

Using the “Exploring your aquatic resources” web mapping application

For further questions contact:

Stephen Carpenedo

406-444-5327

SCarpenedo2@mt.gov

Exploring your aquatic resources

- This short tutorial is designed to highlight the basic functions of the “Exploring your aquatic resources” web mapping application.
- This application has been designed to help facilitate the development of preliminary wetland specific goals and objective to address water quality impairments. And, the selection of wetland and riparian areas that may improve the water quality and/or quantity impairments identified by the Montana Department of Environmental Quality through the water quality assessment and listing process (303d).
- It is currently developed for two pilot watersheds. The Gallatin and the Big Hole Watershed in Southwest Montana.

Exploring your aquatic resources

Exploring your aquatic resources has two main functions.

1. The first relates the functions provided by wetlands and riparian areas to the water quality impairments identified in waters that may be a 303d listed water thus requiring a TMDL (Total Maximum Daily Load). These wetland functions are:
 - Improve stream temperatures for aquatic life,
 - Reduce flood peaks and desynchronize flood flows,
 - Stabilize the banks along watercourses,
 - Retain sediments and reduce siltation,
 - Increase attenuation of nutrients, and
 - Maintain late season stream flows.

And displays which wetlands or riparian areas have the greatest ability to perform these functions and should be targeted for further on the ground investigation. Field information collected can then be used to determine the need to either protect the area to ensure the continued proper functioning condition or restoration necessary to return the area to a proper functioning condition. This information can also be used to help set preliminary wetland specific goals and objects.

Exploring your aquatic resources

Exploring your aquatic resources has two main functions.

2. The second allows user to:

- Visually see how the functions provided by wetlands and riparian areas differ based where they are in the landscape,
- Collect relevant information before conducting field investigations including:
 - National Wetlands Inventory wetland type,
 - Hydrogeomorphic wetland type,
 - Is the wetland hydrologically modified?,
 - Size of the wetland or riparian area,
 - Coordinates of site,
 - Who owns the land where the wetland is located, and
 - Whether surrounding lands are prior converted wetlands that could possibly be restored.
- Read a brief report explaining which wetland types could be targeted to address water quality impairments in the impaired water contributing area based on the observed causes of impairment or sub-watershed regions based on wetland profiles.

Exploring your aquatic resources

Exploring your aquatic resources web mapping application also has an added function that allows users to look at the general need for restoring specific wetland types in all sub-watersheds within the Big Hole or Gallatin watersheds. This is found under the “Wetland Profiles” box and is currently under development.

Wetland profiles are based on looking at the difference between the actual proportion of wetland types within a sub-watershed and relating this to the proportion of wetland types in a corresponding general “reference” sub-watershed.

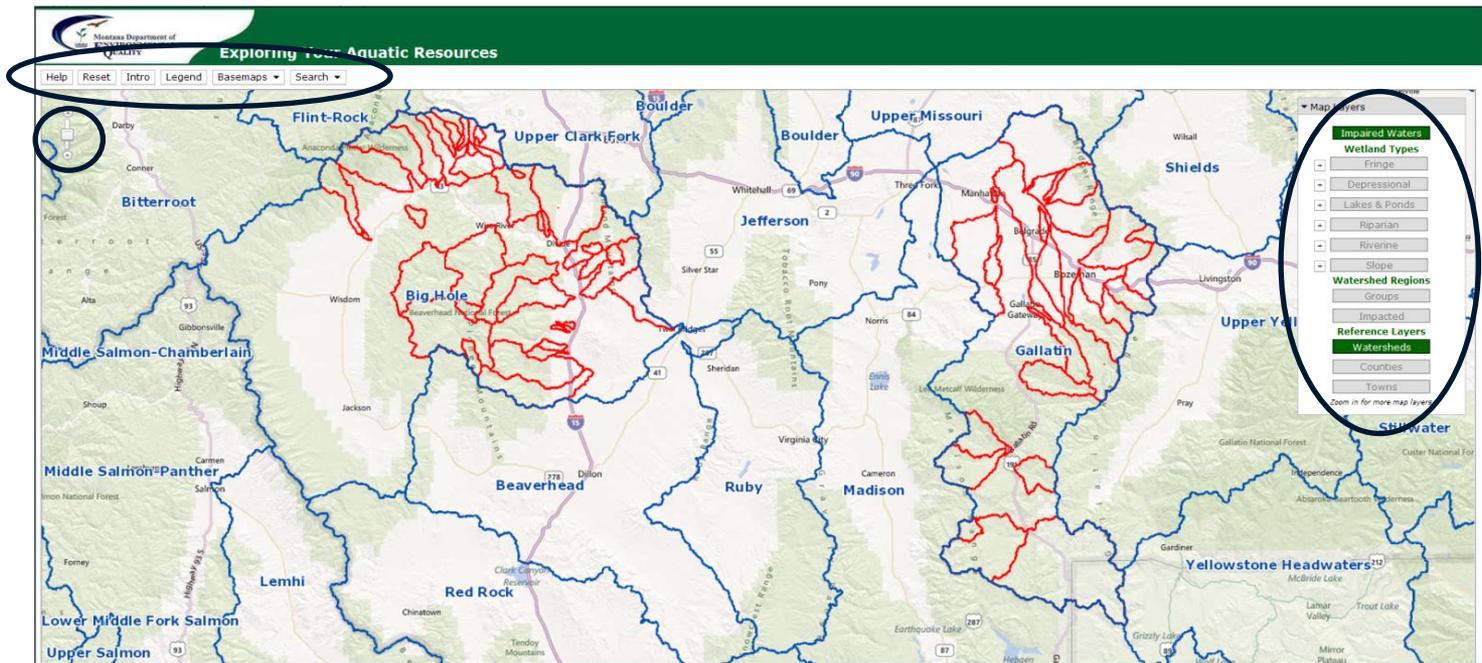
General “reference” sub-watersheds are divided into on groups which represent either valley bottom (*Big Hole only*), low, mid, or high elevation sub-watersheds.

The “Wetland Profiles” information and reports give users the ability to determine which wetland types, and necessary acreage could be restored to bring any given sub-watershed closer to the general “reference” sub-watershed wetland profile for their particular elevation group. This information can also be used to help set preliminary wetland specific goals and objects for sub-watersheds with out 303d listed streams.

Using the “Exploring Your Aquatic Resources Tool”

Upon opening the web page you will see the impaired water contributing areas of both watersheds in the map view window. Terrain maps, roads, land ownership and other geographic information will automatically load and change based on the scale of the map. Help, map legends, basemaps, search functions, and printing (*future*) are found above the map.

The user has control over zooming to watershed/area of interest; in the basemaps tab turning on/off 2009/2011 normal and CIR aerial photos, topographic maps, and roads; in the map layers turning on/off hydric soils, TMDL contributing areas, wetland profiles, wetland by HGM type (*based on NWI*), land cover, properties, and sub-watershed areas.



Using the “Exploring Your Aquatic Resources Tool”

Left clicking on the map will bring up an information box with all information about that particular point. Information about each layer is shown in separate tabs. Currently there is information on the lat/long; township, range and section; land cover; property information; impaired water contributing area; sub-watershed wetland profile; wetlands; historic wetlands; hydric soils; and site photos. A drop down tab on the upper right allows for the user to select information.

Montana Department of ENVIRONMENTAL QUALITY

Exploring Your Aquatic Resources

Help Reset Intro Legend Basemaps Search

About This Location

Location Impaired Waters (1) Sub-Watersheds (1) Wetlands (4)

Latitude: 45.76446 **Longitude:** -111.09494

County: GALLATIN

Township & Range: 1S 5E **Section:** 10 **QQ:** NESW

Land Cover: Rocky Mountain Lower Montane-Foothill Riparian Woodland and Shrubland

Property Information:

Parcel Id: [06090410201010000](#)

Classification: Private

Access: semi-improved road - landlocked/non

Owner: HEIDECCKER CAROL LEE

Physical Address: OUTLAW DR 59715

Acres: 28.114

Map Layers

- Impaired Waters
- Wetland Types**
 - Fringe
 - Depressional
 - Lakes & Ponds
 - Riparian
 - Riverine
 - Slope
- Watershed Regions**
 - Groups
 - Impacted
- Reference Layers**
 - Watersheds
 - Counties
 - Towns
 - Land Divisions
 - NWI (1980)
 - Property Bnds.
 - Hydric Soils
 - Land Cover
 - Site Photos

Using the “Exploring Your Aquatic Resources Tool”

Clicking a wetland type (i.e. Slope Wetlands) on the side bar will display in the map view window all wetlands of that type. See the legend as to which color corresponds to which wetland type. You can also expand a wetland type box to display individual water quality/quantity functions. Checking one of the wetland function boxes will highlight the wetlands of that particular type that potentially have greatest ability to address that water quality or quantity function. Multiple wetland types and functions can be checked at the same time.

The image displays the 'Exploring Your Aquatic Resources' tool interface. On the left, there are two 'Map Layers' panels. The first panel shows a list of categories: Impaired Waters, Wetland Types, Watershed Regions, Reference Layers, and Counties. The 'Wetland Types' category is expanded, showing options: Fringe, Depressional, Lakes & Ponds, Riparian, Riverine, and Slope. The 'Slope' option is selected. The second panel, titled 'Map Layers', shows a detailed view of the 'Wetland Types' section. It includes a '+' sign next to 'Fringe', a '+' sign next to 'Depressional', a '+' sign next to 'Lakes & Ponds', a '+' sign next to 'Riparian', a '+' sign next to 'Riverine', and a '-' sign next to 'Slope'. Below these, there are checkboxes for various functions: Flood Abatement, Sediment Retention (checked), Nutrient Attenuation, Streamflow Maint., Bank Stabilization, and Temperature. A red arrow points from the 'Sediment Retention' checkbox to the map view. The map view shows an aerial photograph of a rural area with a river and surrounding fields. A red arrow points from the 'Slope' option in the first panel to the map. On the right side of the map view, there is a legend titled 'Map Layers' with a tree view structure. The 'Wetland Types' category is expanded, showing 'Fringe', 'Depressional', 'Lakes & Ponds', 'Riparian', 'Riverine', and 'Slope'. The 'Slope' option is selected. Below the 'Wetland Types' section, there are checkboxes for various functions: Flood Abatement, Sediment Retention (checked), Nutrient Attenuation, Streamflow Maint., Bank Stabilization, and Temperature. The map view shows the results of these selections, with a red arrow pointing to a specific area on the map.

Using the “Exploring Your Aquatic Resources Tool”

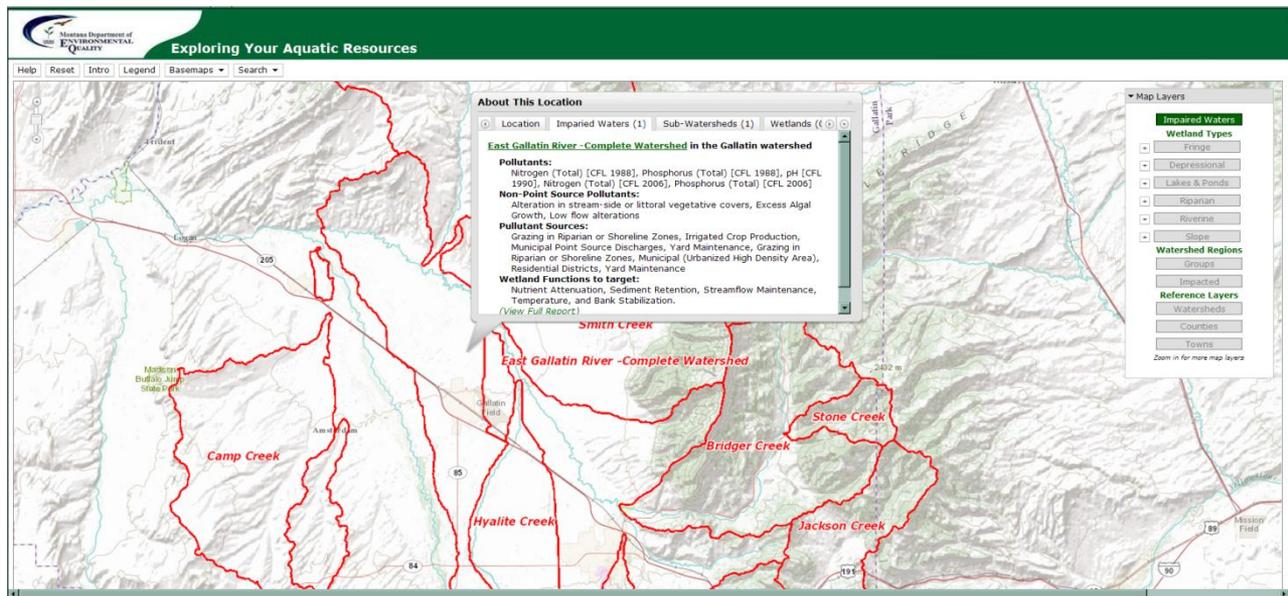


Please spend a few minutes to explore the application and familiarize yourself with the buttons, legend, map symbols, etc.

Identifying wetlands to target water quality impairments

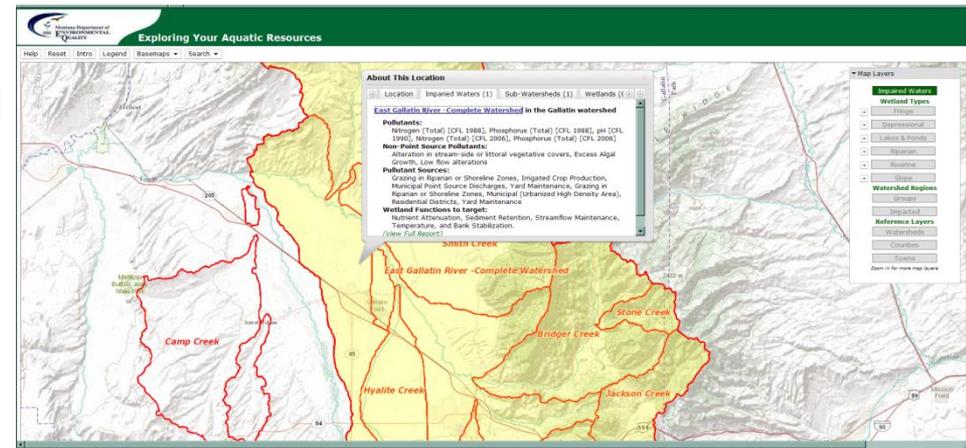
Turn on the impaired water box and click on an impaired water contributing area. The information box opens with an impaired waters tab that provides the following information:

- Contributing area name,
- Link to PDF report,
- Impairment Cause(s) – Pollutants and Pollution
- Causes of Impairment,
- Wetland functions to target that should address identified causes of the water quality impairment(s).



Identifying wetlands to target water quality impairments

- For Example (*Highlighted Area*)
 - **East Gallatin River -Complete Watershed**– *linked to full PDF report*
 - **Pollutants:** Nitrogen (Total), Phosphorus (Total), pH
 - **Pollution:** Alteration in stream-side or littoral vegetative covers, Excess Algal Growth, Low flow alterations
 - **Causes of Impairment:** Grazing in Riparian or Shoreline Zones, Irrigated Crop Production, Municipal Point Source Discharges, Yard Maintenance, Grazing in Riparian or Shoreline Zones, Municipal (Urbanized High Density Area), Residential Districts, Yard Maintenance
 - **Wetland Functions to Target:** Nutrient Attenuation, Sediment Retention, Stream flow Maintenance, and Temperature.



Identifying wetlands to target water quality impairments

Click on the PDF report link in the impaired waters tab to open a two page report. This report goes more in-depth as to which wetland types and functions can be targeted to address water quality impairments.

Page 1 of each report includes:

- Impaired water contributing area name;
- Unique Identifier;
- Impairment causes – pollution and pollutants;
- Causes of impairment;
- Associated wetland functions that address causes of impairment; and,
- Percent of each wetland type that has the greatest potential to provide an associated wetland function.

Identifying wetland and riparian areas to improve water quality and quantity East Gallatin River -Complete Watershed Impaired Waters Contributing Area, Gallatin Watershed

GIS ID: Gallatin 24

This brief report summarizes the types of wetland and riparian areas in East Gallatin River -Complete Watershed Impaired Waters Contributing Area. And, identifies which wetland types or riparian areas can be targeted for restoration or protection based on their contribution to water quality and quantity. East Gallatin River -Complete Watershed watershed has had a water quality assessment conducted and may be listed as a 303d stream under the Clean Water Act thus requiring the development of a TMDL (Total Maximum Daily Load). Specific information on the water quality assessment for East Gallatin River -Complete Watershed can be found at: <http://cwaic.mt.gov/>

Impairment Nitrogen (Total) [CFL 1988], Phosphorus (Total) [CFL 1988], pH [CFL 1990], Nitrogen (Total) [CFL Cause(s) - 2006], Phosphorus (Total) [CFL 2006]
Pollutants:

Impairment Alteration in stream-side or littoral vegetative covers, Excess Algal Growth, Low flow alterations
Cause(s) -
Pollution:

Source: MDEQ 2008 305b GIS Layer

MDEQ identified the following as potential causes of impairment of the observed pollutants and pollution:

Grazing in Riparian or Shoreline Zones, Irrigated Crop Production, Municipal Point Source Discharges, Yard Maintenance, Grazing in Riparian or Shoreline Zones, Municipal (Urbanized High Density Area), Residential Districts, Yard Maintenance

Targeting wetlands for restoration and protection based on their capacity to provide water quality and quantity functions can be an effective means of reducing the amount of pollutants entering streams and rivers. In the East Gallatin River -Complete Watershed impaired waters contributing area, restoring and protecting wetland and riparian areas that have a high capacity to provide the functions marked with an X in the chart below can help moderate the negative impacts from the identified causes of impairment and improve water quality and/or water quantity.

Flood Abatement	Sediment Retention	Nutrient Attenuation	Streamflow Maintenance	Bank Stabilization	Temperature
	X	X	X	X	X

Each wetland type has the ability to perform all of the identified water quality/quantity functions to a degree. Some wetlands, though, are better at providing these functions than others. For Example, in the East Gallatin River - Complete Watershed impaired waters contributing area 100% of Riverine wetlands display a high capacity to improve stream temperatures for aquatic life. The proportion of each wetland type and riparian area within this impaired water contributing area that displays a high capacity to perform an identified water quality/quantity function is listed below. The wetland type and riparian areas that are in bold italics have the greatest capacity to moderate the negative impacts from the identified pollutant sources. Values of 0.0% in the chart means that these wetland types or riparian areas have only a medium to low capacity to moderate the negative impacts from identified pollutant sources.

Type	Flood Abatement	Sediment Retention	Nutrient Attenuation	Streamflow Maintenance	Bank Stabilization	Temperature
Lake	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Fringe	0.0%	35.9%	0.0%	0.0%	0.0%	25.7%
Riparian	86.2%	0.0%	0.0%	0.0%	41.4%	0.0%
Riverine	28.0%	97.8%	0.0%	0.0%	0.0%	100.0%
Slope	8.8%	54.9%	35.6%	0.0%	0.0%	0.0%
Depressional	40.0%	9.8%	17.1%	0.8%	0.0%	0.4%

Identifying wetlands to target water quality impairments

Page 2 of each report includes:

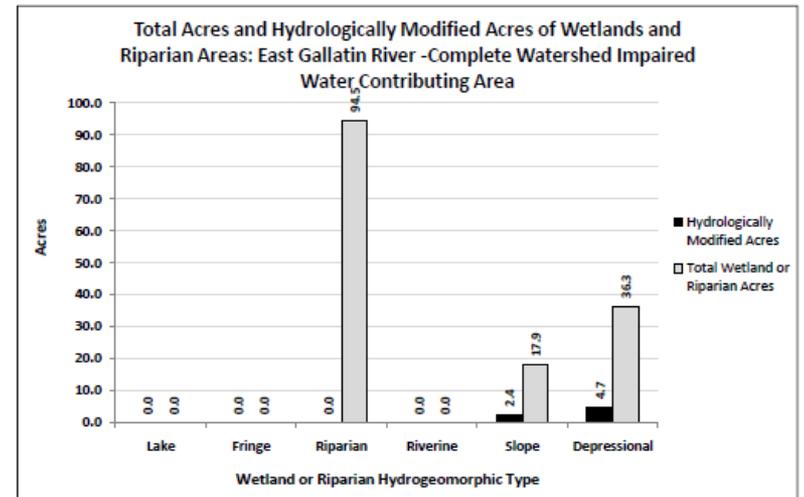
- Text description of wetland types found in the impaired water contributing area and percent that is hydrologically modified (*Wetland Profile*);
- Recommendations on which wetland types to target for water quality quantity impairments; and
- A graph of the wetland profile within each impaired water contributing area.

Please view the tutorial on [“Using Impaired Water Contributing Area reports and Wetland Profile reports”](#) for an in-depth explanation for using these reports to set wetland specific goals and objectives.

East Gallatin River -Complete Watershed has a total of 149 wetland and riparian acres within its impaired waters Contributing Area, with 7 acres (5%) considered as hydrologically modified in the National Wetland Inventory database. The majority of wetlands or riparian areas are Riparian (63.6%), followed by Depressional (24.4%), and Slope (12.1%).

Using East Gallatin River -Complete Watershed impaired waters contributing area's wetland and riparian areas profile and associated hydrogeomorphic (HGM) functions. Restoring and/or protecting the following wetland types and riparian areas in East Gallatin River -Complete Watershed impaired water contributing area should help to moderate the negative impacts from the identified causes of impairment and provide the following water quality and/or water quantity benefits:

Improve stream temperatures for aquatic life:	Fringe Wetlands, Riverine Wetlands, Depressional Wetlands
Reduce flood peaks and desynchronize flood flows:	
Stabilize the banks along watercourses:	Riparian Areas,
Retain sediments and reduce siltation:	Fringe Wetlands, Riparian Areas, Riverine Wetlands, Slope Wetlands, Depressional Wetlands
Increase attenuation of nutrients:	Slope Wetlands, Depressional Wetlands
Maintain late season streamflows:	Depressional Wetlands

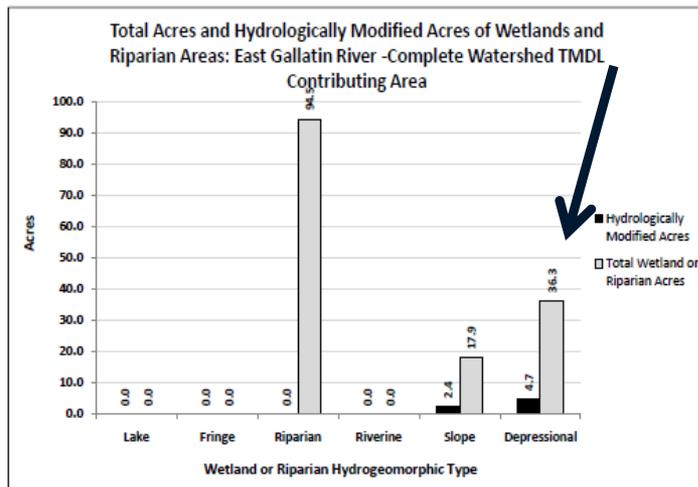


Identifying wetlands to target water quality impairments

Using the East Gallatin impaired water contributing area report as an example. One of the wetland specific goals and objectives may be:

- Opportunities for restoring or protecting depressional wetlands in the East Gallatin Impaired water CA will be evaluated to help retain sediments and reduce siltation in 303d listed streams and contributing waters.

Restoring depressional wetlands may be a goal or objective because they have the ability to address multiple water quality or quantity impairments. Depressional wetlands also comprise 24.4% of wetland and riparian areas in the East Gallatin impaired water contributing area, of which 13% are hydrologically modified.

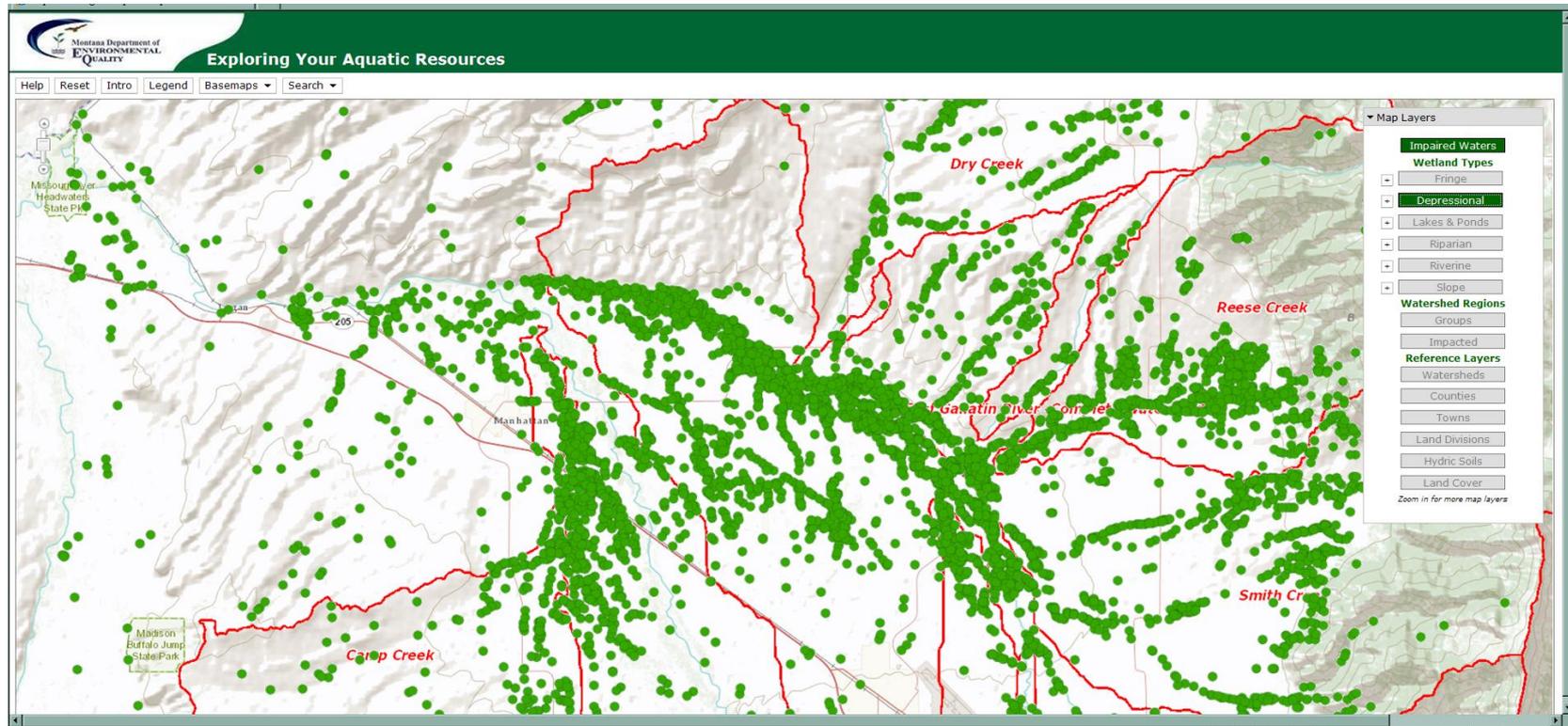


Improve stream temperatures for aquatic	Fringe Wetlands, Riverine Wetlands, Depressional Wetlands
Reduce flood peaks and desynchronize flood flows:	
Stabilize the banks along watercourses:	
Retain sediments and reduce siltation:	Fringe Wetlands, Riparian Areas, Riverine Wetlands, Slope Wetlands, Depressional Wetlands
Increase attenuation of nutrients:	Slope Wetlands, Depressional Wetlands
Maintain late season streamflows:	Depressional Wetlands wetlands should be targeted for restoration and protection to maintain streamflows.

Recommended wetland types to target water quality impairments.

Identifying wetlands to target water quality impairments

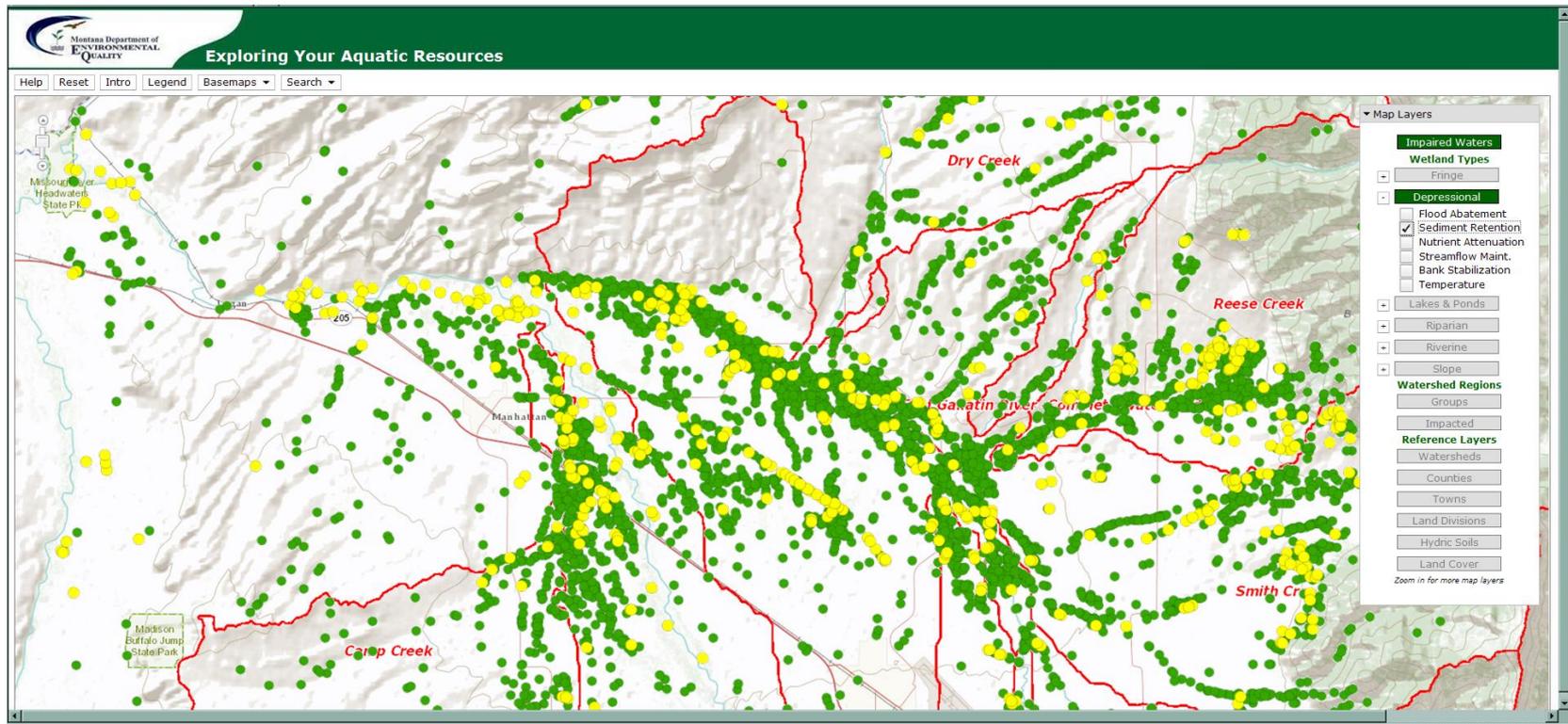
Returning to the “Exploring your Aquatic Resources” web map. Zoom in until the wetland types appear in the side bar. Click on the depressional wetlands box and all depressional wetlands appear in green (points at large scales).



Identifying wetlands to target water quality impairments

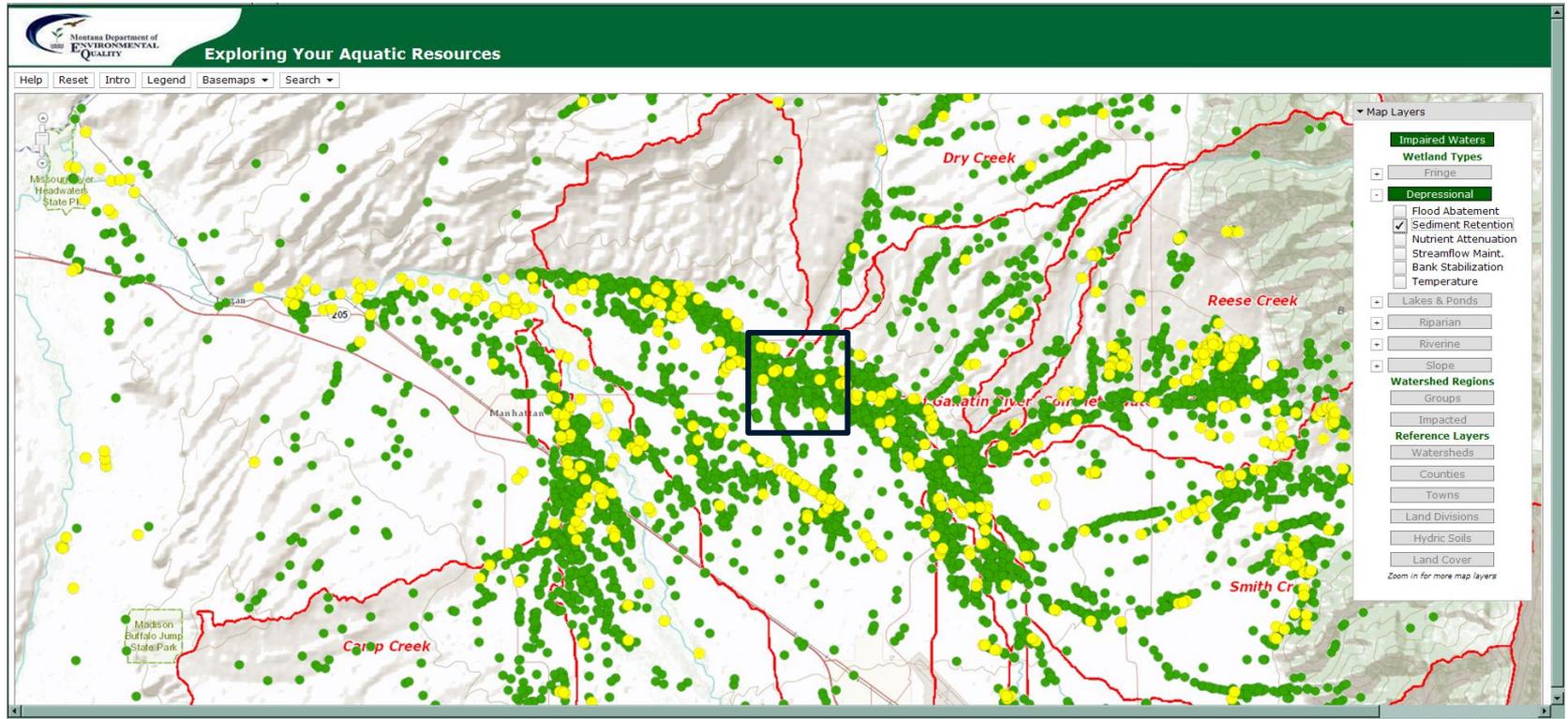
If you want to look at depressional wetlands that will address sediment and siltation check the box next to “Sediment Retention.” All wetlands that have the greatest potential to address sediment and siltation will be highlighted.

You have the ability to highlight multiple functions for multiple wetland types at the same time.



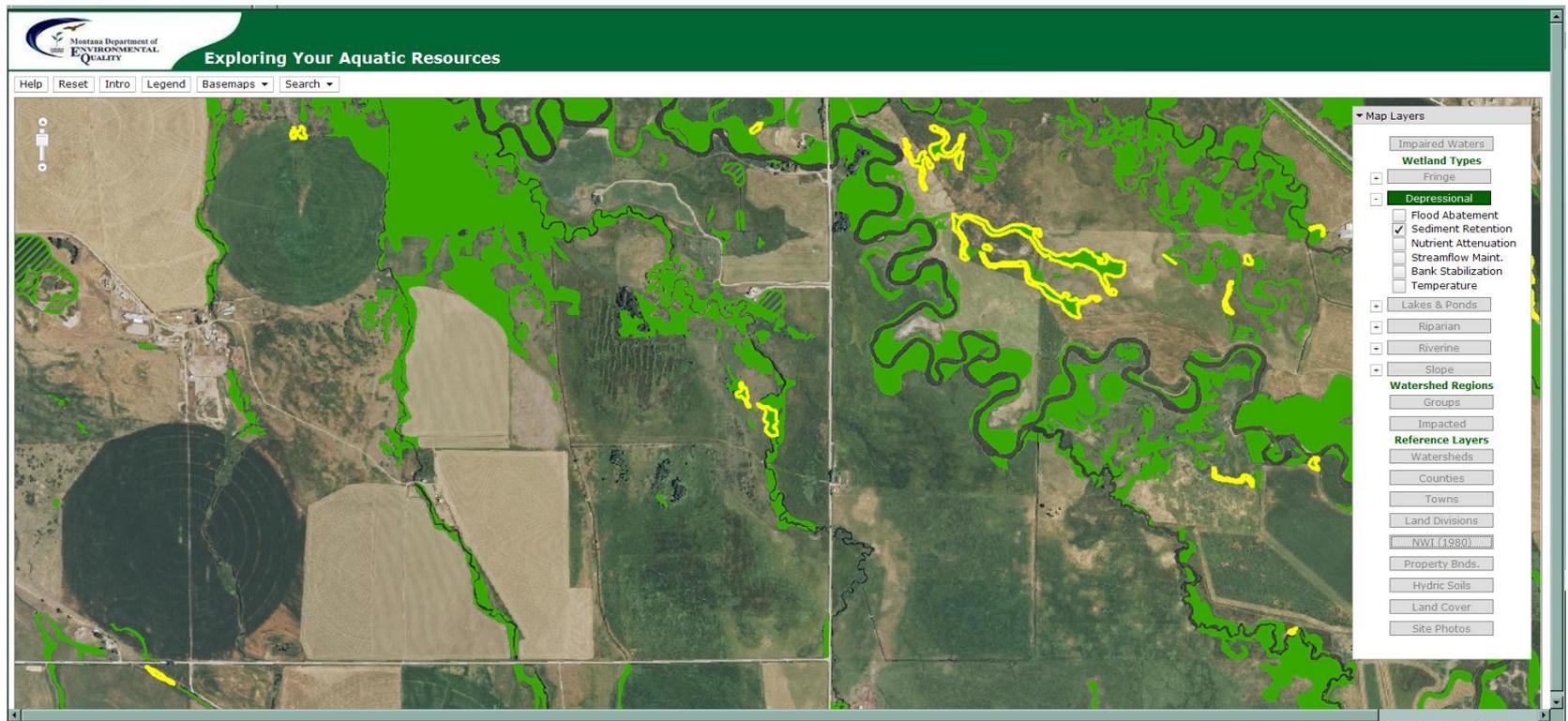
Identifying wetlands to target water quality impairments

At this point look for highlighted clusters to zoom into and begin exploring for possible spots to further evaluate in the field.



Identifying wetlands to target water quality impairments

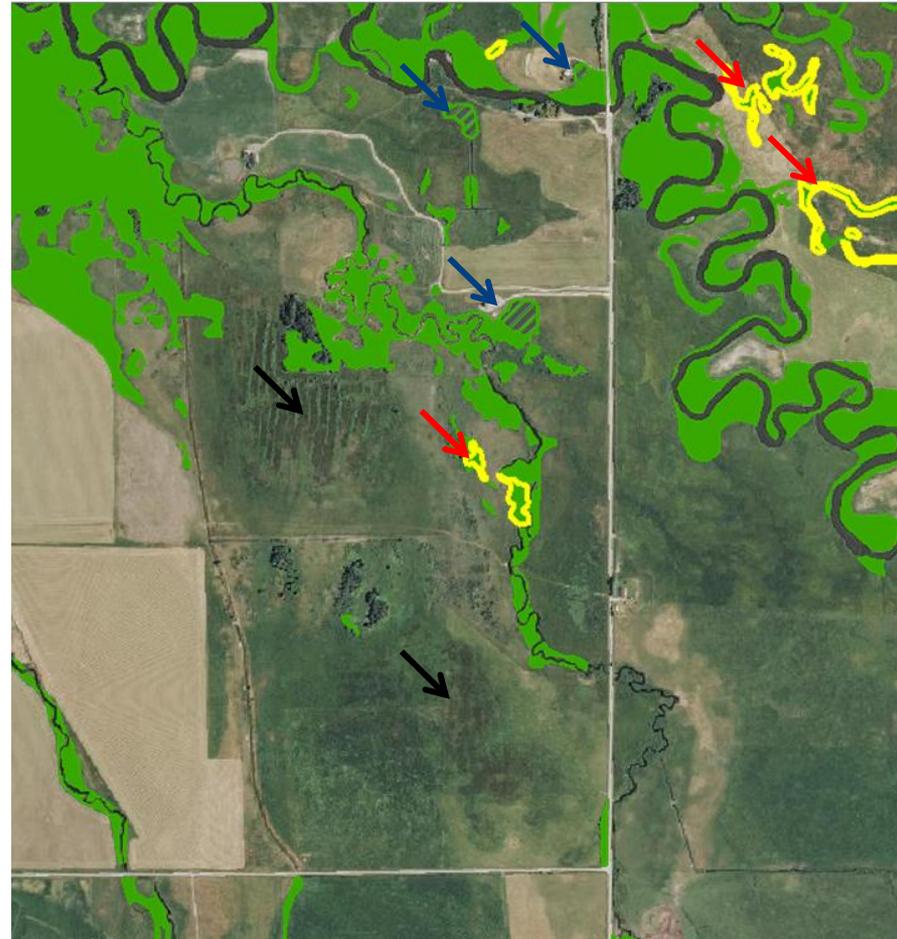
At this point look for highlighted clusters to zoom into and begin exploring for possible spots to further evaluate in the field. Turn on other relevant information like historic NWI, hydric soils, or land cover.



Identifying wetlands to target water quality impairments

In this example we can see that there are several clusters of depressional wetlands that have a high capacity to address sediment retention (*red arrows*) and existing depressional wetlands that are hydrologically modified (*blue arrows*). These are all possible areas to gather information about and potentially evaluate in the field.

Just as important though is the other information and what is not identified by the current wetland maps. In this example there are two large areas that were historically wetlands (*black arrows*) that appear to be ditched and may be suitable candidates for restoration. These historic wetlands should be evaluated in the field and the interest of the landowners gauged.



Identifying wetlands to target water quality impairments

We can now collect some general information about these wetlands and landownership that will help us prioritize where we want to conduct field evaluations.

By clicking on the highlighted wetland we find that this wetland is:

- Located at -111.204E, 45.854N;
- a freshwater emergent wetland that is ~1.0 acre in size, associated with a small stream;
- has a high potential to attenuate nutrients and retain sediment;
- is semi-permanently flooded;

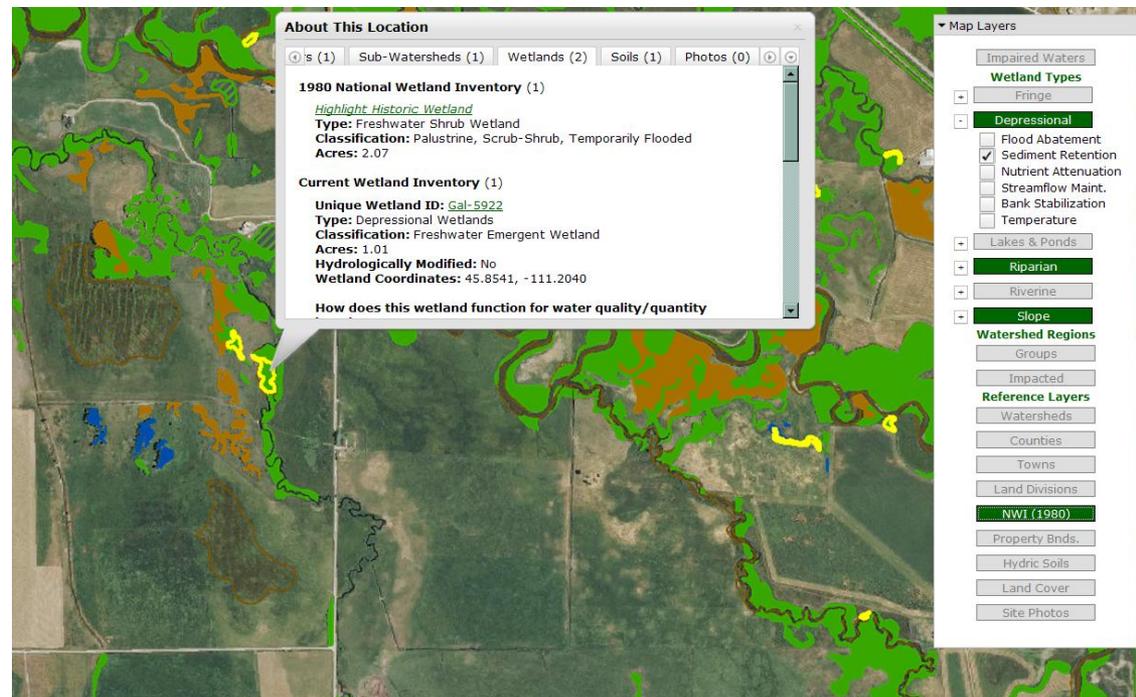
The screenshot displays a GIS interface with a map of wetlands. A pop-up window titled "About This Location" is open, providing details for a specific wetland. The window includes a navigation bar with "Sub-Watersheds (1)", "Wetlands (2)", "Soils (1)", and "Photos (0)". The main content area shows information from the "1980 National Wetland Inventory (1)", including a link to "Highlight Historic Wetland", the "Type: Freshwater Shrub Wetland", "Classification: Palustrine, Scrub-Shrub, Temporarily Flooded", and "Acres: 2.07". It also lists information from the "Current Wetland Inventory (1)", such as "Unique Wetland ID: Gal-5922", "Type: Depressional Wetlands", "Classification: Freshwater Emergent Wetland", "Acres: 1.01", "Hydrologically Modified: No", and "Wetland Coordinates: 45.8541, -111.2040". A section at the bottom asks "How does this wetland function for water quality/quantity". To the right, a "Map Layers" panel is visible, showing various layers like "Impaired Waters", "Wetland Types", "Depressional", "Riparian", "Slope", and "Watershed Regions". The "Wetland Types" panel is expanded, showing "Fringe" and "Depressional" sub-categories. The "Depressional" sub-category is checked, and "Sediment Retention" is also checked. Other layers include "Lakes & Ponds", "Riparian", "Riverine", "Slope", "Watershed Regions", "Groups", "Impacted", "Reference Layers", "Watersheds", "Counties", "Towns", "Land Divisions", "NWI (1980)", "Property Bnds.", "Hydric Soils", "Land Cover", and "Site Photos".

Identifying wetlands to target water quality impairments

We can now collect some general information about these wetlands and landownership that will help us prioritize where we want to conduct field evaluations.

By clicking on the highlighted wetland we find that this wetland is:

- Located at -111.204E, 45.854N;
- a freshwater emergent wetland that is ~1.0 acre in size, associated with a small stream;
- has a high potential to attenuate nutrients and retain sediment;
- is semi-permanently flooded;
- was historically classified as a shrub-scrub wetland that was 2.07 acres in size;

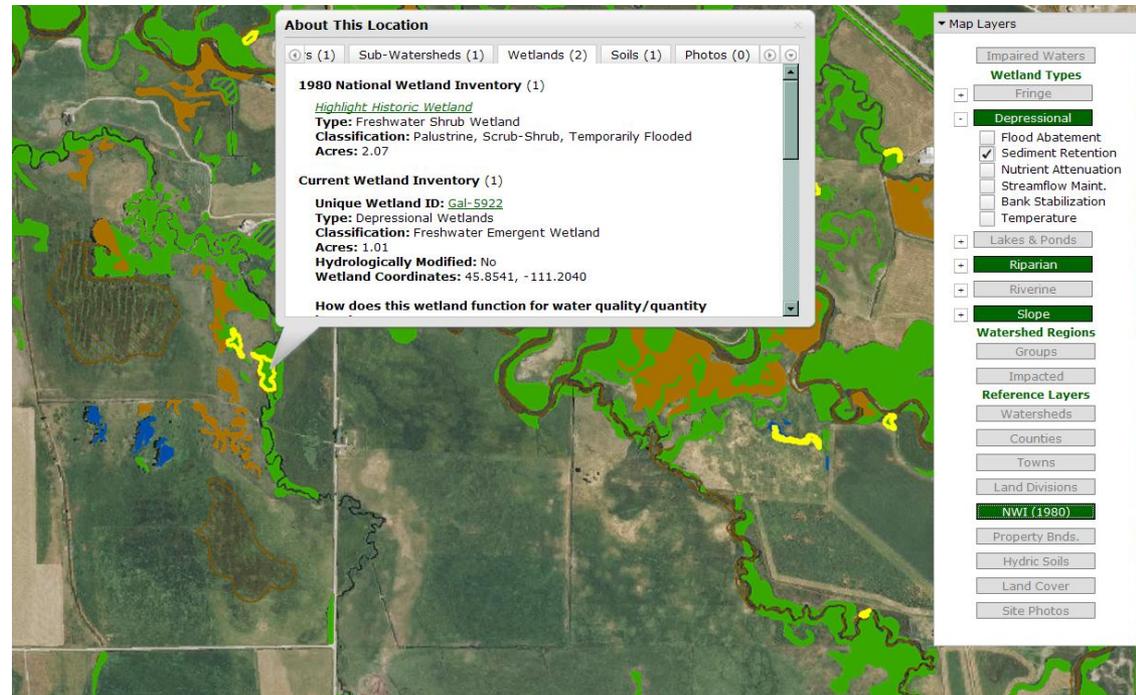


Identifying wetlands to target water quality impairments

We can now collect some general information about these wetlands and landownership that will help us prioritize where we want to conduct field evaluations.

By clicking on the highlighted wetland we find that this wetland is:

- Located at -111.204E, 45.854N;
- a freshwater emergent wetland that is ~1.0 acre in size, associated with a small stream;
- has a high potential to attenuate nutrients and retain sediment;
- is semi-permanently flooded;
- was historically classified as a shrub-scrub wetland that was 2.07 acres in size; and,
- the Cowan-Skinner Ranch Co. at 100 W. Dry Creek Rd in Belgrade owns the property where the highlighted and ditched wetlands are located.



Identifying wetlands to target water quality impairments

With this information in hand we can then add the wetland site to a list of potential sites to evaluate in the field for restoration and protection. This list can then be further refined based on knowledge about the current conditions, land ownership, and resources to conduct on the ground evaluations.

This information combined with information from meetings with interested landowners and field evaluations can then be used to further refine any relevant wetland specific goals or objectives. Using our wetland specific goal from earlier:

- Opportunities for restoring or protecting depressional wetlands in the East Gallatin impaired water CA will be evaluated to help retain sediments and reduce siltation in 303d listed streams.

We may add an objective that states:

- Work with interested partners to restore and protect the depressional wetlands and historically drained wetlands adjacent to Story Creek on the Cowan-Skinner Ranch Co. located in the East Gallatin impaired water contributing area.

Questions and next steps

This tool is part of a pilot project and changes may be made to the information provided. Most important, and the purpose for developing this tools, is that it helps:

1. Develop preliminary wetland specific goals and objectives;
2. Identify possible wetland sites to evaluate for protection and or restoration; and,
3. Provide as much relevant information as possible about a site for planning purposes.

If you have questions or suggestions for improvement please send an email to the address below. Your input important for improving this product.

Stephen Carpenedo
Wetland Environmental Science Specialist
MDEQ Wetland Program
SCarpenedo2@mt.gov