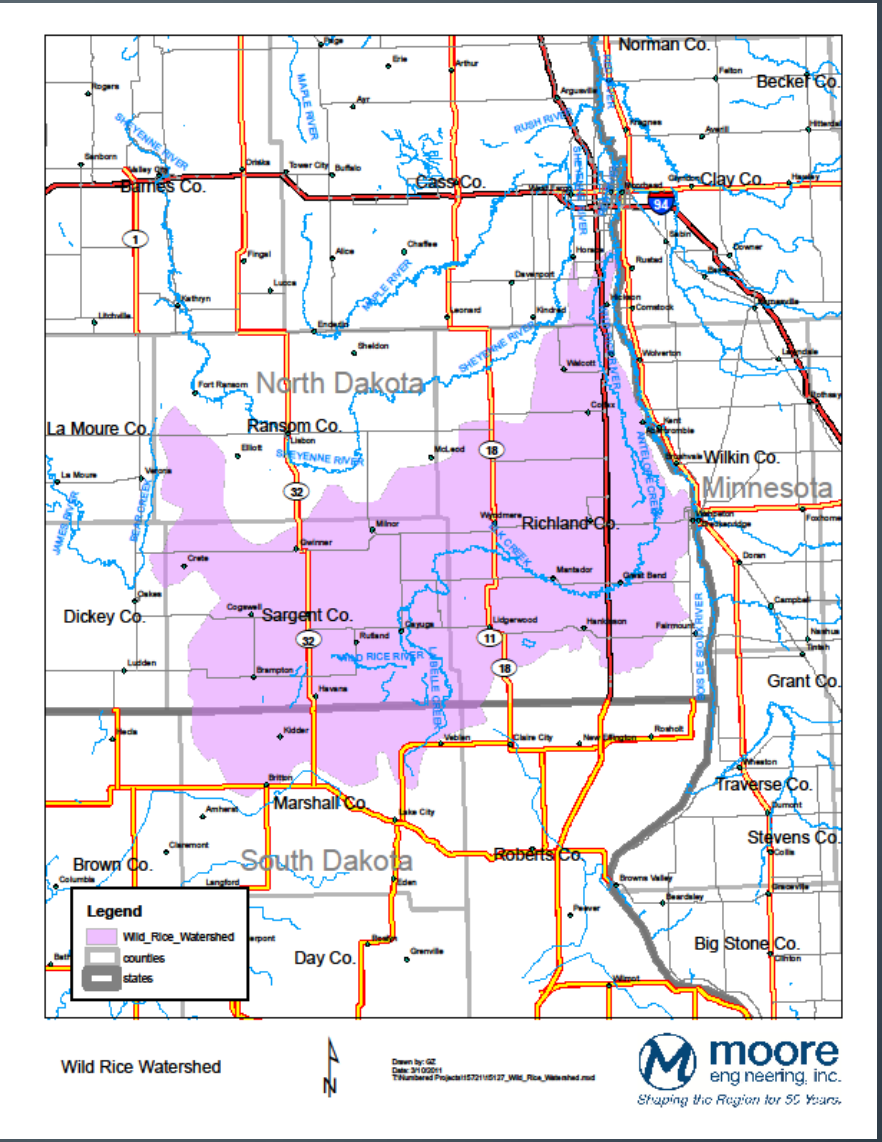
Sargent Central River Watch

Marcus Mahrer, Josh Christianson, Hailey Hamilton, Taylor Wyum, Tyler Peterson

Wild Rice River



Moore Engineering (2013)

The Wild Rice Fascinating Facts

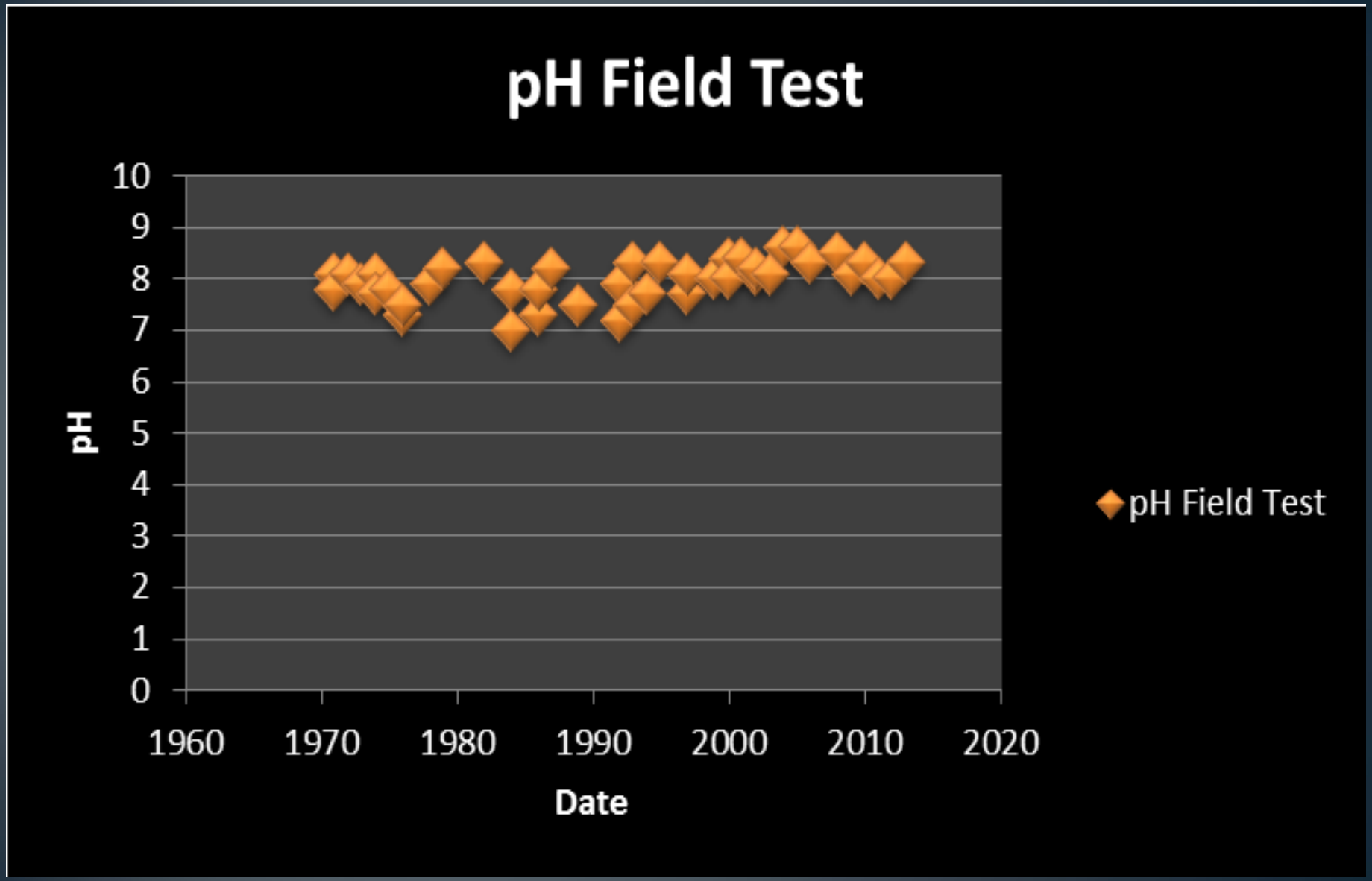
- Tributary of the Red River of The North
- 251 miles long
- Drains an area of 2,233 square miles
- Average rate of flow is 100 cubic feet per second
- Sight seeing, bird watching, and kayaking are some of the many activities that occur on this water system

What is Tewaukon?

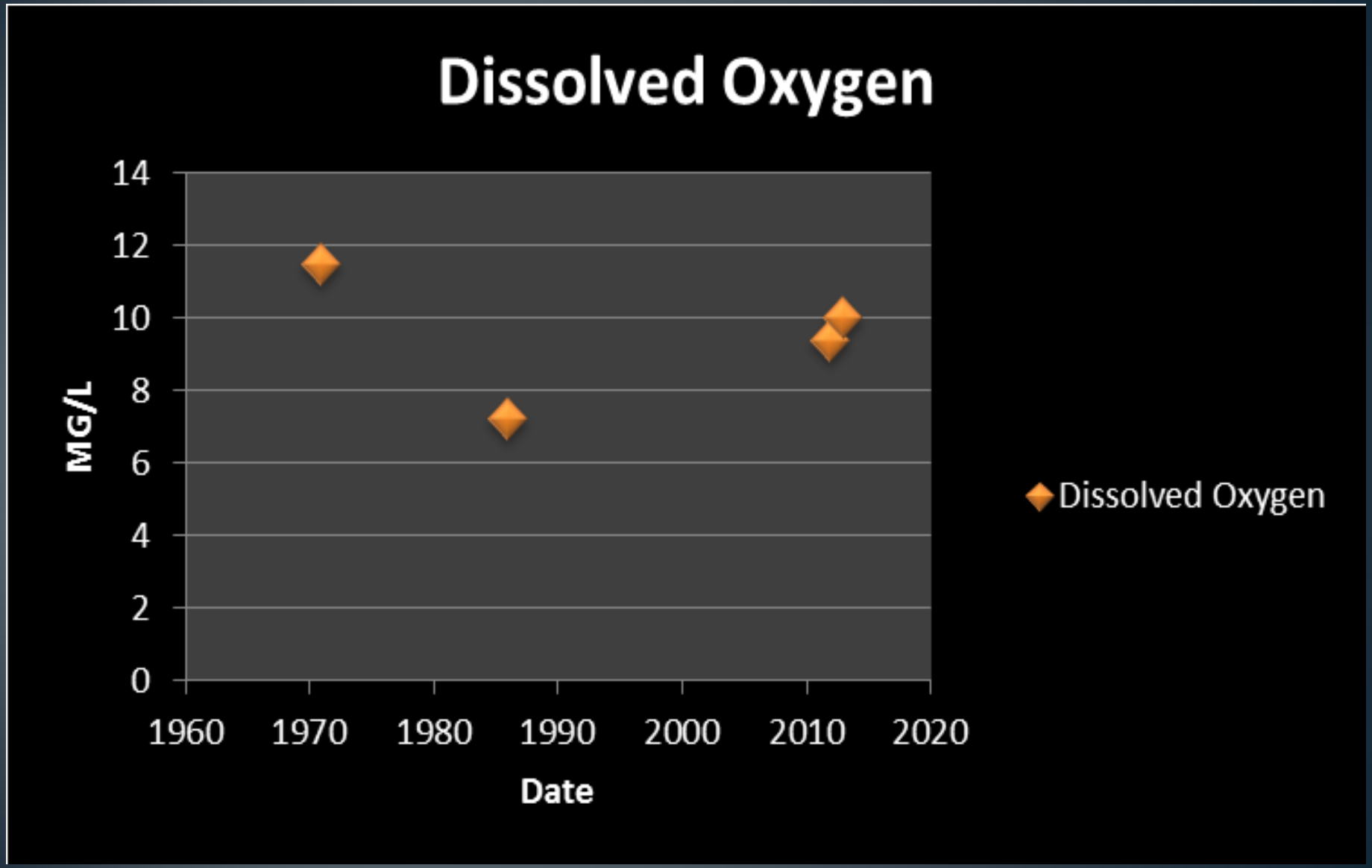
- What is the purpose of Tewaukon?
- What do we already know?
- What do we want to find out?

Acceptable Water Quality Values (Watercourse 2002)

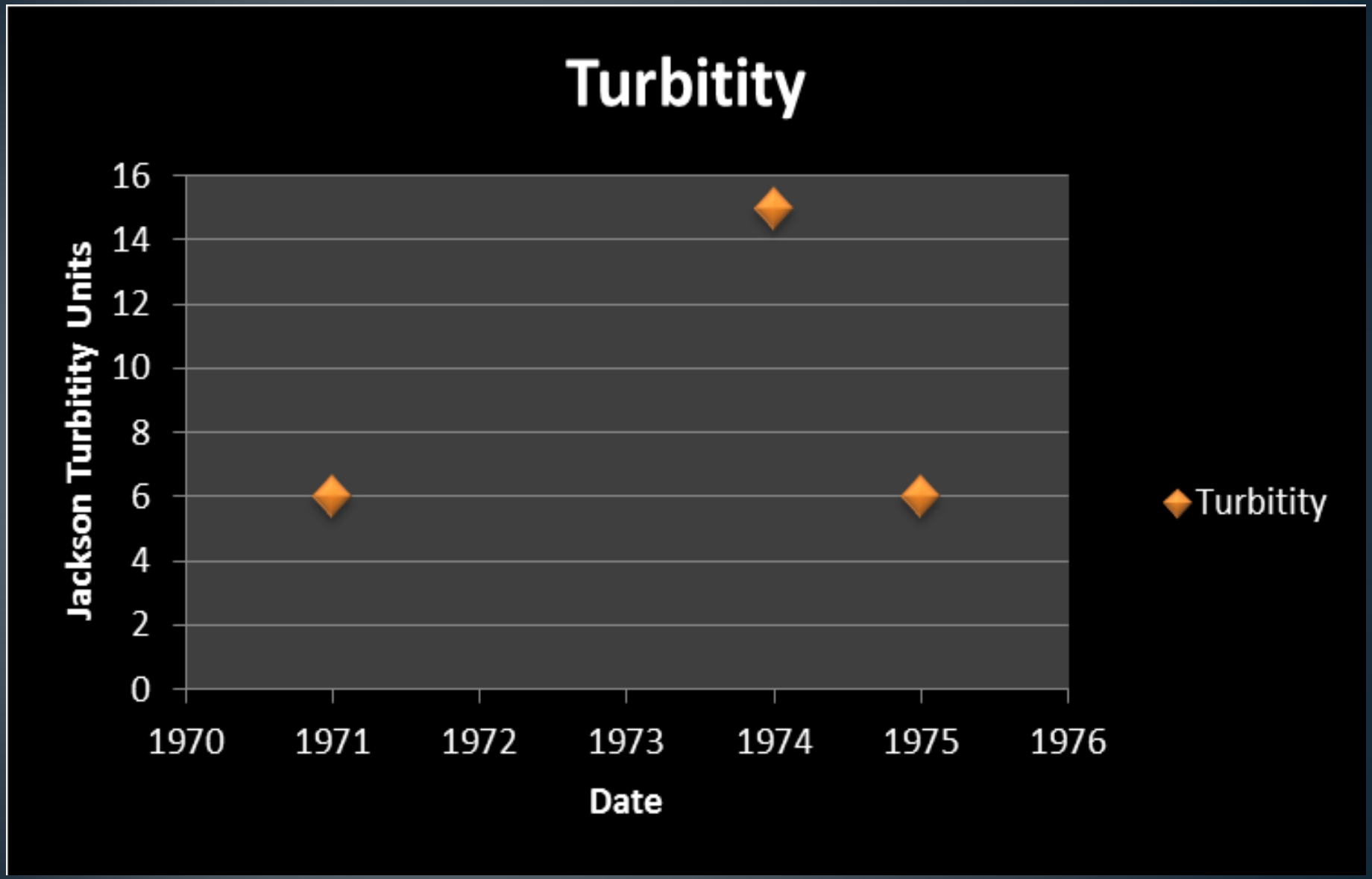
Parameter	Acceptable Values
Conductivity	150-500 microsiemens/cm
Dissolved Oxygen	Above 5 mg/l
pH	7-8
Turbidity	Less than 1 Nephelometric Turbidity Units (NTU)
Nitrates	Less than 1 mg/l
Phosphates	Less than .1 mg/l


pH Field Test
10
9
8
7
6
5
4
3
2
1
0
pH
1960
1970
1980
1990
2000
2010
2020
Date
pH Field Test

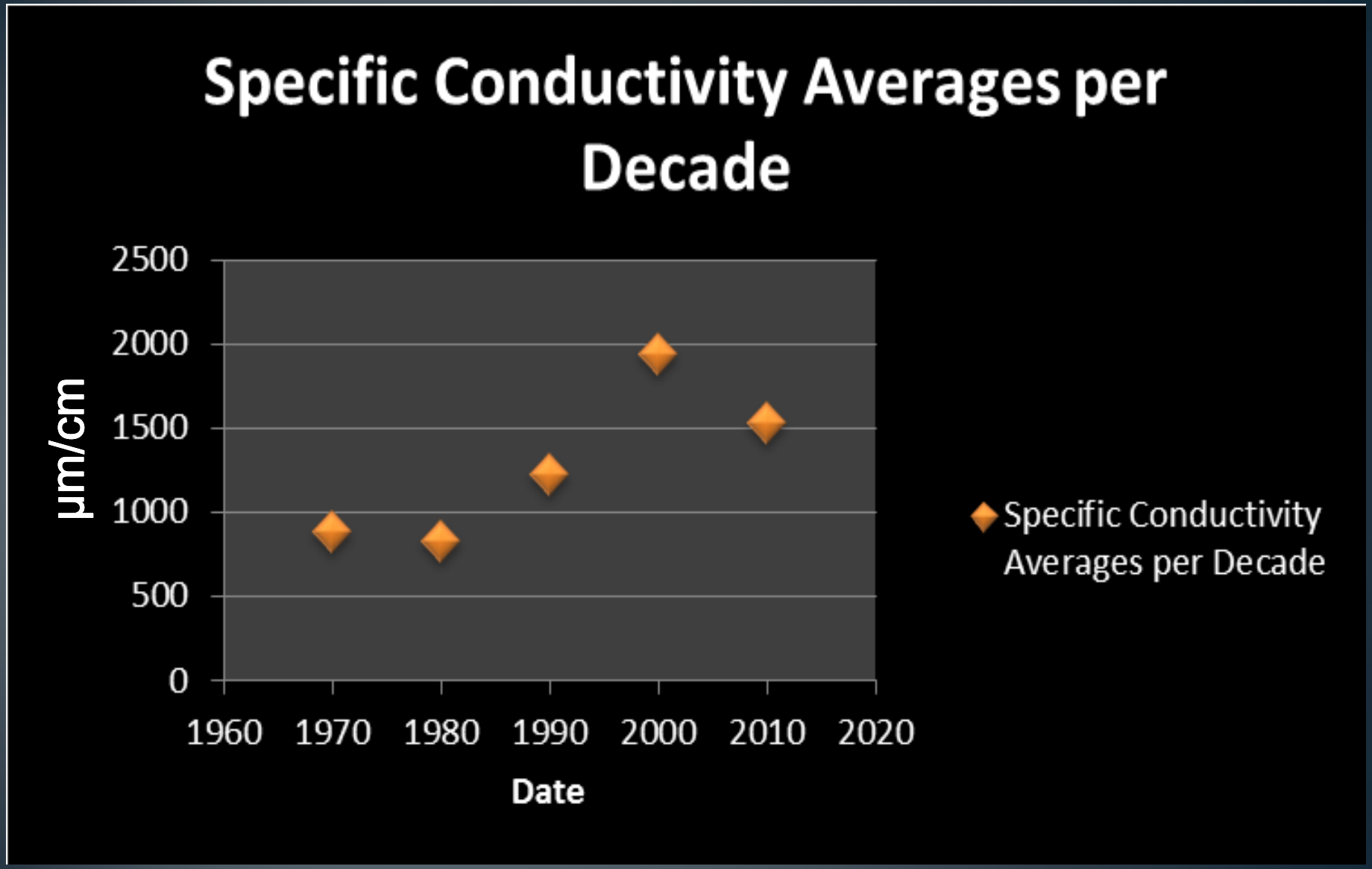
USGS, 2013


Dissolved Oxygen
14
12
10
8
6
4
2
0
MG/L
1960
1970
1980
1990
2000
2010
2020
Date
Dissolved Oxygen

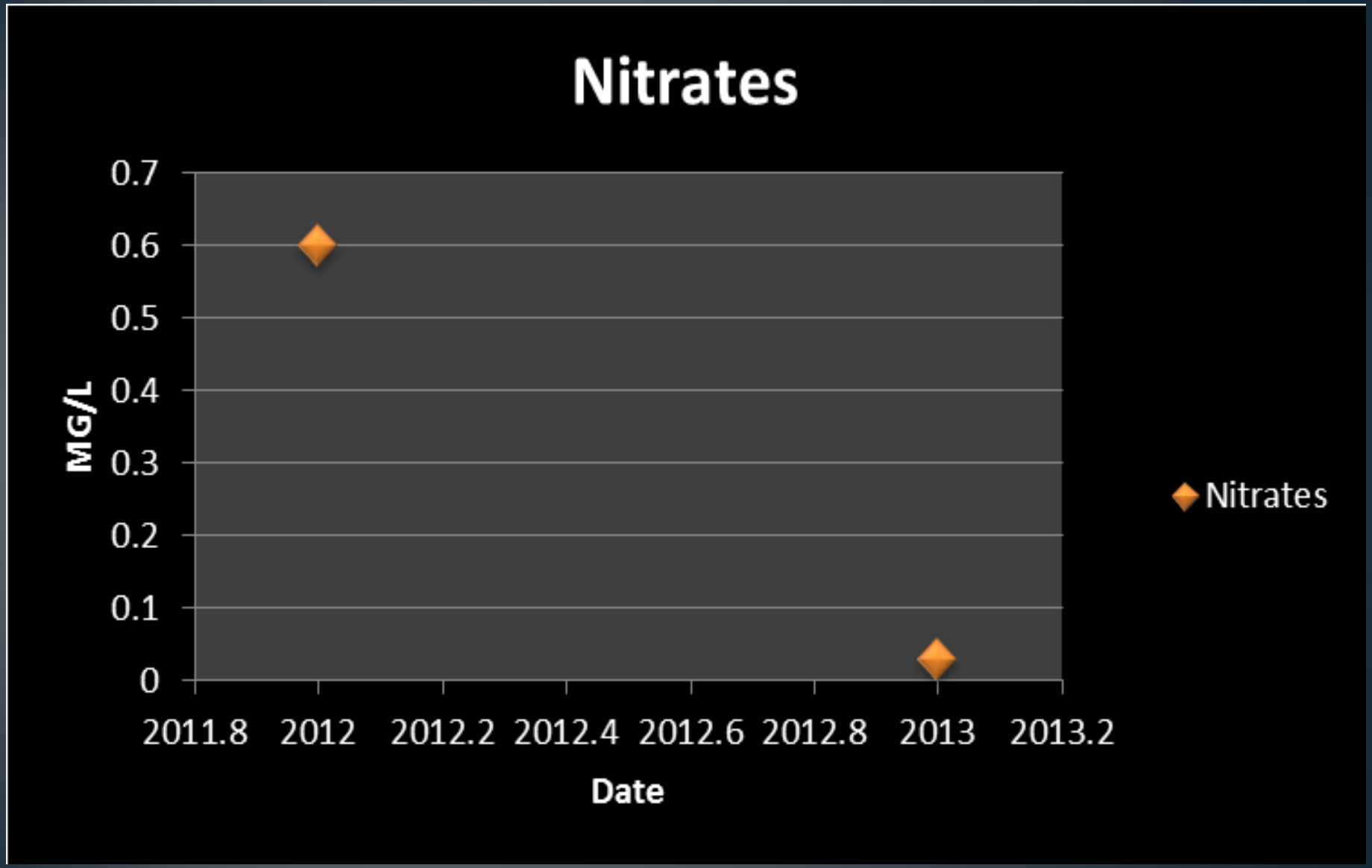
USGS, 2013


Turbitity
Jackson Turbitity Units
16
14
12
10
8
6
4
2
0
1970
1971
1972
1973
1974
1975
1976
Date
Turbitity

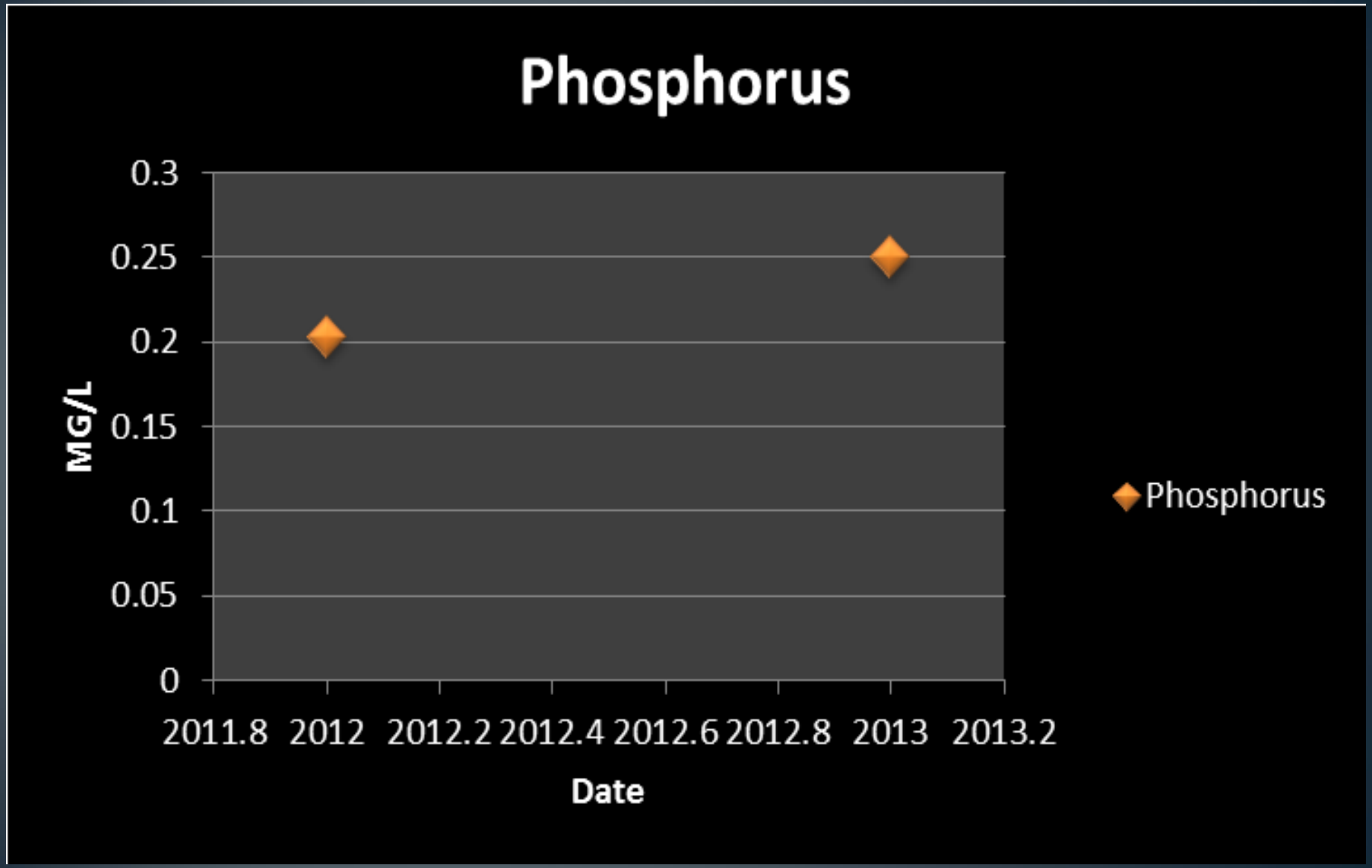
USGS, 2013


Specific Conductivity Averages per Decade
µm/cm
2500
2000
1500
1000
500
0
1960
1970
1980
1990
2000
2010
2020
Date
Specific Conductivity Averages per Decade

USGS, 2013


Nitrates
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
MG/L
2011.8
2012
2012.2
2012.4
2012.6
2012.8
2013
2013.2
Date
Nitrates

USGS, 2013


Phosphorus
0.3
0.25
0.2
0.15
0.1
0.05
0
MG/L
2011.8
2012
2012.2
2012.4
2012.6
2012.8
2013
2013.2
Date
Phosphorus

USGS, 2013

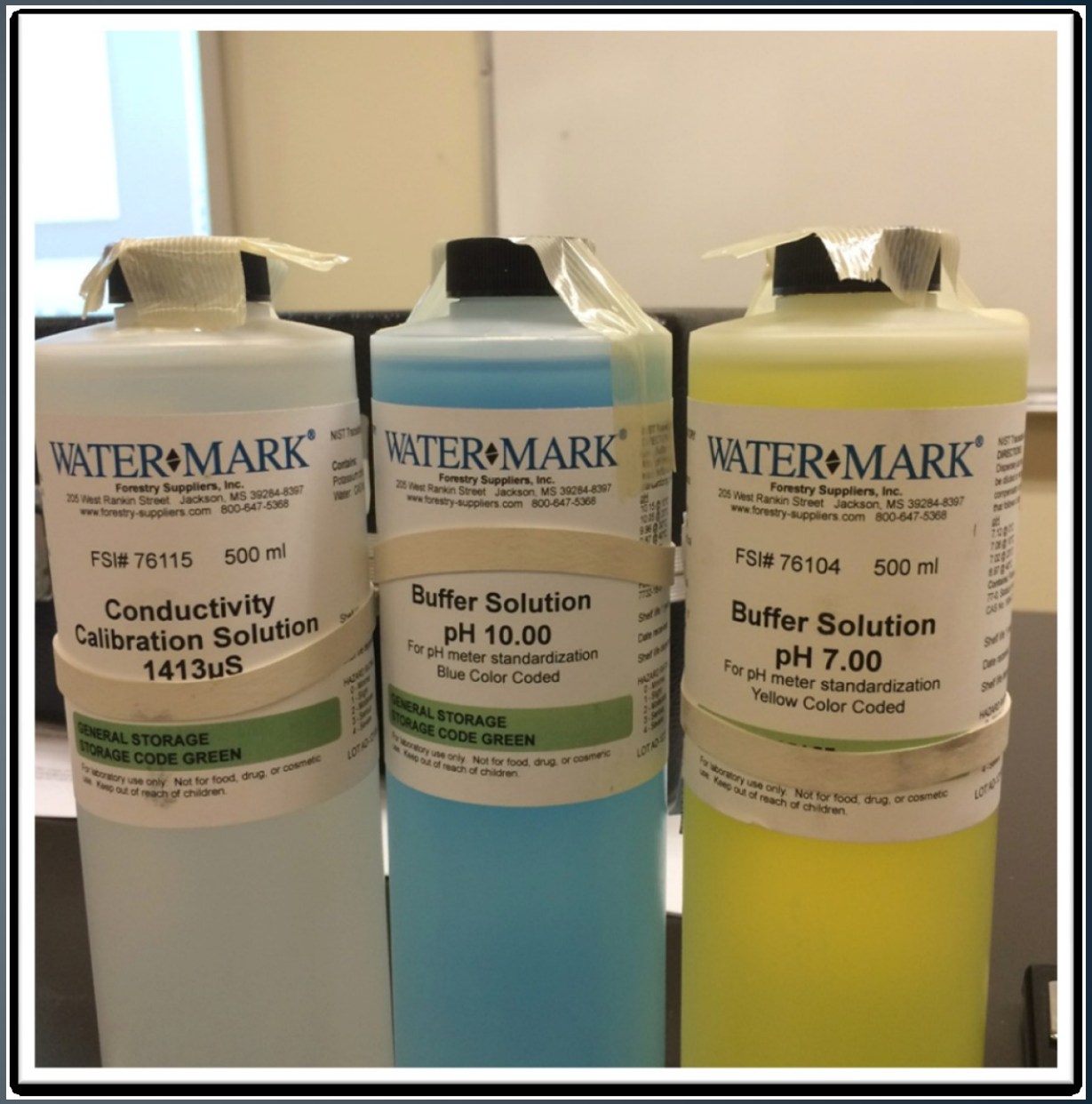
Methods and Materials

- YSI Handheld and Sonde 600 XL
- Hach Turbidimeter
- Water Sampler

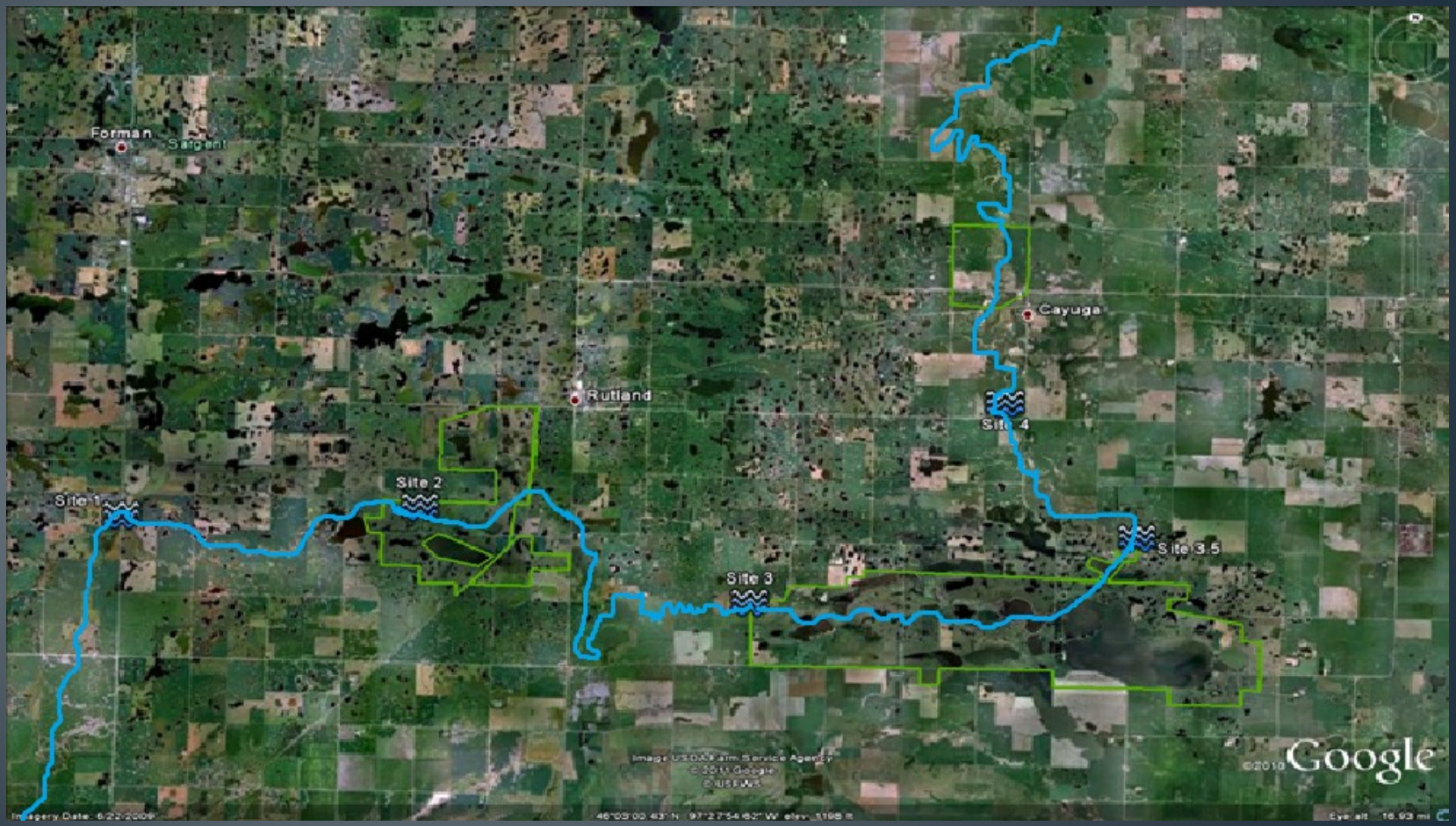
- We tested turbidity, specific conductivity, dissolved oxygen, and pH before and after Tewaukon in order to become aware of any changes that may be a result of the Tewaukon buffer zone.


HACH
2100Q

Calibration Fluid

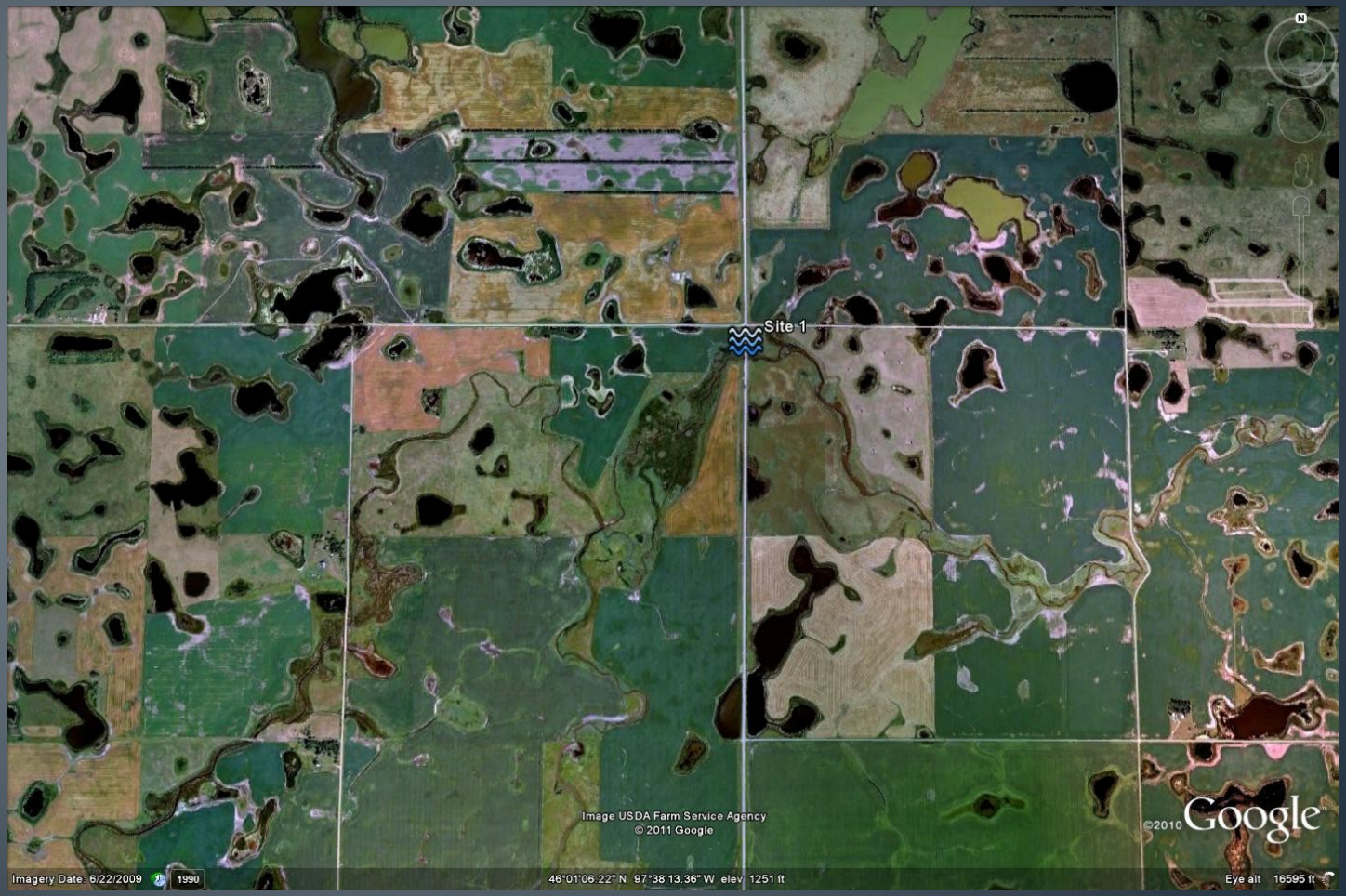


Sites



Google, Inc.

Site 1


Site 1
Image USDA Farm Service Agency
© 2011 Google
©2010 Google
Imagery Date: 6/22/2009
1990
46°01'06.22" N 97°38'13.36" W elev 1251 ft
Eye alt 16595 ft

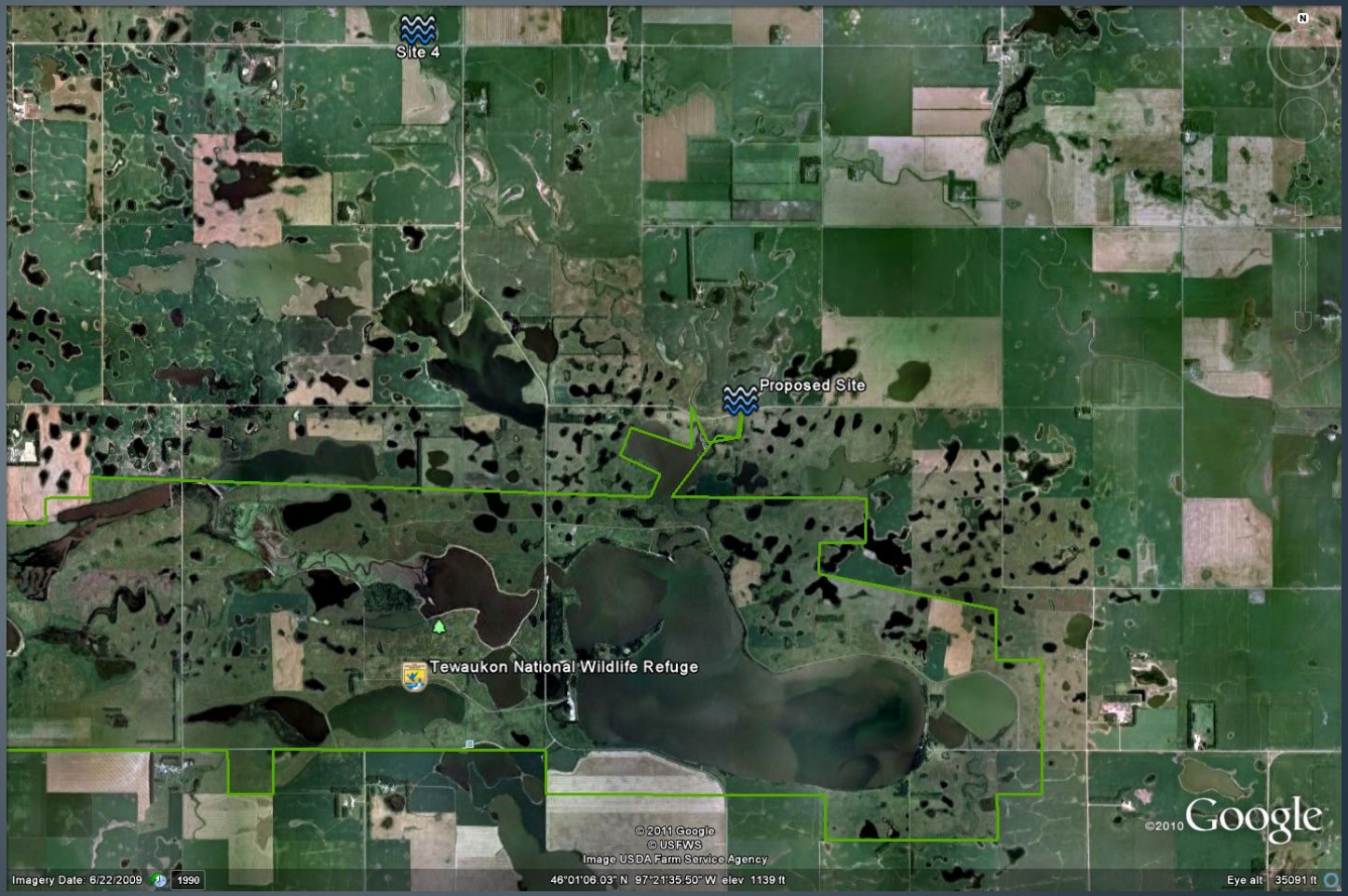
Site 2


N
Site 2
Image USDA Farm Service Agency
© 2011 Google
©2010 Google
Imagery Date: 6/22/2009
1990
46°01'28.63" N 97°33'54.00" W elev 1230 ft
Eye alt 11710 ft

Site 3


Site 3
Image USDA Farm Service Agency
© 2011 Google
©2010 Google
Imagery Date: 6/22/2009
1990
45°59'41.20" N 97°28'32.08" W elev 1186 ft
Eye alt 17580 ft

Site 3.5


Site 4
Proposed Site
Tewaukon National Wildlife Refuge
©2010 Google
©2011 Google
©USFWS
Image USDA Farm Service Agency
Imagery Date: 6/22/2009
1990
46°01'06.03" N 97°21'35.50" W elev 1139 ft
Eye alt 35091 ft

Site 4

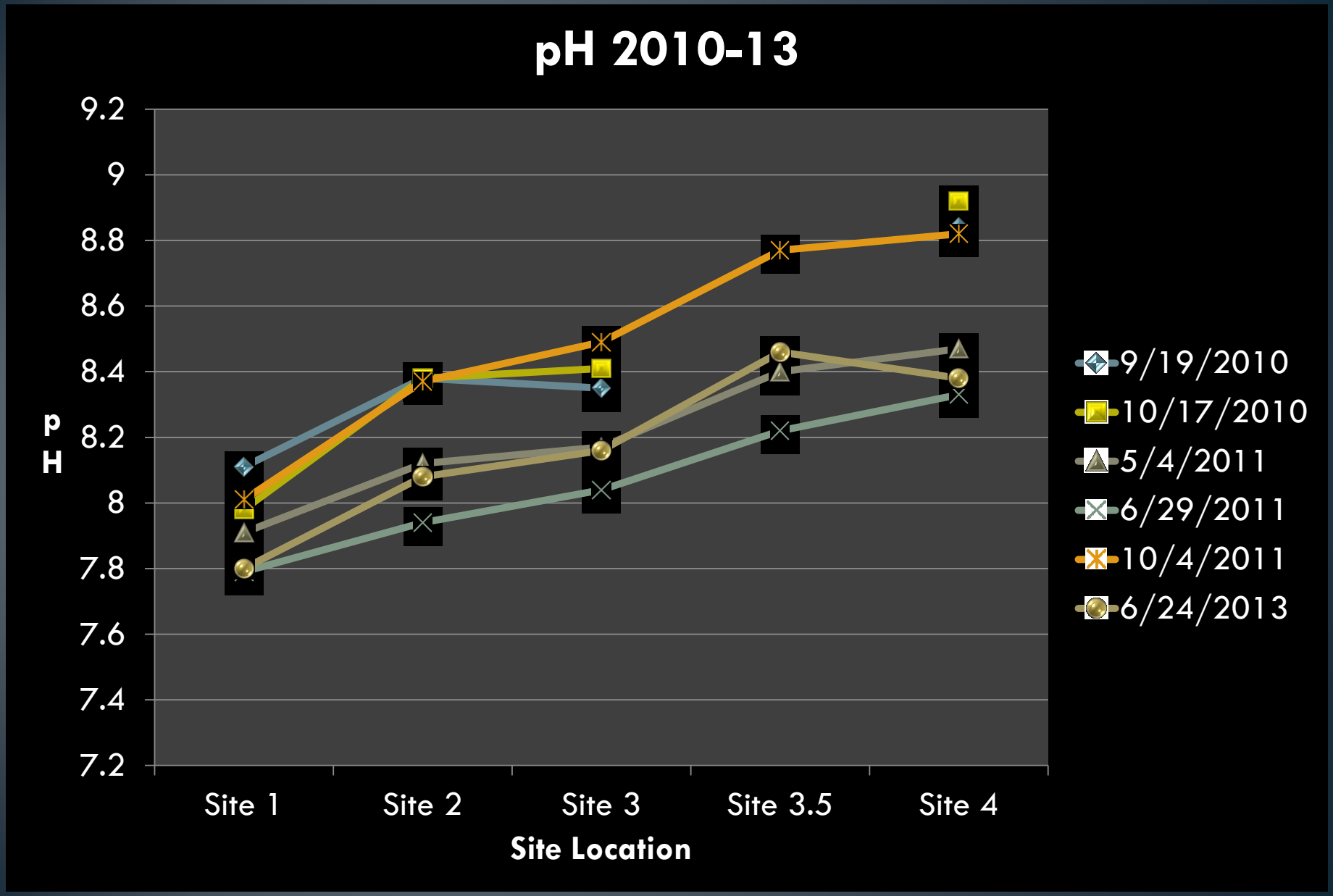

Site 4
Image USDA Farm Service Agency
© 2011 Google
©2010 Google
Imagery Date: 6/22/2009
1990
46°01'15.04" N 97°22'50.91" W elev 1162 ft
Eye alt 34621 ft

Tewaukon NWR

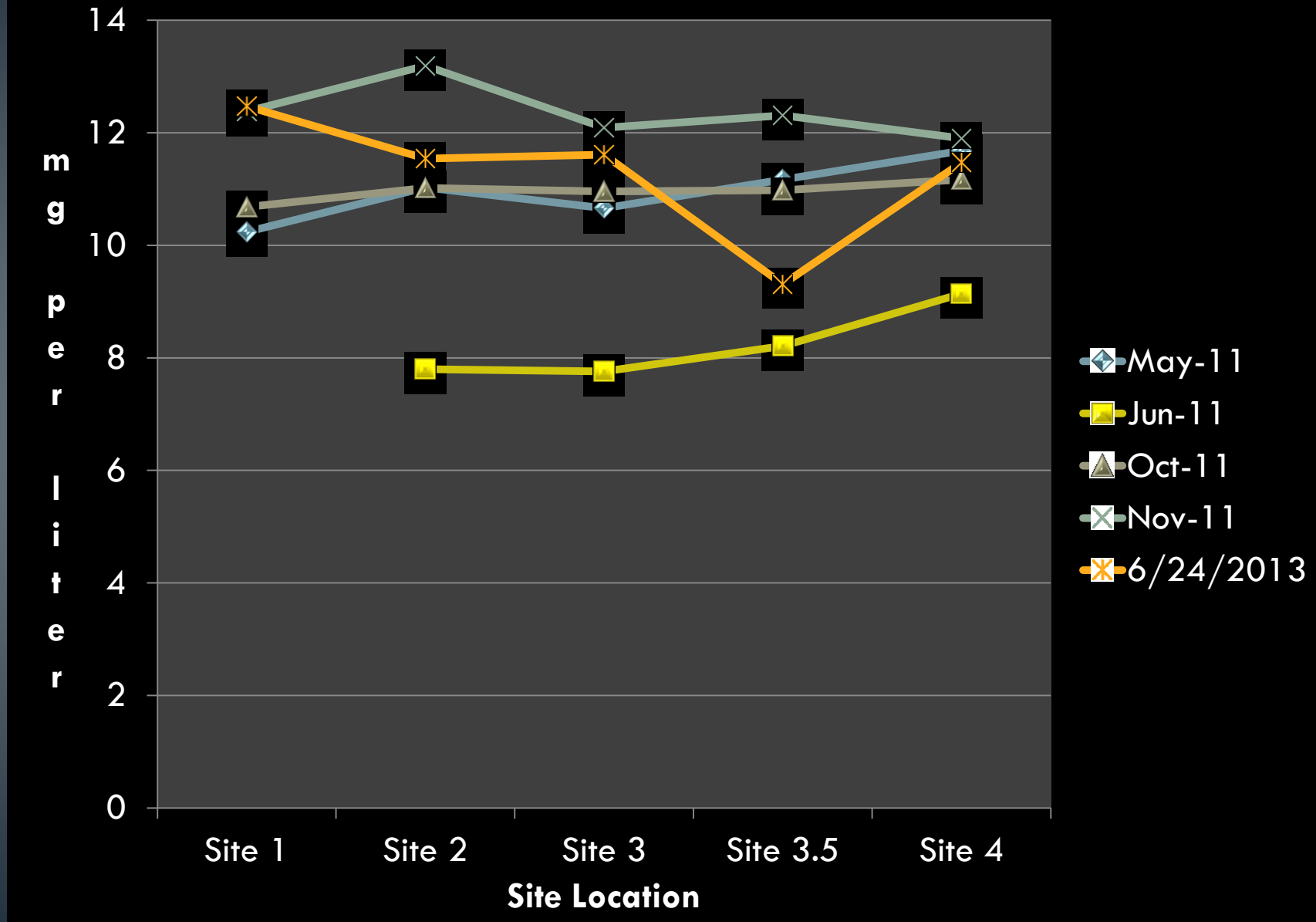
Tewaukon's Wetlands

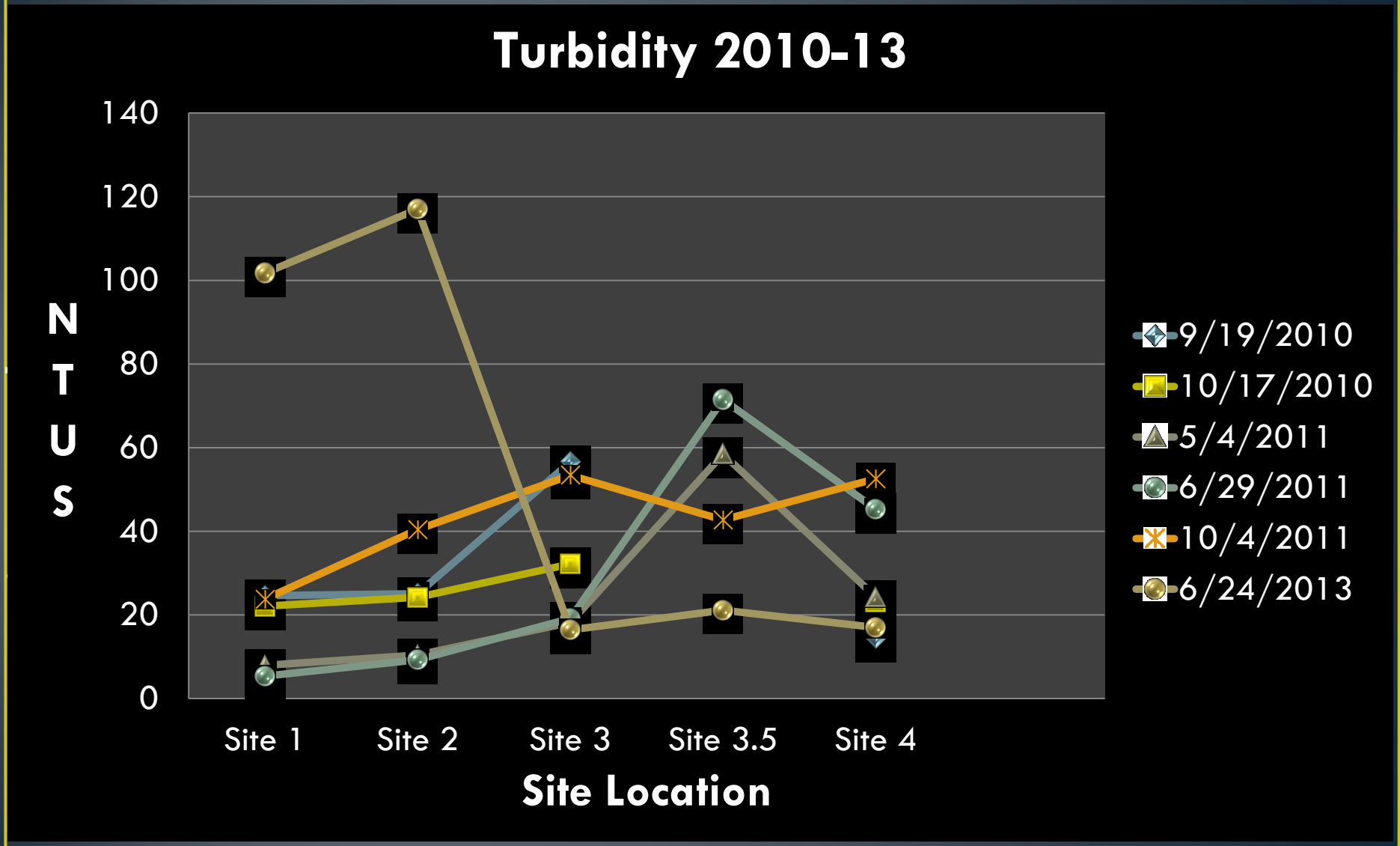
Results:

What We Found

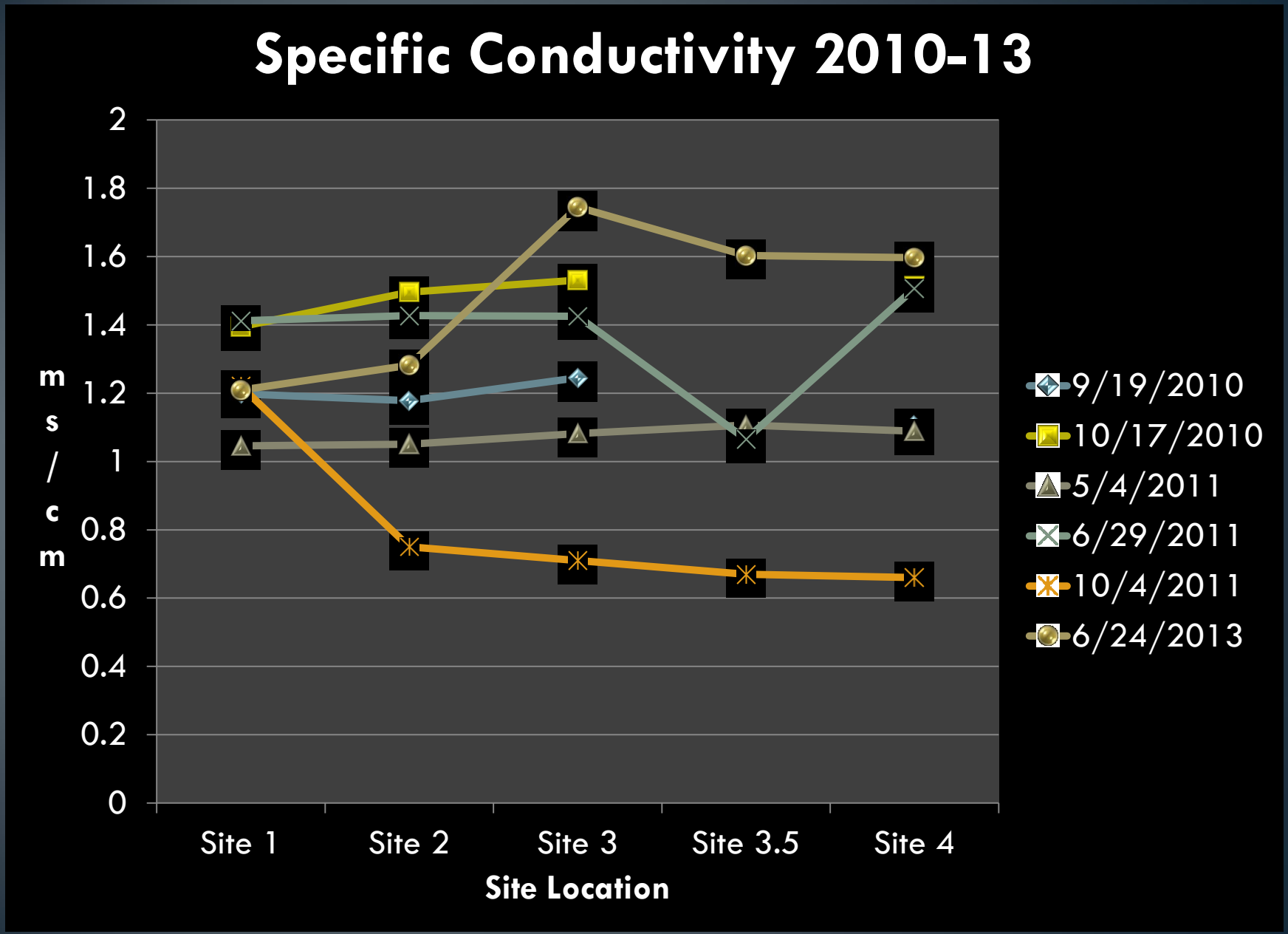

pH 2010-13
9.2
9
8.8
8.6
8.4
8.2
8
7.8
7.6
7.4
7.2
pH
Site 1
Site 2
Site 3
Site 3.5
Site 4
Site Location
9/19/2010
10/17/2010
5/4/2011
6/29/2011
10/4/2011
6/24/2013

Dissolved Oxygen 2010-13




Turbidity 2010-13
NTUS
140
120
100
80
60
40
20
0
Site 1
Site 2
Site 3
Site 3.5
Site 4
Site Location
9/19/2010
10/17/2010
5/4/2011
6/29/2011
10/4/2011
6/24/2013

Specific Conductivity 2010-13



Discussion

What Does All of This Mean?

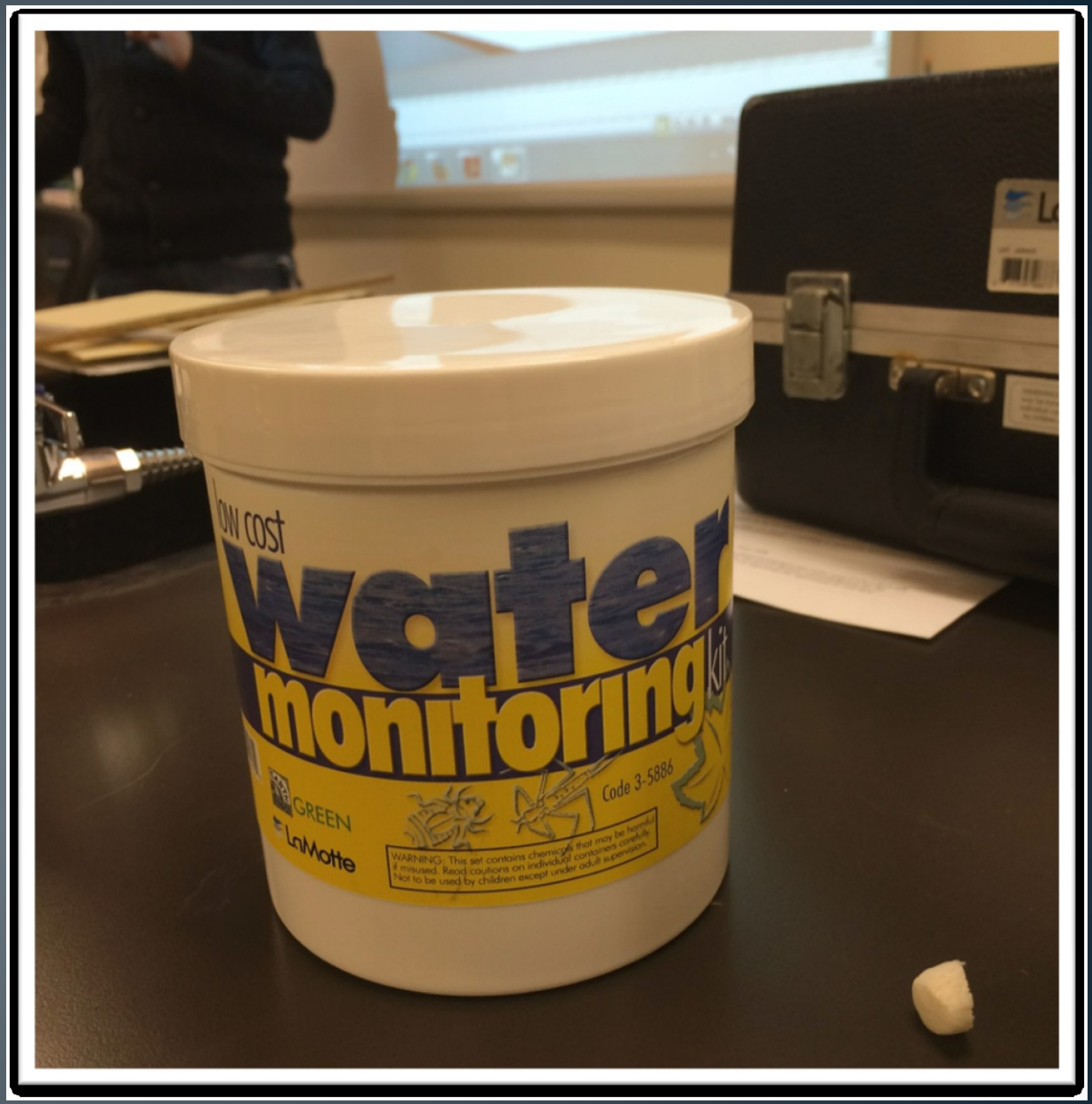
Trends

- pH increases as water flows through buffer zone as expected due to increased plant activity
- Dissolved oxygen is at high levels. This means that nutrient levels coming in from runoff may be at acceptable levels within the Wild Rice River.
- Turbidity is high. Characteristic of muddy North Dakota rivers. Could be caused by the high levels of agriculture around the watershed. Some of our high readings due to seasonal runoff. Ours higher than the USGS test station
- Specific conductivity was high. Clay soil may contribute to this number. Ions for agricultural runoff.

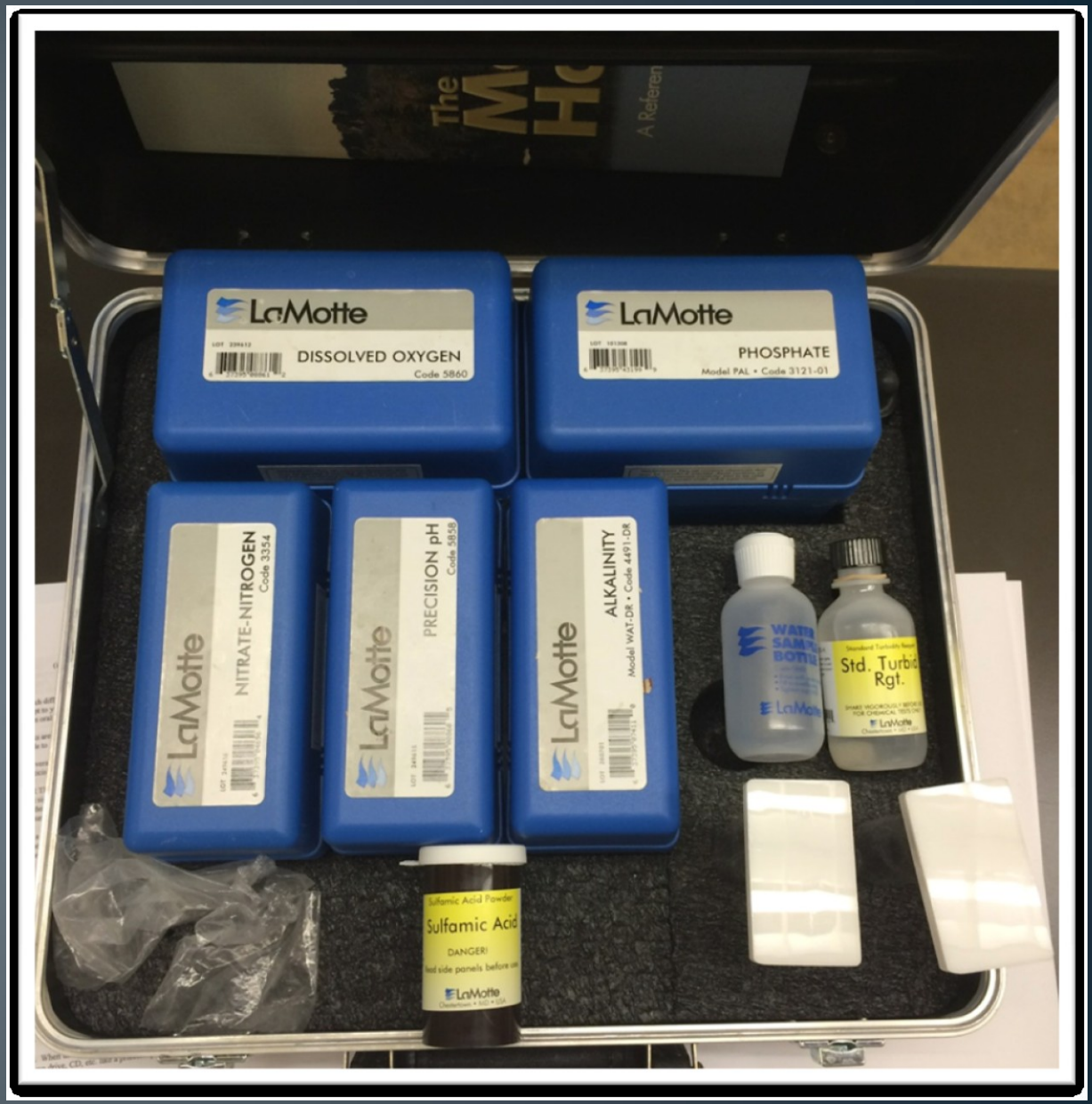
Recommendations

- The trends on the previous slide may be possible explanations for the values we found. Further background research needs to be done to explain these numbers.
- In order to help explain these numbers more fully, we will be testing for nitrates and phosphates using Lamotte kits.

LaMotte Low Cost Water Monitoring Kit



LaMotte Water Quality Educator and Monitoring Kit



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The Watercourse. (2002) Healthy Water, Healthy People: Testing Kit Manual. Retrieved from: http://www.amazon.com/Healthy-Water-People-Testing-Manual/dp/1888631139