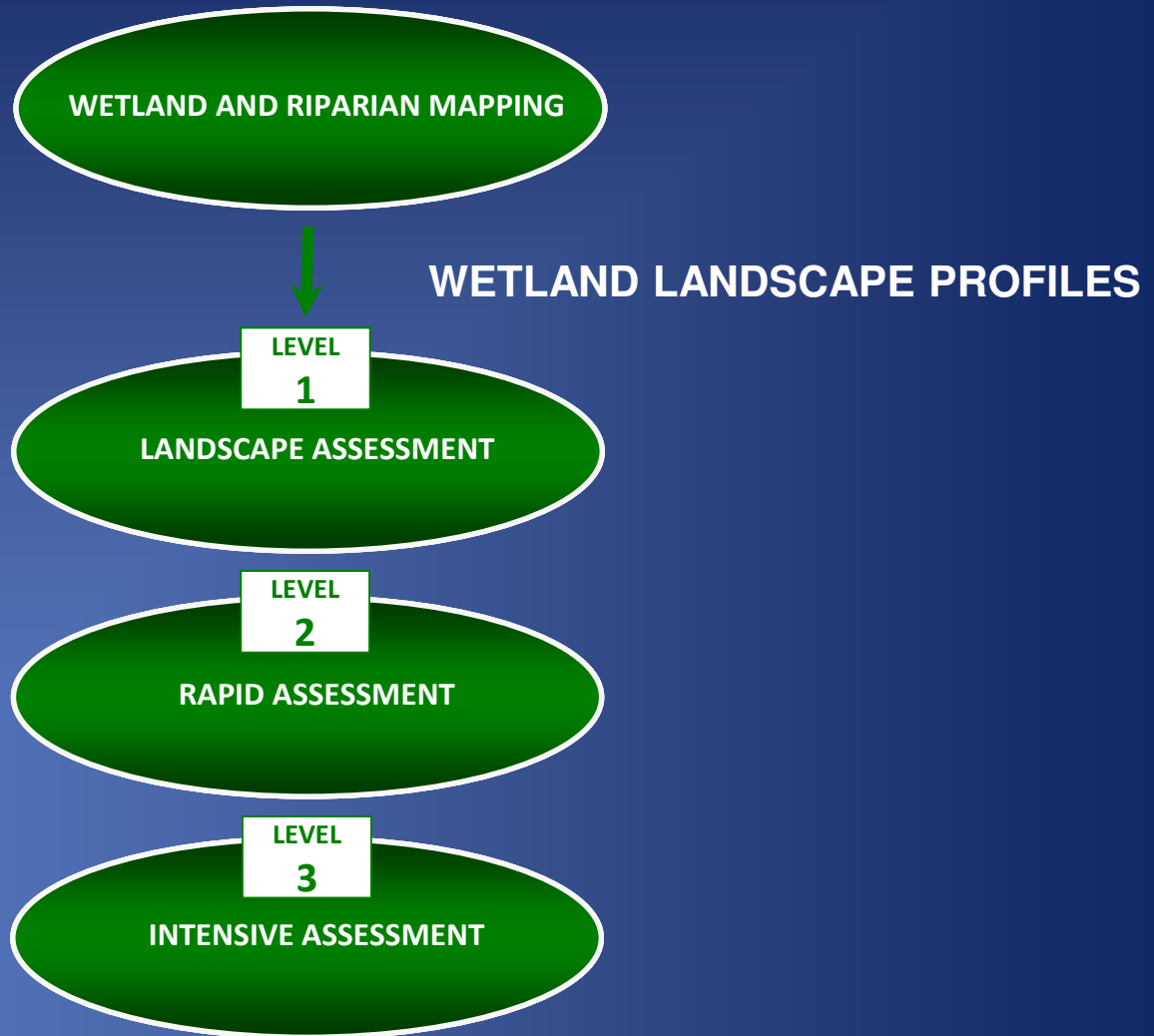# Level 1: GIS-based Desktop Assessments

Meghan Burns, Landscape Ecologist

EPA three-tier framework

Level 1 Assessment

- Based on Geographic Information Systems (GIS)
- Uses readily available digital data
- Performed on desktop computer

Level 1 Assessment

- Describe the extent, distribution, and type of wetlands in a study area

- Provide preliminary characterization of landscape disturbances

- Supply basic information for status and trend analysis

- Identify areas to target restoration and conservation priorities

Level 1 Assessment

- May be repeated over time
- Sample entire populations
- Requires fewer resources than field-based assessments
- But, yields less reliable information
- Assume GIS layers represent the stressors affecting wetland condition
- Need verification by field methods

Level 1 Assessment

Requires wetland mapping to perform assessments

National Wetland Inventory Wetland Mapping Status by USGS Topographic Quad
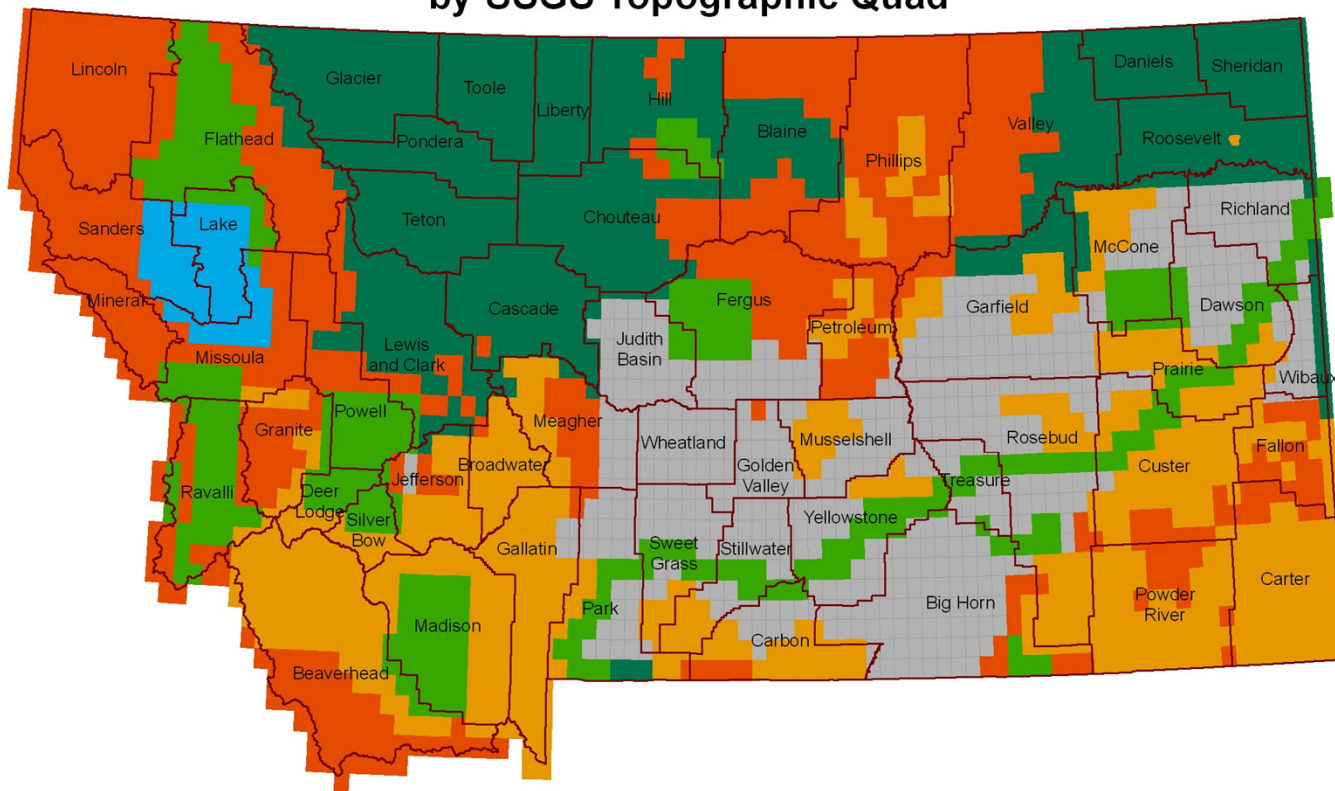
Level 1 Methodology

Example from the Milk, Marias, and
St. Mary Rotating Basin Assessment

Level 1 Methodology

- Conducted analysis on selected NWI polygons and their corresponding buffers:
  - 100m, 300m, and 1 km
- Considered the following sources of anthropogenic disturbance:
  - Transportation
  - Hydrology
  - Land use

LEVEL
1

LANDSCAPE ASSESSMENT

Transportation Data

- Data obtained from the U.S. Census Bureau
- Roads symbolized by type:
  - 4-wheel drive
    - vehicular trails and private roads for service vehicles
  - Local roads
    - service roads, rural roads, local neighborhood roads and city streets
  - Highways
   - primary and secondary roads and limited access highways

Transportation Metrics

- Distance to 4-wheel drive roads, local roads, and highways
- Density of 4-wheel drive roads, local roads, and highways
  - Meters of road per hectare

Hydrology Data

- Water Wells
  - Groundwater Information Center (GWIC) at the Montana Bureau of Mines and Geology

- Reservoirs
  - USGS 1:24k high resolution National Hydrography Dataset (NHD)

- Canals/ditches
 - USGS 1:24k high resolution National Hydrography Dataset (NHD)
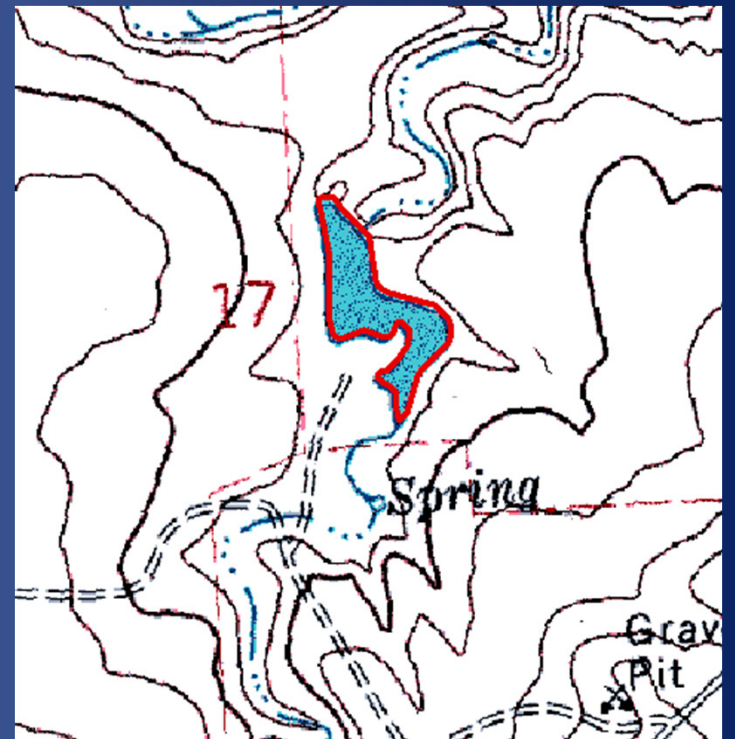
Hydrology Metrics

- Density of wells
  - Number per hectare
- Distance to wells
- Presence of reservoir upstream of wetland
- Density of canals/ditches
  - meters per hectare
- Distance to canals/ditches

Landuse Data

- MSDI Landcover layer
  - Based on the ReGAP layer with updates specific to Montana
- NAIP imagery
 - Visual inspection by photointerpreter
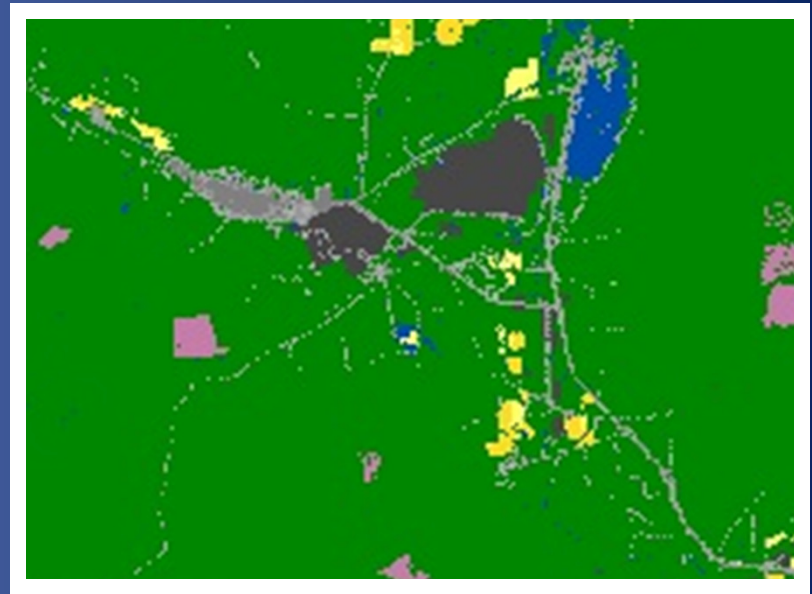
Landuse Metrics

- Percent of each Land use type:
  - MSDI Landcover:
    - Developed, Open Space
    - Developed, Low Intensity
    - Developed, Medium Intensity
    - Pasture/Hay
    - Cultivated Cropland
  - NAIP Imagery
    - Evidence of livestock
    - Mines/Gravel pits
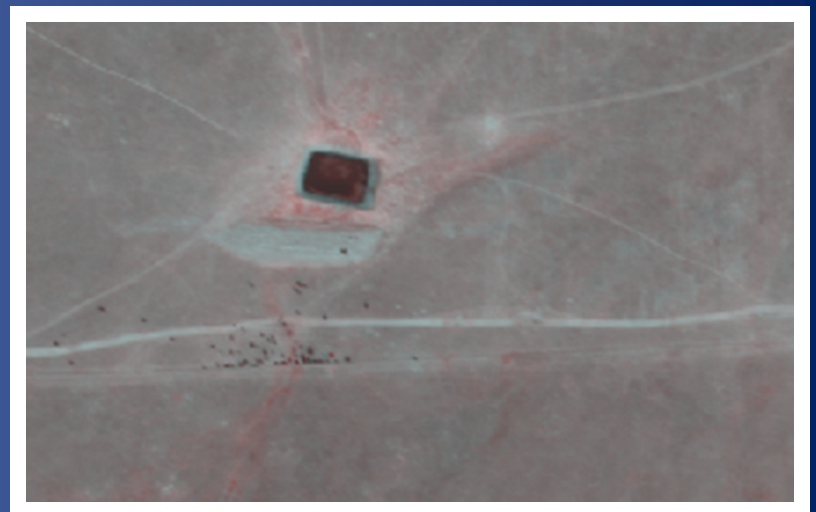
Additional Metrics

Climate:

– Relative Effective Annual Precipitation (REAP) developed by the Natural Resources Conservation Service (NRCS)

– Calculated the average inches of precipitation for each wetland polygon and corresponding buffers
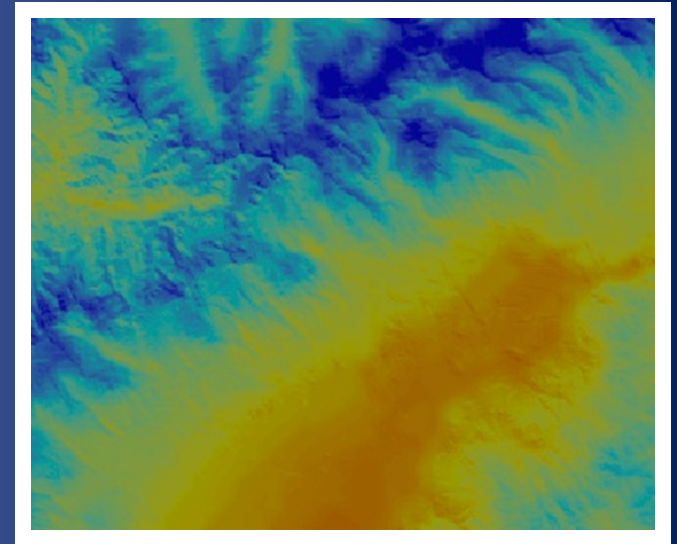
Wetland Metrics

- Wetland Characteristics
  - Wetland polygon size (acres)
  - Perimeter to Area ratio of wetland polygon (meters/square meters)
 - Distance to nearest five wetlands
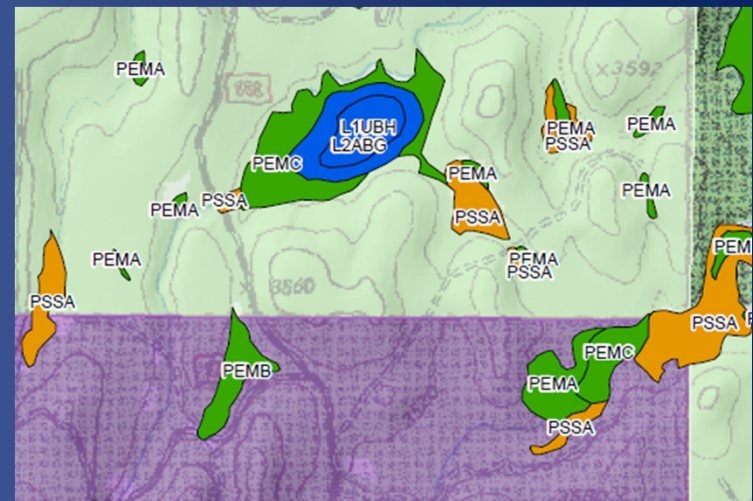
Additional Layers to Consider

- Water Rights maintained by the Department of Natural Resources and Conservation (DNRC)
  - Density of water rights (Number per hectare)
- Revenue Final Land Unit (FLU) layer
  - Digitized primarily from 2005 NAIP imagery
  - Classifies private agricultural land
    - Continuously cropped
    - Non-irrigated hay land
    - Irrigated land
    - Summer fallow farmland

EPA three-tier framework

EPA three-tier framework
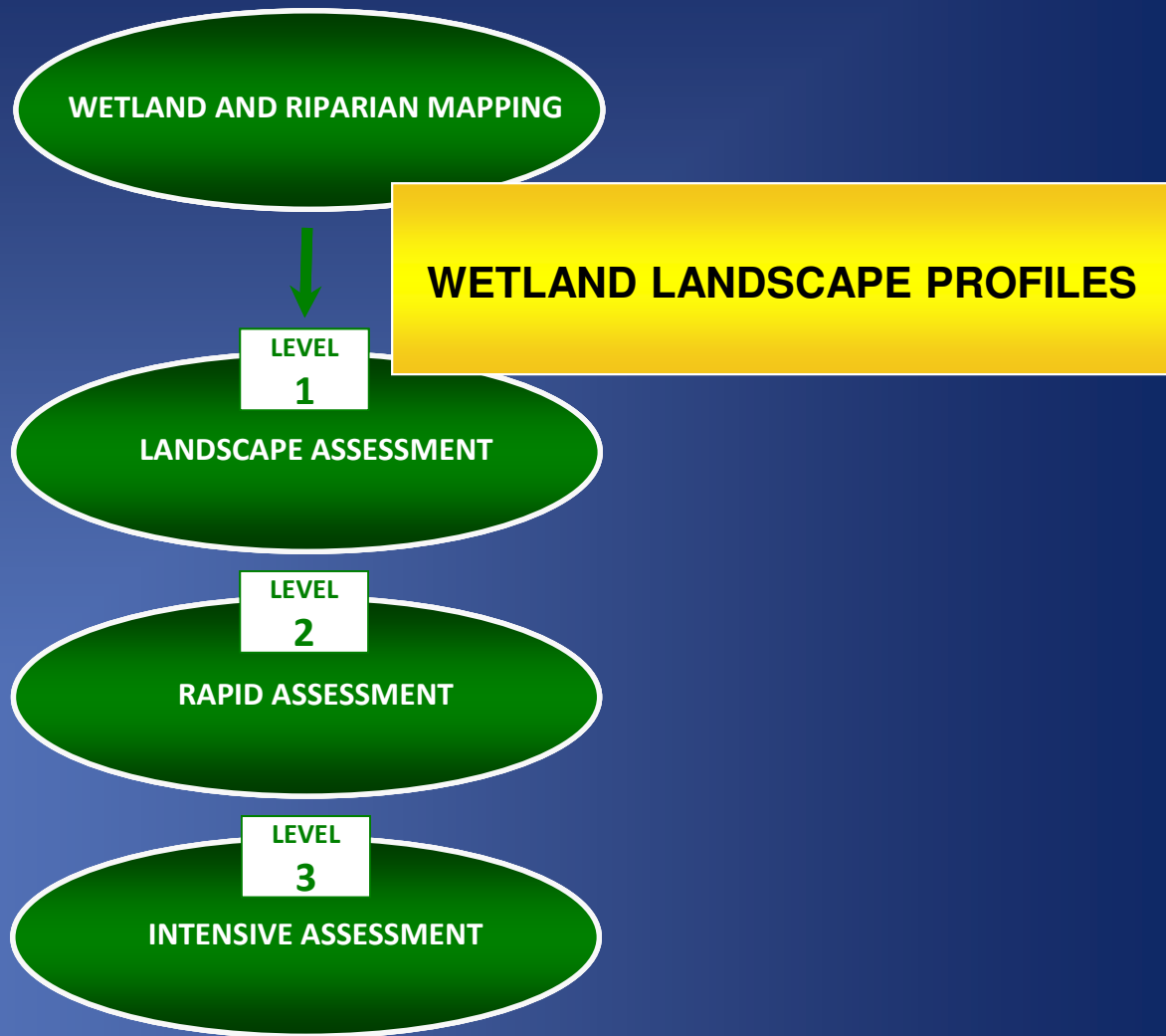
Wetland Landscape Profile

- Utilizes the attributes from the wetland and riparian mapping data layer
- Can be calculated for any polygon layer:
  - Watersheds, counties, etc.
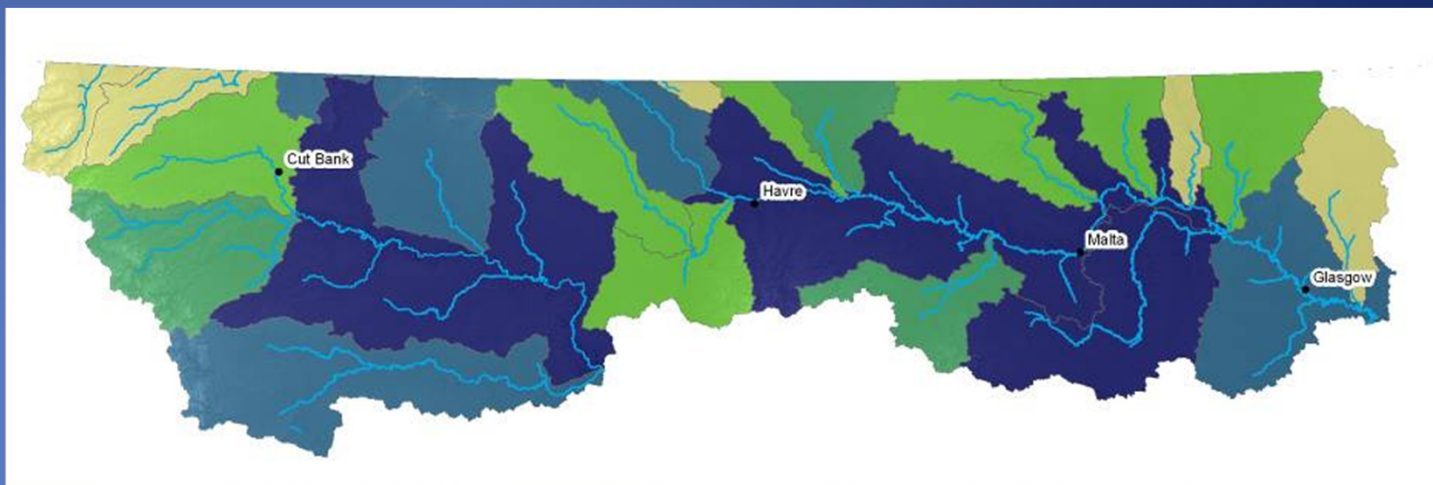
Wetland Landscape Profile

- Offers a rapid characterization of function and condition in a given area

- Helps target management needs, including mitigation planning and conservation

- Explore data across multiple scales

Wetland Landscape Profile

- Summarize by type:
  - Palustrine, Riverine, Lacustrine, Riparian
  - Scrub-shrub, Emergent, Forested, Aquatic Bed
- Summarize by Human alteration:
  - Diked/impounded or excavated
- Summarize by landscape position:
  - Lotic, lentic, terrene
- Summarize by land stewardship:
  - Privately owned vs. Public land
- Summarize by Function

Example - Sediment Retention Function

- All wetlands perform some sediment trapping functions

- Functions are especially significant near watercourses in agricultural areas

- Floodplain and Interfluve Basin wetlands have "high" ranking

- Upland Terrene Basin rated "moderate"

- Flat wetlands are rated "low"

Wetland Landscape Profile

Ruby Watershed

Ruby Watershed
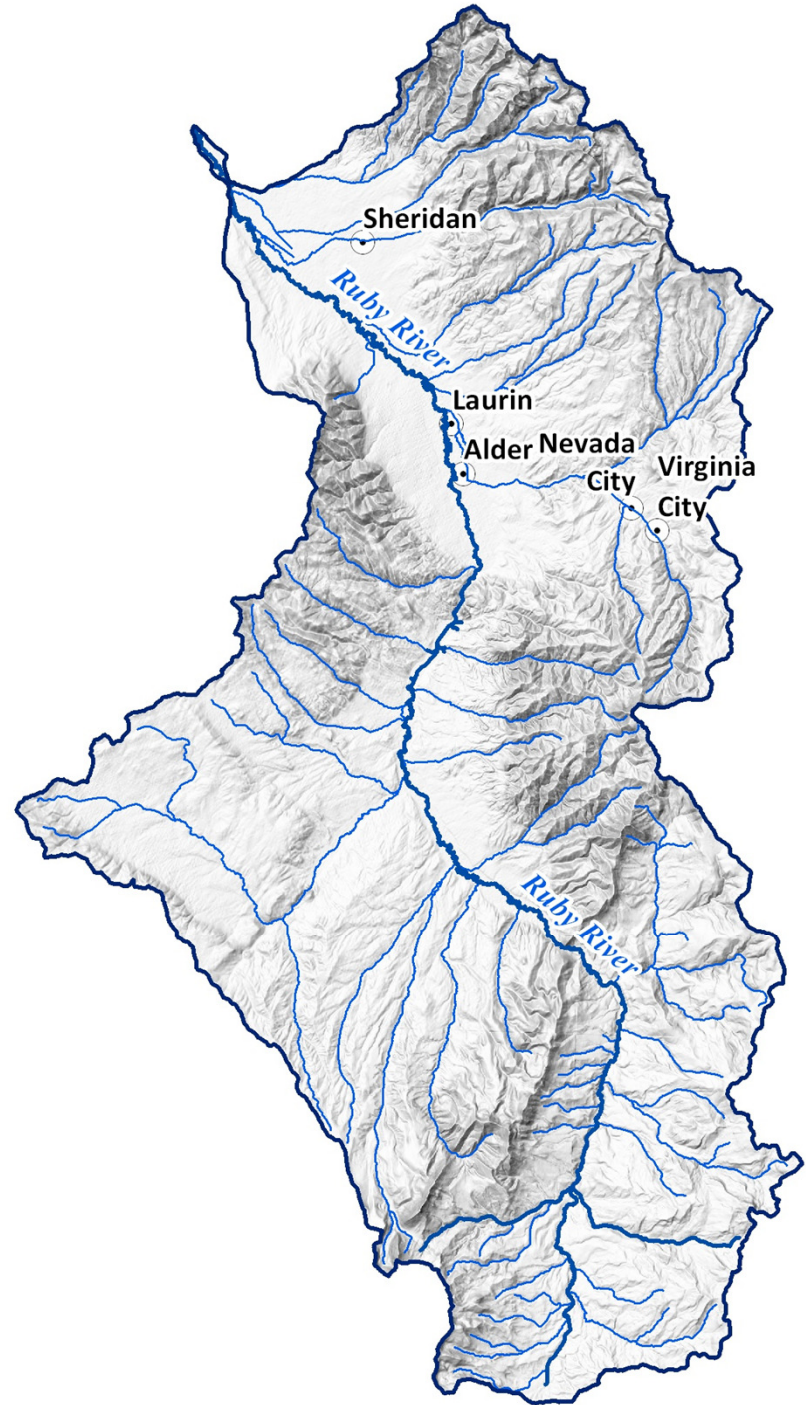
Ruby Watershed: Acres by Wetland Type

Ruby Watershed
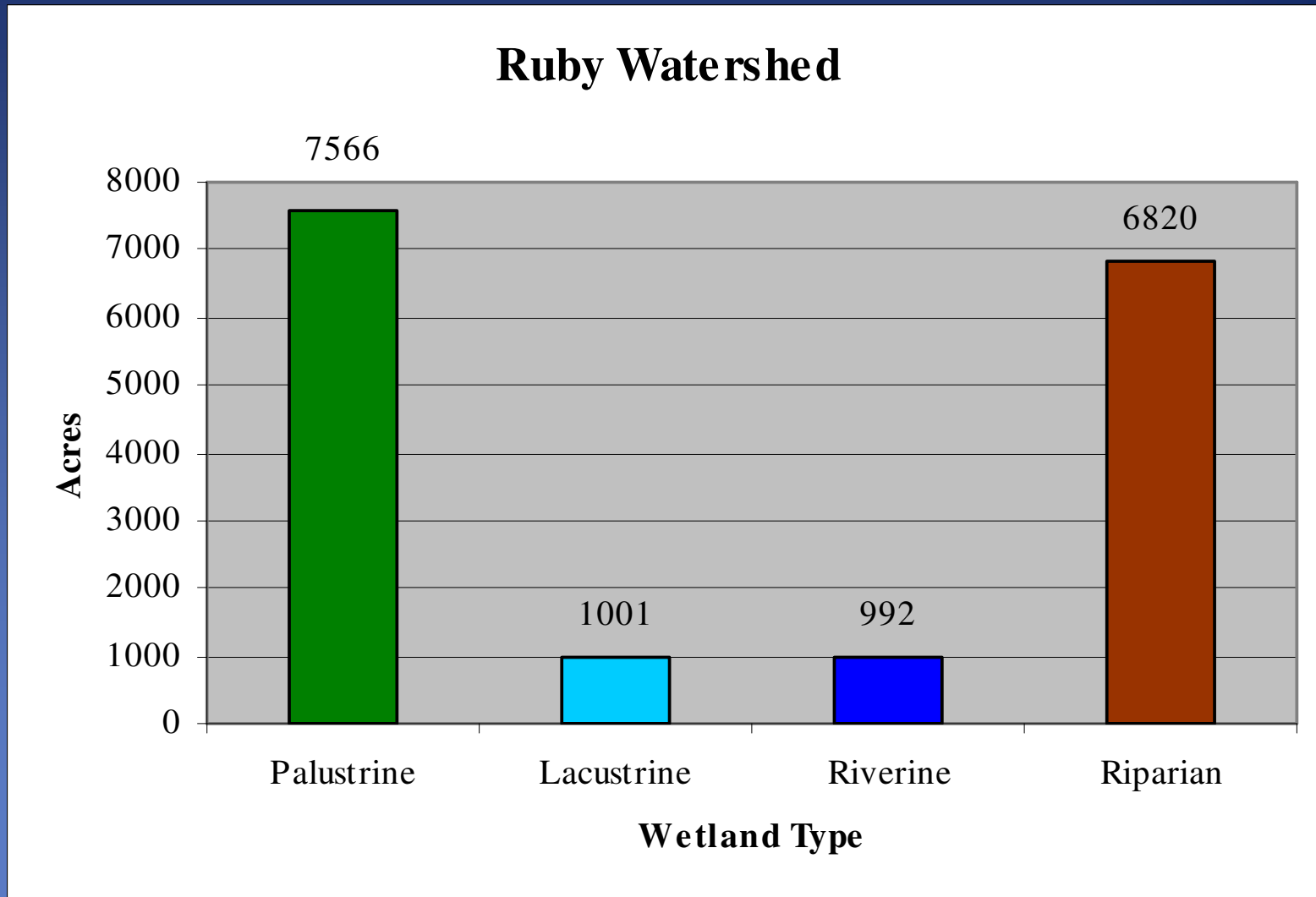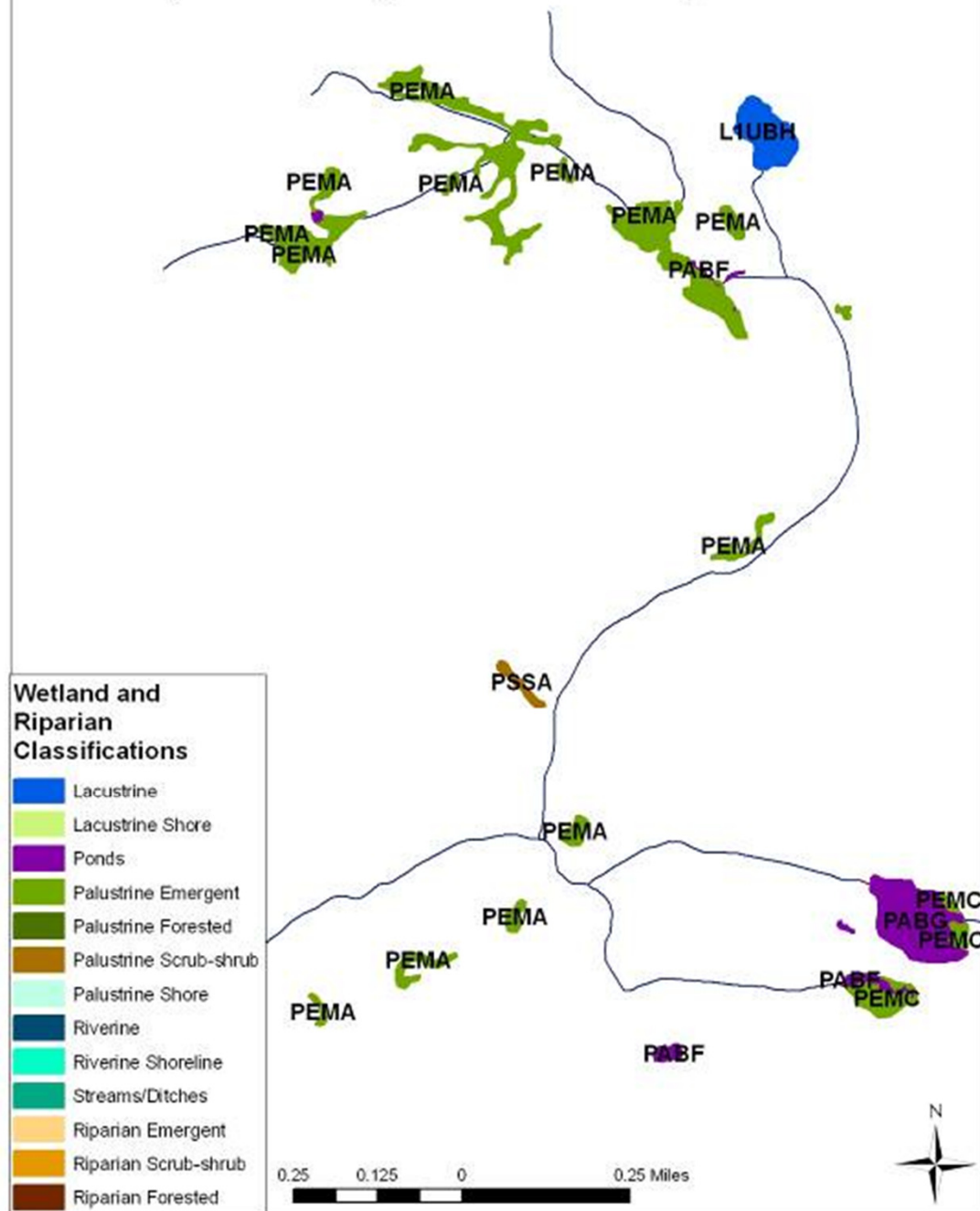
Ruby River Valley Wetlands and Riparian Areas

Wetland and Riparian Classifications

- Lacustrine
- Lacustrine Shore
- Ponds
- Palustrine Emergent
- Palustrine Forested
- Palustrine Scrub-shrub
- Palustrine Shore
- Riverine
- Riverine Shoreline
- Streams/Ditches
- Riparian Emergent
- Riparian Scrub-shrub
- Riparian Forested
- Ruby Valley USGS 24k Quads
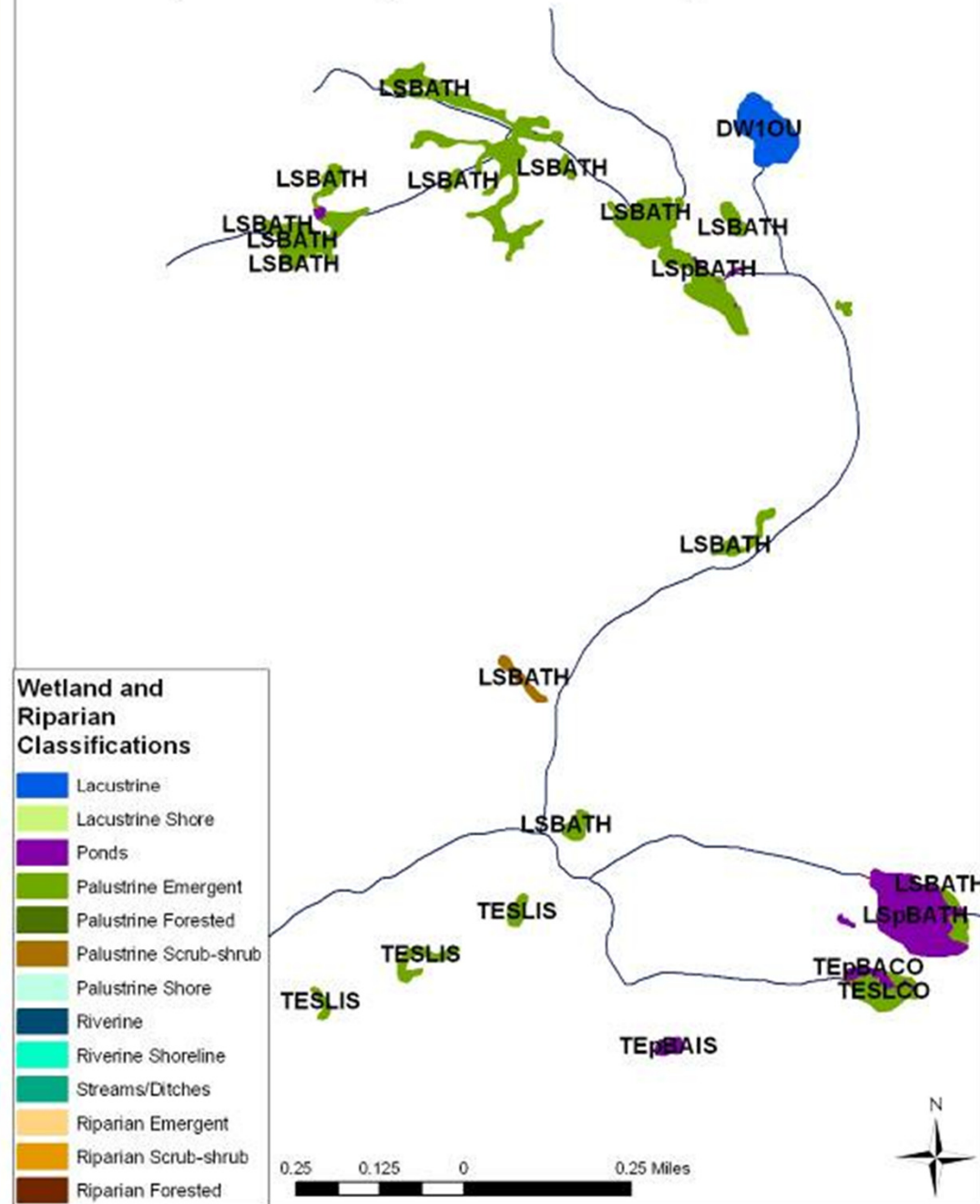- Ruby River 4th Code HUC Watershed

N

10   5   0   10 Miles

Ruby River Valley Wetlands and Riparian Areas
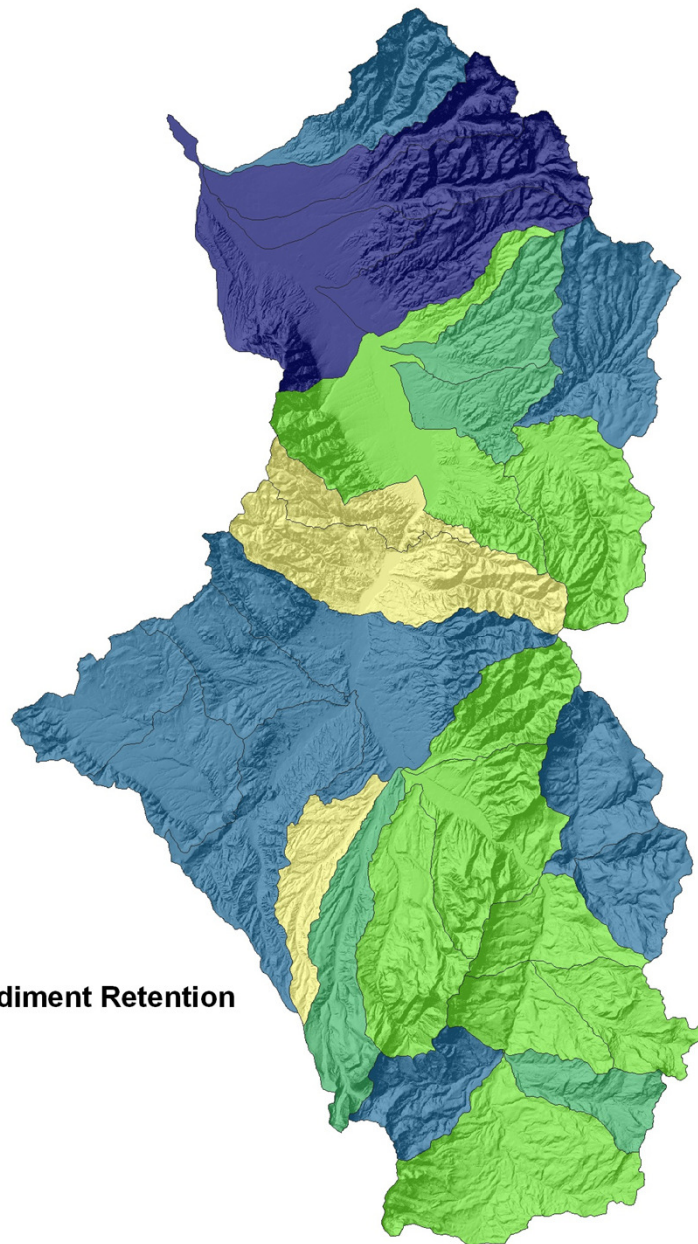
Ruby River Valley Wetlands and Riparian Areas
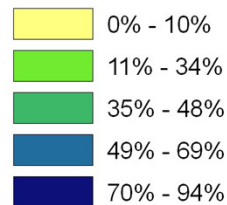
Ruby River Valley Wetlands and Riparian Areas

Ruby Watershed

The percent of wetlands in a given subwatershed (6th code) that have high Sediment Retention Function

Percent High Sediment Retention

- 0% - 10%
- 11% - 34%
- 35% - 48%
- 49% - 69%
- 70% - 94%

Thank you

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http://mtnhp.org/