English Coulee: Perspectives and Alternatives for Managing a Prairie Stream in an Urban Environment

Rachel Thorstenson, Environmental Restoration Student Club
Phil Gerla, H. Hamm School of Geology and Geological Engineering

University of North Dakota

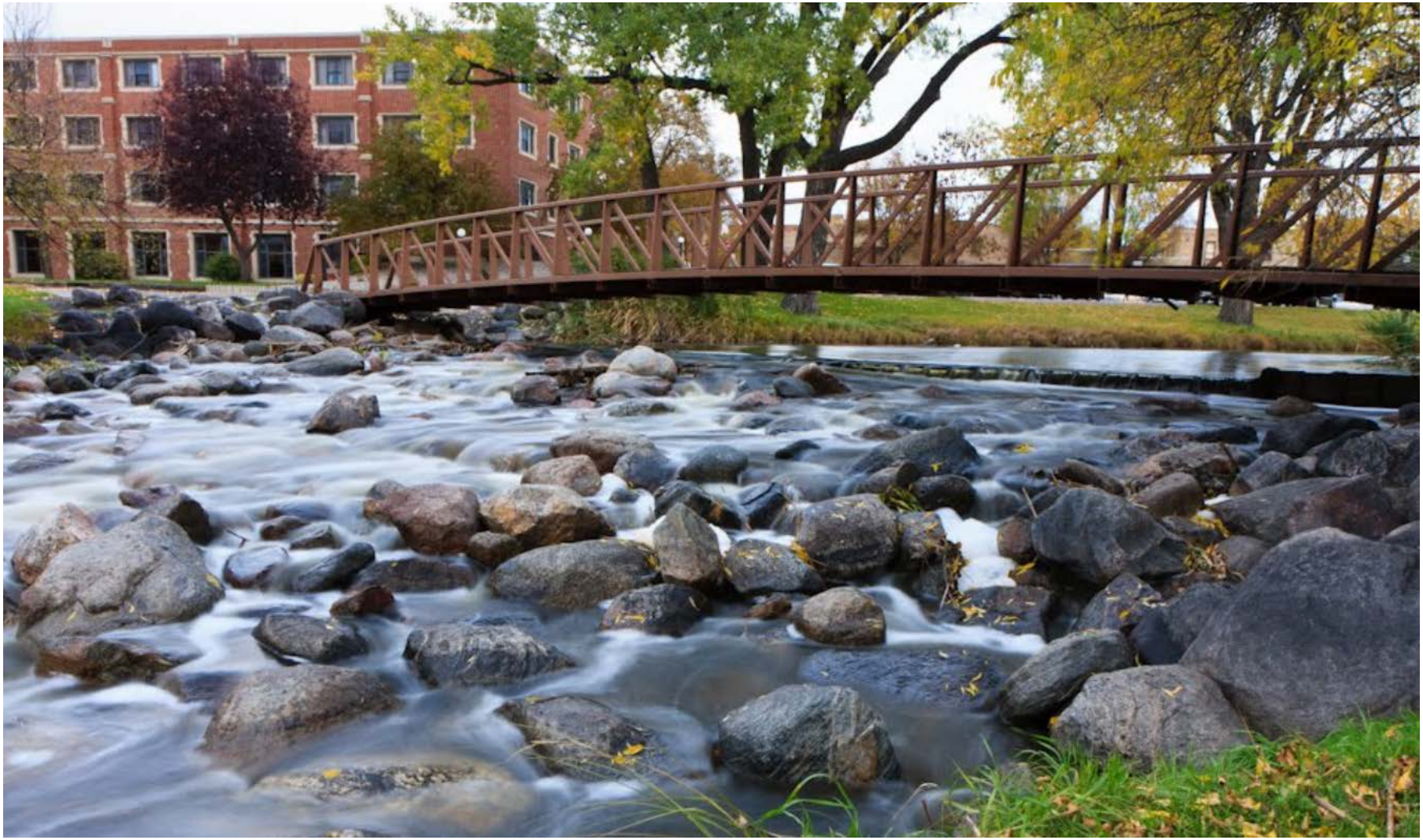
(a) Focus of Attention -- *Interdisciplinary Course*
(b) Current Efforts Undertaken by *UND's Environmental Restoration Club*

Presentation Outline:

Importance to UND and Grand Forks
Water Quality and Habitat Problems
Original Waterway
Present Condition
Discharge & Water Quality
Options for Improvement
Plans

English Coulee’s Significance

Several of the most important buildings at UND lie along English Coulee



Unusual scene for a Midwestern – Great Plains university

Grand Forks' Japanese Gardens & Sertoma Park

photo from Cindy Sandvick and the Bismarck Tribune

Water Quality & Habitat Problems

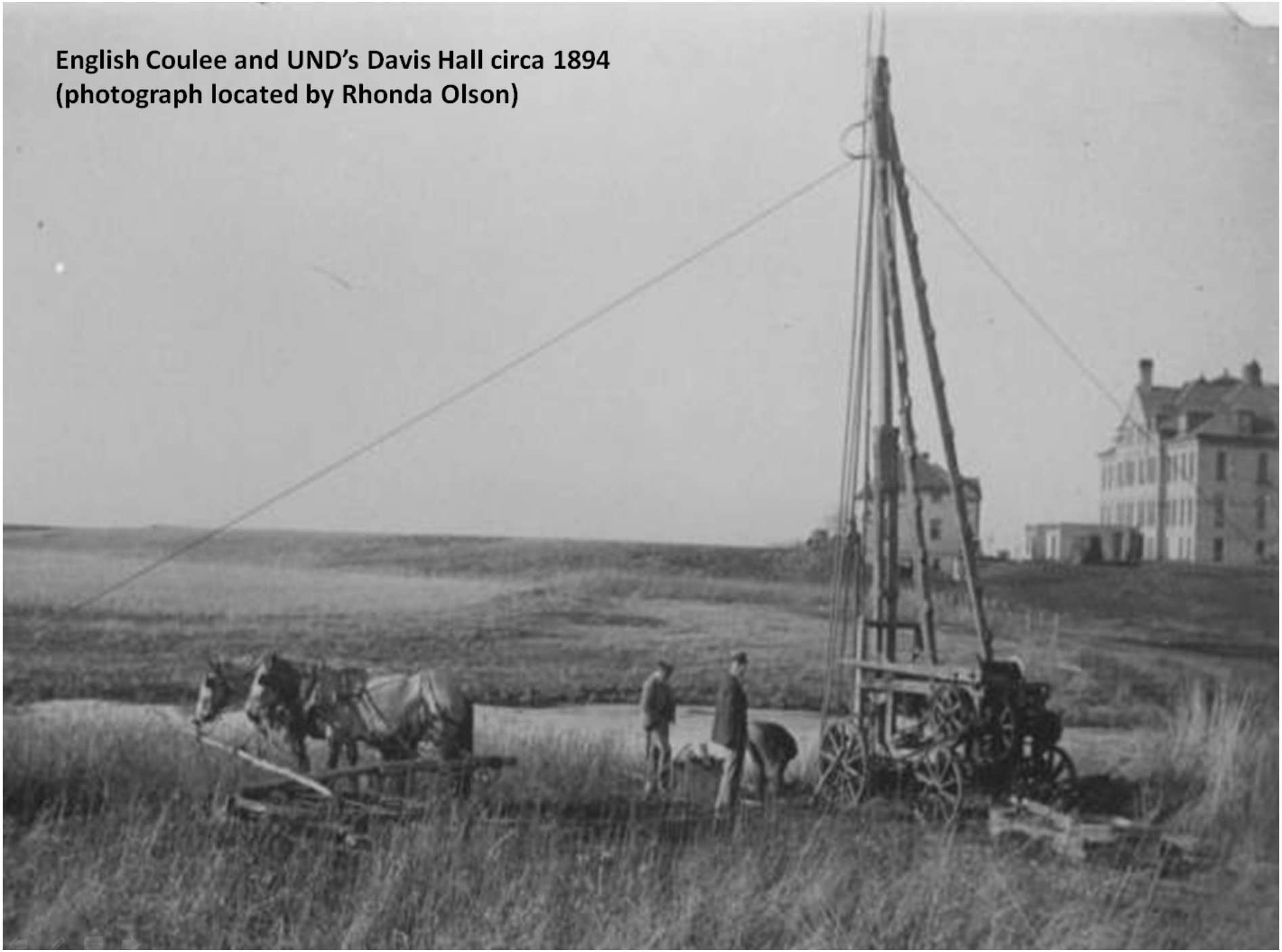
English Coulee, south edge of UND campus; photo by P. Gerla

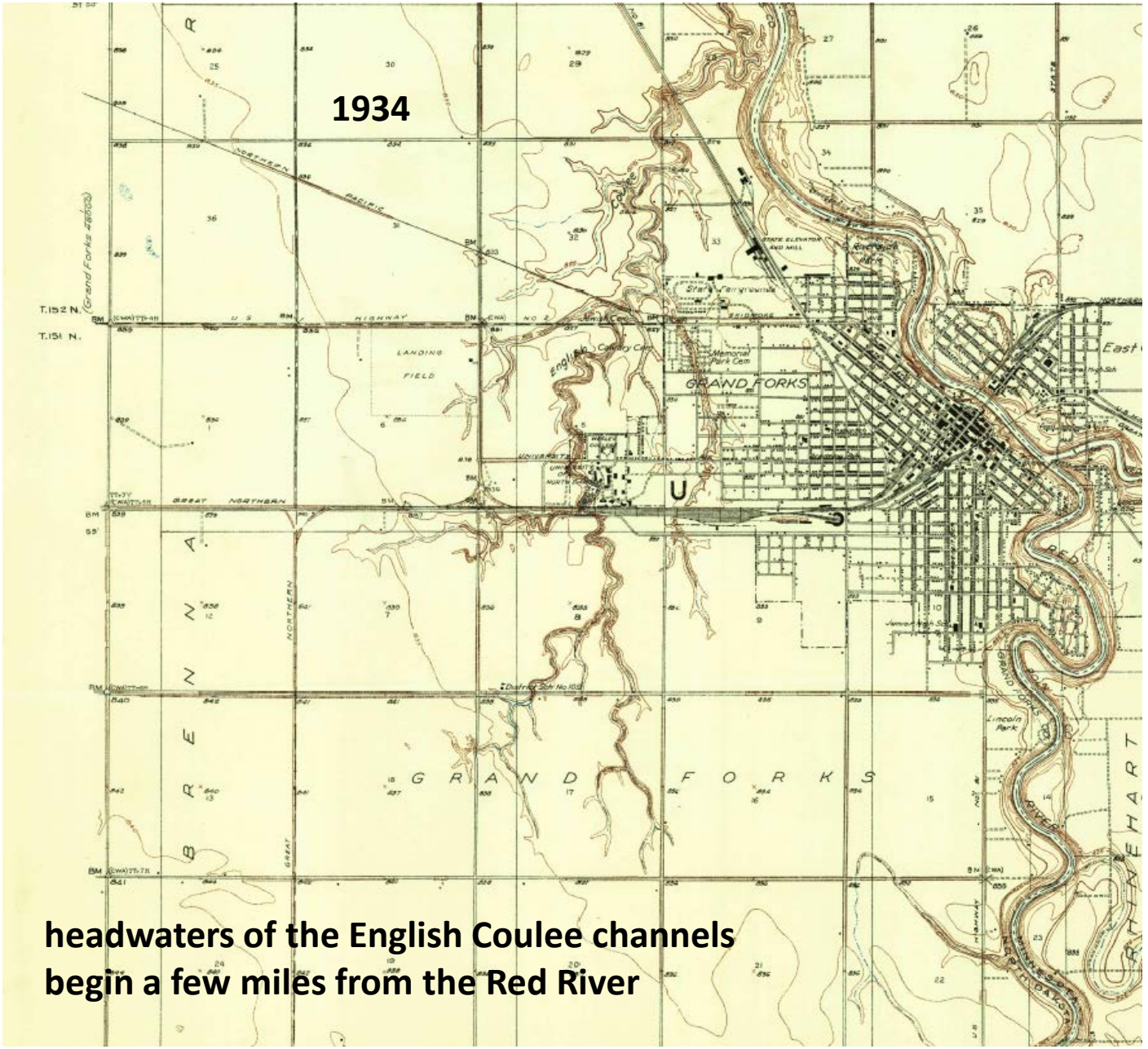
English Coulee and feedlot (near the intersection of Columbia Road and N. Washington St. (Google imagery)

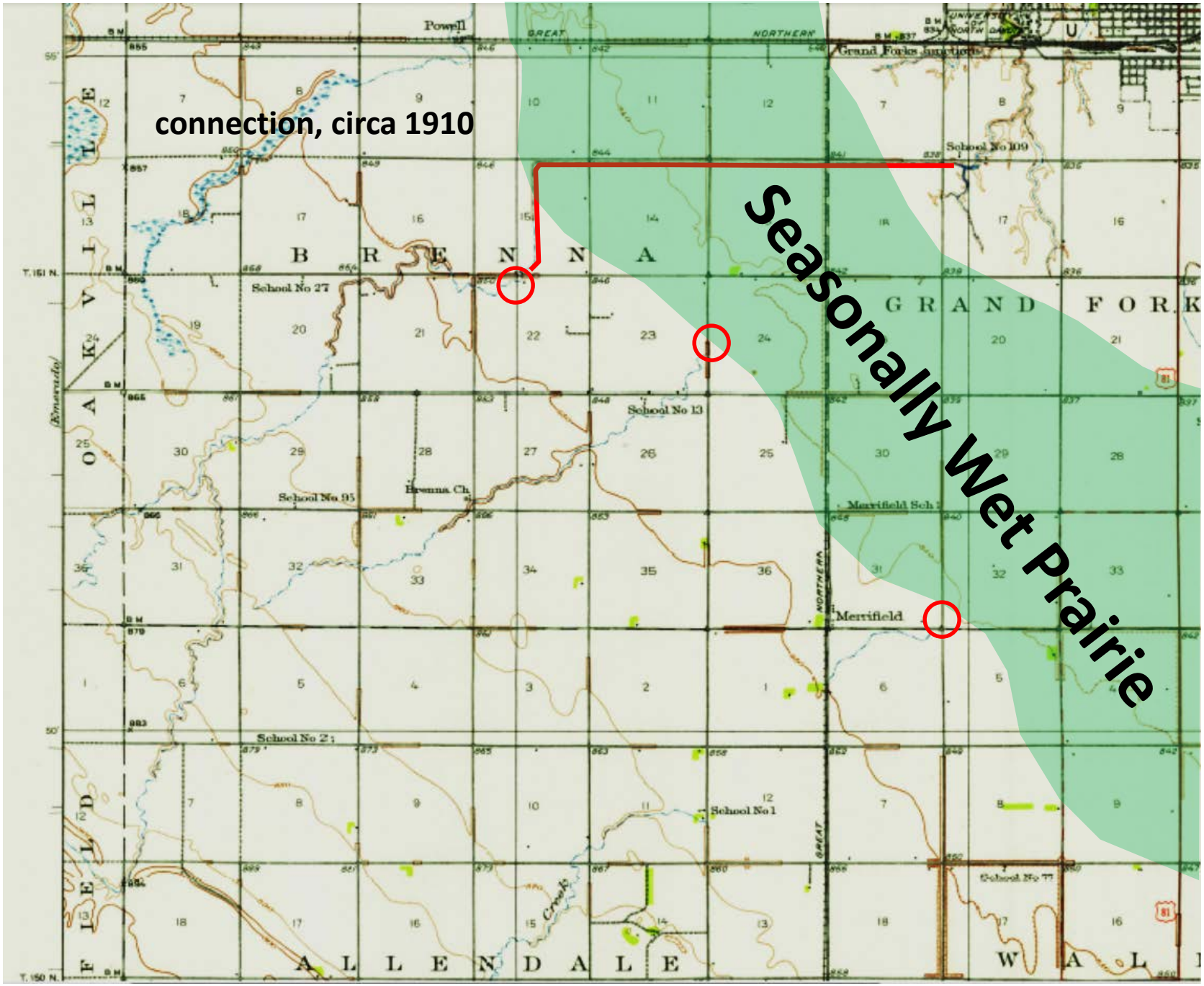
excessive invasives --- photo by Kristine Lofgren

Characteristics and Nature of the Original Waterway

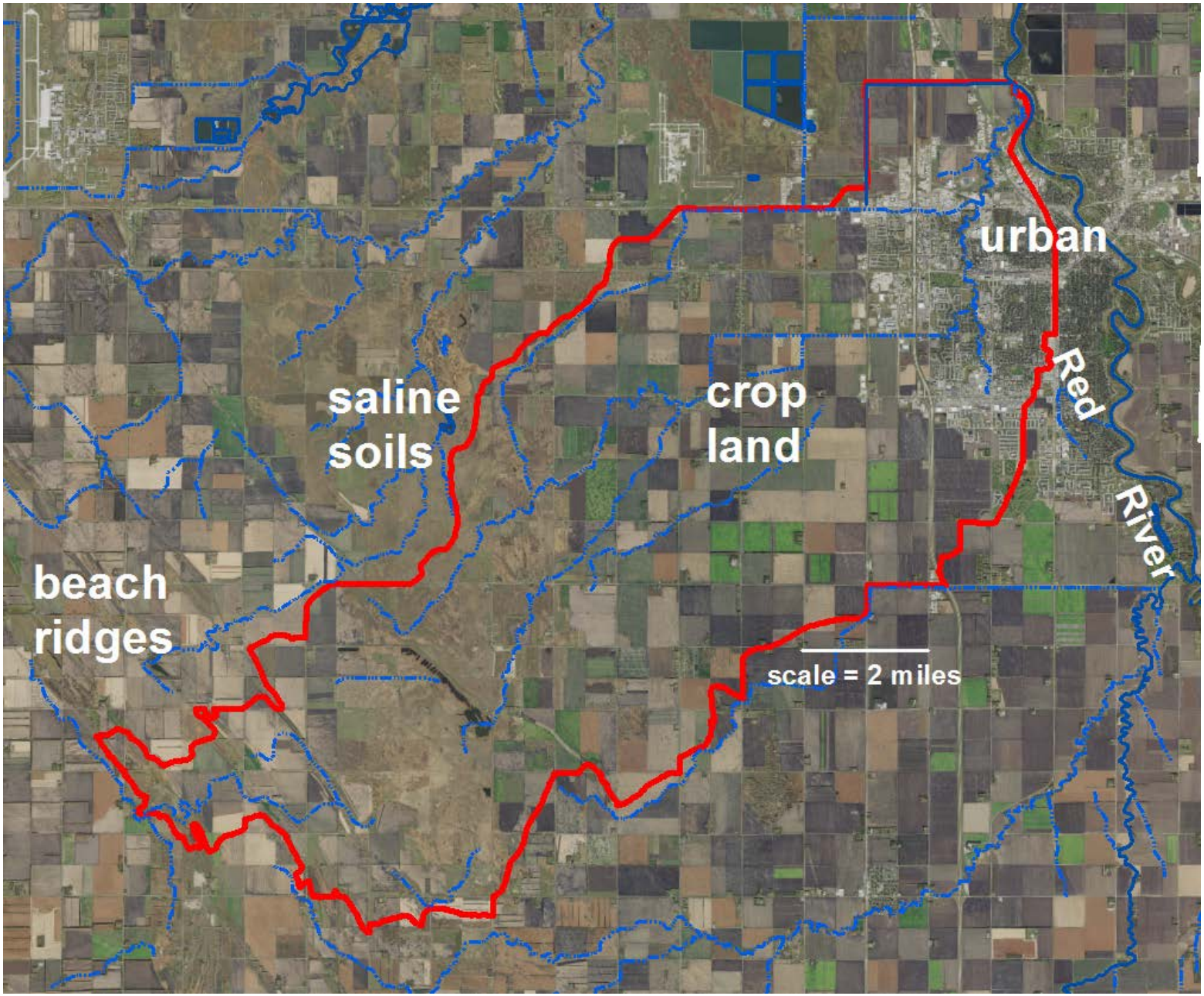
photo from http://minnesotaseasons.com/

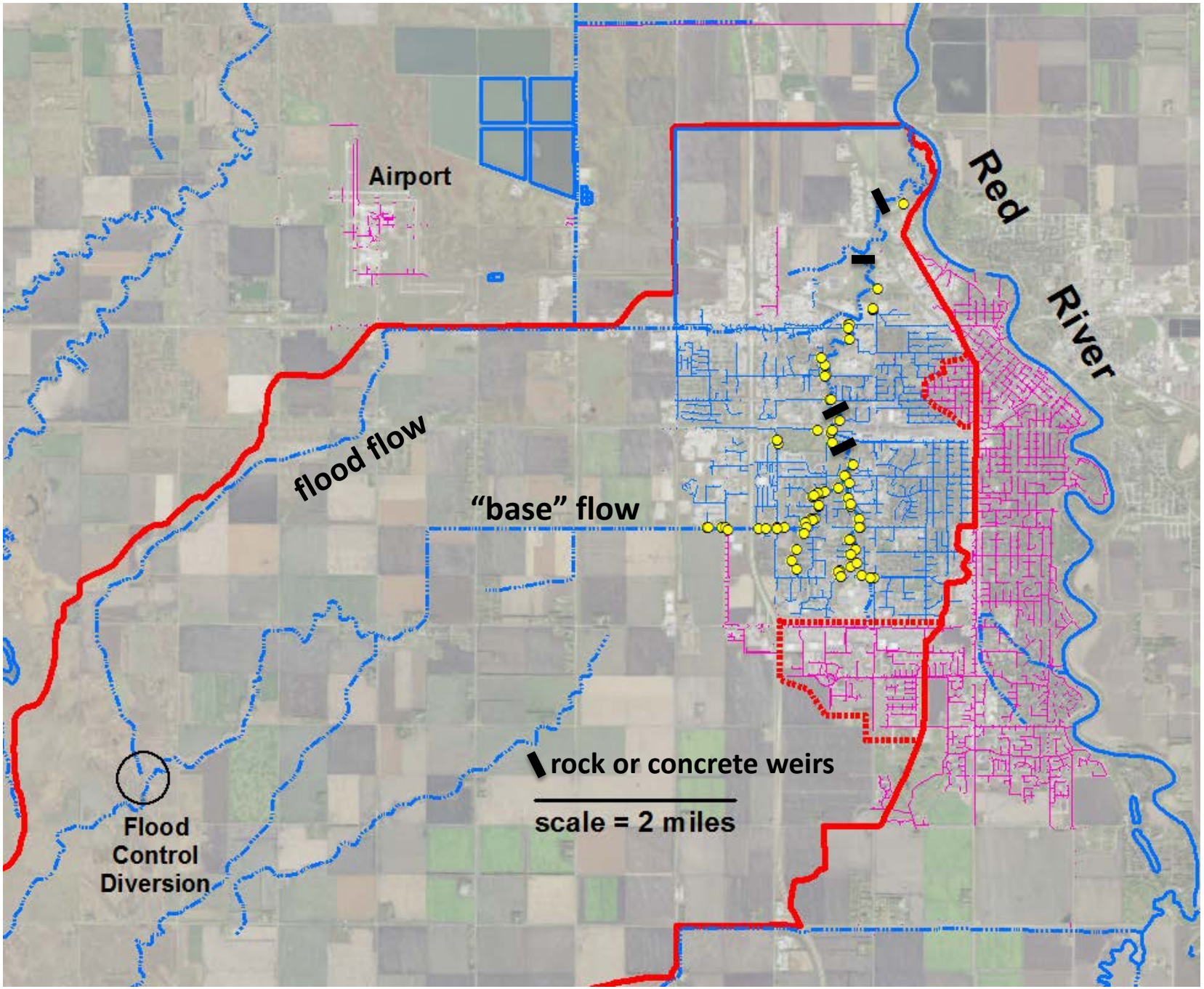

English Coulee and UND's Davis Hall circa 1894
(photograph located by Rhonda Olson)

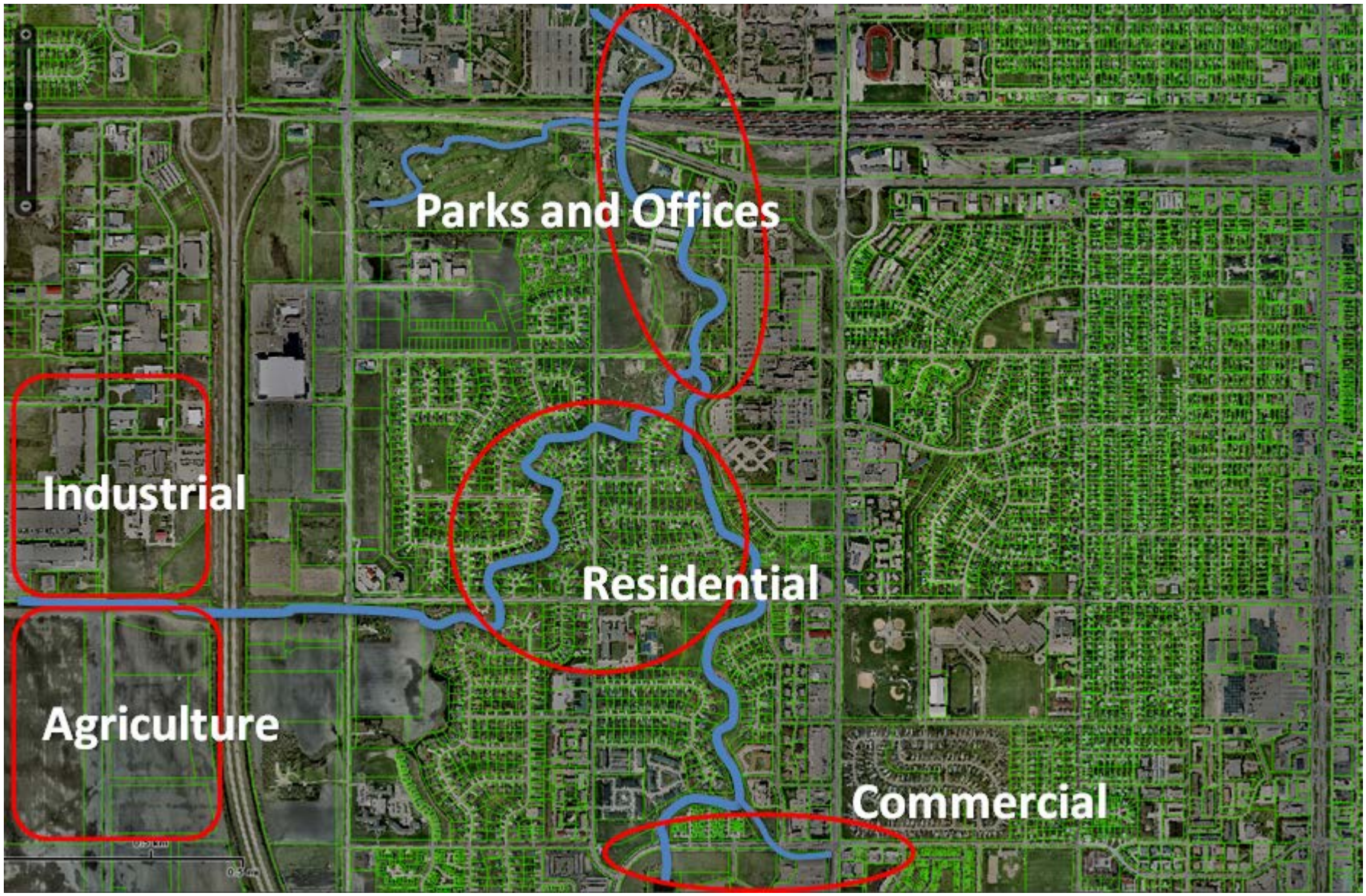

1934
GRAND FORKS
headwaters of the English Coulee channels
begin a few miles from the Red River


connection, circa 1910
Seasonally Wet Prairie
Powell
GREAT NORTHERN
Grand Forks
School No 109
BRENNA
GRAND FORK
School No 27
School No 13
School No 95
Brenna Ch
Merrifield Sch
Merrifield
NORTHERN
School No 2
School No 1
School No 77
Creek
ALLENDALE
WALL
VALLEY
COAL
FIELD

Characteristics and Nature of the Current Waterway


urban
saline
soils
crop
land
Red
River
beach
ridges
scale = 2 miles

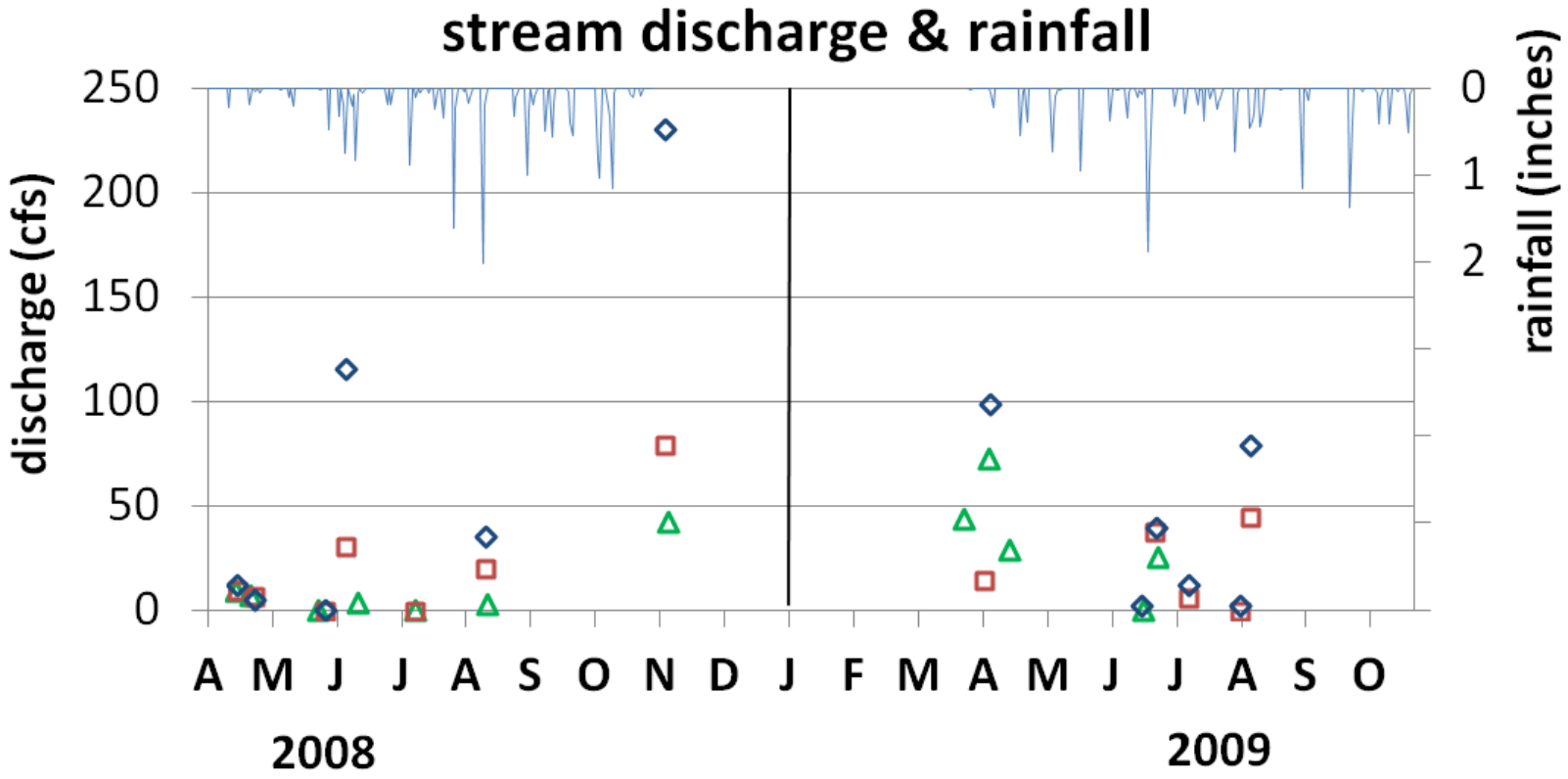

Airport
Red River
flood flow
"base" flow
rock or concrete weirs
scale = 2 miles
Flood Control Diversion

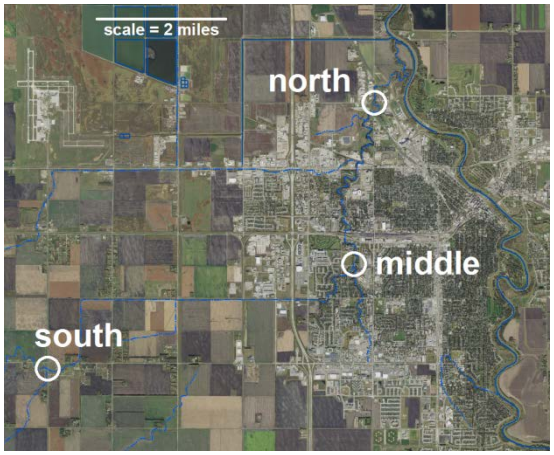


Large range of land use and ownership --- Tight infrastructure limits off-channel modifications

Channel Discharge & Water Quality

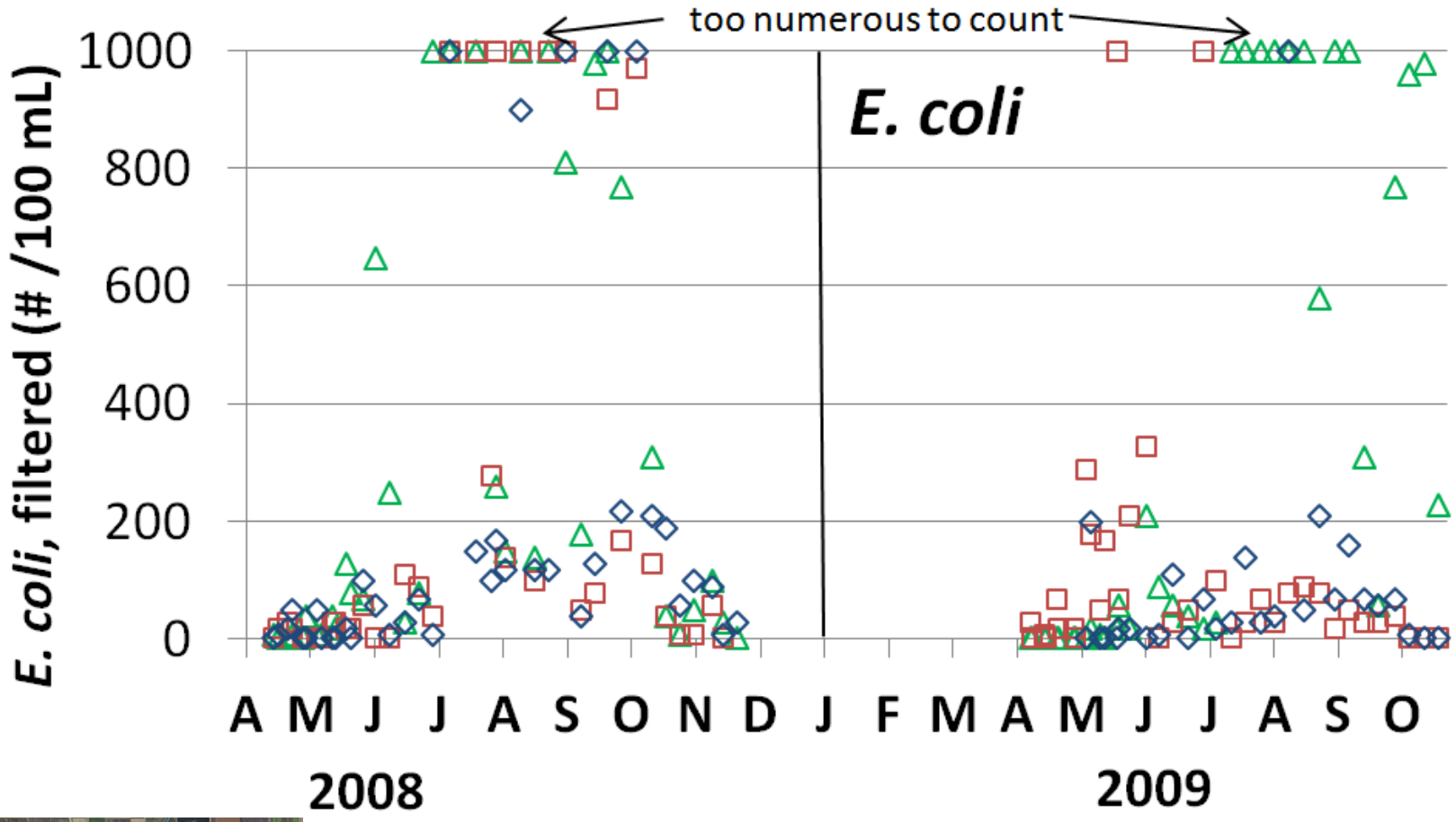
2008-2009 data from the
ND Dept. of Health
and USGS

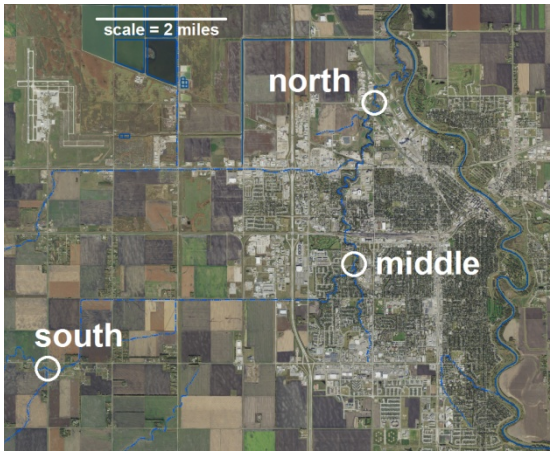




△ south □ middle ◇ north — rainfall

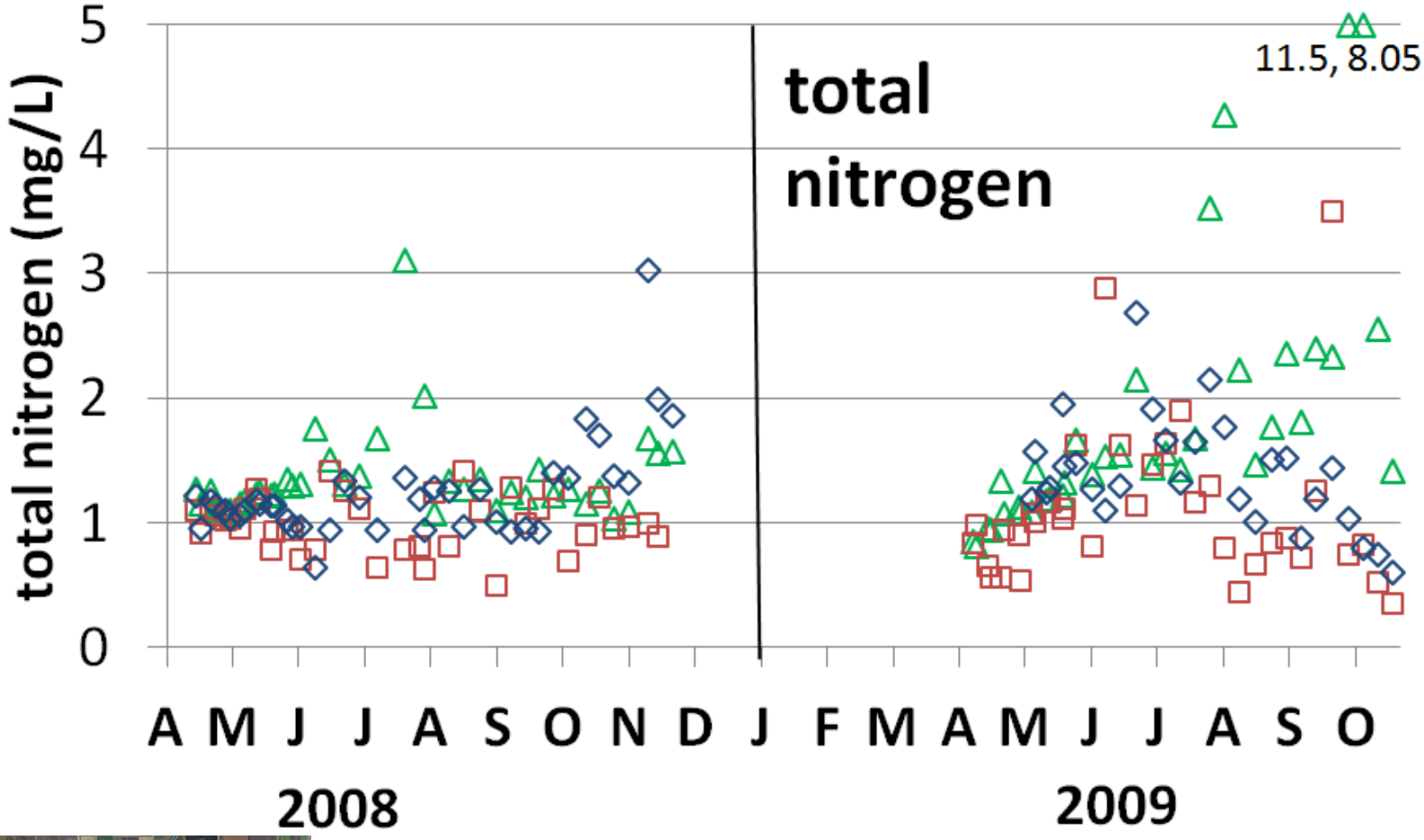
rainfall data from the Grand Forks NDAWN station
stream discharge measurements – U.S. Geological Survey and NWIS

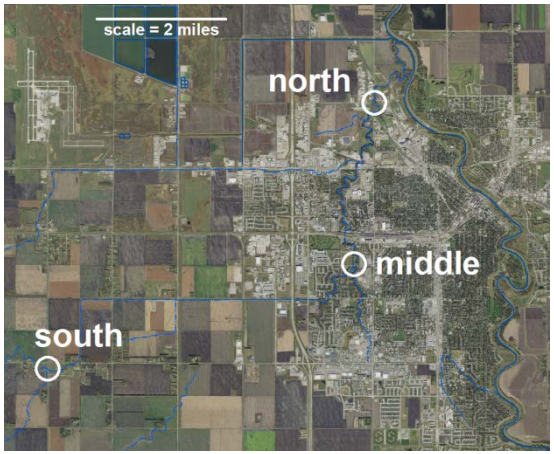




△ south □ middle ◇ north

data from the ND Department of Health





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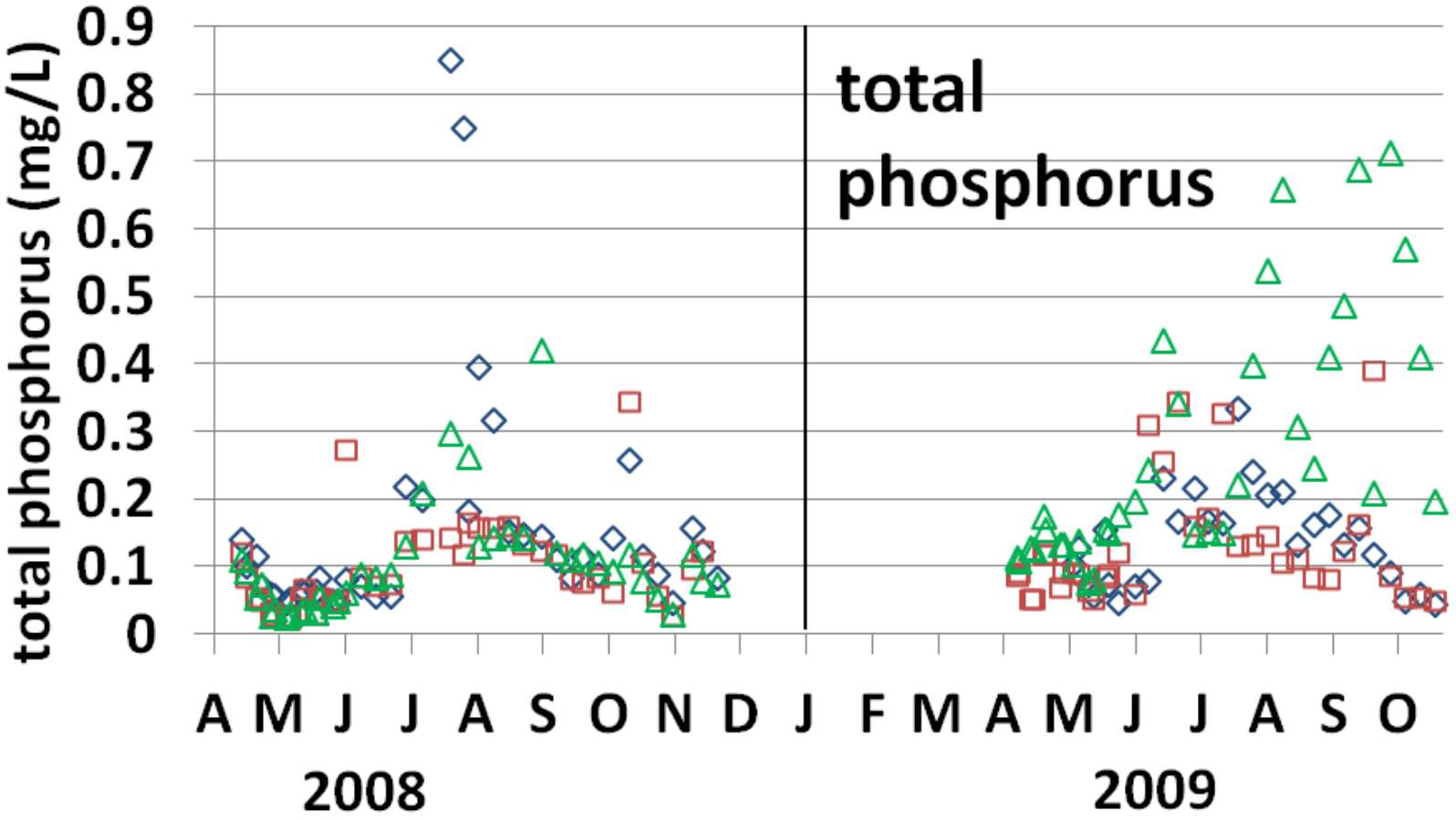
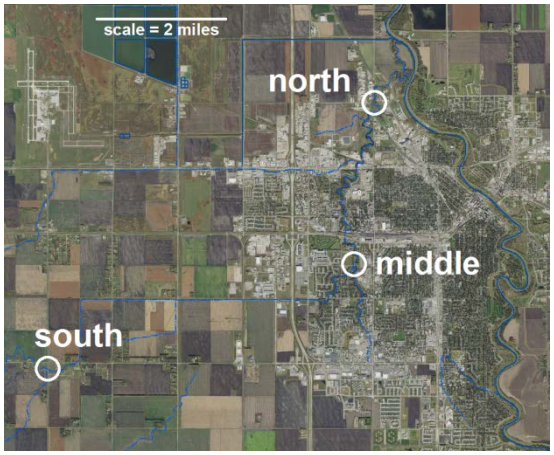
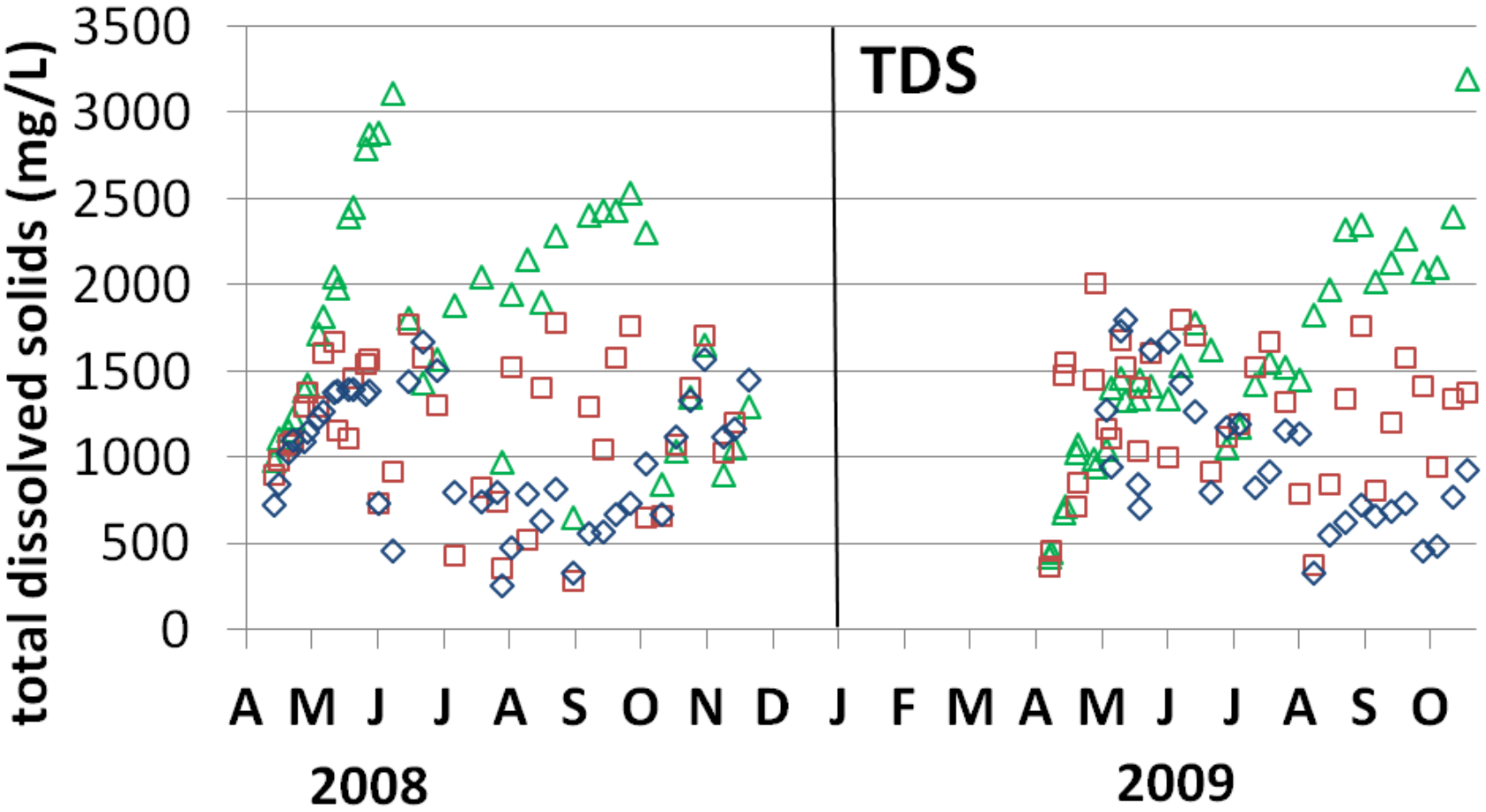
data from the ND Department of Health

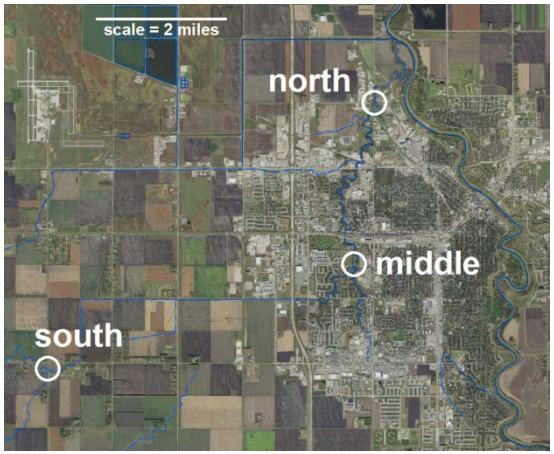




◇ north □ middle △ south

data from the ND Department of Health





△ south □ middle ◇ north

data from the ND Department of Health

Some observations from 2008-2009 discharge and water-quality data

- Discharge & flashiness generally increased downstream, due to storm runoff
- *E. coli* measurements suggest contamination throughout the reach
- *E. coli* consistently fell well above recreational standards (geometric mean of 5 samples over a 30-day period is required to be less than 125 CFU/100 mL, with no sample testing higher than 235 CFU/100 mL (U.S. EPA)
- Total N varied between 1 - 2 mg/L, mean total phosphorus roughly 0.2 mg/L
- Greatest nutrient concentrations occurred during the summer (late in 2009, ditch clean-outs led to elevated concentrations)
- TDS varied an order of magnitude within a few weeks time (precipitation flushing?)

Summary –

Large variation in both quantity and quality of the water.

Flow in the summer is sustained almost entirely by urban storm flow and possibly groundwater seepage

No potential for restoration to pre-development conditions

Mitigation of water quality problems and poor habitat will need to be framed in the waterway's present state

What are the alternatives?

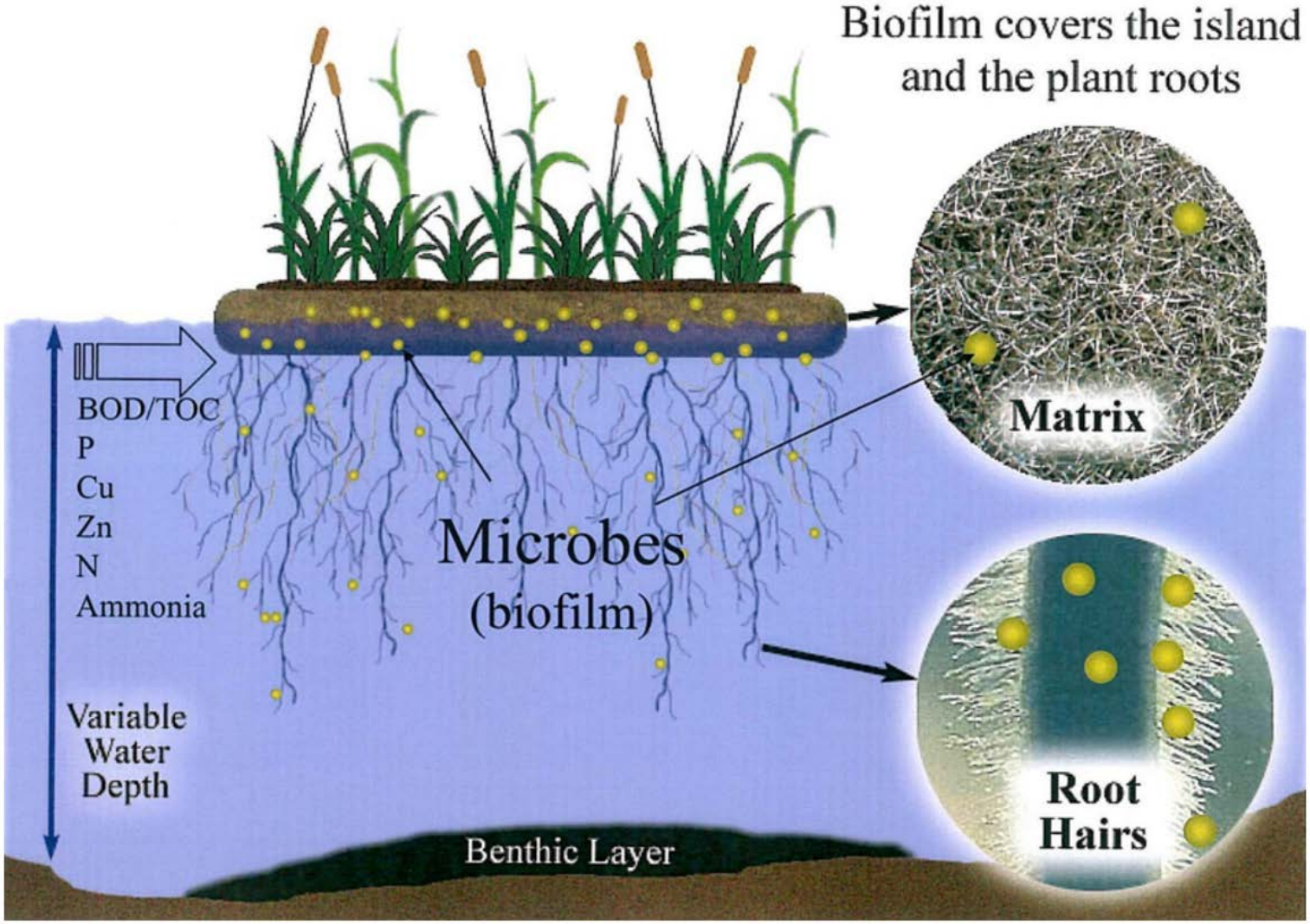
No Action – perhaps the safest and least costly

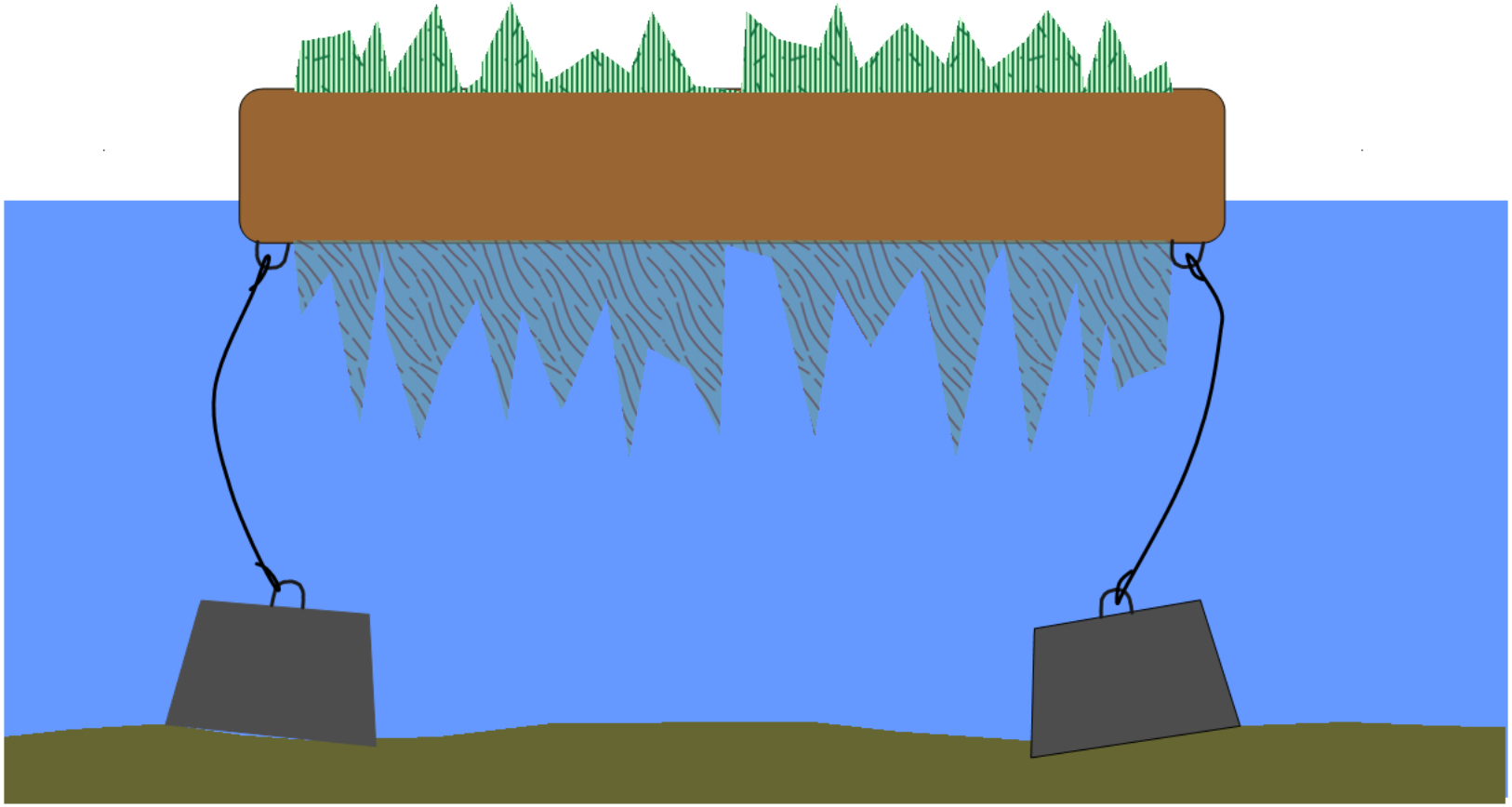
Control the Flow – modify the Coulee's diversion
controlled flush – potential flood damage
Regulate or Remove Rock Weirs – loss of permanent water

Reduce Storm Runoff (rain gardens, barrels) – potential to raise the water table
Hold & Treat Storm Runoff (retention ponds) – adopted in new areas
Aeration – cost and maintenance

Create Rural Buffers – loss of productive lands, affective for short periods
Improve the Urban Banks and Riparian Zone *– minor if any influence on water quality*
Floating Wetland Gardens *– the Environmental Restoration club's direction*
low cost / low maintenance
mobile
both water quality and habitat improvement
visible

image from http://midwestfloatingisland.com/technology/





install 7 x 10 foot “islands” in wider, lower velocity parts of the waterway

Potential “Island” Species

SOFTSTEM BULRUSH
Schoenoplectus tabernaemontani

HARDSTEM BULRUSH
Schoenoplectus acutus

THREE-SQUARE BULRUSH
Schoenoplectus pungens

BROAD-LEAVED ARROWHEAD
Sagittaria latifolia

NORTHERN WILD RICE
Zizania palustris

RATTLESNAKE MANNA GRASS
Glyceria canadensis

hardstem bulrush, image from P. Slichter (http://science.halleyhosting.com/

Conclusions

English Coulee is neglected but potentially valuable for habitat, aesthetics, recreation

Original hydrological characteristics greatly modified

Hydrological system reflects many stressors and impairments

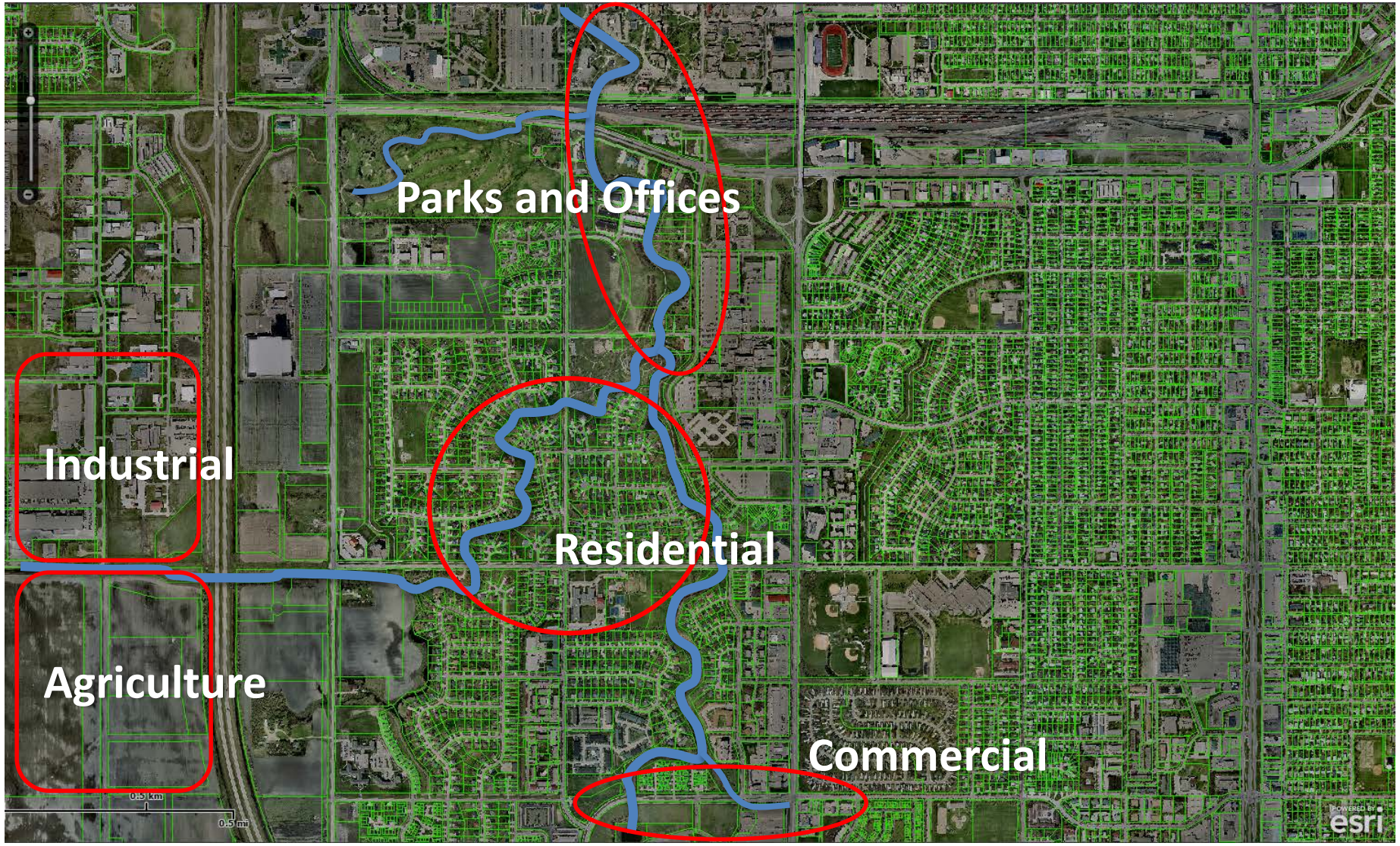
Mitigation of impairments constrained by urban infrastructure

UND plans to move forward:

--- floating islands

--- better manage a narrow riparian edge

--- explore other options


Parks and Offices
Industrial
Residential
Agriculture
Commercial
0.5 km
0.5 mi
esri

Impoundment (few miles NW of Thompson)


Diversion (few miles W on 32nd Ave.)
100 meters