

The Range-Wide Bull Trout eDNA Project ArcGIS Online Map Guide

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General map notes:

The sample points may not line up with the chosen basemap. The points are aligned with the NHD Plus version 2 NHDFlowline streams. Actual field sample locations may differ slightly depending on the ground situation and personnel collecting the samples.

Overview

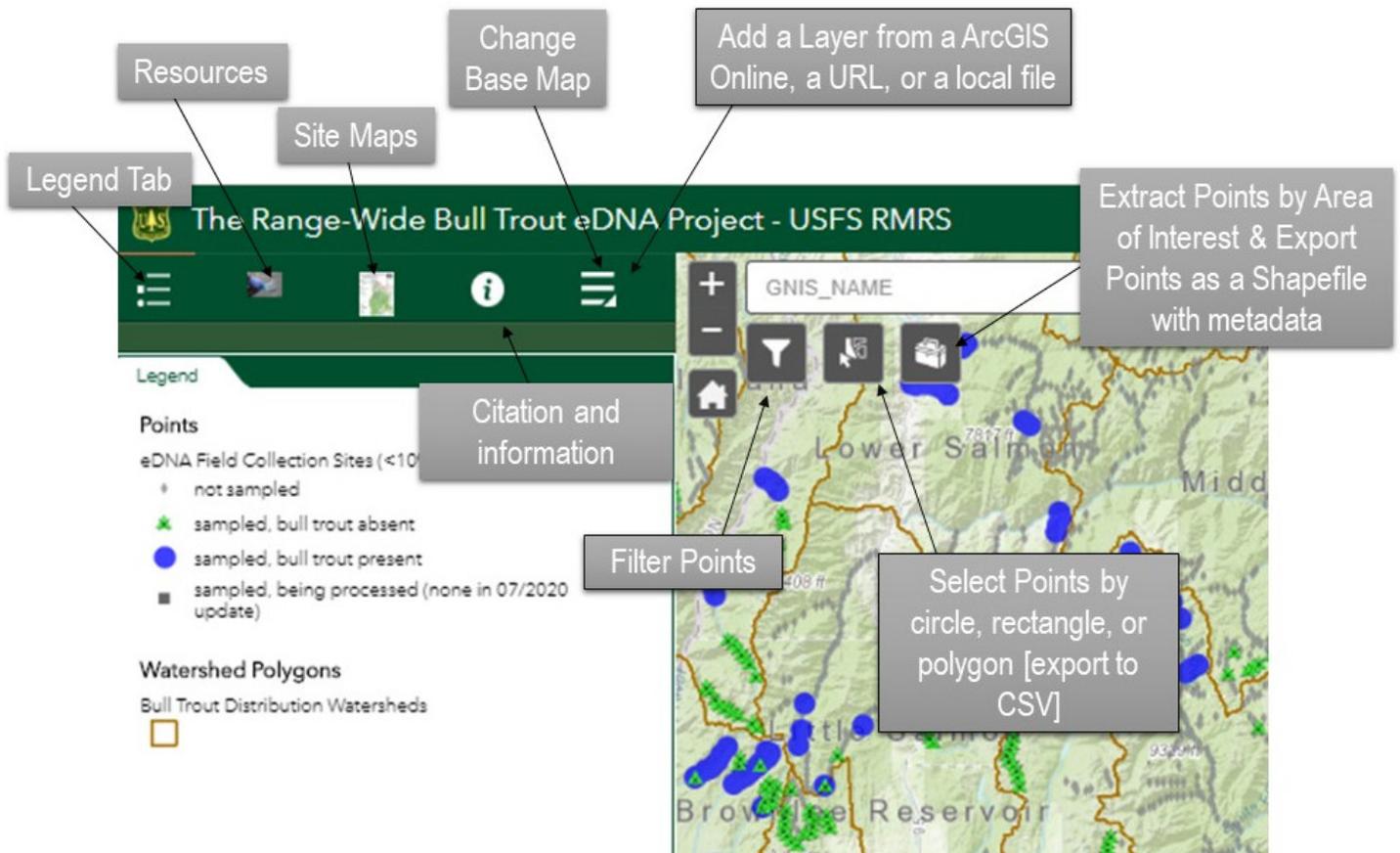
There are tabs available along the left under the map name and tools available in the upper left-hand corner of the map under the search bar.

[Navigating the Map](#)

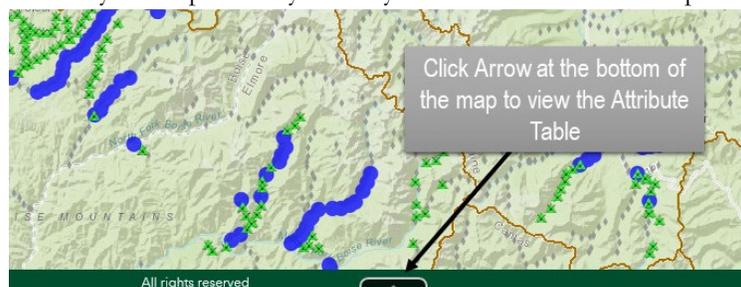
[Legend Tab](#) | [Resources](#) | [Sample Site Maps](#) | [Add Layer from ArcGIS Online, a URL, or a File](#) | [Change Base Map](#)

[Filter Points](#) | [Select Points by circle, rectangle, or polygon](#) | [Geoprocessing - download points by area of interest](#)

[Search Bar](#)



The [attribute table](#) is available by selecting the arrow at the bottom of the map. You can [filter by HUC](#) or other attributes. Note that the [Filter Points](#) button also allows you to specifically filter by HUC name or bull trout presence/absence.



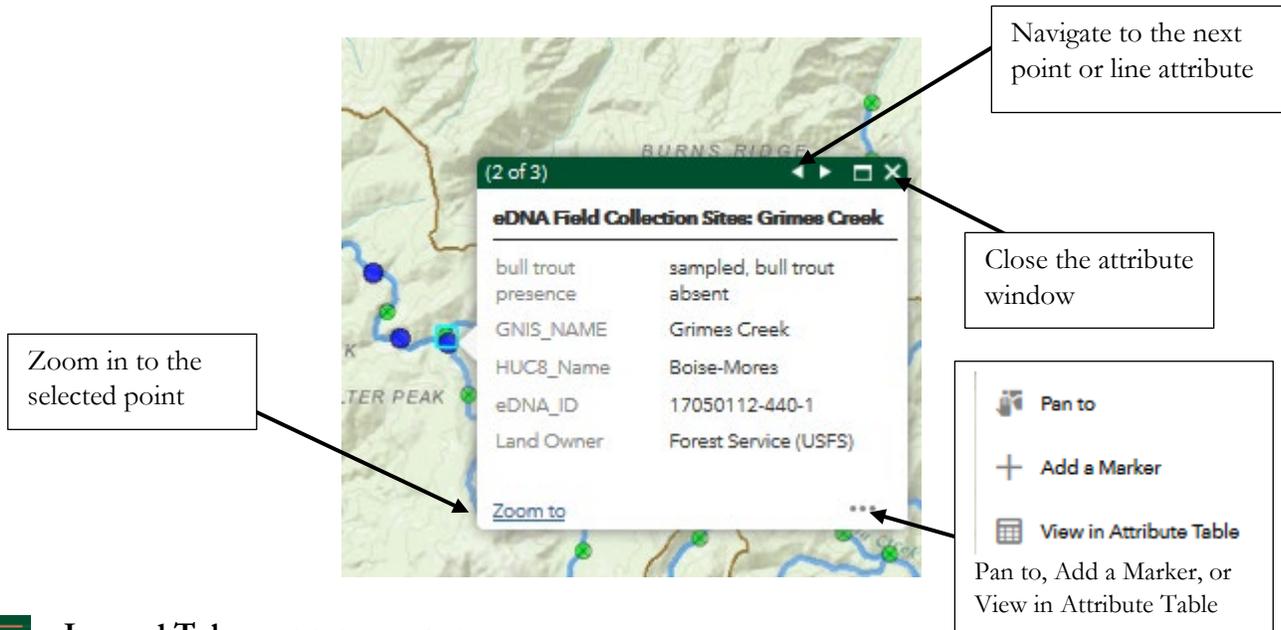
Note that occasionally the arrow will not be available even after refreshing your browser. You can open the attribute table by opening the [Select tool](#) to select points and using the ellipsis to select "View in Attribute Table".

Navigating the Map – general tips

To zoom in and out, use the + or – buttons in the upper-left hand corner of the map  or use the scroll on your mouse.

To immediately zoom out to the initial extent, click the “home” button in the upper-left hand corner of the map .

To see the attributes of specific points on the map, use your mouse to click that point. A box will pop up with those available attributes. If more than one point is selected, or there are line data under the point, you can use the navigation to see the next attribute.



Legend Tab [\(ESRI help document for this tool\)](#)

The Legend tab loads with the map as a default. It shows the visible map layers and their symbols. To minimize this (or any) tab, click the arrow in the bottom right section of the tab.

eDNA Field Collection Sites – Points represent the sample site locations. Colors help users find those points that were sampled and where bull trout was absent (green triangle with an X; points that were sampled and where bull trout were present (blue circle), points that are being processed (black square) and those point locations that are not yet sampled (gray diamond). If you would like to [participate](#), the gray diamond sites would be ideal. Visible at all scales, but symbology changes as you zoom in past 1:555,000 (scale bar at 3 miles). Note that previous versions displayed a green circle with an X for sample results with bull trout absent. This was modified to a green triangle while the blue circle indicating samples where bull trout eDNA was present were made slightly larger. This allows users to see multiple samples at the same location.

https://apps.fs.usda.gov/fsgisx02/rest/services/rmrs/RMRSAAWAE_eDNAFieldCollectionSites_01/MapServer

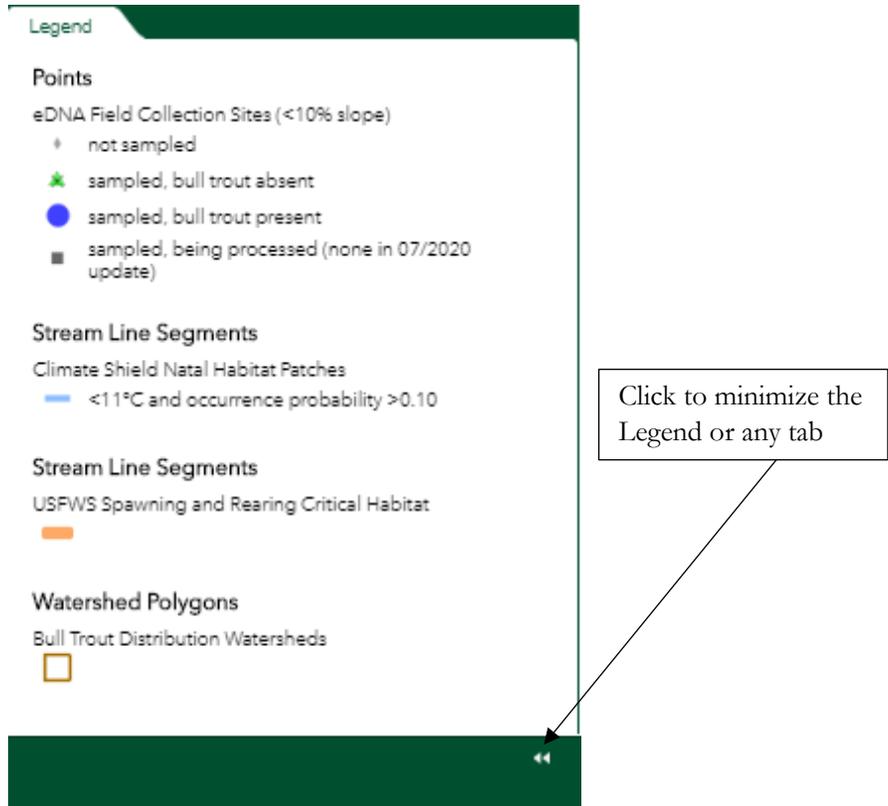
Climate Shield Patches – Light blue stream lines from the [Cold Water Climate Shield](#) project that denote streams at less than 11° C and a bull trout probability of greater than 10%. This layer is visible only as you zoom in beyond 1:500,000 (scale bar at 3 miles) and has a slight transparency.

https://apps.fs.usda.gov/fsgisx02/rest/services/rmrs/RMRSAAWAE_eDNA_ClimatShieldPatches_01/MapServer

USFWS Bull Trout Spawning and Rearing Critical Habitat – thicker light orange stream lines from the US Fish and Wildlife service as queried "H_USE_TYPE" = 'SR'. This layer is visible only as you zoom in beyond 1:500,000 (scale bar at 3 miles).

https://apps.fs.usda.gov/fsgisx02/rest/services/rmrs/RMRSAAWAE_eDNADistributionSR_01/MapServer

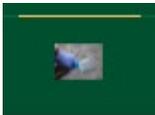
Bull Trout Distribution Watersheds – Polygons noting the watersheds for bull trout distribution from the WDB. The layer is always visible, but watershed names (HUC8_NAME) are shown between 1:3,500,000 & 1:1,150,000. https://apps.fs.usda.gov/fsgisx02/rest/services/rmrs/RMRSAWAE_eDNAWatersheds_01/MapServer



The legend is titled "Legend" and is divided into four sections:

- Points**
 - eDNA Field Collection Sites (<10% slope)
 - not sampled (grey diamond)
 - sampled, bull trout absent (green star)
 - sampled, bull trout present (blue circle)
 - sampled, being processed (none in 07/2020 update) (grey square)
- Stream Line Segments**
 - Climate Shield Natal Habitat Patches
 - <11°C and occurrence probability >0.10 (blue line)
 - USFWS Spawning and Rearing Critical Habitat (orange line)
- Watershed Polygons**
 - Bull Trout Distribution Watersheds (yellow square)

A callout box on the right side of the legend contains the text "Click to minimize the Legend or any tab" with an arrow pointing to a minimize button (two left-pointing chevrons) located at the bottom right corner of the legend panel.



Resources

The Resources tab contains links to [the Range-wide bull trout eDNA project website](#), including supporting science. Click this button to see those resources and links.



Sample Site Maps

The Site Maps tab contains links to the Range-wide bull trout eDNA project [static PDF maps and Excel spreadsheets](#) by HUC 8 watershed. Click this button to see an example map and the link to the page containing those digital static maps and sample coordinates in excel spreadsheets.



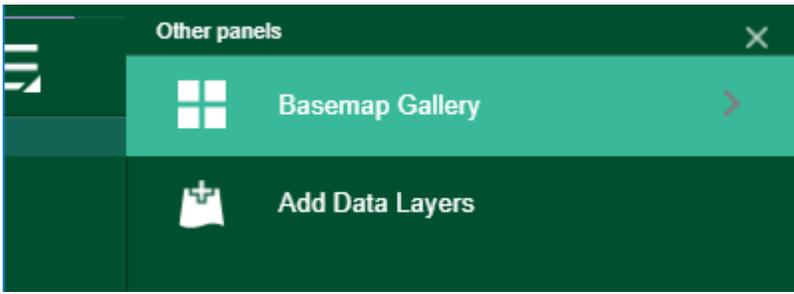
Citation

The citation if using the downloaded data or data in the map. This panel also includes a link to the [Research Data Archive DOI](#), which includes very detailed GIS metadata. The citation is also at the [end](#) of this guide



More Panels

Choose this option to change your basemap or add a relevant data layer to this map.

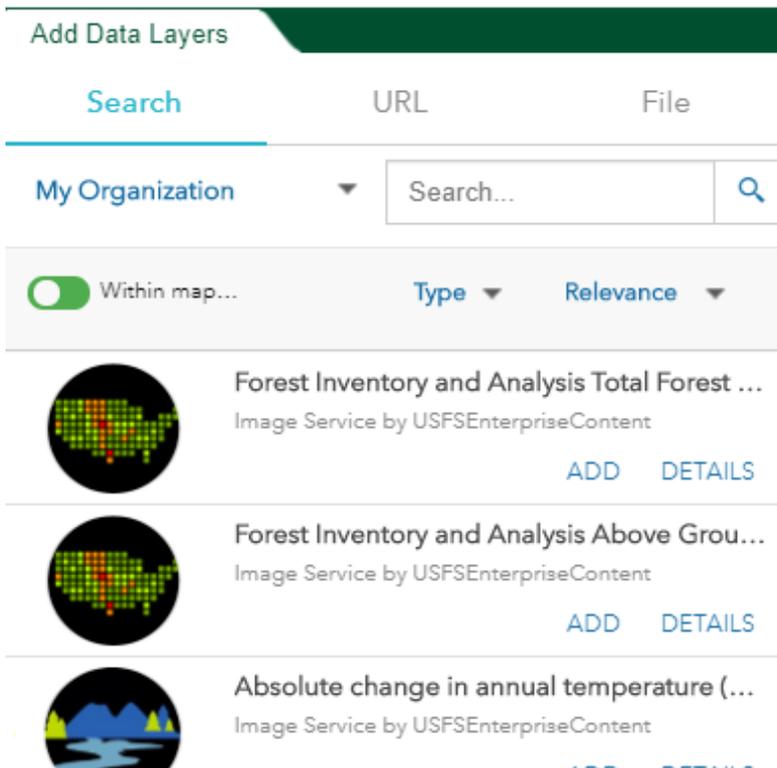


Change Base Map [\(ESRI help document for this tool\)](#)

Clicking the Basemap Gallery button allows you to choose a different base map or background layer. This may be helpful as you zoom into your specific area of interest.

Add Data Layer from a URL or ArcGIS Online

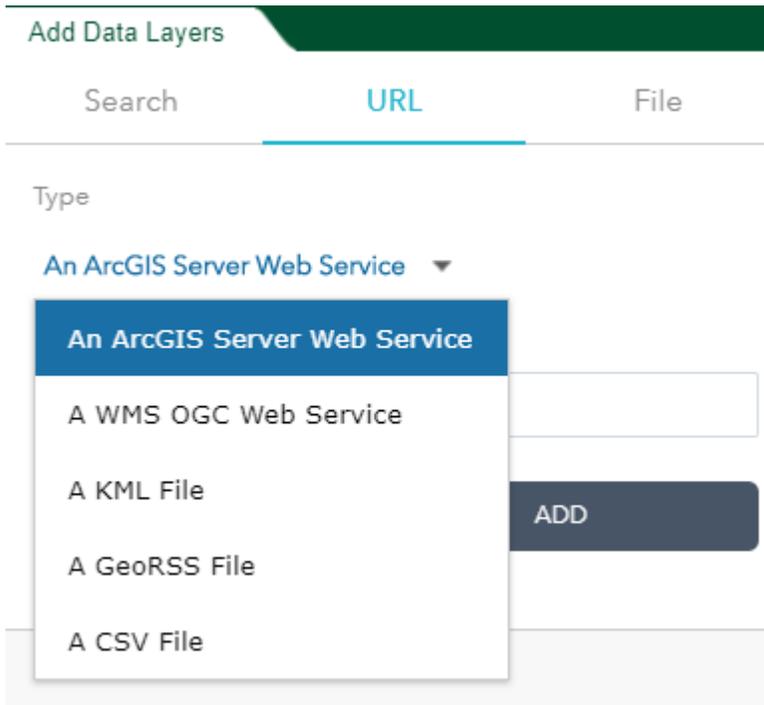
Choosing the Add Data Layer button allows you to add other online layers to this map. You can 1) search the available data in ArcGIS online, or 2) enter a specific URL if you already have a web service link or a KML file, GeoRSS File or CSV file URL, or 3) upload a file from your computer. It supports shapefiles in Zip format, and CSV, GPX and GeoJSON files.



Click the icon  to only search layers within the map area. Clicking it turns the icon red so you can search all layers in the scope.

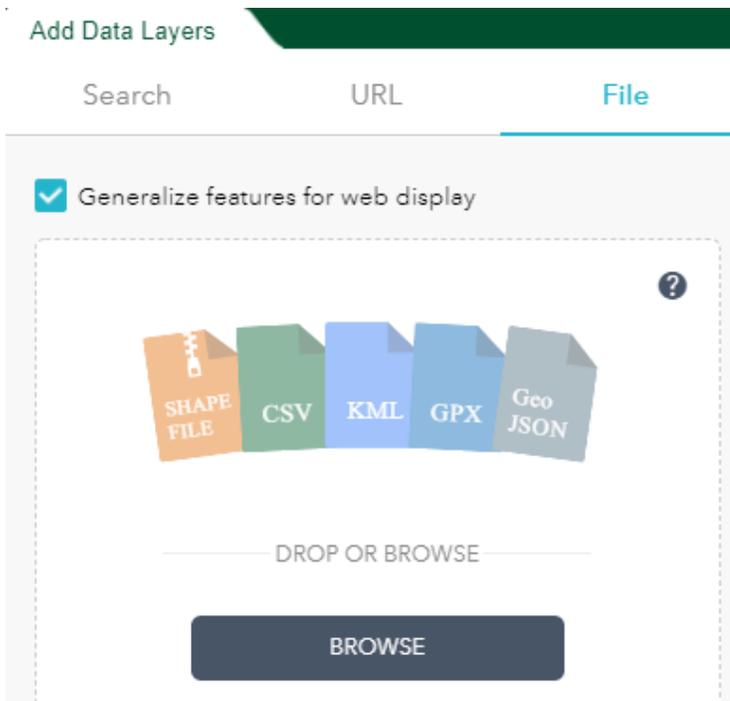
Click the sort icon  to refine the type of search layer and sort the items.

- Click the Type drop-down list to search layers based on map service, feature service, image service, vector tile service, KML, or WMS.
- Click the Sort By drop-down list to sort items by relevance, title, owner, rating, view, or date.



To add layers by URL, click the URL tab next to the Search tab. Choose a type and enter the URL. Click Add to add the data to the map. The added layer will appear in the Layer List widget as well. The following types are supported through the URL:

- ArcGIS Server web service
- WMS OGC web service
- KML
- GeoRSS
- CSV



Click the File tab to upload files locally. You can either drag and drop the file or browse to it. It supports shapefiles in Zip format, and CSV, KML, GPX and GeoJSON files.

To remove layers added click LAYERS in the lower right corner of the Add Data window. In the Layers panel, click the trash can icon next to the layer to remove it.

Click BACK in the lower right corner to return to the main Add Data panel.

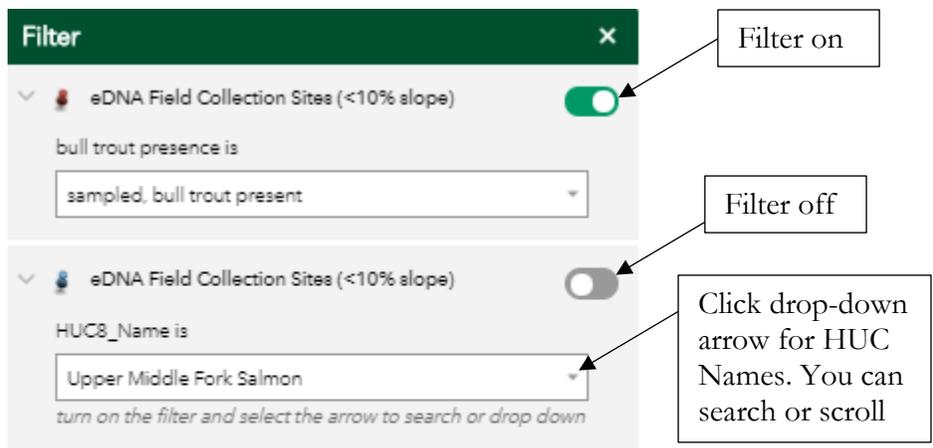
Note that you can't remove the added layer without refreshing the map, but you can turn that layer off in the [Layer List tab](#).



Filter Points

The Filter Points button allows you to filter the points on the map and in the attribute table by bull trout sample results and/or HUC8 watershed boundary.

After clicking the button, use the drop-down boxes to make your choice(s). You can filter by one of these or by both.



Once you've chosen how you want to filter, click the green toggle button to apply that filter.

To remove the filter, toggle the apply button off.

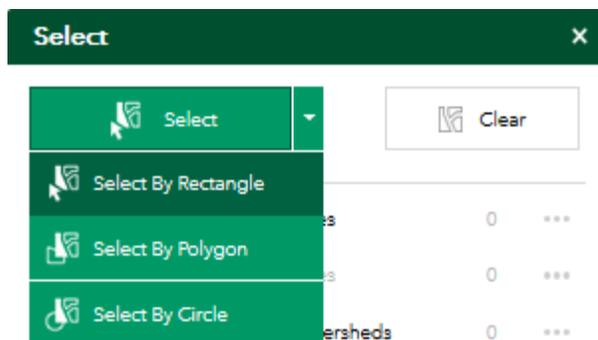
You can build custom filters using the Options in the attribute table. [See example.](#)



Select Points [\(ESRI help document for this tool\)](#)

Clicking this button and using the Select Points tool allows you to choose up to 1000 points on the map by rectangle, polygon, or circle. You can use it in conjunction with the [Filter tool](#) or you can zoom in and select points in a general area. You can view the selected points in the attribute table, and even [export to a CSV file from there.](#)

Please note that this selection tool doesn't allow export to a shapefile. It also does not allow for you to select more than one area. For those options, please see the Geoprocessing Tool to [Extract Points by Area of Interest.](#)

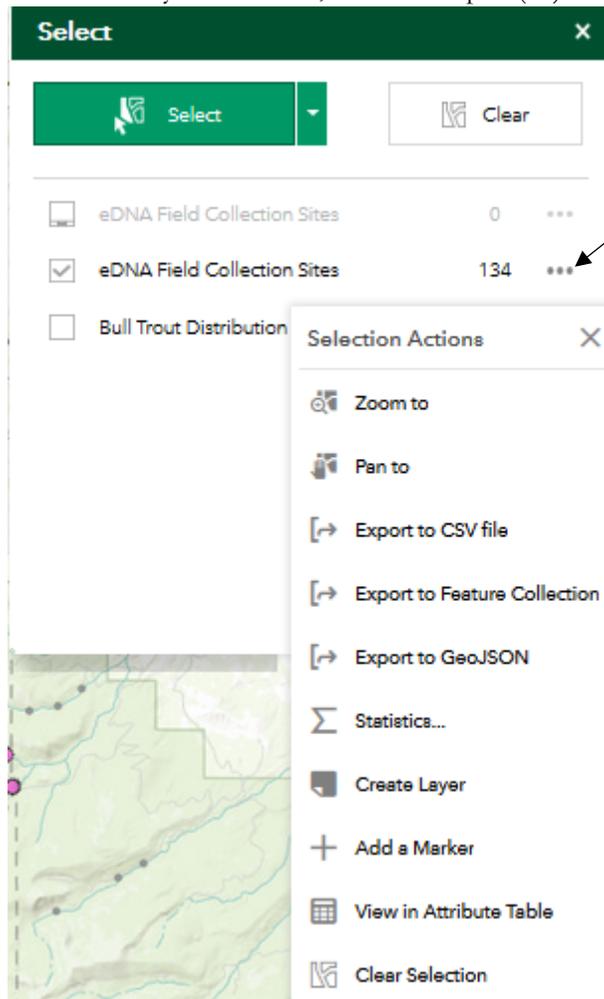


Select by Rectangle and Select by Circle draw those shapes for you. Select by Polygon requires that you draw your polygon boundary and you will need to click the map to start that polygon.

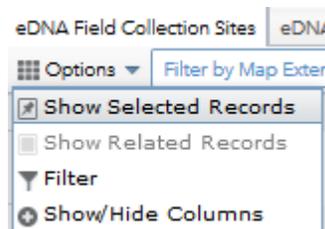
You can clear your selection by clicking the “Clear” button in the upper right-hand corner of the Select window. If you have already closed the window, you can click the Select button again to open the window and clear the selection.

You have the option to use this tool to select and view watershed attributes, but you cannot export watersheds to a CSV file.

After a moment, the points are selected. Once they are available, click the ellipsis (...) to see your options.



You can view only the selected points in the attribute table by clicking the arrow at the bottom of the map to open the attribute table and choosing Options/Show Selected Records.





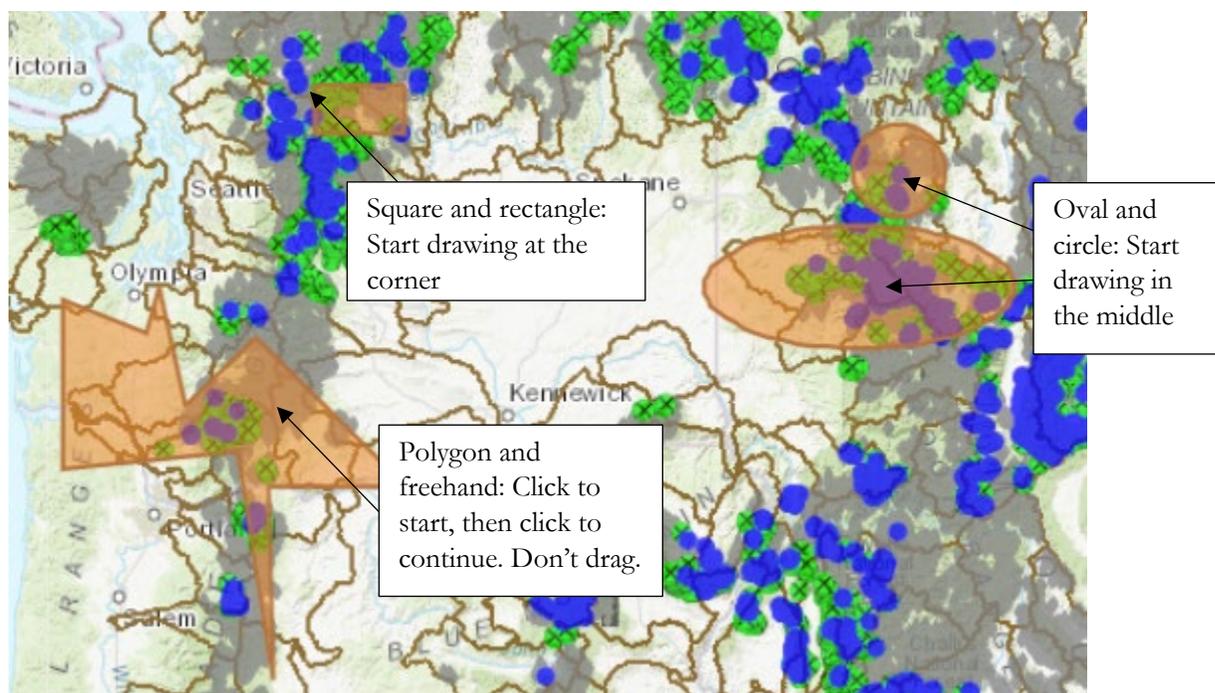
Geoprocessing - Extract and Download Points by Area of Interest [\(ESRI help document for this tool\)](#)

Clicking the Geoprocessing button brings up a tool that allows you to select an area of interest. Once you've made your selection, you can export the points within the area(s) of interest as a shapefile or geodatabase. Please note you will only be exporting the eDNA site locations. If you would like to download Climate Shield data, you can do that here - <https://www.fs.fed.us/rm/boise/AWAE/projects/ClimateShield.html>

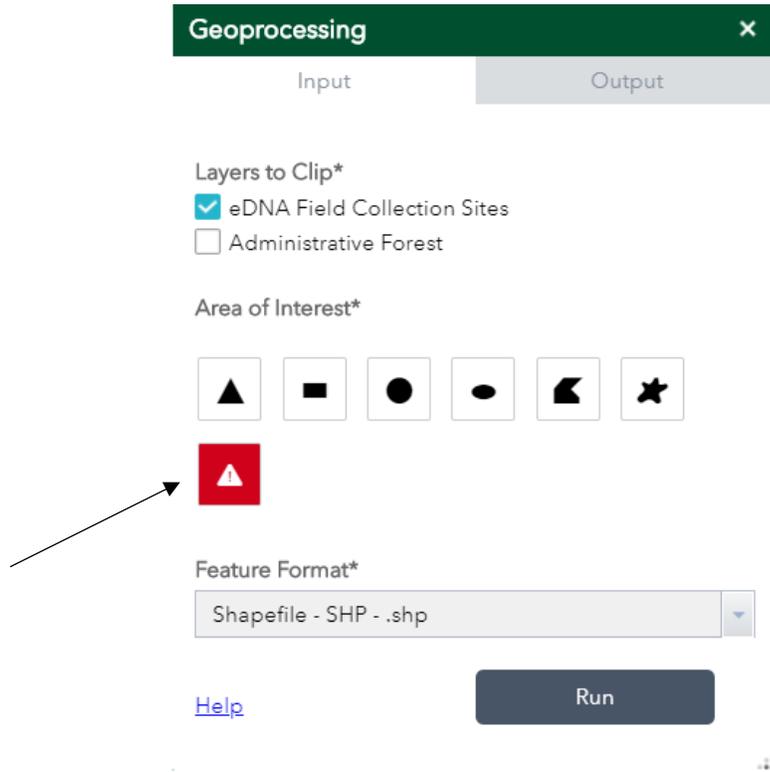
Notes:

- You can create more than one polygon to select different areas.
- If using a triangle, circle, or oval, the area you click and drag will be in the center of the drawn triangle, circle, or oval.
- If using a square or rectangle, the area you click and drag will be one side of the square or rectangle.
- This tool does not select points. Rather, it allows the points within your area(s) of interest to be exported to a shapefile. To select points to view in the attribute table, use the [Select Point](#) tool.

Once you've selected your area(s), click the "Run" button. Depending on the size of your browser window, you may need to scroll down to see the button. After a few moments, the Output tab will be a link to an output zip file containing a shapefile or geodatabase with your selected features. This shapefile includes the metadata in an XML file. Please note that the points in the map may need to be projected to match the data for your project.

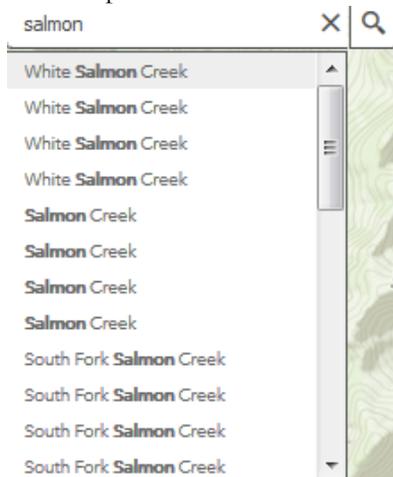


To remove the polygons you've created, click the 'delete' red exclamation icon.

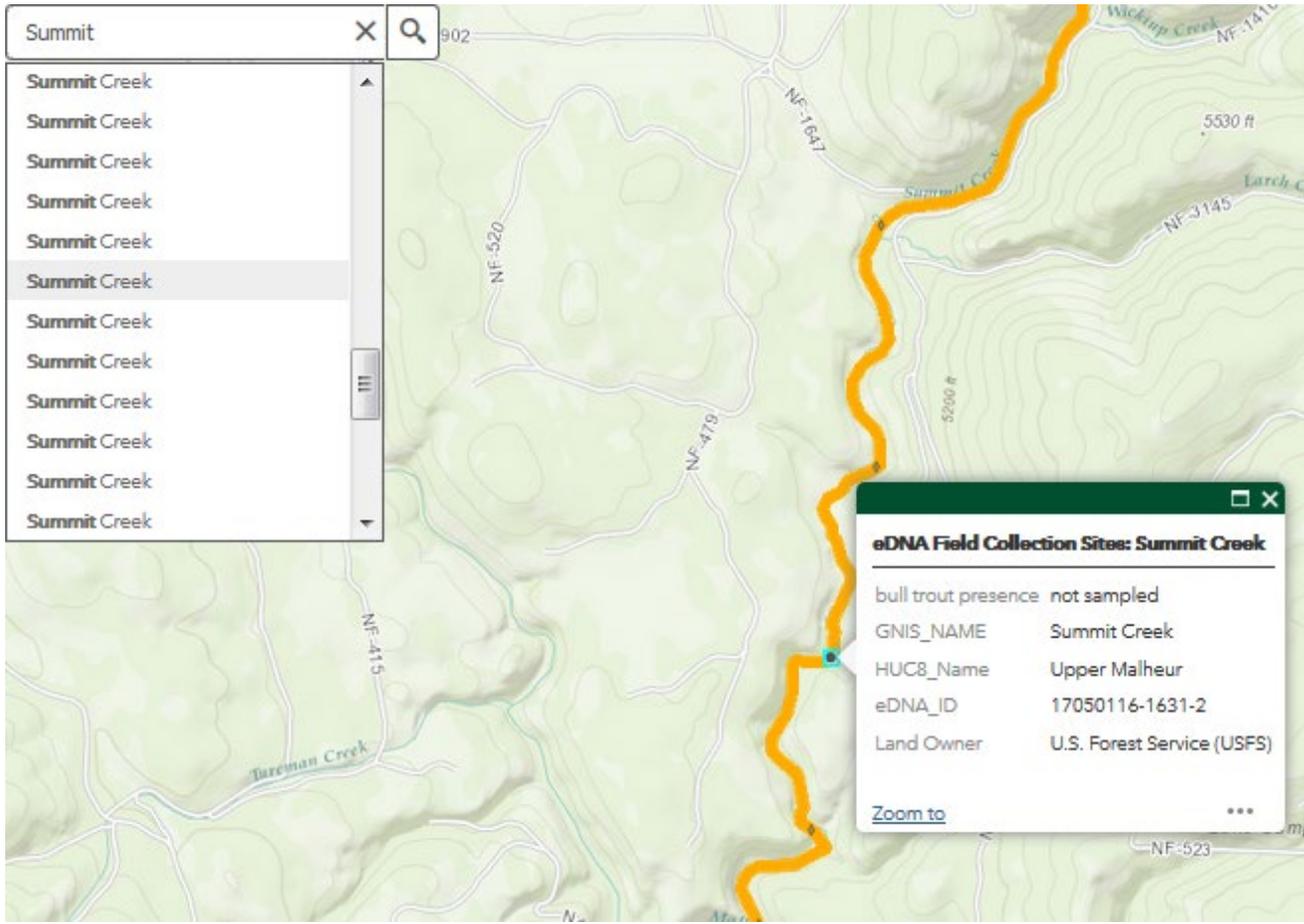


Search for a stream by NHD Plus version 2 GNIS_NAME. Type your search and hit 'enter' or click the magnifying glass.

Searches take a moment and return up to 50 results. You can use this tool if you are not certain geographically where a stream or watershed is located. It will automatically zoom to the first result, but the search bar will have a slider to search for other results. Click another result and the map will zoom or pan to that location.



Tip: If you [filter](#) the available points to a specific HUC, the search results will be only those GNIS names within that specific HUC.



Attribute Table



The attribute tables can be opened and closed by clicking the arrow located at the bottom of the map. There are 4 tables available.

[eDNA Field Collection Sites](#) |
 [Climate Shield Natal Habitat Patches](#) |
 [USFWS Spawning and Rearing Critical Habitat](#) |
 [Bull Trout Distribution Watersheds](#)

For any of these attribute tables, you can choose the Options link in the upper left-hand corner of the table to [create a filter](#) or to show different columns. As you zoom in on the map, the default is to filter the attribute table based on what is in the map view. Click that option to turn it off. You can filter and select point(s) and then zoom to that location.

eDNA Field Collection Sites (<10% slope)	Climate Shield Natal Habitat Patches	Spawning and Rearing Critical Habitat	Bull Trout Distribution Watersheds
Options <input type="checkbox"/> Filter by Map Extent <input checked="" type="checkbox"/> Zoom to <input checked="" type="checkbox"/> Clear Selection <input type="checkbox"/> Refresh			
<input checked="" type="checkbox"/> Show Selected Records	RecoveryUn	CHU_NUM	CHU
<input type="checkbox"/> Show Related Records	Upper Snake	25	Jarbidge River
<input type="checkbox"/> Filter	Upper Snake	25	Jarbidge River
<input type="checkbox"/> Show/Hide Columns	Upper Snake	25	Jarbidge River
<input type="checkbox"/> Export All to CSV			

The **eDNA Field Collection Sites point attribute table** shows the following attributes:

[Detailed metadata here](#)

Bull trout presence (BTPresentI) – Pop-up text corresponding to the BT_Present field

GNIS_NAME – Feature Name from the Geographic Names Information System (GNIS_NAME) NHD Plus version 2

eDNA_ID - Full eDNA Project ID number for the sample point derived from concatenating the HUC8 number and the unique eDNA sample Site_ID.

HUC8_Name - Watershed Boundary Dataset 8-digit subbasin number

HUC8_Name - Watershed Boundary Dataset 8-digit subbasin name

Site_ID – eDNA Field sample point unique ID

COMID – Common identifier (COMID) of the underlying NHDFlowline (version 2)

REACHCODE – REACHCODE of the underlying NHD Plus version 2 NHDFlowline

TotDASqKM – Total Upstream Cumulative Drainage Area, in square kilometers, at the downstream end of the NHDFlowline

DD_X – x-coordinate in Decimal Degrees- contributor field coordinates

DD_Y – y-coordinate in Decimal Degrees - contributor field coordinates

UTM_Zone – UTM Zone based on eDNA point file (NAD 83)

UTM_X – UTM x-coordinate generated from point file

UTM_Y – UTM y-coordinate generated from point file

SummerQ - Mean summer flow (cfs) at the sample point from the [VIC flow model](#)

eDNA_Slope - Stream channel slope averaged to the next upstream field sample point or tributary.

Land Owner (Ownership) - Land ownership at the field sample point from the Protected Areas Database of the United States.

Date_Coll – Indicates the date the eDNA sample was collected. Null = Not sampled.

Datasource – Agency or organization of the individual who collected the field sample.

Field_Zone - UTM zone for the coordinates where the sample was collected in the field.

Field_East - UTM easting (X) coordinate where the sample was collected in the field.

Field_Nrth - UTM northing (Y) coordinate where the sample was collected in the field.

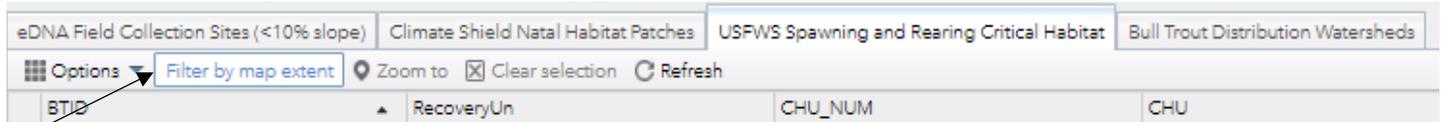
Samp_Visit - A field identifier for a sample if more than one sample was taken at the same place and the same day. Null indicates only one unique sample was taken at the same location and day and no identifier is needed.

BT_Present – Indicates if a site has had eDNA sampled and if bull trout is present. [Value = 1 (not sampled); Value = 2 (sampled, bull trout absent); Value = 3 (sampled, bull trout present); Value = 4 (sampled, being processed)]

S1_93_11 – Mean August [NorWeST](#) Stream Temperature (C) at the sample point

ID_Tag - Unique ID assigned to each eDNA sample stored/processed at the National Genomics Center for Wildlife and Fish Conservation

The default table view is to filter the attribute table based on what is in the map view. If you are not seeing attributes, zoom in to turn on the layer. You could also toggle off the “Filter by map extent” option on the table view. Depending on how many records there are, it may take several moments to populate the table.



The **Climate Shield Natal Habitat Patches line attribute table** shows the following attributes:

NORWEST – [NorWeST](#) Production Unit name

PATCH_ID – [Climate Shield](#) Patch ID

BT_OBRK - probability of bull trout occurring somewhere within a patch assuming brook trout occur in none of the sites within that patch

The **USFWS Spawning and Rearing Critical Habitat [["H_USE_TYPE" = 'SR'\] line attribute table](#)** shows the following attributes:

BTID - Unique identifier for critical habitat - Originally was LLID value from StreamNet PNW Hydro data set (streams) or generated by USFWS (marine).

RecoveryUn - Bull Trout Recovery Unit

CHU_NUM - Critical Habitat Unit number

CHU - Name of Critical Habitat Unit

OCCUPANCY - Known status of Bull Trout occupancy [O = Known occupied; P = Presumed occupied; U = Unknown occupied]

The **Bull Trout Distribution Watersheds polygon attribute table** shows the following attributes:

HUC_8 – Watershed Boundary Dataset HUC 8 number

HUC_NAME – Watershed Boundary Dataset HUC 8 Name

Filter Attribute Table by HUC example

Click on the arrow at the bottom of the map to open the attribute table

Click the Options tab in the upper left-hand corner of the table and choose the Filter option

The screenshot shows a GIS application window with two tabs: "eDNA Field Collection Sites" and "Bull Trout Distribution Watersheds". The "Bull Trout Distribution Watersheds" tab is active. At the top, there are buttons for "Options", "Filter by Map Extent", "Zoom to", "Clear Selection", and "Refresh". Below these is a menu with options: "Show Selected Records" (checked), "Show Related Records", "Filter" (highlighted with an arrow), "Show/Hide Columns", and "Export Selected to CSV".

			GNIS_NAME	HUC8_Name
			Falls Fork Rock Creek	Flint-Rock
				Flint-Rock
0	0		Copper Creek	Flint-Rock
0	0		Copper Creek	Flint-Rock
0	0		Falls Fork Rock Creek	Flint-Rock

At the bottom of the window, it says "12111 features 44 selected".

In the Filter window, click “Add a filter expression” and then use the dropdown to choose HUC8_Name (String). Click the Unique radio button.

The "Filter" dialog box is shown. It has a title bar with "Filter" and a close button. Below the title bar are two buttons: "+ Add a filter expression" and "+ Add an expression set". The "Add a filter expression" button is active. Below these buttons is a filter expression field with a dropdown menu. The field contains "{UC8_Name (String)" and "is". To the right of the field is a dropdown menu with a small "x" button. Below the field are three radio buttons: "Value", "Field", and "Unique". The "Unique" radio button is selected. An arrow points to the dropdown menu on the right side of the filter expression field.

At the bottom of the dialog box are two buttons: "OK" and "Cancel".

After a moment, click the dropdown. It will be populated with the available HUC8 watershed names. Choose your desired watershed and click “OK”.

Both the map and the attribute table will show only the points within that watershed. You can click to the left of the first record in the table, move the slider bar along the right all the way to the bottom of the filtered attributes, and then **click the shift key** and select the last record. This will select all the points you have filtered.

Note that your mouse will change from an arrow to a pointing hand when selecting.

BT_Present	YEAR	GNIS_NAME	HUC8_Nam
2	2016	Standish Creek	Flint-Rock
2	2016	Standish Creek	Flint-Rock
2	2016	Alder Creek	Flint-Rock
2	2016	Alder Creek	Flint-Rock
2	2016	Alder Creek	Flint-Rock
2	2016	Harvey Creek	Flint-Rock

44 features 44 selected

Once you have selected all the points you wish to export, Click the Options tab in the upper left-hand corner of the table and choose the Export Selected to CSV option.

GNIS_NAME	HUC8_Nam
Falls Fork Rock Creek	
Copper Creek	
Copper Creek	
Falls Fork Rock Creek	

12111 features 44 selected

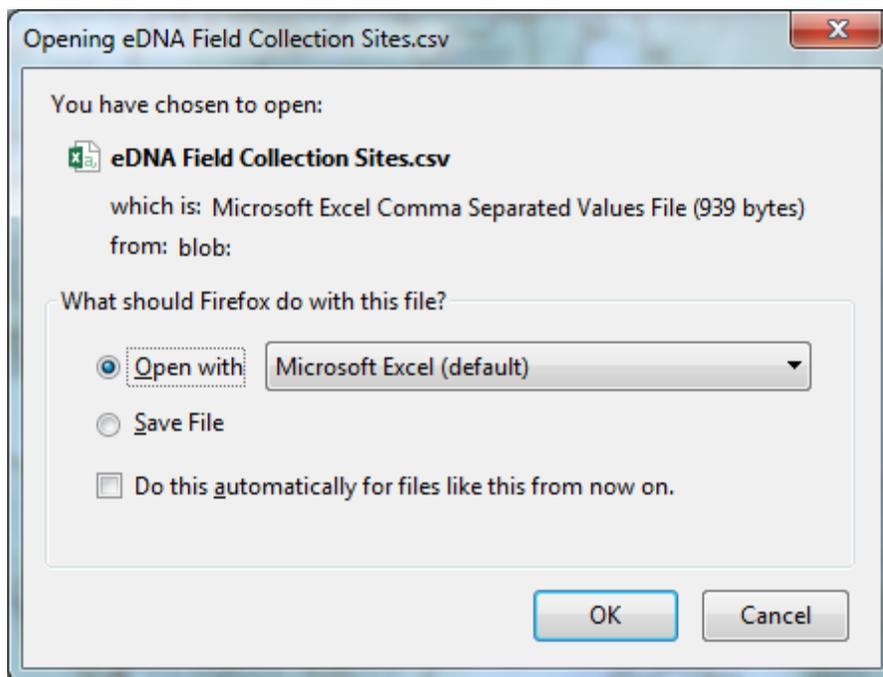
You will be prompted to confirm that you want to export to a CSV file. Click OK.

Export to CSV

Export data to CSV file?

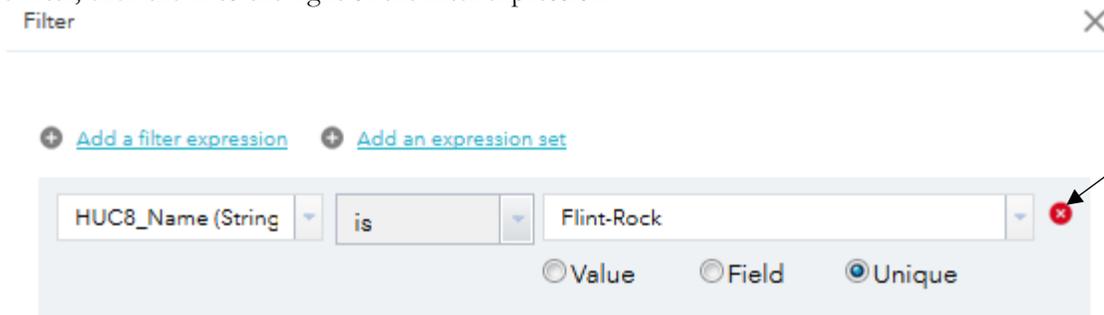
OK Cancel

You then have the option to Open or Save the file. Click OK.



Please note that there is no automatic download of the metadata with the table as there is when you download using the [area of interest](#) geoprocessing tool and export as a shapefile. You can find [a general metadata document](#) on the bull trout eDNA website to add to any downloaded CSV files.

To remove the filter, click the X to the right of the filter expression



Please cite downloaded data as:

Young, Michael K.; Isaak, Daniel J.; McKelvey, Kevin S.; Schwartz, Michael K.; Carim, Kellie J.; Fredenberg, W.; Wilcox, Taylor M.; Franklin, T.; Chandler, Gwynne L.; Nagel, David E.; Parkes-Payne, Sharon L.; Horan, Dona L.; Wollrab, Sherry P. 2017. Species occurrence data from the Range-Wide Bull Trout eDNA Project. Fort Collins, CO: Forest Service Research Data Archive. Updated 31 July 2020. <https://doi.org/10.2737/RDS-2017-0038>.

[Link to ArcGIS Online Map](#)

