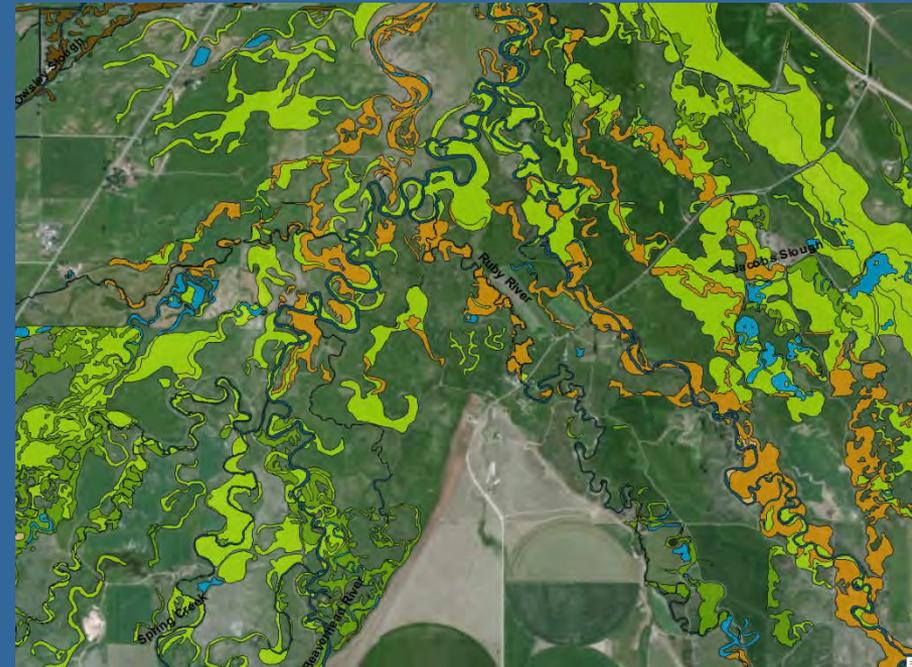


Montana Wetland and Riparian Mapping

Where to Find It and How to Use It



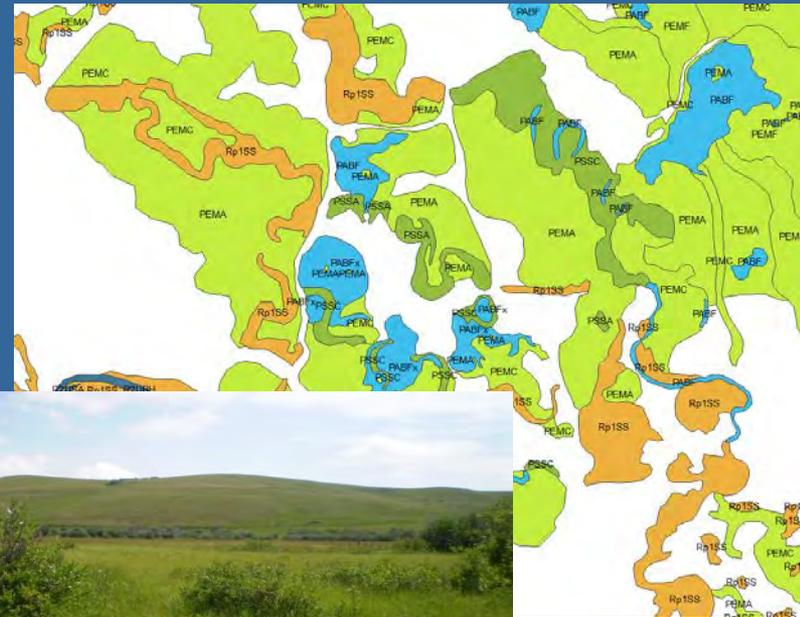
Levia Shoutis, PWS
ERM, Inc.
Livingston, MT



Training Goals

The goal is for participants to understand:

- What wetland and riparian mapping is
- How to access the mapping
- Potential uses and limitations



Training Overview

- Definition of wetland and riparian areas
- What is wetland and riparian mapping?
- Mapping programs and status
- Classification systems
- How mapping is created
- Accessing mapping
- Hands-on mapping activity
- Uses, limitations, and examples



Wetland definition:

From: USFWS National Wetlands Inventory (Cowardin et al. 1979)

Lands transitional between upland and aquatic systems where the water table is usually at or near the surface or inundated by shallow water.

A wetland must have one or more of the following attributes:

1. Dominated by wetland plants
2. Substrate is predominantly hydric soil
3. Substrate is saturated or covered by shallow water at some time during the growing season annually.

Definition is non-regulatory



Riparian definition:

From: USFWS (2009)

Plant communities contiguous to and affected by surface and subsurface hydrologic features; usually transitional between wetland and upland.

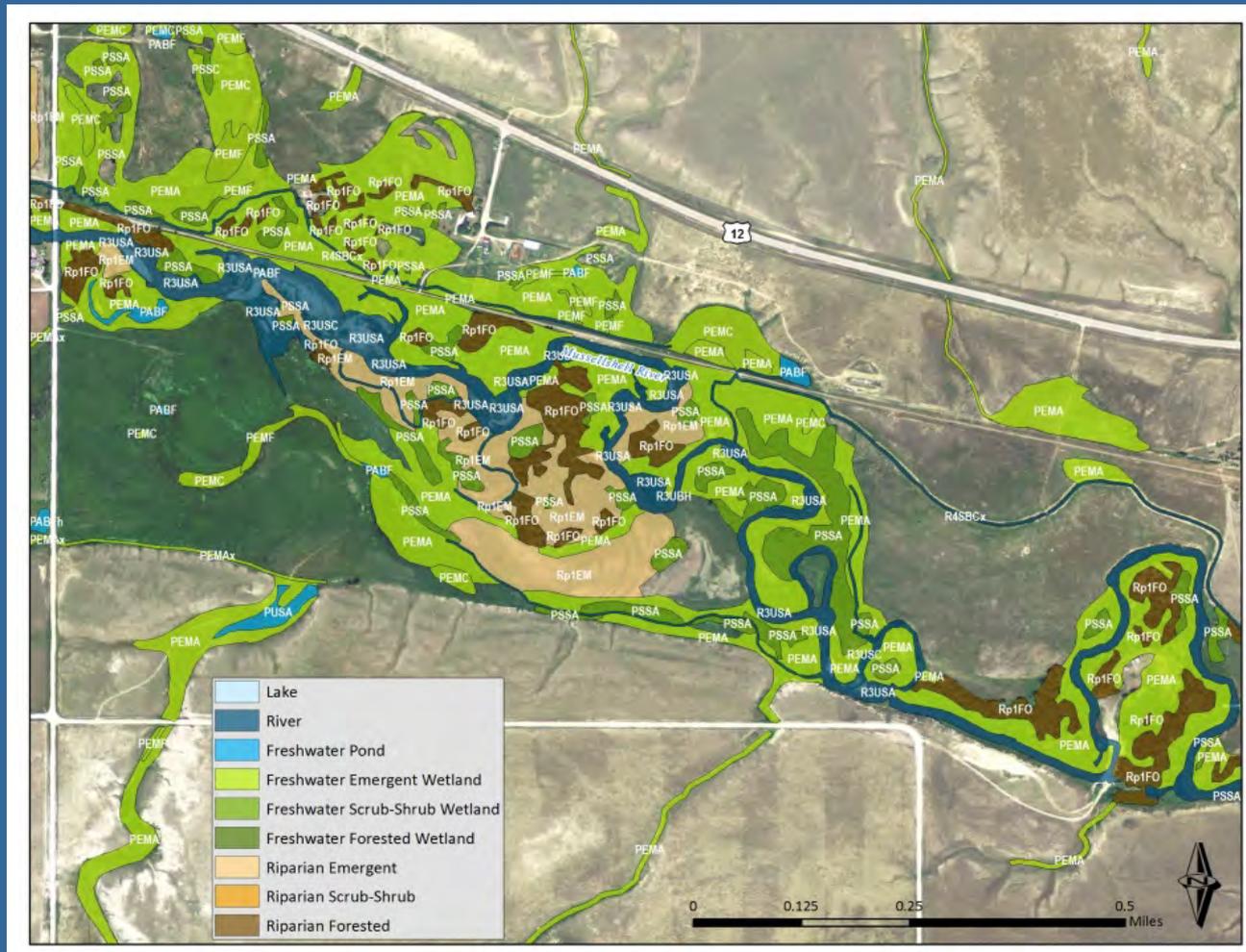
Mapped as riparian where soils, plants, and hydrology do not display wetland characteristics.

Definition is non-regulatory



What is Wetland and Riparian Mapping?

- Digital maps of potential wetland and riparian areas
- Maps are developed using aerial imagery interpretation



Training Overview

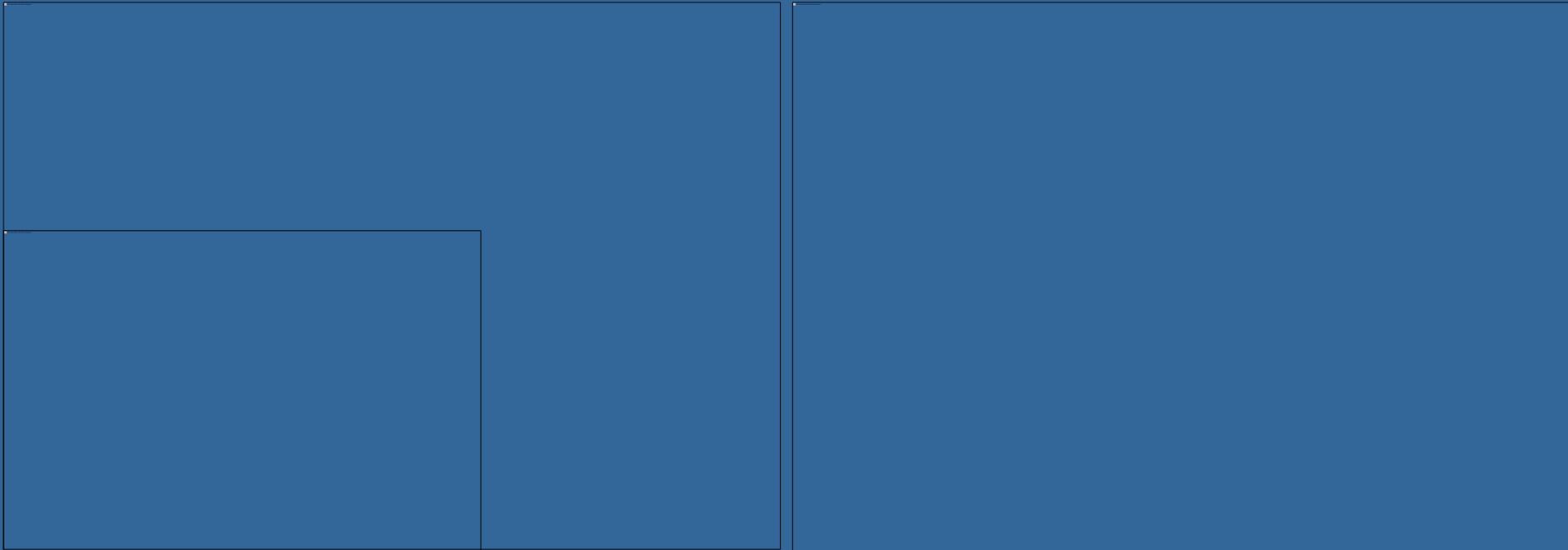
- Definition of wetland and riparian areas
- What is wetland and riparian mapping?
- **Mapping programs and status**
- **Classification systems**
- How mapping is created
- Accessing mapping
- Hands-on mapping activity
- Uses, limitations, and examples



USFWS National Wetlands Inventory

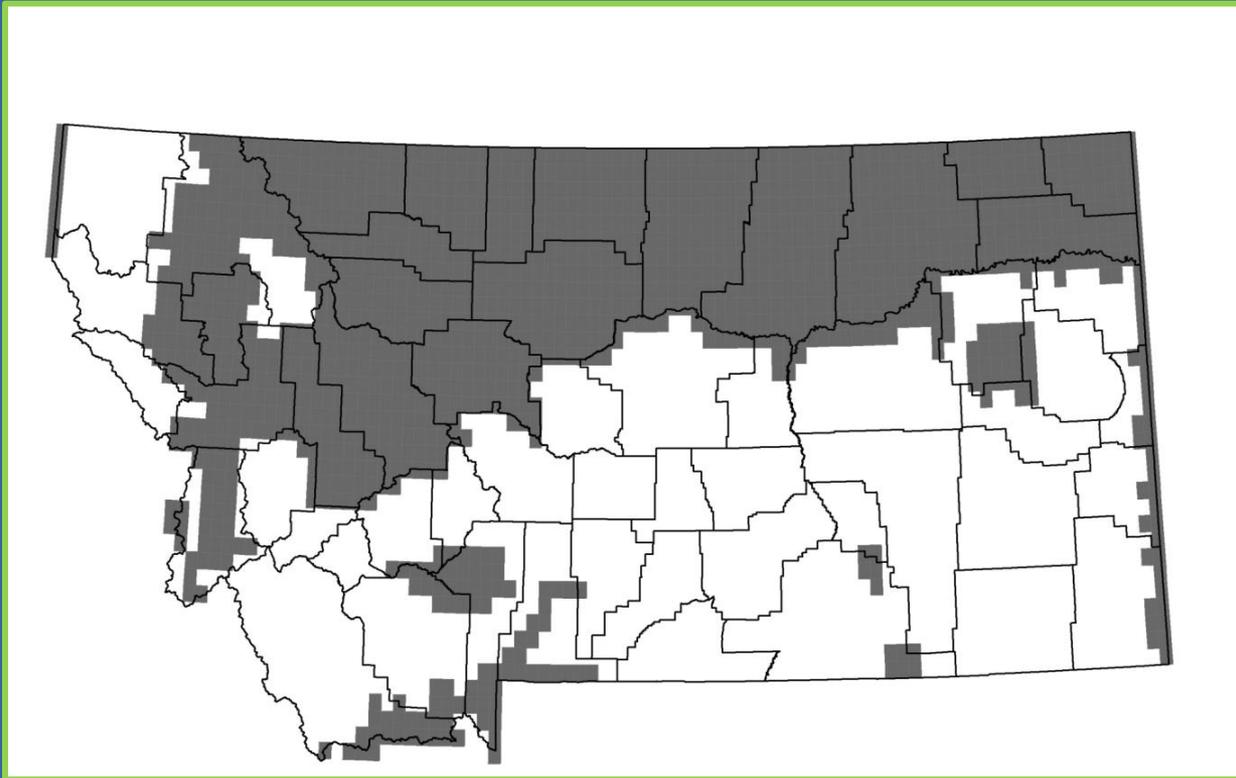
www.fws.gov/wetlands

- Goal: conduct a nationwide inventory of wetlands in the U.S.
- Maps and classifies wetland, riparian, and deepwater habitats
- Preliminary tool-non-regulatory



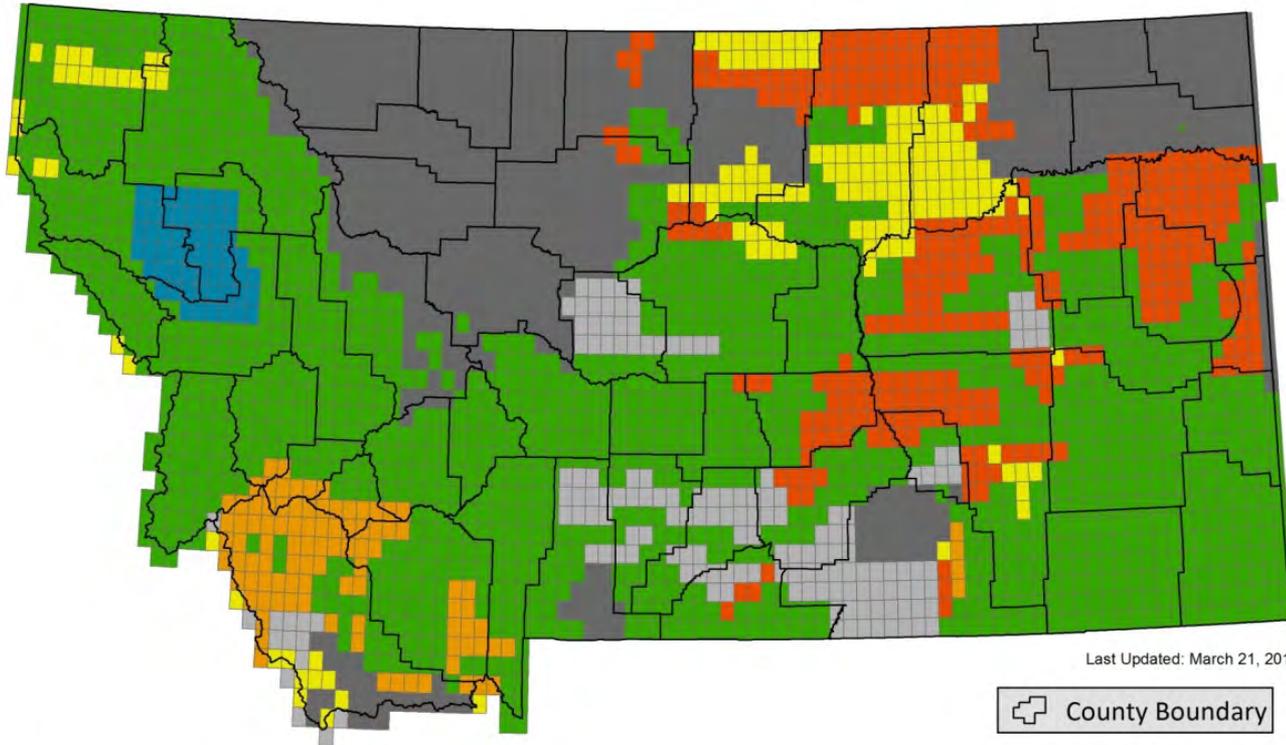
Status of NWI Mapping in Montana circa 2006

- Completed in 1980's, wetlands only, no riparian
- Considered "historic" mapping to be updated
- *Not always representative of "historic" conditions*



MTNHP Mapping after 2006

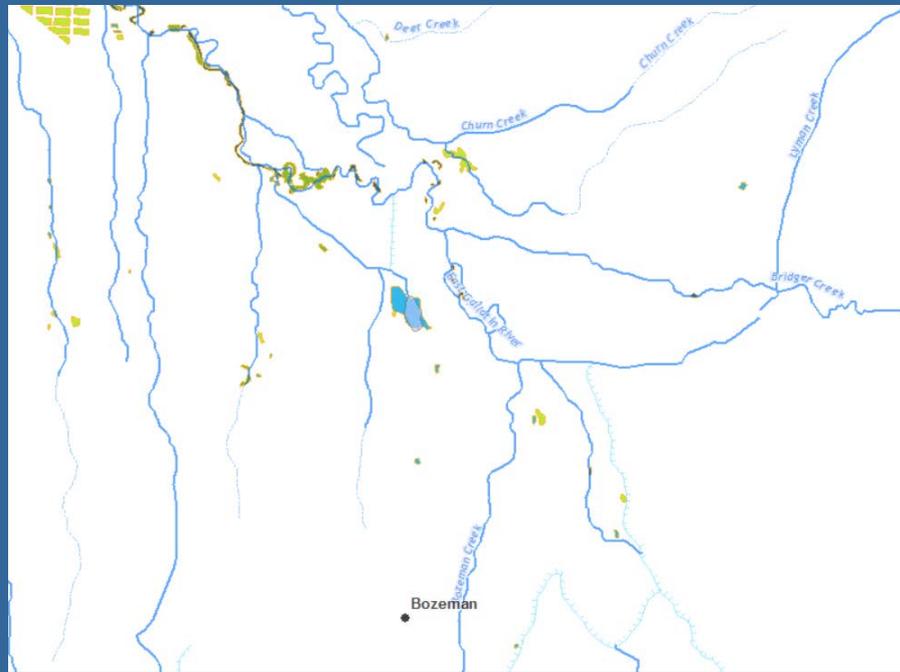
Wetland and Riparian Mapping Status by USGS Topographic Quad



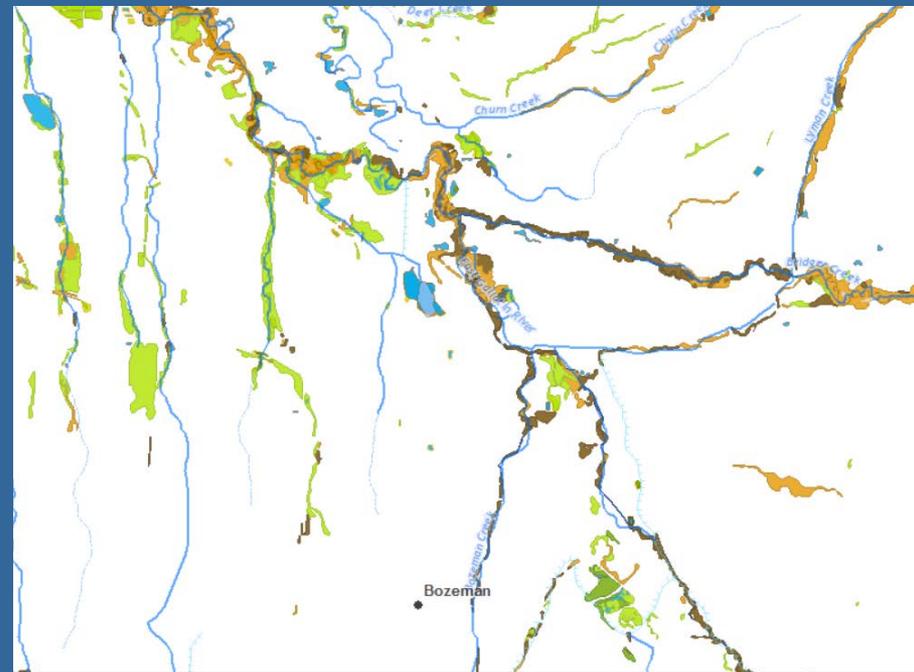
Wetland and Riparian Mapping Status

- | | |
|--|--|
|  Final Mapping completed by and available from MTNHP |  Mapping in progress by MTNHP |
|  Mapping completed by Confederated Salish and Kootenai Tribes |  Scheduled to be mapped by MTNHP |
|  Provisional Mapping completed by and available from MTNHP |  Historic NWI Mapping completed by USFWS (no Riparian mapping) |
| |  No Wetland and Riparian Mapping Available |

Historic Versus Updated Mapping Lower Gallatin River Watershed

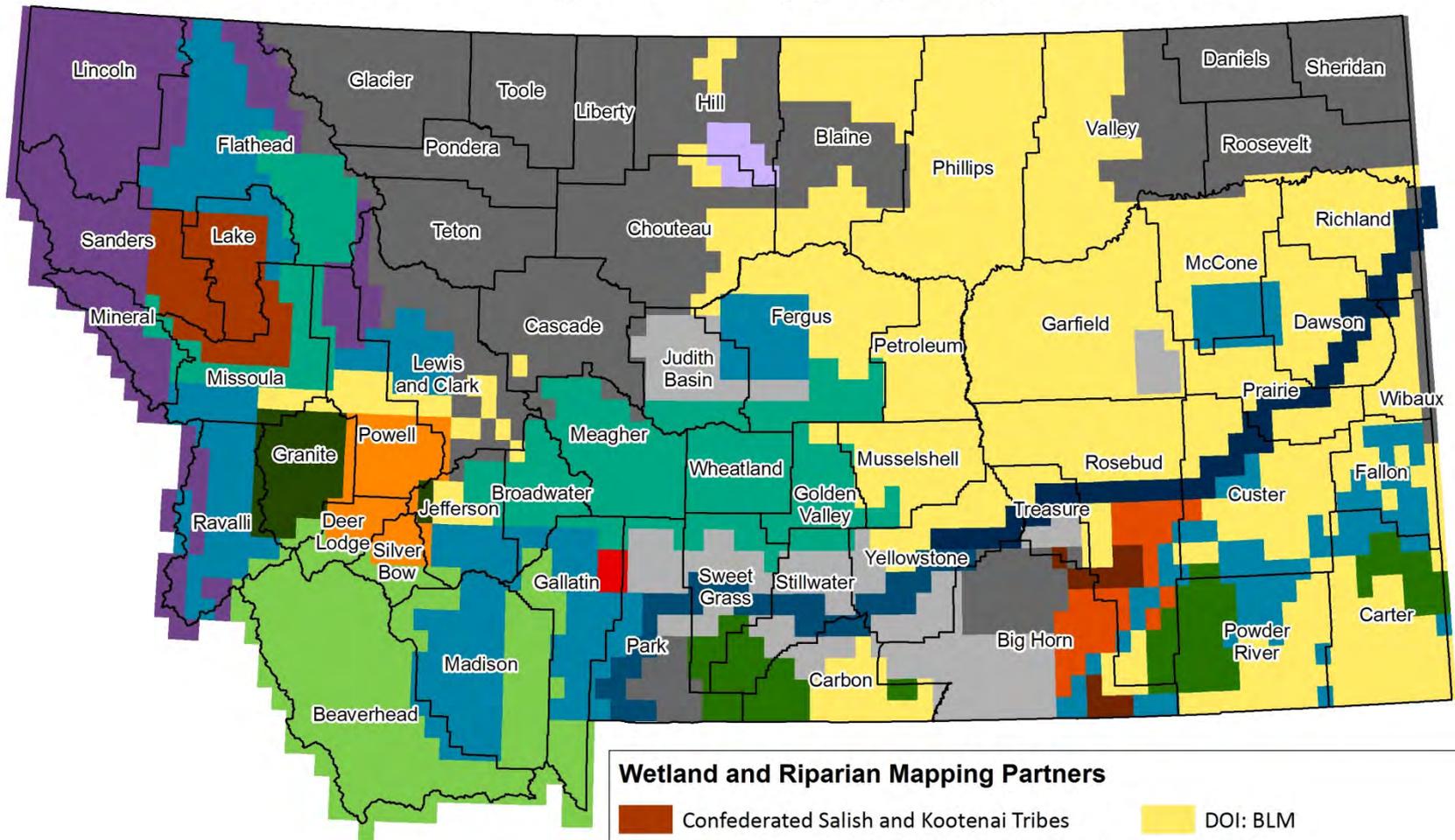


Historic Mapping



Updated Mapping

Wetland and Riparian Mapping Project Partners



Wetland and Riparian Mapping Partners

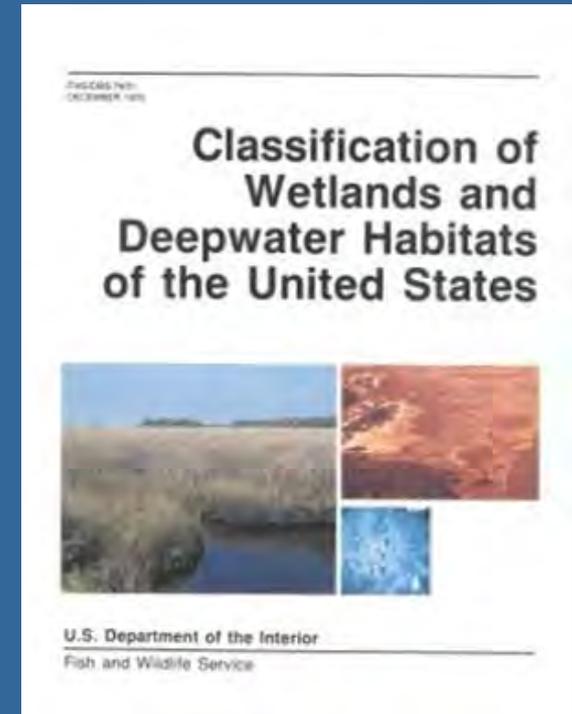
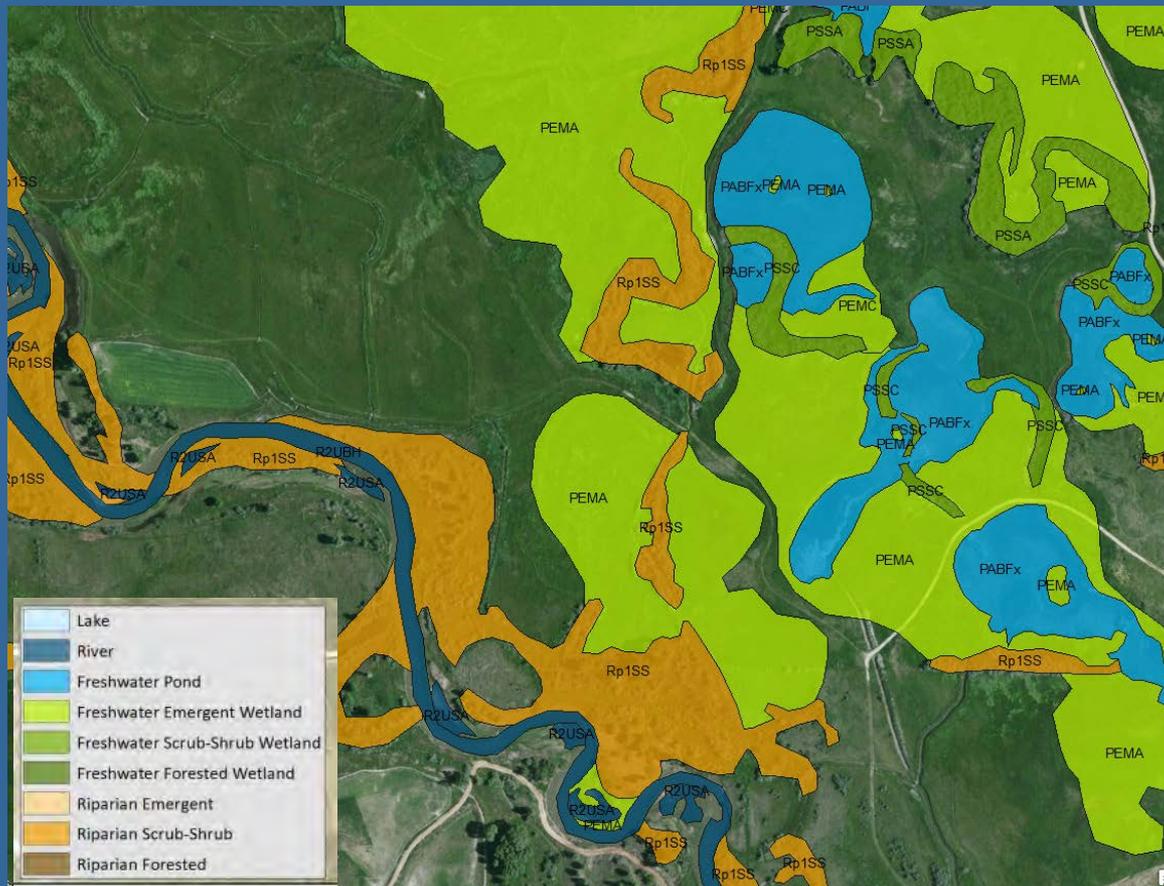
- | | |
|--|---|
|  Confederated Salish and Kootenai Tribes |  DOI: BLM |
|  SWMT - (MT DEQ, PPL, MLIA, USFS Region1) |  US EPA |
|  MT DOJ: Natural Resource Damage Program |  USFS - Custer National Forest |
|  MT DEQ Mines |  Great Northern LCC |
|  US Army Corps of Engineers |  MT DEQ |
|  MLIA/Yellowstone River Conservation District |  Northern Cheyenne Tribe |
|  Chippewa Cree Tribe |  US Forest Service - Region 1 |
|  MT Land Information Act | |

 Mapped from 1980s Imagery (USFWS)

 No Mapping Available

Classification Systems

- Wetlands classification: USFWS NWI Cowardin et al. (1979)
- Riparian classification: USFWS (2009)
- Use codes to describe vegetation, water regime, and any alterations



Palustrine Wetlands

- Greater than 30% vegetation cover, *OR*
- Unvegetated, or vegetation covers less than 30% of area, but less than 20 acres, and less than 20 ft deep

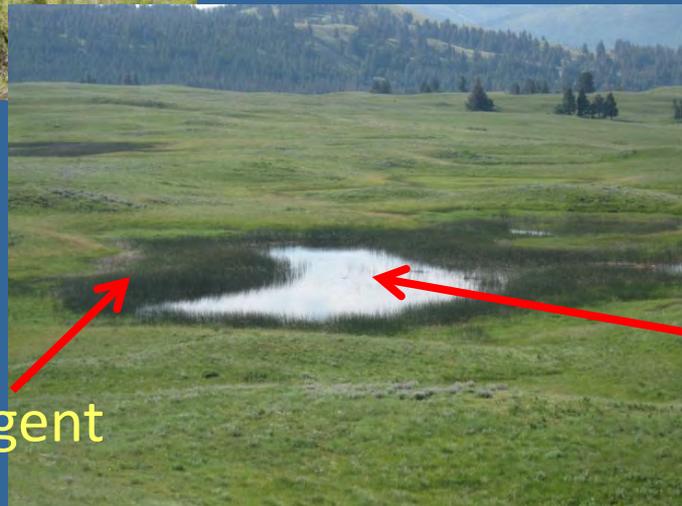
Palustrine scrub-shrub



Palustrine emergent



Palustrine emergent



Palustrine
unconsolidated bottom or
aquatic bed

Riverine Wetlands

- Located *within* a stream or river channel with less than 30% vegetation cover



Unconsolidated bottom or
Unconsolidated shore
(upper or lower perennial)



Riparian Areas

- Vegetated areas contiguous to rivers, streams, lakes, or drainage ways that are influenced by both surface and below surface hydrology.

Riparian forested



Riparian forested

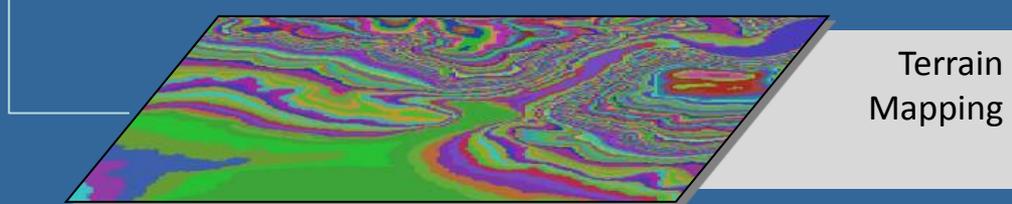
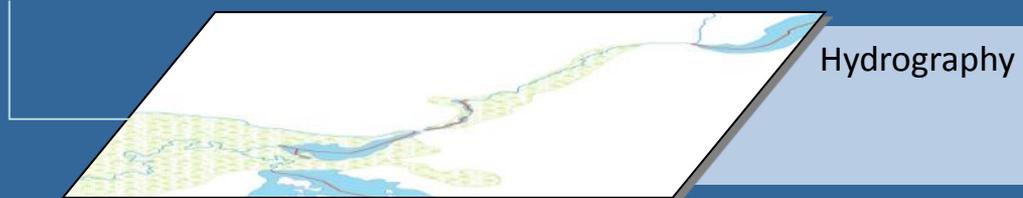
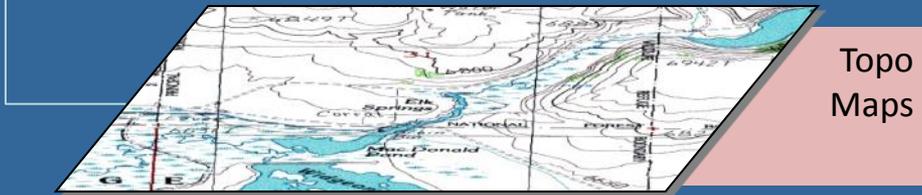


Training Overview

- Definition of wetland and riparian areas
- What is wetland and riparian mapping?
- Mapping programs and status
- Classification systems
- **How mapping is created**
- Accessing mapping
- Hands-on mapping activity
- Uses, limitations, and examples



How is Mapping Created?



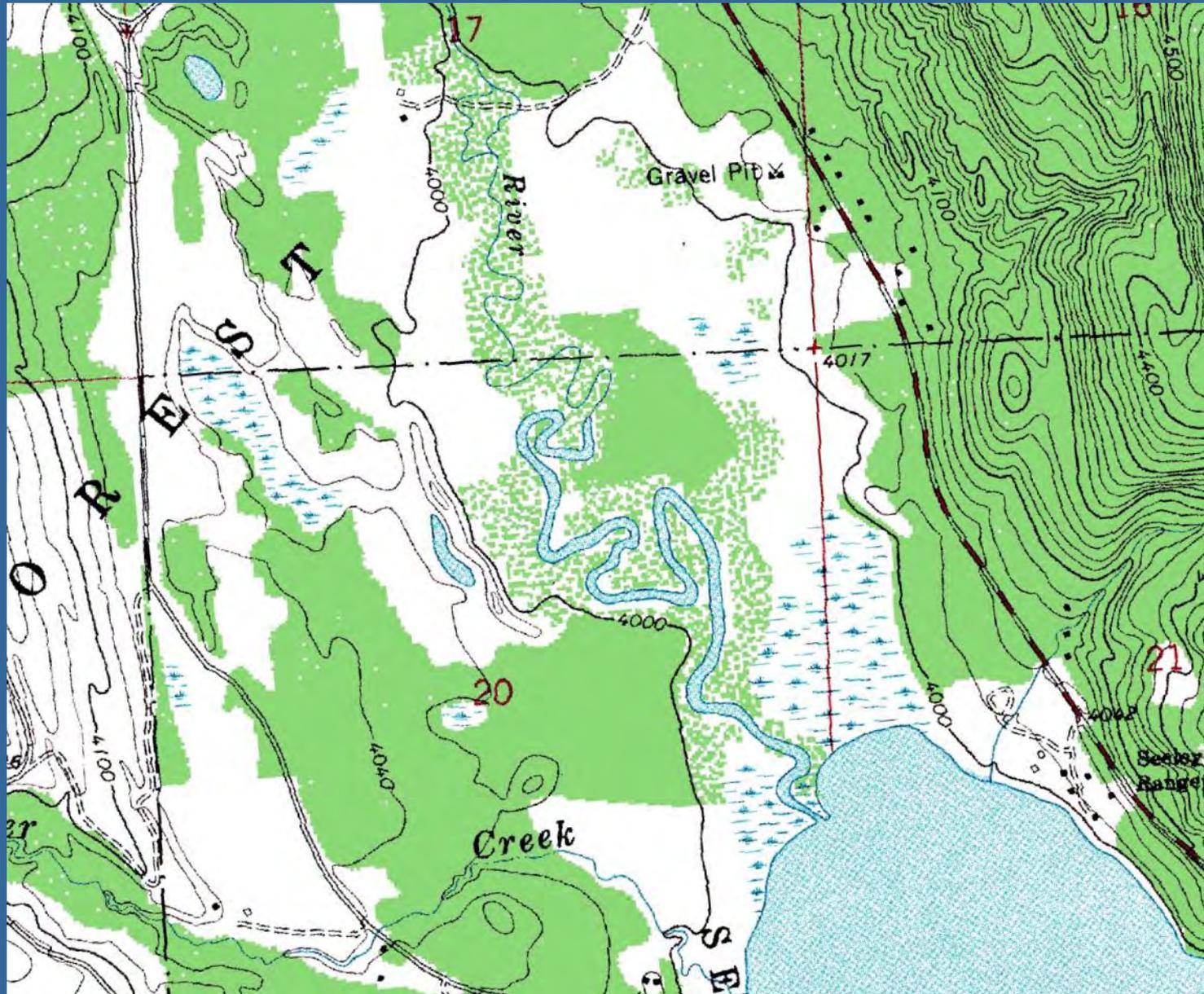
Color Infrared Imagery



Natural Color Imagery



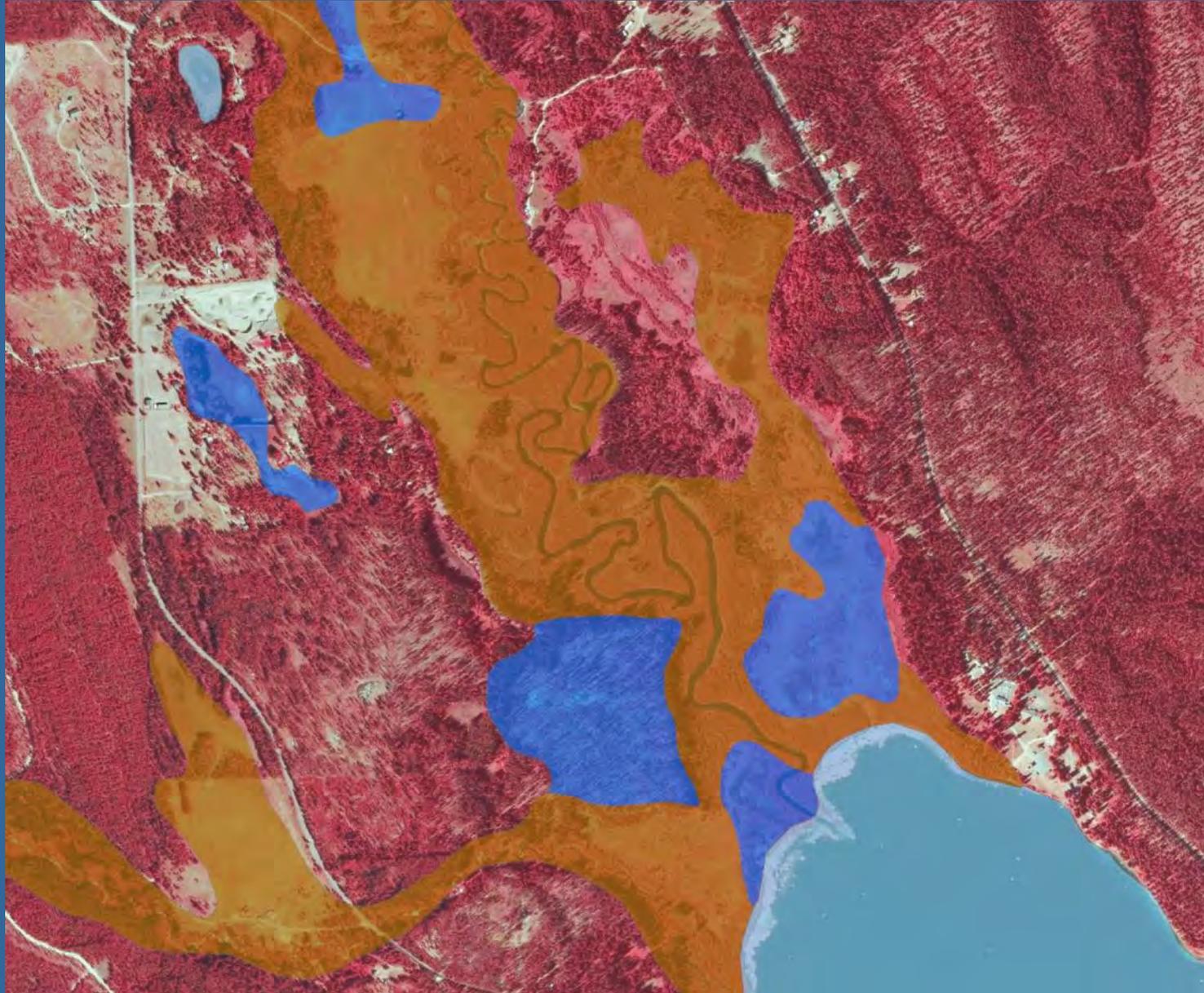
Topographic Maps



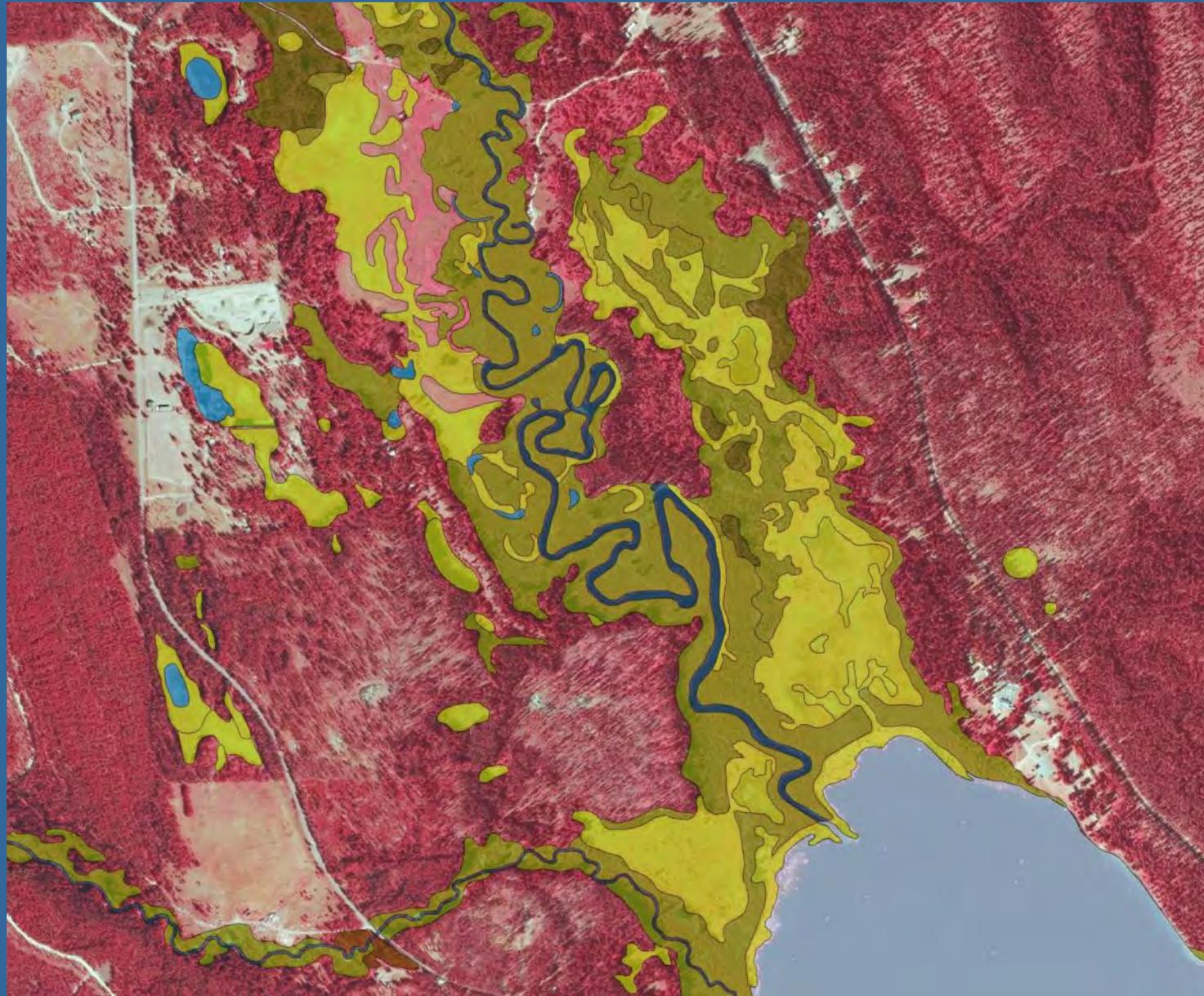
Hydrography



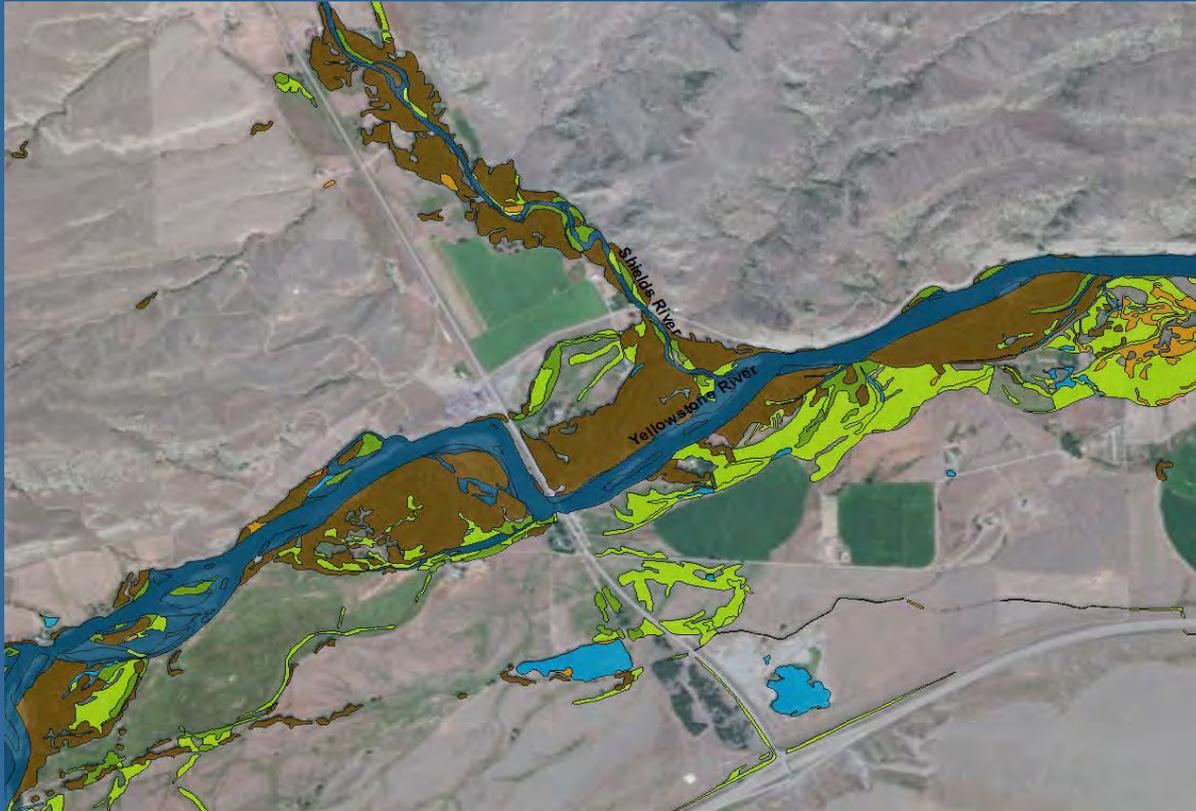
Potential Wetland Soils



Result: Wetland and Riparian Mapping



Questions?



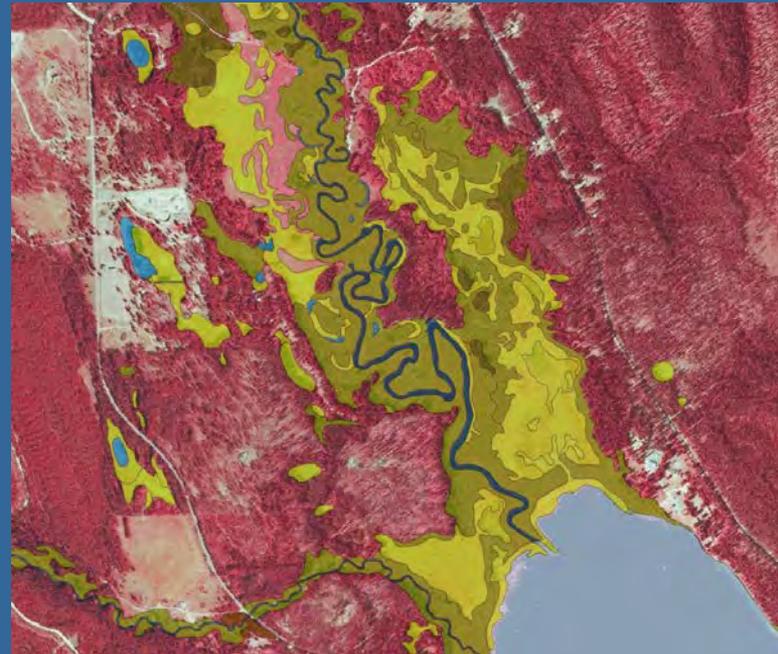
Training Overview

- Definition of wetland and riparian areas
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Accessing Mapping

1. MTNHP Map Viewer: mapping status and mapping
2. GIS
 - a. View mapping as a Map Service layer in GIS
 - b. Download mapping for use in GIS



Accessing Mapping

Comparison of Access Methods

Application	MapView	GIS MapService	GIS Download
GIS skill level required	None	Low	Moderate
Preliminary review	X	X	X
View data attributes using identify tool	X	X	X
Data summary	X	X	X
Overlay ancillary data layers	X	X	X
Overlay project infrastructure layers		X	X
View data in attribute table			X
Data analysis			X
Edit data (shapes or attributes)			X

Accessing Mapping

MT Natural Heritage Program
Wetland and Riparian Mapping Center
<http://mtnhp.org/NWI>

View mapping and other data layers in Map Viewer

GIS Options:
Map Service or Download

View status of mapping in MT (final, historic)

The screenshot shows the website's main content area. On the left, there is a 'Partners Map' section with a map of Montana. The main content is divided into three columns. The first column contains introductory text about wetland and riparian areas, mentioning the Montana Spatial Data (MSD) and the National Wetlands Inventory (NWI). The second column is titled 'Wetland and Riparian Mapping Center' and contains a list of links: 'Wetland and Riparian Mapping Status', 'Natural Heritage Map Viewer-Wetland and Riparian Mapping' (circled in red), 'View & Download Wetlands Data', and 'National Wetlands Inventory Guide'. Below this is an 'Other Information' section with links for 'View Ecology Information', 'View Aquatic Information', 'Land Stewardship Mapping', 'View Plant Information', 'View Animal Information', 'Submit Observations', and 'Request Information'. A large map of Montana is shown below the 'Other Information' section, with the caption 'View an example of Montana wetland and riparian mapping.' The third column contains a 'Mapping Status' section with a map of Montana showing mapping progress, and a 'Related Links' section with various external links. At the bottom of the page, there is a footer with social media icons and navigation links.

Map Viewer

mtnhp.org/mapviewer/

The screenshot shows a web browser window with the URL <http://mtnhp.org/MapViewerBeta/>. The browser's address bar and menu bar are visible. The main content area displays a 'Map Viewer Beta' window with a welcome message: 'Welcome to the latest version of our Map Viewer!'. Below this, a modal window titled 'Which Task would you like?' is open, featuring a 'Sign In' link and a grid of task categories. A red arrow points to the 'Wetland and Riparian Mapping' option.

Map Viewer Beta

Welcome to the latest version of our Map Viewer!

This version is close to finalized but may contain the occasional glitch. Things we know about.

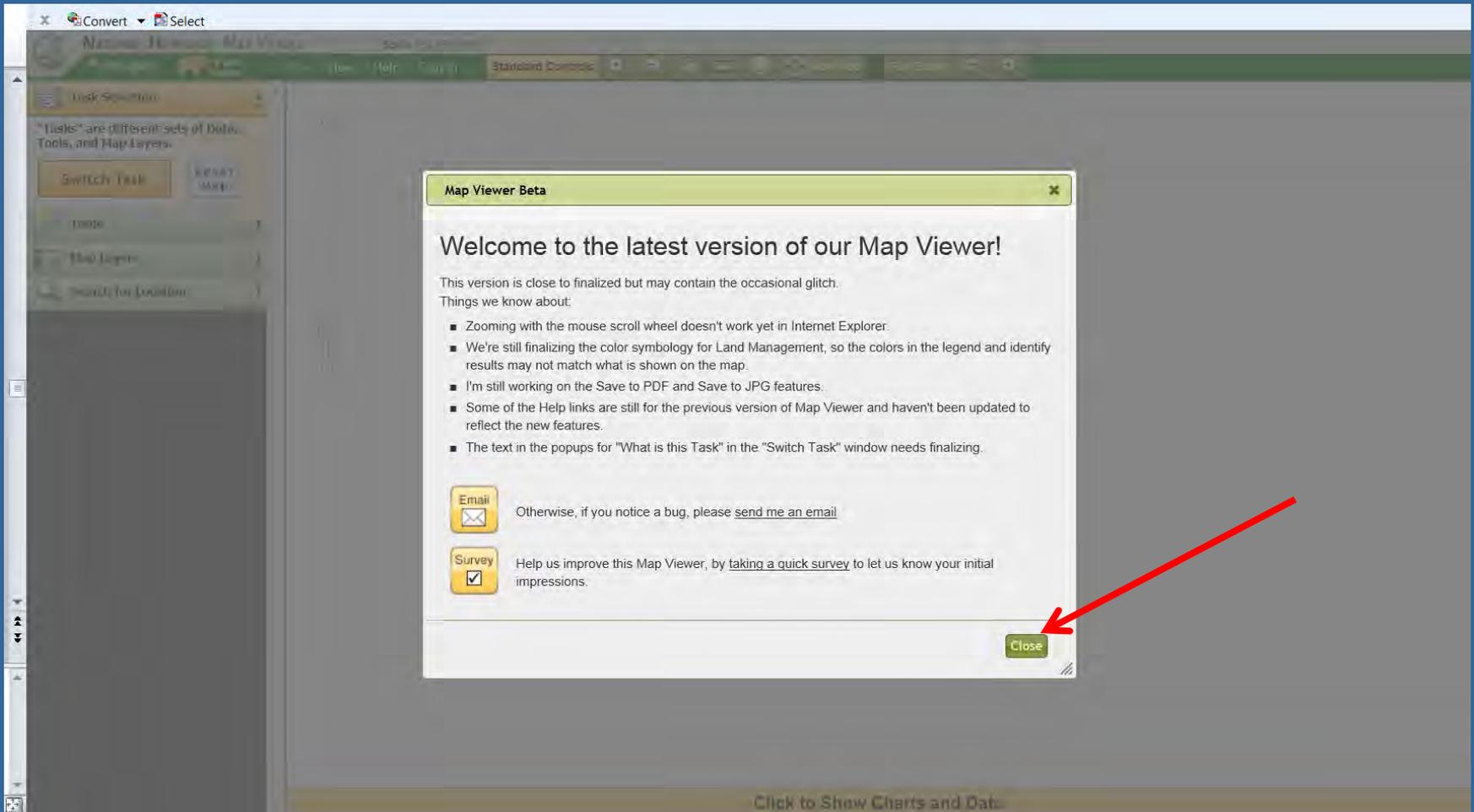
Which Task would you like? [Sign In](#)

Species Related	Ecological Information	Land Management	Other
Generalized Observations	Landcover	Land Management	Georeferenced Photos
	Wetland and Riparian Mapping		

Help us improve the Map Viewer by taking a quick survey to let us know your initial impressions.

Map Viewer

Review known bugs, click “Close”



Map Viewer

NATURAL HERITAGE MAP VIEWER Scale 1:4,613,350

File View Help Sign In **Standard Controls** Add Obs Full Extent

Task Selection
NHP Wetland and Riparian Mapping
"Tasks" are different sets of Data, Tools, and Map Layers.
Switch Task Reset Map

Tools
Show Wetland and Riparian
Summarize Wetland and Riparian By

Map Layers
 Show Summarize Boundaries
 Land Management
 Wetland and Riparian Mapping Status
 Wetland and Riparian (historic)
 Wetland and Riparian
 Lakes and Streams
 Counties
 Township, Range & Section
 Roads
 Towns
 LL, QLL, QLL
 Site Photos
 State Mask

Base Layers
Air Photos Air Photos 2009
2011

Legend
Wetland and Riparian
Wetland and Riparian Explanation
Final Provisional Historic
Type
Lake
River
Freshwater Pond
Freshwater Emergent Wetland
Freshwater Scrub-Shrub Wetland

NHP Wetland and Riparian Mapping

Click to Show Charts and Data

Map Viewer

In Map Layers, click on “Wetland and Riparian”

To add aerial imagery, click “Base Layers”

The screenshot displays the Natural Heritage Map Viewer interface. The top navigation bar includes the mt.gov logo, a Field Guide icon, and menu options: File, View, Help, Sign In, Standard Controls, Add Obs, and Full Extent. The main map area shows a geographical region with various colored overlays representing wetlands and riparian areas. A legend is visible in the top right corner. On the left side, there is a Task Selection panel with a dropdown menu set to 'NHP Wetland and Riparian Mapping'. Below this, there are buttons for 'Switch Task' and 'Reset Map'. The Tools panel includes 'Show Wetland and Riparian' and 'Summarize Wetland and Riparian By'. The Map Layers panel is expanded, showing a list of layers with checkboxes: 'Show Summarize Boundaries' (checked), 'Land Management', 'Wetland and Riparian Mapping Status', 'Wetland and Riparian (historic)', 'Wetland and Riparian' (checked), 'Lakes and Streams' (checked), 'Counties', 'Township, Range & Section', 'Roads', 'Towns' (checked), 'LL, QLL, QQLL', 'Site Photos', 'State Mask' (checked), and 'Base Layers' (unchecked). Two red arrows point to the 'Wetland and Riparian' and 'Base Layers' checkboxes. Below the map, there is a text box labeled 'NHP Wetland and Riparian Mapping' and a button labeled 'Click to Show Charts and Data'.

Map Viewer

Base Layers

- Aerial imagery, hillshade (terrain), color IR imagery, topographic map, landcover

The screenshot displays the 'NATURAL HERITAGE MAP VIEWER' interface. The top navigation bar includes 'File', 'View', 'Help', 'Sign In', 'Standard Controls', 'Add Obs', 'Full Extent', and a 'Legend' button. The left sidebar contains a 'Task Selection' dropdown set to 'NHP Wetland and Riparian Mapping', a 'Tools' section with 'Show Wetland and Riparian' and 'Summarize Wetland and Riparian By', and a 'Map Layers' section. The 'Map Layers' section lists various layers with checkboxes: 'Show Summarize Boundaries' (checked), 'Land Management', 'Wetland and Riparian Mapping Status', 'Wetland and Riparian (historic)', 'Wetland and Riparian' (checked), 'Lakes and Streams' (checked), 'Counties', 'Township, Range & Section', 'Roads', 'Towns' (checked), 'LL, QLL, QLL', 'Site Photos', and 'State Mask' (checked). Below this is a 'Base Layers' section with a dropdown menu currently set to 'Air Photos 2009'. A red arrow points to this dropdown menu. The main map area shows a satellite-style aerial view overlaid with colored polygons representing wetland and riparian areas. A red arrow points to the 'Legend' button in the top right corner. At the bottom of the map, there is a yellow bar with the text 'Click to Show Charts and Data'.

Map Viewer

Legend

- Click “Wetland and Riparian Explanations” to view classification details

The screenshot displays the 'NATURAL HERITAGE MAP VIEWER' interface. On the left, a 'Task Selection' dropdown is set to 'NHP Wetland and Riparian Mapping'. Below it, a 'Tools' section includes 'Show Wetland and Riparian' and a link to 'show Wetland and Riparian Legend'. A 'Map Layers' section on the left has several layers checked, including 'Wetland and Riparian' and 'Lakes and Streams'. The main content area is titled 'A GUIDE TO WETLAND AND DEEPWATER HABITATS CLASSIFICATION USED IN THE NATIONAL WETLAND INVENTORY (NWI) MAPPING'. It contains sections for 'Purpose', 'Wetlands', 'Riparian', and 'PALUSTRINE SYSTEM (P):'. The 'PALUSTRINE SYSTEM (P):' section includes a list of bullet points and a sub-section for 'Palustrine Classes:'. On the right, a 'Wetland and Riparian Explanation' legend is visible, with a red arrow pointing to the 'Wetland and Riparian' tab. The background shows a satellite map with colored overlays representing wetland and riparian areas.

A GUIDE TO WETLAND AND DEEPWATER HABITATS CLASSIFICATION USED IN THE NATIONAL WETLAND INVENTORY (NWI) MAPPING

Purpose:

The Montana Natural Heritage Program's Wetland and Riparian Mapping Center uses the Cowardin classification system (Cowardin et al. 1979) adopted by the National Wetland Inventory (NWI) for wetlands mapping (FGDC Wetlands Subcommittee 2009). The Cowardin wetland classification system separates wetlands first into systems, and then further separates systems into subsystems and classes.

A coding convention using letters and numbers is assigned to each mapped wetland. These letters and numbers describe the broad landscape context of the wetland, its vegetation type, its water regime, and the kind of alterations that may have occurred. Similar coding, based on U.S. Fish and Wildlife Service (USFWS) conventions, is applied to riparian areas (U.S. Fish and Wildlife Service 2009). These are mapped areas where vegetation composition and growth is influenced by nearby water bodies but where soils, plant communities, and hydrology do not display true wetland characteristics.

Both of these classification systems are described in more detail below. Classification types listed are followed by the coding convention used for mapping purposes.

Wetlands

In Montana, there are three wetland systems: **Palustrine**, **Lacustrine**, and **Riverine**.

Riparian

In Montana, there is one classification system for **Riparian** areas.

PALUSTRINE SYSTEM (P):

- In Montana, this system includes all wetlands dominated by trees, shrubs, and emergent, herbaceous vegetation.
- Wetlands lacking vegetation are also included in this system if they are less than 8 hectares (20 acres) in size and are less than 2 meters (6.6 feet) deep in the deepest portion of the wetland.

Palustrine Classes:

Within the Palustrine System, seven classes of wetlands occur in Montana. Classes distinguish between substrate types or vegetation, or both. The wetland classes typically mapped in Montana include the following:

Rock Bottom (RB):

- Wetlands with a substrate made up of 75% or greater stones, boulders, and bedrock with less than 30% vegetation cover.

Unconsolidated Bottom (UB):

- Wetlands where mud, silt or similar fine particles cover at least 25% of the bottom, and where vegetation cover is less than 30%.

Aquatic Bed (AB):

Map Viewer Summarize Data

NATURAL HERITAGE MAP VIEWER Scale 1:18,023

mt.gov Field Guide File View Help Sign In Standard Controls

Task Selection

NHP Wetland and Riparian Mapping

"Tasks" are different sets of Data, Tools, and Map Layers.

Switch Task Reset Map

Tools

Show Wetland and Riparian

[Click to show Wetland and Riparian Legend](#)

Summarize Wetland and Riparian By

County

Show Summarize Boundaries

[See Current Status of NWI Mapping](#)

Map Layers

- Show Summarize Boundaries
- Land Management >>
- Wetland and Riparian Mapping Status >>
- Wetland and Riparian (historic) >>
- Wetland and Riparian >>
- Lakes and Streams >>
- Counties >>
- Township, Range & Section >>
- Roads >>
- Towns >>
- LL, QLL, QQLL >>

NHP Wetland and Riparian Mapping

Summarize data by: state, county, quad, watershed, township, section

Click on map to summarize

Map Viewer Summarize Data

Summarize Data

- Review and acknowledge mapping status statement

NATURAL HERITAGE MAP VIEWER Scale: 1:576,743

File View Help Sign In Standard Controls Add On Flat Extent

Task Selection
NHP Wetland and Riparian Mapping
"Tasks" are different sets of Data, Tools, and Map Layers.
Switch Task Reset Map

Tools
View Wetland and Riparian
Click to show Wetland and Riparian Legend

Summarize Wetland and Riparian By
4th Code Watershed
 Show Summarize Boundaries
See Current Status of NHP Mapping

Map Layers
 Show Summarize Boundaries
 Land Management
 Wetland and Riparian Mapping Status
 Wetland and Riparian (historic)
 Wetland and Riparian
 Lakes and Streams
 Counties
 Township, Range & Section
 Roads
 Towns
 LL, QLL, QLL

Legend
Wetland and Riparian Explanation
Final Provisional Historic
Type
Lake
River
Freshwater Pond
Freshwater Emergent Wetland
Freshwater Scrub-Shrub Wetland

Mapping Status
Wetland and Riparian Mapping Status
Please be advised, wetland and riparian mapping may not exist for all or portions of a geographic unit. Refer to the Legend to determine the topographic quads that have mapping completed.

Wetland and Riparian Mapping Status
 Final Mapping completed by and available from MTNHP
 Provisional Mapping completed by and available from MTNHP
 Mapping in progress by MTNHP
 Scheduled to be mapped by MTNHP
 Mapping completed by Confederated Salish and Kootenai Tribes
 Historic NWI Mapping completed by USFWS
 No mapping available

Click to acknowledge that you've read the statement above.

Process

4th Code Watershed Gallatin (10020008) - 1,181,754
Notes on Appropriation
18,000
16,000
14,000
12,000
10,000
8,000
6,000
4,000
2,000
0
Acres

201 Acres 1001 10 Acres 1002E
14 Acres 1005 12 Acres 1002C
1,824 Acres 1002B 1 Acres 1002M
896 Acres 1002D 1 Acres 1002H

Wetland and Riparian Explanation

Map Viewer Summarize Data

- Acreage by type and modification
- Print report to jpg or pdf

NATURAL HERITAGE MAP VIEWER Scale 1:576,743
 mt.gov Field Guide File View Help Sign In Standard Controls Add Obs Full Extent

Task Selection
 NHP Wetland and Riparian Mapping
 "Tasks" are different sets of Data, Tools, and Map Layers.
 Switch Task Reset Map

Tools
 Show Wetland and Riparian
 Click to show Wetland and Riparian Legend

Summarize Wetland and Riparian By
 4th Code Watershed
 Show Summarize Boundaries
 See Current Status of NWI Mapping

Map Layers
 Show Summarize Boundaries
 Land Management
 Wetland and Riparian Mapping Status
 Wetland and Riparian (historic)
 Wetland and Riparian
 Lakes and Streams
 Counties
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Legend
 Wetland and Riparian
 Wetland and Riparian Explanation
 Final Provisional Historic
 Type
 Lake
 River
 Freshwater Pond
 Freshwater Emergent Wetland
 Freshwater Scrub-Shrub Wetland

Charts and Data
 Notes on Appropriate Uses of Wetland and Riparian Mapping
4th Code Watershed
Gallatin
 (10020008) - 1,181,754 Acres (1.26% of Montana)

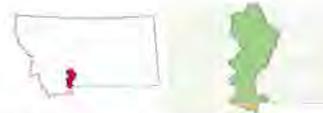
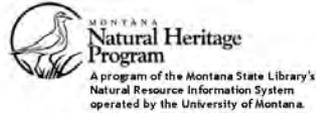
172 Acres	PUB	1,109 Acres	R3UB
1,401 Acres	PAB	123 Acres	R3US
54 Acres	PUS	472 Acres	R4SB
16,691 Acres	PEM	4,561 Acres	Rp1SS
4,581 Acres	PSS	7,808 Acres	Rp1FO
16 Acres	PFO	1,520 Acres	Rp1EM
291 Acres	L1UB	10 Acres	Rp2SS
14 Acres	L2US	12 Acres	Rp2FO
1,624 Acres	R2UB	1 Acres	Rp2EM
686 Acres	R2US		

[Wetland and Riparian Explanation](#)
[Printable Report](#)

Final and Provisional Mapping Summary

Map Viewer Summarize Data

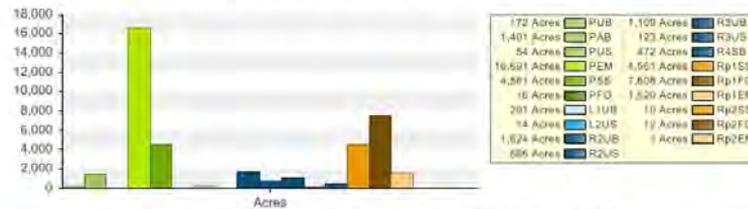
Print report to
jpg or pdf



Montana Wetland and Riparian Mapping Summary

Report generated 5/7/2014 12:16:28 PM

Notes on Appropriate Uses of Wetland and Riparian Mapping



(Chart only shows "Final" and "Provisional" mapping. Historic Wetland Mapping is not included)

Wetland and Riparian Explanation [e](#)

4th Code Watershed

Gallatin

(10020008) - 1,181,754 Acres (1.26% of Montana)

Final and Provisional Mapping Summary

Final and Provisional Mappings represents wetland and riparian mapping created from 2005 or later aerial imagery. [\(show more\)](#)

Category	Code	Description	Acres
Palustrine	PUB	Unconsolidated Bottom	172
	PAB	Small Pond	1,401
	PUS	Unconsolidated Shores	54
	PEM	Emergent	4,591
	PFS	Scrub-Shrub	4,591
	PFO	Forested	16
Lacustrine (Lakes)	L1UB	Unconsolidated Bottom	10
	L2US	Unconsolidated Shores	14
Riverine (Rivers)	R2UB	Unconsolidated Bottom	1,520
	R2US	Unconsolidated Shores	1,520
	R3UB	Unconsolidated Bottom	123
Upper Perennial	R3SB	Unconsolidated Shore	472
	Rp1SS	Unconsolidated Bottom	4,551
Intermittent	Rp1FD	Forested	7,508
	Rp1EM	Emergent	1,520
Riparian	Rp2SS	Scrub-Shrub	10
	Rp2FD	Forested	14
	Rp2EM	Emergent	1

Accessing Mapping

View or Download for GIS

<http://mtnhp.org/NWI>

Overview

Wetlands and riparian areas are one of the 14 themes in the [Montana Spatial Data Infrastructure \(MSDI\)](#), and our goal is to create a statewide digital wetland and riparian layer as a resource for management, planning, and restoration efforts.

With support from the Montana Wetland Council and our other [partners](#), the Center maps wetlands and riparian areas to [FGDC](#) and [USFWS](#) National Wetlands Inventory (NWI) standards.

Additionally, wetland mapping can be enhanced by incorporating descriptors to characterize hydrogeomorphic features to identify potential wetland function. These descriptors are added to each wetland polygon to describe the landscape position, landform, water flow path, and waterbody type ([LLWW](#)).

Digital wetland mapping is necessary to effectively and efficiently [assess Montana's wetlands](#) by identifying the type, size, and location of wetland resources.

Partners Map

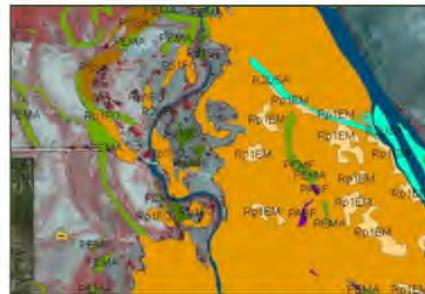


Wetland and Riparian Mapping Center

- [Wetland and Riparian Mapping Status](#)
- [Natural Heritage Map Viewer-Wetland and Riparian Mapping](#)
- [View & Download Wetlands Data](#)
- [National Wetlands Inventory Guide](#)

Other Information

- [View Ecology Information](#)
- [View Aquatic Information](#)
- [Land Stewardship Mapping](#)
- [View Plant Information](#)
- [View Animal Information](#)
- [Submit Observations](#)
- [Request Information](#)



View an example of Montana wetland and riparian mapping.

Mapping Status



Related Links

- [Wetland & Riparian Mapping Fact Sheet](#)
- [National Spatial Data Infrastructure \(NSDI\) Wetlands Layer](#)
- [Montana Wetland Information Clearinghouse](#)
- [USFWS National Wetlands Inventory \(NWI\)](#)
- [USFWS NWI Riparian Mapping](#)
- [Confederated Salish & Kootenai Tribes Wetlands Conservation Program](#)
- [Montana Geographic Information](#)
- [US EPA Wetlands Info](#)

Mapping Status by Watershed



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View or Download for GIS

<http://geoinfo.montanastatelibrary.org/data/msdi/wetlands/>



Geographic Information

Providing Montana a sense of place



MSDI Data Geography Web Changes

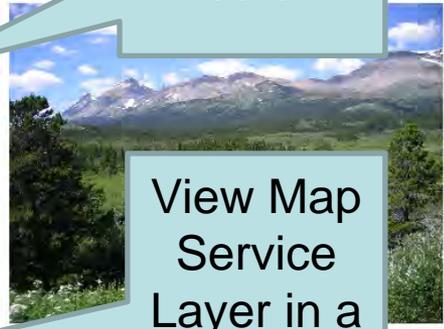
Home > Data > Montana Spatial Data Infrastructure (MSDI) > Wetlands

Wetlands

Data and Documentation

Wetlands Data Download for Desktop GIS Users

Spatial data representing the extent, type, and approximate location of wetlands, riparian areas, and deepwater habitats in Montana along with associated metadata are provided in geodatabase versions 10 or 9.3. Data are downloaded at a statewide scale. New data are added as individual project areas are completed.



Download data

View Map Service Layer in a GIS

Applications

Wetland and Riparian Framework Web Service

This application provides access to the Montana Spatial Data Infrastructure Framework dataset. Included in this service are provisional and final wetland and riparian polygons and labels, the wetland and riparian mapping program status map, and historic wetland mapping polygons and labels completed by the National Wetland Inventory.

Wetlands Framework Contact Information

Wetlands Framework Theme Leads

Karen Newlon

Montana Natural Heritage Program
Ecologist/Project Manager
Email: knewlon@mt.gov
Phone: 406-444-0915

Lynda Saul

Department of Environmental Quality
Wetland Program Coordinator
Email: Lsaul@mt.gov
Phone: 406-444-6652

Wetlands Framework Theme Stewards

Montana Natural Heritage Program

About

View Using Map Service in GIS

Click Save, use the drop down arrow to “Save As”
Save with your ArcMap layers, add layer to your map

ArcGIS Services Directory [Login](#) | [Get Token](#)

[Home](#) > [MSDI_Framework](#) > [WetlandsRiparian \(MapServer\)](#) [Help](#) | [API Reference](#)

MSDI_Framework/WetlandsRiparian (MapServer)

View In: [ArcMap](#) [ArcGIS Explorer](#) [ArcGIS JavaScript](#) [Google Earth](#) [ArcGIS.com Map](#)

View Footprint In: [Google Earth](#)

Service Description: The WetlandsRiparian Web Map Service provides access to the Montana Spatial Data Infrastructure (MSDI) Wetlands and Riparian Framework dataset. Included in this service are the wetlands and riparian mapping program status map as well as historic, provisional and final wetlands polygon, outline, and labels. Metadata and access to the datasets that support this service is available through the Montana GIS Portal - <http://gisportal.msl.mt.gov> Additional information about these data sets and information about the Montana Wetlands and Riparian Center is available at - <http://mtnhp.org/nwi/>

Map Name: Layers

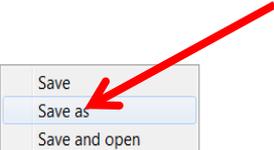
[Legend](#)

[All Layers and Tables](#)

Layers:

- [Wetland and Riparian Mapping](#) (0)
 - [Labels](#) (1)
 - [Mapping Status](#) (2)
 - [Wetland and Riparian Mapping](#) (3)
- [Historic NWI Mapping](#) (4)
 - [Labels](#) (5)
 - [Historic Mapping Outline](#) (6)
 - [Historic NWI Mapping](#) (7)
- [Wetland and Riparian Mapping Status](#) (8)
 - [Active Projects](#) (9)
 - [Quads with Final Mapping](#) (10)
 - [Quads with Provisional Mapping](#) (11)
 - [Historic NWI](#) (12)
 - [No Mapping A](#)

Do you want to open or save **MSDI_Framework_WetlandsRiparian.lyr** (4.00 KB) from **gisservice.mt.gov**?



Download for GIS

<http://geoinfo.montanastatelibrary.org/data/msdi/wetlands/>



Geographic Information

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[MSDI](#) [Data](#) [Geography](#) [Web Changes](#)

[Home](#) > [Data](#) > [Montana Spatial Data Infrastructure \(MSDI\)](#) > [Wetlands](#)

Wetlands

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Wetlands Framework Theme Stewards

Montana Natural Heritage Program

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Montana State Data Infrastructure (MSDI)



Geographic Information

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[MSDI](#) [Data](#) [Geography](#) [Web Changes](#)

[Home](#) > [Data](#) > [Data List](#) > [Data List Details](#)

Montana Wetland and Riparian Framework ★ MSDI

[Download Data](#)

Data Provider: Montana Natural Heritage Program (MTNHP)

Date: 03/14/2014

Content Type: Downloadable Data

[Description](#) [Usage](#) [Distribution](#) [Metadata](#)

Abstract

The Montana Wetland and Riparian Framework represents the extent, type, and approximate location of wetlands, riparian areas, and deepwater habitats in Montana. These data delineate the areal extent of wetlands and deepwater habitats as defined by Cowardin et al. (1979) and riparian areas as defined by the U.S. Fish and Wildlife Service (2009).

The Montana Wetland and Riparian Framework consists of features that were manually digitized at a scale of 1:4,500 or 1:5,000 from orthorectified digital color-infrared aerial imagery collected during the summers of 2005, 2006, 2009, 2011, and 2013 by the National Agricultural Imagery Program (NAIP). These data are intended for use in publications at a scale of 1:12,000 or smaller.

Data List Quick Search

Search by single word or exact phrase
[Advanced Search](#)

- [Browse Full Data List](#)
- [Help](#)

Data Categories

- [Montana Spatial Data Infrastructure \(MSDI\)](#)
- [Biota](#)
- [Boundaries](#)
- [Climatology/Meteorology/Atmosphere](#)
- [Economy](#)
- [Elevation](#)
- [Environment](#)
- [Farming](#)
- [Geoscientific Information](#)
- [Health](#)

Download for GIS

Download zip file for your version of ArcGIS

FTP directory /Data/Spatial/MSDI/Wetlands at ftp.geoinfo.msl.mt.gov

To view this FTP site in File Explorer: press Alt, click View, and then click Open FTP Site in File Explorer.

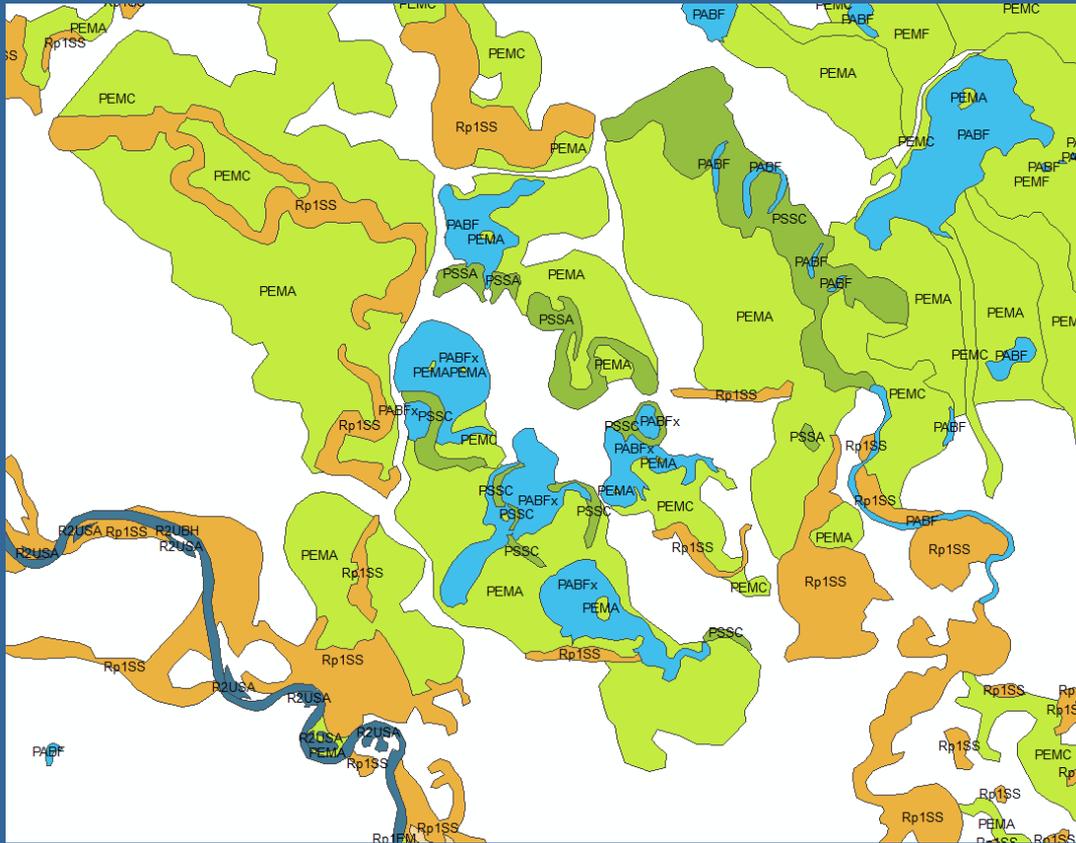
[Up to higher level directory](#)

03/21/2014 03:33PM	345,698,445	Wetland Riparian 2014.zip
03/21/2014 03:37PM	345,392,438	Wetland Riparian v93 2014.zip

ArcGIS 10.x users

ArcGIS 9.3 users

Questions?



Training Overview

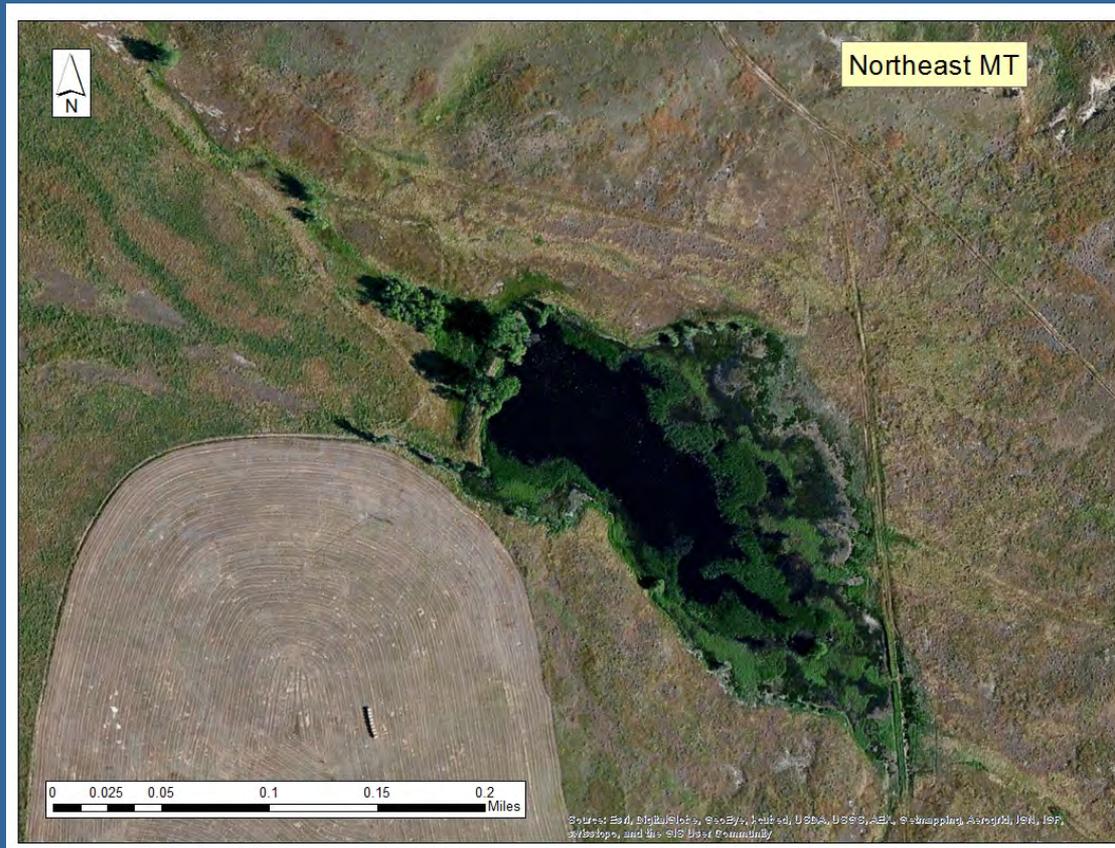
- Definition of wetland and riparian areas
- What is wetland and riparian mapping?
- Mapping programs and status
- Classification systems
- How mapping is created
- Accessing mapping
- **Hands-on mapping activity**
- Uses, limitations, and examples



Mapping Activity

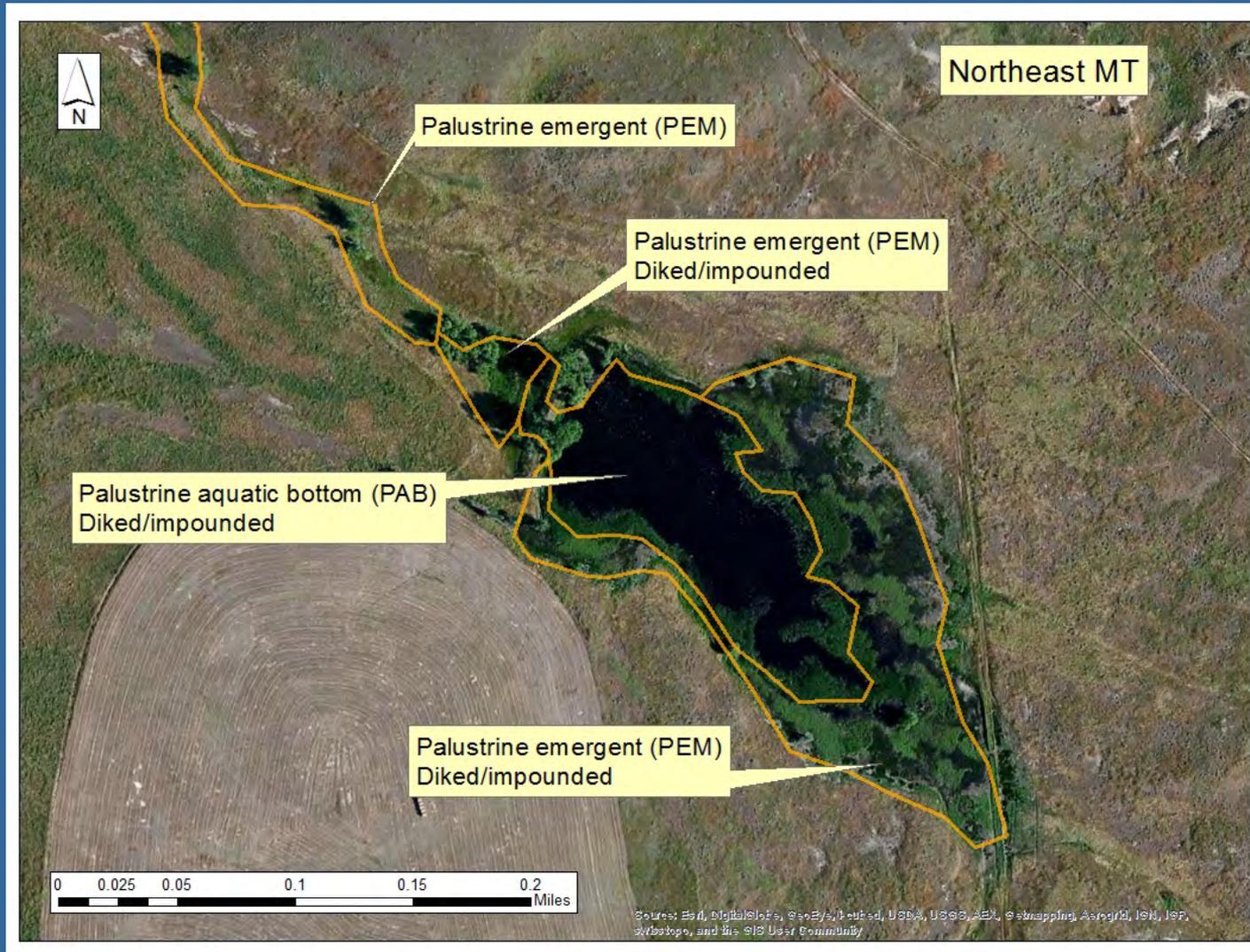
Directions

- Outline potential wetland types
- Add wetland classification if time allows



20 minutes

Mapping Activity



Training Overview

- Definition of wetland and riparian areas
- What is wetland and riparian mapping?
- Mapping programs and status
- Classification systems
- How mapping is created
- Accessing mapping
- Hands-on mapping activity
- **Uses, limitations, and examples**



Potential Uses

- Preliminary site assessment
- General data management
- Floodplain management
- Riparian setbacks
- NEPA process
- Project permitting
- Project facilities siting
- CWA Section 404 Permitting
- Assessing wetland function
- Restoration planning
- Monitoring plan development
- Evaluate watershed-scale wetland losses/gains
- Habitat assessment
- Fisheries protection
- Water quality protection

Limitations?

- Landscape level, reconnaissance information
- Accuracy depends upon image quality, image date, and image analyst experience
- Function information is limited (easily added to database)
- No condition information (easily added to database)
- Scale limitations
 - Minimum mapping unit: wetlands, 0.1 ac; riparian, 0.5 ac
 - Publication scale: 1:12,000 or “smaller”
- No jurisdictional information
- Requires groundtruthing for site use



General Use Data Management

GIS layer can be used as the geodatabase to house any wetland/riparian data set



Table

Wetland and Riparian Mapping

WETLAND_TYPE	ATTRIBUTE	ACRES	Status	SYSTEM	SUBSYSTEM	CLASS	WATER_REG	SPECIAL_MODIFIER	NWCode	FULL_CLASS	M
River	R3UBF	28.003481	Final	R	3	UB	F		R3UB	Riverine, Upper Perennial, Unconsolidated Bottom, Semipermanently Flooded	R
Freshwater Emergent Wetland	PEMA	2.052434	Final	P		EM	A		PEM	Palustrine, Emergent, Temporarily Flooded	P
Freshwater Pond	PABFx	0.074808	Final	P		AB	F	x	PAB	Palustrine, Aquatic Bed, Semipermanently Flooded, Excavated	P
River	R3UBF	18.250269	Final	R	3	UB	F		R3UB	Riverine, Upper Perennial, Unconsolidated Bottom, Semipermanently Flooded	R
Freshwater Emergent Wetland	PEMA	0.217019	Final	P		EM	A		PEM	Palustrine, Emergent, Temporarily Flooded	P
River	R4SBCx	27.438884	Final	R	4	SB	C	x	R4SB	Riverine, Intermittent, Streambed, Seasonally Flooded, Excavated	R
Freshwater Pond	PABFx	0.333811	Final	P		AB	F	x	PAB	Palustrine, Aquatic Bed, Semipermanently Flooded, Excavated	P
River	R4SBCx	40.464602	Final	R	4	SB	C	x	R4SB	Riverine, Intermittent, Streambed, Seasonally Flooded, Excavated	R
Freshwater Pond	PABFx	0.162224	Final	P		AB	F	x	PAB	Palustrine, Aquatic Bed, Semipermanently Flooded, Excavated	P
Freshwater Pond	PABFh	0.085555	Final	P		AB	F	h	PAB	Palustrine, Aquatic Bed, Semipermanently Flooded, Diked/Impounded	P
Freshwater Pond	PABFx	0.213669	Final	P		AB	F	x	PAB	Palustrine, Aquatic Bed, Semipermanently Flooded, Excavated	P
Freshwater Pond	PABFx	0.026285	Final	P		AB	F	x	PAB	Palustrine, Aquatic Bed, Semipermanently Flooded, Excavated	P
Freshwater Emergent Wetland	PEMA	4.03685	Final	P		EM	A		PEM	Palustrine, Emergent, Temporarily Flooded	P
Freshwater Pond	PABFx	0.062419	Final	P		AB	F	x	PAB	Palustrine, Aquatic Bed, Semipermanently Flooded, Excavated	P
Freshwater Pond	PABFx	0.028559	Final	P		AB	F	x	PAB	Palustrine, Aquatic Bed, Semipermanently Flooded, Excavated	P
River	R4SBCx	125.079108	Final	R	4	SB	C	x	R4SB	Riverine, Intermittent, Streambed, Seasonally Flooded, Excavated	R
River	R4SBCx	26.20464	Final	R	4	SB	C	x	R4SB	Riverine, Intermittent, Streambed, Seasonally Flooded, Excavated	R
Freshwater Pond	PABFh	0.882709	Final	P		AB	F	h	PAB	Palustrine, Aquatic Bed, Semipermanently Flooded, Diked/Impounded	P
Freshwater Pond	PABFh	0.151048	Final	P		AB	F	h	PAB	Palustrine, Aquatic Bed, Semipermanently Flooded, Diked/Impounded	P
Freshwater Pond	PABFh	0.797061	Final	P		AB	F	h	PAB	Palustrine, Aquatic Bed, Semipermanently Flooded, Diked/Impounded	P
Freshwater Emergent Wetland	PEMC	0.142154	Final	P		EM	C		PEM	Palustrine, Emergent, Seasonally Flooded	P
Freshwater Pond	PABFh	0.219671	Final	P		AB	F	h	PAB	Palustrine, Aquatic Bed, Semipermanently Flooded, Diked/Impounded	P
Freshwater Pond	PABFh	0.293705	Final	P		AB	F	h	PAB	Palustrine, Aquatic Bed, Semipermanently Flooded, Diked/Impounded	P
Freshwater Pond	PABFh	0.080454	Final	P		AB	F	h	PAB	Palustrine, Aquatic Bed, Semipermanently Flooded, Diked/Impounded	P
River	R3UBF	9.735145	Final	R	3	UB	F		R3UB	Riverine, Upper Perennial, Unconsolidated Bottom, Semipermanently Flooded	R
Freshwater Emergent Wetland	PEMB	0.893598	Final	P		EM	B		PEM	Palustrine, Emergent, Saturated	P
River	R3UBF	4.516137	Final	R	3	UB	F		R3UB	Riverine, Upper Perennial, Unconsolidated Bottom, Semipermanently Flooded	R
Freshwater Pond	PABFh	0.277586	Final	P		AB	F	h	PAB	Palustrine, Aquatic Bed, Semipermanently Flooded, Diked/Impounded	P
Freshwater Pond	PABFh	1.116554	Final	P		AB	F	h	PAB	Palustrine, Aquatic Bed, Semipermanently Flooded, Diked/Impounded	P

Wetland and Riparian Mapping

Data Management

BLM Water Resources Inventory Project

Goal: Develop GIS geodatabase/layer to house:

- BLM Water Right data and BLM Range Improvement Project System (RIPS) data
- Lentic-wetland Proper Functioning Condition inventory and monitoring data

Solution:

- Integrated NWI mapping and DNRC Water Rights layer into a single GIS layer
- This layer, or separate layer could also house the water right and PFC data (TBD)



Example Use

Floodplain Management

Floodplains are natural assets – keeping floodplains as open lands can:

- Save lives, reduce property damage, and avoid costs associated with building requirements
- Reduce environmental damage

FEMA FIRM maps don't always include all river hazard areas

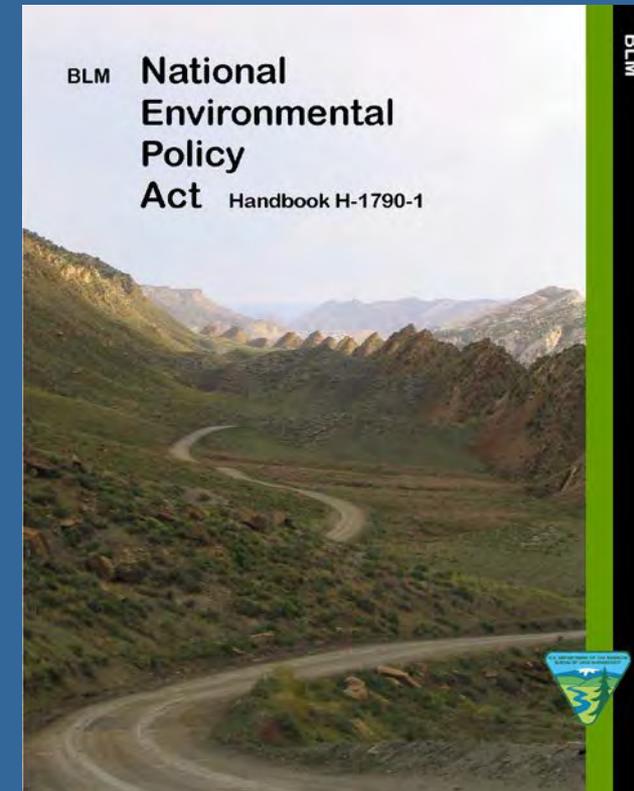
- NWI mapping can be used to augment the FIRM maps to assess potential channel migration and river hazard areas
- Limitations: not regulatory; excludes areas without surface or subsurface hydrologic influence



Example Use

NEPA Process

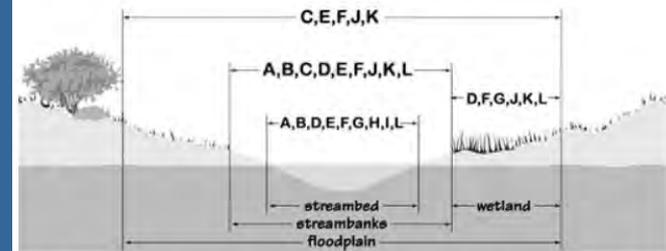
- Characterization of riparian and wetland habitat types and acreage for Affected Environment and Alternatives Analysis Sections
- To house environmental data and ancillary information
- Assessment of restoration and mitigation options



Example Use Project Permitting

- Clean Water Act Section 404 Permit
- Facilities siting
- Stormwater discharge general permits (MPDES, SWPPP)
- Streamside Management Zone Law

Guide to Required Permits



Using the diagram above, determine where your project will take place: streambed, streambanks, wetlands, or floodplain. The letters in the diagram refer to the required permits listed below (A through L) and described on the following pages.

Permits that may be necessary:

[A. Montana Natural Streambed and Land Preservation Act \(310\)](#)

[B. Montana Stream Protection Act \(SPA 124 Permit\)](#)

[C. City or County Floodplain Development Permit](#)

[D. Federal Clean Water Act \(404 Permit\)](#)

[E. Federal Rivers and Harbors Act \(Section 10 Permit\)](#)

[F. Short-Term Water Quality Standard for Turbidity \(318 Authorization\)](#)

[G. Montana Land-Use License or Easement on Navigable Waters](#)

[H. Montana Water Use Act \(Water Right Permit and Change Authorization\)](#)

[I. Montana Water Use Act \(Water Reservations\)](#)

[J. Stormwater Discharge General Permits](#)

[K. Streamside Management Zone Law](#)

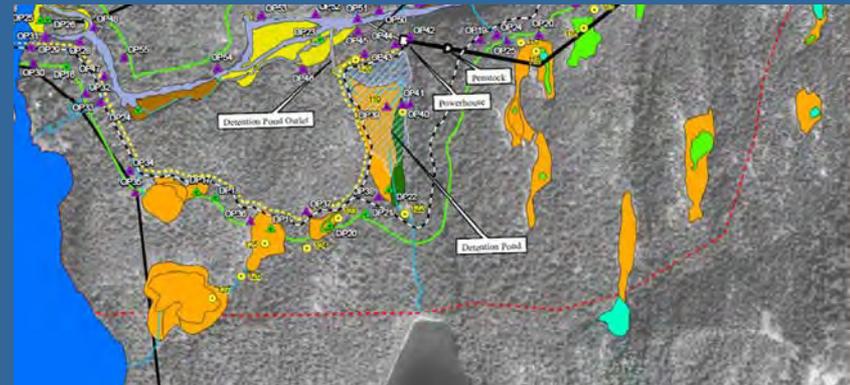
[L. Other Laws that May Apply](#)

Example Use

CWA Section 404 Permitting

- Placement of fill in “Waters of the U.S.” requires CWA Section 404 permit
- Delineation of wetlands and waters
 - Pre-field desktop mapping
 - As base layer geodatabase for wetlands/waters data
- Wetland functional assessment for compensatory mitigation
 - As base layer geodatabase for functional data

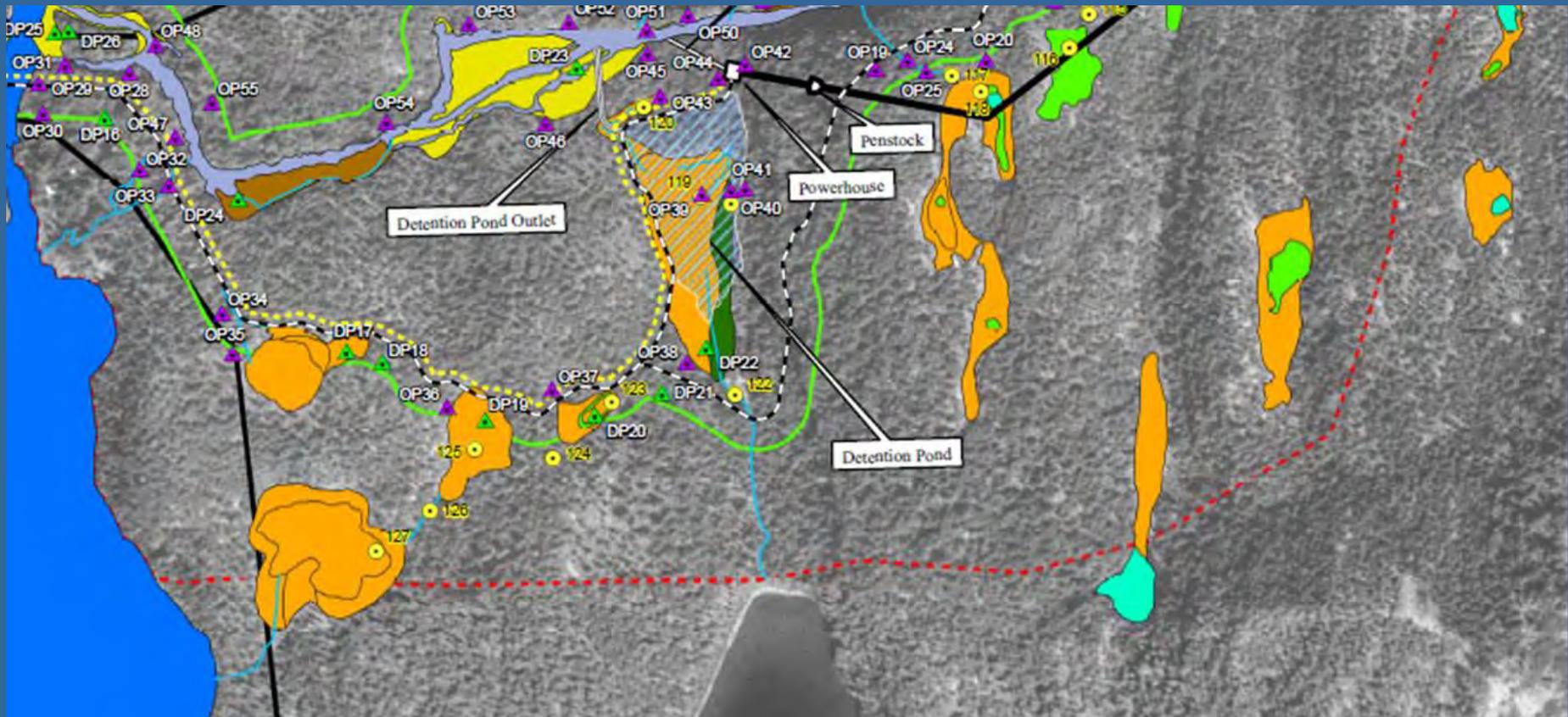
Final delineation and jurisdictional determination requires field groundtruthing



Permitting

Project Facilities Siting and CWA Section 404 Permit

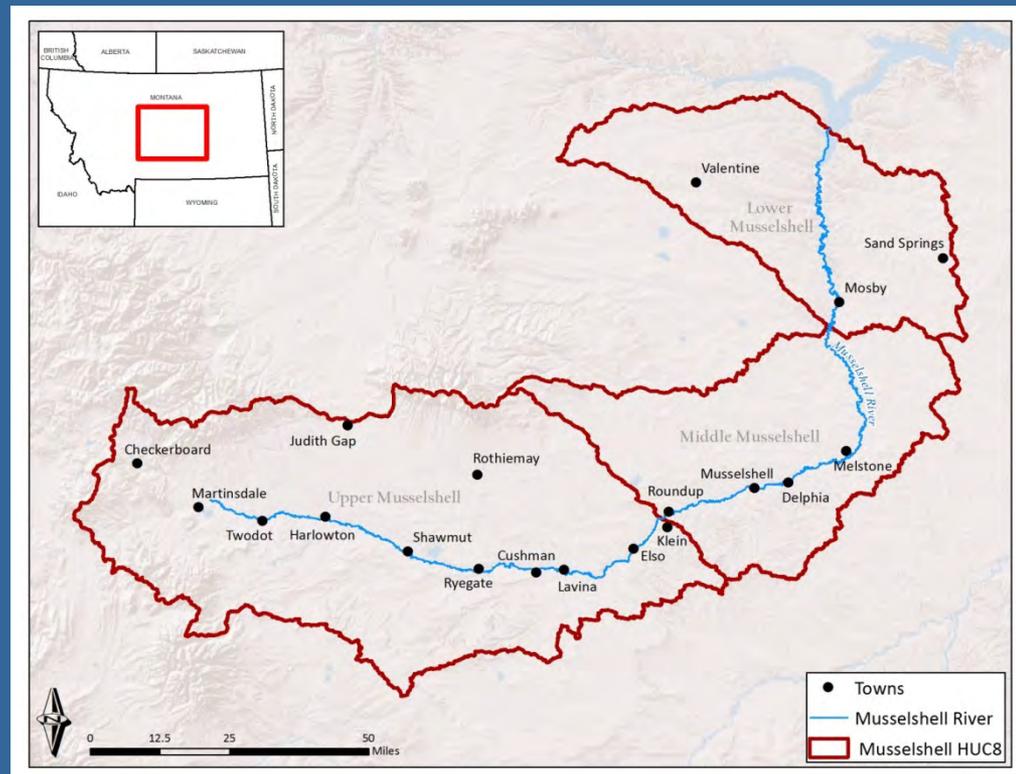
- Assess siting of project infrastructure for permitting
- Example: using wetland mapping to assess best route for proposed road and power transmission line



Project Example

Restoration Planning in the Musselshell Watershed

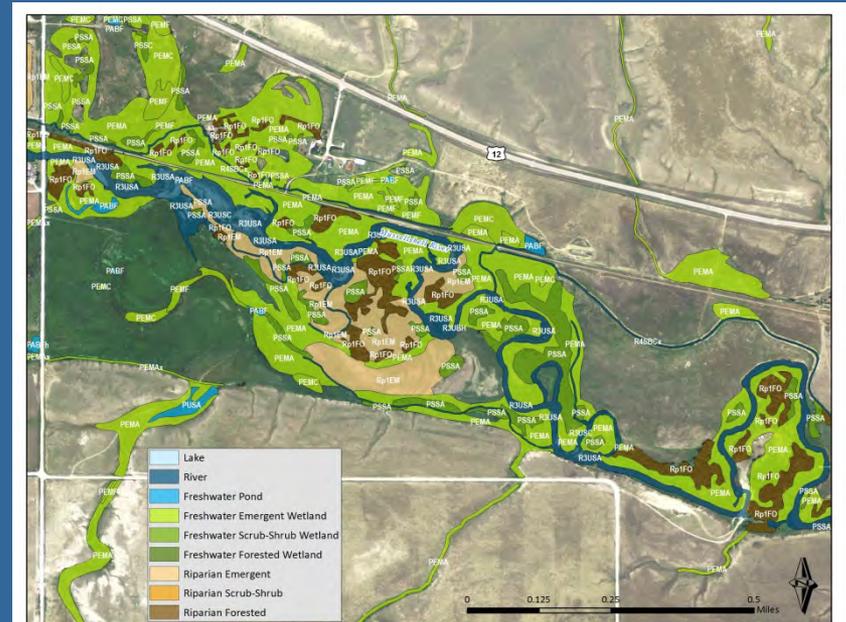
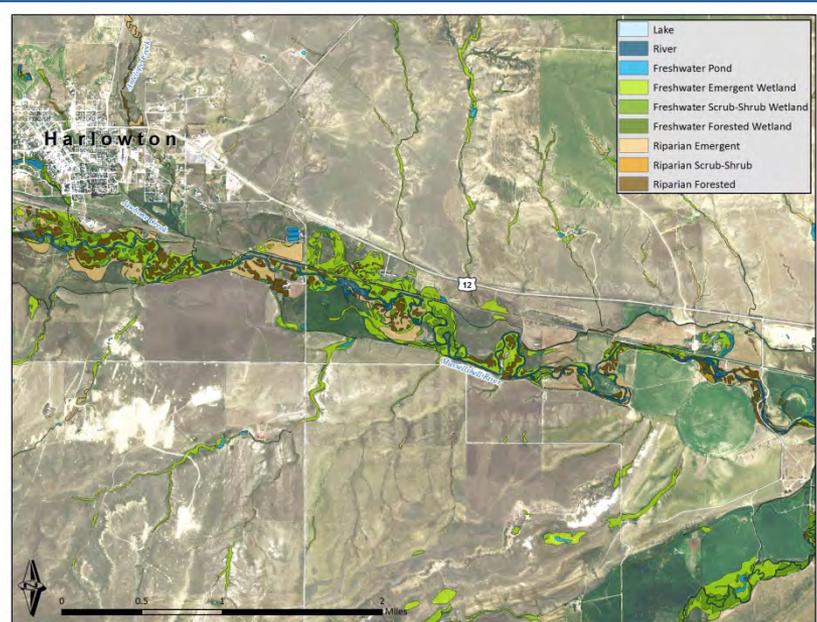
- DEQ pilot project to incorporate wetlands into the WRP
- Employ a “risk-based” approach to identify wetland restoration sites with the highest potential to mitigate impairments to water quality and quantity



Project Example

Restoration Planning in the Musselshell Watershed

- Integration of wetland mapping with field assessment
- Assessment of potential wetland functions to determine their ability to mitigate for impairments
 - Flood attenuation
 - Bank stabilization
 - Maintenance of flow
 - Sediment/nutrient retention



Summary

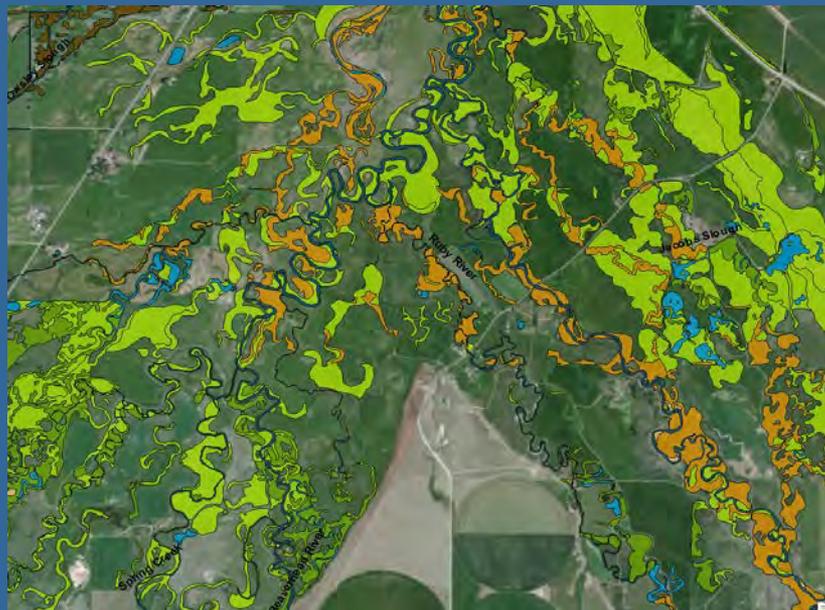
- Ideal for landscape or watershed scale assessment
- NWI is a starting point for more focused assessments requiring field verification
- Available from MTNHP before NWI web site
- Access method based on intended use and user skill level



Questions?

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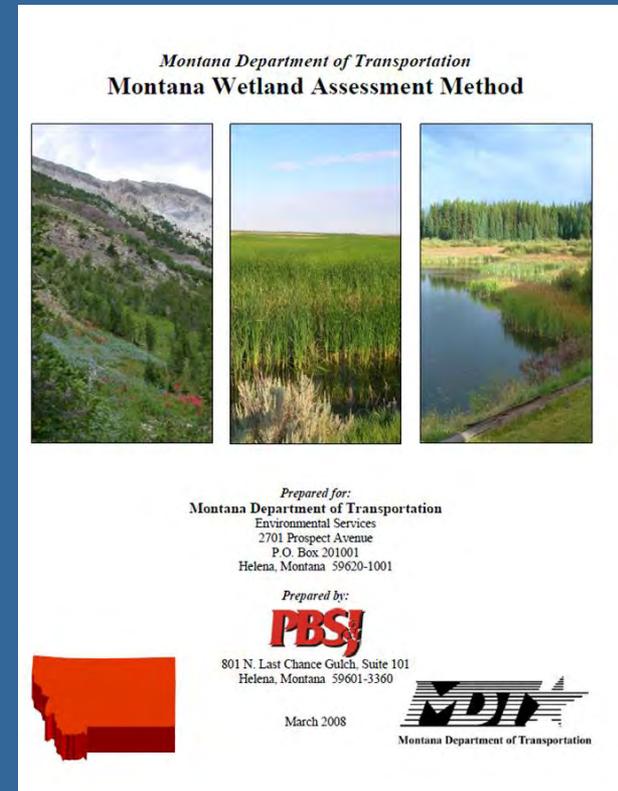


Additional Example Slides

Example Use

Assessing Wetland Function

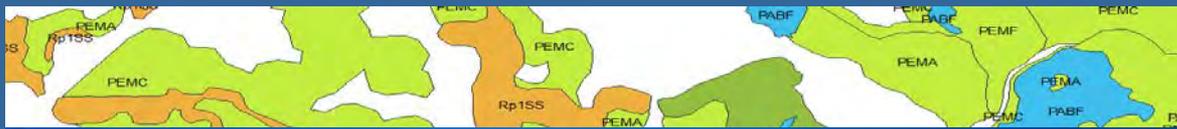
- Understanding potential wetland functions for mitigation and restoration prioritization, i.e.:
 - Flood attenuation
 - Bank stabilization
 - Maintenance of flow
 - Sediment/nutrient retention
- Uses:
 - As base layer geodatabase for functional data (field or desktop data)
 - Landscape-scale assessment and modeling of potential functions in GIS



Example Use

Assessing Wetland Function Continued

- Supplemental data can be added to the attribute table, e.g. hydrogeomorphic data

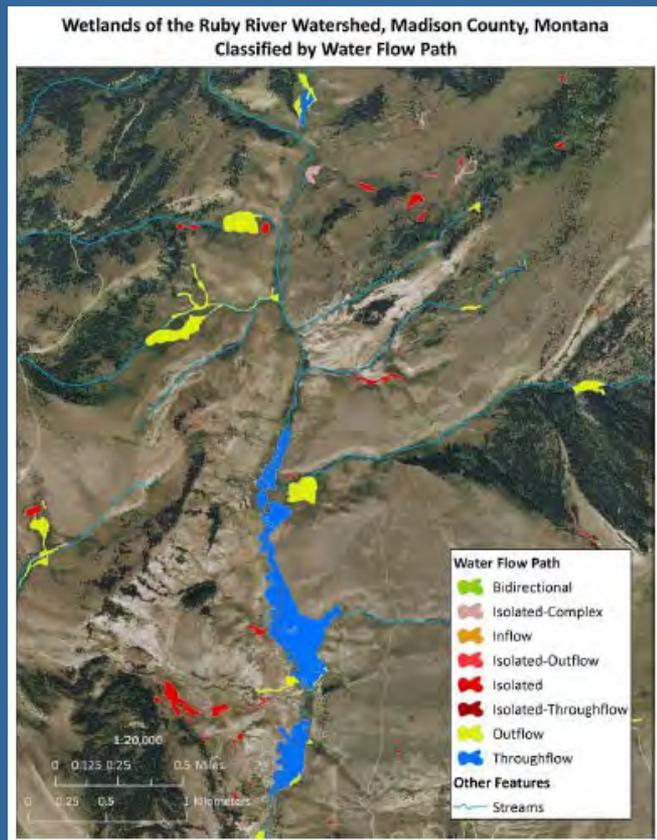


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Freshwater Emergent Wetland	PEMA	2.052134	Final	P		EM	A		PEM	Palustrine, Emergent, Temporarily Flooded	P
Freshwater Pond	PADf x	0.074000	Final	P		AD	F	x	PAD	Palustrine, Aquatic Bed, Semipermanently Flooded, Excavated	P
River	R3UB	18.250269	Final	R	3	UB	F		R3UB	Riverine, Upper Perennial, Unconsolidated Bottom, Semipermanently Flooded	R
Freshwater Emergent Wetland	PEMA	0.217019	Final	P		EM	A		PEM	Palustrine, Emergent, Temporarily Flooded	P
River	R4SBCx	27.438884	Final	R	4	SB	C	x	R4SB	Riverine, Intermittent, Streambed, Seasonally Flooded, Excavated	R
Freshwater Pond	PADf x	0.333811	Final	P		AD	F	x	PAD	Palustrine, Aquatic Bed, Semipermanently Flooded, Excavated	P
River	R4SBCx	40.454602	Final	R	4	SB	C	x	R4SB	Riverine, Intermittent, Streambed, Seasonally Flooded, Excavated	R
Freshwater Pond	PABF x	0.162224	Final	P		AB	F	x	PAB	Palustrine, Aquatic Bed, Semipermanently Flooded, Excavated	P
Freshwater Pond	PABFh	0.085555	Final	P		AB	F	h	PAB	Palustrine, Aquatic Bed, Semipermanently Flooded, Diked/Impounded	P
Freshwater Pond	PADf x	0.213669	Final	P		AD	F	x	PAD	Palustrine, Aquatic Bed, Semipermanently Flooded, Excavated	P
Freshwater Pond	PABF x	0.026285	Final	P		AB	F	x	PAB	Palustrine, Aquatic Bed, Semipermanently Flooded, Excavated	P
Freshwater Emergent Wetland	PEMA	4.03685	Final	P		EM	A		PEM	Palustrine, Emergent, Temporarily Flooded	P
Freshwater Pond	PABF x	0.062419	Final	P		AB	F	x	PAB	Palustrine, Aquatic Bed, Semipermanently Flooded, Excavated	P
Freshwater Pond	PADf x	0.028039	Final	P		AD	F	x	PAD	Palustrine, Aquatic Bed, Semipermanently Flooded, Excavated	P
River	R4SBCx	125.079108	Final	R	4	SB	C	x	R4SB	Riverine, Intermittent, Streambed, Seasonally Flooded, Excavated	R
River	R1SBCx	26.20464	Final	R	4	SB	C	x	R1SB	Riverine, Intermittent, Streambed, Seasonally Flooded, Excavated	R
Freshwater Pond	PABFh	0.882709	Final	P		AB	F	h	PAB	Palustrine, Aquatic Bed, Semipermanently Flooded, Diked/Impounded	P
Freshwater Pond	PABFh	0.151048	Final	P		AB	F	h	PAB	Palustrine, Aquatic Bed, Semipermanently Flooded, Diked/Impounded	P
Freshwater Pond	PABFh	0.797061	Final	P		AB	F	h	PAB	Palustrine, Aquatic Bed, Semipermanently Flooded, Diked/Impounded	P
Freshwater Emergent Wetland	PEMC	0.142154	Final	P		EM	C		PEM	Palustrine, Emergent, Seasonally Flooded	P
Freshwater Pond	PADf h	0.219671	Final	P		AD	F	h	PAD	Palustrine, Aquatic Bed, Semipermanently Flooded, Diked/Impounded	P
Freshwater Pond	PABFh	0.293705	Final	P		AB	F	h	PAB	Palustrine, Aquatic Bed, Semipermanently Flooded, Diked/Impounded	P
Freshwater Pond	PABFh	0.080454	Final	P		AB	F	h	PAB	Palustrine, Aquatic Bed, Semipermanently Flooded, Diked/Impounded	P
River	R3UB	9.735145	Final	R	3	UB	F		R3UB	Riverine, Upper Perennial, Unconsolidated Bottom, Semipermanently Flooded	R
Freshwater Emergent Wetland	PEMf	0.093590	Final	P		EM	B		PEM	Palustrine, Emergent, Saturated	P
River	R3UB	4.516137	Final	R	3	UB	F		R3UB	Riverine, Upper Perennial, Unconsolidated Bottom, Semipermanently Flooded	R
Freshwater Pond	PABFh	0.277685	Final	P		AB	F	h	PAB	Palustrine, Aquatic Bed, Semipermanently Flooded, Diked/Impounded	P
Freshwater Pond	PABFh	1.116554	Final	P		AB	F	h	PAB	Palustrine, Aquatic Bed, Semipermanently Flooded, Diked/Impounded	P

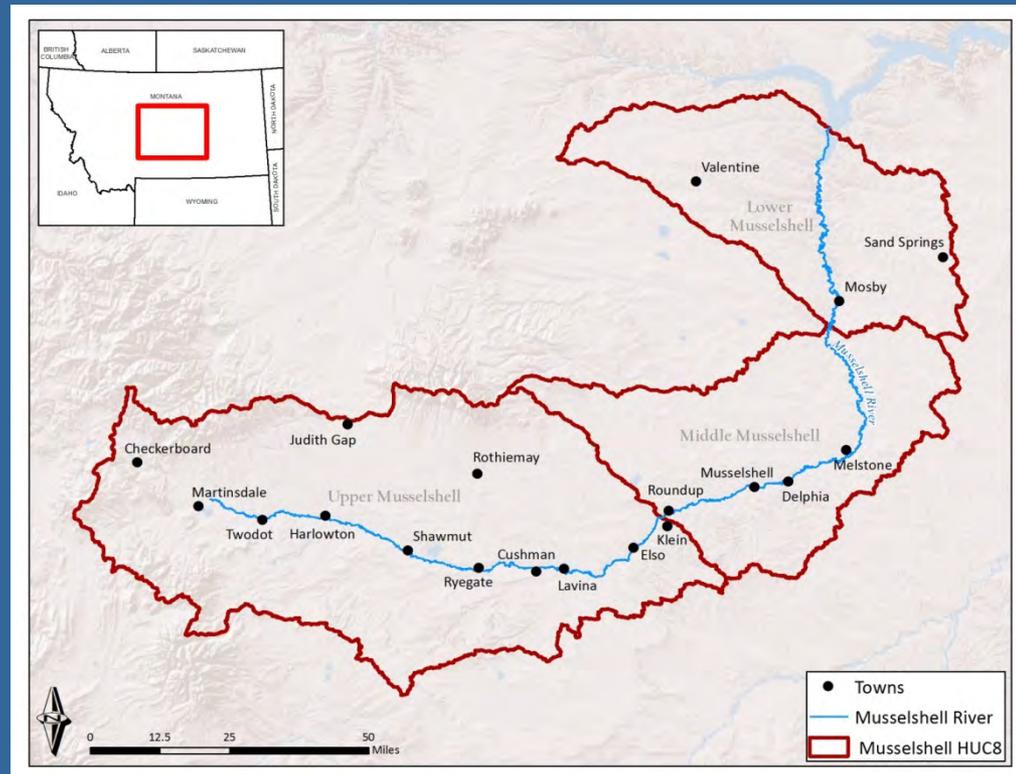
(0 out of 863373 Selected)



Project Example

Restoration Planning in the Musselshell Watershed

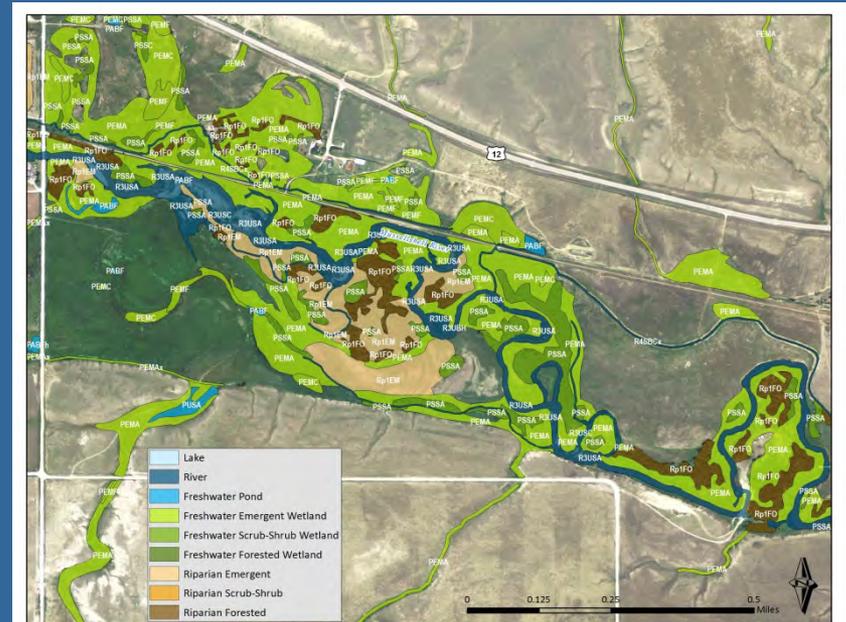
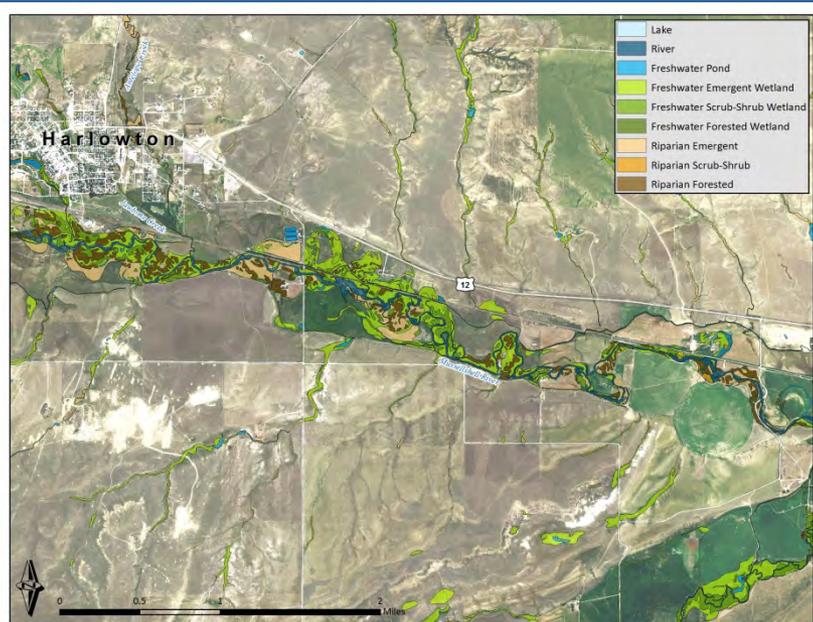
- DEQ pilot project to incorporate wetlands into the WRP
- Employ a “risk-based” approach to identify wetland restoration sites with the highest potential to mitigate impairments to water quality and quantity



Project Example

Restoration Planning in the Musselshell Watershed

- Integration of wetland mapping with field assessment
- Assessment of potential wetland functions to determine their ability to mitigate for impairments
 - Flood attenuation
 - Bank stabilization
 - Maintenance of flow
 - Sediment/nutrient retention



Example Use:

Water Quality Assessment and TMDL Planning

Potential Uses

- Land Use/Land Cover characterization of watershed
- Assessment of natural loading sources
- Identification of source reduction areas (buffering)
- Assist in deriving model inputs for nutrient uptake, sediment retention, and potential shading in riparian areas

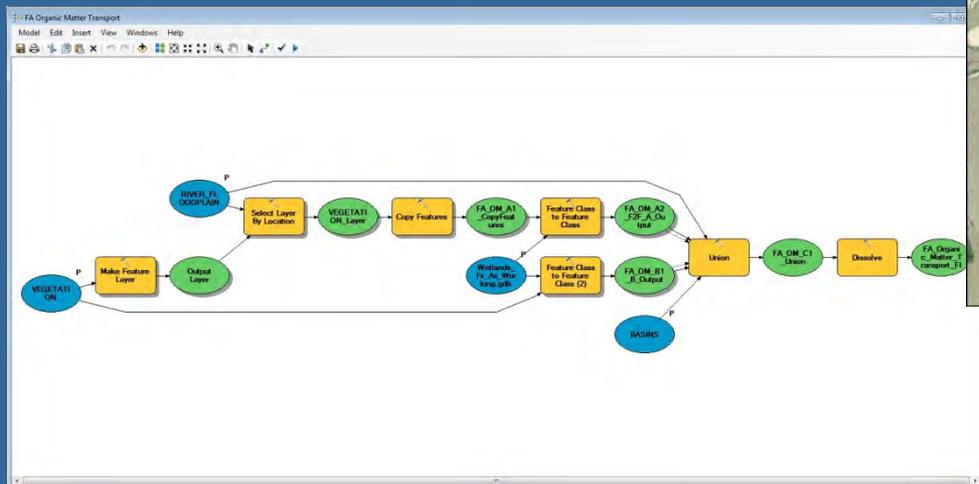
Limitations

- Does not provide condition information
- Requires groundtruthing for site-specific use

Predicting Potential Wetland Functions

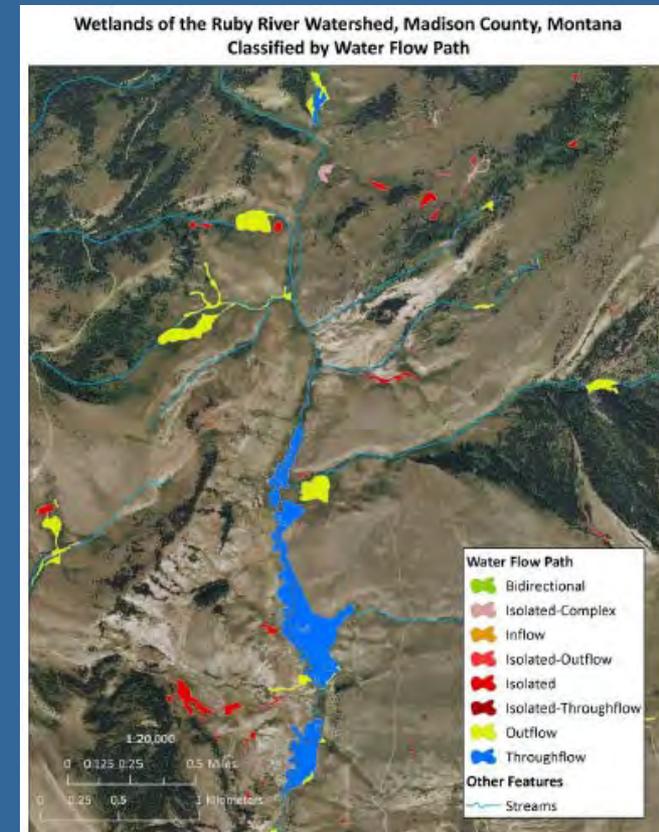
Example

- GIS-based modeling of wetland functions
 - NWI type (vegetation structure)
 - LLWW (hydrogeomorphic information)
 - Slope
 - Proximity to waterbody or wetland types



Assessing Wetland Functions for WRP's

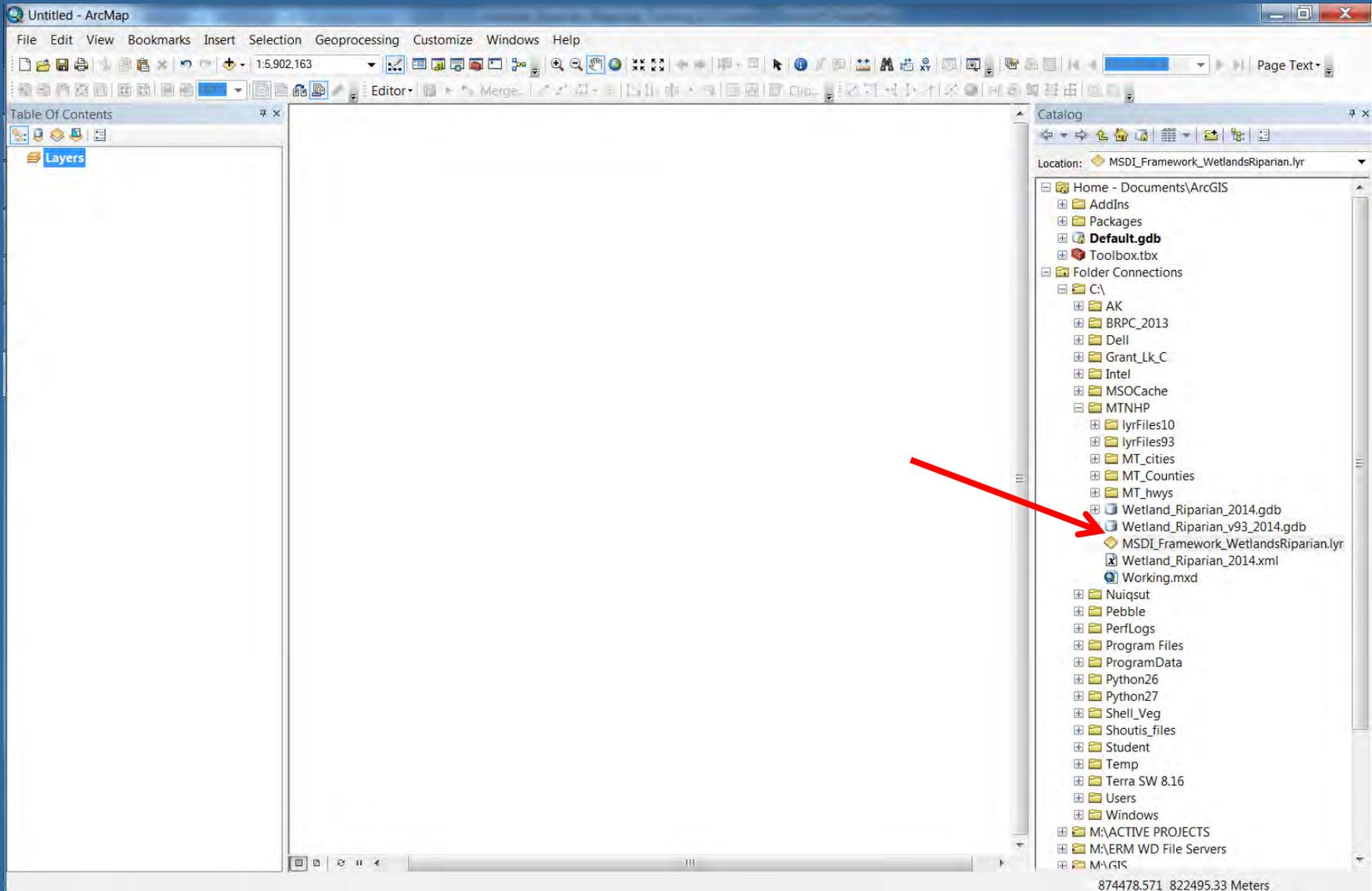
- Hydrogeomorphic characteristics are often used as surrogates to model potential functions at the landscape scale
- HGM is not part of the NWI mapping for MT, but can be added
- NWI uses LLWW descriptors for HGM information
 - *Landscape position*
 - *Landform*
 - *Water flow path*
 - *Waterbody type*



Additional Access Slides

View Using MapService in GIS

Add layer to the map, “MSDI_Framework_WetlandsRiparian.lyr”



View Using MapService in GIS

Initially displays only mapping status at state scale

The screenshot displays the ArcMap interface with the following components:

- Table Of Contents:** Lists the following layers:
 - MSDL_Framework_WetlandsRiparian (highlighted with a red arrow)
 - Wetland and Riparian Mapping
 - Labels
 - Mapping Status
 - Wetland and Riparian Mapping
 - Lake
 - River
 - Freshwater Pond
 - Freshwater Emergent Wetland
 - Freshwater Scrub-Shrub Wetland
 - Freshwater Forested Wetland
 - Riparian Emergent
 - Riparian Scrub-Shrub
 - Riparian Forested
 - Historic NWI Mapping
 - Wetland and Riparian Mapping Sta

- Map:** A grid-based map of Montana showing various colored areas representing different wetland and riparian types.
- Catalog:** Shows the file structure for the project, including folders like 'Home - Documents\ArcGIS' and files like 'MSDL_Framework_WetlandsRiparian.lyr'.

At the bottom right of the window, the coordinates 57440.497 392738.3 Meters are displayed.

View Using MapService in GIS

- Zoom to area of interest to view mapping
- Use **“Identify”** tool to explore attributes

The screenshot displays the ArcMap interface with the following components:

- Table of Contents:** Lists layers including 'MSDI_Framework_WetlandsRiparian', 'Wetland and Riparian Mapping', 'Labels', 'Mapping Status', and various wetland types like 'Lake', 'River', 'Freshwater Pond', etc. A red arrow points to the 'Wetland and Riparian Mapping' layer.
- Map Area:** Shows a map with colored regions representing different wetland and riparian types.
- Identify Tool:** Located in the top toolbar (indicated by a red arrow), it is used to query features on the map. The Identify window shows the following data:

Field	Value
OBJECTID	525696
Shape	Polygon
ATTRIBUTE	R3UBH
WETLAND_TYPE	River
ACRES	1013.486028
Status	Final
SYSTEM	R
SUBSYSTEM	3
CLASS	UB
WATER_REGIME	H
SPECIAL_MODIFIER	
NWCode	R3UB
FULL_CLASS	Riverine, Upper Perennial, Unconsolidated Bot
MAJOR_CLASS	R
Shape_Length	490248.438394
Shape_Area	4101448.848285

Identified 2 features

Download for GIS

Layer files: **lyrFiles10.lyr**

Geodatabase: **Wetland_Riparian_2014.gdb**

