Level 1: GIS-based Desktop Assessments

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EPA three-tier framework

WETLAND AND RIPARIAN MAPPING

WETLAND LANDSCAPE PROFILES

LEVEL 1
LANDSCAPE ASSESSMENT

LEVEL 2
RAPID ASSESSMENT

LEVEL 3
INTENSIVE ASSESSMENT
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
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
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

- Level 1: Rapid Assessment
  - Landscape Assessment

- Level 2: Intensive Assessment
  - Rapid Assessment

- Level 3: Intensive Assessment
  - Intensive Assessment
EPA three-tier framework

WETLAND LANDSCAPE PROFILES

LEVEL 1
LANDSCAPE ASSESSMENT

LEVEL 2
RAPID ASSESSMENT

LEVEL 3
INTENSIVE ASSESSMENT
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

Palustrine: 7566 acres
Lacustrine: 1001 acres
Riverine: 992 acres
Riparian: 6820 acres
Ruby Watershed

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

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