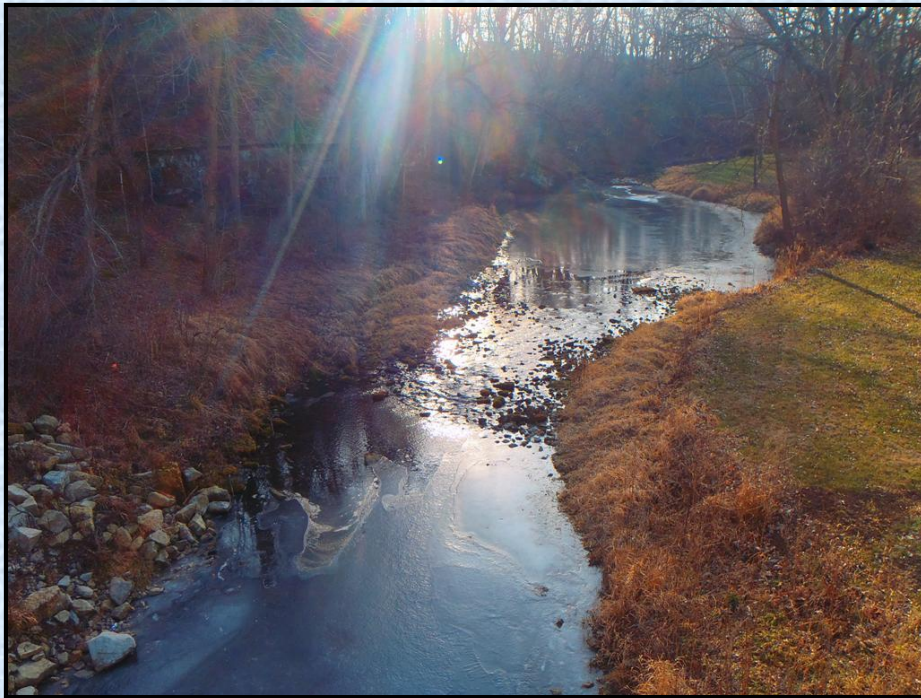


Dodge County Water Monitoring Update - 2017



Why Monitor ?

- To assess & protect public health
- To support existing grants and programs – and promote possible extensions
- To promote public education and participation
- To explore new grant possibilities
- To support water plan objectives



Monitoring Program:

Private Well Testing

Goals:

1. To assess & protect public health
2. To expand the private well database and increase potential for data-based projects.
3. To determine water quality trends over time.

Future/ Timeline:

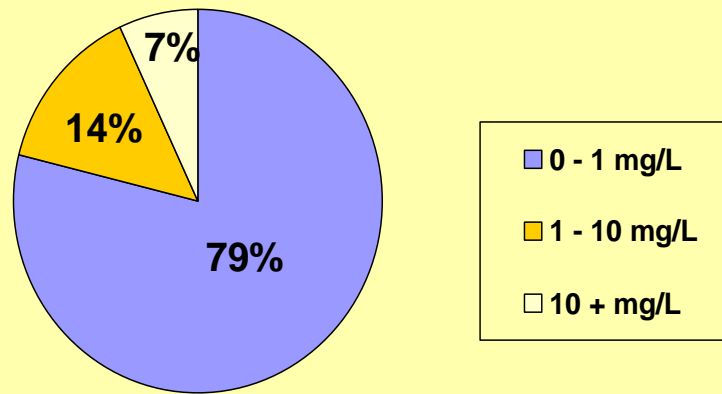
1. Ongoing program
2. Primarily funded through user fees.

NITRATE CONTAMINATION

Sources: Barnyard or feedlot run-off, excessive fertilizer, septic systems.

Drinking water standard is 10 mg/L. Higher levels cause health risks to infants and expectant mothers.

Nitrate Level in Well Samples 1995-2016 (2547 Samples)

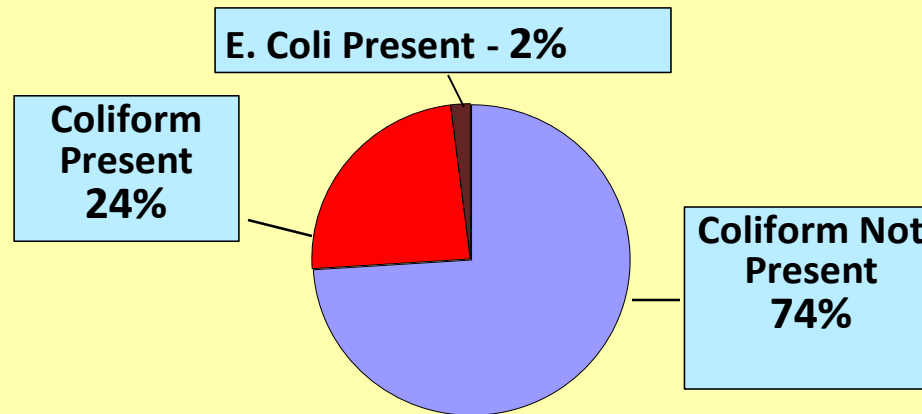


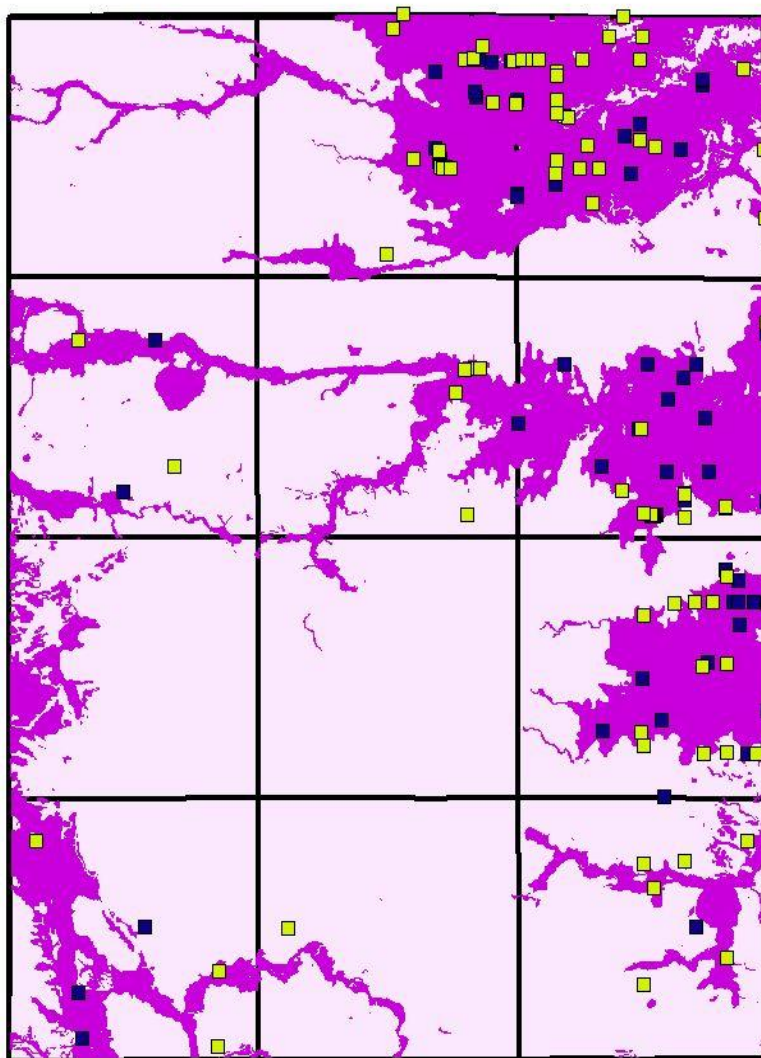
BACTERIA CONTAMINATION

Presence of coliform bacteria in well water indicates surface contaminants and disease organisms may be present.

E.Coli is a more serious disease-causing type of coliform bacteria.

Bacteria in Well Samples 1995 - 2016 (2310 Tests)





DODGE COUNTY WELLS WITH HIGH NITRATE LEVELS

■ 5 - 10 mg/l

■ 10 + mg/l

■ HIGHLY
SENSITIVE
GROUNDWATER
AREA

High nitrate wells occur most frequently in the Highly Sensitive Groundwater Area, where depth-to-bedrock is less than 50 ft, or where underground sand lenses exist.

Monitoring Program:	Woodchip Bioreactor & Saturated Buffer
Goals:	<ol style="list-style-type: none">1. To support an existing grant, and promote possible extension.2. To demonstrate, for interested neighbors, a successful means of reducing nitrate in tile water.
Future/ Timeline:	<ol style="list-style-type: none">1. Bioreactor success shown on both local and regional scale; Sat. buffer needs further local monitoring.2. Recommended bioreactor sampling end after 2017; Sat. buffer after 2018.

Studies conducted by various government agencies can often provide impetus to a sampling effort.

MN Nutrient Reduction Strategy

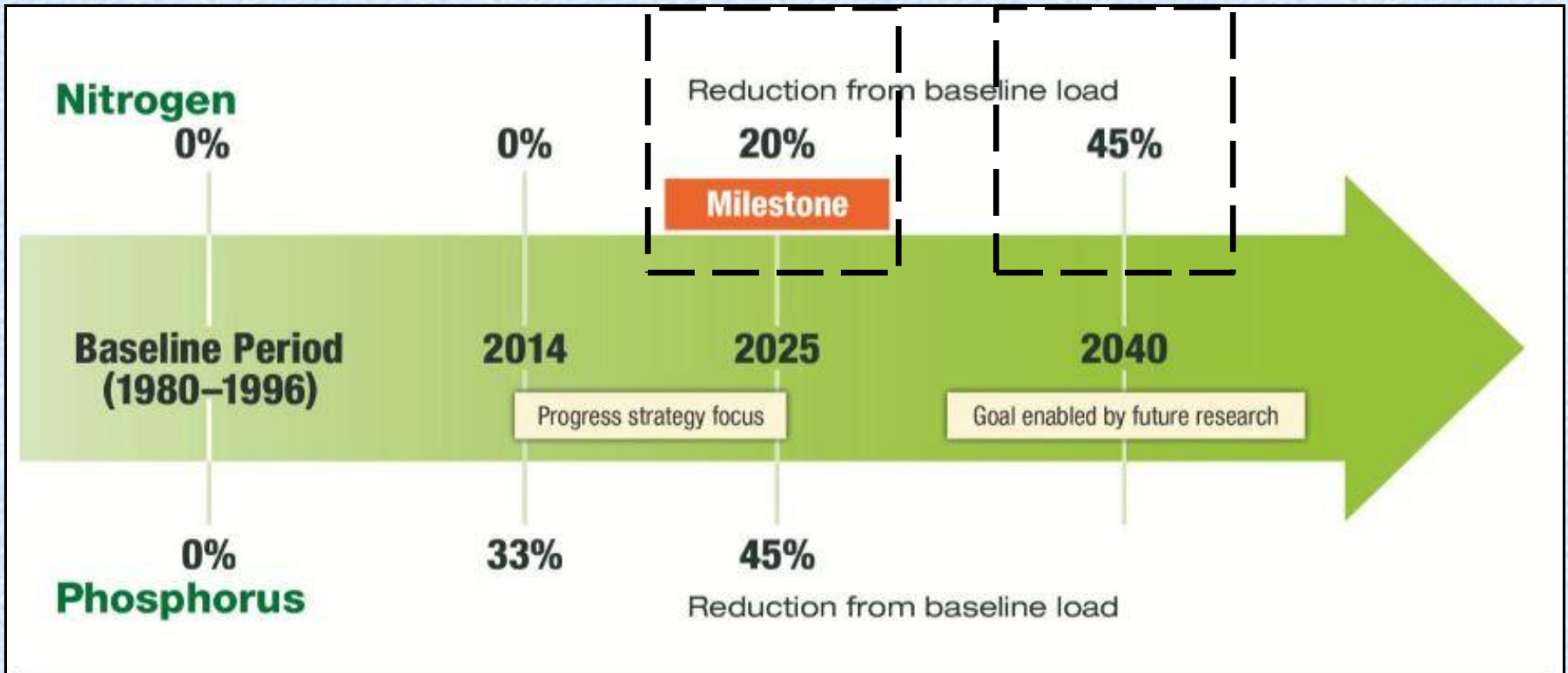
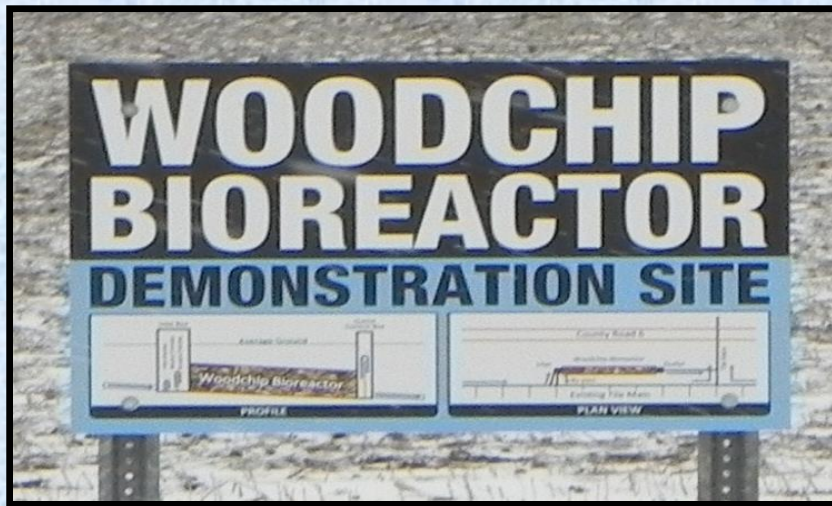
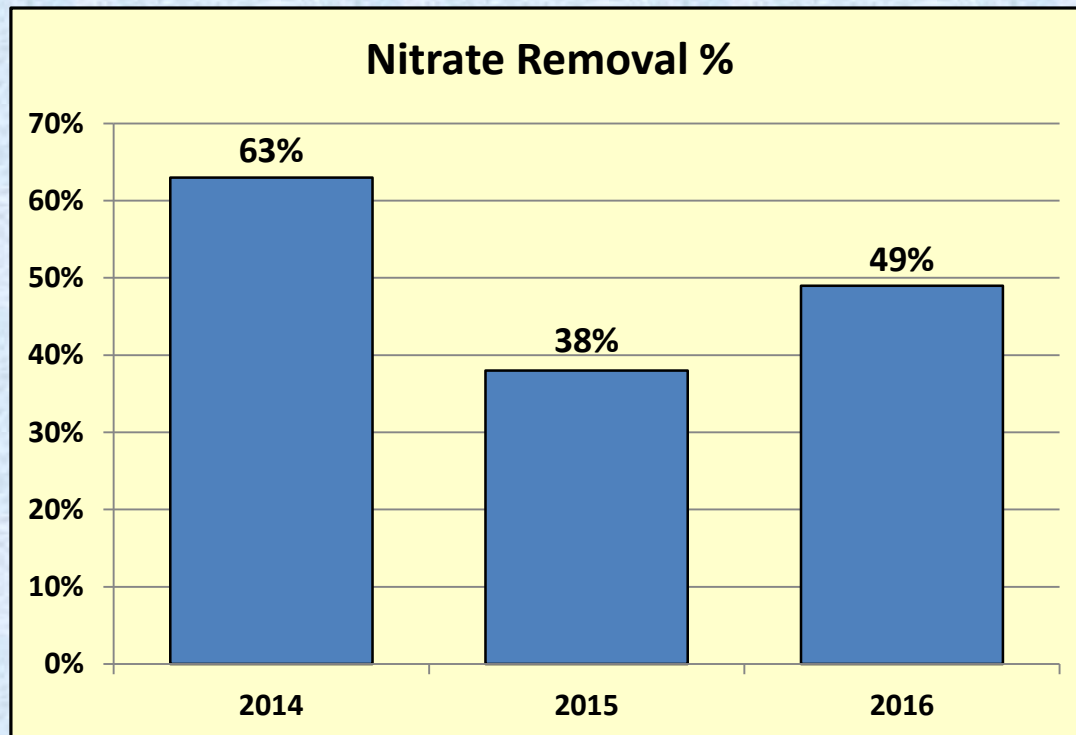


Figure 2. Timeline for achieving the Mississippi River milestone and goal.

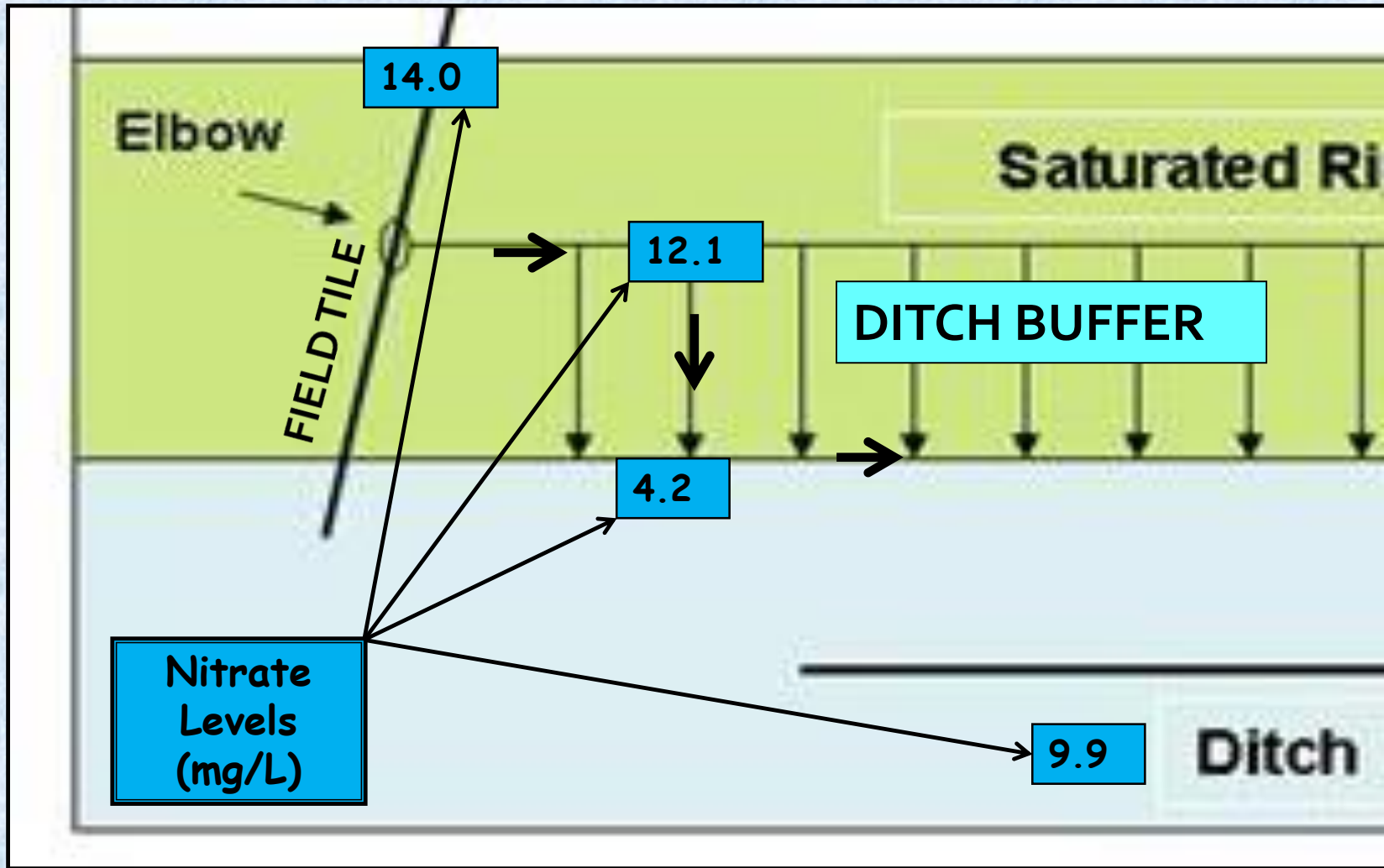


Field tile drainage is diverted through woodchips, where a percentage of nitrate is removed.



Located in rural Ashland

Dodge County Saturated Buffers



Field tile runoff, high in nitrate (14.0 mg/L), is diverted to seep through the ditch buffer, reducing the nitrate to 4.2 mg/L as it enters the ditch.

Monitoring Program:	Transparency Tube Sampling Stream-bottom Bug Sampling
Goals:	<ol style="list-style-type: none"><li>1. To promote public education and participation in water quality<li>2. To continue assessment of Impaired Waters in Dodge County<li>3. To continue assessment of biotic health in the primary county streams
Future/ Timeline:	<ol style="list-style-type: none"><li>1. T-Tube: Minimal Base Monitoring<li>2. Bugs: Cooperative project with DNR and WSU. Biotic summary exists for years 2001- 2015. Program awaiting new partners. Maintenance sampling every 3 – 5 years.

Programs promoting public education and participation

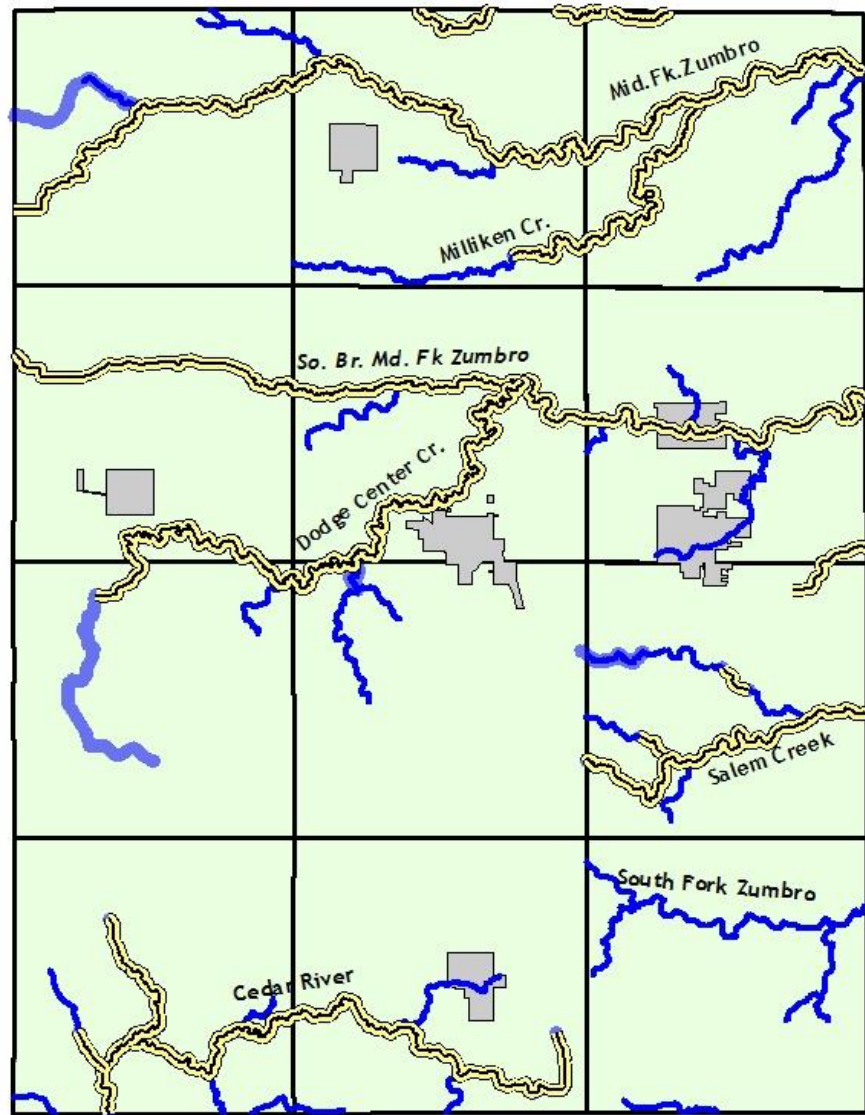
Transparency Tube



Stream Bug Sampling



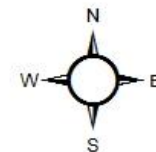
Transparency tube readings (over 5000!) were instrumental in determining the Impaired Waters list in Dodge County



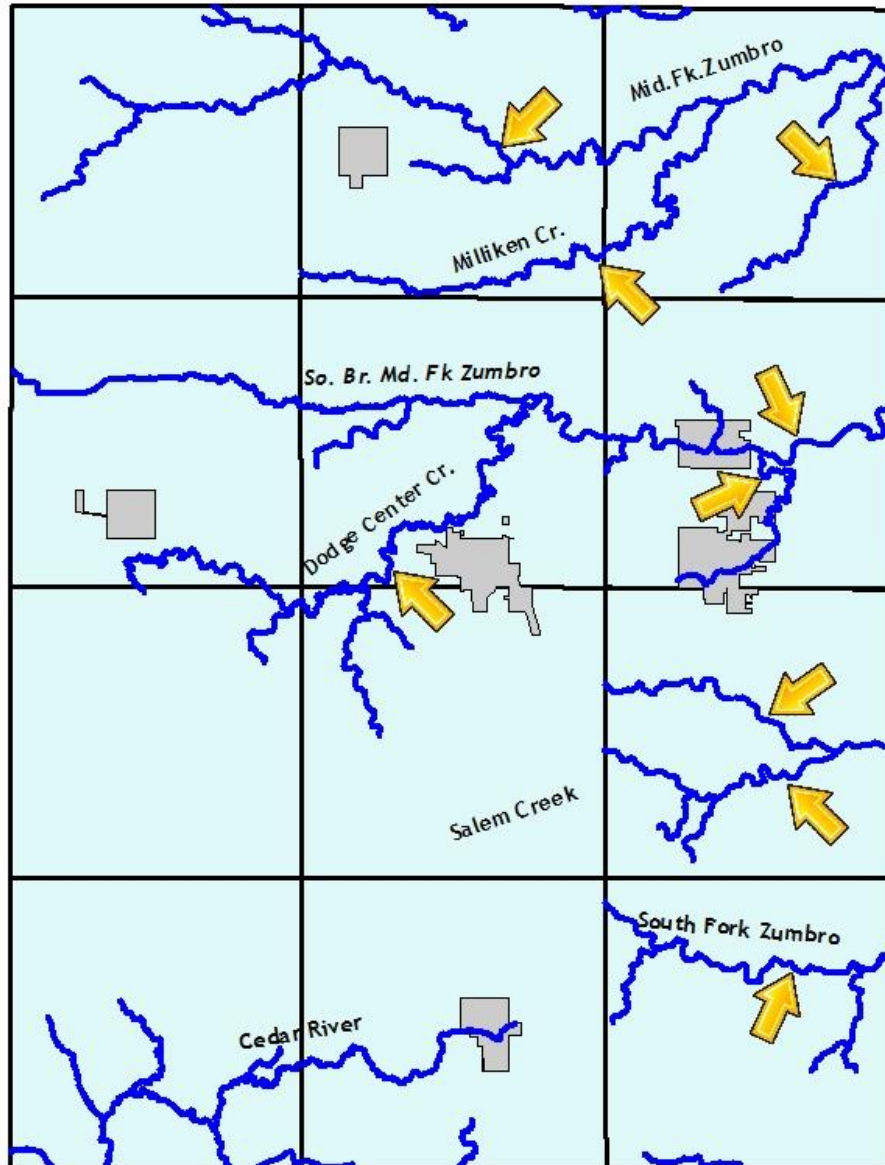
2016 Dodge County Impaired Waters

LEGEND:

- Impaired 2012 Streams
- Impaired 2016 Draft
- Protected Waters
- Cities

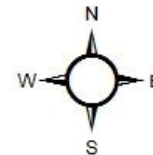


2016 Dodge County Bug Monitoring Sites

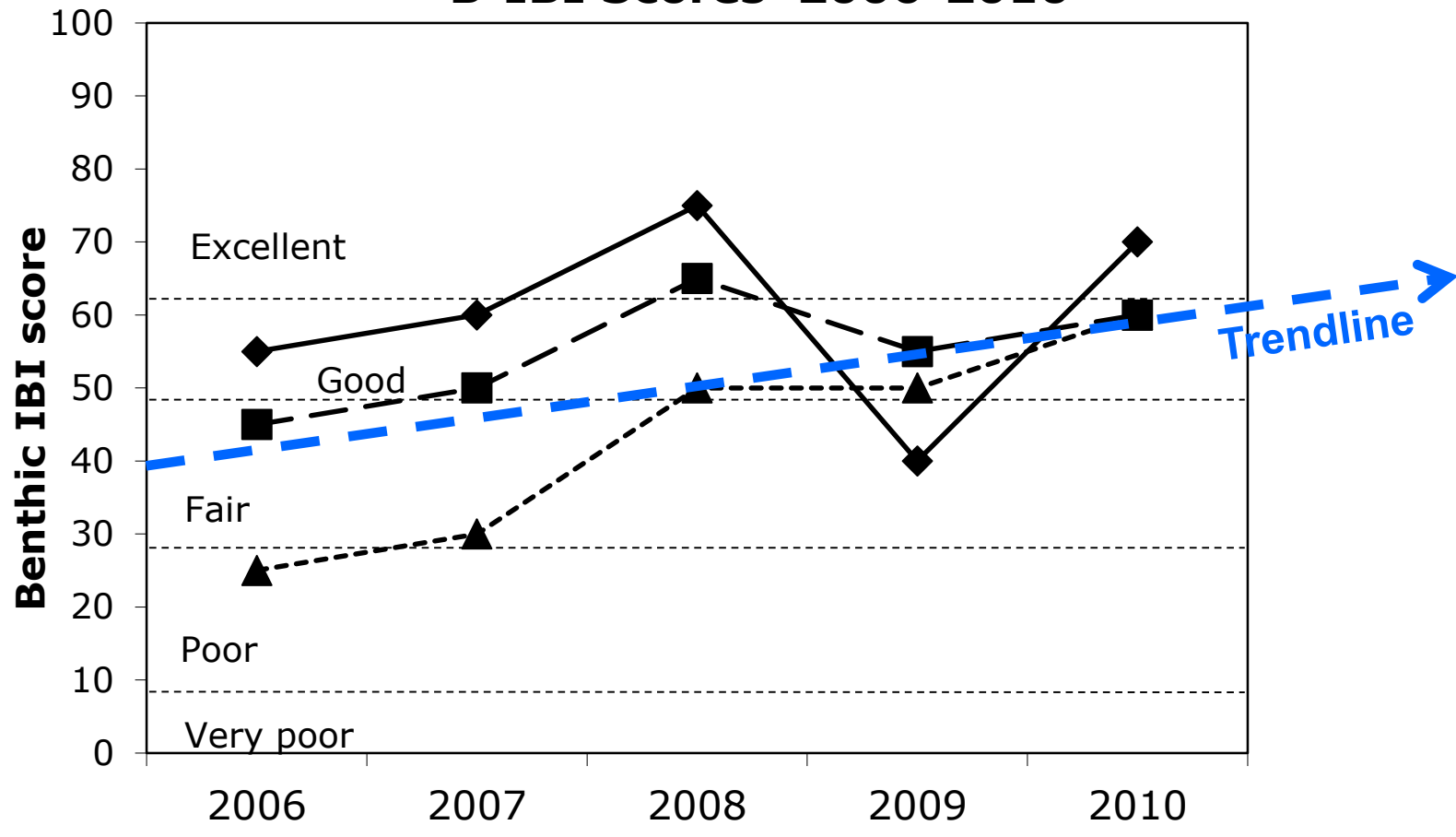


LEGEND:

-  Protected Waters
-  Cities



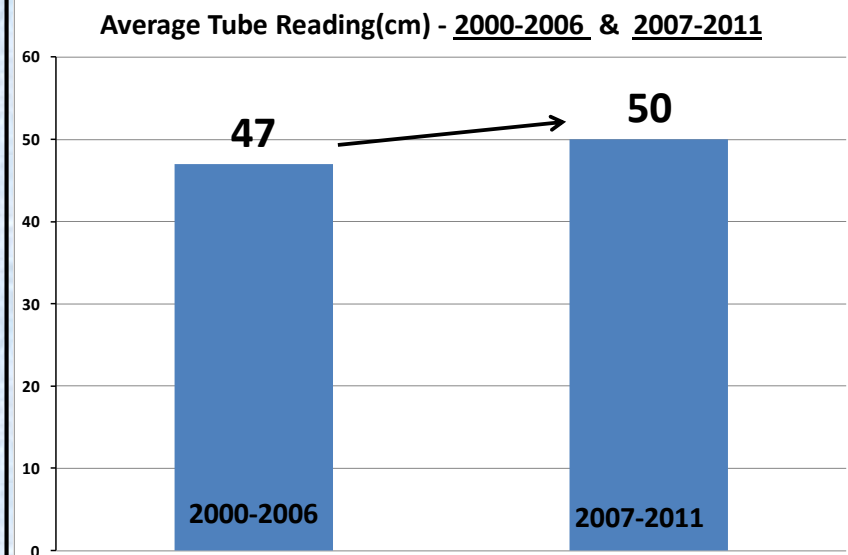
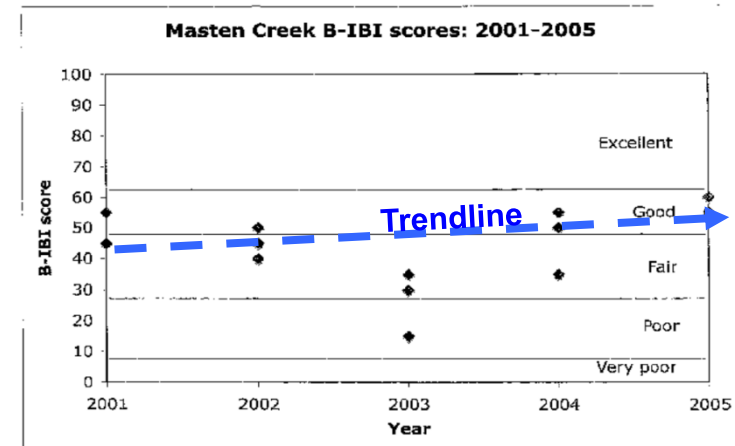
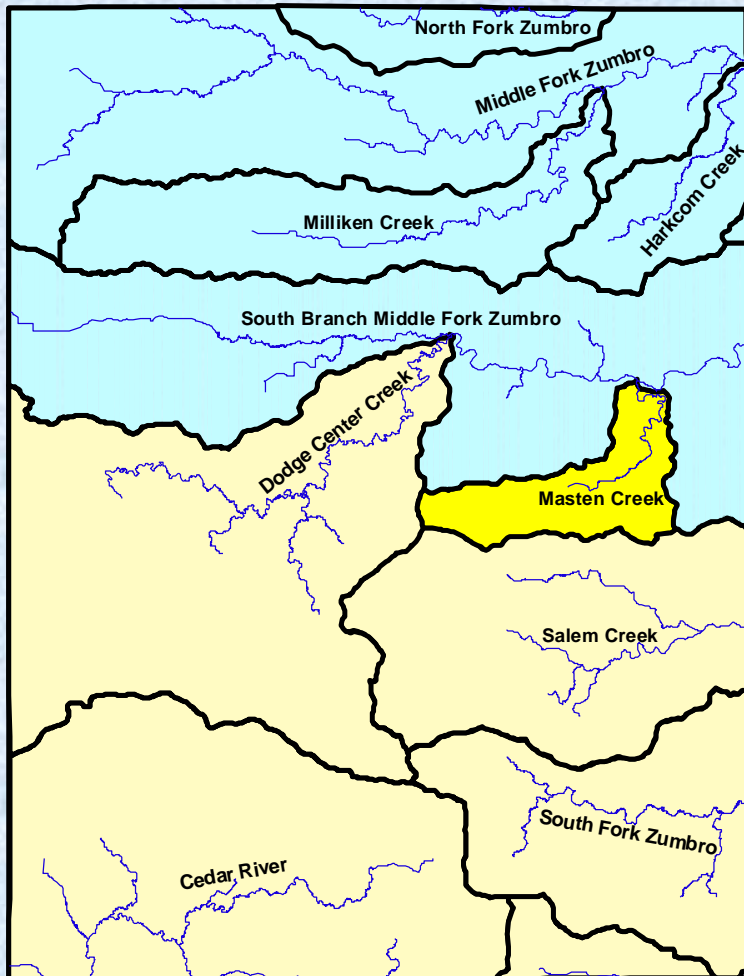
Middle Fork Zumbro River B-IBI Scores 2006-2010



Sample of the Index of Biotic Integrity (IBI) results generated by examining and sorting macroinvertebrates (bugs) gathered from each stream site. Upward trend lines indicate an improving stream environment for living organisms.

Combined, bug sampling and transparency tube results can be used to indicate trends in the health of individual streams.

Masten Creek Grade: B+



Monitoring Program:	Volunteer Nitrate Monitoring Network
Goals:	<ol style="list-style-type: none">1. To support an existing grant, and promote possible extension.2. To promote public education and participation in water quality.3. To expand the database of nitrate levels in drinking water aquifers.
Future/ Timeline:	<ol style="list-style-type: none">1. Program primarily grant funded by various government agencies since inception in 2007.2. Recommend continuing program at least until grant funding ends.

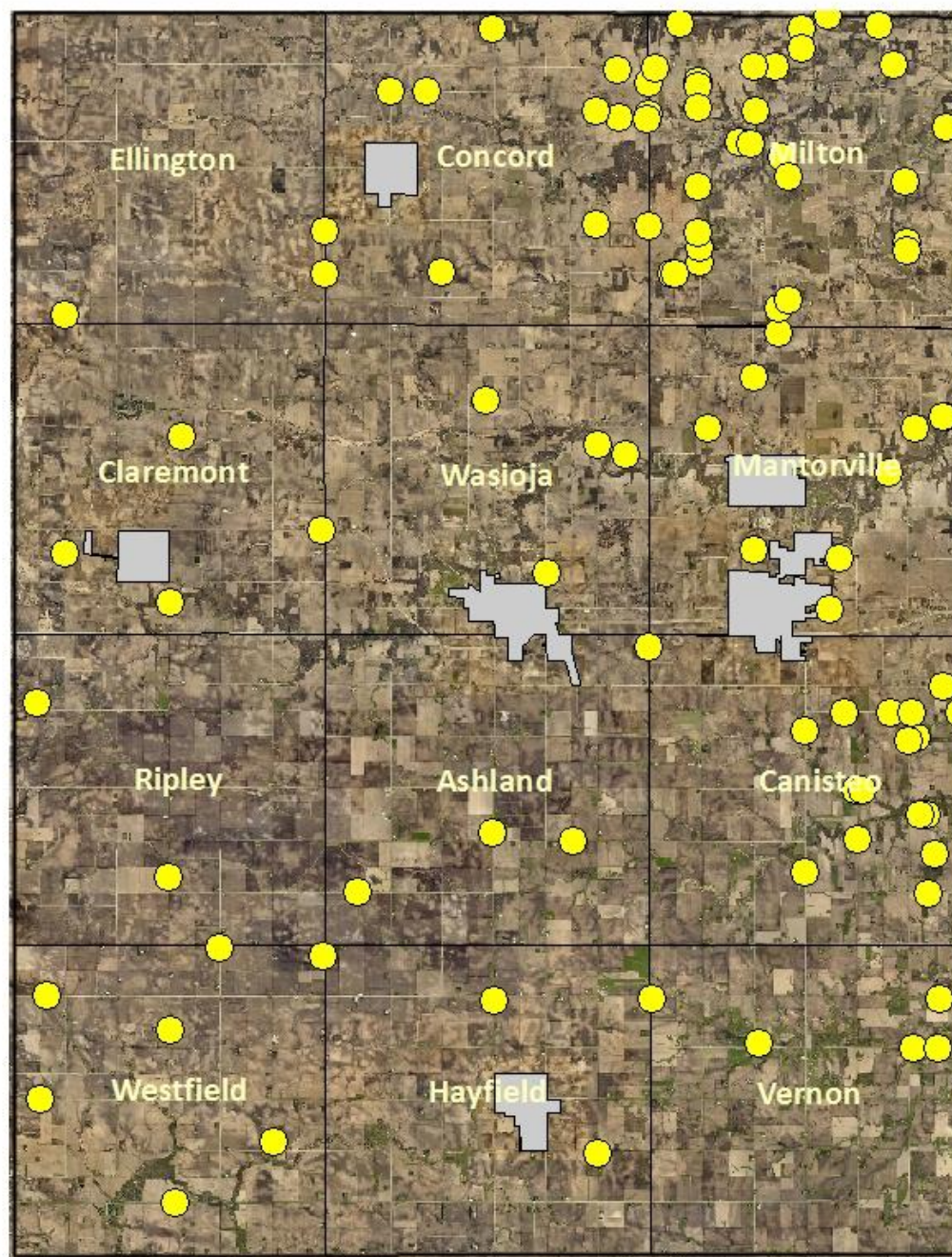
Dodge County Volunteer Nitrate Monitoring Network

- A grant-funded network operating across southeast MN since 2007.
- Approximately 100 private well owners participate in Dodge County, sampling their wells every 6 months.
- The Dodge County network is sub-divided into one baseline, and three targeted, groups. The targeted groups are:

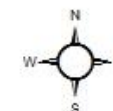


- 1) Wells to monitor areas near known high-nitrate wells.
- 2) Wells to monitor areas near existing sinkholes.
- 3) Wells to monitor the region along the Decorah Edge.

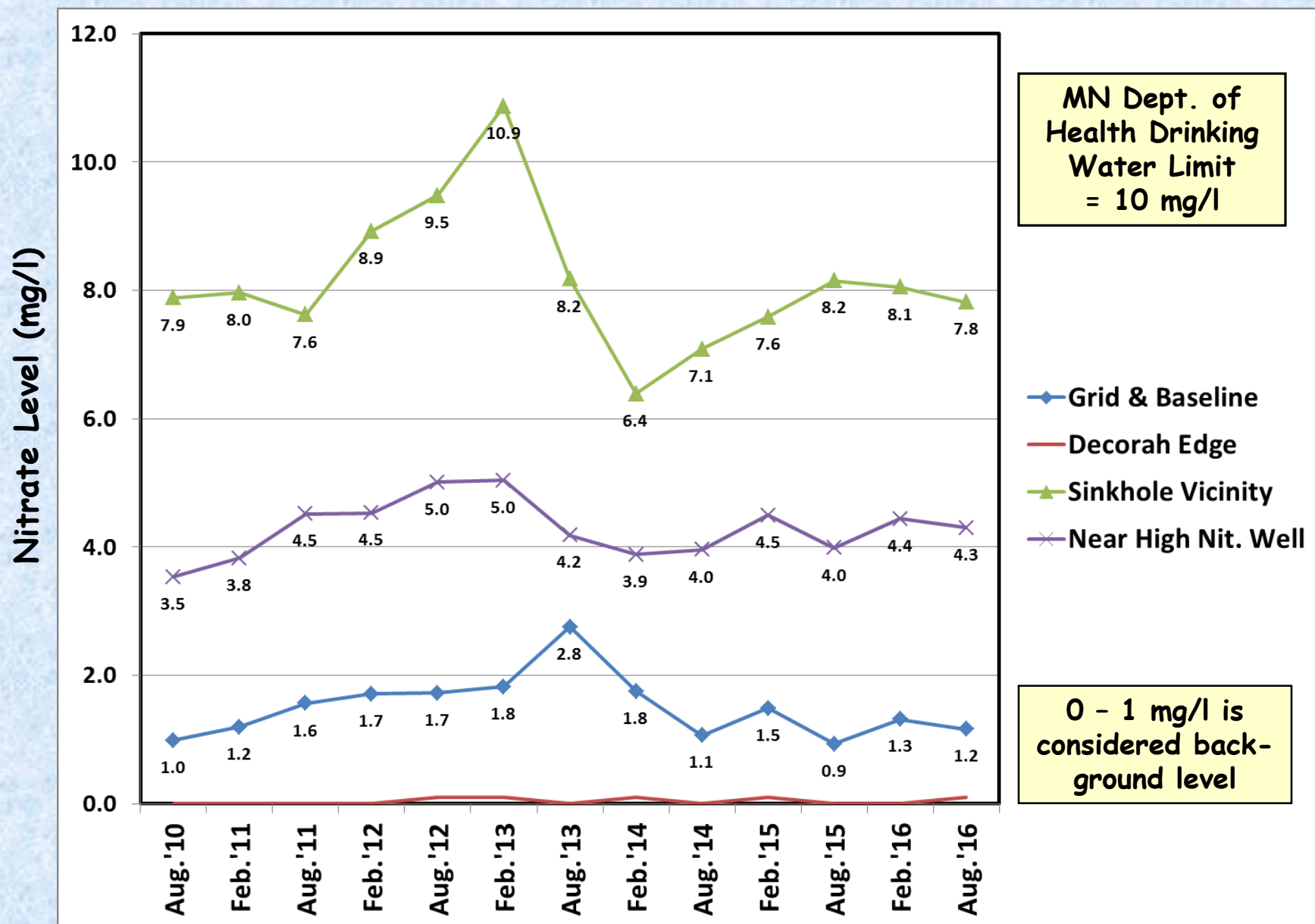
Dodge County Volunteer Nitrate Monitoring Network



- Volunteer Network
- Cities



Dodge County Volunteer Nitrate Monitoring Network Results



Monitoring Program:

Surface Water Nitrate @ Bug Sites

Goals:

1. To explore new grant opportunities and establish a surface water nitrate database at important primary county streams.

Future/ Timeline:

1. Three years of sampling enough to indicate high nitrate levels, which may lead to future opportunities.
2. Recommend sampling discontinue after 2017 season.

Surface Water Nitrate @ Bug Sites



DATE	Site 1 - So. Br. Zumbro River @ 260 Ave.	Site 2 - So. Br. Salem Creek @ 260 Ave.	Site 3 - No. Br. Salem Creek @ 670 Ave.	Site 4 - Masten Creek @ Cty 15	Site 5 - So. Br. MFZR @ 272 Ave.	Site 6 - Harkom Creek @ 270 Ave.	Site 7 - Milliken Creek @ Cty 24	Site 8 - Milliken Creek @ 570 St.	Site 9 - Dodge Center Creek @ 635 St.
3/9/2016	11.33	16.17	17.93	11.22	10.78	13.6	17.93	17.93	15.73
3/25/2016	13.97	18.48	19.36	13.97	15.07	14.6	19.91	19.36	18.7
4/6/2016	18.59	20.46	20.9	18.92	18.04	18.4	20.68	21.01	20.46
4/20/2016	10.78	16.91	17.6	11.77	10.12	13.3	16.94	18.24	16.5
5/5/2016	18.95	19.36	19.58	12.32	15.84	13.5	18.37	19.36	19.54
5/18/2016	27.2	31.1	32	25.3	27	28.2	31.4	32.2	31.8
5/24/2016	21.3	29.6	30.9	19.6	21	25.1	30.1	30.7	29.7
6/1/2016	30.9	32.9	32.9	29.8	29.7	27.7	32.6	33.5	32.5
6/8/2016	30.3	32.9	32.7	29.3	26.7	29.9	31	32	31.6
6/15/2016	14.1	15.6	18.2	16.1	15.1	17.9			17.5
6/21/2016	29	33.3	33.5	29	26.5	31.7	33.1	34	32.9
7/6/2016	7.5	20.2	22.9	3.9	8.1	11.7	15	12.5	9.2
7/27/2016	14.8	16.5	17.2	11.4	12.5	15.4	18.1	20	15.2
8/24/2016	6	13.4	37.4	9.9	9.8	14.2	13	14.9	12.9
9/8/2016	11	13.4	14.7	10.5	7.8	12.6	1		13.6
9/28/2016	10.2	13	14.6	11.7	9	14.4	22.1	14	10.7
10/12/2016	8.5	12.1	14.1	10.8	9.9	13.3	12	5	10.9

Stream Nitrate > 30 mg/L !!

Monitoring Program:

Expanded Well Monitoring Program (with MN Dept. of Agriculture)

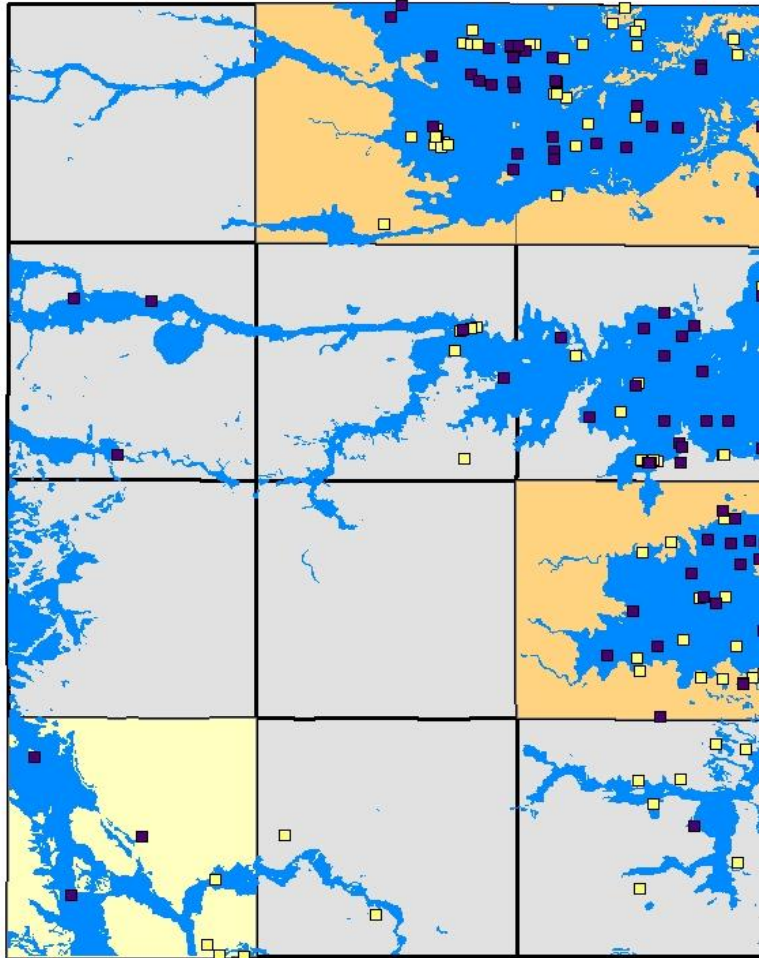
Goals:

1. To explore new grant opportunities, and facilitate implementation of the MN Dept. of Agriculture's Nitrogen Fertilizer Management Plan
2. To provide additional information to rural residents regarding the safety of their well water

Future/ Timeline:

1. Awaiting more information regarding MDA's implementation plan – timeline uncertain.

Dodge County Database Wells w/ High Nitrate, Highly Sensitive Ground Water Region and MDA Twp Nitrate Results



0 2 4 6 8 Miles

LEGEND:

- Nitrate 10+ mg/L
- Nitrate 5-10 mg/L
- High GW Sensitivity
- MDA - Nitrate 5 - 10 mg/L
- MDA - Nitrate > 10 mg/L

Information may be incorrect
and maps may be inaccurate
up to several hundred feet.
They are to be used for
broad examination of
site conditions.

The MN Dept. of
Ag. recently
tested wells in 7
townships for
excess nitrate.
Their results
coupled with our
existing Highly
Sensitive Ground
Water Region
show a likely
relationship.

Monitoring Program:

Continuous Monitoring Station near Byron Sportsmen's Club

Goals:

1. To continuously collect basic stream water quality data at a site near the Dodge/Olmsted county line, and share it with the MPCA state-wide network.

Future/ Timeline:

1. Program funded cooperatively through DNR and MPCA sources
2. Recommend continued operation of the monitoring station.

Continuous Monitoring Station



Located on the South Branch Middle Fork Zumbro near Olmsted County, this station continuously monitors:

- Air Temperature
- Rainfall
- Water Temperature
- Water Depth
- Turbidity



Sampling sensors are an essential part of the monitoring station.