Mapping Potentially Restorable Wetlands in Wyoming

ASWM

State/Tribal/Federal Coordination Meeting

2012

Saint Mary's University OF MINNESOTA

LEAP NEWS

The Official Newsletter of the Mountain-Prairie Region's

Landscape-scale Energy Action Plan

February 2012

What is LEAP?

LEAP will be a suite of web-based tools, data, and analyses that is currently being developed by the U.S. Fish and Wildlife Service (Service) in cooperation with the USGS and ECOS-IPaC. LEAP will provide energy and other project proponents, managers, and biologists with online landscape-scale vulnerability assessments for Federal Trust Resources, a quality-controlled data repository, and links to relevant regulatory processes and policies — including the Bald and Golden Eagle Protection Act, Endangered Species Act, Migratory Bird Treaty Act, and Wind Energy Guidelines.

Collectively, the tools and information provided by LEAP will enable developers to make informed siting decisions earlier in the planning process, and help reduce conservation conflicts. LEAP will also enable Service personnel to perform their duties more efficiently, effectively, and with greater consistency region-wide.

LEAP is part of Region 6's strategic approach to energy development, and will help protect Trust Resources such as the golden eagle (*Aquila chryaetos*).

Potentially Restorable Wetlands Southeastern Wyoming

Wetlands defined as having:

1. Hydrophytic Vegetation (hydrophytes)
2. Hydric Soils
3. Hydrology

Potentially restorable wetlands are those areas that currently do not support hydrophytic vegetation typically due to human intervention, but have existing hydric soils and hydrologic characteristics that would support hydrophytic vegetation.

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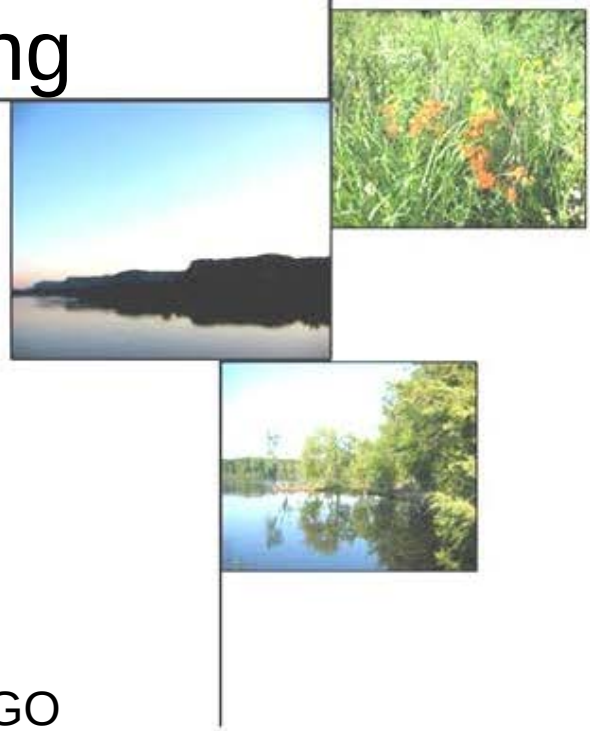
Potentially Restorable Wetlands Southeastern Wyoming



GIS approach to finding potentially restorable wetlands for areas that meet the following criteria:

1. Not currently mapped as wetland by NWI

2. Classified as a hydric soil in NRCS SSURGO database

3. Depression or basin in the landscape based on a digital elevation model

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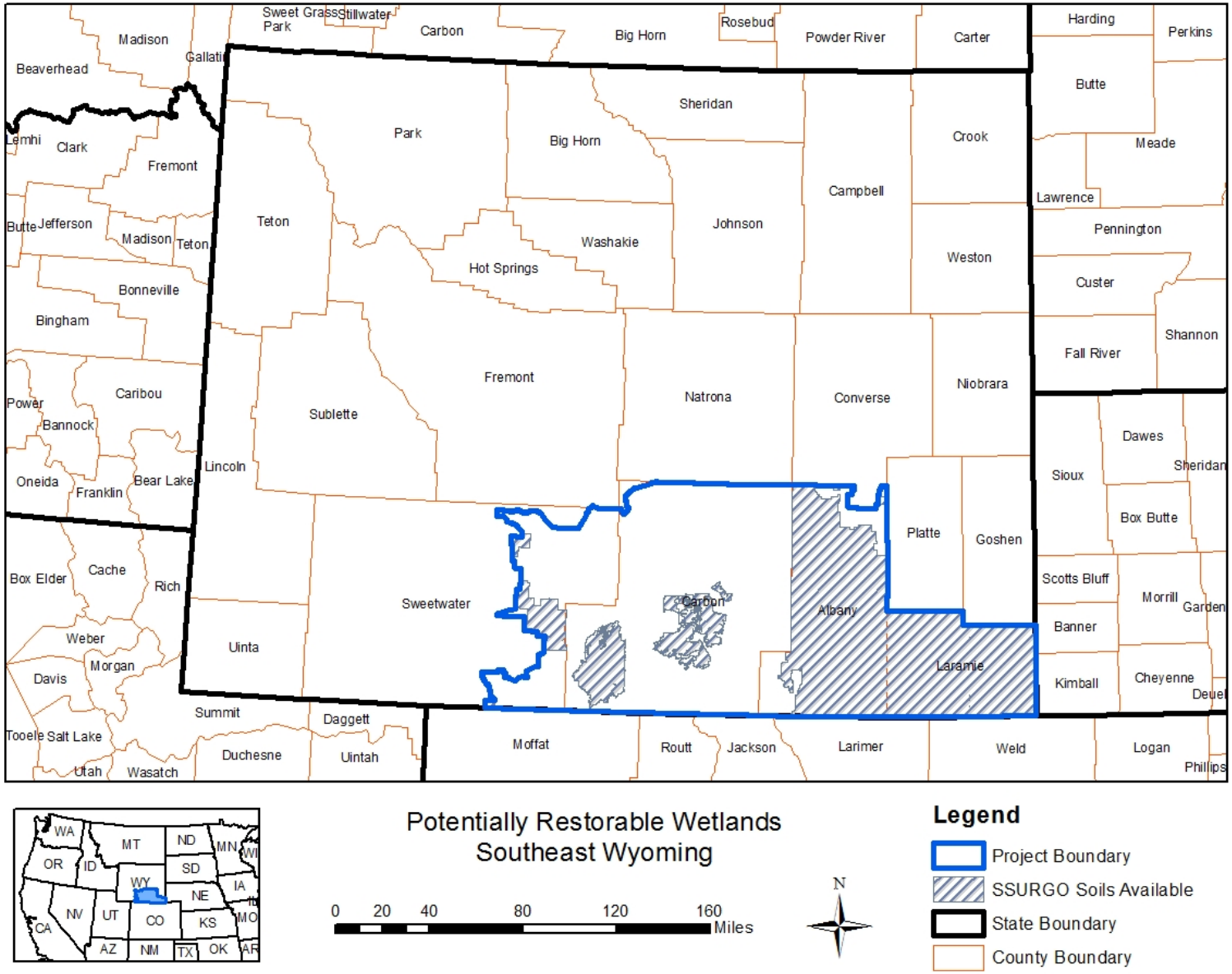
Potentially Restorable Wetlands
Southeast Wyoming
0 20 40 80 120 160
Miles
N
Legend
Project Boundary
SSURGO Soils Available
State Boundary
County Boundary
Madison
Beaverhead
Sweet Grass
Stillwater
Park
Carbon
Big Horn
Rosebud
Powder River
Carter
Harding
Perkins
Butte
Meade
Lawrence
Pennington
Custer
Fall River
Shannon
Niobrara
Dawes
Sioux
Sheridan
Box Butte
Scotts Bluff
Morrill
Garden
Banner
Kimball
Cheyenne
Deuel
Platte
Goshen
Albany
Laramie
Converse
Natrona
Fremont
Sublette
Lincoln
Teton
Park
Sheridan
Big Horn
Crook
Campbell
Johnson
Washakie
Hot Springs
Weston
Lemhi
Clark
Fremont
Butte
Jefferson
Madison
Teton
Bonneville
Bingham
Caribou
Power
Bannock
Oneida
Franklin
Bear Lake
Box Elder
Cache
Rich
Weber
Morgan
Davis
Summit
Tooele
Salt Lake
Utah
Wasatch
Duchesne
Uintah
Daggett
Uinta
Sweetwater
Carbon
Moffat
Routt
Jackson
Larimer
Weld
Logan
Phillips
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AR

Potentially Restorable Wetlands Southeastern Wyoming

Methodology:

1. Query SSURGO and extract soils with dominant drainage class codes of “somewhat poorly drained”, “poorly drained”, and “very poorly drained”
2. Overlay extracted SSURGO data and current NWI to find areas not mapped as wetland by NWI
3. Generate basins and flow network data from the DEM using ESRI Spatial Analyst tools
4. Final data layer - overlay basins data with data generated in step 2, to extract those areas that are not currently mapped as wetland, have hydric soils, and fall within a depression.

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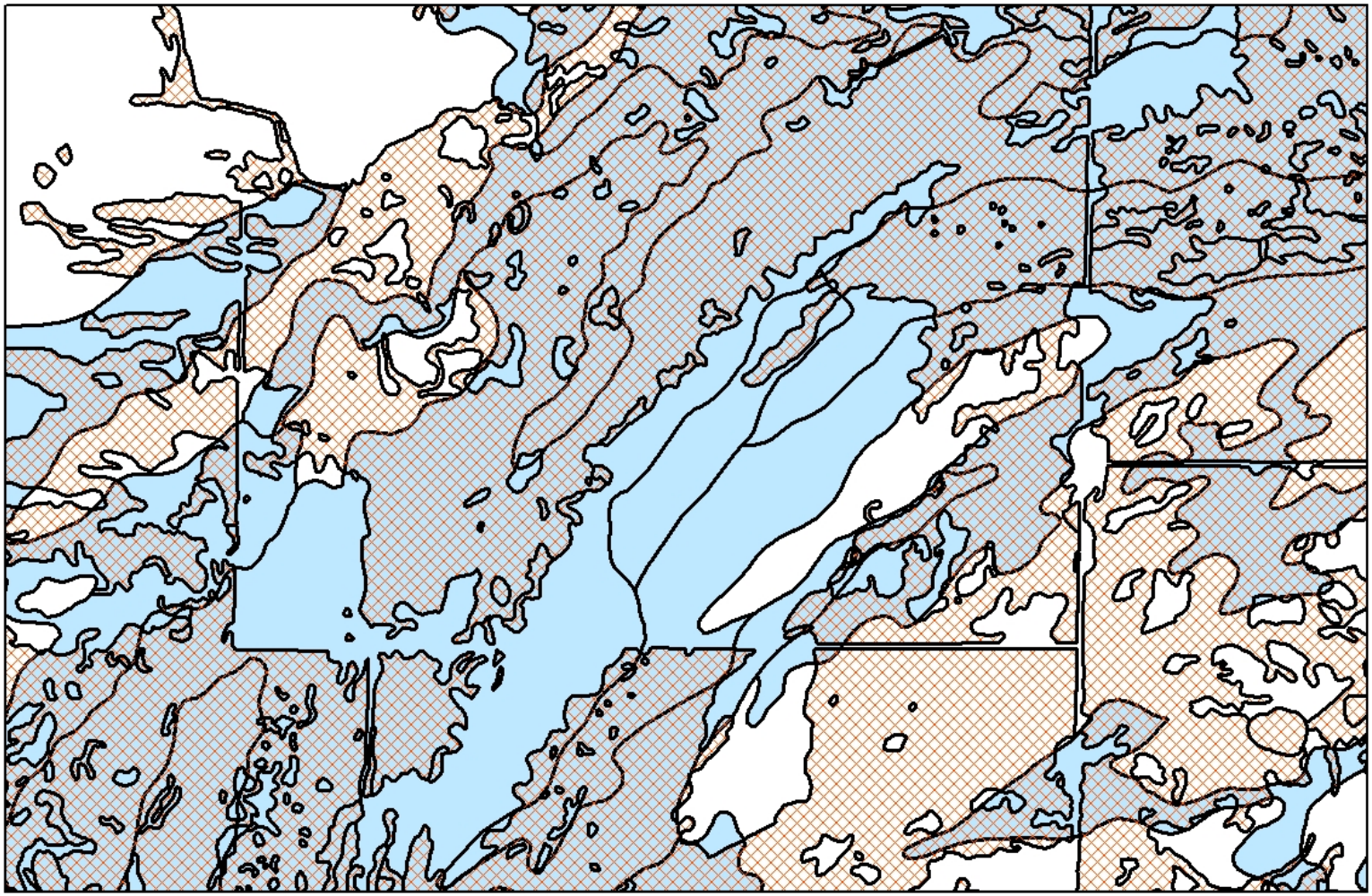


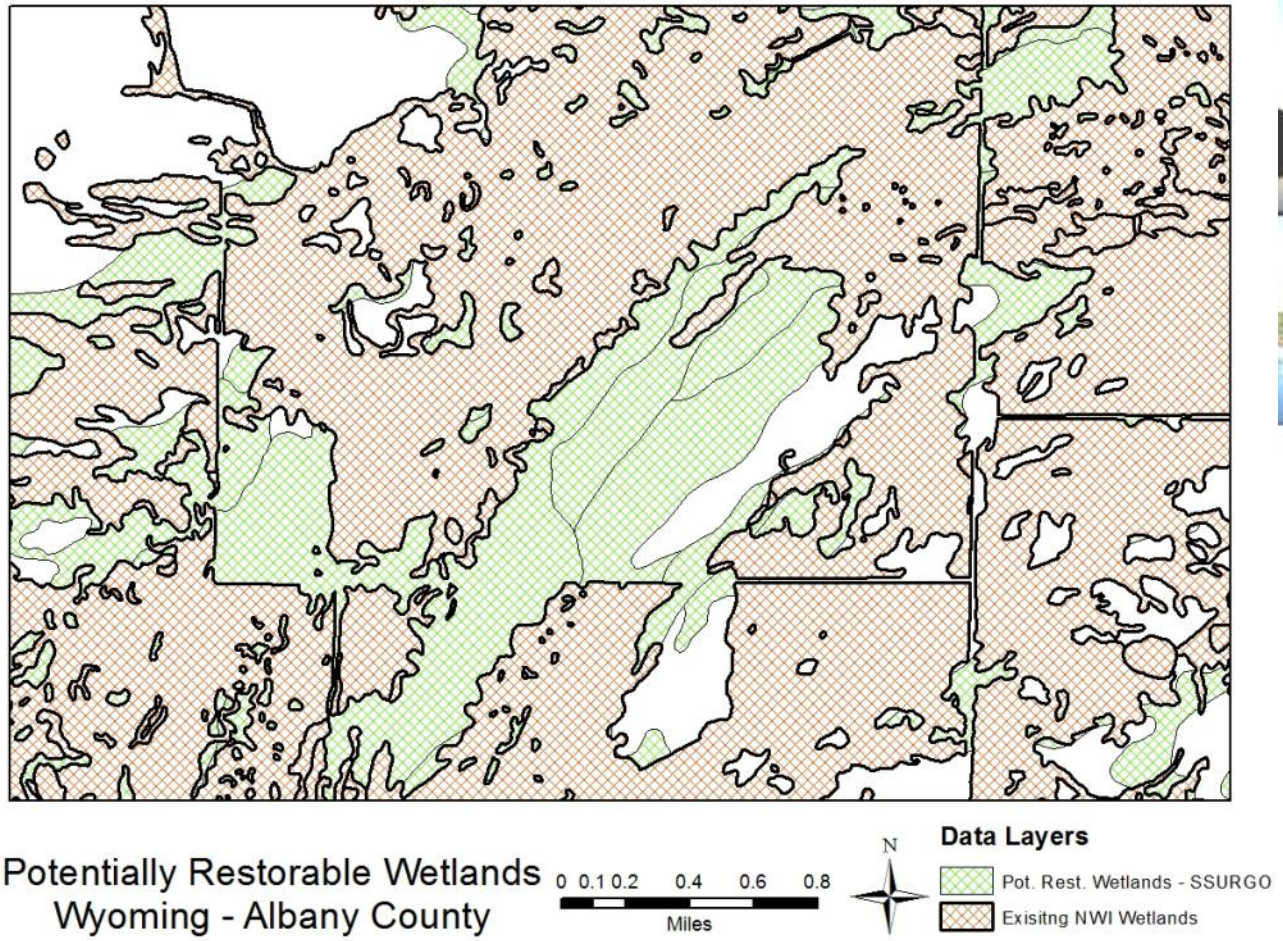
Potentially Restorable Wetlands
Wyoming - Albany County

0 0.1 0.2 0.4 0.6 0.8
Miles

N

Data Layers
Hydric Soils
Exisitng NWI Wetlands

Potentially Restorable Wetlands Southeastern Wyoming



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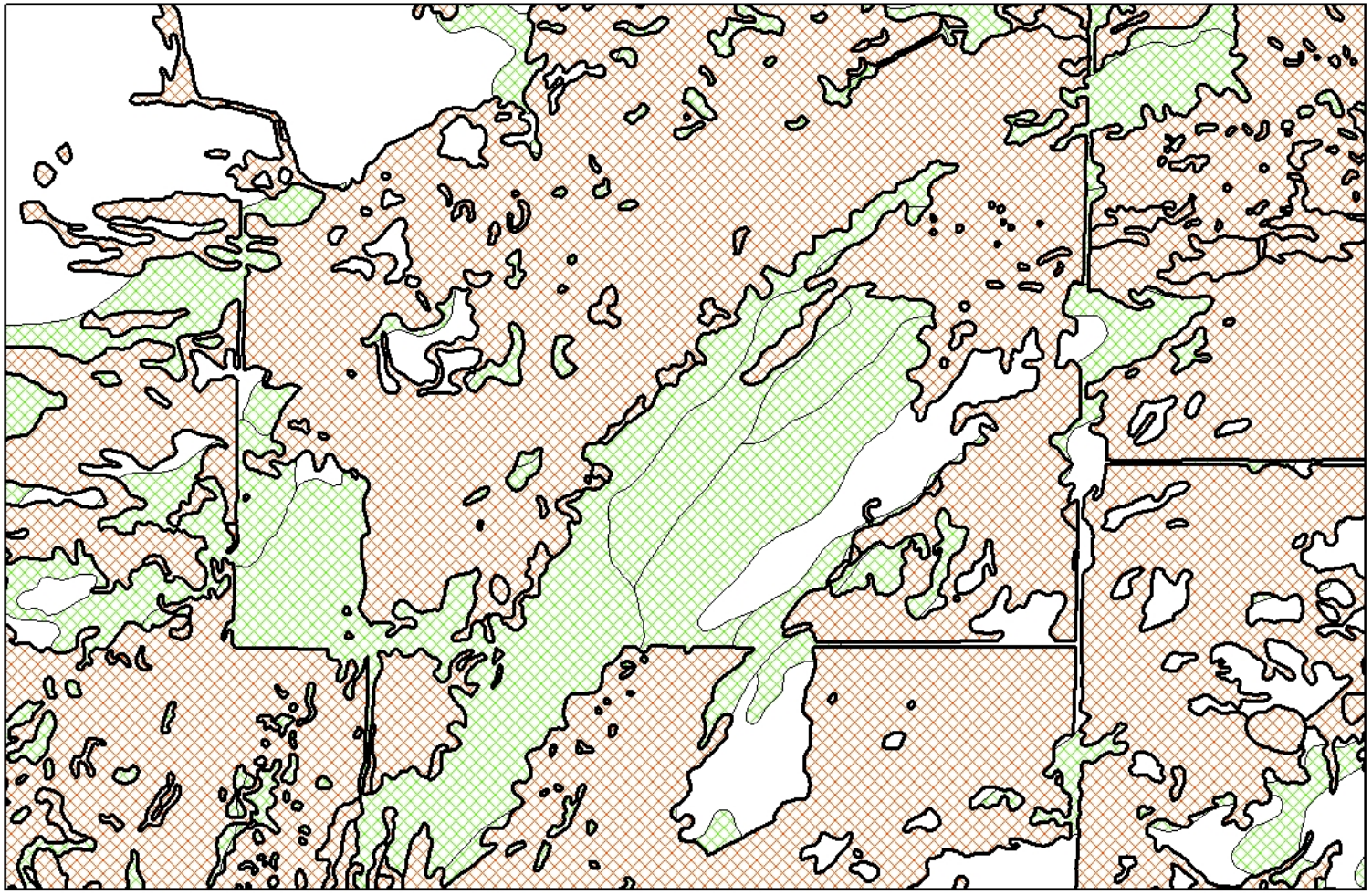

Potentially Restorable Wetlands
Wyoming - Albany County

0 0.1 0.2 0.4 0.6 0.8
Miles

N

Data Layers

Pot. Rest. Wetlands - SSURGO

Exisitng NWI Wetlands

Potentially Restorable Wetlands Southeastern Wyoming

Factors affecting use of SSURGO database:

1. Incomplete for Wyoming – spatial features that had no attributes in the data tables, missing tables, no soil survey for available for many areas

2. Inconsistency between surveys, next slide shows an example of difference in the drainage class

3. General complexity of querying SSURGO – database not designed for attaching spatial attributes, multiple soil surveys within the same county, sheer number of tables and relationships between tables

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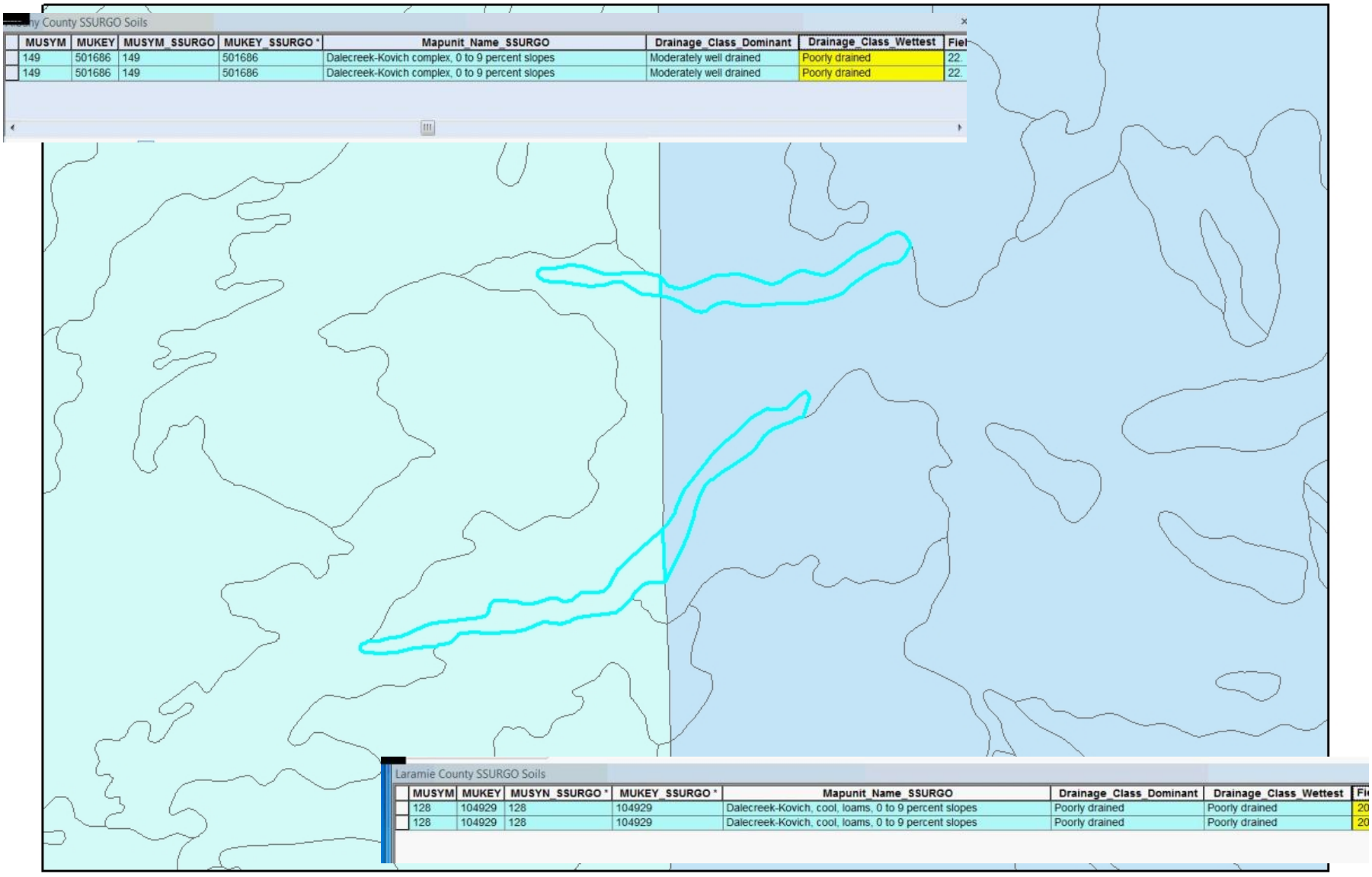

Wyoming Restorable Wetlands SSURGO Soils Discrepancy

Laramie County SSURGO Soils

Albany County SSURGO Soils

Potentially Restorable Wetlands Southeastern Wyoming

Basin Extraction:

1. DEM – National Elevation Dataset, LIDAR, etc.
2. Fill DEM to eliminate sinks and fill basins.
3. Create slope raster from filled DEM.
4. Extract areas of 0 slope from filled DEM, areas of 0 slope are the filled basins.
5. Convert raster created in step 4 to vector format, this is the final basin data.

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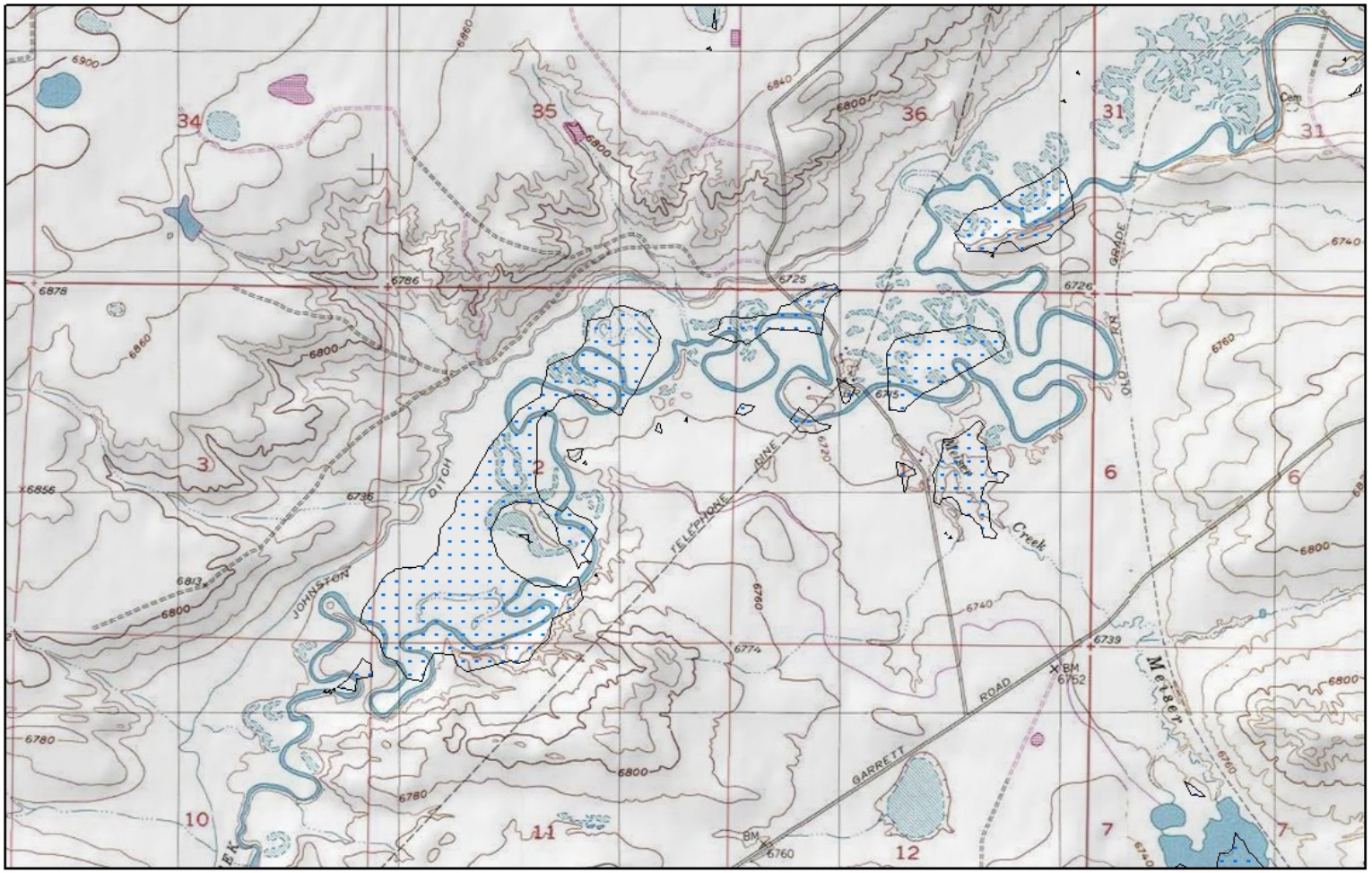


Extracted Basins
Wyoming - Albany County

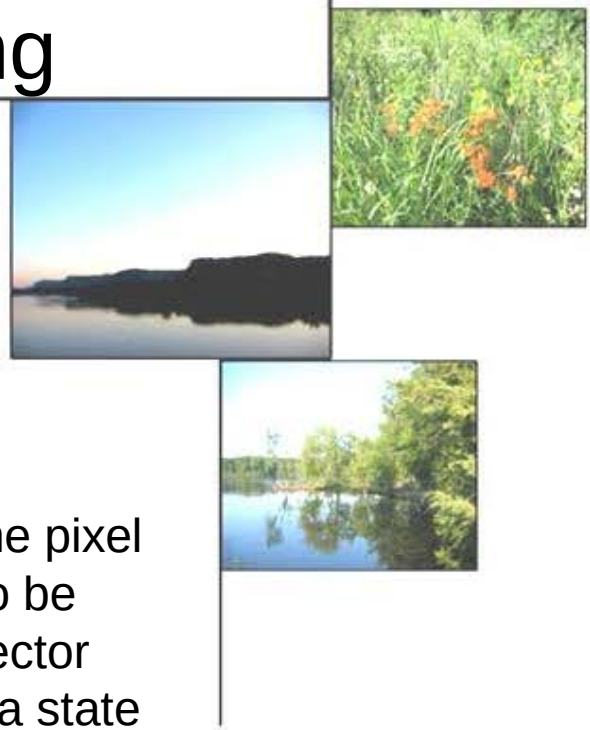
0 0.25 0.5 0.75 1
Miles

N

Data Layers

Basins

Potentially Restorable Wetlands Southeastern Wyoming



Potential Issue with Basin Extraction:

Where DEMs overlap at county boundaries the pixel values do not match, therefore basins need to be extracted for each county individually. The vector basin data can then be combined to produce a state wide data set if desired.

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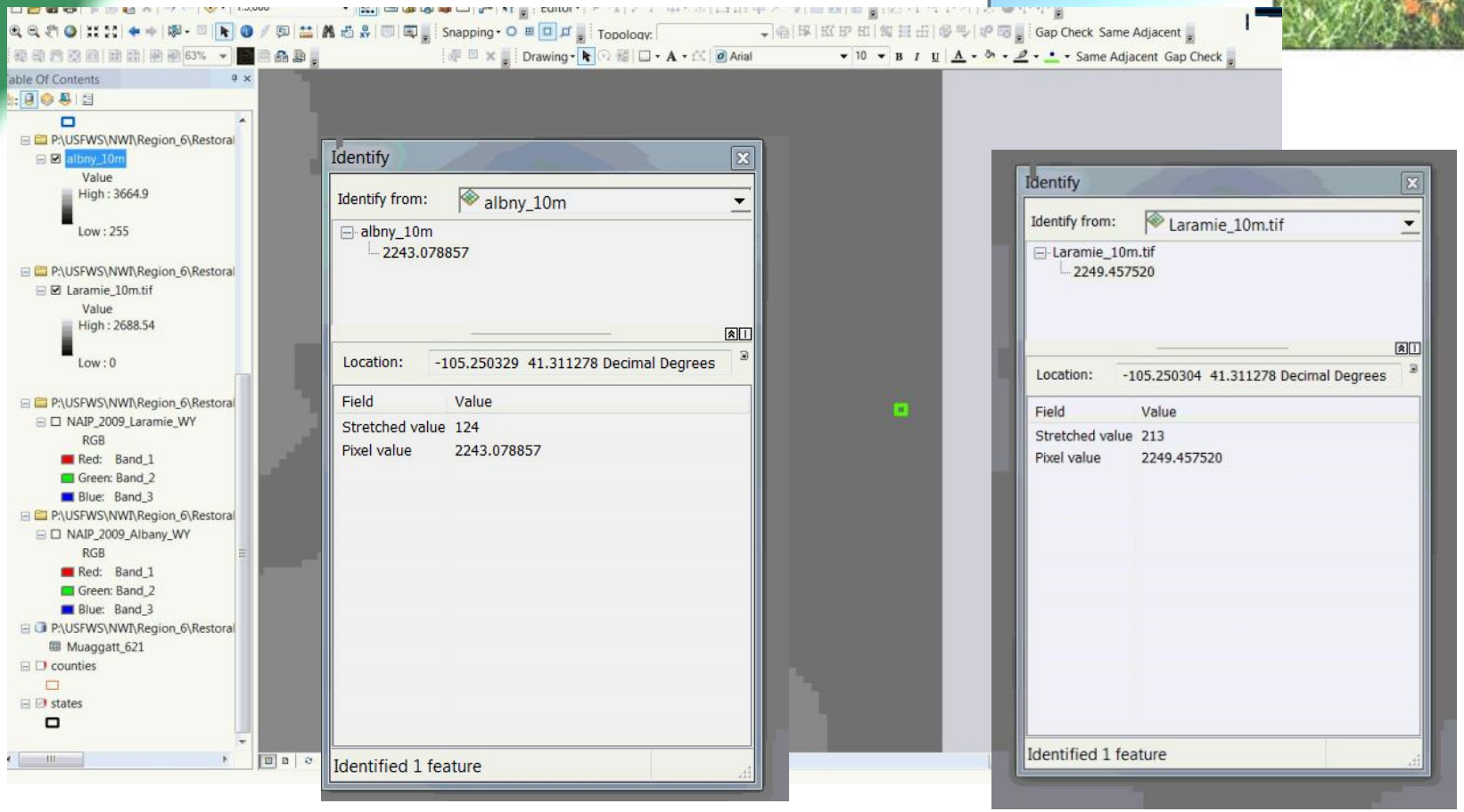
Potentially Restorable Wetlands Southeastern Wyoming



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Potentially Restorable Wetlands Southeastern Wyoming

Putting it all together:

The extracted non-NWI SSURGO soils are clipped using the basin data generated from the DEM. These areas are the potentially restorable wetlands according to the following criteria:

1. Hydric Soils are present.

2. There is <u>not</u> a current NWI wetland present.

3. Basin or depression is present.

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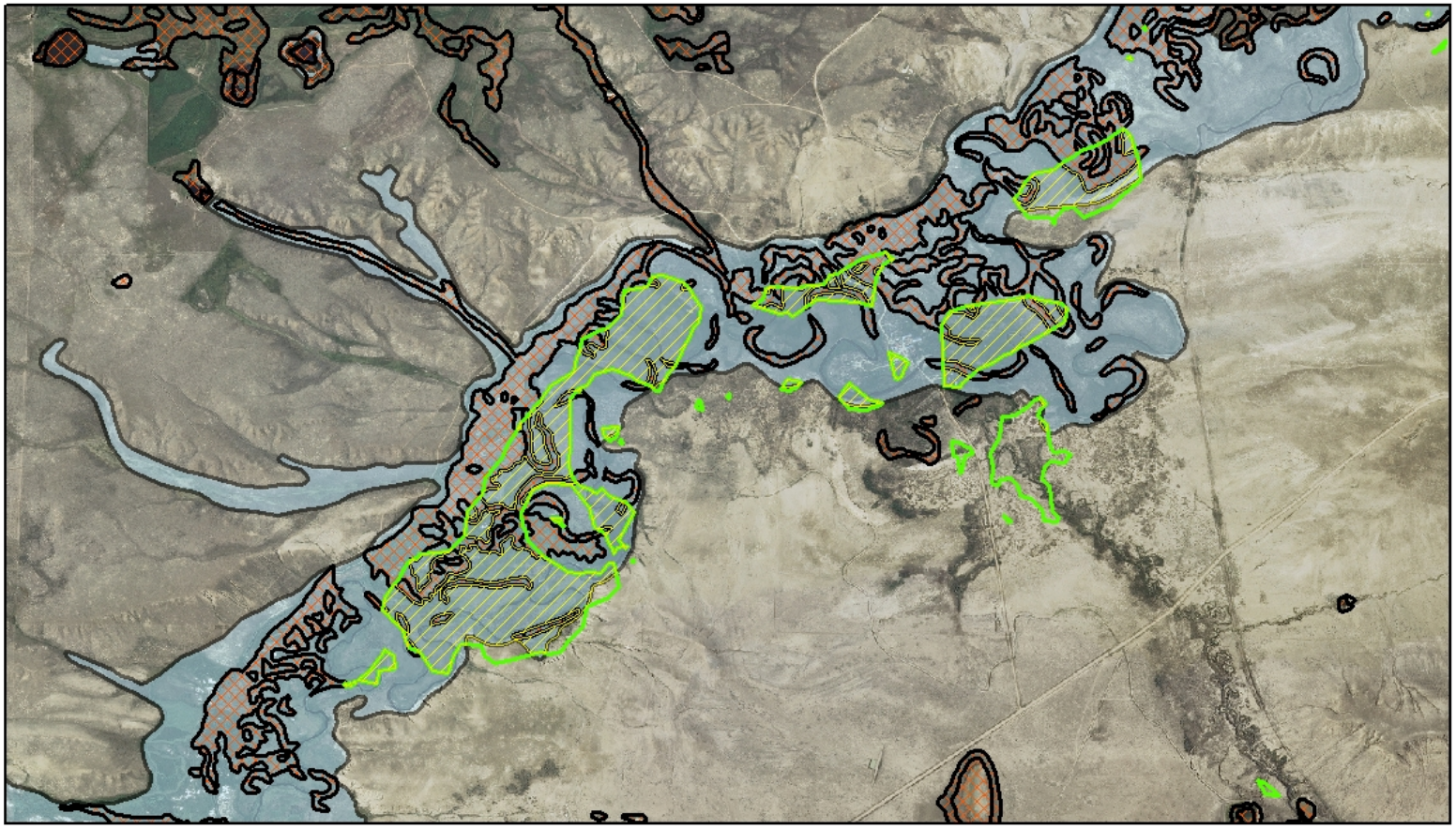


Potentially Restorable Wetlands
Wyoming - Albany County

Notes:
1. Potentially restorable wetlands are areas that fall witin basins, have hydric soils, and no NWI wetlnad polygon is present.
2. Background imagery is 2009 NAIP, 1 m resolution

N

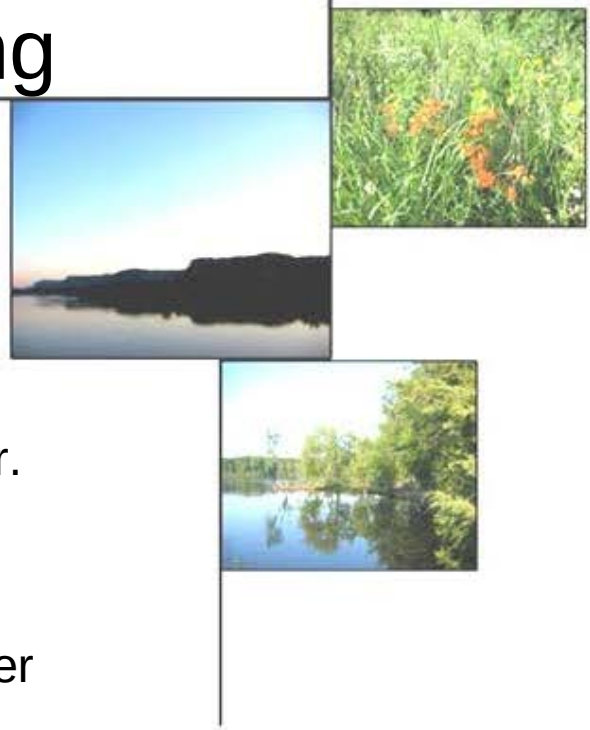
0 0.25 0.5 0.75 1

Miles

Data Layers

- Potentially Restorable Wetlands
- Basins
- Exisitng NWI Wetlands
- Hydric Soils

Potentially Restorable Wetlands Southeastern Wyoming



An additional data set that can be derived from the elevation data is the hydrologic flow network. The flow network provides additional information as to whether or not a basin has a source of surface water.

General process:

1. Filled DEM + Slope raster = Flow Accumulation raster

2. Determine threshhold value for network inclusion and create a binary raster with cell values greater than the threshold set to 1 and everything else to 0

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1. Vectorize binary raster to create linear flow network.

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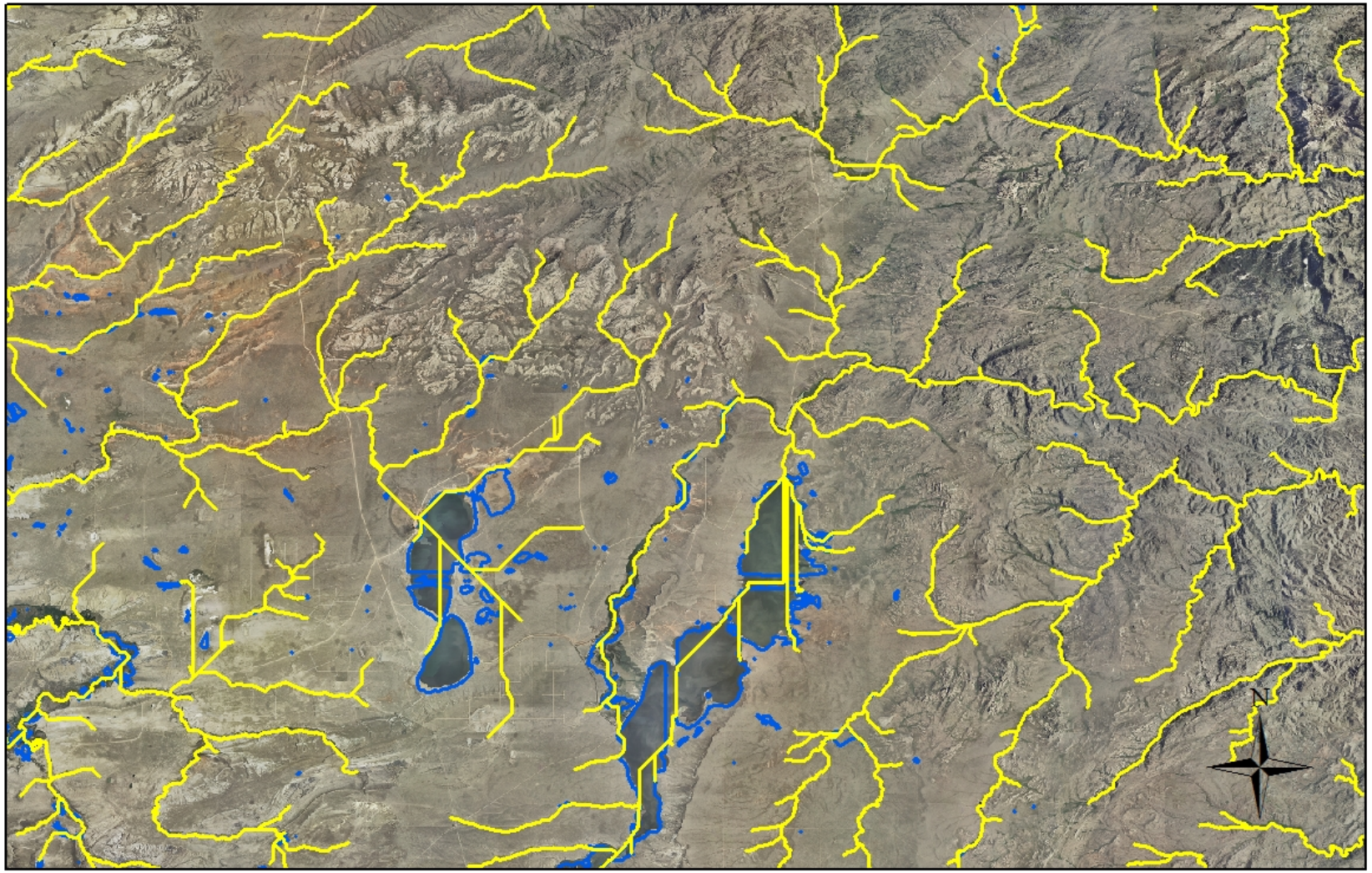

Wyoming Restorable Wetlands Flow Network Albany County

0 1.25 2.5 5 7.5

Miles

Note:
1. Backgorund imagery is 2009 NAIP - 1 meter resolution

Data Layers

Albany Flow Network

Albany Basins

Potentially Restorable Wetlands Southeastern Wyoming

Elevation data set considerations:

1. Coarser elevation data results in less precise flow network and basin data (30m vs. 10m vs. LiDAR)

2. Flat areas can create some unusual looking flowpaths, this does not invalidate the data set, but rather provides a path that insures network connectivity

3. High resolution elevation data such as LiDAR introduces the issue of man made features such as roads ending flow networks, example on next slide. Culvert data could provide a solution.

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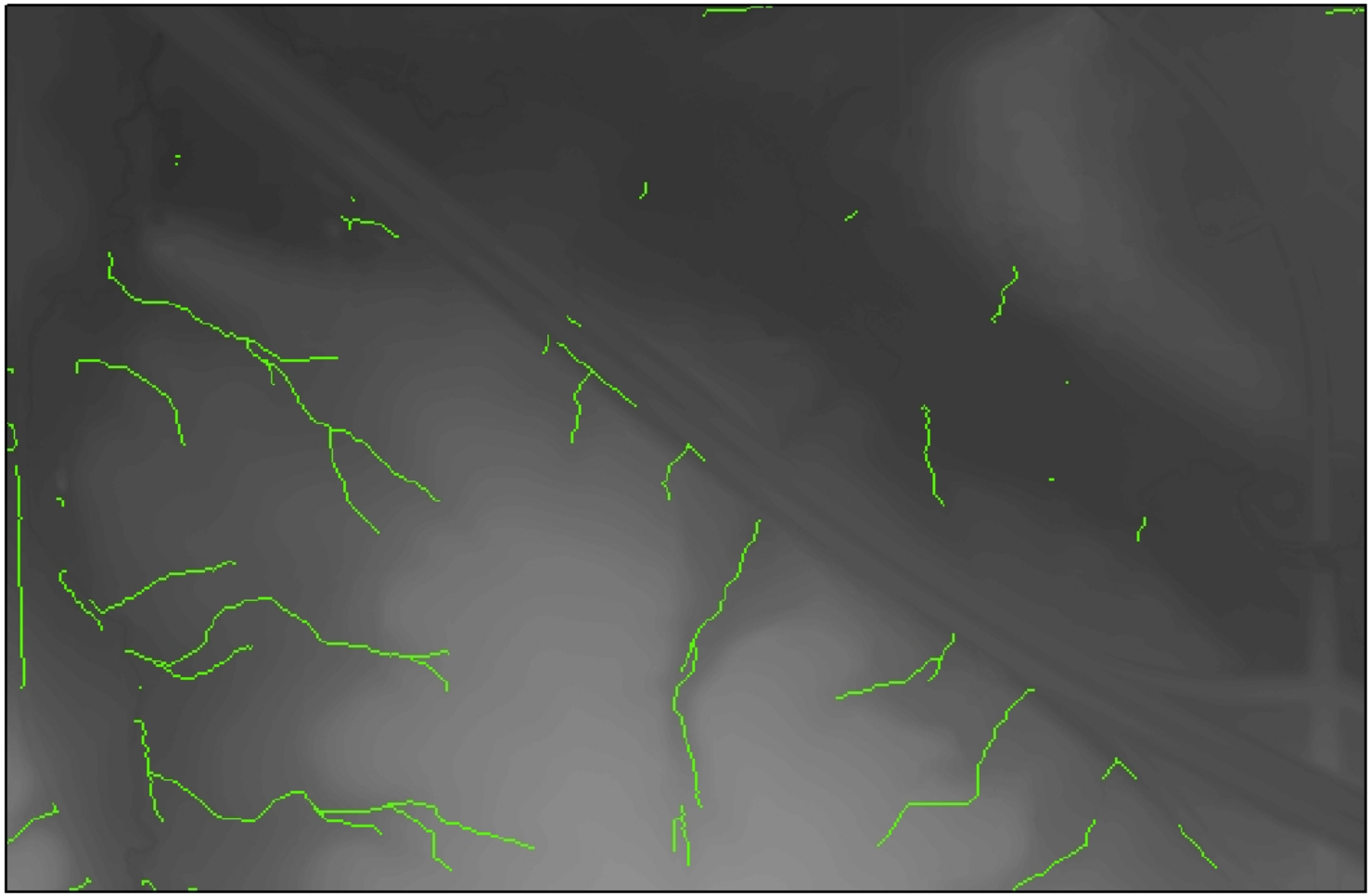


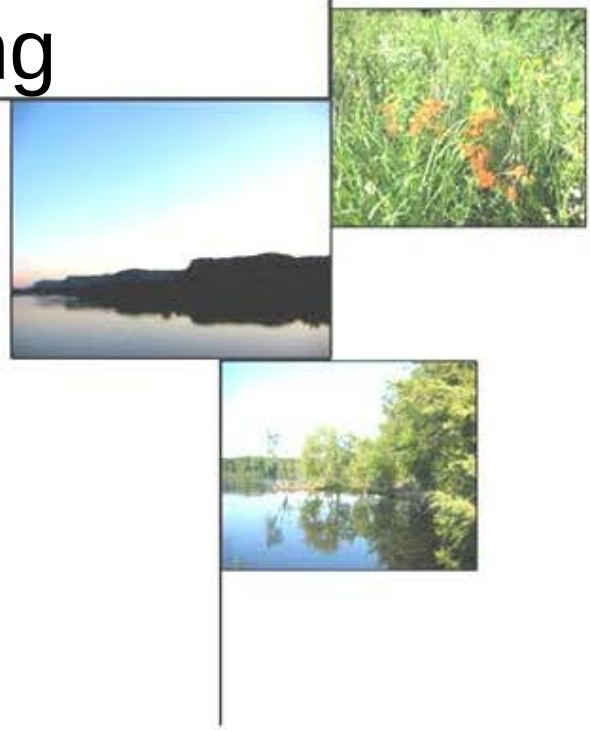
LIDAR Flow Accumulation / Road Example

0 225 450 900 1,350 1,800
Feet

Notes:
1. LIDAR, Olmstead County, MN - 1 meter resolution
2, Flow Accumulation threshold - 1,000

N

Potentially Restorable Wetlands
Southeastern Wyoming



Questions?

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