Groundwater and Drinking Water Education Program

Towns of Baraboo, Delton and Fairfield

University of Wisconsin-Stevens Point
College of Natural Resources

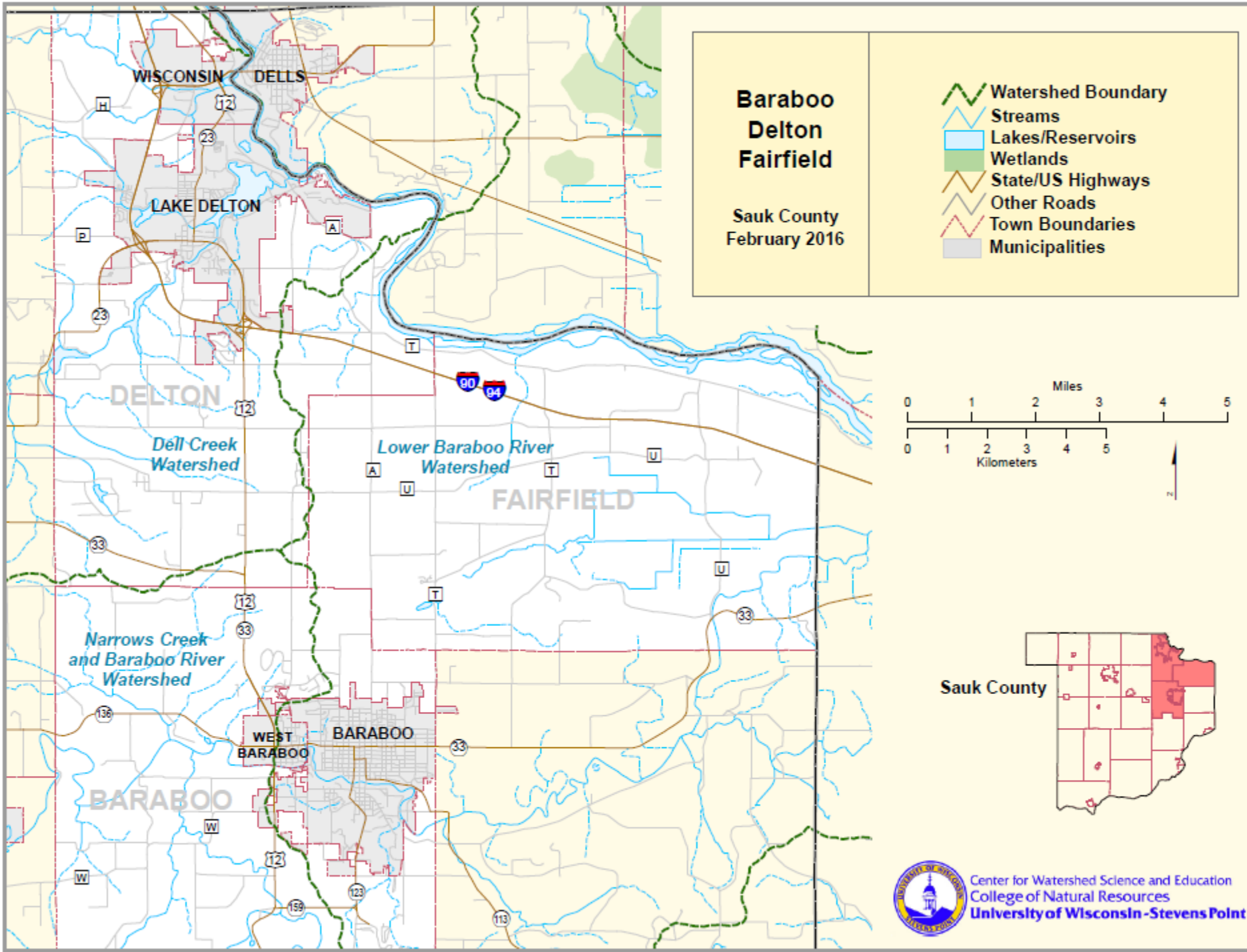
UW Extension
University of Wisconsin-Extension

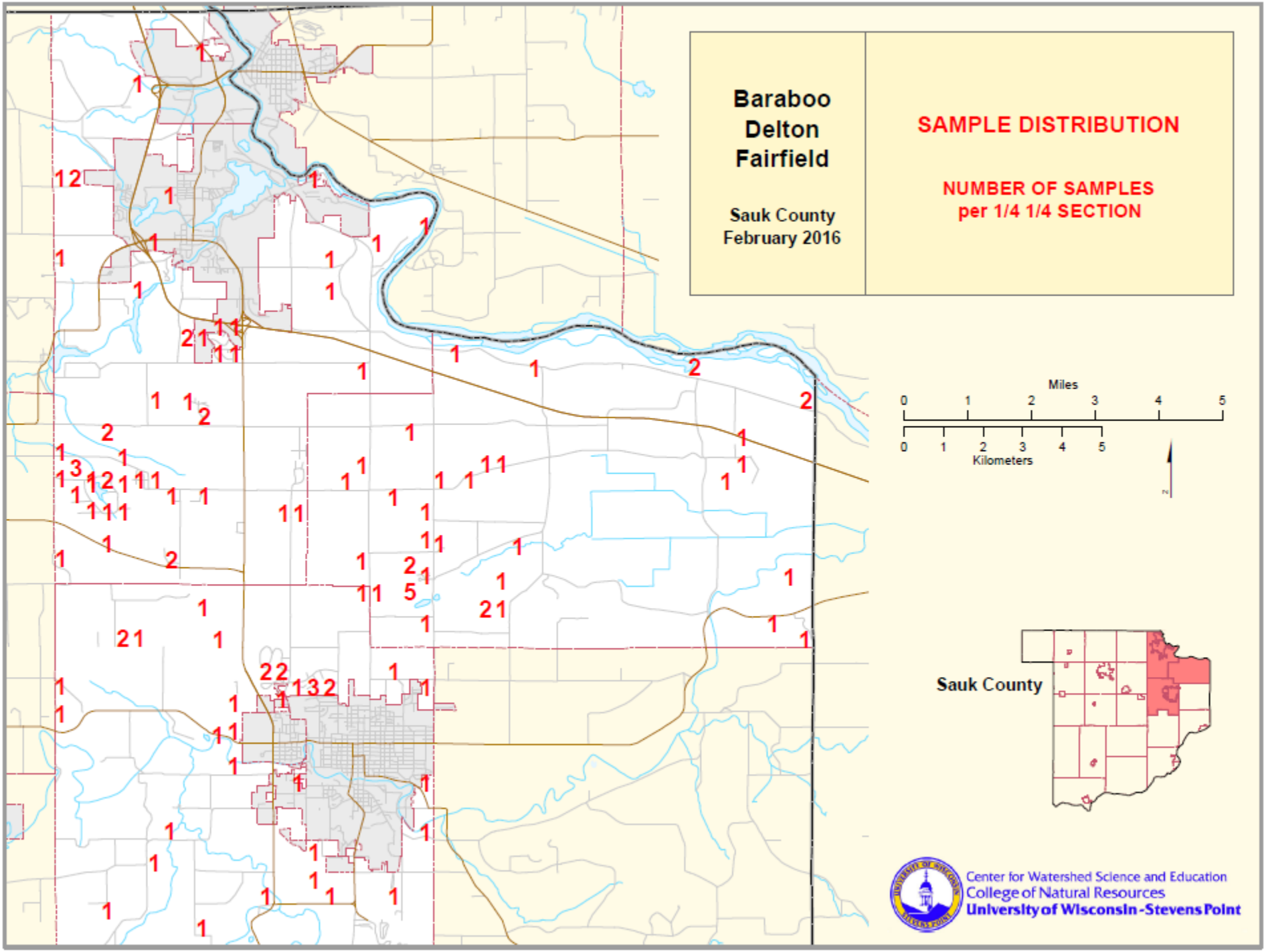
Sauk County
WISCONSIN
Conservation, Planning and Zoning

Through the University of Wisconsin-Extension, all Wisconsin people can access University resources and engage in lifelong learning, wherever they live and work.

Today's presentation

- Groundwater Basics: Where does my water come from
- Well Construction
- What do my individual test results mean?
- General groundwater quality in the Towns of Baraboo, Delton and Fairfield
- Improving your water quality


Baraboo
Delton
Fairfield
Sauk County
February 2016
Watershed Boundary
Streams
Lakes/Reservoirs
Wetlands
State/US Highways
Other Roads
Town Boundaries
Municipalities
WISCONSIN DELLS
LAKE DELTON
DELTON
FAIRFIELD
BARABOO
WEST BARABOO
Dell Creek Watershed
Lower Baraboo River Watershed
Narrows Creek and Baraboo River Watershed
Miles
0 1 2 3 4 5
0 1 2 3 4 5
Kilometers
Sauk County
Center for Watershed Science and Education
College of Natural Resources
University of Wisconsin-Stevens Point


Baraboo
Delton
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Sauk County
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SAMPLE DISTRIBUTION
NUMBER OF SAMPLES
per 1/4 1/4 SECTION
Miles
0 1 2 3 4 5
0 1 2 3 4 5
Kilometers
Sauk County
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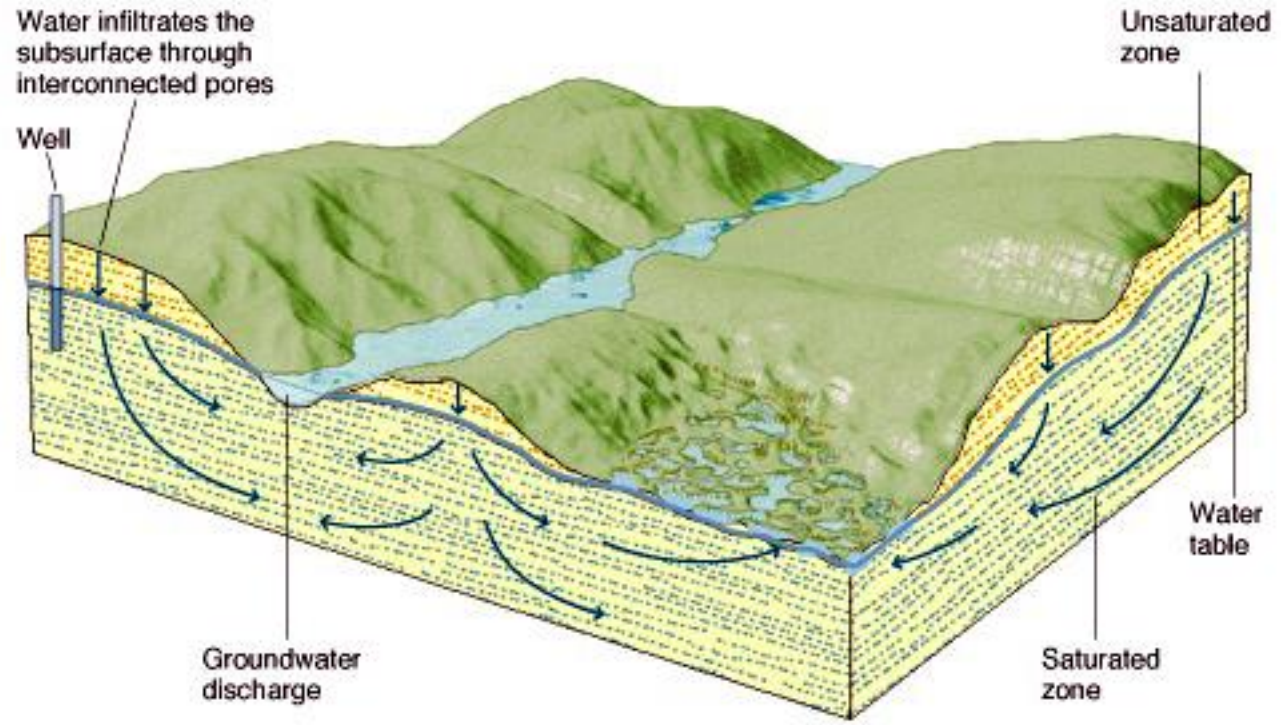
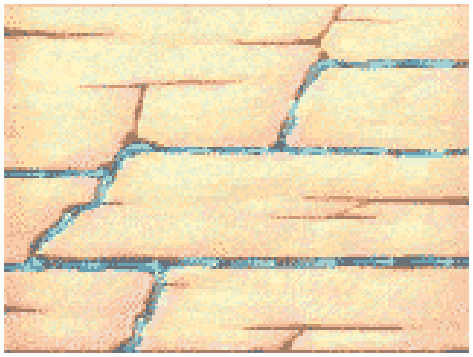
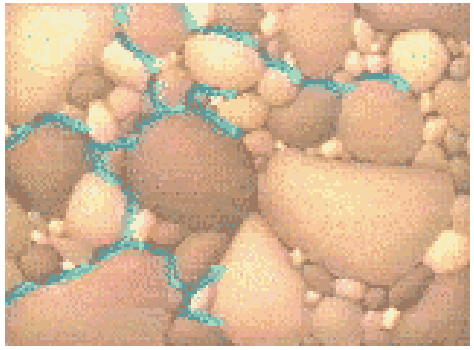
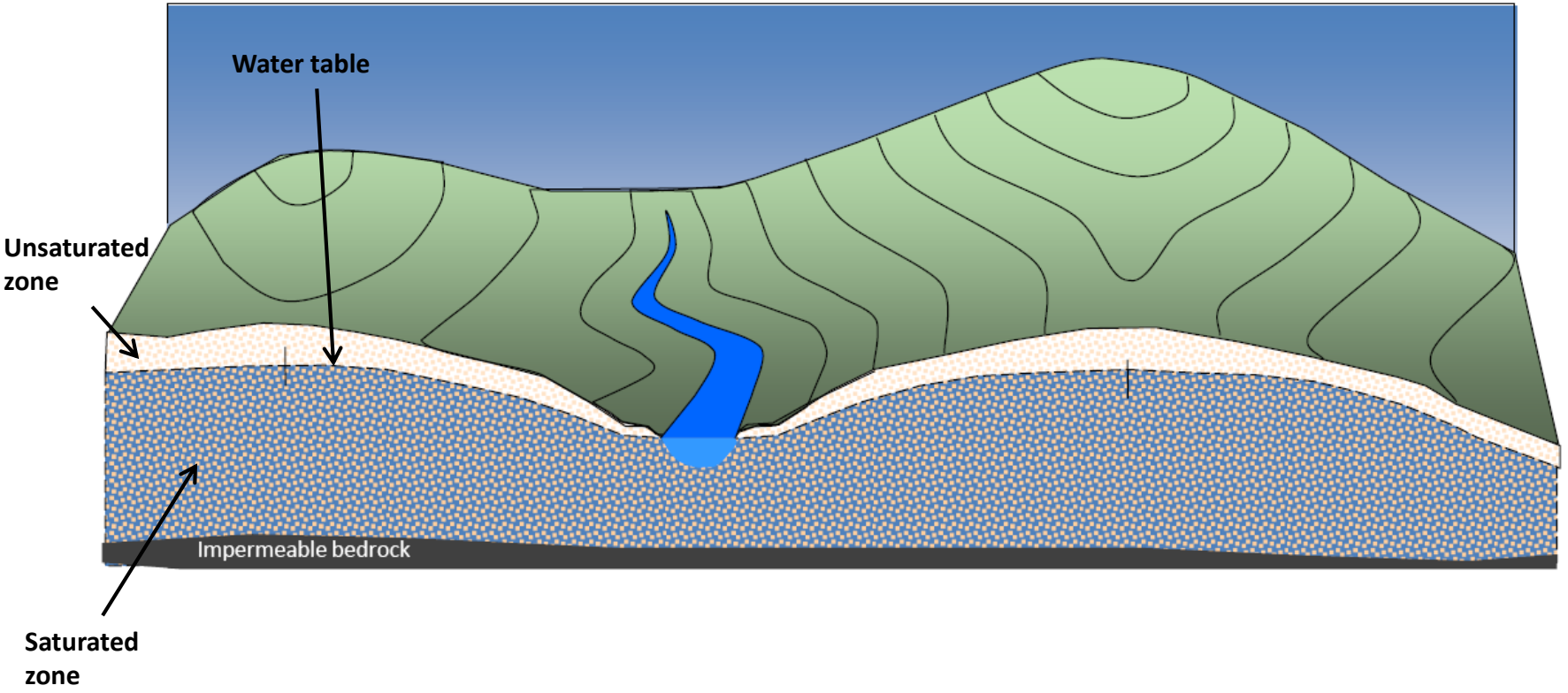
Groundwater Movement









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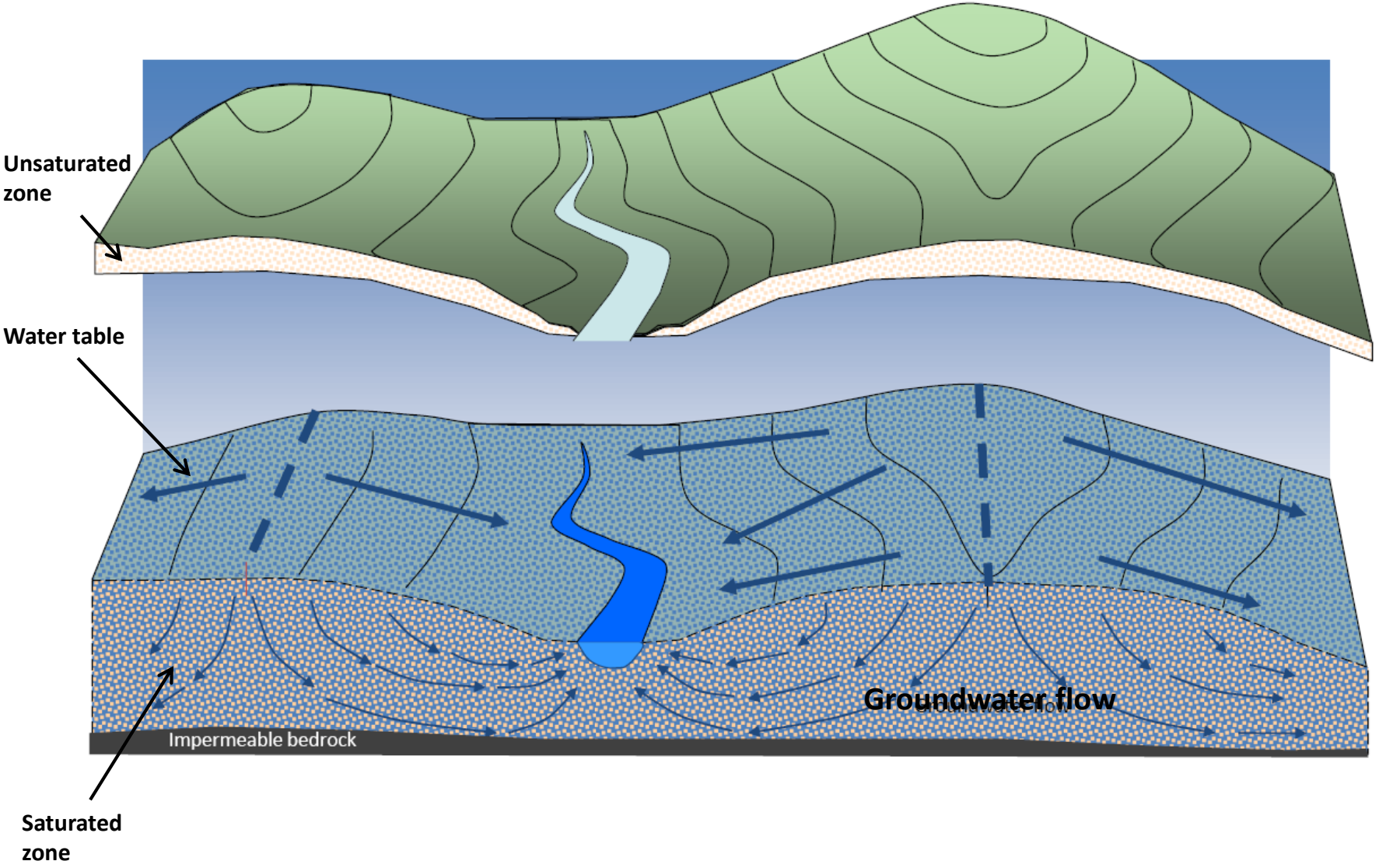

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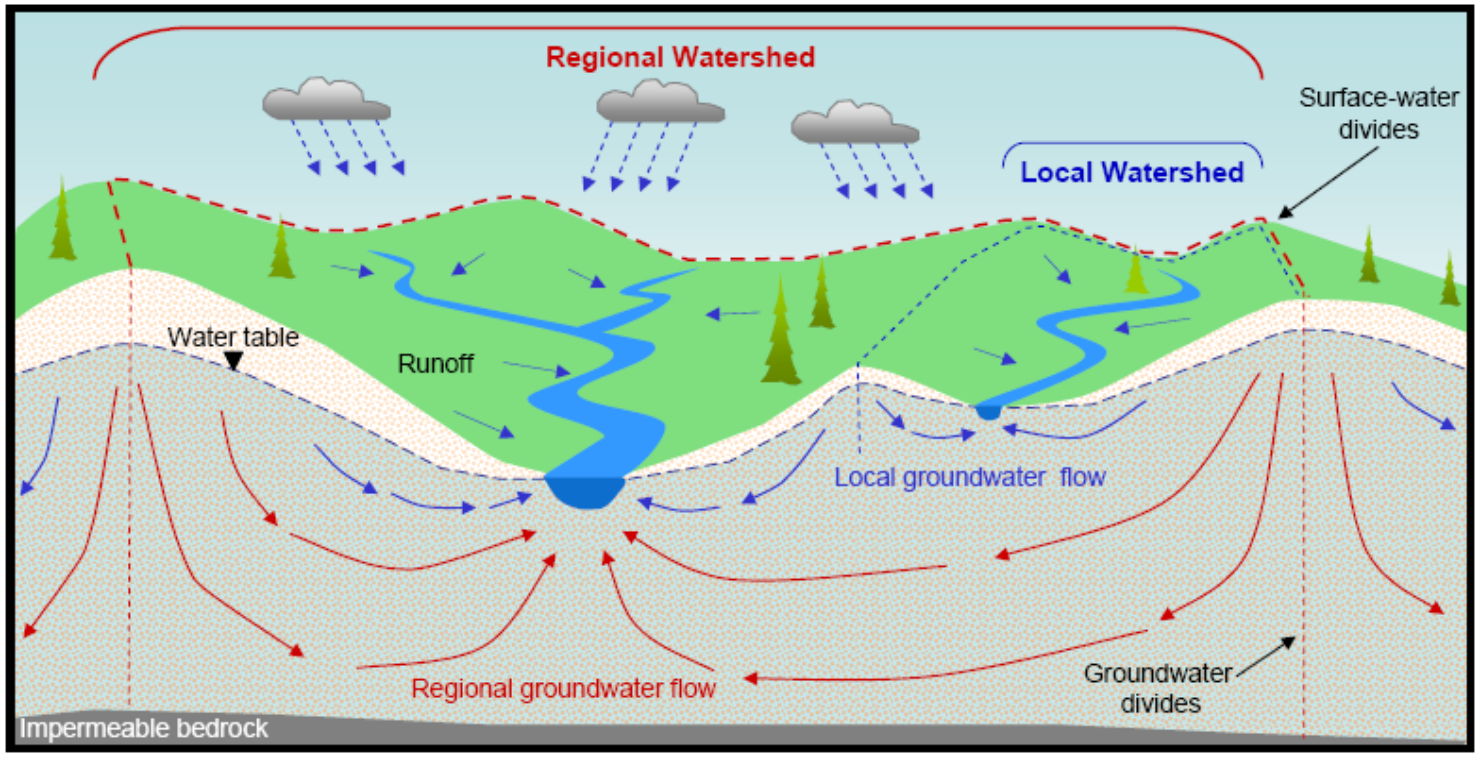
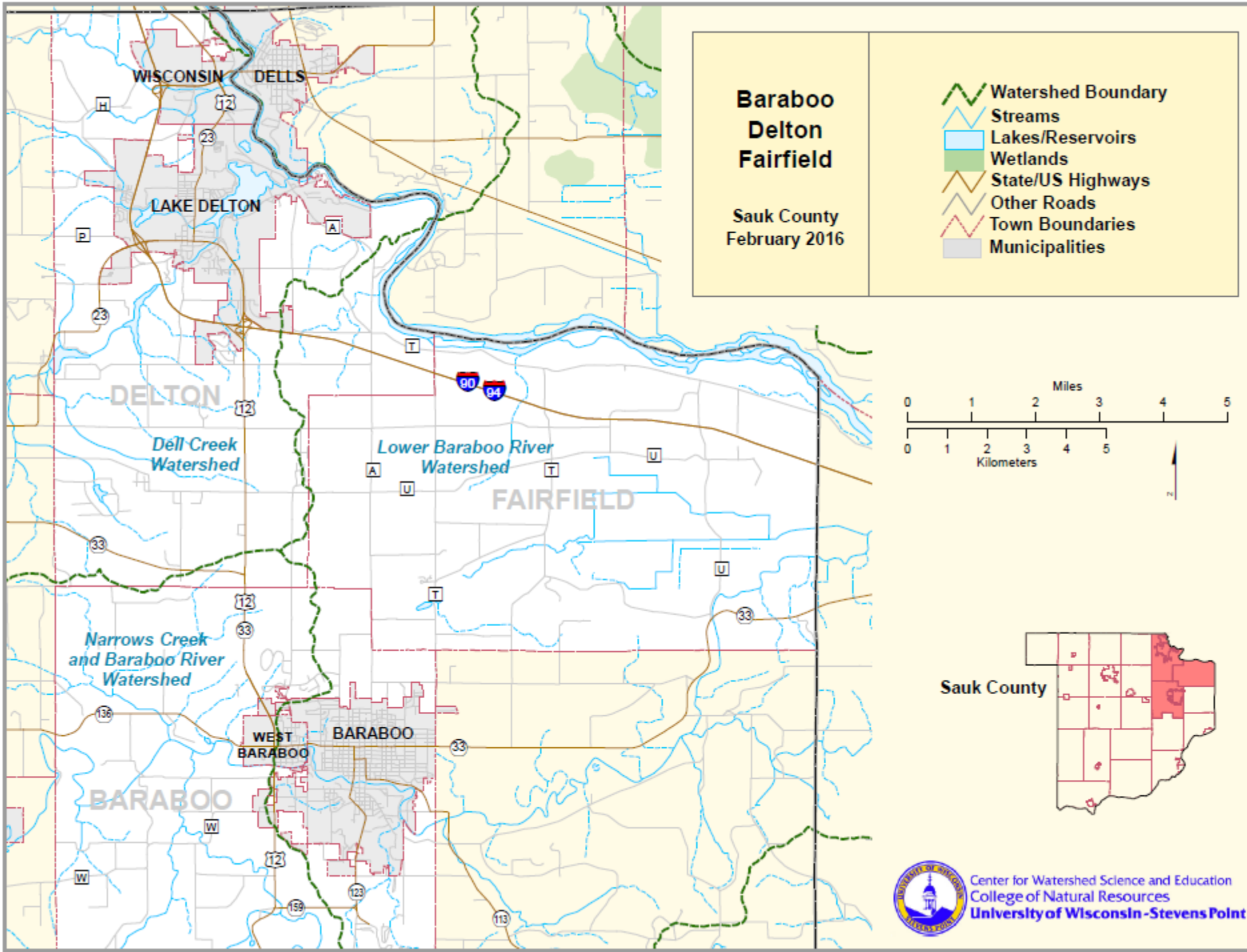


Watershed – the land area where water originates for lakes, rivers or streams. Water flows from high energy to low energy.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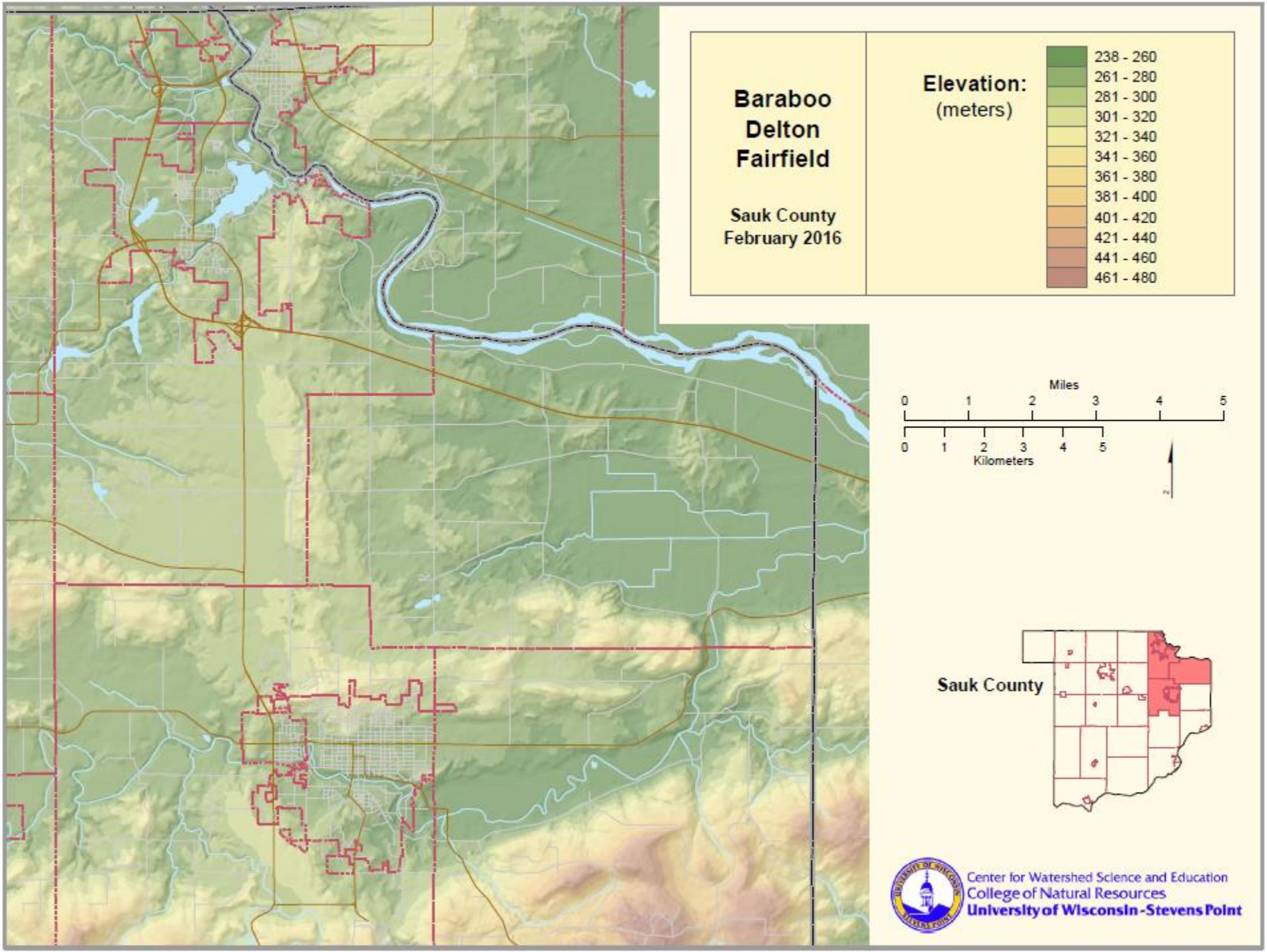
Baraboo
Delton
Fairfield
Sauk County
February 2016
Elevation:
(meters)
238 - 260
261 - 280
281 - 300
301 - 320
321 - 340
341 - 360
361 - 380
381 - 400
401 - 420
421 - 440
441 - 460
461 - 480
Miles
0 1 2 3 4 5
0 1 2 3 4 5
Kilometers
Sauk County
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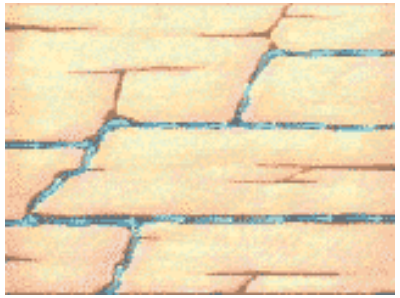
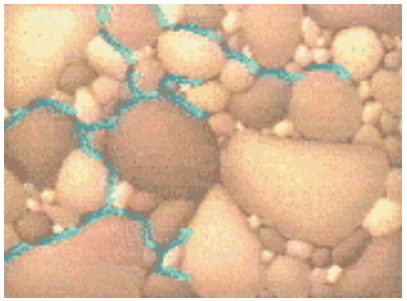
Aquifers: Our groundwater storage units

Aquifers are geologic formations that store and transmit groundwater.

The aquifer properties determine how quickly groundwater flows, how much water an aquifer can hold and how easily groundwater can become contaminated. Some aquifers may also contain naturally occurring elements that make water unsafe.



Water and contaminants can move quickly through cracks and fractures.



Water moving through tiny spaces in between sand particles or sandstone moves slower and allows for filtration of some contaminants.

Wisconsin's geology is like a layered cake. Underneath all of Wisconsin lies the Crystalline bedrock which does not hold much water. Think of this layer like the foundation of your house. All groundwater sits on top of this foundation. Groundwater is stored in the various **sandstone**, **dolomite** and **sand/gravel** aquifers above the **crystalline bedrock** layer. The layers are arranged in the order which they formed, oldest on the bottom and youngest on top.

Learn more about Wisconsin's geologic past by clicking the aquifer names

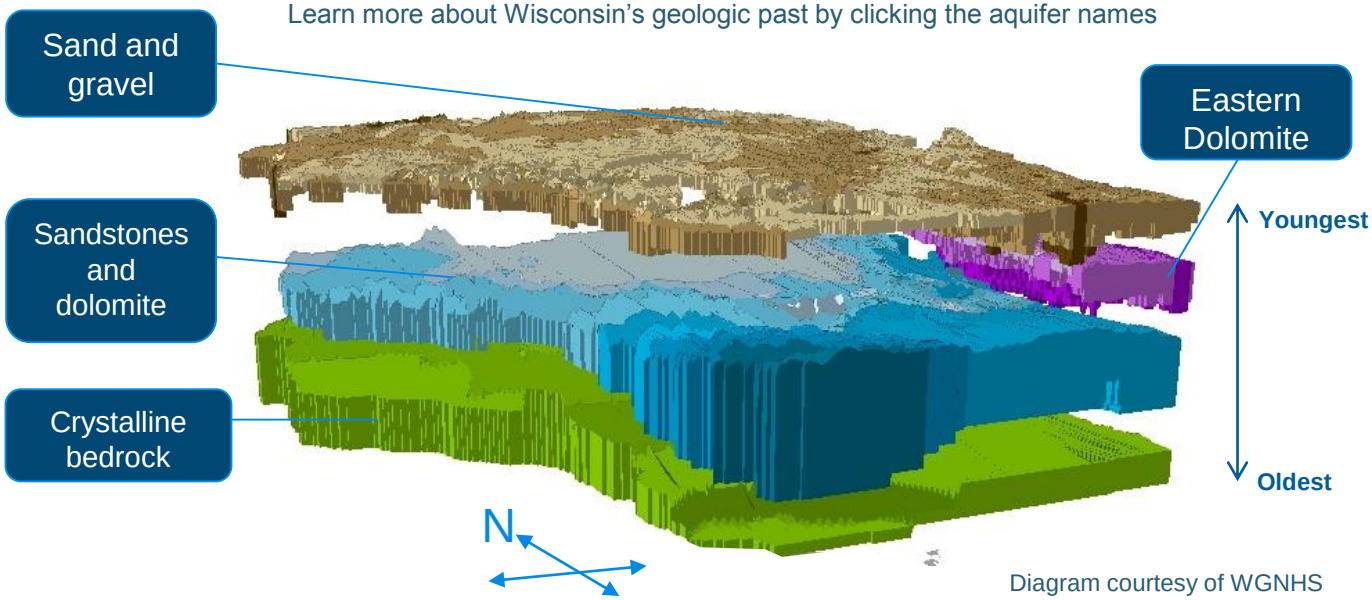
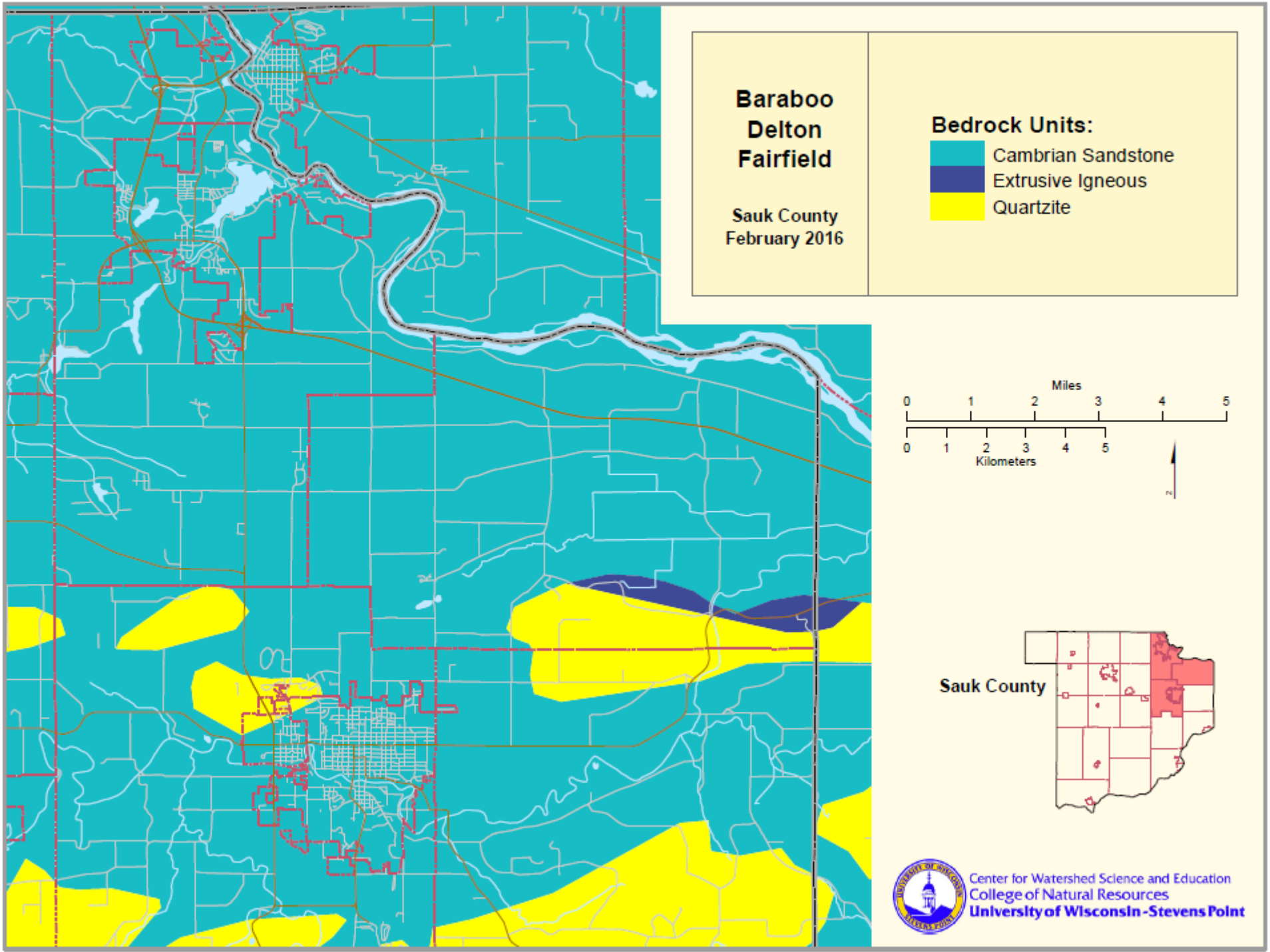


Diagram courtesy of WGNHS


Baraboo
Delton
Fairfield
Sauk County
February 2016
Bedrock Units:
Cambrian Sandstone
Extrusive Igneous
Quartzite
Miles
0 1 2 3 4 5
0 1 2 3 4 5
Kilometers
N
Sauk County
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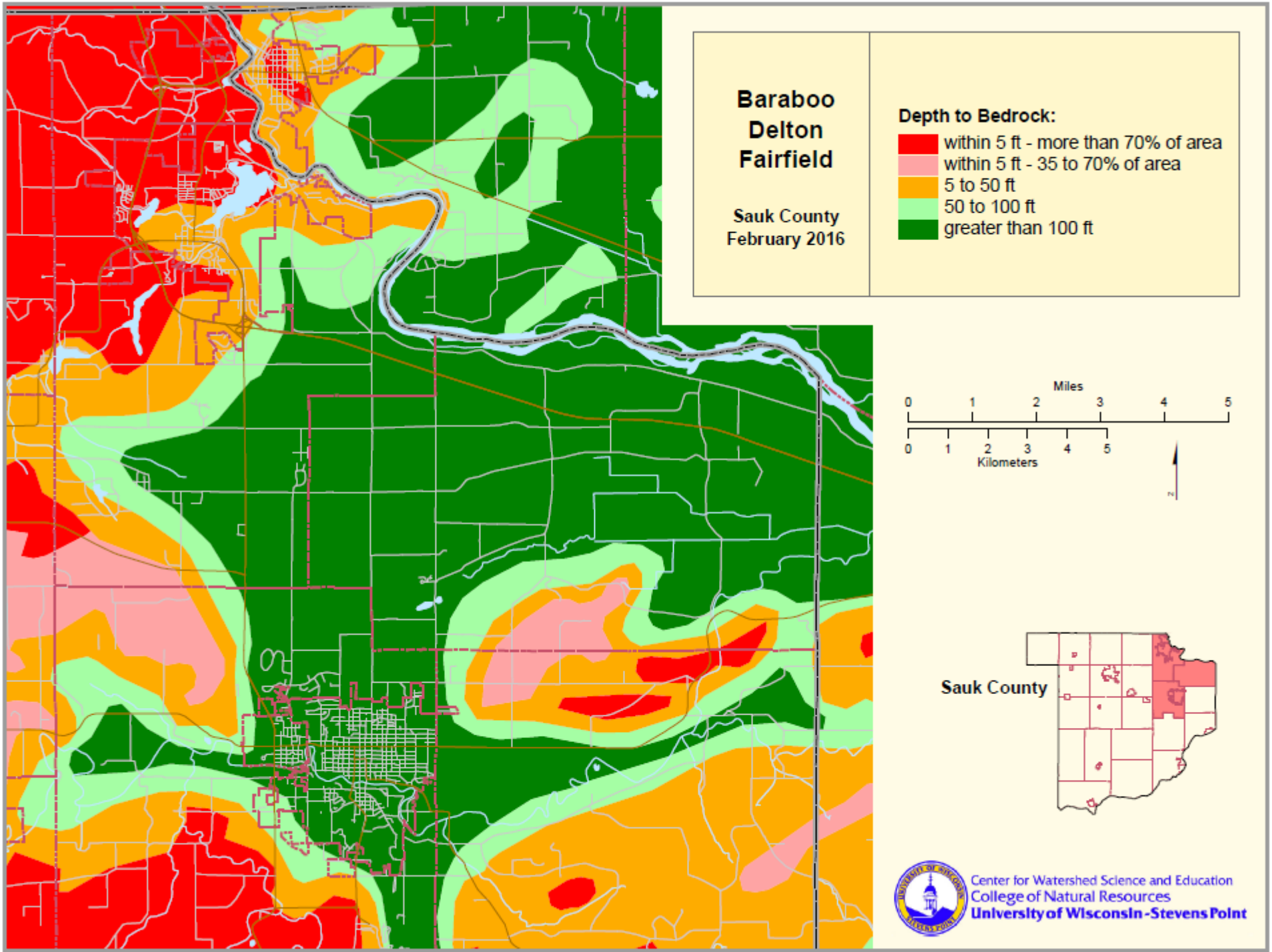
Baraboo
Delton
Fairfield
Sauk County
February 2016
Depth to Bedrock:
within 5 ft - more than 70% of area
within 5 ft - 35 to 70% of area
5 to 50 ft
50 to 100 ft
greater than 100 ft
Miles
0 1 2 3 4 5
0 1 2 3 4 5
Kilometers
N
Sauk County
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Wells in Crystalline Rock

Bedrock like Baraboo Quartzite does not hold much water. Wells rely on fractures with connectivity to overlying aquifers to supply water.

As a result yield in these wells is typically low

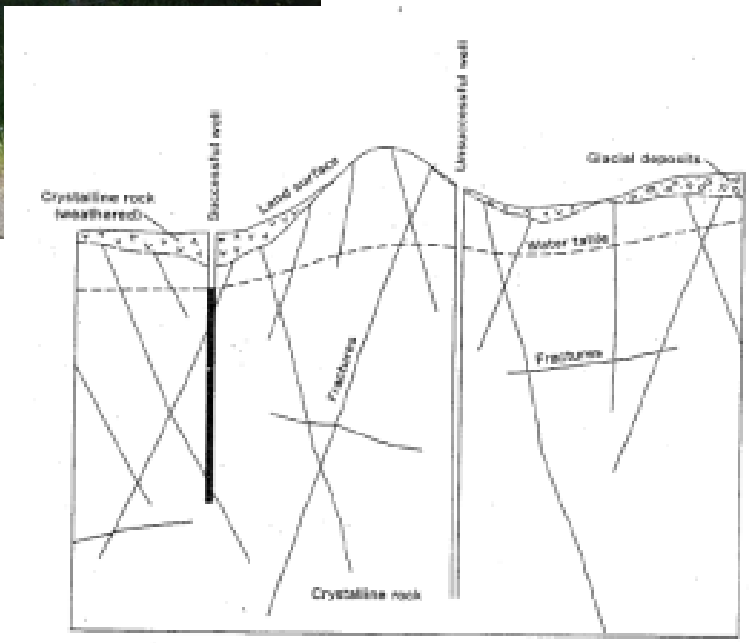
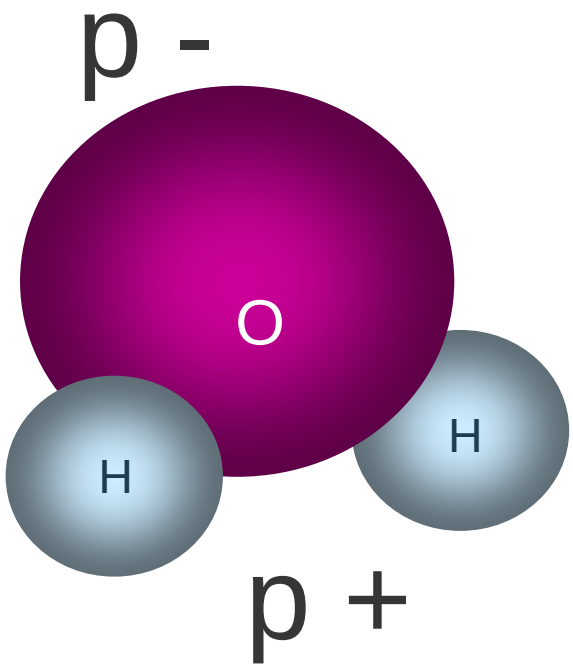


FIGURE 2.—Occurrence of ground water in crystalline rock.

water basics

- "Universal Solvent"
- Naturally has "stuff" dissolved in it.
  - Impurities depend on rocks, minerals, land-use, plumbing, packaging, and other materials that water comes in contact with.
- Can also treat water to take "stuff" out



Interpreting Drinking Water Test Results

Tests important to health:

- Bacteria
- Sodium
- Nitrate
- Copper
- Lead
- Triazine
- Zinc
- Sulfate
- Arsenic

Tests for aesthetic (taste,color,odor) problems:

- Hardness
- Iron
- Manganese
- Chloride

Other important indicator tests:

- Saturation Index
- Alkalinity
- Conductivity
- Potassium

Red = human-influenced **Blue** = naturally found

Health Concern Categories

Acute Effects

- Usually seen within a short time after exposure to a particular contaminant or substance.

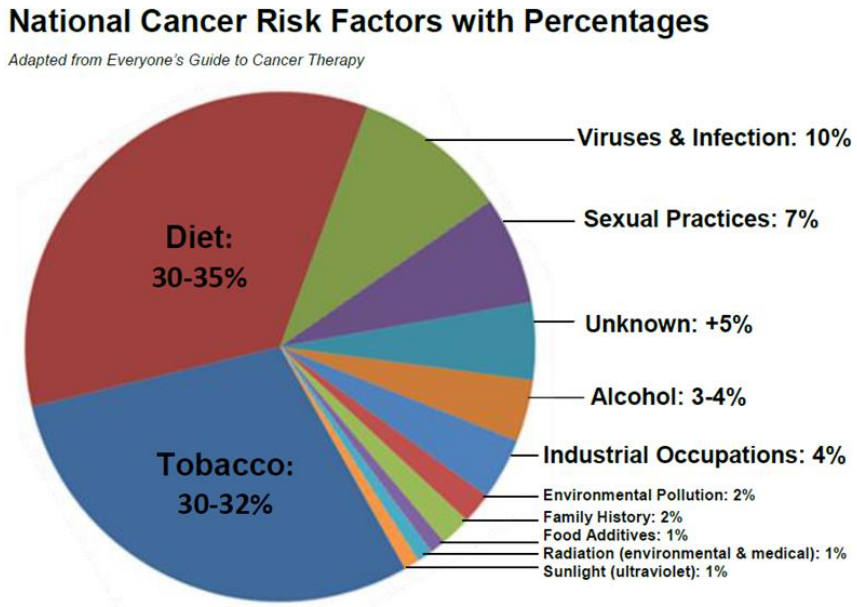
(ex. Bacteria or viral contamination which may cause intestinal disease)

Chronic Effects

- Result from exposure to a substance over a long period of time.
- Increase risk of developing health complications later in life.

(ex. Arsenic or pesticides can increase the risk of developing certain cancers)

Chronic related health concerns are generally about risk management



Being struck by lightning	**0.16 in 1,000 chance.**
0.010 mg/L of arsenic in drinking water.	**3 out of 1,000 people likely to develop cancer.**
2 pCi of indoor radon level.	**4 out of 1,000 people likely to develop lung cancer.[1]**
2 pCi of indoor radon combined with smoking.	**32 out of 1,000 people could develop lung cancer.[1]**

Drinking water quality is only one part of an individual's total risk.

[1]http://www.epa.gov/radon/healthrisks.html

Private vs. Public Water Supplies

Public Water Supplies

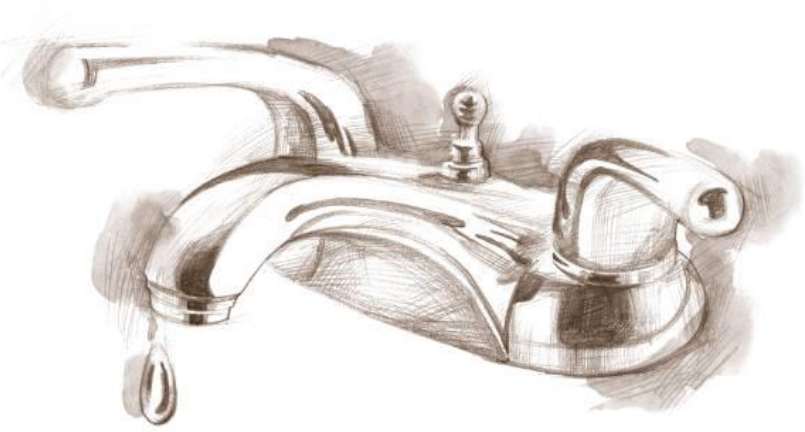
- Regularly tested and regulated by drinking water standards.

Private Wells

- Not required to be regularly tested.
- Not required to take corrective action
- Owners must take special precautions to ensure safe drinking water.

Why do people test their water?

- Installed a new well
- Change in taste or odor
- Buying or selling their home
- Plumbing issues
- Want to know if it’s safe to drink.



Water and Environmental Analysis Lab

UW-Stevens Point, College of Natural Resources
Phone (715)346-3209 or Toll Free (877)383-8378
www.uwsp.edu/cnr/weal

Center for Watershed Science and Education

Monday, August 15, 2011

WELL INFORMATION:

WI Unique Well Number
Add
City
State
County SAINT CROIX
Town Pleasant Valley

Legal Description

SW SW Sec 5 T 28 R 17 W
1/4 1/4 (section) (town) (range)
Map : Gov't Lot#

Year well installed 1950

Casing Diameter:
☐ 3" - less ☑ 4-9" ☐ 10-18" ☐ 18+"

Total well depth 160
Depth of casing
Depth to water

SOURCE:

☐ Municipal ☐ Spring
☐ Other

TREATMENT SYSTEM(s) OWNED:

☐ Water softener ☐ Rev Osmosis
☐ Carbon filter ☐ Neutralizer
☐ Particle filter ☐ Iron Filter
☐ Other

PROBLEMS OBSERVED:

☐ Color ☐ Taste ☐ Odor
☐ Corrosion ☐ Health ☐ None
☐ Other

LAST DATE TESTED:

☐ Never ☐ Unknown
☐ Less than 1 year ☐ 1-2 years
☑ 2-5 years ☐ 5-10 years
☐ Greater than 10 years

REASON FOR TESTING:

☑ Curious about water quality
☐ Suspect water quality problems
☑ Regularly test my well
☐ Required by lending institution
☐ Retest of positive bacteria test
☐ Retest following well disinfection
☐ Infant/pregnant woman/daycare
☐ Other

MAIL RESULTS TO:

last
First
Add
City
State
phon

SAMPLE(s) COLLECTED

Date 4/25/2011
Time 13:30

SAMPLE(s) TAKEN FROM:

☐ Pressure Tank
☐ Kitchen faucet
☑ Bathroom faucet
☐ Outside faucet
☐ Barn
☐ Other

SAMPLE_ID 78543
Labno 86-11-6
Group ST. CROIX CO 11APR#2

LABORATORY RESULTS

Parameter	Qualifier	Results	Units	
Bacteria-Coliform		Absent		(see note 1 below)
Hardness-Total		392	mg/l CaCO3	
Alkalinity		232	mg/l CaCO3	
Conductivity		842	umhos/cm	
pH		7.90	std units	
Saturation Index (Ca)		0.5		Corrosivity Balanced
Nitrogen-Nitrate/Nitrite		27.6	mg/l N	(see note 2 below)
Chloride		51.8	mg/l	
Arsenic	Less Than	0.005	mg/l	
Calcium		93.7	mg/l	
Copper		0.329	mg/l	
Iron		0.002	mg/l	
Lead		0.007	mg/l	
Magnesium		39.0	mg/l	
Manganese	Less Than	0.001	mg/l	
Potassium		16.6	mg/l	
Sodium		15.5	mg/l	
Sulfate		31.5	mg/l	
Zinc		0.697	mg/l	
DACT Screen		0.2	ug/l	

(Report continued for Heinbuch, Sample ID 78543)

1. BACTERIA ABSENT – means that no bacteria were found and your water supply is considered bacteriologically safe for uses such as drinking and cooking. You can be reasonably sure that your water supply is free of fecal coliform and other pathogenic bacteria.

To ensure your well remains in good sanitary condition; consider testing your well again for coliform bacteria annually or sooner if you notice a sudden change in taste, color or odor to the water.

2. NITRATE – Water greater than 10 mg/L of nitrate-nitrogen should not be consumed by infants less than 6 months of age or pregnant women. The WI Department of Health Services recommends that all persons should avoid long-term consumption of water with nitrate-nitrogen concentrations greater than 10 mg/L. You may choose to reduce your exposure to nitrate by installing an approved water treatment device (reverse osmosis, distillation or anion exchange), purchasing bottled water or investigate the possibility that a new well would result in lower nitrate levels.

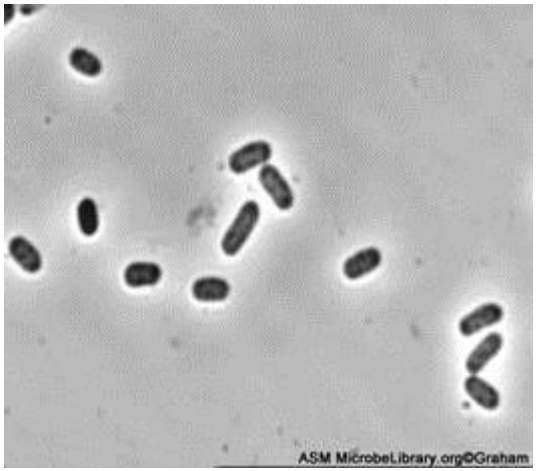
Disclaimer - The analyses run on your samples only cover some of the more common water quality characteristics. Safe levels of these chemicals or bacteria do not guarantee that your water is free of all toxic chemicals. Bacteria die-off in samples over 30 hours old may render results inaccurate and are therefore deemed inconclusive. If you suspect gasoline residues, pesticides, or other trace chemicals, you would need additional analyses. Contact the lab or your Extension office for more informationm.

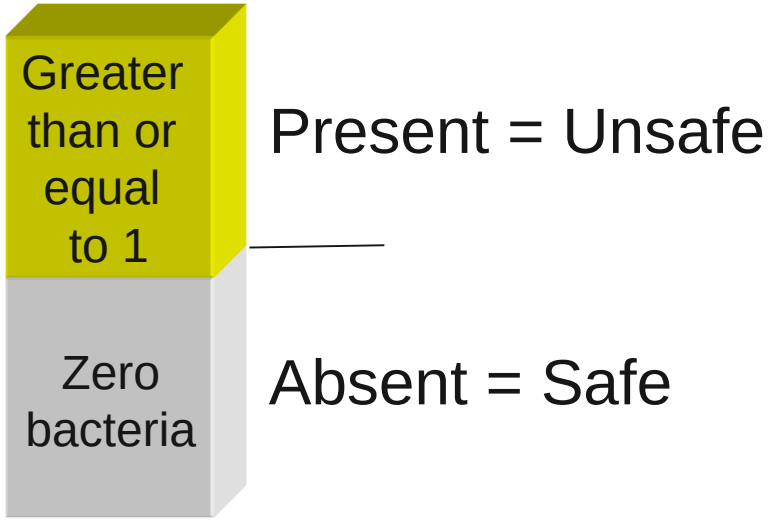
milligrams per liter (mg/l) = parts per million (ppm)

1 mg/l = 1000 parts per billion (ppb)

Coliform bacteria

- Generally do not cause illness, but indicate a pathway for potentially harmful microorganisms to enter your water supply.
  - Harmful bacteria and viruses can cause gastrointestinal disease, cholera, hepatitis
- Well Code: “Properly constructed well should be able to provide bacteria free water continuously without the need for treatment”
- Recommend using an alternative source of water until a test indicates your well is absent of coliform bacteria
- Sources:
  - Live in soils and on vegetation
  - Human and animal waste
  - Sampling error





If coliform bacteria was detected, we also checked for e.coli bacteria test

- Confirmation that bacteria originated from a human or animal fecal source.
- E. coli are often present with harmful bacteria, viruses and parasites that can cause serious gastrointestinal illnesses.
- Any detectable level of E.coli means your water is unsafe to drink.

Contaminants	Sources	Symptoms
BACTERIA		
Escherichia coliform (E. coli) *Salmonella* *Campylobacter* *E. coli 0157* (Requires a special water test for detection. Causes similar, but more serious illness than other E.coli strains. Requires medical treatment.)	• Infected human and animal feces • Manure • Septic systems • Sewage	• Gastrointestinal illness • Low-grade fever • Begins 12 hrs - 7 days after exposure
Leptosporidia	• Urine of livestock, dogs and wildlife • Manure	• High fever, severe headache and red eyes • Gastrointestinal illness • Begins 2-28 days after exposure
MICROSCOPIC PARASITES		
Cryptosporidia *Giardia*	• Infected human and animal feces • Manure • Septic systems • Sewage	• Gastrointestinal illness • Begins 2-14 days after exposure
VIRUSES		
Norovirus	• Infected human feces and vomit • Septic systems • Sewage	• Gastrointestinal illness • Low-grade fever & headache • Begins 12-48 hrs after exposure
CHEMICALS		
Nitrate	• Fertilizers • Manure • Bio-solids • Septic systems	Methemoglobinemia or "Blue Baby Syndrome" – No documented cases in Door County, but elevated nitrate levels in well water may indicate risk of contamination by additional pathogens.
Atrazine (trade-name herbicide for control of broadleaf and grassy weeds)	Estimated to be most heavily used herbicide in the U.S. in 1987/89, with its most extensive use for corn and soybeans in the Midwest, including WI. In 1993, it became a restricted-use herbicide nationally. U.S. EPA set a max. contaminant level (MCL) at 3 parts per billion for safe drinking water.	Short-term exposure above the MCL may cause: congestion of heart, lungs and kidneys; low blood pressure; muscle spasms; weight loss; damage to adrenal glands. Long-term exposure above MCL may cause: weight loss, cardio-vascular damage, retinal and some muscle degeneration; cancer.

Information Sources: United States Department of Health and Human Services – Centers for Disease Control and Prevention (www.cdc.gov) and United States Environmental Protection Agency (www.epa.gov)

How much do you know about your well?

Well Construction Report For
WISCONSIN UNIQUE WELL NUMBER CC 566

Property Owner: Clyde Nuenfeldt — Telephone Number:
Mailing Address: Rt 4
City: Oshkosh — State: WI — Zip Code:
County of Well Location: Winnebago — County Well Location Permit No.: W — Well Completion Date: 9/2/69 (M M D D Y Y)

Well Constructor (Business Name): Wallace Clark — Registration #:
Address: 5411 Ripon Rd
City: Oshkosh — State: WI — Zip Code:

2. Mark well location in correct 40-acre parcel of section. (N / W / E / S)

Department of Natural Resources
Private Water Supply — WS/2
Box 7921
Madison, WI 53707
SAMPLE

1. Location (Please type or print using a black pen.)
☑ Town ☐ City ☐ Village — Fire # (if available)
of Oshkosh
Grid or Street Address or Road Name and Number (if available)
Subdivision Name — Lot # — Block #
Gov't Lot # ___ or NE ¼ of NE ¼ of Section 29 ; T 19 N; R 16 ☑ E ☐ W

3. Well Type ☑ New ☐ Replacement ☐ Reconstruction
of unique well # ___ constructed in 19 ___
Reason for new, replaced or reconstructed well?

4. Well serves 1 # of homes and/or ___ (ex: barn, restaurant, church, school, industry, etc.)
High Capacity Well? ☐ Yes ☑ No
High Capacity Property? ☐ Yes ☑ No

☑ Drilled ☐ Driven Point ☐ Jetted ☐ Other ___

5. Well Located on Highest Point of Property, Consistent with the General Layout and Surroundings? ☐ Yes ☐ No If no, explain on back side.
Well Located in Floodplain? ☐ Yes ☐ No
Distance In Feet From Well To Nearest:

	1. Landfill	100	11. Foundation Drain to Clearwater
50	2. Building Overhang		12. Foundation Drain to Sewer
110	3. Septic or Holding Tank		13. Building Drain ☐ Cast Iron or Plastic ☐ Other
150	4. Sewage Absorption Unit		14. Building Sewer ☐ Gravity ☐ Pressure ☐ Cast Iron or Plastic ☐ Other
	5. Nonconforming Pit		15. Collector or Street Sewer
	6. Buried Home Heating Oil Tank		16. Clearwater Sump
	7. Buried Petroleum Tank		17. Wastewater Sump
	8. Shoreline/Swimming Pool		18. Paved Animal Barn Pen
			19. Animal Yard or Shelter
			20. Silo — Type ___
			21. Barn Gutter
			22. Manure Pipe ☐ Gravity ☐ Pressure ☐ Cast Iron or Plastic ☐ Other
			23. Other Manure Storage ___
	9. Downspout/Yard Hydrant		Other NR 112 Waste Source
	10. Privy		24. ___

6. Drillhole Dimensions

Dia. (in.)	From (ft.)	To (ft.)
10	surface	66
6	66	140

Method of constructing upper enlarged drillhole only.
☐ 1. Rotary — Mud Circulation
☐ 2. Rotary — Air
☐ 3. Rotary — Foam
☐ 4. Reverse Rotary
☐ 5. Cable-tool Bit ___ in. dia.
☐ 6. Temp. Outer Casing ___ in. dia. Removed? ☐ Yes ☐ No If no, explain ___
☐ 7. Other ___

DNR USE ONLY

9. Geology — Type, Caving/Noncaving, Color, Hardness, Etc.

From (ft.)	To (ft.)	
surface	18	Clay
18	66	Sandy clay
66	100	Lime rock
100	140	Sand Stone
		Water bearing

7. Casing, Liner, Screen

Dia. (in.)	Material, Weight, Specification Mfg. & Method of Assembly	From (ft.)	To (ft.)
6	New Black 18.95	surface	66

Dia. (in.)	screen type and material	From	To

10. Static Water Level
___ ft. above ground level
10 ft. below ground surface

11. Pump Test
Pumping Level 13 ft. below surface
Pumping at 20 GPM for 2 hours

12. Well Is:
10 in. ☑ Above ☐ Below Grade
Developed? ☐ Yes ☐ No
Disinfected? ☑ Yes ☐ No
Capped? ☑ Yes ☐ No

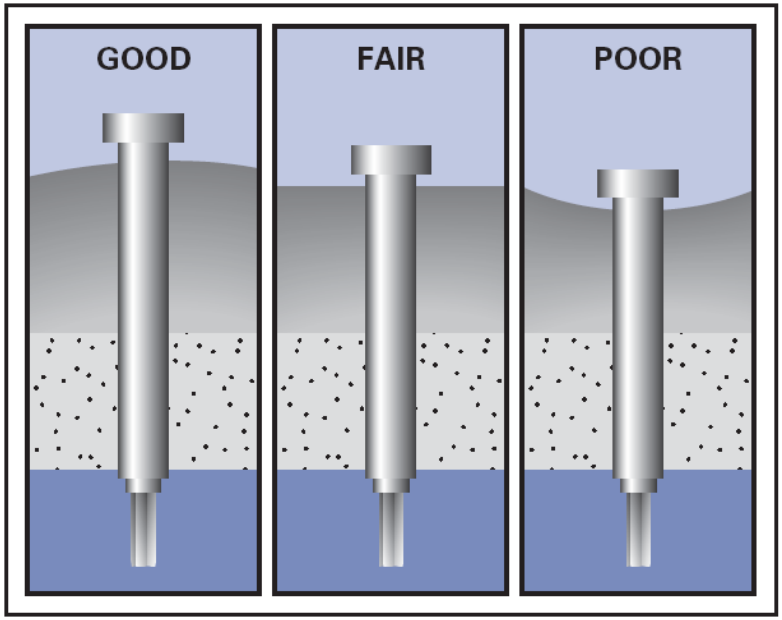
8. Grout or Other Sealing Material
Method ___

Kind of Sealing Material	From (ft.)	To (ft.)	# Sacks Cement
Slurry clay + drillings	surface	66	

13. Did you permanently seal all unused, noncomplying, or unsafe wells? ☐ Yes ☐ No If no, explain ___

14. Signature of Point Driver or Registered Driller — Date Signed
Signature of Drill Rig Operator — Date Signed

Make additional comments on reverse side about geology, etc.
WELL CONSTRUCTION REPORT



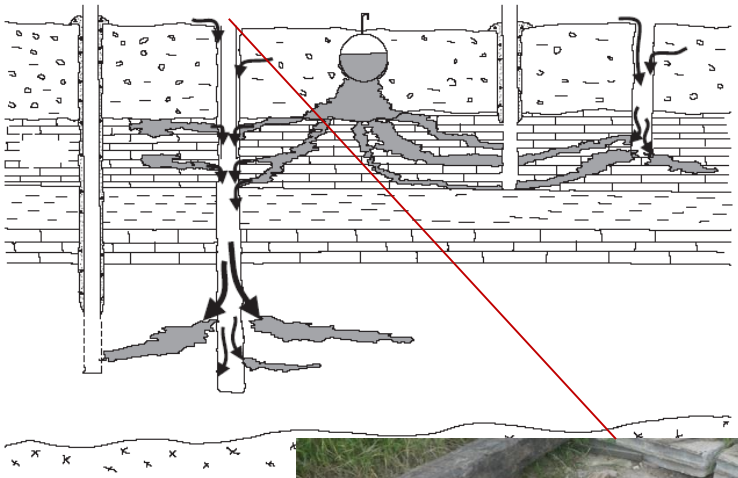
Which of these is a healthy well?

Photos courtesy of: Matt Zoschke

Also check for:

- Cross connections and proper backflow prevention on yard hydrants and livestock waterers.
- Any old unused wells on the property that may represent direct conduits to groundwater

AQUIFER CONTAMINATION THROUGH IMPROPERLY ABANDONED WELLS



Source: Adapted from DiNovo and Jaffe, 1984.

What should I do if coliform bacteria was present?

1. **Use alternative source of water for drinking**
2. **Retest**
3. **Try to identify any sanitary defects**
   - Loose or non-existent well cap
   - Well construction faults
   - A nearby unused well or pit
   - Inadequate filtration by soil
4. **Disinfect the well**
5. **Retest to ensure well is bacteria free.**

- ***For reoccurring bacteria problems the best solution may be a new well or if new well is unlikely to remedy the problem because of geology, may seek approval for treatment.***

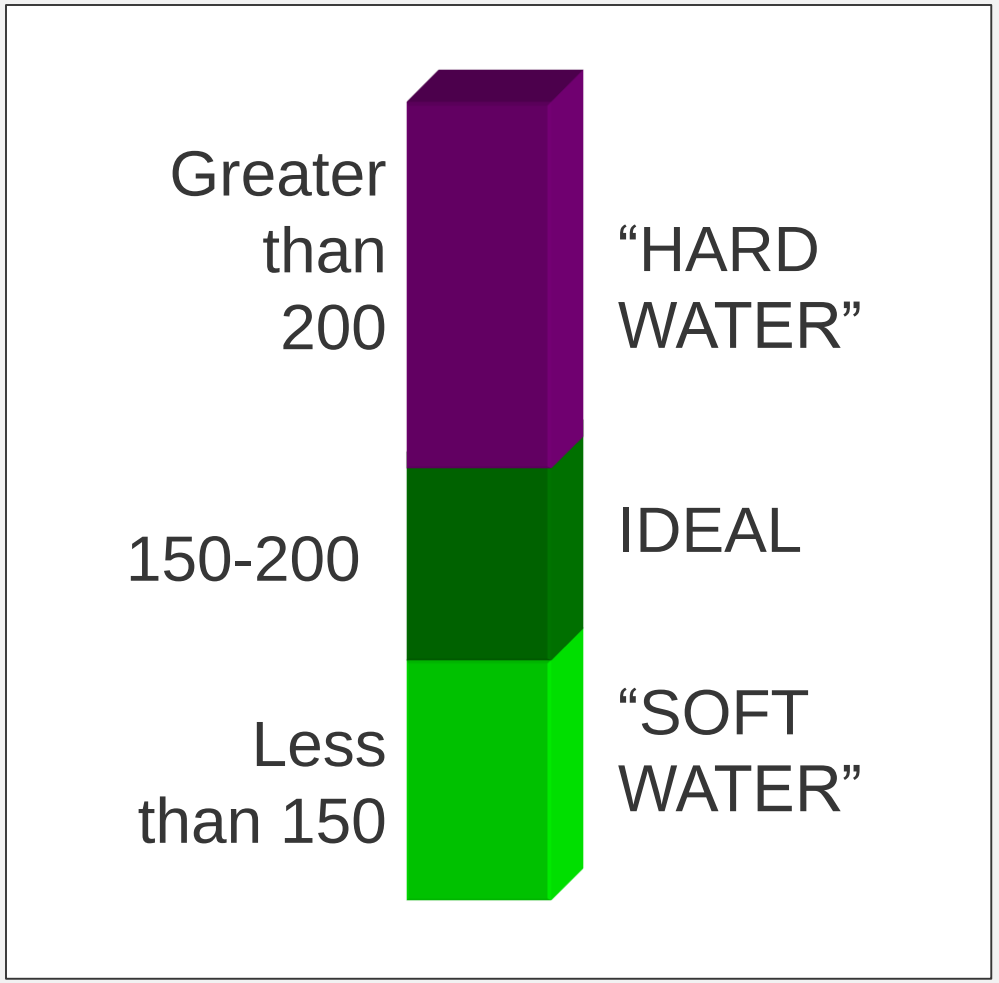
Rock and Soil Impacts on Water Quality

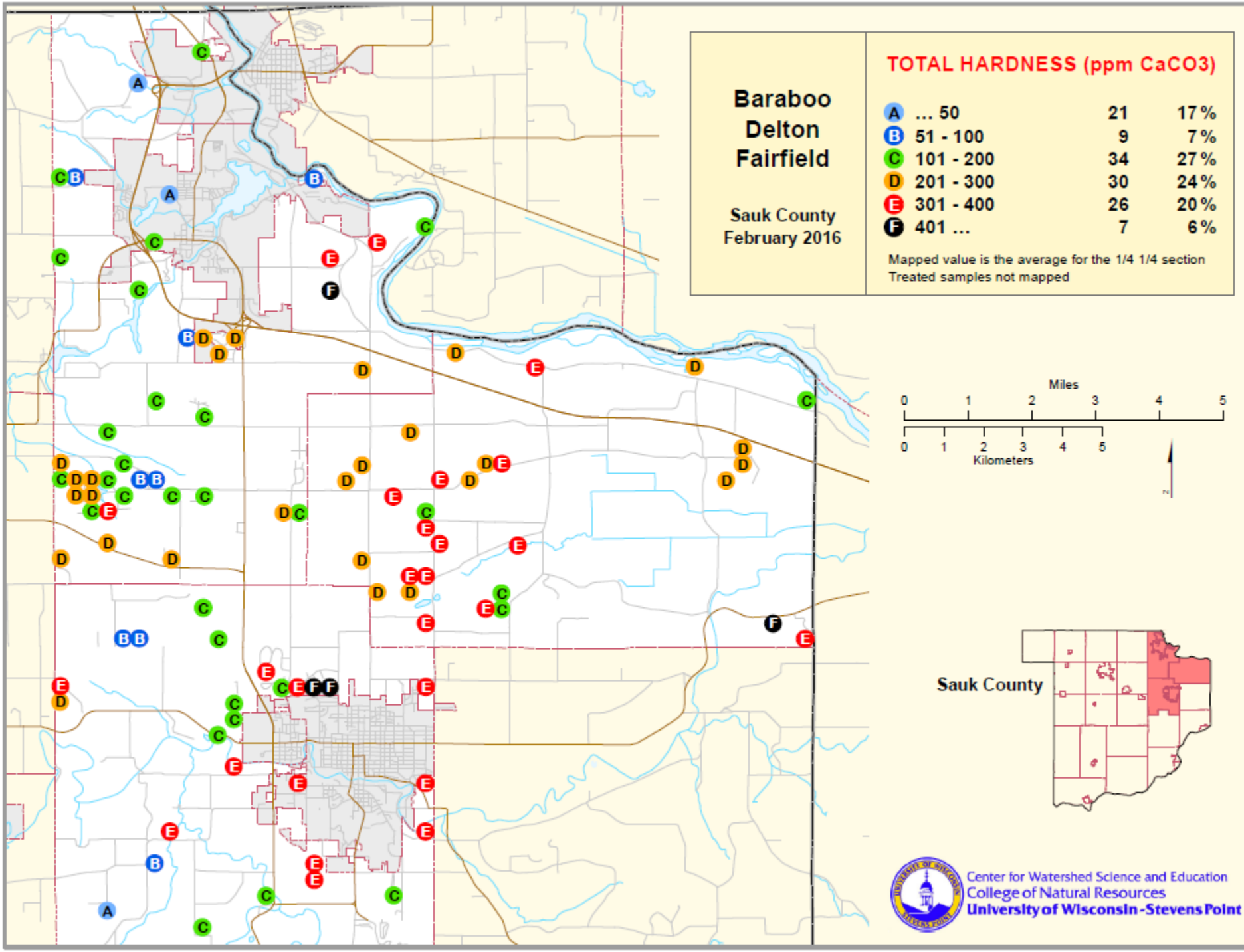
Tests for Aesthetic Problems

Hardness

- Natural (rocks and soils)
- Primarily calcium and magnesium

- Problems: scaling, scum, use more detergent, decrease water heater efficiency

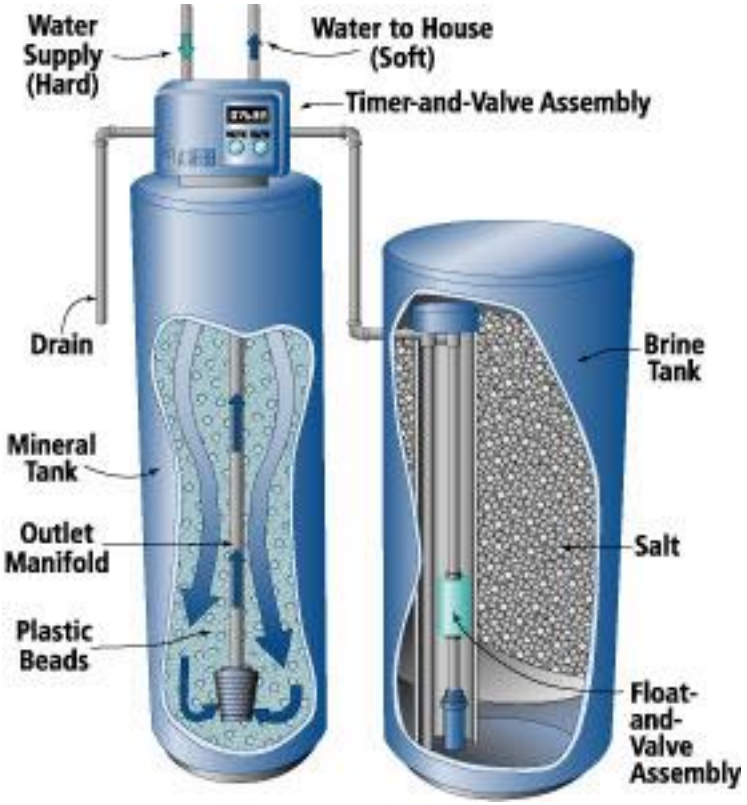



Baraboo
Delton
Fairfield
Sauk County
February 2016
TOTAL HARDNESS (ppm CaCO3)
A ... 50 21 17%
B 51 - 100 9 7%
C 101 - 200 34 27%
D 201 - 300 30 24%
E 301 - 400 26 20%
F 401 ... 7 6%
Mapped value is the average for the 1/4 1/4 section
Treated samples not mapped
Miles
0 1 2 3 4 5
0 1 2 3 4 5
Kilometers
Sauk County
Center for Watershed Science and Education
College of Natural Resources
University of Wisconsin-Stevens Point

Water Softening

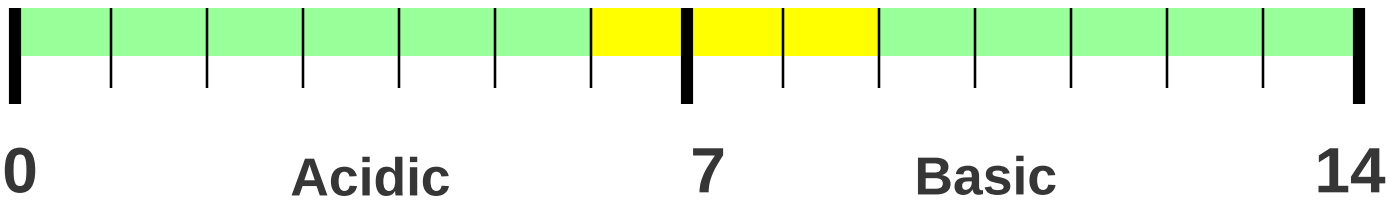
Water softeners remove calcium and magnesium which cause scaling and exchange it for sodium (or potassium).

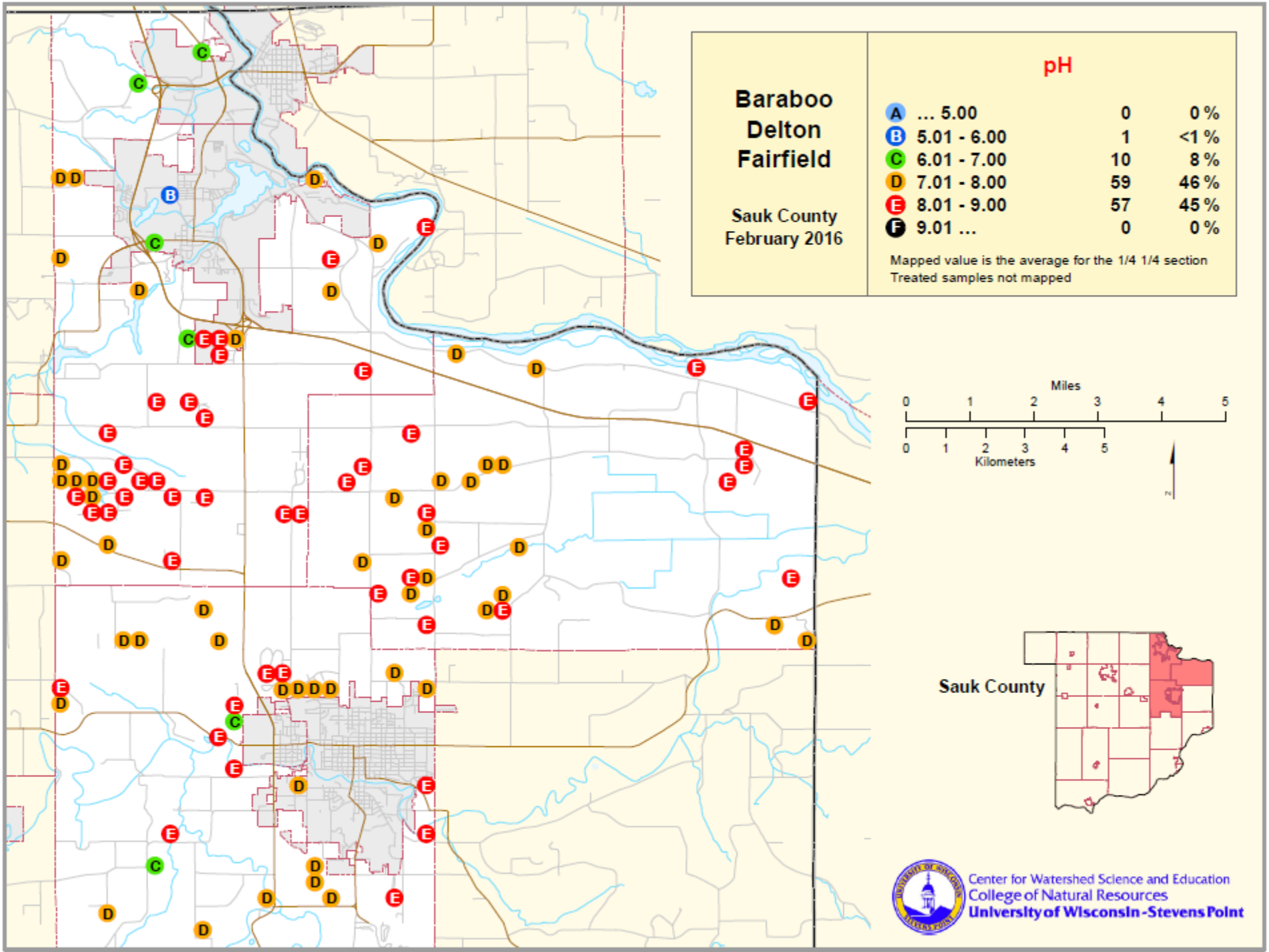
- **Negative: Increases sodium content of water.**
- **Suggestions:**
  - **Bypass your drinking water faucet.**
  - **Do not soften water for outdoor faucets.**
  - **If you are concerned about sodium levels – use potassium chloride softener salt.**



Tests for Overall Water Quality

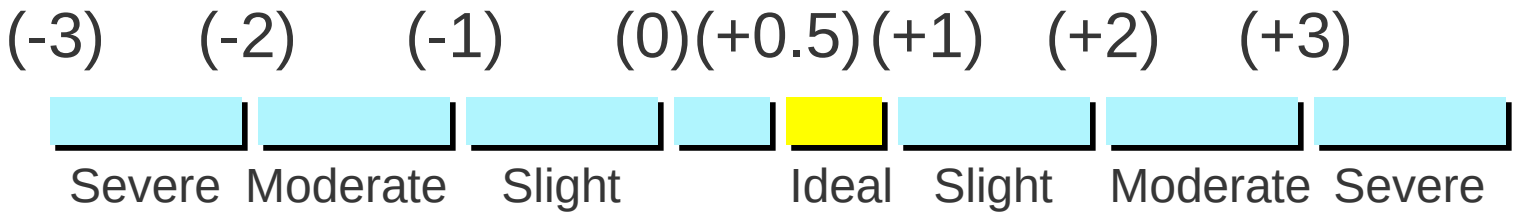
- **Alkalinity** – ability to neutralize acid
- **Conductivity** –
  - Measure of total ions
  - can be used to indicate presence of contaminants (~ twice the hardness)
- **pH** – Indicates water's acidity and helps determine if water will corrode plumbing




Baraboo
Delton
Fairfield
Sauk County
February 2016
pH
A ... 5.00 0 0 %
B 5.01 - 6.00 1 <1 %
C 6.01 - 7.00 10 8 %
D 7.01 - 8.00 59 46 %
E 8.01 - 9.00 57 45 %
F 9.01 ... 0 0 %
Mapped value is the average for the 1/4 1/4 section
Treated samples not mapped
Miles
0 1 2 3 4 5
0 1 2 3 4 5
Kilometers
Sauk County
Center for Watershed Science and Education
College of Natural Resources
University of Wisconsin-Stevens Point

Tests for Overall Water Quality

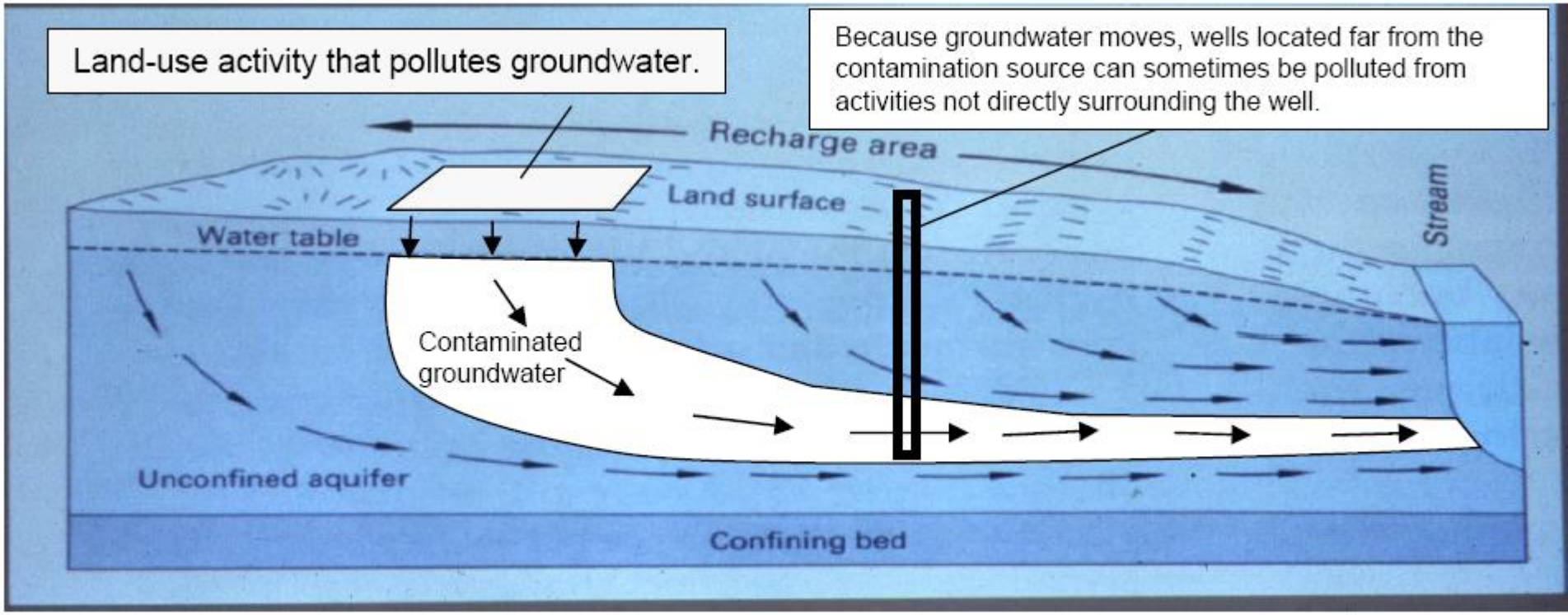
Saturation Index



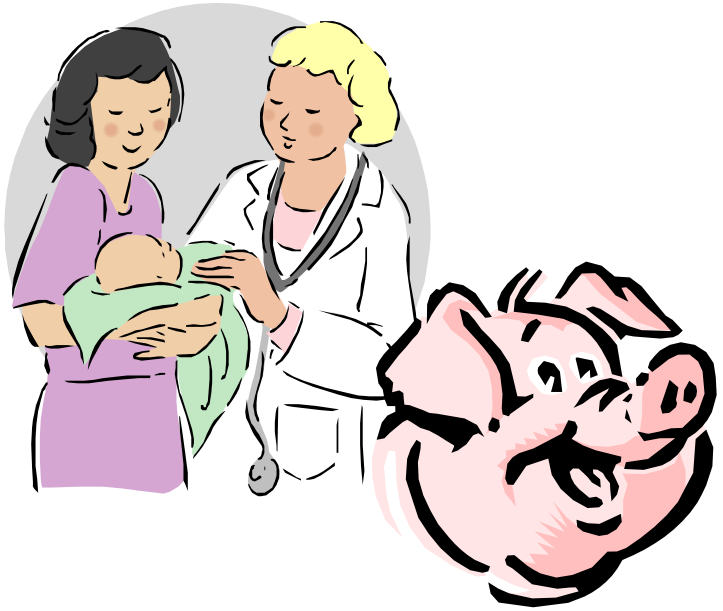
Corrosion occurs

Scaling occurs


OIL
OIL
OIL
Soil


Land-use activity that pollutes groundwater.
Because groundwater moves, wells located far from the contamination source can sometimes be polluted from activities not directly surrounding the well.
Recharge area
Land surface
Water table
Stream
Contaminated groundwater
Unconfined aquifer
Confining bed

Nitrate-Nitrogen

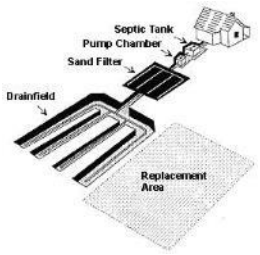


Health Effects:

- Methemoglobinemia (blue baby disease)
- Possible links to birth defects and miscarriages (humans and livestock)
- Indicator of other contaminants

Sources:

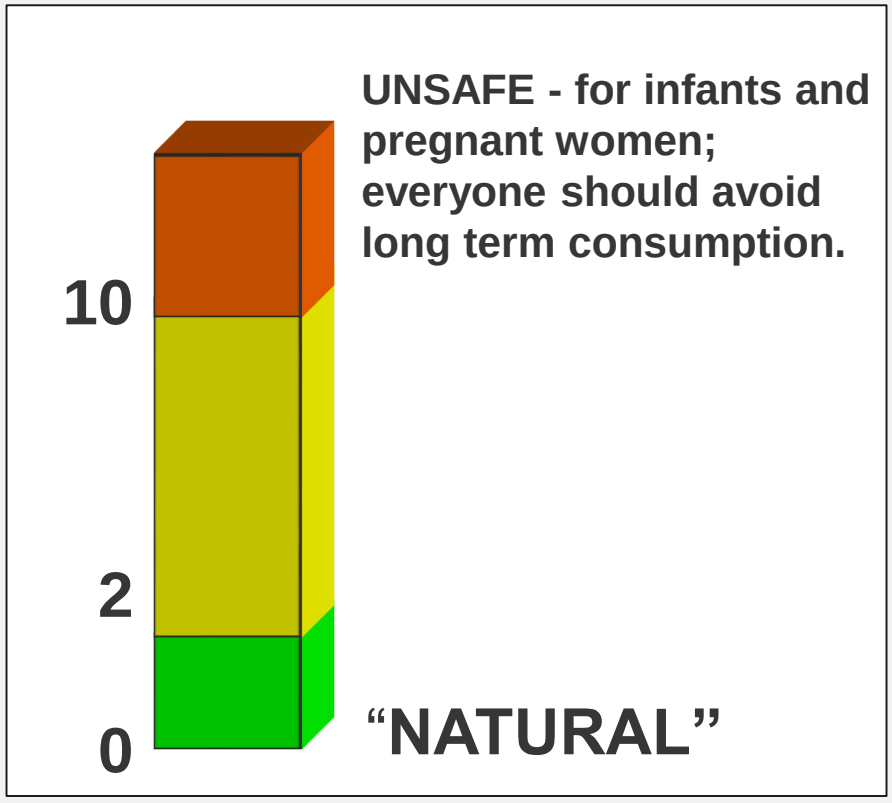
- Agricultural fertilizer
- Lawn fertilizer
- Septic systems
- Animal wastes

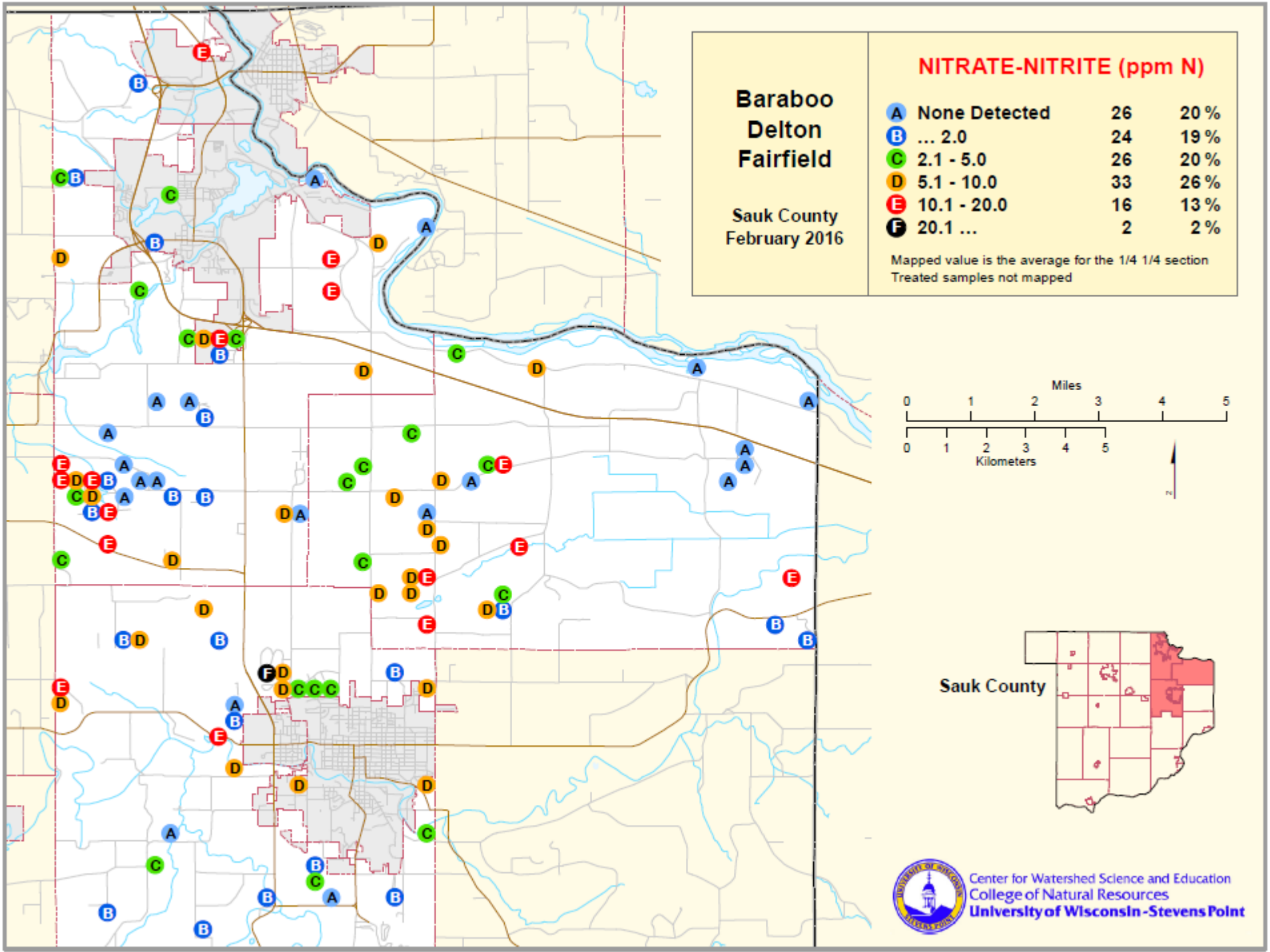


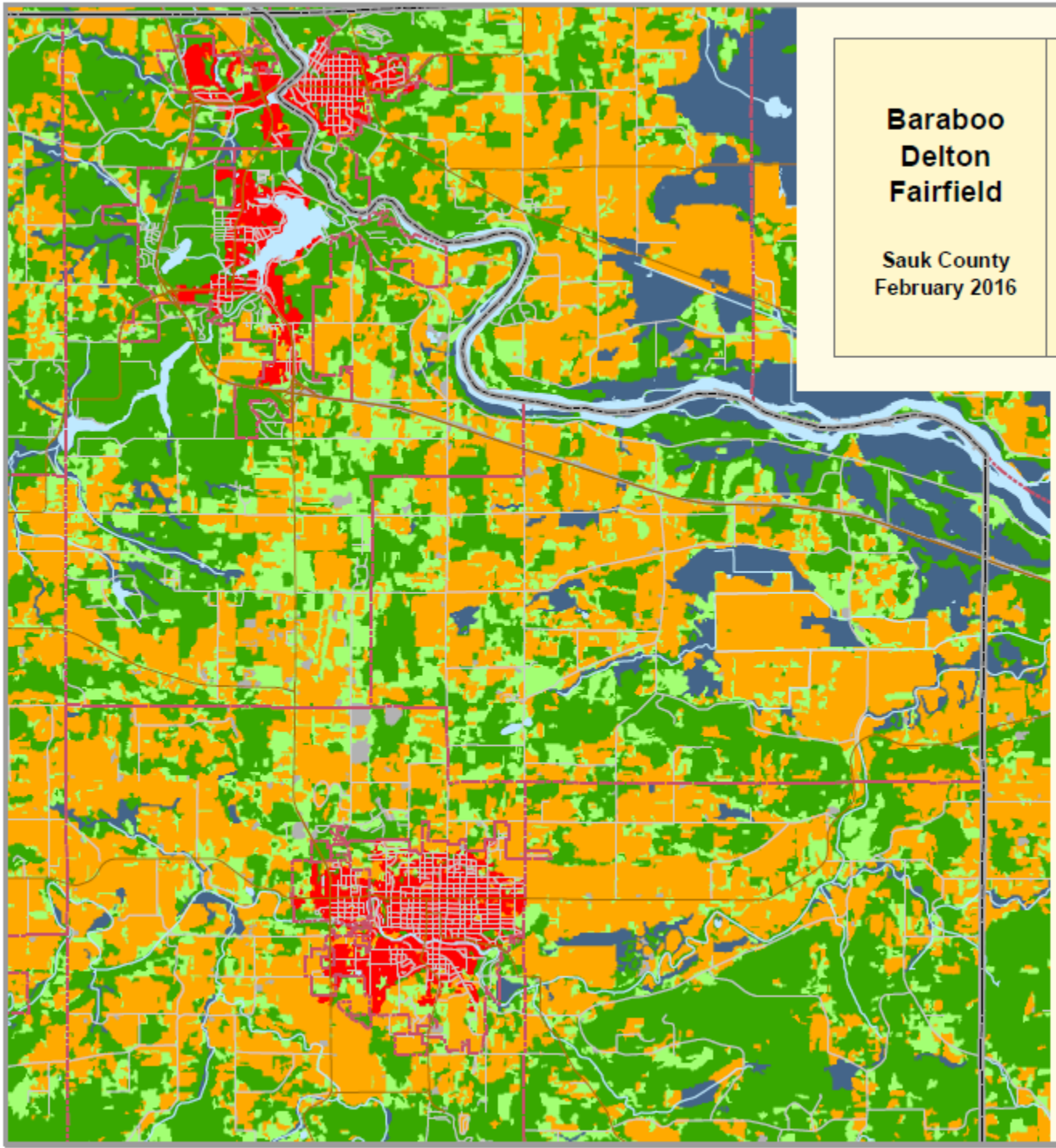
Test Important to Health

Nitrate Nitrogen

- **Greater than 10 mg/L**
  Exceeds State and Federal Limits for Drinking Water
- **Between 2 and 10 mg/L**
  Some Human Impact
- **Less than 2.0 mg/L**
  "Transitional"
- **Less than 0.2 mg/L**
  "Natural"




Baraboo
Delton
Fairfield
Sauk County
February 2016
NITRATE-NITRITE (ppm N)
A None Detected 26 20 %
B ... 2.0 24 19 %
C 2.1 - 5.0 26 20 %
D 5.1 - 10.0 33 26 %
E 10.1 - 20.0 16 13 %
F 20.1 ... 2 2 %
Mapped value is the average for the 1/4 1/4 section
Treated samples not mapped
Miles
0 1 2 3 4 5
0 1 2 3 4 5
Kilometers
Sauk County
Center for Watershed Science and Education
College of Natural Resources
University of Wisconsin-Stevens Point



Baraboo
Delton
Fairfield

Sauk County
February 2016

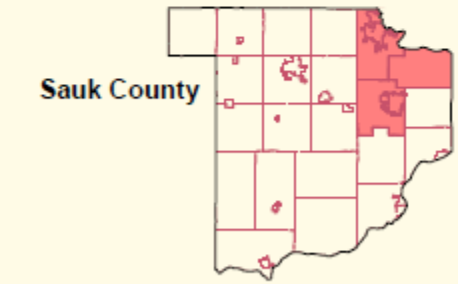
Land Use:

- Urban
- Agriculture
- Forest
- Shrub-Grass
- Wetland
- Water
- Other

Miles
0 1 2 3 4 5
0 1 2 3 4 5
Kilometers

N

Sauk County



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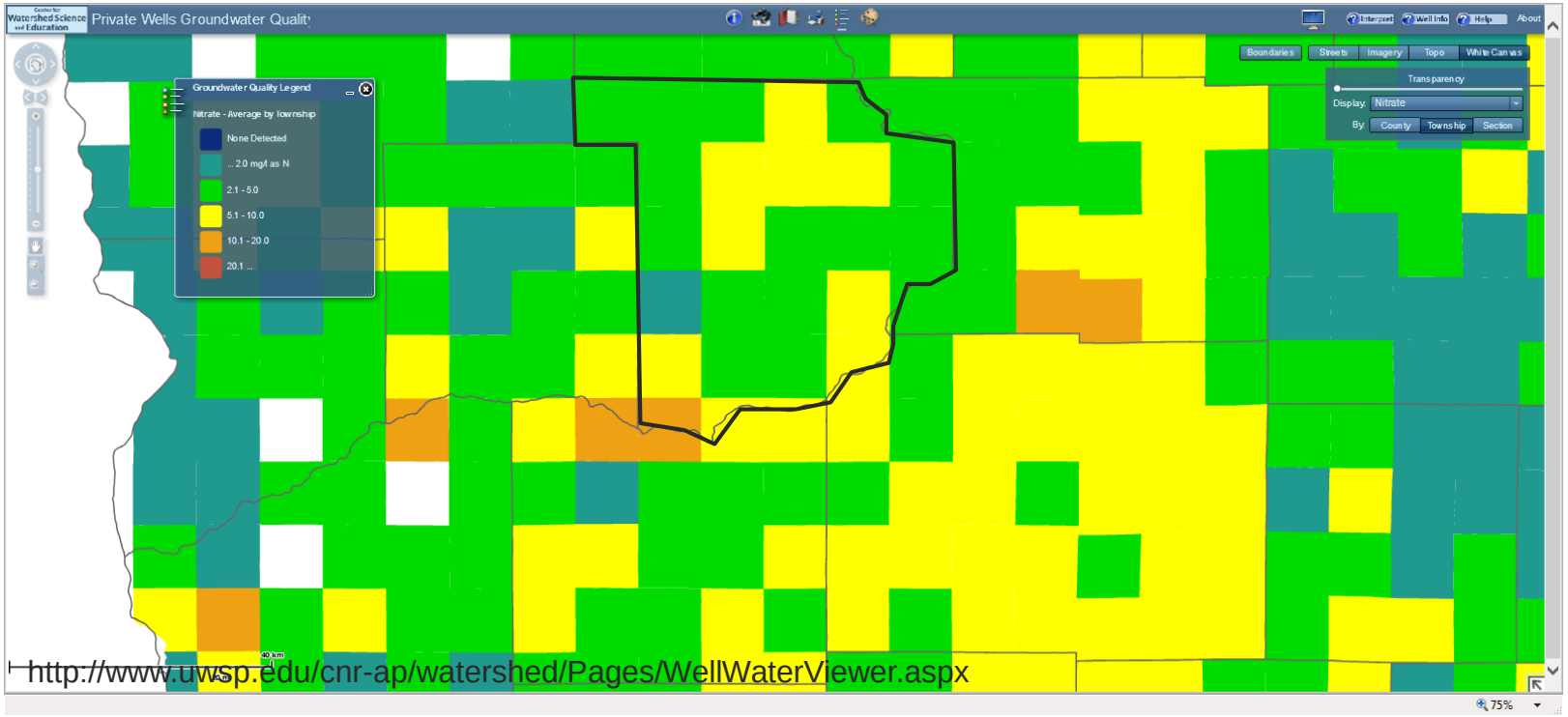
Sauk County Nitrate Overview



16% of wells in Sauk County are above 10 mg/L nitrate-nitrogen
The median concentration is 3.0 mg/L nitrate-nitrogen
The average concentration is 5.3 mg/L nitrate-nitrogen

What can I do to reduce my nitrate levels?

Solution:

- **Eliminate contamination source or reduce nitrogen inputs**

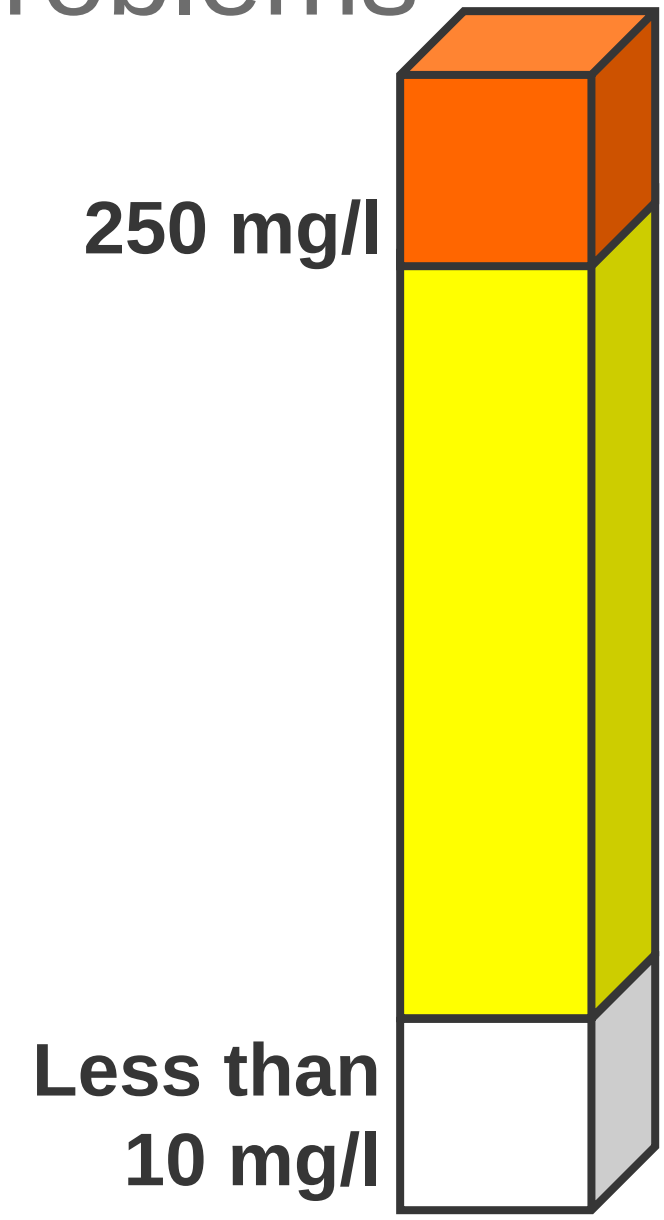
Short term:

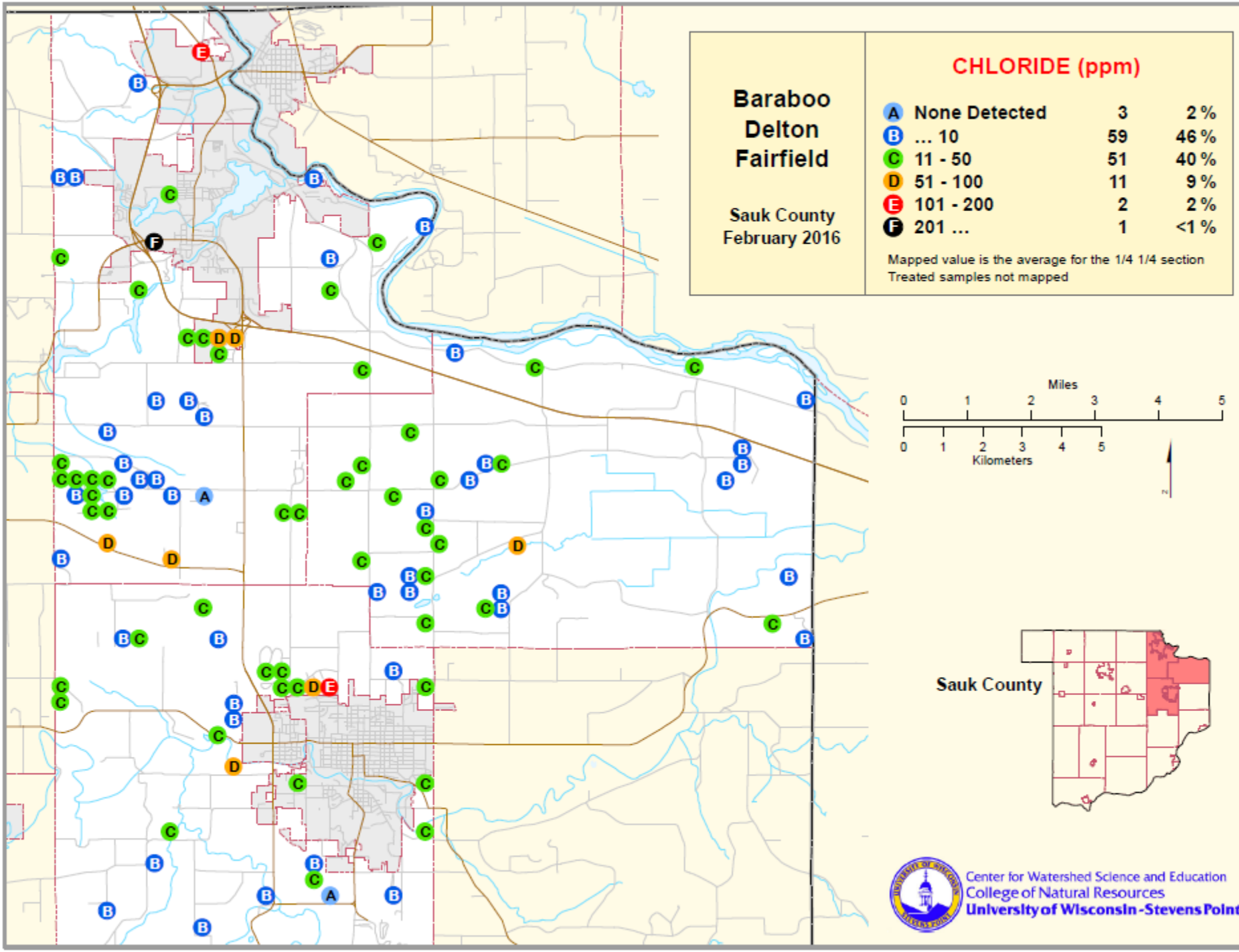
- **Change well depth or relocate well**
- **Carry or buy water**
- **Water treatment devices**
  - **Reverse osmosis**
  - **Distillation**
  - **Anion exchange**

Tests for Aesthetic Problems

Chloride

- Greater than 250 mg/l
  - No direct effects on health
  - Salty taste
  - Exceeds recommended level
- Greater than 10 mg/l may indicate human impact
- Less than 10 mg/l considered “natural” in much of WI
- **Sources:** Fertilizers, Septic Systems and Road Salt



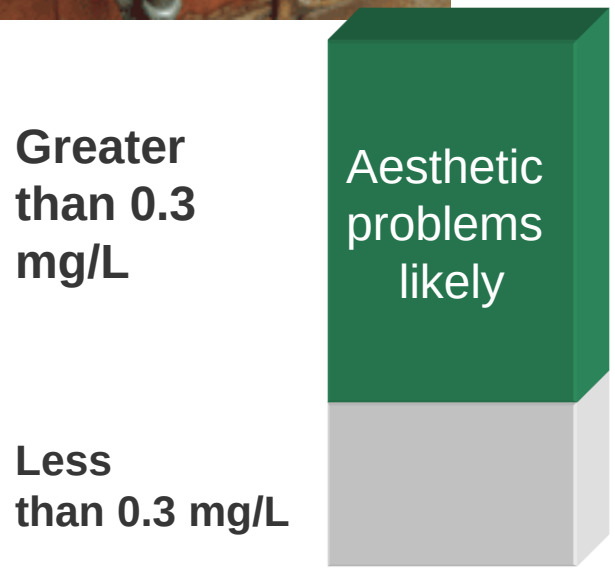

Baraboo
Delton
Fairfield
Sauk County
February 2016
CHLORIDE (ppm)
A None Detected 3 2 %
B ... 10 59 46 %
C 11 - 50 51 40 %
D 51 - 100 11 9 %
E 101 - 200 2 2 %
F 201 ... 1 <1 %
Mapped value is the average for the 1/4 1/4 section
Treated samples not mapped
Miles
0 1 2 3 4 5
0 1 2 3 4 5
Kilometers
Sauk County
Center for Watershed Science and Education
College of Natural Resources
University of Wisconsin-Stevens Point

Tests for Aesthetic Problems

Iron

- Natural (rocks and soils)
- May benefit health
- Red and yellow stains on clothing, fixtures

- If iron present, increases potential for iron bacteria
  - Slime, odor, oily film



Tests for Aesthetic Problems

Manganese

- Natural (rocks and soils)
- Aesthetic issues: taste, odor, color (black staining or precipitates)
- Health Advisory Level: 0.300 mg/L

➢ Many years of exposure to high levels of manganese can cause harm to the nervous system. A disorder similar to Parkinson's disease can result. This type of effect is most likely to occur in the elderly. The federal health advisory for manganese is intended to protect against this effect.

Greater than 0.300 mg/L

Greater than 0.050

Less than 0.050

Test Important to Health

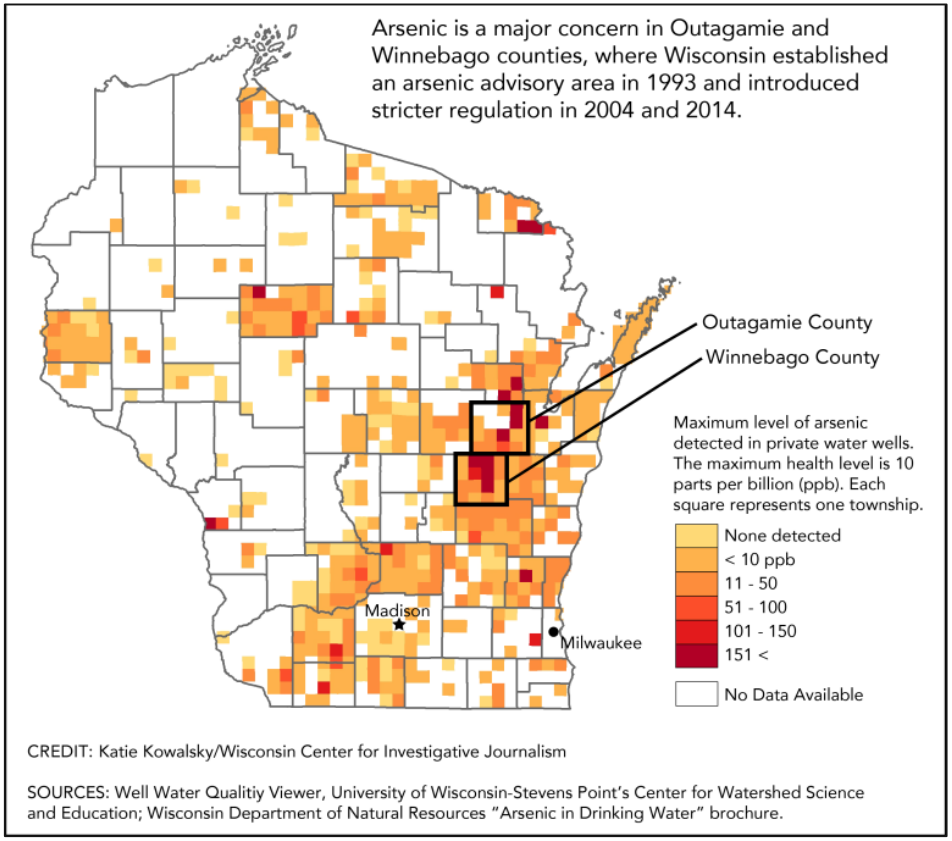
Arsenic

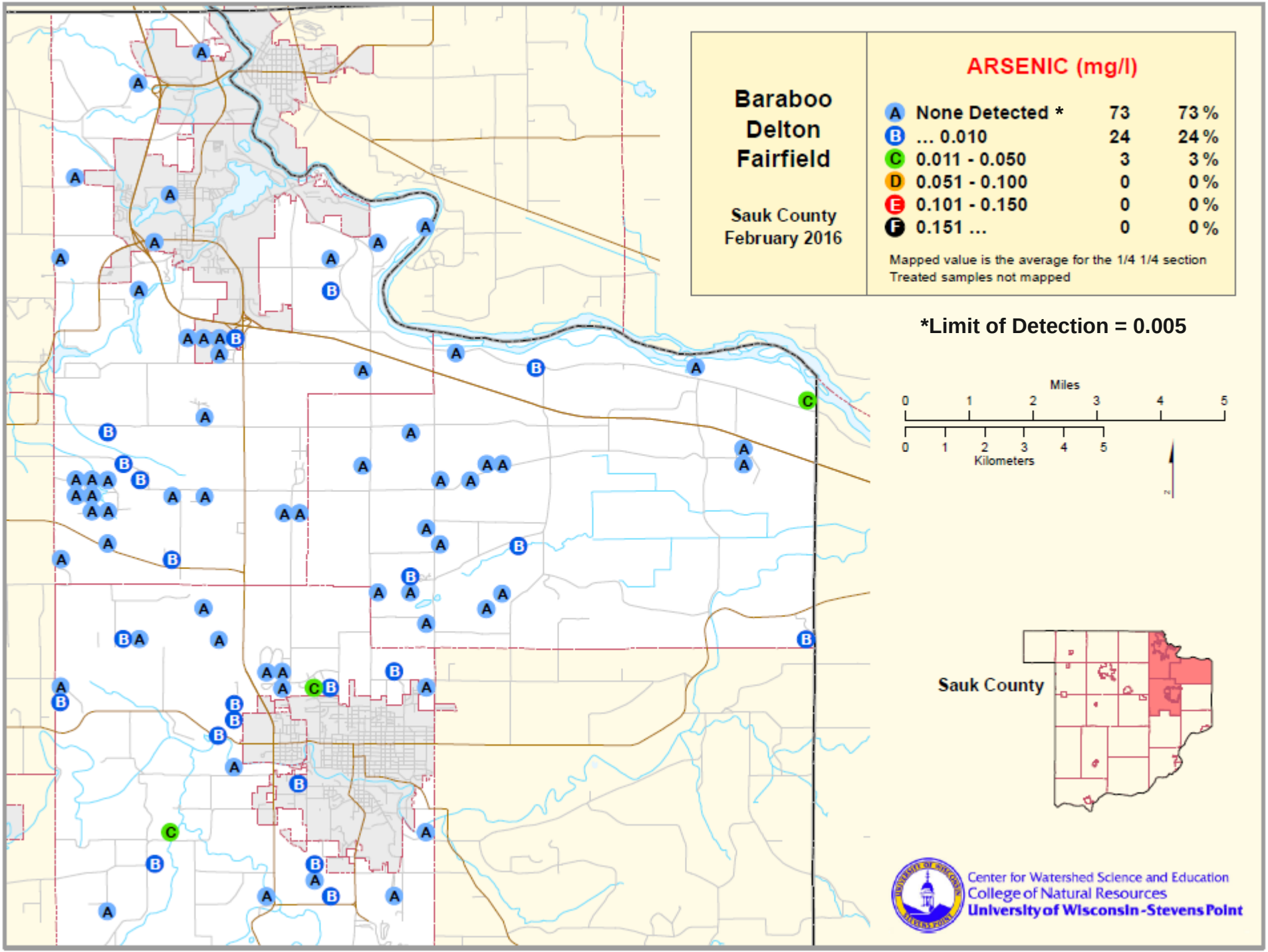
Sources: Naturally occurring in mineral deposits

Standard: 0.010 mg/L (10 ppb)

Health Effects:

- Increased risk of skin cancers as well as lung, liver, bladder, kidney, and colon cancers.
- Circulatory disorders
- Stomach pain, nausea, diarrhea
- Unusual skin pigmentation




Baraboo
Delton
Fairfield
Sauk County
February 2016
ARSENIC (mg/l)
A None Detected * 73 73 %
B ... 0.010 24 24 %
C 0.011 - 0.050 3 3 %
D 0.051 - 0.100 0 0 %
E 0.101 - 0.150 0 0 %
F 0.151 ... 0 0 %
Mapped value is the average for the 1/4 1/4 section
Treated samples not mapped
*Limit of Detection = 0.005
Miles
0 1 2 3 4 5
0 1 2 3 4 5
Kilometers
Sauk County
Center for Watershed Science and Education
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Test Important to Health

Copper

- **Sources:** Copper water pipes
- **Standard:** Less than 1.3 mg/L is suitable for drinking

Health Effects:

- Some copper is needed for good health
- Too much may cause problems:
  - Stomach cramps, diarrhea,
  - vomiting, nausea
  - Formula intolerance in infants

Test Important to Health

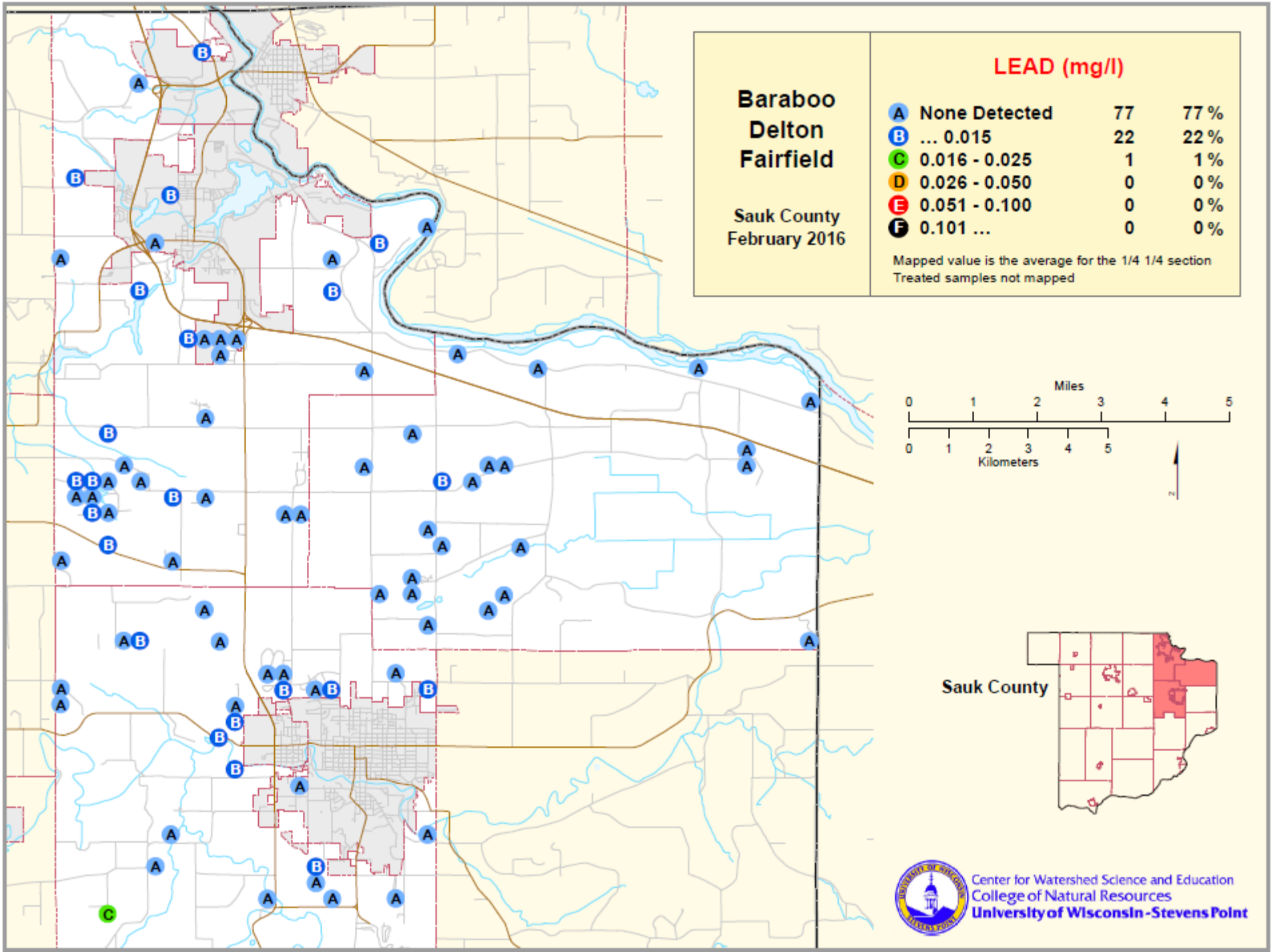
Lead

Sources: Lead solder joining copper pipes (pre-1985) or brass fixtures

Standard: 0.015 mg/L (15 ppb)

Health Effects:

- Young children, infants and unborn children are particularly vulnerable.
- Lead may damage the brain, kidneys, nervous system, red blood cells, reproductive system.


Baraboo
Delton
Fairfield
Sauk County
February 2016
LEAD (mg/l)
A None Detected 77 77 %
B ... 0.015 22 22 %
C 0.016 - 0.025 1 1 %
D 0.026 - 0.050 0 0 %
E 0.051 - 0.100 0 0 %
F 0.101 ... 0 0 %
Mapped value is the average for the 1/4 1/4 section
Treated samples not mapped
Miles
0 1 2 3 4 5
0 1 2 3 4 5
Kilometers
N
Sauk County
Center for Watershed Science and Education
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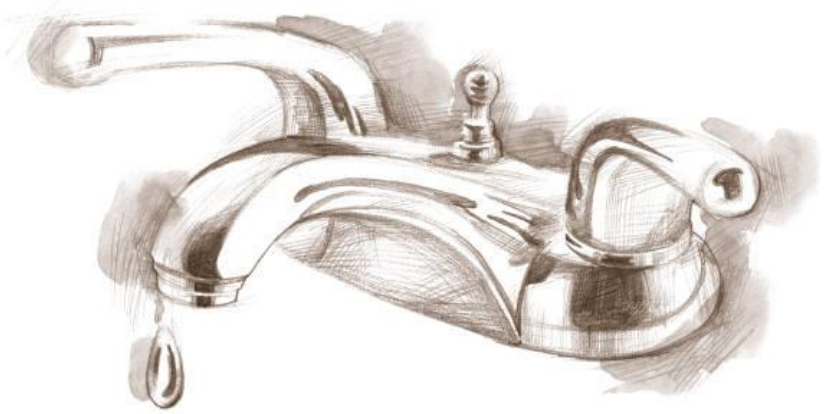
Lead and Copper

Solutions:

- Allow water to run for a minute or two before using for drinking or cooking

or

- Use a treatment device, but generally not necessary



Pesticides in Drinking Water

- Pesticides include: insecticides, herbicides, fungicides and other substances used to control pests.
- Health standards usually only account for parent compound.
- Parent compounds breakdown over time.
- Little research into health effects from the combination of chemicals..

- **Most frequently detected pesticides in Wisconsin:**
  - Alachlor* and its chemical breakdown products
  - Metolachlor and its chemical breakdown products
  - Atrazine** and its chemical breakdown products
  - Metribuzin
  - Cyanazine and its chemical breakdown products.

Tests Important to Health

DACT Screen

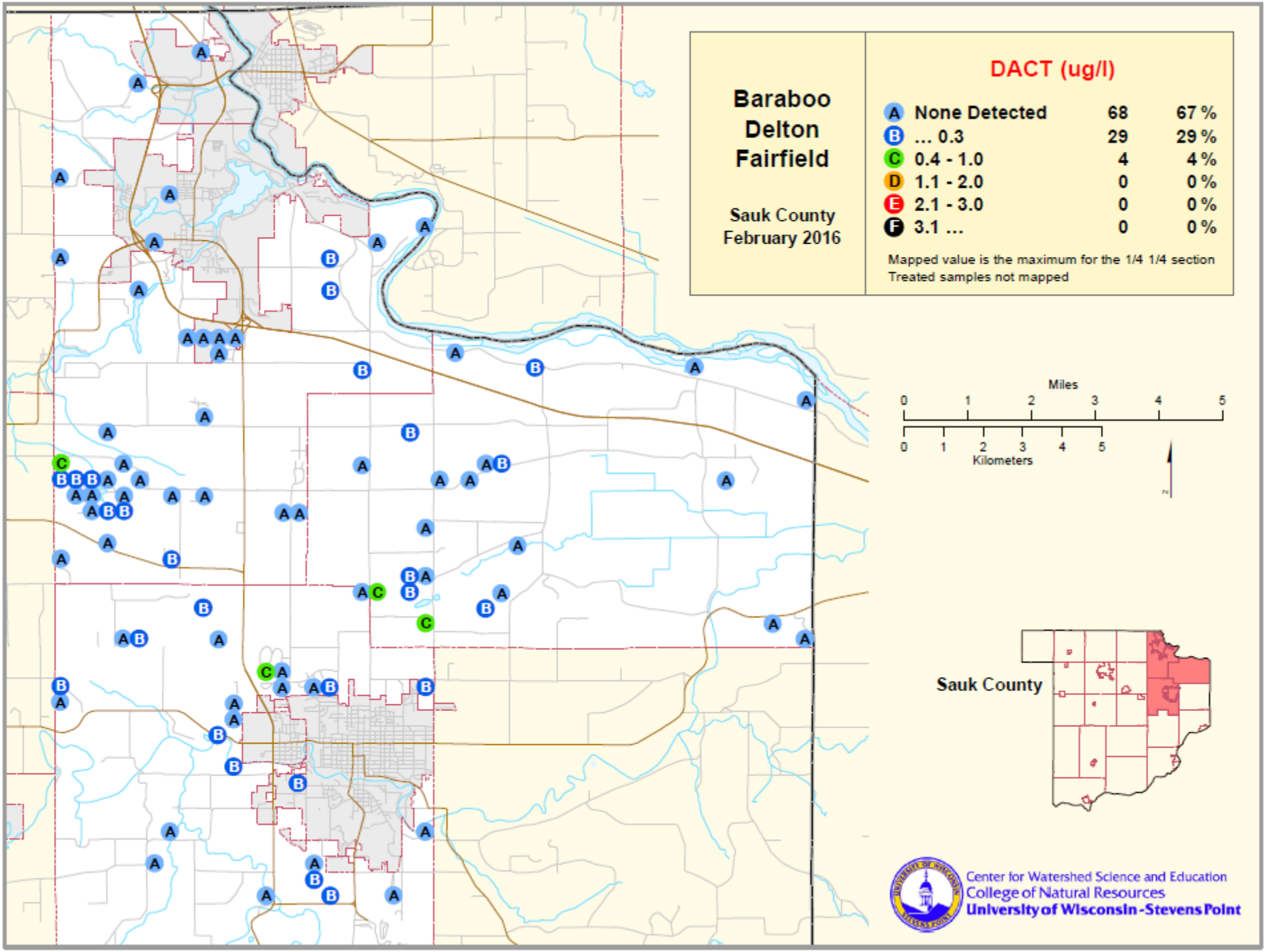
Sources: Triazine pesticides (a class of pesticides mainly used on corn)

DACT Screen: Only measures the diaminochlorotriazine (DACT) residue levels of triazine type pesticides (atrazine, simazine, propazine, cyanazine, etc)

Specific to diaminochlorotriazine (DACT), does not account for parent compound or other breakdown components

Drinking water limit:

- **3 ppb of total atrazine** *(atrazine + the 3 breakdown components)*


Baraboo
Delton
Fairfield
Sauk County
February 2016
DACT (ug/l)
A None Detected 68 67 %
B ... 0.3 29 29 %
C 0.4 - 1.0 4 4 %
D 1.1 - 2.0 0 0 %
E 2.1 - 3.0 0 0 %
F 3.1 ... 0 0 %
Mapped value is the maximum for the 1/4 1/4 section
Treated samples not mapped
Miles
0 1 2 3 4 5
0 1 2 3 4 5
Kilometers
Sauk County
Center for Watershed Science and Education
College of Natural Resources
University of Wisconsin-Stevens Point

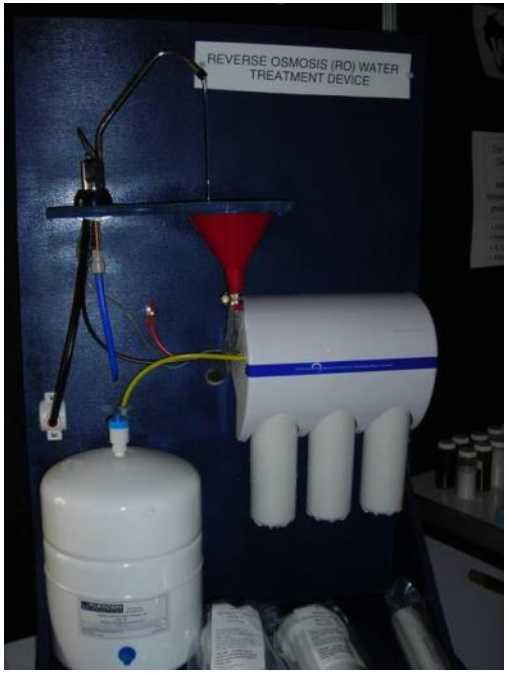
Improving water quality

- **Long-term improvements**
  - Eliminate sources of contamination

- **Short-term improvements**
  - Repair or replace existing well
  - Connect to public water supply or develop community water system
  - Purchase bottled water for drinking and cooking
  - Install a water treatment device
    - Often the most convenient and cost effective solution

understanding water treatment

- **Advantages:**
  - + Reduce level of contaminants and other impurities
  - + Improve taste, color and odor
- **Keep in Mind:**
  - – Require routine maintenance
  - – Can require additional energy costs
  - – Testing is often the only way to know it is functioning properly for most health related contaminants
- **Other important information:**
  - Treatment methods often selective for certain contaminants
  - Multiple treatment units may be necessary
  - Treatment may also remove beneficial elements from water in the process.



Where to go from here:

- **Coliform Bacteria:**
  - Test well annually for bacteria, or if water changes color or clarity
- **Nitrate:**
  - If nitrate levels are above 5 mg/L, consider testing annually (or seasonally if your result is near 10 mg/L)
- **Arsenic:**
  - If you haven't checked for arsenic consider testing
  - If arsenic was present greater than 0.005 mg/L consider testing again in the future to see if levels have changed

List of laboratories can be found on the DNR Website "Recommended testing"

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Center for Watershed Science and Education

College of Natural Resources and University of Wisconsin-Extension

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- Groundwater Center
- Activities
- Reports
- WI Well Water Quality Viewer
- Student Involvement
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About our Center

The Center for Watershed Science and Education is a partnership between the UW-Stevens Point College of Natural Resources and UW – Extension. In the spirit of the Wisconsin Idea, the Center works across the state helping to:

- Support watershed stewardship
- Assist citizens with lake, river and drinking water quality problems
- Promote management strategies for water resource protection
- Provide water quality assessment and support
- Prepare students for careers as water resource professionals.

News From The Center

Postcards from the Central Sands: Kraft interviewed for article on groundwater

USGS report on groundwater pumping impacts on streams

Use our Well Water Quality Viewer to access groundwater information for your community

Central Sands study on pumping effects on lakes and streams published in international scientific journal

Walking on Water: Essays for the Central Sands. Get your free copy today!

www.uwsp.edu/cnr-ap/watershed

UW Extension
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College of Natural Resources

Thanks to you and the following for helping sponsor this program:

- **Towns of Baraboo, Delton and Fairfield**
- **Sauk County UW-Extension**
- **Sauk County Conservation, Planning and Zoning**

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www.uwsp.edu/cnr-ap/watershed

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