

# Improved Watershed Assessment: New Tools in Google Earth



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Wetland Condition Assessment Workshop**

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# Outline

The background of the slide is a photograph of a natural landscape. In the foreground, there is a field of tall, dry, golden-brown grass. In the middle ground, a calm body of water, possibly a lake or a wide river, reflects the sky. The background consists of rolling hills under a clear, light blue sky. The overall scene is peaceful and scenic.

**Introduction – purpose of the work**

**Approach used**

**Results**

**Interpretation – specific potential applications**

**Demonstration – Accessing results in Google Earth**

**Conclusions/recommendations/suggestions**

# Introduction

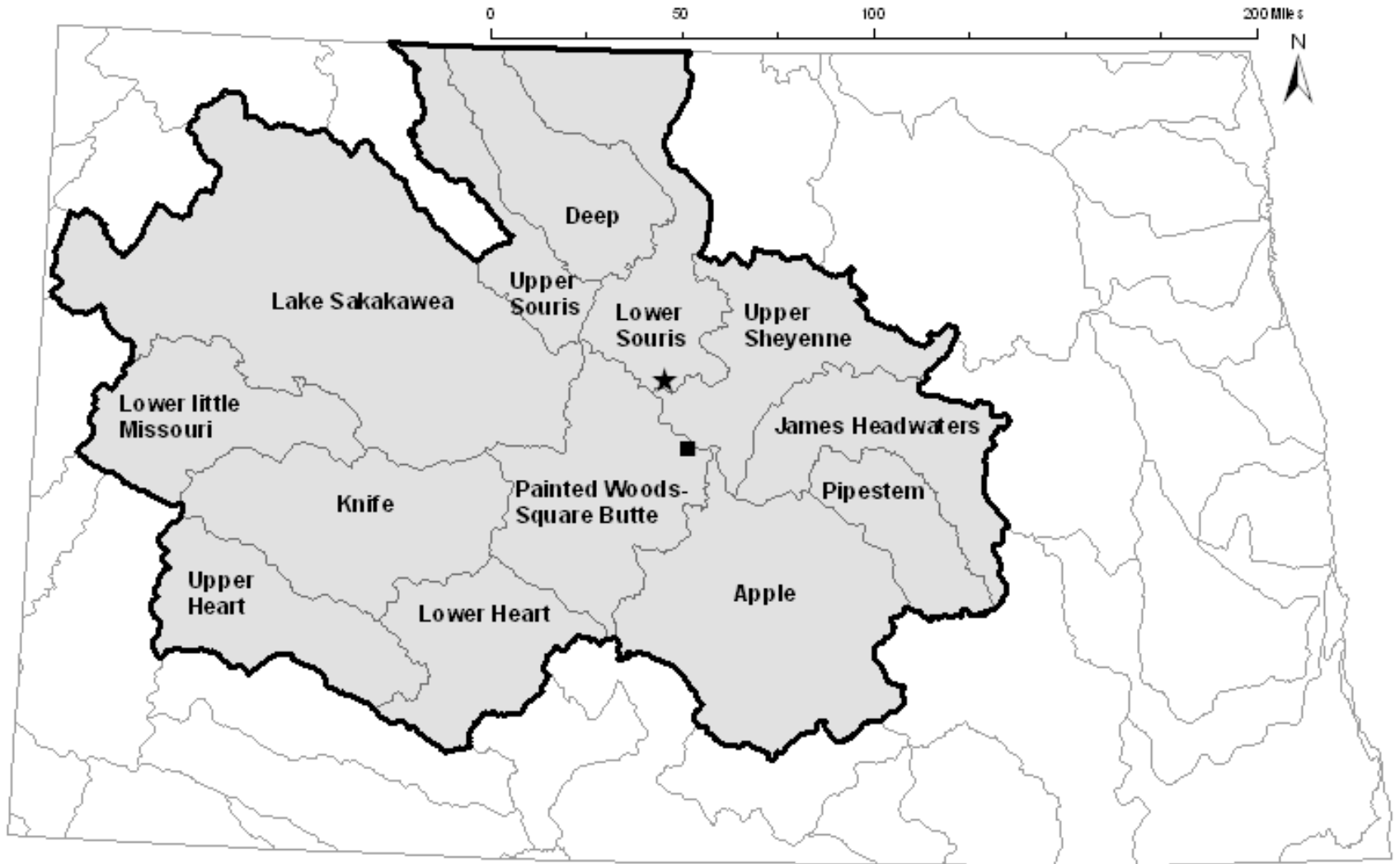
## Regional Wetland Monitoring and Assessment Work Group (Apr 26 2008)

**Stated Goal:**

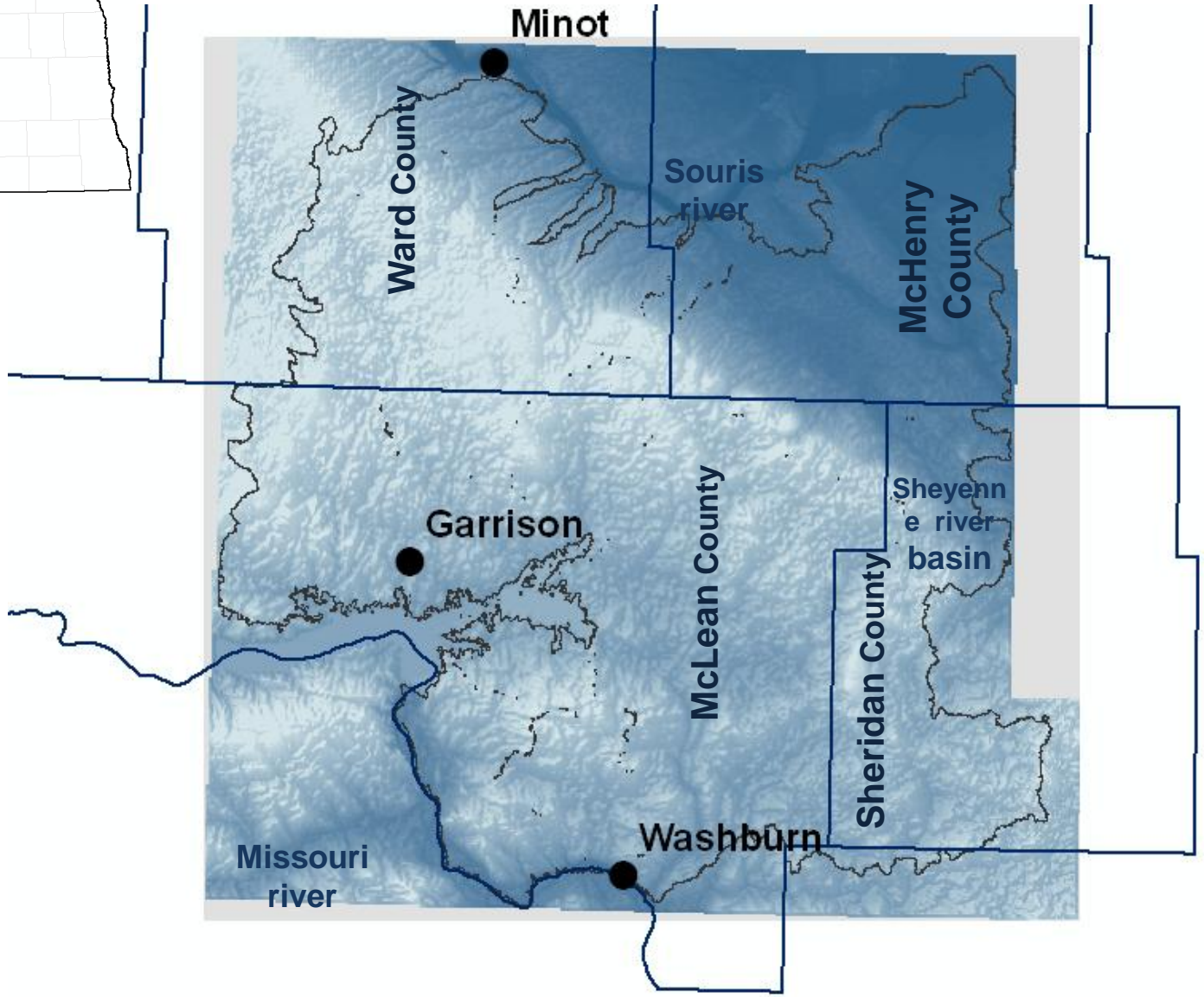
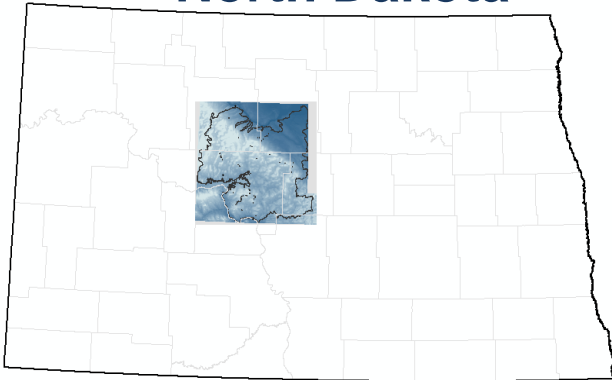
**Demonstrate how project results can be reported  
to the public and restoration practitioners to  
inform management decisions**

**The federal mitigation rule demands a “Watershed  
Approach”**

# Problem Statement



# North Dakota



Minot

Ward County

Souris river

McHenry County

Garrison

McLean County

Sheyenne river basin

Sheridan County

Missouri river

Washburn

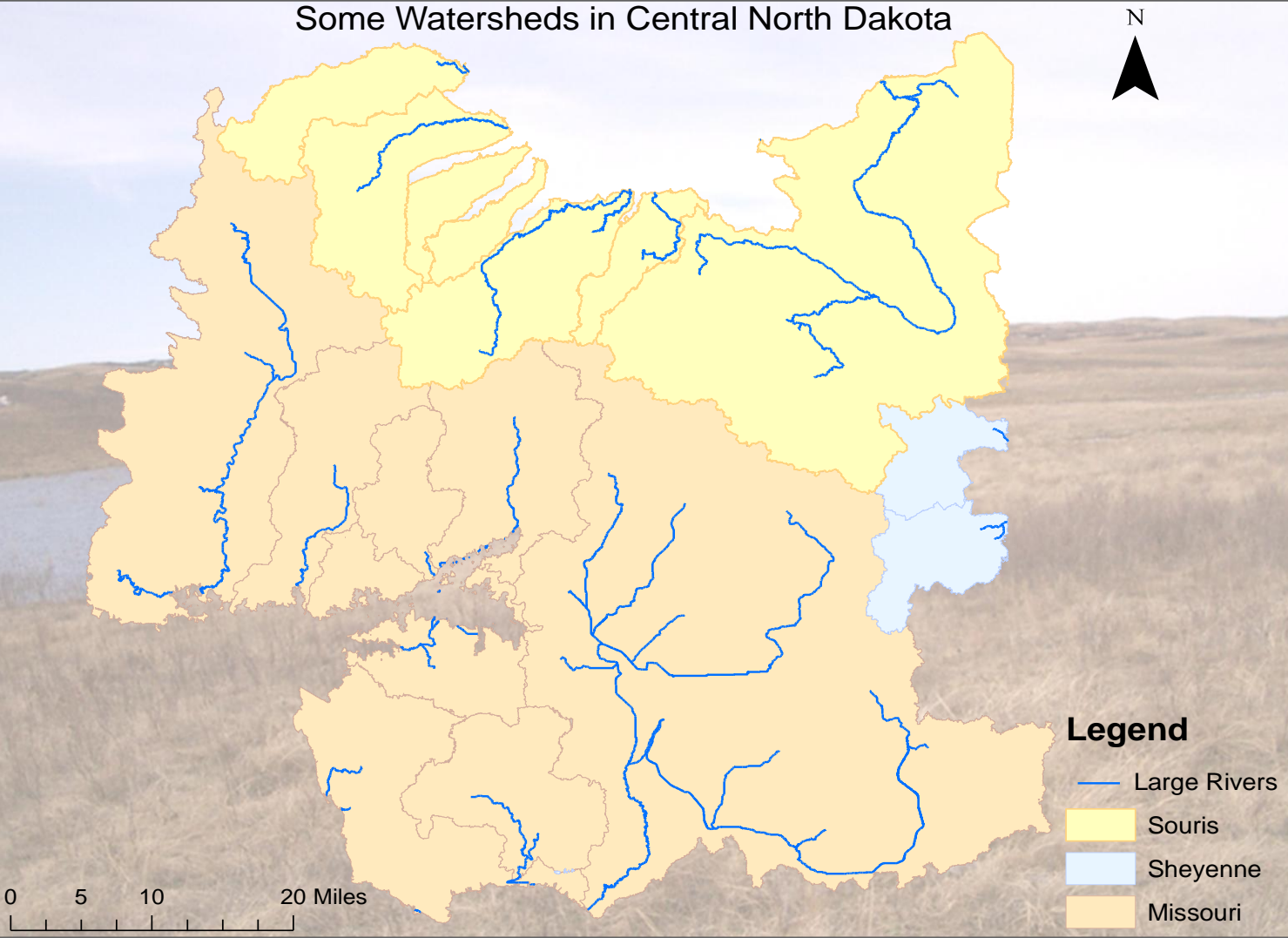
# Some Watersheds in Central North Dakota

101°00'W



48°00'N

47°30'N



## Legend

- Large Rivers
- Souris
- Sheyenne
- Missouri

0 5 10 20 Miles

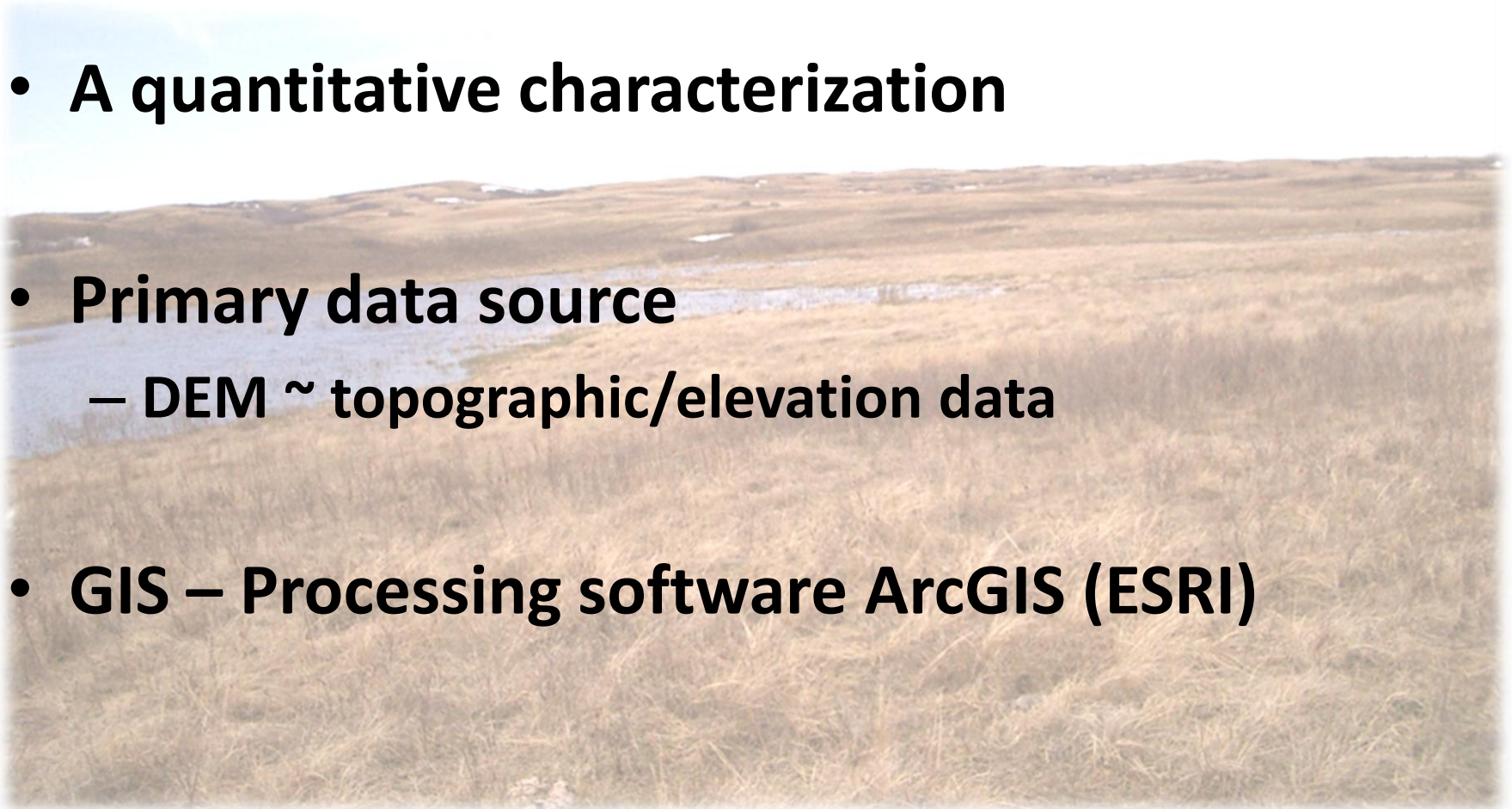
101°00'W

100°00'W

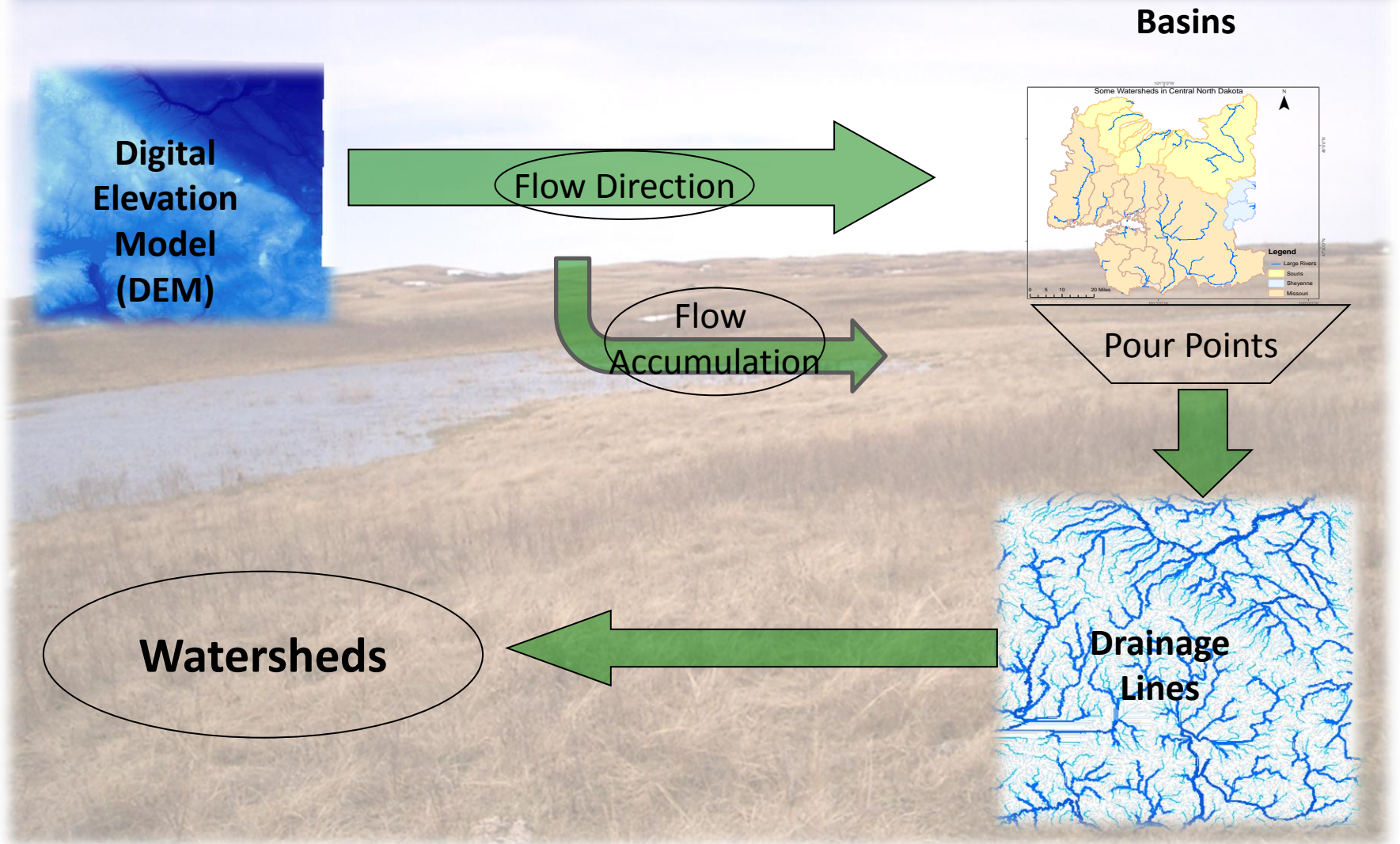
# Delineation of watersheds: Approach

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- **A quantitative characterization**
- **Primary data source**
  - DEM ~ topographic/elevation data
- **GIS – Processing software ArcGIS (ESRI)**



# Approach used: Delineation of watersheds





101°00'W

# Some Watersheds in Central North Dakota

N



48°00'N

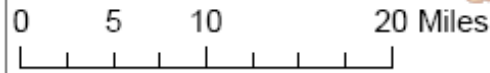
48°00'N

47°30'N

47°30'N

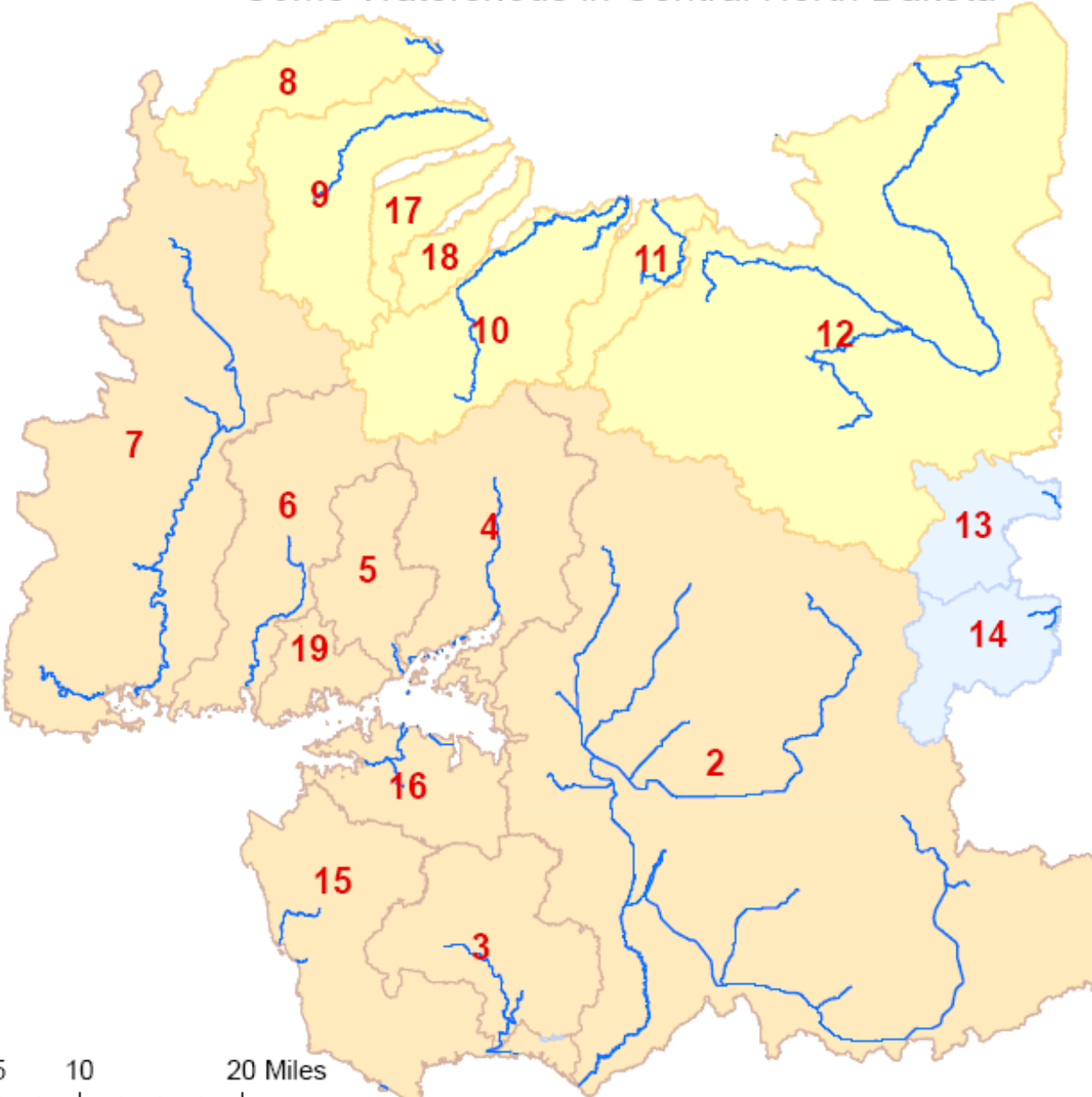
101°00'W

100°00'W



## Legend

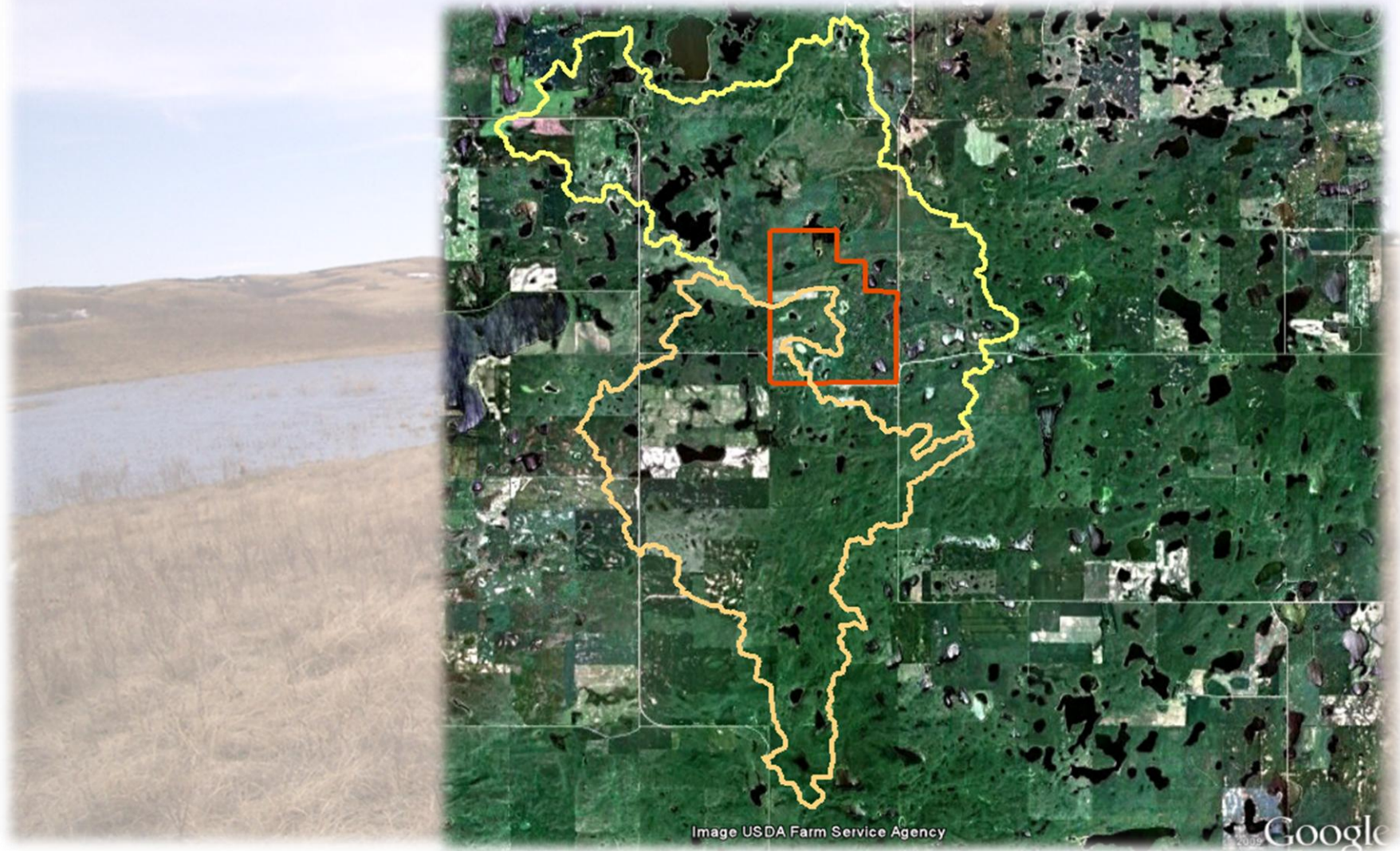
- Large Rivers
- Souris
- Sheyenne
- Missouri



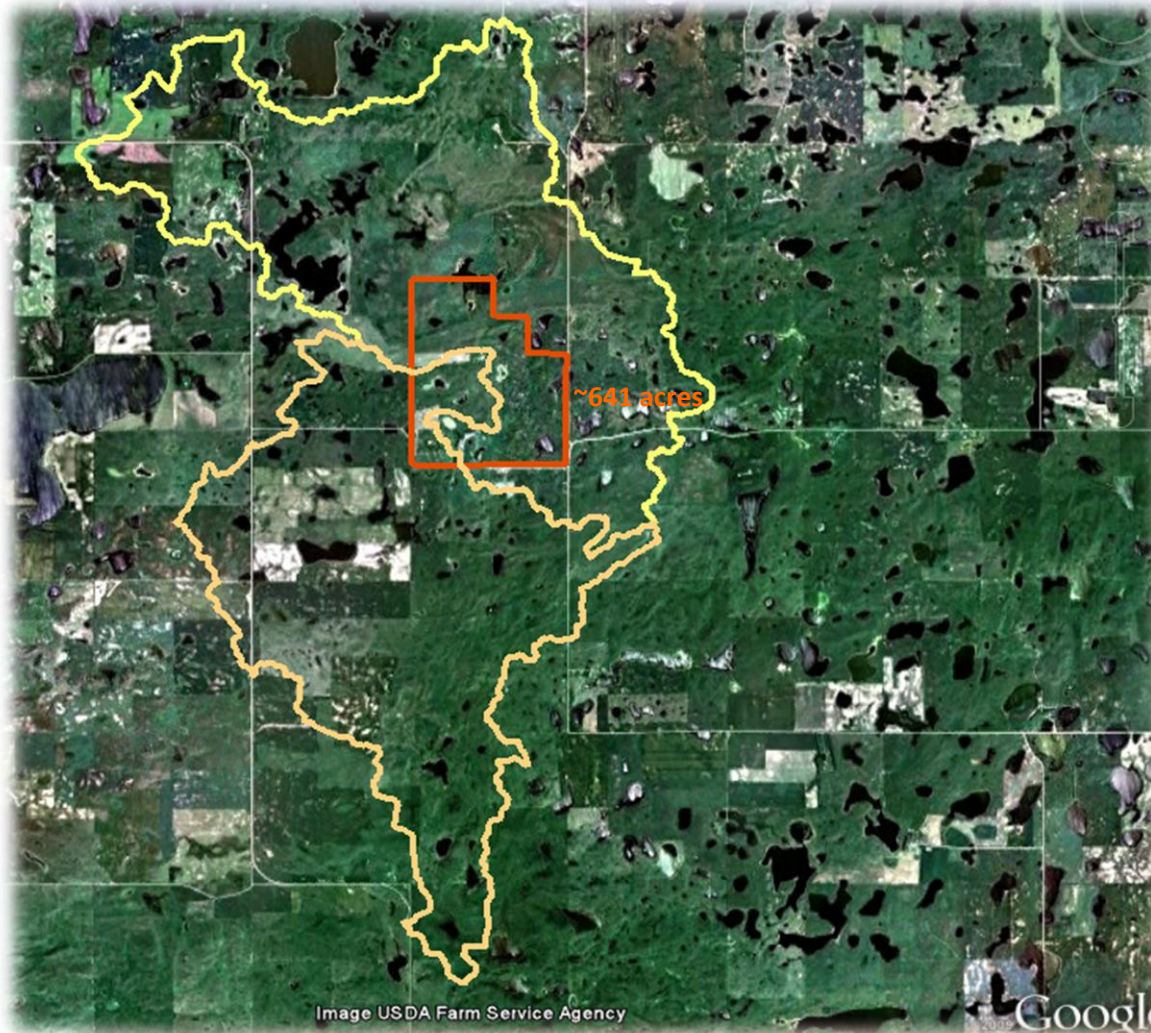
# Results

<b>Watershed</b>	<b>Catchment basins (acres)</b>	<b>Total Area (acres)</b>	<b>Catchment basins Volume ft<sup>3</sup></b>	<b>Vol:Area ratio</b>
2	22,476	585,637	127,785	5.7
3	4,097	71,527	6,006	1.5
4	9,037	92,020	22,959	2.5
5	3,638	37,046	10,624	2.9
6	6,991	77,540	16,156	2.3
7	17,846	251,881	29,520	1.7
8	3,064	49,315	3,393	1.1
9	6,678	73,971	15,157	2.3
10	6,716	83,560	15,670	2.3
11	1,562	26,153	66	0.0
12	30,452	363,331	994,238	32.6
13	3,770	32,051	8,152	2.2
14	3,780	37,503	11,614	3.1
15	3,108	98,622	1,801	0.6
16	1,271	46,573	8,679	6.8
17	1,008	20,972	1,598	1.6
18	1,052	16,950	2,287	2.2
19	1,063	19,850	1,893	1.8

# Interpretation: specific potential applications



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**Water shed total area:  
3800 acres**

**Sum of catchment surface  
area: 370 acres**

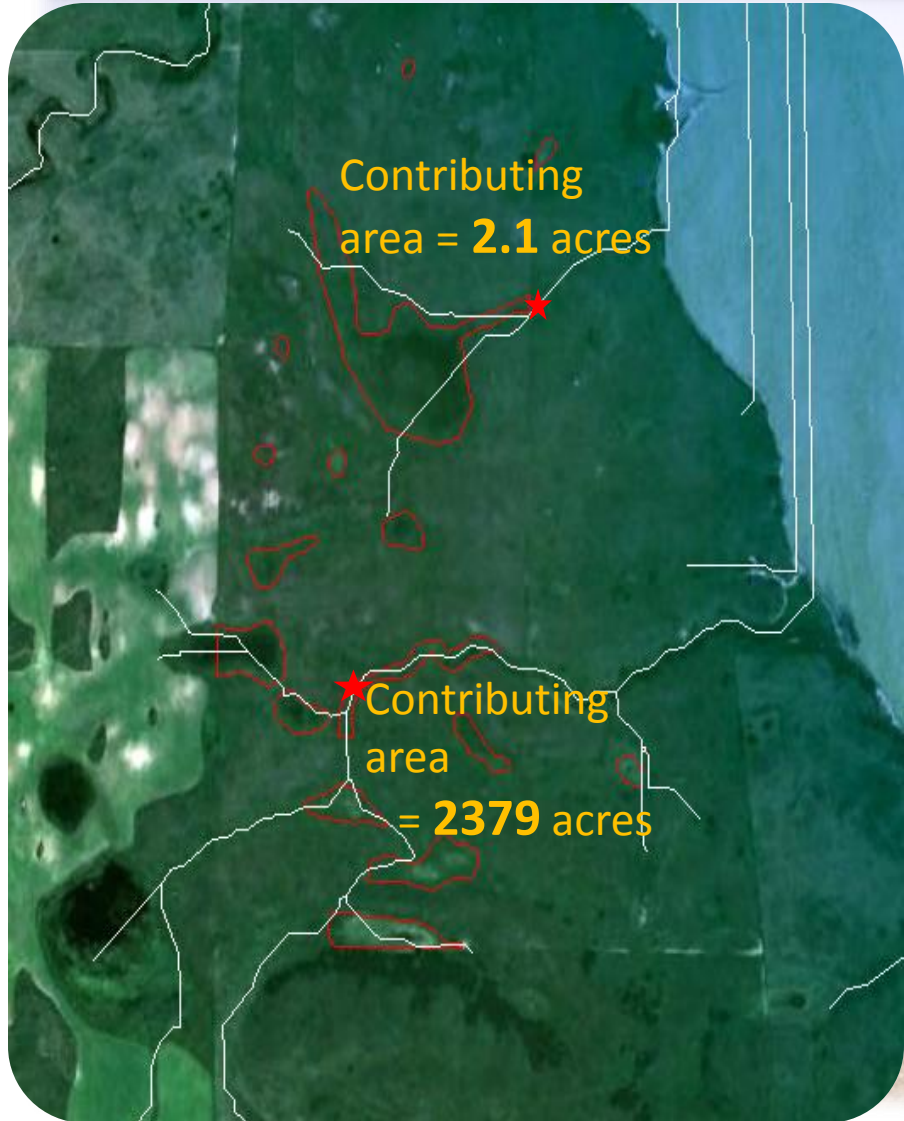
**Sum of catchment potential  
volume: 1,432,859**

**Water shed total area:  
3370 acres**

**Sum of catchment surface  
area: 314 acres**

**Sum of catchment potential  
volume: 1,495,325**

# Interpretation: specific potential applications



# Demonstration: Accessing the results in Google Earth



- USDA-ARS Mandan website
- <http://www.ars.usda.gov/Research/docs.htm?docid=19461>



The screenshot displays the USDA-ARS Mandan website. The header includes the USDA and ARS logos, the text "United States Department Of Agriculture Agricultural Research Service", and navigation links for "Northern Plains", "Mandan, North Dakota", "ARS Home", "About ARS", "Help", "Contact Us", and "En Español". A search bar is present with the text "You are here: Research / Watershed Assessment Tools". The main content area is titled "Research" and contains text about landform characteristics and water movement. A map of North Dakota is shown with a yellow outline of the central region, and a smaller map of the region is also visible. The footer contains copyright information and a "Last Modified" date of 03/18/2010.

USDA ARS United States Department Of Agriculture Agricultural Research Service

Northern Plains Mandan, North Dakota

ARS Home About ARS Help Contact Us En Español

Portable Version Small page

Search

You are here: Research / Watershed Assessment Tools

## Research

Landform characteristics dictate water movement, water storage, and water retention. The Prairie Provinces Region (PPR) is characterized by numerous catchment basins that provide water retention, wildlife habitat, and water quality functions. Understanding how water moves across PPR landforms within and among watersheds is needed for functional assessment of PPR agricultural wetland landscapes.

New watershed data are now available for the central North Dakota PPR, located between Bismarck and Minot along the Missouri Colado.

### North Dakota

Minot

Garrison

Washtub

Landform topographic features indicate where surface waters potentially flow and eventually drain to major rivers. For our area of interest, there are three major river outflows: Missouri, the Souris, and the Sheyenne. These drainage points can be used to model the area contributing water to each point—the area is defined as the watershed. Within each watershed are thousands of drainage networks and catchment basins that are used to characterize water movement, storage and retention.

[Learn more about watersheds in this region, including quantification of watershed characteristics and individual catchment basins.](#)

You will need Google Earth to view the maps and read the data.

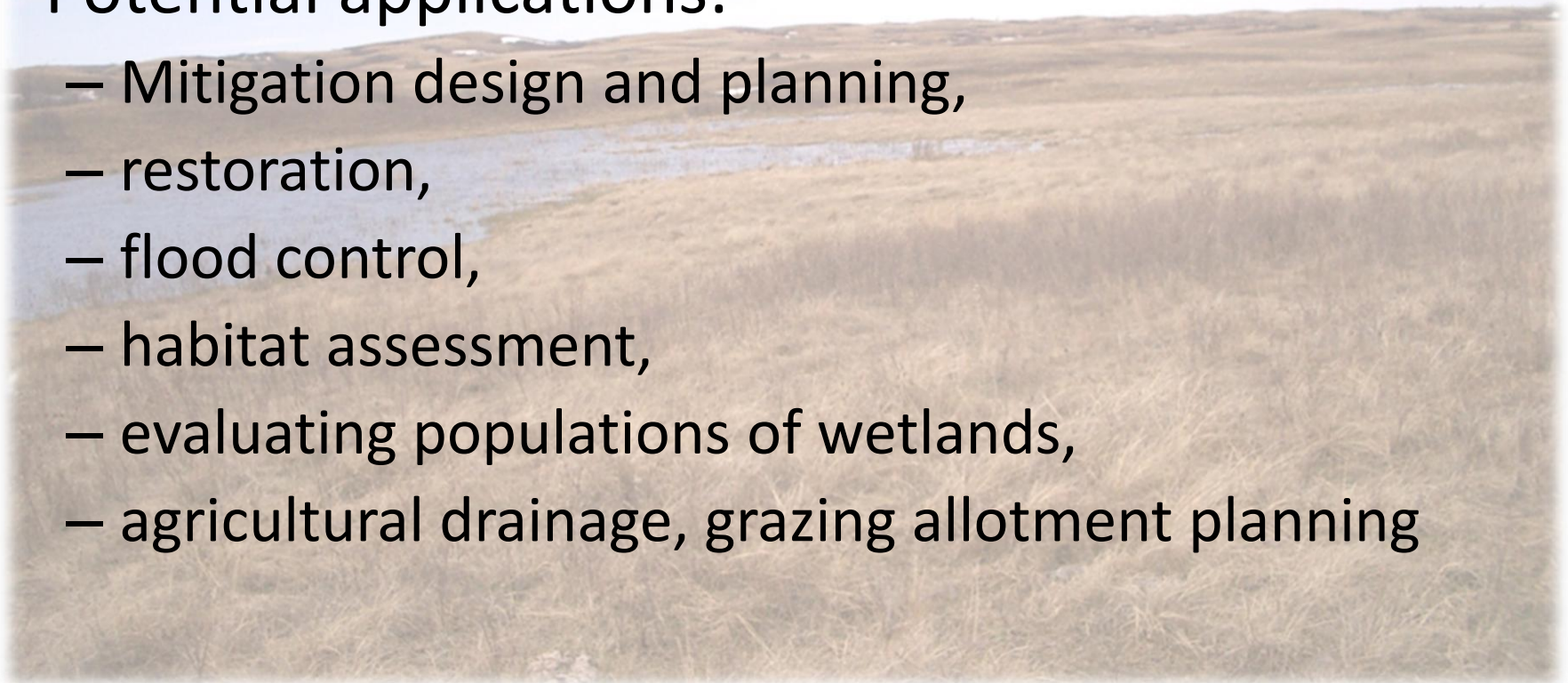
If you do not have the Google Earth software, please [download it here](#). Performance of Google Earth improves if you clear the "Temporary Places" files you do not need or large files stored in your "My Places" folder.

Last Modified: 03/18/2010

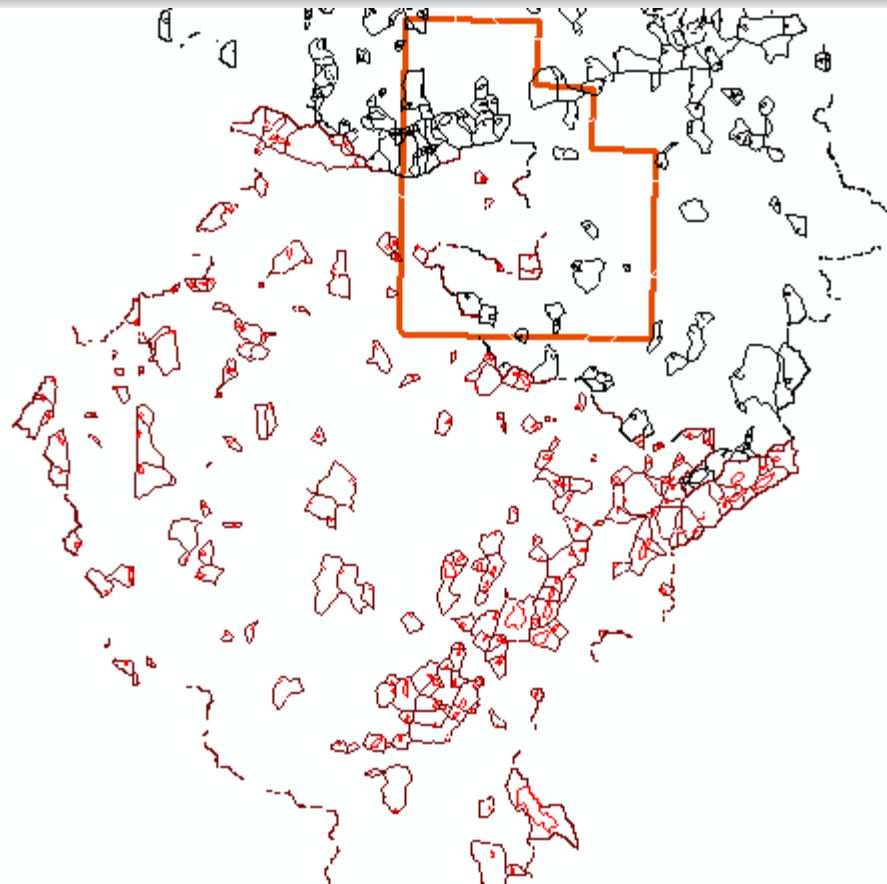
ARS Home | USDA.gov | Site Map | Policies and Links  
FOIA | Accessibility Statement | Privacy Policy | Non-discrimination Statement | Information Quality | USA.gov | White House

# Conclusions/recommendations/ suggestions

- Website :  
<http://www.ars.usda.gov/Research/docs.htm?docid=19461>
- Potential applications:
  - Mitigation design and planning,
  - restoration,
  - flood control,
  - habitat assessment,
  - evaluating populations of wetlands,
  - agricultural drainage, grazing allotment planning



# NWI data/USGS



- sub1\_water\_wo\_NWI □
- sub1\_water51\_no\_NWI □
- sub1\_basin\_wo\_NWI □
- sub0\_water\_wo\_NWI □
- sub0\_water51\_no\_NWI □
- sub0\_basins\_wo\_NWI □
- manz\_brdr □

