



State of Oregon Department of Environmental Quality

Coquille River Watershed TMDL Mapping Tool

Contact: Bryan Duggan
381 N 2nd St.
Coos Bay, OR 97420

Introduction

The Oregon Coquille River Watershed Total Maximum Daily Load (TMDL Mapping Tool) was developed so that users can evaluate potential benefits of riparian enhancement throughout the watershed. The tool allows the user to access detailed riparian and channel information at one or more selected location(s). Auxiliary information further allows the user to overlay the benefits of site treatment with areas identified as being, or having the potential to be, high value habitat for Coho Salmon. The tool allows display and analysis of a variety of other fish species throughout the watershed.

This document details the steps taken to create the Coquille River Watershed TMDL Mapping Tool, including a list of the different spatial layers found within the tool. Additionally, there are some basic guidance recommendations for users to maximize the utility of the Mapping Tool.

QUICK TIPS – User Guidance

- Pop-Ups are enabled for many operational (and all Query Tool output) layers as default.
- Clicking on the three dots () to the right in the operational layer list (Top right of map) allows the user to access layer options:

<<Zoom to, Transparency, Disable Pop-up, Move Up/Down Layer on Map, Open Attribute Table, Description>>

- These same three dots are available under the Query pop-up window, in the second tab (“Results”) after a query is executed and offer these options:

<<Zoom to, Pan to, Flash, Statistics, Export to..., View in Attribute Table, Remove this Result>>

- You can increase the size of the Query window by dragging the lower right hand corner.
- Some queries may fail, this is most likely due to the extent being too large. Zoom into the map more, or make a sub-selection using the dark gray rectangle to the left of the white trash can within the red square.
- You can export query outputs as a CSV file (viewable in Excel), Feature Collection, or GeoJSON.
- Shade model reach identifiers for small tributaries to larger streams are often identified by code and are numbered consecutively with the receiving waterbody reach identification numbers.

- The attribute table can be opened by clicking on the tab located at the bottom, center of the screen. Note that operational layers are shown in tabs at the top of the attribute table and can be selected to view layer attributes, along with other mapping functions from this interface.

Shade Model Inputs

Between 2002 and 2006 the Coquille Watershed Association secured funding to complete riparian and channel condition assessments and shade modeling for most of the Coquille River Watershed. There is a web-link at the top of the tool, above the map, to the ODEQ web page containing download links for the different area-specific shade assessment reports. Users are encouraged to refer to this documentation information in order to fully understand the shade models used in this tool. The characteristics of current and potential vegetative communities are discussed in detail in area-specific reports.

The different shade model outputs were combined and assigned to line features covering most major waterways within the Coquille River Watershed. The model outputs provided by Oregon DEQ were from the Mainstem Coquille, North Fork Coquille, East Fork Coquille and Upper East Fork Coquille, Middle Fork Coquille, and South Fork Coquille shade models. All of these different model outputs were combined into one consistent line coverage for use in the Mapping Tool.

The amount and type of data produced by the different shade models varies so the most common and priority outputs were employed for the Mapping Tool. The outputs leveraged by the Mapping Tool are the current shade and potential shade for each model reach (based on potential riparian area restoration efforts as input into each area-specific shade model). These two values were used to estimate Current and Potential Thermal Loads for each reach. The magnitude and percent change in thermal loads from current to potential thermal loads was also calculated to allow additional query functions in the Mapping Tool.

Operational Layers

The list below details “operational” layers provided for display and, in some cases, analysis as part of the Mapping Tool, along with pertinent information about the layer, or group of layers. These can be moved up or down in the Layers List to show different layers on top of others, including results of queries. Pop-Up windows are activated by default for most operational layers where a user can simply click on any point in the map and the attribute information will pop-up for the one or more layers on that locale/point.

1. Oregon Fish Distribution – Coho Salmon

Color coded Coho lifecycle use for migration only, rearing and migration, spawning and rearing, and unknown.

SFC-5A	
Model Reach ID	SFC-5A
W_B_E1	B
Current Thermal Load (BTU)	2,172.00
Potential Thermal Load (BTU)	1,610.00
Potential Change in Thermal Loading (BTU)	562.00
Potential Percent Change in Thermal Loading (percent)	35.00
Zoom to ...	

2. Shade Model (Coquille River Watershed Shade and Channel Assessment)

Shade model operational layers include:

Modeled Extent

Indicates where existing and site potential shade modeling has been completed.

Modeled Percent Change

Color coded ranges of the percent change expected between existing and future site potential shade.

Modeled Potential Loading BTU

Color coded British Thermal Units (BTUs) ranges under site potential mature vegetation conditions.

Current Loading BTU

Color coded BTU ranges under existing site vegetation conditions.

BTUs were selected to quantify the amount of heat energy provided by the sun. On a sunny day in late July approximately 2,440 BTUs strike earth's surface in the vicinity of the Coquille Subbasin. The shade model looks at how much of this energy is blocked by shade under current vegetative conditions, and how much of the sun's energy would be blocked under site potential mature vegetative conditions. Increasing the amount of the sun's energy that strikes the water's surface contributes to warming of the water. Human-caused shade reductions can increase the thermal load that reaches a stream. This increase in thermal load is the "pollutant" for the stream temperature parameter. Shade and thermal load are closely related but are depicted in differing units.

The lookup table below shows the relationship between percent shade and BTUs. If existing shade is improved from 25% to 50% then pollutant loads are reduced by 610 BTUs (1830 BTU – 1220 BTU = 610 BTU). Characterizing activities in terms of pollutant load reductions helps measure progress that is being made toward reducing stream temperatures. Even though it can take vegetation decades to mature, this tool allows the user to quantify the potential reductions in thermal load could be realized from a specific riparian enhancement project.

Percent Shade	Flat Plane British Thermal Units (BTU)
0	2440
5	2318
10	2196
15	2074
20	1952
25	1830
30	1708
35	1586
40	1464
45	1342
50	1220
55	1098

Percent Shade	Flat Plane British Thermal Units (BTU)
60	976
65	854
70	732
75	610
80	488
85	366
90	244
95	122
100	0

The shade and channel assessment attributes available for each stream segment may vary. If attribute information is not available for a given parameter the field will be shown as blank.

Attribute table headings are explained in more detail in the table below and in area-specific reports available at the ODEQ web page (see web-link at the top of the tool, above the map, to the ODEQ web page containing download links for the different area-specific shade assessment reports).

Shade and Channel Assessment Attributes	
Code	Attribute
Model Reach Name	A unique name assigned to a stream reach
ReachID	A unique number assigned to a stream segment within a reach
W_B_E1	B means both stream banks have similar characteristics. If the characteristics of the stream bank differ the east bank is denoted as E and the west bank is denoted as W.
C_Thrml_Ld	Current thermal load (BTU).
P_Thrml_Ld	Thermal load under site potential vegetative conditions (BTU).
Property Owner(s)	Generally identifies federal and private lands where available.
Percent Overhang (decimal percent)	The decimal percent of riparian vegetation overhang. This is the vegetation that would provide shade when the sun is directly over the stream.

Active Channel Width (feet)	The bank full width of the channel.
Reach length (feet)	Length of the specified stream segment.
Tree Height (feet)	The average height of the riparian canopy, in feet.
Reach Orientation (degrees)	The bearing of the segment from true north. Degrees measured toward west are positive; the degrees measured toward east are negative.
Shade Density (decimal percent)	The ratio of light to shaded area within a unit length.
Existing vegetative cover	See vegetative cover codes in area-specific assessment documents.
Road within 100' (Y/N)	Identifies if a road is present within 100' of the stream.
Riparian Land Use	Identifies the land use within the riparian area as forestry, agriculture or urban.
Source of Model Data	Identifies which assessment the segment was part of (Middle, South, North Forks or Coquille River mainstem).
Total Existing Shade (decimal percent)	Percent of stream shaded at the time of the assessment (aerial photo years vary – see assessment documentation for specific series used).
Total Potential Shade (decimal percent)	Percent of stream that would be shaded if mature site potential vegetation were present (see assessment documents for information regarding how site potential vegetation was derived).
Potential change in shade (decimal percent)	Percent change in shade between existing and site potential vegetation.
Potential change in thermal loading (BTU)	The change in the amount of thermal loading between existing and site potential vegetative conditions (BTU).
Potential change in thermal loading (percent)	The percent change in the amount of thermal loading between existing and site potential vegetative conditions.

3. Auxiliary Layer Group

Auxiliary layers are provided for the user along with supporting information to allow consideration of the potential for multiple benefits that may be realized from site treatments. The

Auxiliary Layer Group contains a Hydrography layer sub-group (containing stream lines and Coquille basin boundary), a layer named “Intrinsic Potential – Coho Salmon), a layer sub-group named “Water Quality Limited Waters”, and a layer sub-group named “Watershed Restoration Inventory”.

Intrinsic Potential – Coho Salmon is scored from 0-1, with the value 1 indicating the highest intrinsic potential. This information allows the user to prioritize areas where riparian enhancements may provide benefits to a specific fish species.

Water Quality Limited Waters provides information about where water quality does not meet Oregon criteria designed to support beneficial uses. The layer identifies which water quality parameters are known to be impaired and during what season this impairment occurs.

The **Watershed Restoration Inventory** layer allows a user to evaluate the proximity of other restoration and enhancement activities.

4. Oregon Fish Distribution Layer Group

Data for these layers were compiled by the StreamNet project (May 2013), which is administered by the Pacific States Marine Fisheries Commission. Data were provided by Washington Dept. of Fish and Wildlife, Oregon Dept. of Fish and Wildlife, Idaho Dept. of Fish and Game and Montana Fish Wildlife and Parks.

5. Oregon Transportation Layer Group

Data for these layers include all signed Interstate, State, and US routes for the State of Oregon. The purpose of this dataset is to show location of routes and provide cross-reference to ODOT highway numbers. This file includes all applicable jurisdictions of roadways to give a complete picture of routes located within Oregon. Please note that not all signed routes are State of Oregon highways. Replaces Routes_xref. Source: ODOT, 1:24,000 (2014).

6. USDA/NRCS SSURGO Layer Group

USDA/NRCS SSURGO: This layer shows the Soil Survey Geographic (SSURGO) by the United States Department of Agriculture’s Natural Resources Conservation Service. SSURGO digitizing duplicates the original soil survey maps. This level of mapping is designed for use by landowners, townships, and county natural resource planning and management.

USDA/NRCS STATSGO: This layer shows the U.S. General Soil Map of general soil association units by the United States Department of Agriculture’s Natural Resources Conservation Service. It was developed by the National Cooperative Soil Survey and supersedes the State Soil Geographic (STATSGO) dataset published in 1994. It consists of a broad-based

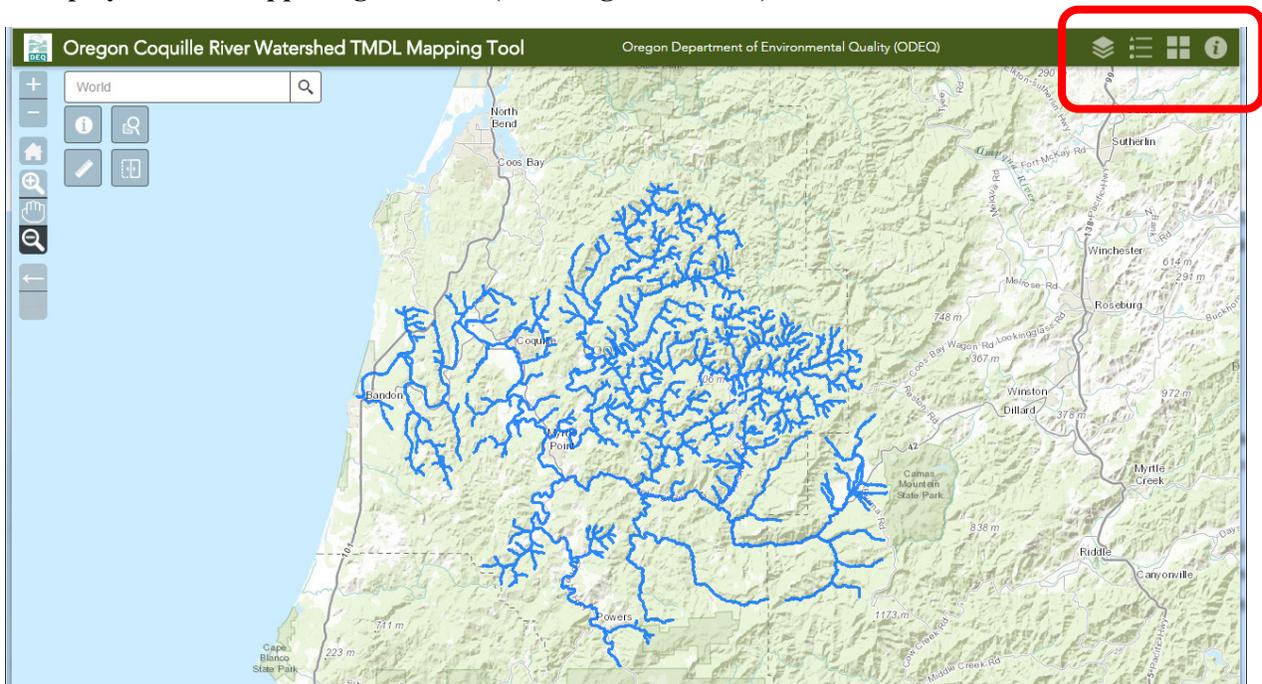
inventory of soils and non-soil areas that occur in a repeatable pattern on the landscape and that can be cartographically shown at the scale mapped.

USDA/NRCS GLOBAL SOIL REGIONS: This layer shows the Global Soil Regions map by the United States Department of Agriculture’s Natural Resources Conservation Service. The data and symbology are based on a reclassification of the FAO-UNESCO Soil Map of the World combined with a soil climate map. The soils data is symbolized to show the distribution of the 12 soil orders according to Soil Taxonomy.

Detailed User Guidance

Buttons on the top right of the tool allow the user to select layers for display as well as a legend. The left-hand side of the tool includes many additional buttons that allow for zooming, panning, measuring, etc. In addition, as described below, these buttons include the tool’s query functions.

4 Display Buttons - upper right corner (in dark green ribbon)



Layer List

Shows the operational layers, or groups of layers, available for display and analysis.

- To expand a group, or look at layer symbology and colors, click on the small triangle.
- To turn on/off display of any layer, or groups of layers, click on the box to the left of the layer name (to the right of the small triangle).

Map Legend

Provides color codes, or symbology, for the operational layers currently displayed on the map (i.e., turned on), as well as outputs of any Query Tool runs.

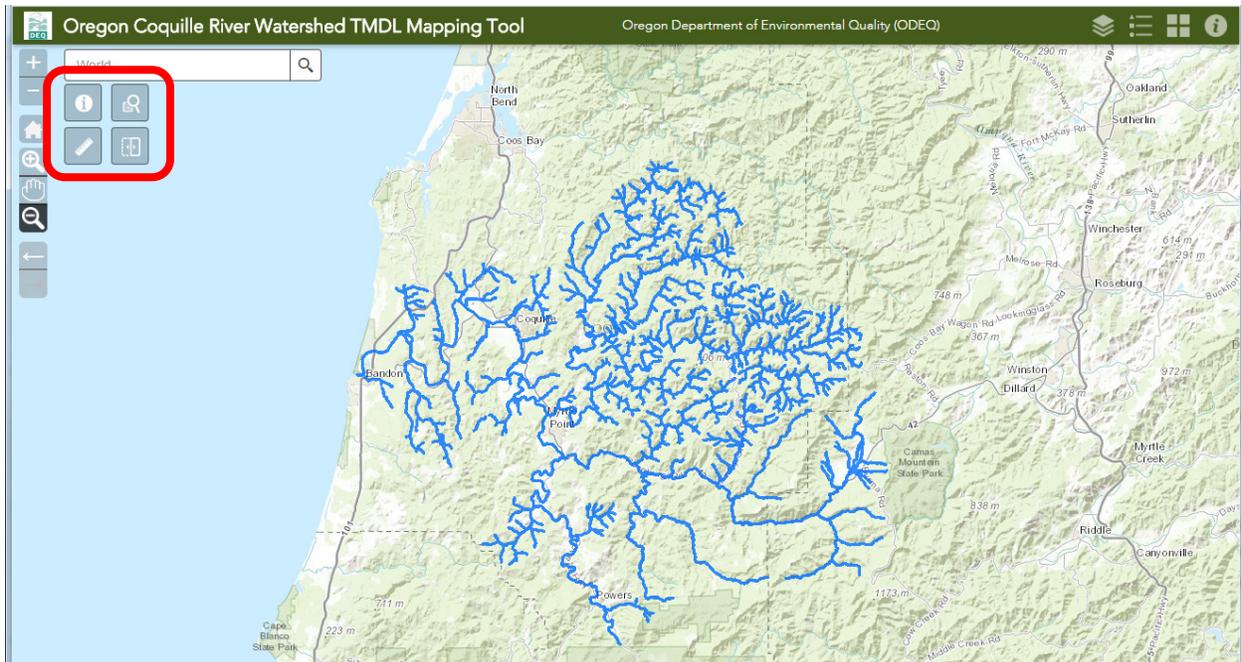
Base Map Gallery

Allows you to select the backdrop for the operational layers. Selections include topography, terrain and aerial photography.

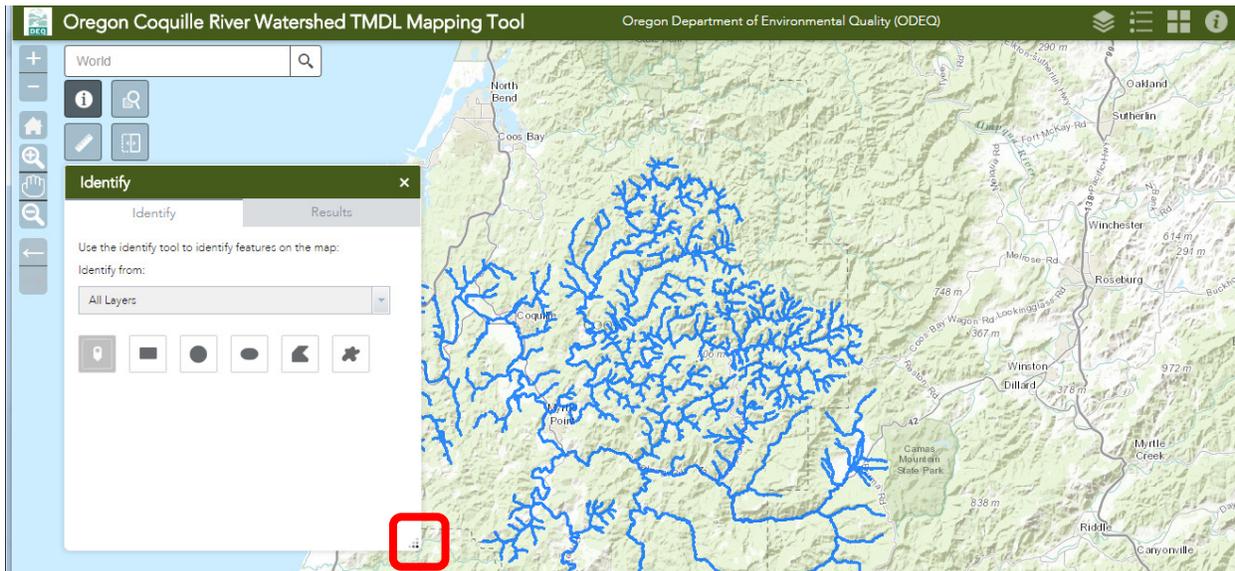
About Tab

Summary of Mapping Tool's purpose and functionality.

4 Operational Buttons - upper left corner of map (below search function)

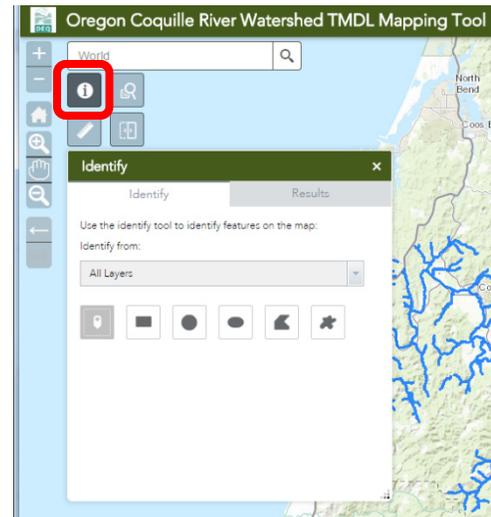


NOTE – once the user clicks any of these four buttons, they can enlarge/reduce the window size by dragging the lower, right hand corner of pop-up windows. See example/location of this function below:



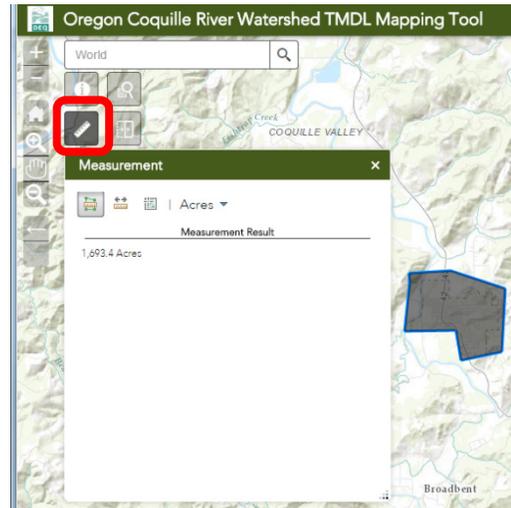
Identify Tool

The identify tool allows the user to select using a point, or rectangular or oval shaped polygon (hold and drag mouse), or other shape by clicking multiple times, to view operational layer information detail in the extent currently displayed on the map. When using the point identify tool to view information available for a selected stream reach, the user may need to zoom in. In many instances the operational layers do not align exactly and because of this may not be selected simultaneously. Alternatively, the user may consider using the polygon function of the identification tool to assure all selected operational layers are identified.



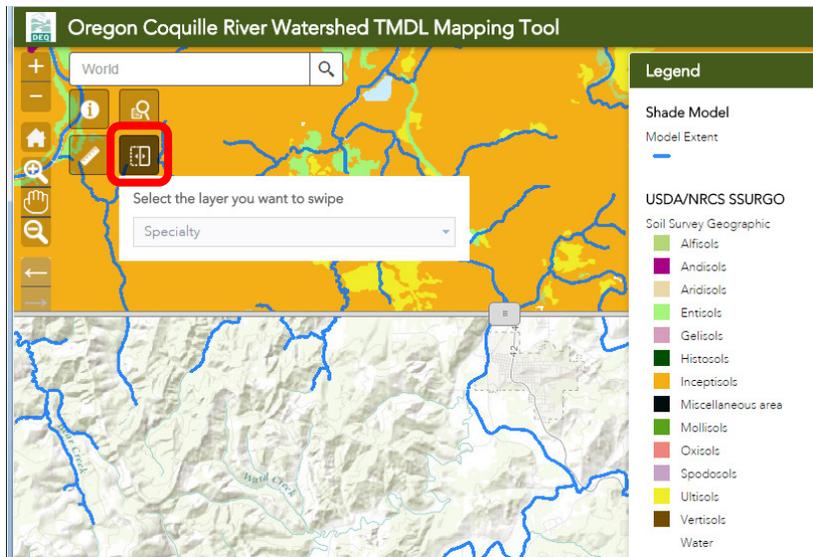
Measuring Tool

The measuring tool allows the user to measure area or distance, or to identify the latitude and longitude of a selected point or cursor position.



Swipe Tool

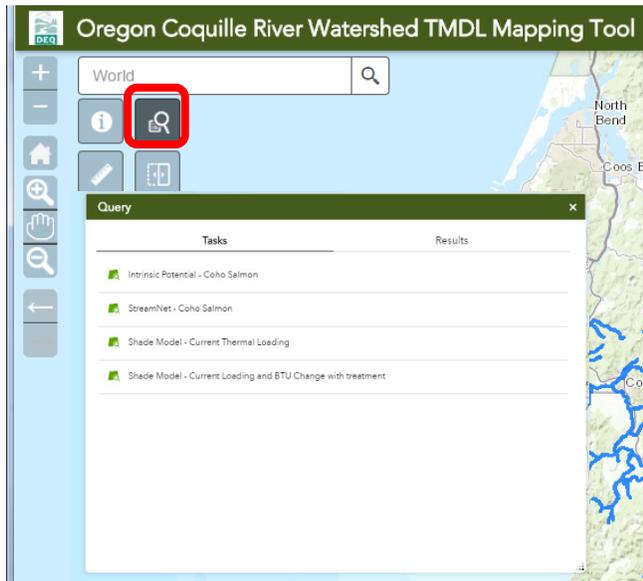
This tool creates a “curtain” that is pulled up from the bottom of the screen. It is strictly for visual purposes but can be useful for visual comparisons by the user. It allows the user to select one operational layer, or query output layer, to have ‘disappear’ as the line (with box in the middle) is pulled upwards.



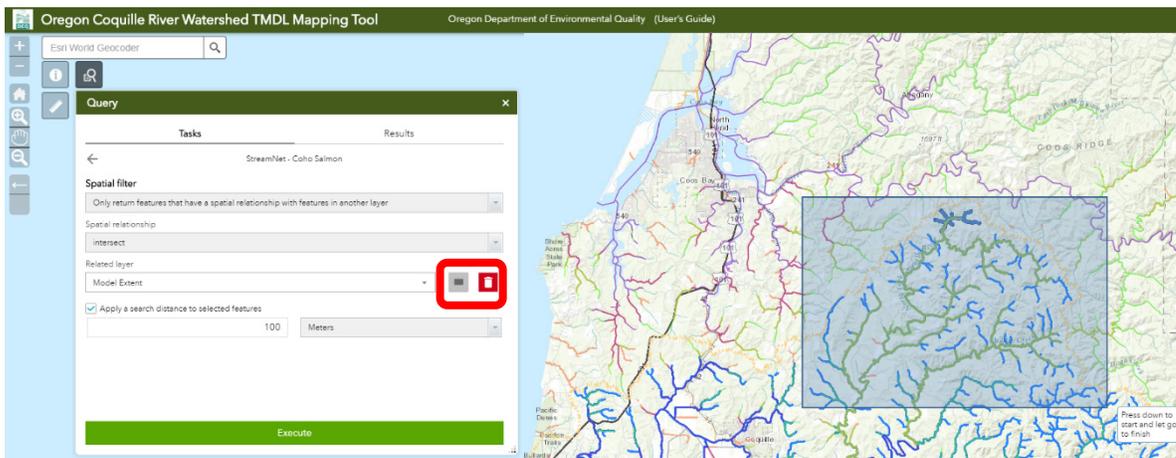
Query Tool(s)

There are four Query “Tasks” (i.e., tools) available to a user, to select a subset of one of three operational data layers:

- Intrinsic Potential - Coho Salmon
- StreamNet – Coho Salmon
- Shade Model Reaches (two queries developed for this data layer)



The query functions have best performance when parameters are set so that results are under 200 reaches, or when map scale is less than 1:150,000. If the query or spatial extent is too large then the query function may time out and report back “Query failed!” to the user. When queries fail—this is most likely due to the extent being too large—zoom into the map more and/or make a sub-selection using the dark gray rectangle to the left of the white trashcan within the red square (see screen shot below, where an example of one of the query tools is provided).



The query named “StreamNet – Coho Salmon” only allows the user to obtain a sub-selection by querying on (i.e., limiting the Query output) one of the following spatial filter mechanisms:

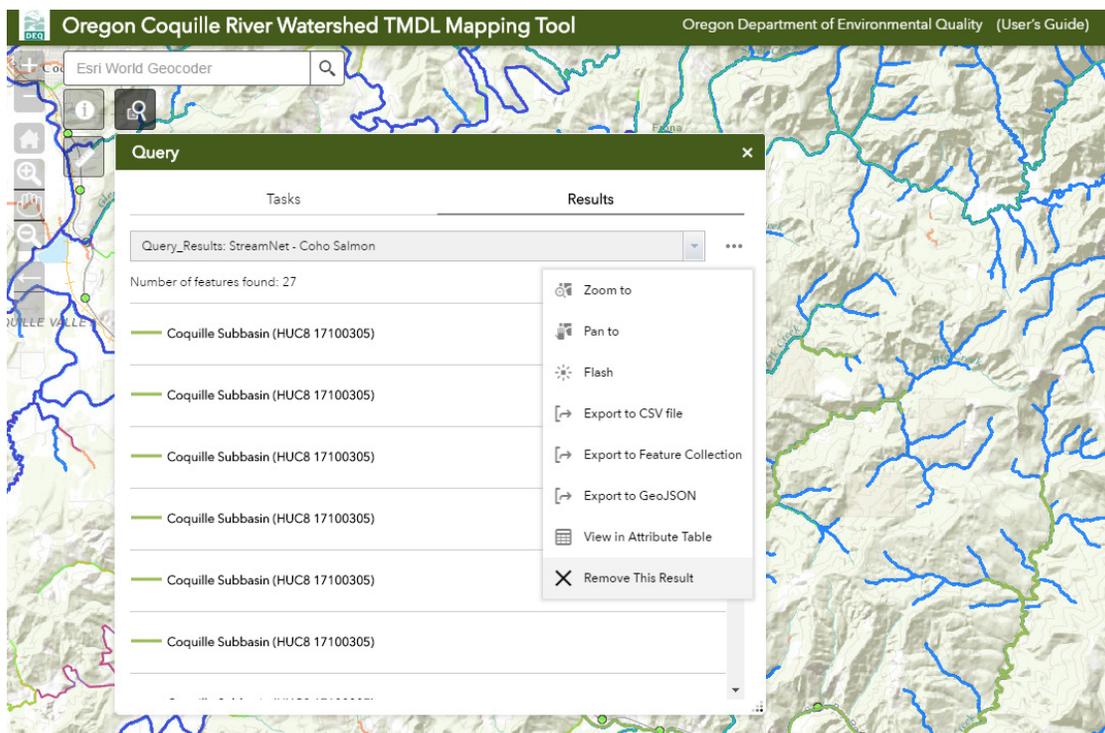
- Features within the current map extent
- Features within a user specified area/boundary (point/click, rectangle, oval, custom-sized)
- Features that have a spatial relationship (intersect) with features in another layer (“Related Layer”), or a within a specific search distance.

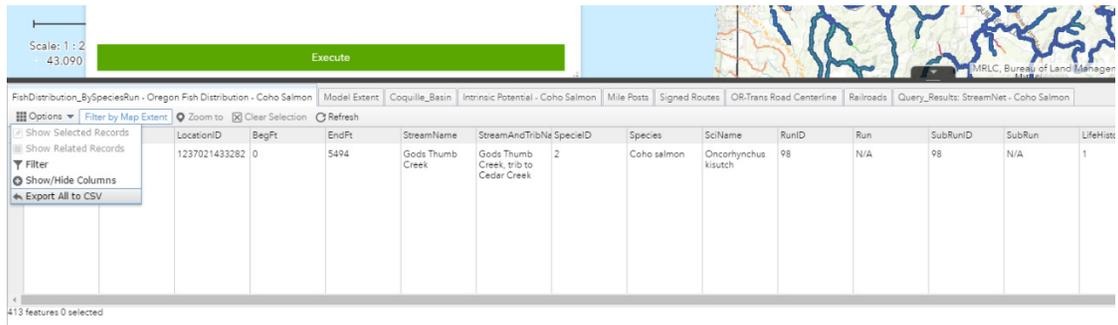
- Includes the option of using features within results (i.e., outputs) from another, different query task.

The other 3 queries allow a user to perform a **two-step query**, if desired. In the first step, the user can select a subset of records based on specific attributes of the Shade Models layer or the Intrinsic Potential layer (depending on which query is initially selected). As part of the second step, spatial filters can be applied by using **one** of the following spatial filter mechanisms:

- Features within the current map extent
- Features within a user specified area/boundary (point/click, rectangle, oval, custom-sized)
- Features that have a spatial relationship (intersect or touch) with features in another layer (“Related Layer”), or within a specific search distance.
 - Includes the option of using features within results (i.e., outputs) from another, different query task.

To help avoid confusion as additional queries are performed, Query results can be saved (“Export to ...”), viewed (“View in Attribute Table”) or deleted using the “Remove This Result” option under the three dots **...** to the right of a particular “Query_Results” in the “Results” Tab (see screen shot below). Query Outputs can also be Exported to a CSV file format (and then opened in Microsoft Excel) from the Attribute Table interface located at the bottom of the Mapping Tool, under the “Options” Drop down menu (see last screen shot below).





Alternative formats

Documents can be provided upon request in an alternate format for individuals with disabilities or in a language other than English for people with limited English skills. To request a document in another format or language, call DEQ in Portland at 503-229-5696, or toll-free in Oregon at 1-800-452-4011, ext. 5696; or email deqinfo@deq.state.or.us.