, and habitat context based on available data, and select options if any species of conservation concern is within 500 m. There are also text fields to document which species were identified

OF 25: Local moisture deficit

“In the next column, enter the CMD value (Annual) for the raster cell containing this wetland.”

1. Using the online ClimateBC Map Viewer find the approximate location of your wetland on the map
2. Select “Normal_1991-2020” in the “Historical” drop-down menu
3. Record the CMD value (annual) for the raster cell containing this wetland



OF 26: Degree days index

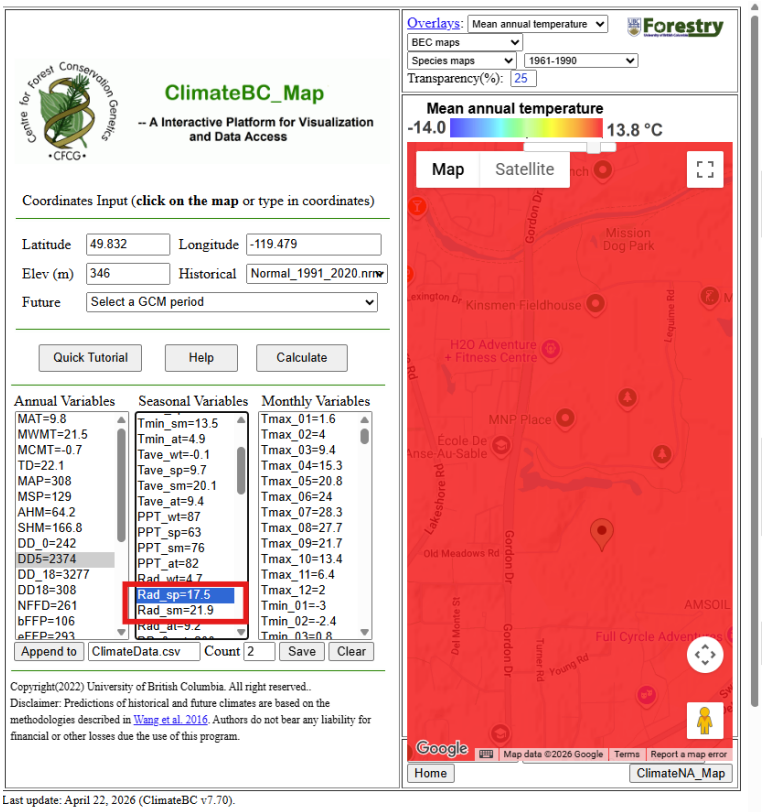
“Enter the DD>5 value (Annual) for the raster cell containing this wetland.”

1. Using the online ClimateBC Map Viewer to find the approximate location of your wetland on the map
2. Select “Normal_1991-2020” in the “Historical” drop-down menu
3. Record the DD5 value (annual) for the raster cell containing this wetland

OF 27: Local solar input

“Enter the sum of RAD_sp and RAD_sm values (Seasonal) for the raster cell containing this wetland.”

1. Using the online ClimateBC Map Viewer find the approximate location of your wetland on the map
2. Select “Normal_1991-2020” in the “Historical” drop-down menu
3. Record the sum of RAD_sp and RAD_sm values (seasonal) for the raster cell containing this wetland



OF 28: Site index (soil nutrients)

Relevant Layers and Datasets:

- VRI – YEAR – Forest Vegetation Composite Rank 1 Layer

“Enter the mean Site Index for the AA. If VRI contains no data for this attribute at AA's location, leave blank.”

Notes:

- Use the mean SI if working with a wetland that spans multiple VRI polygons. If the site index is unavailable or the value is "NaN", leave this question blank

Select one of the following:

- <6.3%
- 6.3 - 9.5%

- 9.6 - 13.3%
- 13.4 - 18.5%
- >18.5%

OF 29: Topographic position

Relevant Layers and Datasets:

- VRI – 2024 – Forest Vegetation Composite Polygons

"Enter the predominant Site_Position_Meso code (C, D, F, L, M, T, or U) the assessment area If VRI contains no data for this attribute at the AA's location, leave the next cell blank."

Notes:

- Use the provincial landform data to assign the appropriate slope position for the Assessment Area (AA). Landform codes include:
  - **D** = Depression (Valley, Local Valley in Plain)
  - **F** = Flat (Plains)
  - **L** = Lower slope
  - **M** = Middle slope (Gentle Slopes, Steep Slopes)
  - **U** = Upper slope (Hilltop in Valley, Headwaters)
  - **T** = Toe slope
  - **C** = Crest (Ridges and Peaks, Local Ridge in Plain)
- If no **T** (Toe slope) or **L** (Lower slope) code is present for the AA, use the most applicable available code based on inspection of terrain

OF 30: Road density within AA's buffer (100 m)

Relevant layers and datasets:

- Digital Road Atlas (DRA) – Master Partially – Attributed Roads
- BC Cumulative Effects Framework – Integrated Roads
- Buffer_100m_NoWetland

"Considering a buffer of 100 m from the AA's edge, identify visible roads and mapped roads in the Digital Road Atlas. The length (km) of all roads within that buffer, divided by the buffer's area, is:"

Notes:

- Include All road types (paved, unpaved, resource) within the buffer. Exclude the wetland area itself from calculations to avoid skewed density values
- If the road layer is in meters, convert units to kilometers before calculating density

Select one of the following:

- < 0.12 km/km^2
- 0.12-0.30 km/km^2
- > 0.30 km/km^2

1. Consider the Buffer_100m_NoWetland layer
2. Select intersecting roads:
   i. Add the Integrated Roads layer
   ii. Use **Clip** tool with Buffer_100m_NoWetland (Spatial Relationship = Intersect)
3. Export and calculate road length:
   i. Export the selected roads as AllRoads_100m.
   ii. In the **Attribute Table**, ensure the length field is in kilometers (see Appendix A-11)
   iii. Sum the total road length (see Appendix A-14).
4. Open the **Attribute Table** of Buffer_100m_NoWetland
   i. Confirm area in km^2
5. Calculate road density using the formula below:

$$\text{Road Density} = \frac{\text{Total Road Length (km)}}{\text{100m Buffer Area (km2)}}$$

OF 31: Road density within 2 km of the AA

Relevant layers and datasets:

- Digital Road Atlas (DRA) – Master Partially – Attributed Roads
- BC Cumulative Effects Framework – Human Disturbance
- 2km_buffer_excluding_AA polygon

"Consider the 2 km buffer from the AA. The length (km) of all roads within that buffer, divided by the buffer's area, is:"

Select one of the following:

- < 0.12 km/km2
- 0.12-0.30 km/km2
- > 0.30 km/km2

1. Consider the **2km_buffer_excluding_AA**
2. Follow the same remaining steps as **OF 30** to calculate total road length, buffer area, and road density.

OF 32: Intactness of landscape within 2 km

Relevant layers and datasets:

- BC Cumulative Effects Framework – Human Disturbance

- AAbuffer_2km_ excluding_AA

"Within that 2-km buffer, the percentage that is natural or semi-natural is:"

Select one of the following:

- <5%
- 5-30%
- 30-60%
- 60-90%
- >90%

1. Consider the 2km_buffer_excluding_AA
2. Extract disturbance features only within the buffer by using **Clip** and save as HumanDisturbance_2km
3. **Reclassify** land cover into two categories:
   i. Intact (Natural/Semi-Natural): forest, wetland, grassland, etc.
   ii. Not Intact (Disturbed): urban, agriculture, clearcuts, etc.
4. Calculate intact percentage:

$$\text{Intact } \% = \frac{\text{2km Buffer Area (km2)} - \text{HumanDisturbance\_2km (km2)}}{\text{2km Buffer Area (km2)}}$$

OF 33: Mature and old growth forest within 2 km

Relevant layers and datasets:

- Old Growth Technical Advisory Panel (TAP) – Forest Seral Stage
- AABuffer-2km

"Within that 2-km buffer, the percentage of area mapped as old growth or mature from total forest area is:"

Notes:

- The percentage is relative to total forested area within the 2 km buffer, not total land area

Select one of the following:

- <5%
- 5-30%
- 30-60%
- 60-90%
- >90%

1. Consider **Buffer-2km** layer
2. Select for Mature and Old Growth classes:

   i. Open the **Attribute Table** of the forest layer
   ii. Open **Select by Attributes** to select features where the field DESCR = Mature OR class = Old
3. Use **Clip** to extract forest features within the 2km_buffer_excluding_AA (see Appendix A-13)
   i. Save as Forests_within2km
4. **Clip** the selected Mature + Old Growth subset the same way.
   i. Save as **Mature_OldGrowth_within2km**
5. Use **Calculate Geometry** to find total hectares for **Forests_within2km**.
   i. Repeat for **Mature_OldGrowth_within2km**
6. Determine the percentage using the formula below:

$$\textbf{Mature + Old Growth \%} = \frac{\textbf{Mature + Old Growth Forest Area}}{\textbf{Total Forest Area}} \textbf{ X 100}$$

OF 34: Land cover type uniqueness

Relevant layers and datasets:

- B.C. Land Cover (if available)
- VRI attribute bclcs_level_4
- Sentinel Land Cover
- AABuffer_1km
- AABuffer_5km

"Do any of the land cover types that are present in the AA comprise <1% of the land cover in the surrounding 1km or 5km buffers?"

Notes:

- In cases where available land cover mapping is inaccurate, defer to observed land cover types based on the most recent available imagery
- Use the best available land cover classification and aerial image interpretation for your location to assess landscape diversity within 1 km and 5 km buffers around the wetland
- Overlay the AA layer with each buffer (1 and 5 km) and identify 'unique' land cover types present in each to determine if some of the land cover types within the AA are rare compared to the surrounding areas
- The quality of landcover classification layers varies in different locations. Consider the recommended relevant layers listed, or better versions if available for your location
- The classes listed below from the various sources, provides examples of the level of detail the user is expected consider
- Landcover types in the VRI attribute BCLCS: level 4 includes the following categories:

    - TC = Treed-coniferous
    - TB = Treed-broadleaf
    - TM = Treed Mixed
    - ST = Shrub Tall
    - SL = Shrub Low
    - HE = Herb-Forbs
    - HG = Herb – Graminoids
    - BY = Bryoid
    - BM = Bryoid – Moss
    - BL = Byroid – Lichens
    - SI = Snow/Ice
    - RO = Rock/Rubble
    - EL = Exposed Land
- With slightly different categories, the BC_Landcover layer (if available) considers:
    - Barren Land
    - Coniferous Forest
    - Cropland
    - Deciduous Forest
    - Estuary
    - Fresh Water
    - Grassland
    - Intertidal Zone
    - Marine Water
    - Mixed Forest
    - Riparian - Coniferous Forest
    - Riparian - Deciduous Forest
    - Riparian – Grassland
    - Riparian - Mixed Forest
    - Riparian - Shrubland
    - Shrubland
    - Snow and Ice
    - Subtidal Zone
    - Unclassified
    - Urban and Built-up
    - Wetland

Select all that apply:

- Yes, at least one land cover type within the AA comprises <1% of the area within the 1 km buffer of the AA (and outside of the AA)

- Yes, at least one land cover type within the AA comprises <1% of the area within 5 km of the AA (and outside of the AA)
- Neither of the above

1. To calculate land cover area by type in the AA, first **Clip** the best available land cover data using the AA polygon (see Appendix A-13) and save as **AA_Landcover**
2. Consider the total area of the **Buffer_1km** and **Buffer_5km** layers and calculate if any land cover types that occur within the AA are rare within the buffers (<1% of area). If you can visually tell that none of the land cover types within the AA are rare in the buffers, then you can select c) and not continue any further
3. To calculate the percentage of the buffer covered by any rare land cover types, use **Intersect** with the best available land cover data and each buffer (see Appendix A-9)
    i. Save the land cover layers as **Landcover_1km**, **Landcover_5km**
4. If your land cover source is a shape file, then calculate the area of each land cover type using **Calculate Geometry** (see Appendix A-11):
    i. Divide each land cover area from the AA by the land cover area in the total buffer area to get a percentage
    ii. Identify any types where coverage is <1%
5. If your landcover file is a raster, you'll need to use the **Build Raster Attribute Table**, and select the overwrite option, to generate a new pixel count of each class in the clipped raster. You can obtain percentages based on relative pixel counts

OF 35: Maximum dominance of a land cover type

Relevant Layers and Datasets:

- B.C. Land Cover (if available)
- VRI attribute bclcs_level_4
- Sentinel Land Cover

"Identify the most extensive land cover type within the AA and calculate it as a percent of the total area."

Notes:

- If there's only one type of land cover in the AA, such as coniferous, the answer would be 1. If the wetland is made up of 60% grassland and 40% mixed forest, then the answer would be 0.6.

1. Use the same landcover layer from analysis in OF34 (step 1). Calculate the area of each land cover type using **Calculate Geometry** (see Appendix A-11) and save as **Area_ha**
2. Identify the dominant land cover type with the largest total area within the AA
3. Divide the area of the dominant land cover type by the total AA land cover area
4. Calculate proportions and enter the result as a decimal with a maximum value of 1

OF 36: Number of land cover types in the AA and 100 m buffer

Relevant layers and datasets:

- B.C. Land Cover (if available)
- VRI attribute bclcs_level_4
- Sentinel Land Cover

"The number of different land cover types mapped within the AA, plus all land cover types within 100 m of its edge is:"

Notes:

- Use the land cover classification to identify unique land cover types present within the AA and its 100 m buffer. Each unique class counts once, regardless of area
- In cases where available land cover mapping is inaccurate, defer to observed land cover types based on the most recent available imagery

Select one of the following:

- 1
- 2
- 3 or 4
- >4

1. Consider the **Buffer_100m_including_AA** layer
2. **Clip** the land cover layer to the **Buffer_100m_including_AA** layer (see Appendix A-13) and save as **Landcover_AA_100m**
3. Identify unique classes by using the **Attribute Table** and reviewing the **Classification** field
    i. If unclear, run **Summary Statistics** (see Appendix A -13)
4. Count the number of unique land cover types present and select the appropriate category

OF 37: Number of land cover types within 2 km

Relevant layers and datasets:

- B.C. Land Cover (if available)

- VRI attribute bclcs_level_4
- Sentinel Land Cover
- Aerial imagery

"The number of different land cover types mapped within the AA plus all types within the 2 km buffer is:"

Notes:

- Use the land cover classification to identify distinct types present within the AA and its 2 km buffer. Each unique class counts once, regardless of area
- In cases where available land cover mapping is inaccurate, defer to observed land cover types based on the most recent available imagery

Select one of the following:

- <4
- 4 or 5
- 6 or 7
- 8 to 11
- >11

1. **Clip** the land cover layer to the **Buffer_2km_including_AA** layer (see Appendix A-13) and save as **Landcover_AA_2km**
2. Identify unique classes by using the **Attribute Table** and reviewing the **Classification** field
3. If unclear, run **Summary Statistics** (see Appendix A -13)
4. Count the number of unique land cover types present and select the appropriate category

OF 38: Deciduous land cover within the AA and 100 m buffer

Relevant layers:

- VRI attribute bclcs_level_4

"The percentage of the deciduous land cover type within the AA plus 100 m from its edge, as compiled from the land cover layer, is:"

Notes:

- In cases where available land cover mapping is inaccurate, defer to observed land cover types based on the most recent available imagery

Select one of the following:

- <6%
- 6-20%
- 21-39%
- 40-66%
- >66%

1. Clip the VRI to a 100m buffer from the edge AA
2. Open the **Attribute Table** and consider the attribute bclcs_level_4, which indicates the type of vegetation
   i. Under bclcs_level_4 values of "TB" (tree-broadleaf) should be considered for this question
3. Calculate areas using the **Calculate Geometry** (see Appendix-10) to find the area of deciduous polygons (ha)
4. Use the formula below to calculate the percentage of deciduous land cover within the AA and 100 m buffer:

$$\text{Deciduous \%} = \frac{\text{Total Deciduous Area}}{\text{Total AA} + \text{100m Buffer Area}} \text{ X } 100$$

OF 39: Closed coniferous land cover within the AA and 100 m buffer

Relevant layer:

- VRI attribute bclcs_level_4

"The proportion of the coniferous land cover type within the AA plus 100 m from its edge, as compiled from the land cover layer, is:"

Notes:

- In cases where available land cover mapping is inaccurate, defer to observed land cover types based on the most recent available imagery

Select one of the following:

- <20%
- 20-47%
- 48-69%
- 70-90%
- >90%

1. Clip the VRI to a 100m buffer from the AA
2. Open the **Attribute Table** and consider the attribute bclcs_level_4, which indicates the type of vegetation

   i. Under bclcs_level_4 values of "TC" (tree-coniferous) should be considered for this question
3. Calculate areas using the **Calculate Geometry** (see Appendix-10) to find the area of coniferous polygons (ha)
4. Use the formula below to calculate the percentage of coniferous land cover within the AA and 100 m buffer:

$$\text{Coniferous \%} = \frac{\text{Total Coniferous Area}}{\text{Total AA} + \text{100m Buffer Area}} \text{ X } 100$$

OF 40: Non-tree vegetation within the AA and 100 m buffer

Relevant layer:

- VRI attribute bclcs_level_4

"The percentage of the land cover that is non-tree, within the AA plus 100 m from its edge, as compiled from the land cover layer, is:"

Notes:

- In cases where available land cover mapping is inaccurate, defer to observed land cover types based on the most recent available imagery

Select one of the following:

- <10%
- 10-25%
- 25-45%
- 45-75%
- >75%

1. **Clip** the VRI to a 100m buffer from the AA
2. Open the **Attribute Table** and consider the attribute bclcs_level_4, which indicates the type of vegetation
   i. Under bclcs_level_4 consider all values except the TC (tree-coniferous), TB (tree-broadleaf), and TM (Tree-Mix) for this question
3. Calculate areas using the **Calculate Geometry** (see Appendix-10) to find the area of non-treed polygons (ha)
4. Use the formula below to calculate the percentage of non-treed land cover within the AA and 100 m buffer:

$$\text{Non} - \text{treed} = \frac{(\text{Total AA+100m Buffer Area}) - \text{Sum of TC,TB,TM Areas}}{\text{Total AA+100m Buffer Area}} \text{ X } 100$$

OF 41: Disturbed area percentage in the WAU

Relevant layer:

- Assessment Watershed Unit (WAU)
- B.C. Cumulative Effects Framework – Human Disturbance

"As a percentage of the WAU, the Disturbed area (GIS layer provided) comprises:"

Notes:

- This measure reflects disturbance proportion across the full WAU, not just within the AA

Select one of the following:

- <10%
- 10-20%
- 20-30%
- 30-40%
- >40%

1. Consider the **WAU** layer, and document it's total area in hectares
2. **Clip** the Human Disturbance layer to the WAU boundary and save as "Disturbed_WAU"
3. Open the **Attribute Table** of **Disturbed-WAU** and select all disturbed areas
   i. Disturbance is typically coded as 1 = Not disturbed and 2 = Disturbed.
   ii. Filter for "Disturbed (2)" values only
4. Use **Calculate Geometry** to measure the disturbed area in hectares and sum these values to determine the total disturbed area (see Appendix A-11,or 13.
5. Use the formula below:

$$\text{Disturbed \% (WAU)} = \frac{\text{Total Disturbed Area}}{\text{Total WAU Area}} \text{ X } 100$$

OF 42: Road density in the WAU

Relevant Layers and Datasets:

- Watershed Assessment Unit (WAU)
- Cumulative Effects Framework – Integrated Roads – 2025
- Digital Road Atlas (DRA) – Master Partially – Attributed Roads

"Intersect the WAU with the Digital Road Atlas. The length (km) of all roads within that WAU, divided by the WAU's area, is:"

Notes:

- Include all road types present in the Integrated Roads layer (paved, unpaved, and resource roads)
- Make sure road length is in km
- The WAU area should be measured in km^2, not ha. This will result in road density in units of km/km^2

Select one of the following:

- <0.4 km/km2
- 0.4-1.2 km/km2
- > 1.2 km/km2

1. Consider the WAU layer
2. **Clip** the roads layer to the WAU boundary and save as **Roads_WAU**
3. Open the **Attribute Table** to calculate the total road length
    i. Sum the total road length in km (see Appendix A:13)
4. Calculate road density:
    i. Confirm the WAU area in km^2 (Appendix A:10)
    ii. Use the following formula:

$$\text{Road Density} = \frac{\text{Total Road Length (km)}}{\text{WAU Area (km2)}}$$

    iii. Choose the appropriate category

OF 43: Wetland density in the WAU

Relevant Layers and Datasets:

- Watershed Assessment Unit (WAU)
- Freshwater Atlas – Wetlands
- Any additional local wetland mapping (if available)

"The summed area of all wetlands in the wetland's WAU, divided by the WAU's area, is:"

Select one of the following:

- <0.03
- 0.03-0.04
- 0.05-0.07
- 0.08-0.13
- >0.13

1. Consider the **Wetlands** layer

2. **Clip** the wetlands layer to the WAU boundary and save as **Wetlands_WAU**
3. Open the **Attribute Table** to calculate the total wetland area in km^2
    i. Sum the total wetland area in km^2 (see Appendix A:13)
4. Calculate wetland density:
    i. Calculate the WAU area in km^2 (Appendix A:10)
    ii. Use the following formula:

$$\text{Wetland Density} = \frac{\text{Wetland area (km2)}}{\text{WAU Area (km2)}}$$

    iii. Choose the appropriate category

OF 44: Ecoprovince

Relevant layer:

- Ecoprovinces - Ecoregion Ecosystem Classification of British Columbia

"The AA's ecoprovince is:"

NOTES:

- If the AA falls within more than one ecoprovince, visually estimate which ecoprovince covers the majority of the AA.

Select one of the following:

- Boreal Plains (BP)
- Central Interior (CI)
- Coast and Mountains (CM)
- Georgia Depression (GD)
- Northern Boreal Mountains (NBM)
- Southern Interior (SI)
- Southern Interior Mountains (SIM)
- Sub-Boreal Interior (SBI)
- Taiga Plains (TP)

1. Identify the AA's ecoprovince using **Select Layer by Location**
    i. Choose ecoprovinces as the input feature, AA as the selecting feature, and ensure relationship is set to intersect
2. Determine ecoprovince classification:
    i. Open the **Attribute Table** of the selected ecoprovince polygon and locate the ecoprovince name
3. Select the matching option from the list above

References

Government of British Columbia. 2002. Reconnaissance Karst Potential Mapping. https://catalogue.data.gov.bc.ca/dataset/395568e1-d233-4217-9732-7afadb6f4265 [accessed 18 June 2025].

Government of British Columbia. 2004. Ecoprovinces - Ecoregion Ecosystem Classification of British Columbia. https://catalogue.data.gov.bc.ca/dataset/51832f47-efdf-4956-837a-45fc2c9032dd [accessed 18 June 2025].

Government of British Columbia. 2006. BC Historical Fish Distribution - Points (50,000) - Dataset - Data Catalogue. https://catalogue.data.gov.bc.ca/dataset/3b723ef2-abd4-4722-abea-9a51258eae15 [accessed 18 June 2025

Government of British Columbia. 2008a. Freshwater Atlas Glaciers - Dataset - Data Catalogue. https://catalogue.data.gov.bc.ca/dataset/8f2aee65-9f4c-4f72-b54c-0937dbf3e6f7 [accessed 18 June 2025].

Government of British Columbia. 2008b. Freshwater Atlas Lakes - Dataset - Data Catalogue. https://catalogue.data.gov.bc.ca/dataset/cb1e3aba-d3fe-4de1-a2d4-b8b6650fb1f6 [accessed 18 June 2025].

Government of British Columbia. 2008c. Freshwater Atlas Assessment Watersheds - Dataset - Data Catalogue. https://catalogue.data.gov.bc.ca/dataset/51f20b1a-ab75-42de-809d-bf415a0f9c62 [accessed 21 April 2026].

Government of British Columbia. 2016. Municipalities - Legally Defined Administrative Areas of BC - Dataset - Data Catalogue. https://catalogue.data.gov.bc.ca/dataset/municipalities-legally-defined-administrative-areas-of-bc [accessed 18 June 2025].

Government of British Columbia. 2018. Geology Faults - Dataset - Data Catalogue. https://catalogue.data.gov.bc.ca/dataset/c94e0c13-5385-49c1-9922-822e10135fc6 [accessed 18 June 2025].

Government of British Columbia. 2019. VRI Relational Data Dictionary. https://www2.gov.bc.ca/assets/gov/farming-natural-resources-and-industry/forestry/stewardship/forest-analysis-inventory/data-management/standards/vegcomp_poly_rank1_data_dictionaryv5_2019.pdf [accessed 18 June 2025].

Government of British Columbia. 2023a. BC Cumulative Effects Framework - Human Disturbance - 2023. https://catalogue.data.gov.bc.ca/dataset/7d61ff12-b85f-4aeb-ac8b-7b10e84b046c [accessed 18 June 2025].

Government of British Columbia. 2023b. Freshwater Atlas Stream Directions - Datasets - Data Catalogue. https://catalogue.data.gov.bc.ca/dataset/freshwater-atlas-stream-directions [accessed 18 June 2025].

Government of British Columbia. 2024a. Critical Habitat for federally-listed species at risk (posted) - Datasets - Data Catalogue. https://catalogue.data.gov.bc.ca/dataset/076b8c98-a3f1-429b-9dae-03faed0c6aef [accessed 7 February 2025].

Government of British Columbia. 2024b. Freshwater Atlas Stream Network - Datasets - Data Catalogue. https://catalogue.data.gov.bc.ca/dataset/freshwater-atlas-stream-network [accessed 7 February 2025].

Government of British Columbia. 2024c. NGO Conservation Areas - Fee Simple - Datasets - Data Catalogue. https://catalogue.data.gov.bc.ca/dataset/ngo-conservation-areas-fee-simple [accessed 7 February 2025].

Government of British Columbia. 2024d. VRI - 2024 - Forest Vegetation Composite Polygons - Dataset - Data Catalogue. https://catalogue.data.gov.bc.ca/dataset/6ba30649-14cd-44ad-a11f-794feed39f40 [accessed 18 June 2025].

Government of British Columbia. 2025a. BC Cumulative Effects Framework - Integrated Roads - 2025 - Dataset - Data Catalogue. https://catalogue.data.gov.bc.ca/dataset/a489bc6a-f676-4503-8cd7-dcf0bdf2ae99 [accessed 18 June 2025].

Government of British Columbia. 2025b. BC Parks, Ecological Reserves, and Protected Areas - Dataset - Data Catalogue. https://catalogue.data.gov.bc.ca/dataset/1130248f-f1a3-4956-8b2e-38d29d3e4af7 [accessed 18 June 2025].

Government of British Columbia. 2025c. BC Wildfire Fire Perimeters - Historical - Dataset - Data Catalogue. https://catalogue.data.gov.bc.ca/dataset/22c7cb44-1463-48f7-8e47-88857f207702 [accessed 18 June 2025].

Government of British Columbia. 2025d. Conservation Lands - Datasets - Data Catalogue. https://catalogue.data.gov.bc.ca/dataset/conservation-lands [accessed 7 February 2025].

Government of British Columbia. 2025e. Digital Road Atlas (DRA) - Master Partially-Attributed Roads - Dataset - Data Catalogue.https://catalogue.data.gov.bc.ca/dataset/bb060417-b6e6-4548-b837-f9060d94743e [accessed 18 June 2025].

Government of British Columbia. 2025f. Freshwater Atlas Rivers - Dataset - Data Catalogue. https://catalogue.data.gov.bc.ca/dataset/f7dac054-efbf-402f-ab62-6fc4b32a619e [accessed 18 June 2025

Government of British Columbia. 2025g. Freshwater Atlas Watershed Boundaries - Datasets - Data Catalogue. https://catalogue.data.gov.bc.ca/dataset/freshwater-atlas-watershed-boundaries [accessed 7 February 2025].

Government of British Columbia. 2025h. Freshwater Atlas Wetlands - Dataset - Data Catalogue. https://catalogue.data.gov.bc.ca/dataset/93b413d8-1840-4770-9629-641d74bd1cc6 [accessed 18 June 2025].

Government of British Columbia. 2025i. Glaciers - Datasets - Data Catalogue. https://catalogue.data.gov.bc.ca/dataset/freshwater-atlas-glaciers [accessed 7 February 2025].

Government of British Columbia. 2025j. Species and Ecosystems at Risk - Publicly Available Occurrences - CDC - Dataset - Data Catalogue. https://catalogue.data.gov.bc.ca/dataset/0e035e55-f257-458f-9a96-80c01c69d389 [accessed 18 June 2025].

Government of British Columbia. 2025k. TANTALIS – Conservancy Areas - Dataset - Data Catalogue. https://catalogue.data.gov.bc.ca/dataset/tantalis-wildlife-management-areas [accessed 7 February 2025].

Government of British Columbia. 2025l. TANTALIS - Wildlife Management Areas - Datasets - Data Catalogue. https://catalogue.data.gov.bc.ca/dataset/550b3133-2004-468f-ba1f-b95d0e281e78 [accessed 18 June 2025].

Government of British Columbia. 2025m. Ungulate Winter Range - Approved - Datasets - Data Catalogue.https://catalogue.data.gov.bc.ca/dataset/ungulate-winter-range-approved [accessed 7 February 2025].

Government of British Columbia. 2025n. Wildlife Habitat Features - Incidental Observations - Publicly Available - Dataset - Data Catalogue. https://catalogue.data.gov.bc.ca/dataset/50dc6ba5-8883-4bfc-b3aa-b420b190b45b [accessed 18 June 2025].

Government of British Columbia. 2025o. Wildlife Habitat Features - Survey Observations - Publicly Available - Dataset - Data Catalogue. https://catalogue.data.gov.bc.ca/dataset/884c20fa-17c1-491a-b5cb-993be5dff8d3 [accessed 18 June 2025].

Government of British Columbia. 2025p. Wildlife Species Inventory - Incidental Observations - Publicly Available. https://catalogue.data.gov.bc.ca/dataset/7d5a14c4-3b6e-4c15-980b-68ee68796dbe [accessed 18 June 2025].

Government of British Columbia. 2025q. Wildlife Species Inventory - Survey Observations - Publicly Available. https://catalogue.data.gov.bc.ca/dataset/f3ece977-aa7f-4cb2-b7d0-de64155f6c83 [accessed 18 June 2025].

Government of British Columbia. 2025r. Wildlife Species Inventory - Telemetry Points - Publicly Available - Dataset - Data Catalogue. https://catalogue.data.gov.bc.ca/dataset/45656315-b3a5-4ab2-a85c-82cadb9c72cc [accessed 18 June 2025].

Government of British Columbia. 2026a. Old Growth Technical Advisory Panel (TAP) – Old Forests. https://catalogue.data.gov.bc.ca/dataset/6f08c9d8-d6c0-4f08-ac64-54585c92ccb0 [accessed April 28,2026].

Government of British Columbia. 2026b. Request Data and Information from the Conservation Data Centre: https://www2.gov.bc.ca/gov/content?id=302E3F5E951C40058683EA767135BA7B [accessed April 28, 2026].

Impact Observatory, and Esri. 2026. Sentinel-2 10m land use/land cover time series. ArcGIS Living Atlas of the World. https://www.arcgis.com/home/item.html?id=cfcb7609de5f478eb7666240902d4d3d [accessed 23 March 2026]

Perkins, G., T. Andy, and D. Morgan. 2026. Calculate Ecosystem Function and Benefit Scores for Wetlands. https://bcwf-wetlands.github.io/wespr/ [accessed 18 March 2026

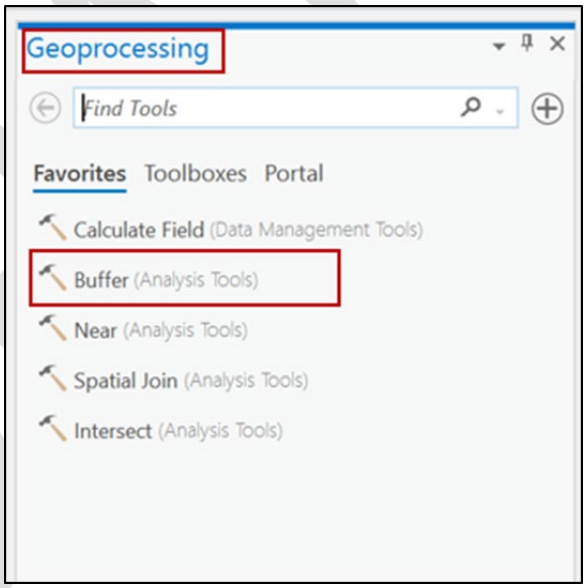
APPENDIX A - Common GIS tools

1. Creating a buffer

Buffers are used to define an area within a specified distance around features:

1. Open the **Buffer Tool** (Go to **Analysis** > **Tools** > **Buffer**)
2. Set **Input Features**:
    i. Choose the feature layer you want to buffer (for example, CA_Polygon, AA_of_Interest)
3. Specify **Buffer** distance:
    i. Enter the distance (for example, 100 meters)
    ii. Choose the correct unit (meters, kilometers, etc.)
4. Save output with the appropriate file name
5. Select **Run**

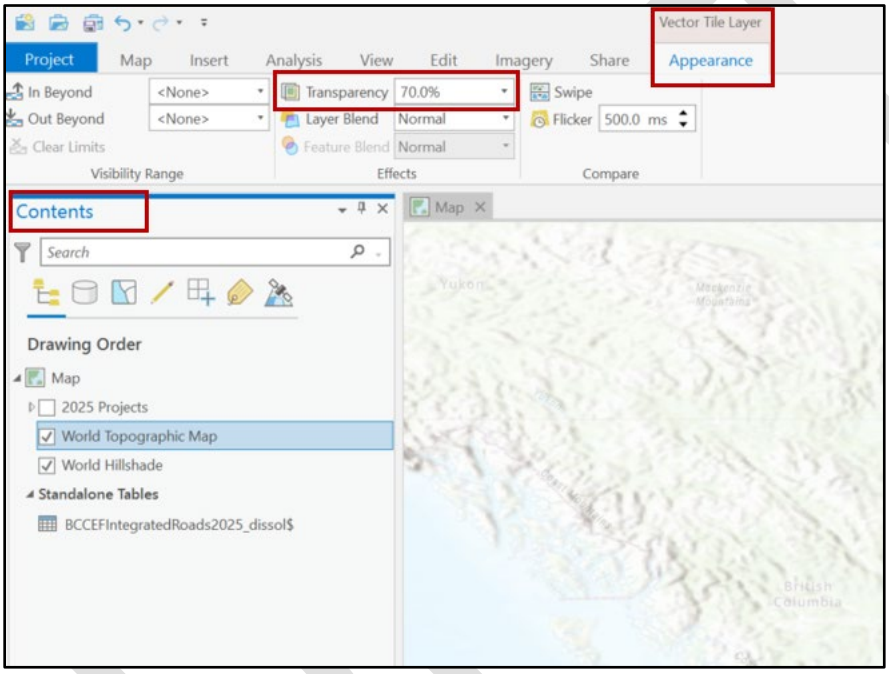
Tip: Adjust layer transparency (see Appendix A:2) for instructions on how to overlap the buffer with other layers.



2. Optimizing layer transparency

Transparency allows you to see multiple layers at once by making one layer partially see-through. This is useful when comparing overlapping datasets:

1. Select the layer of interest in the Contents Pane
2. Open the Appearance tab (Go to the Feature Layer > Appearance on the ribbon)
3. Adjust Transparency:
    i. Use the **Transparency** slider to set the desired level (for example, 70%)
4. Arrange order of layers in the **Contents Pane** to ensure your transparent layer is above the reference layers



3. Adding datasets to map

1. Go to the **Map** tab > select **Add Data** > browse to your data source (for example, saved local file on C drive).
2. Select the desired dataset > select **Add**
3. The layer is added to your map and appears in the **Contents pane**

4. Accessing spatial data using WESPR package

The WESPR GitHub includes instructions on how to prepare spatial data and use a package that obtains the majority of the datasets from the BC data package. This package shows if there are no layers within your relevant search area, and eases the burden of viewing each dataset separately.

5. Exporting data from iMapBC

1. Go to **IMAPBC**
2. Use **Add Provincial Layers** in the **Data Sources** tab to find and check off the layers you need
3. Select the **Export** tab
4. Select **Provincial Layer Download**
5. In the download service panel, select the layers you want (toggle on oroff), choose area of interest (extent), select output format (for example Shapefile preferred) and coordinate system
6. Enter your email if required, agree to terms, then **Submit Order**
7. Wait for a link with the download; unzip/import into ArcGIS Pro

6. Using the BC Data Catalogue

1. Go to BC Data Catalogue
2. Search for the dataset name or topic (for example, Freshwater Atlas Wetlands)
3. Use filters like Format = Shapefile or geodata to narrow results
4. Download the data and unzip if needed
5. In ArcGIS Pro, go to **Map** > **Add Data** > browse to the extracted shapefile or layer package

7. Adding basemaps

Basemaps provide background context for your data. ArcGIS Pro includes built-in basemaps such as Topographic, Imagery, Streets and more:

1. Open the Basemap gallery and select **Basemap**
2. From the gallery, choose the desired basemap (for example, Topographic, Imagery, Streets)

3. To manage visibility, you can toggle the basemap on or off in the **Contents Pane**

8. Measure distances

The **Measure** tool allows you to calculate distances directly on the map. This is useful for estimating travel paths or validating buffer distances

1. Go to **Map** and select the **Measure** tool: 

.
2. Choose measurement type by selecting the Distance option
3. If needed, set the desired units (for example, meters, kilometers) from the drop-down list
4. **Measure** distance**:**
    i. Select once on the map to set the starting point
    ii. Select again to set the end point
    iii. The distance is displayed in the Measure window
5. To finish the measurement, double-select to the end of the measurement

9. Intersect features

The **Intersect** tool combines two or more layers and keeps only the areas where they overlap. This tool preserves the attributes from all layers in the output. This is useful when you need to find features that share the same space (for example, wetlands within a buffer, roads crossing a watershed). Note, this feature will find all combinations of overlap (for example, 1, 2, and 3; 2 and 3 but not 1, 1 and 2 but not 3)

1. Open the **Intersect** tool (Go to **Analysis** > **Tools** > **Intersect**)
2. To set the **Input Features**, select two or more layers you want to intersect (for example, **Wetlands_2km** and **Buffer_2km**)
3. In the tool options, set the desired output type (for example, Point, Line, Polygon)
4. Save the results with a clear name (for example, **Clipped_Wetlands_2km**)
5. Select **Run**

10. Merge layers tool

To combine two feature layers of the same geometry (e.g,. points, lines, polygons), use the Merge Layers Tool:

1. Open the Merge Layers Tool (**Analysis**>**Manage Data**>**Merge Layers**)
2. To set the **Input Features**, select two layers you want to merge

3. Save the results with a clear name (for example, Lakes and Wetlands in 2km)
4. Select **Run**

11. Calculate geometry

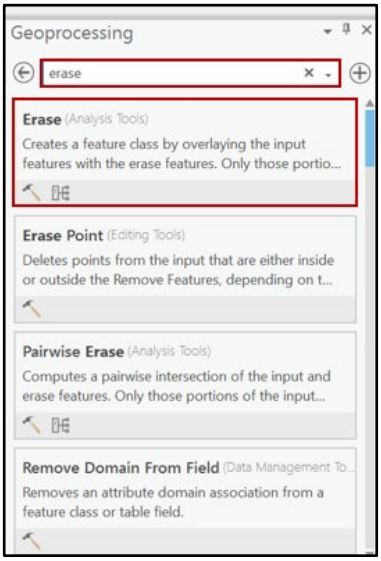
The **Calculate Geometry** function allows you to populate a field with geometric properties of features, such as area, length, or coordinates. This is useful for reporting quantitative results (for example, hectares of wetlands, length of streams).

1. Right-select the layer of interest in the **Contents Pane** and select **Attribute Table**.
2. If needed, add a new field by selecting **Add Field**
   i. Name the field clearly (for example, Area_ha, Length_km).
   ii. Set **Data Type** = **Double** to store decimal values
   iii. Select save to add the field data
3. Open the **Calculate Geometry** by selecting the new field heading.
4. Choose the desired geometry property (for example, Area, Length, X/Y Coordinates).
5. Select **Run**

12. Erase features

The **Erase** tool removes portions of one layer that overlap another layer. The output contains only the parts of the input features that do **not** overlap the erase features. This is useful when you want to exclude areas (for example, subtracting wetlands from a contributing area):

1. Open the **Erase** tool (Go to **Analysis** > **Tools** > **Erase**)
2. To set **Input Features**, choose the layer that you want to modify (for example, Catchment Area, CA)
3. Choose the layer that will be removed from the input (for example, AA_polygon)
4. Save the results with a clear name (for example, CA_excluding_AA)
5. Select **Run**



13. Clip features

The **Clip** tool trims features to the boundary of another layer. The output contains only the portions of the input features that fall inside the clip features. This tool preserves only the attributes from the clipped layer. This is useful for restricting data to an area of interest (for example, clipping streams to a watershed):

1. Open the Clip Tool (Go to **Analysis** > **Tools** > **Clip**)
2. To set **Input Features**, select the layer you want to trim
3. To set **Clip Features**, choose the boundary layer thar defines the area of interest (for example, AA_boundary)
4. Save the results with a clear name (for example, Streams_within_watershed).
5. Select **Run**

14. Summary statistics

The **Summary Statistics** tool calculates totals, averages, and other statistics for one or more fields in a dataset, grouped by an attribute (for example, land cover type):

1. Open the tool and search for **Summary Statistics**.
2. Set inputs:
    i. **Input Table** = the dataset you want to summarize (for example, AA_Landcover)
    ii. **Output Table** = choose a name and save location (for example, AA_Landcover_Summary)
3. Choose fields and statistics:
    i. Under **Statistics Fields**, select the numeric field you want to summarize (for example, Area_ha)
    ii. Choose a statistic type (for example, Sum, Mean, Minimum, Maximum)
    iii. You can add multiple fields or multiple statistics if needed.
4. If you want results broken down by category (for example, land cover type), add the relevant field under **Case Field**
    i. If no **Case Field** is set, results will be calculated for the entire table