

**BEAUFORT REGIONAL  
ENVIRONMENTAL ASSESSMENT**

**Geospatial Analysis Tool  
User Manual**



January 29, 2013

## **User Manual**

### **Regional Environmental Assessment (REA) Toolkit**

January 29, 2013

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## Table of Contents

1.0 BREA Webmap .....	3
2.0 Navigation Tools.....	4
3.0 Map Tools.....	5
3.1 Table of Contents .....	6
3.2 Measure tool.....	7
3.3 Print tool .....	9
3.4 Identify Tool .....	9
4.0 Analysis Tools.....	10
4.1 Buffer Vector.....	11
4.2 Select by Attributes.....	12
4.3 Select by Location .....	13
4.4 Intersect Tool .....	14
4.5 Euclidean Distance .....	15
4.6 Vector to Raster .....	16
4.7 Reclass Raster .....	17
5.0 Raster Tools:.....	18
5.1 Weighted Overlay .....	19
5.2 Raster Calculator.....	20

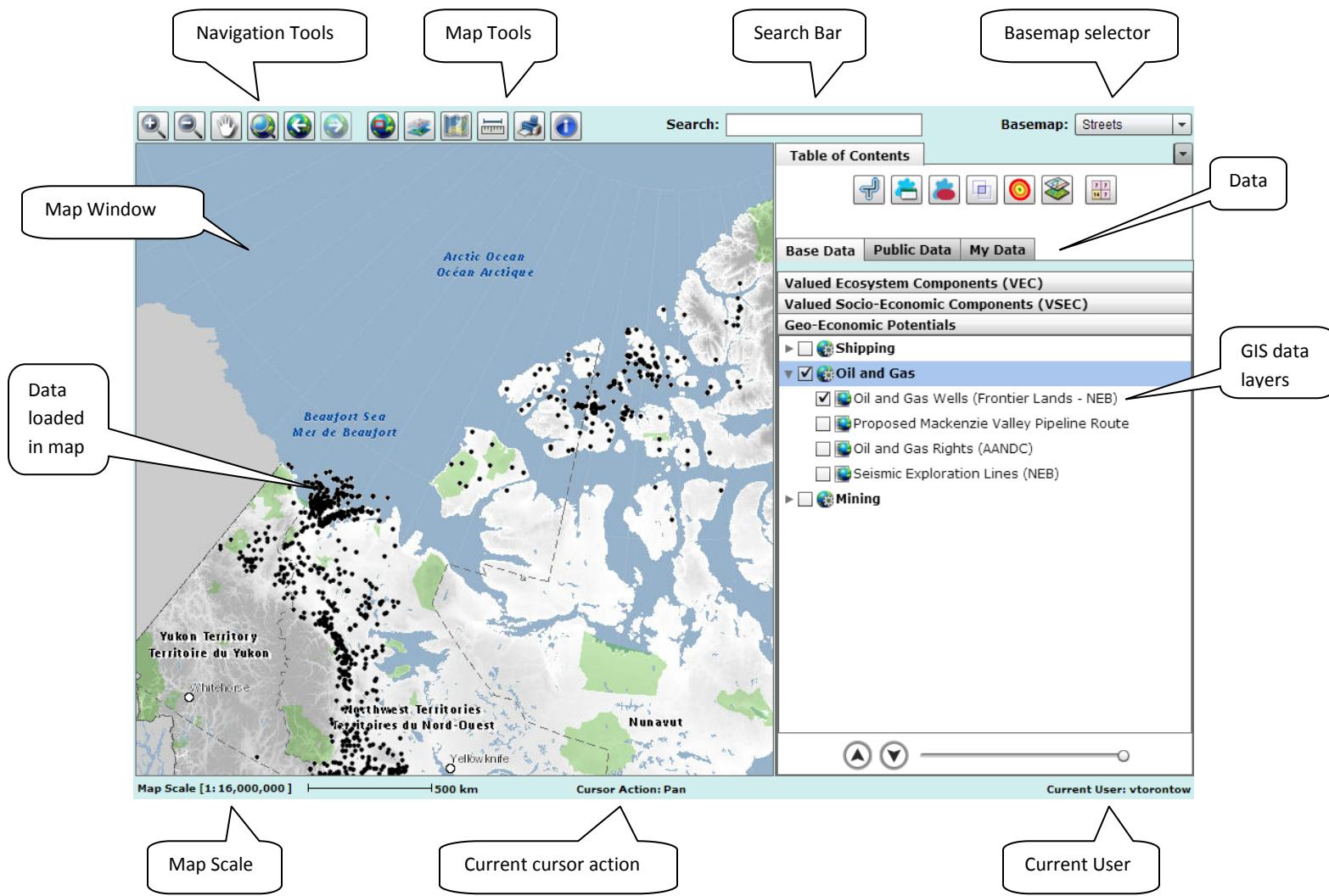
## 1.0 BREA Webmap

This web-based GIS tool has been developed to include a variety of tools for the display and analysis of existing and new information to support the Beaufort Regional Environmental Assessment. It includes baseline information and research on a number of environmental factors including flora and fauna, water, air and climatic factors, ice and geo-hazards as well as cultural, sociological and infrastructure information.

To access the webmap, log on to the NWRC webpage and select the **BREA** map, under the **Maps** tab.



The following figure provides an overview of the portal layout.



## 2.0 Navigation Tools

The Navigation Tools are used for map navigation within the map window.

Icon	Name	Function
	Zoom In	Zoom in by dragging a box on the map or by double clicking on the map.
	Zoom Out	Zoom out by dragging a box on the map.
	Pan	Pan the map by dragging the map.
	Full Extent	Zoom to the full extent of the map. By default, this is the extent of the BREA study area.
	Back Extent	Go back to the previous extent of the map after navigating.
	Next Extent	Go forward again through the sequence of extents you have been viewing on the map.

## 3.0 Map Tools

The Map Tools are used for map navigation, data access and query within the map.

Icon	Name	Function
	Overview	Displays an overview map when the spatial location of the detailed map might be hard to determine. Displays in the bottom left corner of the map.  The image shows two versions of a map of the Beaufort Sea. The left version, labeled "Overview Enabled", includes a small inset map in the bottom-left corner showing a detailed view of the Beaufort Sea area. The right version, labeled "No Overview Map", does not have this inset. A "vs." label is positioned between the two maps.
	<a href="#">Table of Contents</a>	Opens the table of contents. The table of contents lists all the layers on the map and shows what the features in each layer represent.
	Legend	Displays the legend for a map layer.
	<a href="#">Measure</a>	Measure distance, area and coordinates on the map.
	<a href="#">Print</a>	Export a graphic image of the map currently visible on the screen.
	<a href="#">Identify</a>	Identify a geographic feature by clicking on them.

### 3.1 Table of Contents



Click the Table of Contents tool on the Map Tools toolbar.

The following window opens and allows you to view available layers and turn on (make visible)/turn off layers. The table of contents also gives you access to tools you will need to work/process/manipulate your data.

These are 3 'folders' which contain different types of data. **Base Data** contains VEC, VSEC and GE Potential data viewable to all users.

An empty box means the layer is turned off (or not visible on the map).

A box with a checkmark means the layer is turned on (or visible on the map).

Moves the position of a layer up or down the list in the table of contents.

Analysis Toolbar: Set of tools for manipulating GIS data.

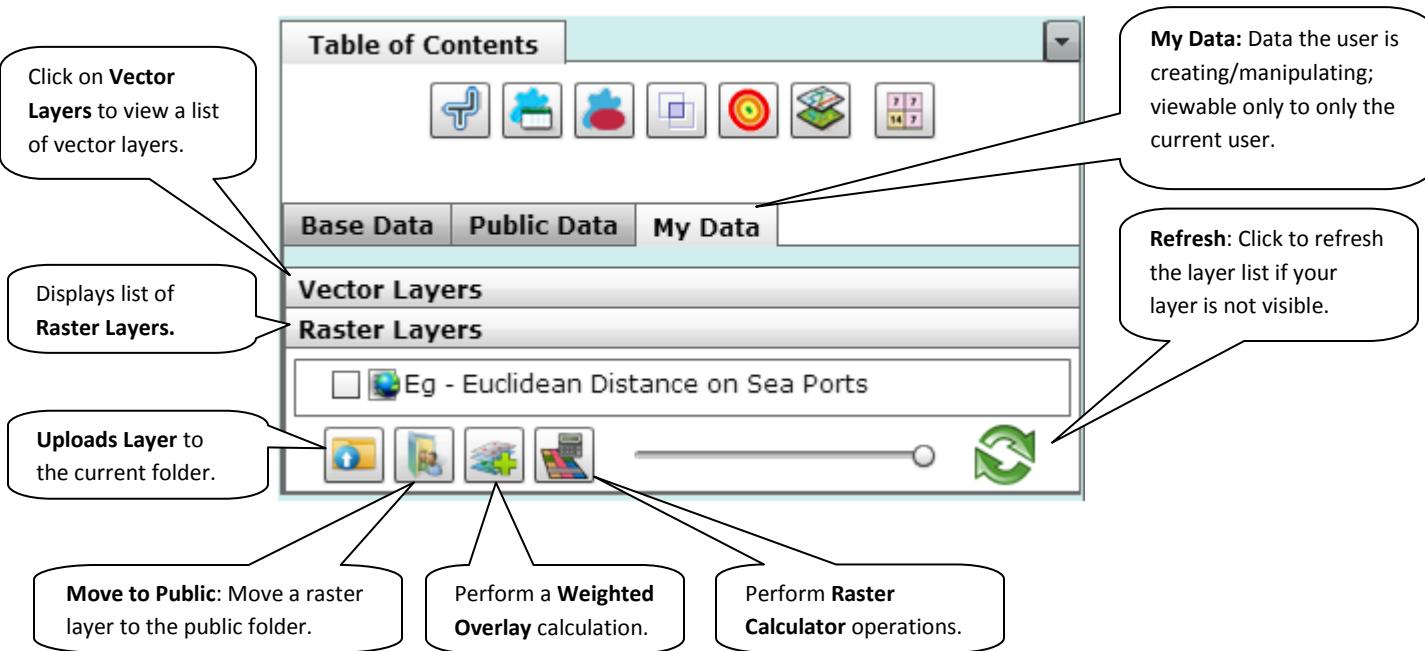
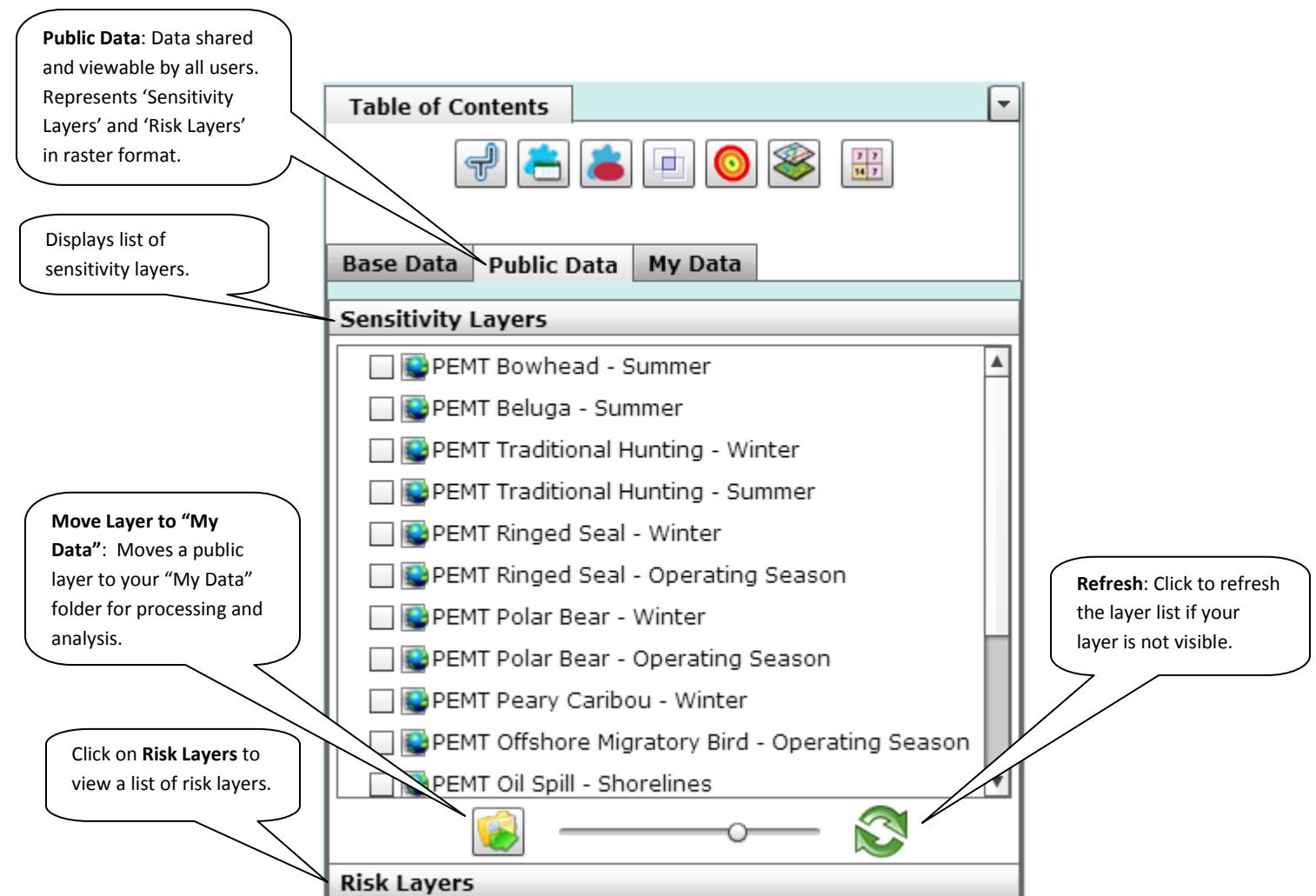
Click **VEC** to view a list of VEC layers.

Click **VSEC** to view a list of VSEC layers.

Displays a list of **GE Potentials** layers.

Transparency slider: The slider in the left position shows the layer as 100% opaque and the slider in the right position is 100% transparent.

Category	Sub-Layers
Valued Ecosystem Components (VEC)	
Valued Socio-Economic Components (VSEC)	
Geo-Economic Potentials	<input type="checkbox"/> Shipping <input type="checkbox"/> Mining <input checked="" type="checkbox"/> Oil and Gas <ul style="list-style-type: none"><li><input checked="" type="checkbox"/> Oil and Gas Wells (Frontier Lands - NEB)</li><li><input type="checkbox"/> Proposed Mackenzie Valley Pipeline Route</li><li><input type="checkbox"/> Oil and Gas Rights (AANDC)</li><li><input type="checkbox"/> Seismic Exploration Lines (NEB)</li></ul>



### 3.2 Measure tool



Click the Measure tool on the Map Tools toolbar.

The following window opens and allows you to specify what you would like to measure.

- 1) Select the 'Basic Measurement' type, and 'Units'.
- 2) Click the point of interest on the map where you want to start measuring the distance or area.
- 3) Move the pointer to the next point of interest and click to measure the distance or area. If you want to continue measuring distances to other points or adding more vertices to your polygon, simply move the pointer to another location and click to add additional vertices.
- 4) Double-click where you want to end the line or polygon.

The distance/area are displayed in the measurement window.

The screenshot shows the 'Measure' dialog box with several callouts explaining its features:

- Select a Feature to measure.
- Measure a Line
- Measure a Polygon
- The last measurement performed is displayed here.
- Displays last distance measurement.
- Displays a list of past measurements from one polygon or line. Length is displayed for Lines, and Area and Perimeter are displayed for polygons.
- Select the units you would like to measure in: meters, kilometers, miles or feet.
- Select which layer you would like to measure features from.
- Displays coordinates (Degree Min Sec) for the 'Select a Feature' option only.
- Displays the total length area or perimeter.

**Measure**

**Basic Measurement:**

**Feature Measurement:**  
Measure Features from Layer:

**Last Measurement:**  
Distance: 327,139.32 m

Coordinates: 74° 46' 16.54" N 113° 55' 11.84" W

**Past Measurements:**

Length	Area	Perimeter
327,139.32 m	0.00 m <sup>2</sup>	0.00 m
607,676.96 m	0.00 m <sup>2</sup>	0.00 m
394,178.36 m	0.00 m <sup>2</sup>	0.00 m

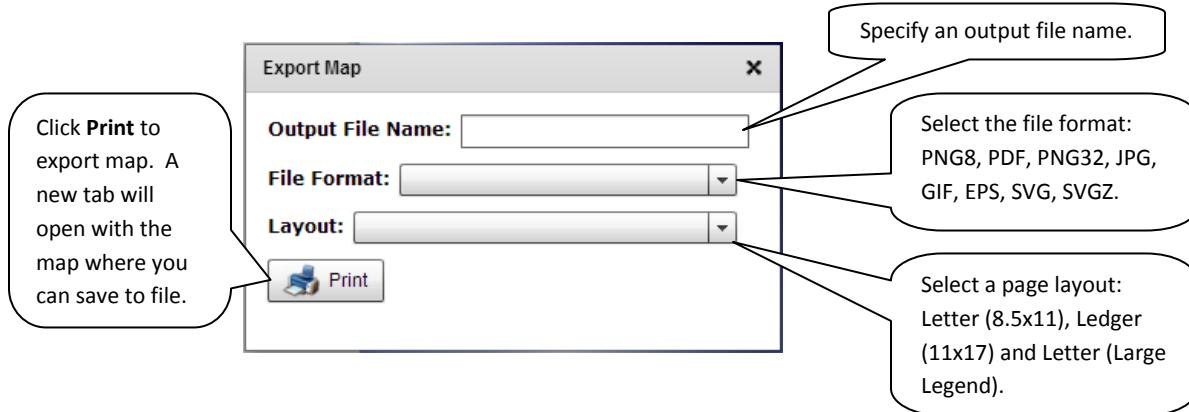
Total Length Total Area Total Perimeter

1,328,994.65 m	0.00 m <sup>2</sup>	0.00 m
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### 3.3 Print tool



Click on the Print tool on the Map Tools toolbar. The following window opens and allows you to specify what you would like to print (export to graphic).



### 3.4 Identify Tool



Click on the Identify tool on the Map Tools toolbar.

Click on a location in your map to identify the features at that location. The 'Identify Results' window will appear. Choose the layer which you would like to show results for from the drop down menu. The attributes are presented in the 'Identify Results' window and the feature will be highlighted.

The image shows a map on the left with a red circle highlighting a specific feature. On the right is the 'Identify Results' window.

Annotations explain the interface:

- A callout points to the highlighted feature on the map with the text: "Highlighted feature."
- A callout points to the dropdown menu in the 'Identify Results' window with the text: "Specify a layer to identify."
- A callout points to the table of attributes with the text: "List of attributes for the identified feature."

The 'Identify Results' window displays the following table of attributes for the highlighted feature:

NAD_83_LAT	69.605677
OPERATOR	Imperial Oil Limited
SPUD_DATE	19860210
LAND_TITLE	EA105
NAD_27_LAT	69.60572
NAD_27_LON	-134.01997
UWI_ORIG	300G076940134000
Shape	Point
NAD_83_LON	-134.022764
STATUS_CUR	Abandoned
WELL_ID	1597
WELL_NAME	HANSEN G-07
CLASS	Exploratory Well
R_RELEASE	19860411
REGION	NWT Mackenzie Delta

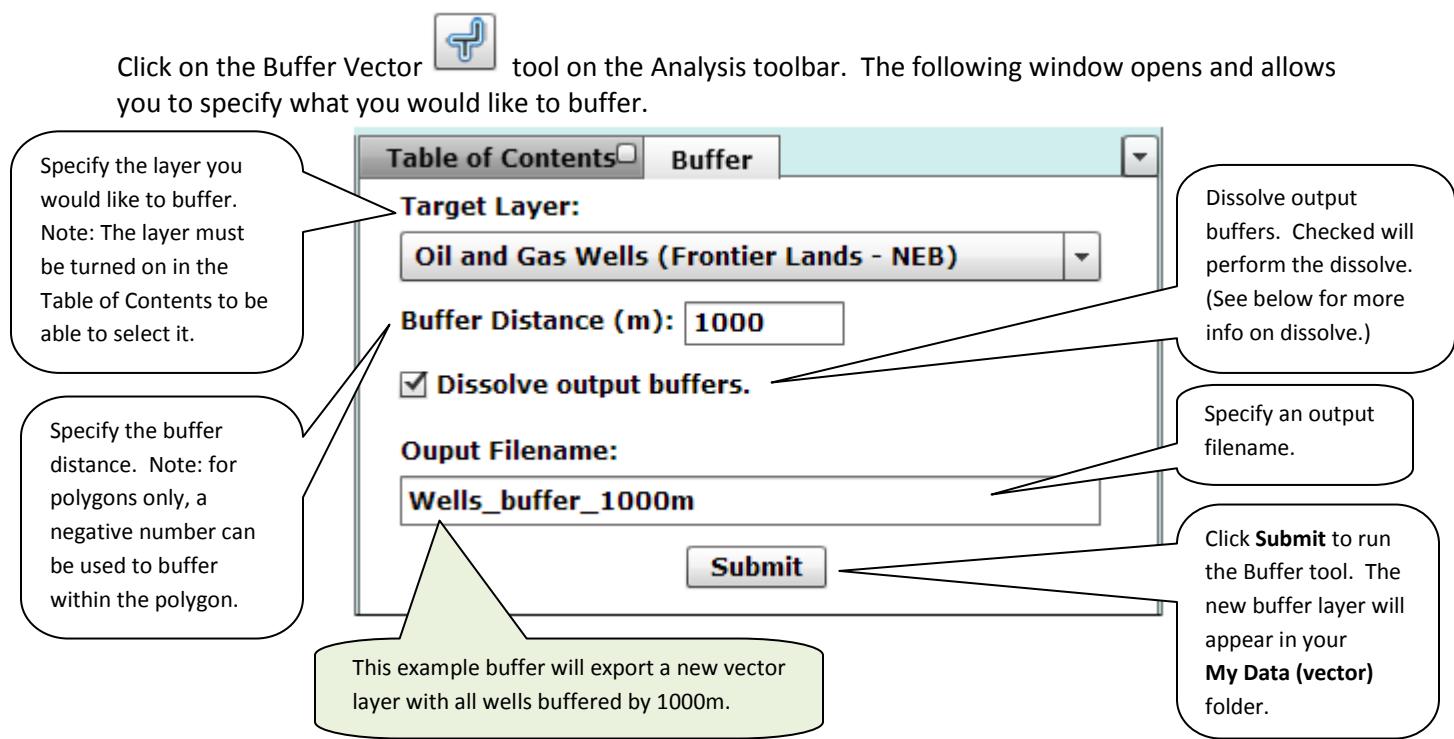
## 4.0 Analysis Tools

The Analysis Tools are used to manipulate and process vector and raster data (found under Table of Contents).

Icon	Name	Function
	<a href="#">Buffer Vector</a>	Creates buffer polygons around input features to a specified distance.
	<a href="#">Select by Attributes</a>	Select By Attributes allows you to provide an SQL query expression that is used to select features that match the selection criteria.
	<a href="#">Select by Location</a>	The Select By Location tool lets you select features based on their location relative to features in another layer.
	<a href="#">Intersect</a>	Computes a geometric intersection of the input features. Features or portions of features which overlap in both layers will be written to the output feature class.
	<a href="#">Euclidean Distance</a>	Calculates, for each cell, the Euclidean distance to the closest source.
	<a href="#">Vector to Raster</a>	Converts point, line, or polygon data into a raster surface (1 km cells)
	<a href="#">Reclass Raster</a>	The Reclass tool allows the user to reclassify or change input cell values to alternative values.

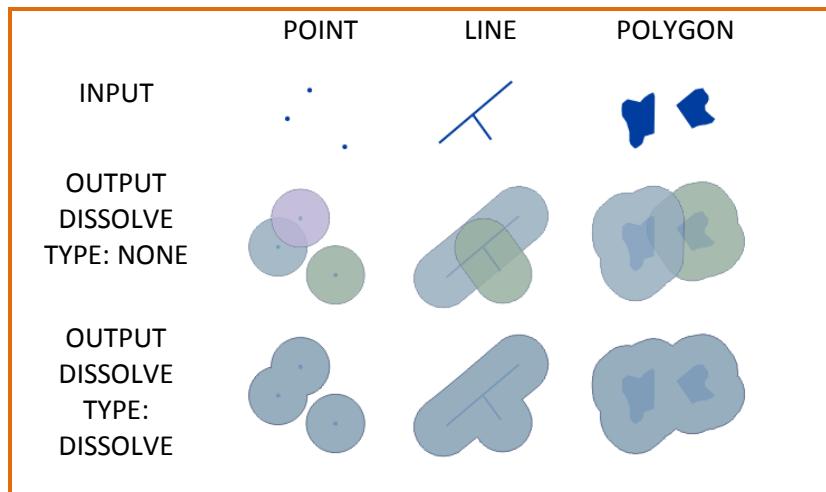
## 4.1 Buffer Vector

You can create a buffer around selected points, lines, or area features. For instance, you might use buffers to show an ecological zone around a waterway, or the area around a contaminated well. You can buffer more than one feature at once, but a separate buffer will be created around each feature.



### Dissolving output buffers:

- This check box allows the user to specify if a dissolve should be performed to remove buffer overlap.
- NONE (Unchecked box): An individual buffer for each feature is maintained, regardless of overlap.
- ALL (Checked box): All buffers are dissolved together into a single feature, removing any overlap.



## 4.2 Select by Attributes

Select By Attributes allows you to provide an SQL query expression that is used to select features that match the selection criteria and export those features to a new layer.



Click on the Select by Attributes tool on the Analysis toolbar. Note: Input for this tool must be vector. The following window opens and allows you to specify your selection.

Specify the layer to perform the selection against. Layer must be turned on in the table of contents.

The list of fields for that layer are displayed (which you can use to create your query).

Selected field.

Click Get Unique Values to see the values for the selected field when creating a query expression.

The list of unique values for a selected field are displayed here.

Expression building tools used to create a query.

Build a query in the selection widow by using the expression building tools (and double clicking fields and unique values) or by typing in the query.

SELECT \* FROM forms the first part of the SQL expression and is automatically supplied for you.

This example query will export a vector file with all the northern communities that are in the province of Yukon.

Output Filename:

Submit

Selected field.

Get Unique Values

Unique Values:

YT  
NT  
NU  
QC  
NL

= <> < <= > >=

LIKE AND OR NOT IS

- % ( )

SELECT \* FROM Layer WHERE:

"Territory\_Province" = 'YT'

Output Filename:

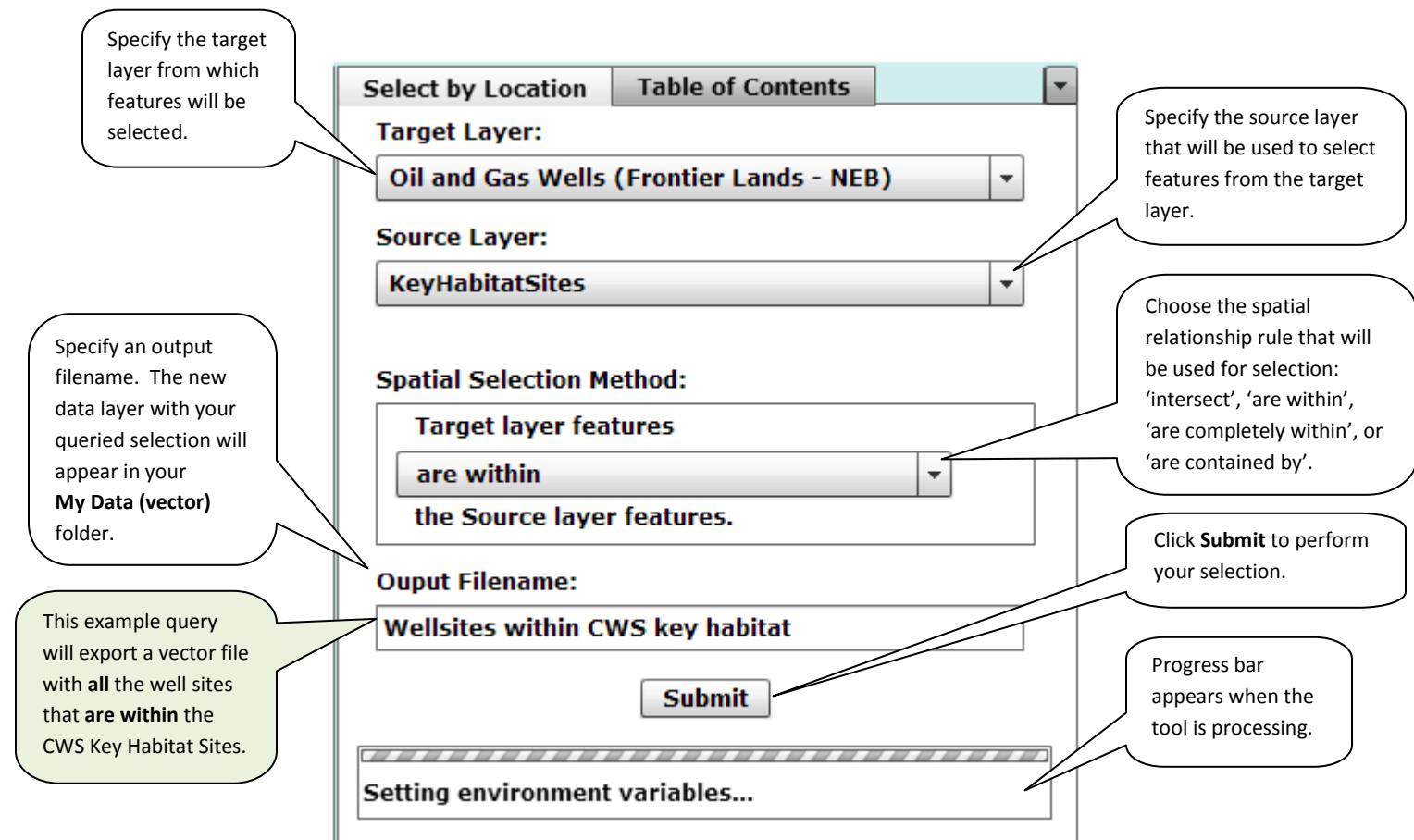
Northern Communities in YT

Submit

### 4.3 Select by Location

The Select By Location tool lets you select features based on their location relative to features in another layer.

Click on the Select by Location  tool on the Analysis toolbar. Note: Input for this tool must be vector. The following window opens and allows you to specify your selection.



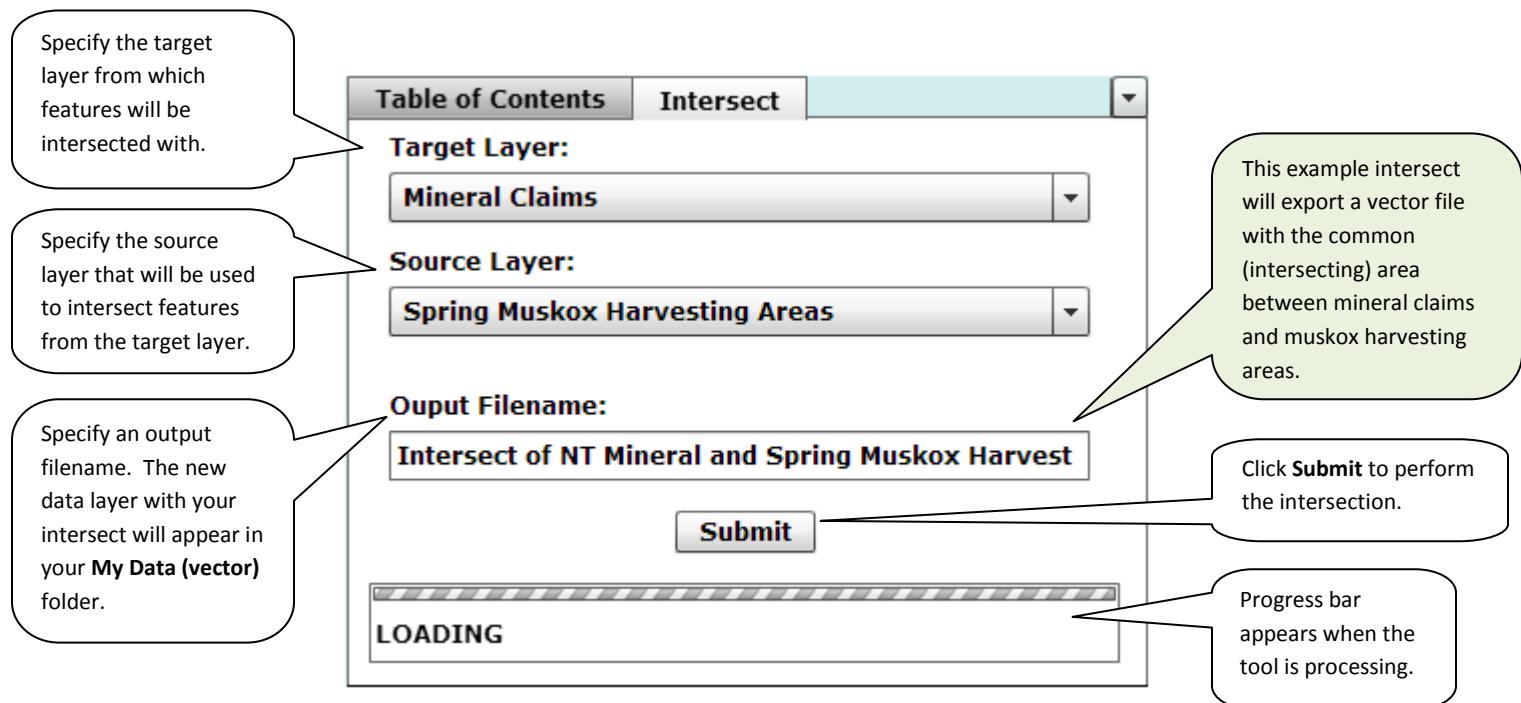
Spatial Selection Method details:

Rule	Definition
intersect	Intersect returns any feature that either fully or partially overlaps the source feature(s).
are within	To be selected, the geometry of the target feature must fall inside the geometry of the source feature. Selected features and source features can have overlapping boundaries.
are completely within	To be selected, all parts of the target features must fall inside the geometry of the source feature(s) and cannot touch the source's boundaries.
are contained by	This method differs from the Are completely within method in that the geometry of the target feature must fall inside the geometry of the source feature including its boundaries.

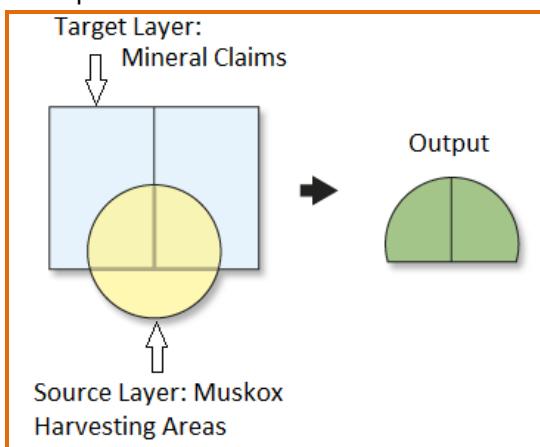
#### 4.4 Intersect Tool

Intersect creates a new feature from the common areas or edges of any two selected features of the same geometry type. You can create a new feature from the intersection of features of different layers, but the layers must be of the same geometry type (point, line or polygon).

Click on the Intersect  tool on the Analysis toolbar. Note: Input for this tool must be vector. The following window opens and allows you to perform an intersect between vector layers.



Example intersect:



#### 4.5 Euclidean Distance

Euclidean distance gives the measured distance from each cell in the raster to the closest source.



Click on the Euclidean Distance tool on the Analysis toolbar. Note: Input for this tool can be vector or raster. Output data will be raster. The following window opens and allows you to calculate Euclidean distance.

Specify the maximum distance (m) which accumulative values cannot exceed. If exceeded, values become NoData.

Specify the layer you would like to run Euclidean Distance on.

This example performs a Euclidean distance calculation up to a maximum distance of 6000m.

Click **Submit** to calculate the Euclidean Distance.

Table of Contents    Euclidean Distance

**Target Layer:**  
Oil and Gas Wells (Frontier Lands - NEB)

**Max Distance (m):** 6000

**Ouput Filename:**  
Euclidean\_Wells\_6000m

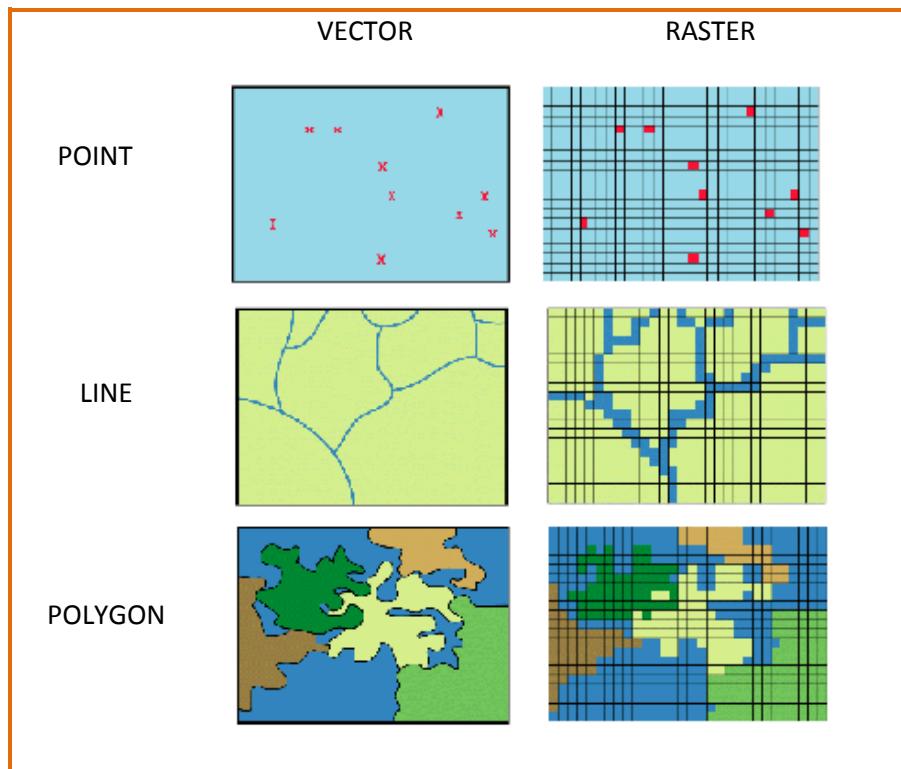
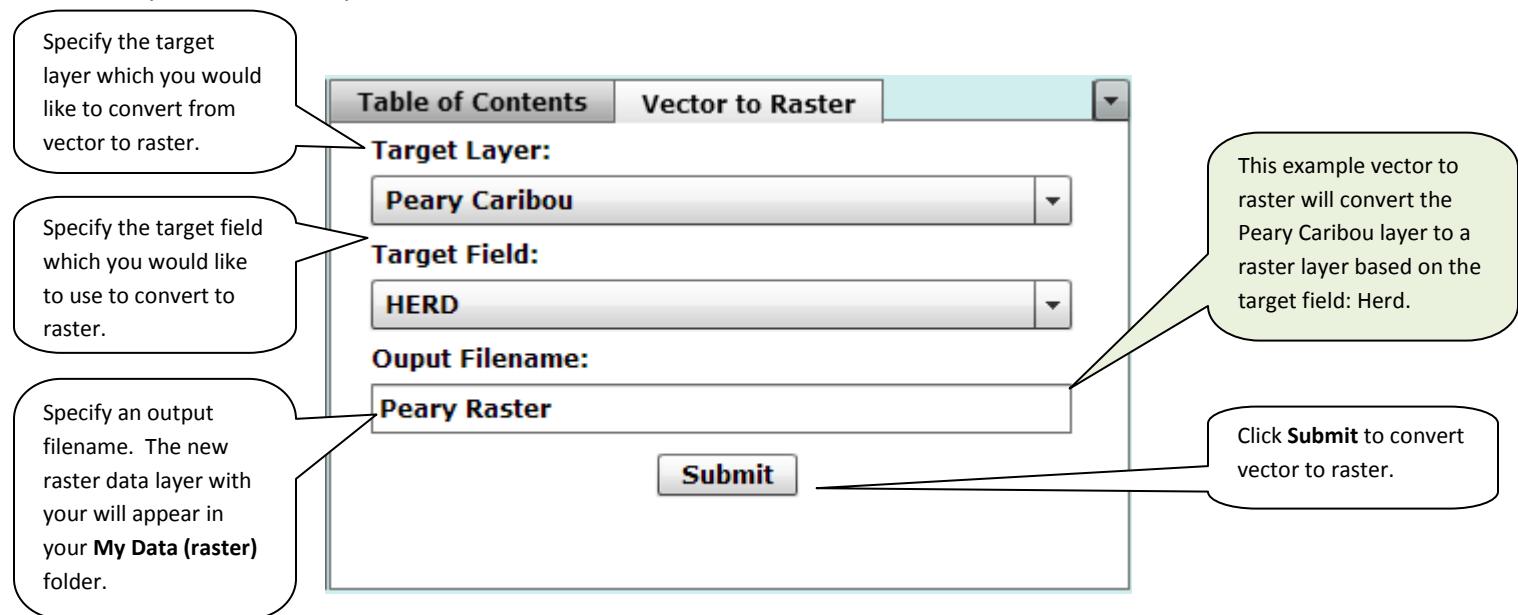
**Submit**

## 4.6 Vector to Raster

Vector to Raster converts point, line, or polygon data into a raster surface with 1 km cells.



Click on the Vector to Raster tool on the Analysis toolbar. Note: Input for this tool must be vector. Output data will be raster. The following window opens and allows you to convert a vector layer to a raster layer.



## 4.7 Reclass Raster

The Reclass tool allows the user to reclassify or change input cell values to alternative values.



Click on the Raster Calculator tool on the Analysis toolbar. Note: Input for this tool must be raster. The following window opens and allows you to specify your selection.

Specify the raster target layer which you would like to reclassify

The Value you will be reclassifying.

This example Reclass Raster reclassifies Tug/Barge and Tanker 4, and reclassifies Gov vessel, Passenger vessel, and Govt vessel (Nor) to 2. General Cargo Ship is reclassified to 0.

Reclass Value must be between 0-5. Reclass value 0 = transparent

Assign a new Reclass Value for each Value in the layer.

Double click the '0' to assign a new reclass value. Type in a new value from 0-5.

Output Filename: Arctic\_Shipping\_Routes\_Reclass

Submit

Value	Reclass Value (...)
Tug/Barge	4
Government Vessel/Ice Breaker	2
Passenger Vessel	2
Tanker	4
Govt Vessel (Norwegian)	2
General Cargo Ship	0

## 5.0 Raster Tools:

The Raster Tools are used to manipulate and process raster data (found under Table of Contents, My Data, Raster Layers).

Icon	Name	Function
	Upload Layer	Allows the user to upload a raster layer to their <b>My Data (raster)</b> folder so the layer can be incorporated into the analysis.
	Move To Public	Moves a raster layer (values 0-5) from the <b>My Data</b> folder to the <b>Public Data</b> folder so other users may access the layer.
	<a href="#"><u>Weighted Overlay</u></a>	Overlays several rasters using a common measurement scale and weights each according to its importance.
	<a href="#"><u>Raster Calculator</u></a>	Allows the user to create and execute Map Algebra expressions (add, subtract, multiply, etc.) in a tool.

## 5.1 Weighted Overlay

The Weighted Overlay Overlays several rasters using a common measurement scale and weights each according to its importance.



Click on the Weighted Overlay tool on the Raster toolbar. Note: Input for this tool must be raster. The following window opens and allows you to specify your selection.

**Table of Contents** **Weighted Overlay**

**Check off all inputs and assign each a weight between 0-100. All weights must sum to 100.**

	Sensitivity Grids	Weight
<input checked="" type="checkbox"/>	<b>Canadian Conservation Areas</b>	15
<input checked="" type="checkbox"/>	<b>Caribou Harvesting Areas</b>	50
<input type="checkbox"/>	<b>Fishing Areas</b>	0
<input type="checkbox"/>	<b>Polar Bear Range</b>	0
<input checked="" type="checkbox"/>	<b>Critical Grizzly Bear Denning Areas</b>	35

**Output Filename:** **Weighted Raster**

**Submit Job**

Specify the rasters to include in the weighted overlay.  
Checked: includes the raster in the overlay.  
Unchecked: excludes the layer from the overlay.

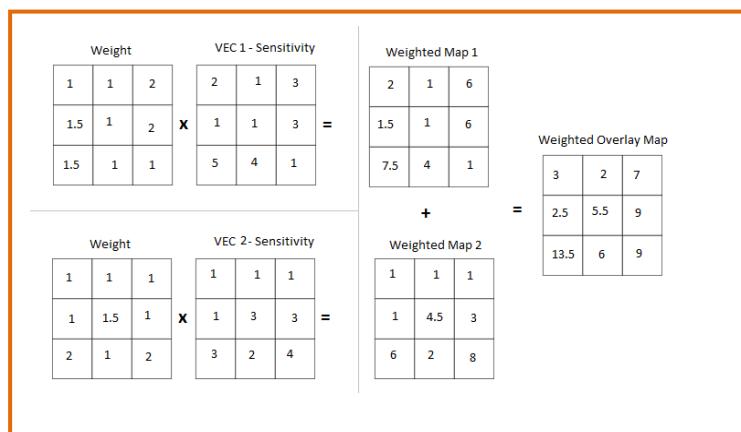
Specify an output filename. The new raster data layer with your will appear in your **My Data (raster)** folder.

Specify the weight by typing in a value from 1-99. All weights must sum to 100.

This example weighted overlay combines three rasters with their respective weights.

Click **Submit Job** to perform the weighted overlay.

Example:



## 5.2 Raster Calculator

The Raster Calculator allows the user to create and execute Map Algebra expressions (add, subtract, multiply, etc.) in a tool.

Click on the Raster Calculator  tool on the Raster toolbar. Note: Input for this tool must be raster. The following window opens and allows you to specify your selection.

