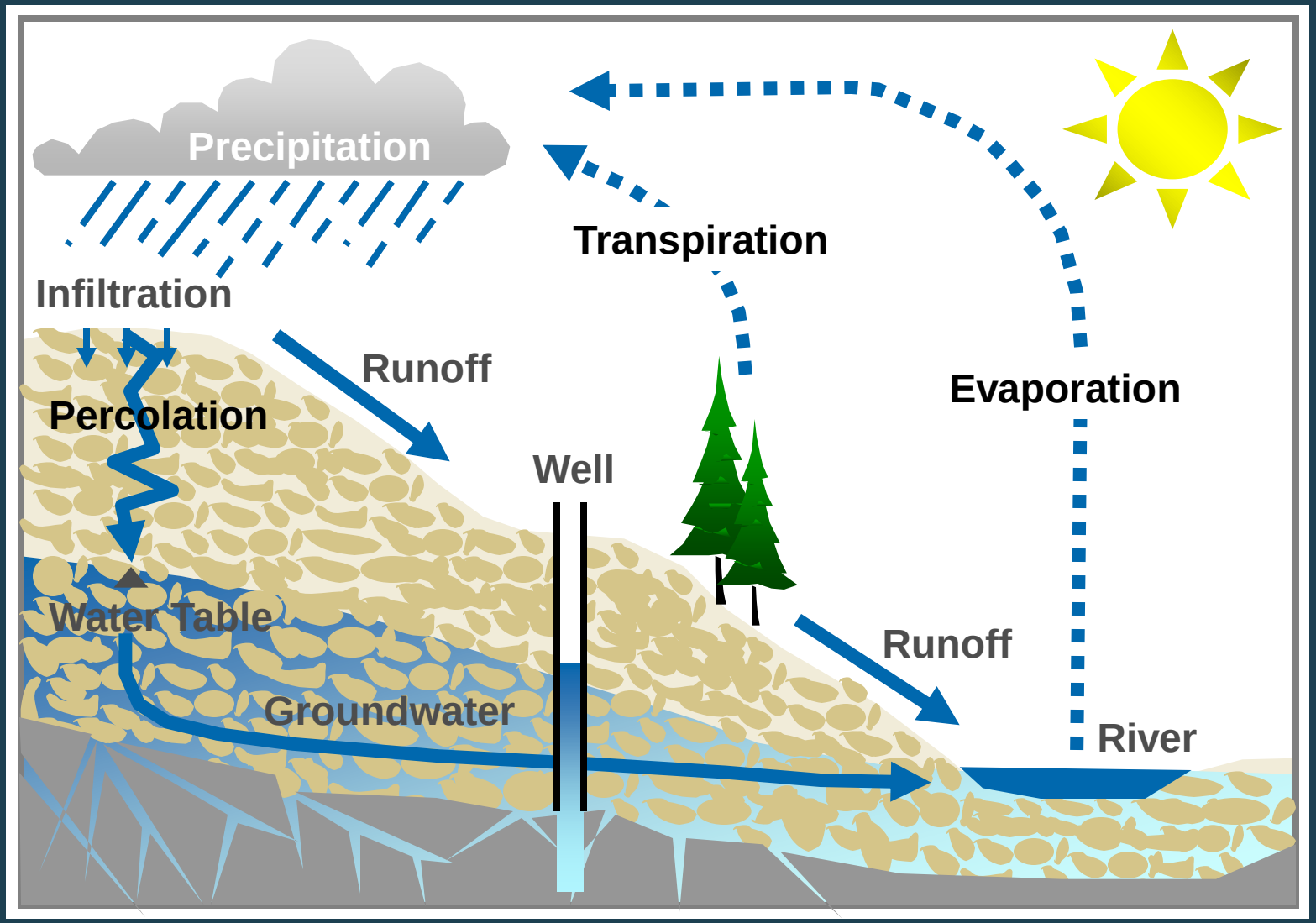
Sauk County Community Drinking Water Program

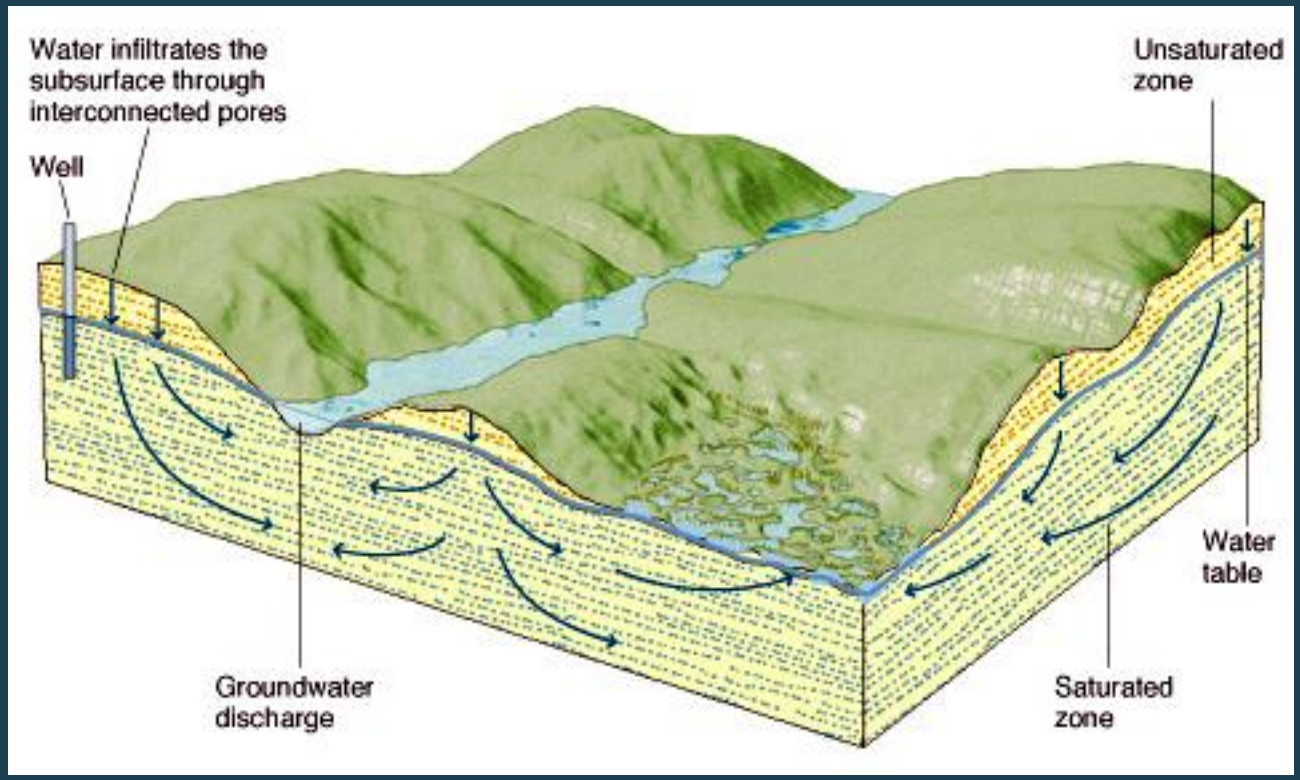
Today's presentation

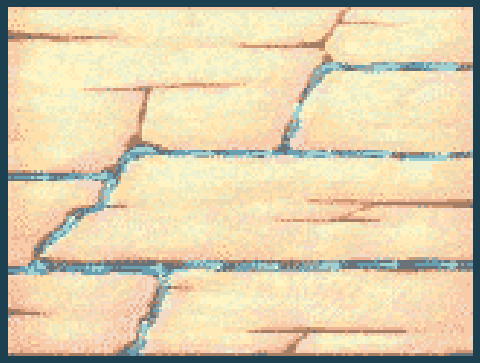
- Groundwater Basics: Where does my water come from
- Well Construction
- What do my individual test results mean?
- General groundwater quality in Towns of Woodland and LaValle
- Improving your water quality

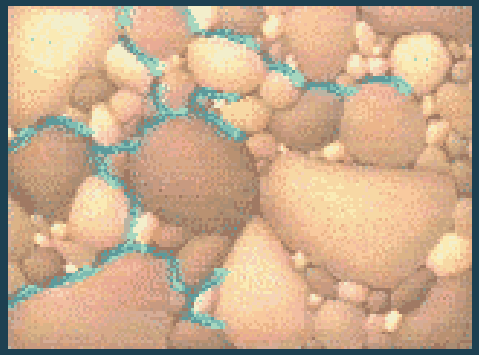
The Water Cycle

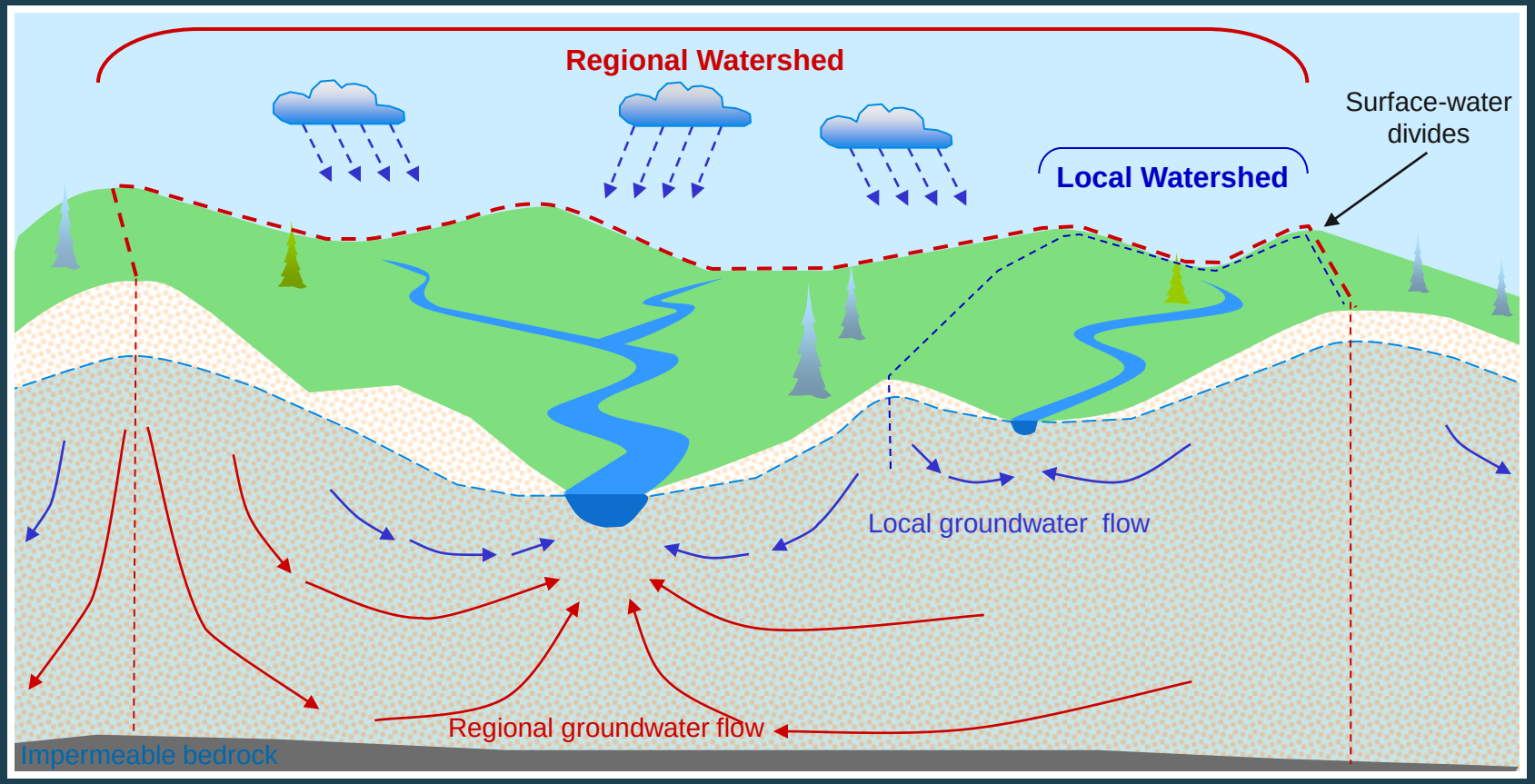


Groundwater Movement

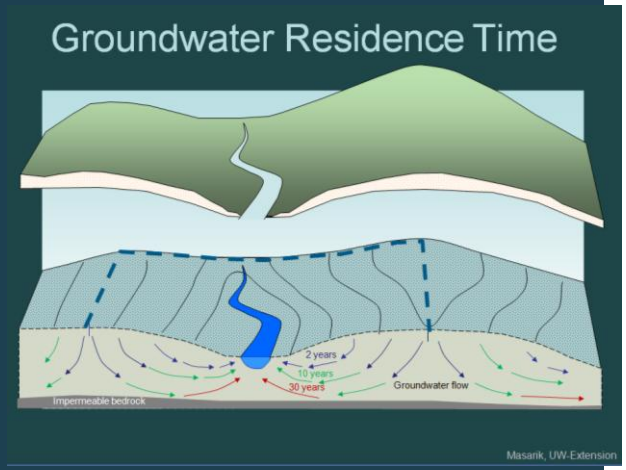








- Water converges at discharge locations
- Rivers and streams act like a drain for water to exit a watershed



References

Clayton, Lee, and Attig, J.W., 1990, Geology of Sauk County, Wisconsin: Wisconsin Geological and Natural History Survey Information Circular 67, 68 p.

Dunne, T., and Leopold, L.B., 1978, *Water in Environmental Planning*: W.H. Freeman and Company, 818 p.

Hindall, S.M., and Borman, R.G., 1974, Water resources of Wisconsin, Lower Wisconsin River Basin: U.S. Geological Survey Hydrologic Investigations Atlas HA-479.

Krohelski, J.T., and Batten, W.G., 1995, Simulation of stage and the hydrologic budget of Devils Lake, Sauk County, Wisconsin: U.S. Geological Survey Open-File Report 94-348, 22 p.

U.S. Geological Survey [1996–97], Digital raster graphics of topographic quadrangles (7.5-minute series, topographic), Sauk County, Wisconsin.

U.S. Geological Survey, 2001, National elevation dataset. Online; available at URL: <http://gisdata.usgs.net/ned/>.

Wisconsin Department of Natural Resources Well Constructor's Reports (1936–2000).

Scale 1:100,000

KILOMETERS

MILES

Explanation

Contours of equal elevation of the water table; dashed where uncertain. Datum is mean sea level. Contour interval is 40-ft ; contour is bold every 200 feet. Supplemental contours are dotted.

Well completed in sand and gravel aquifer

Well completed in dolomite/sandstone aquifer

Well completed in crystalline bedrock

Direction of regional shallow groundwater flow

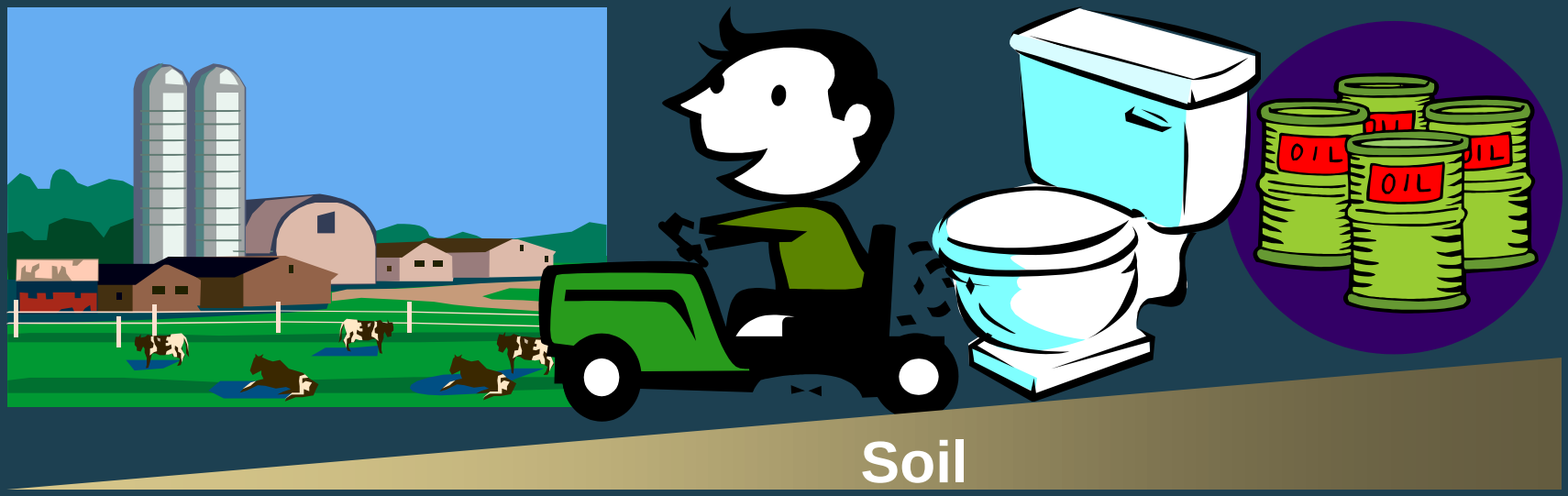
Approximate locations of surface-water divides

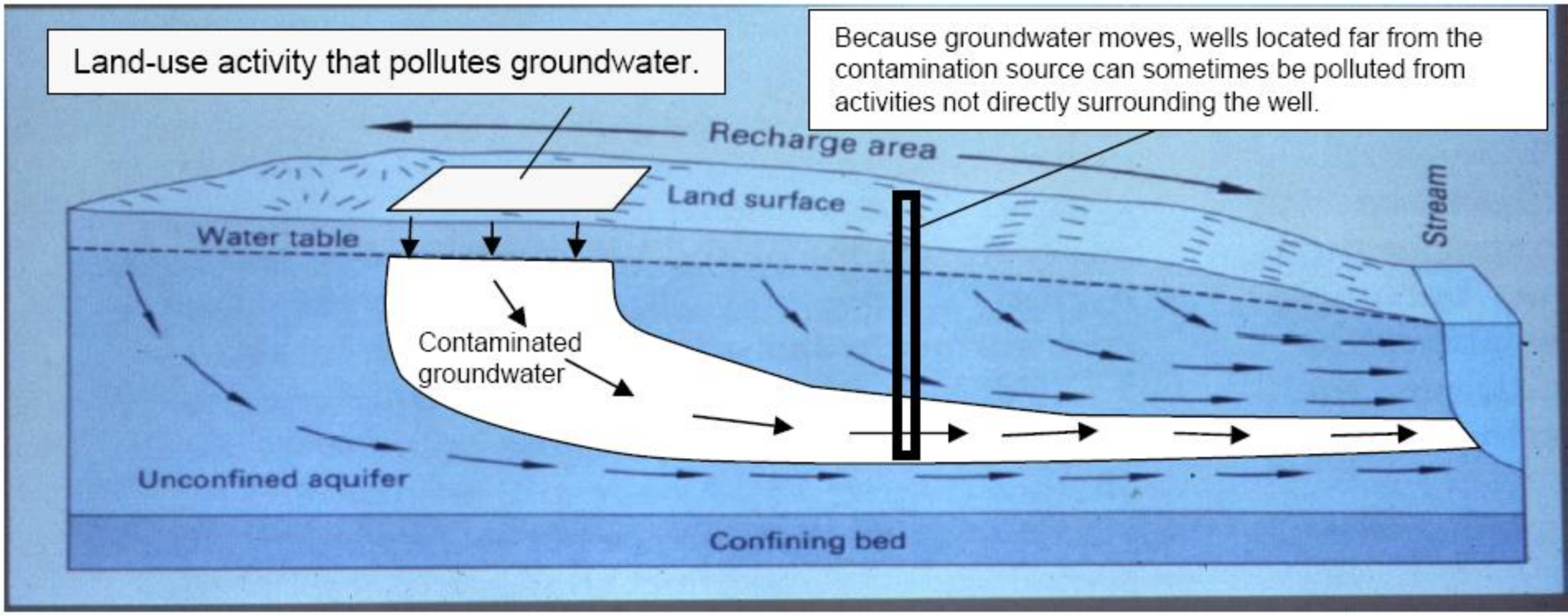
Stream, dashed where ephemeral

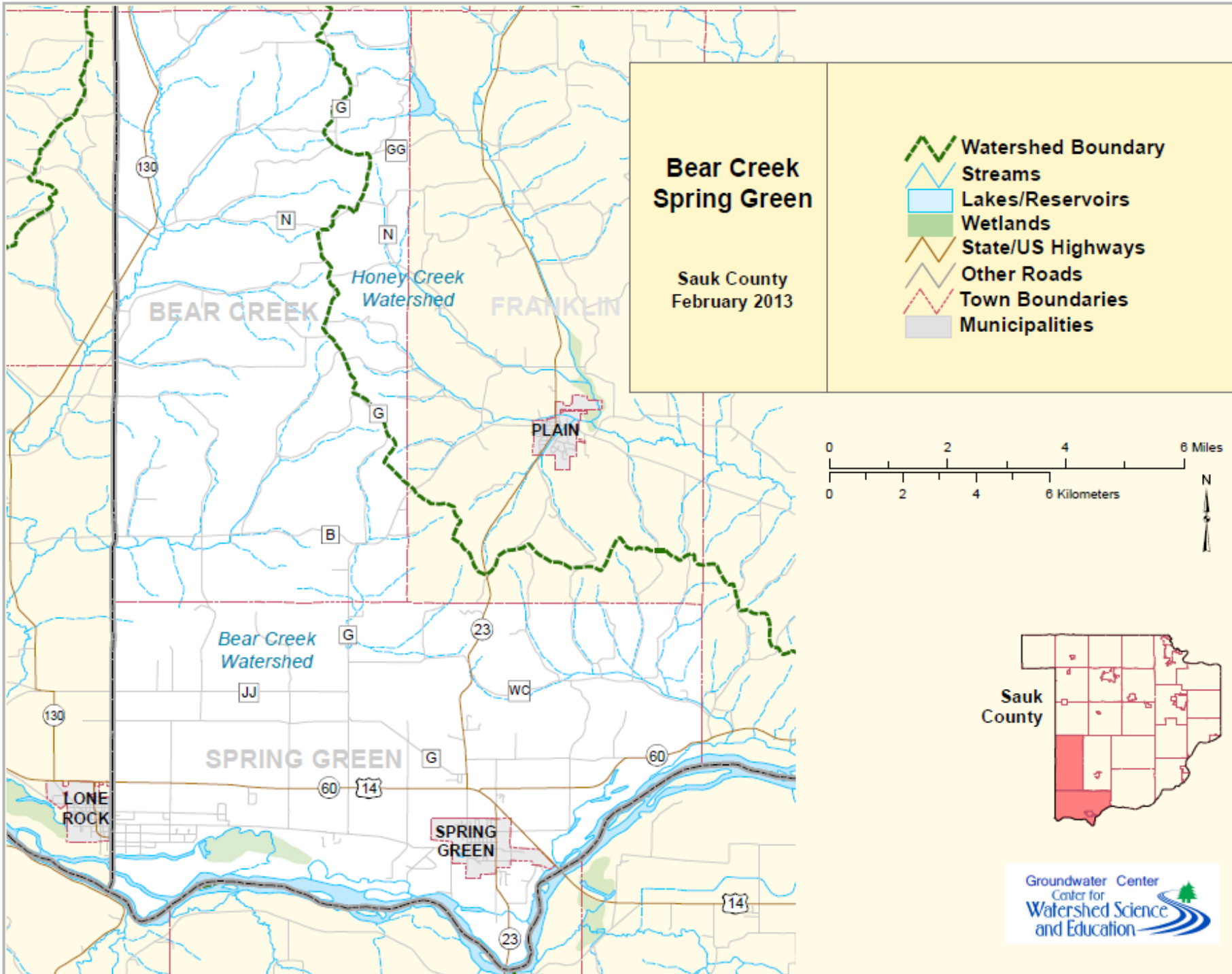
Approximate locations of groundwater divides

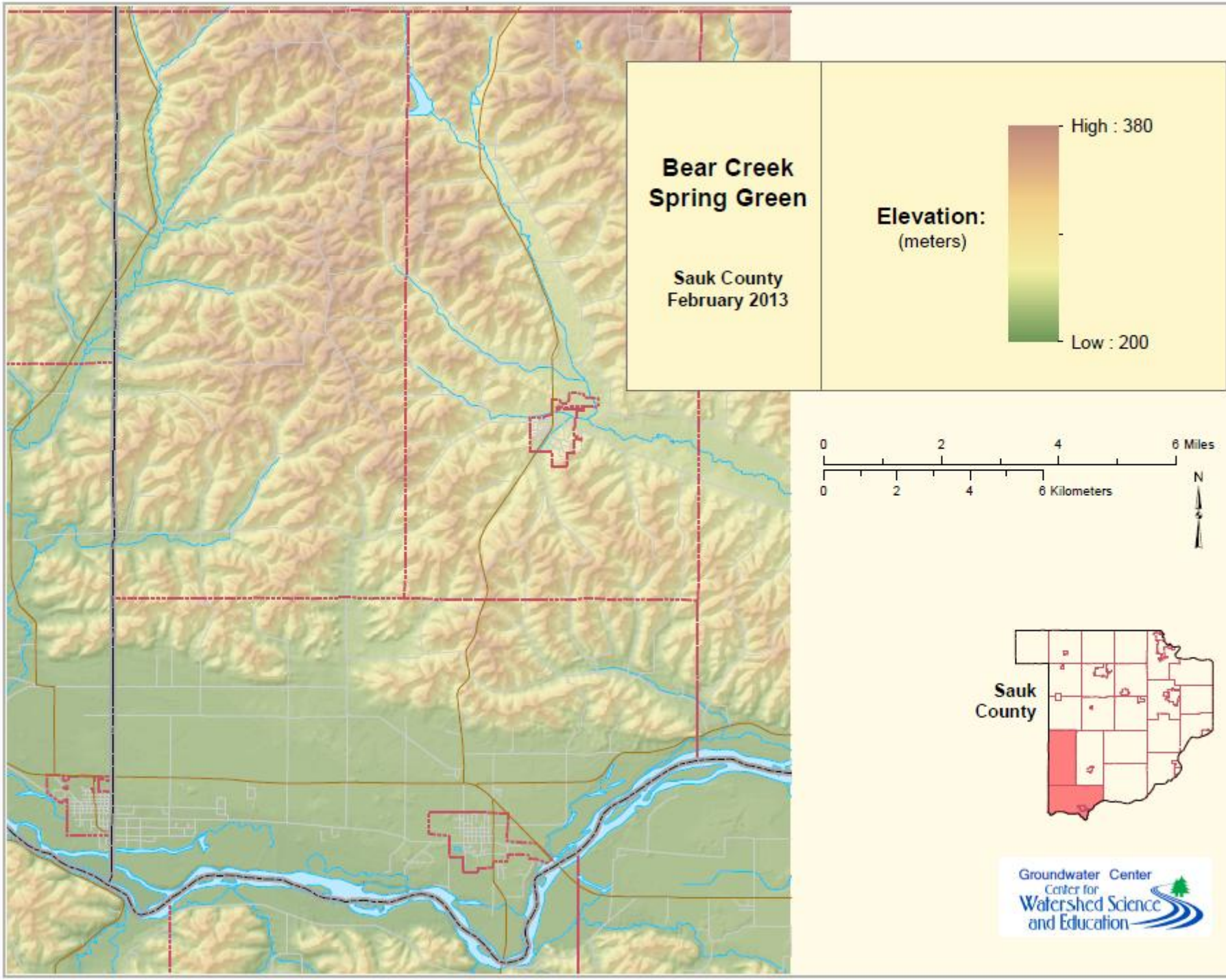
Lakes and ponds; where shown, value is average stage in feet above mean sea level.

Area where sand and gravel aquifer and dolomite and sandstone aquifer are typically thin or not present. Wells completed in sandstone in this area indicate that the sandstone is of sufficient thickness to yield water to wells.


OIL
OIL
OIL
Soil

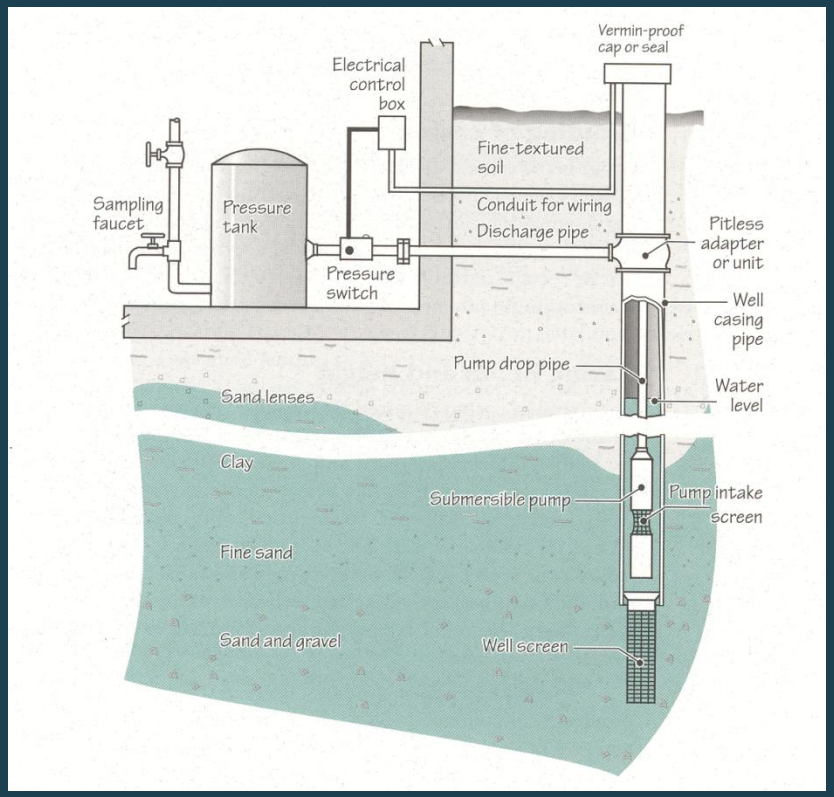

Land-use activity that pollutes groundwater.
Because groundwater moves, wells located far from the contamination source can sometimes be polluted from activities not directly surrounding the well.
Recharge area
Land surface
Water table
Stream
Contaminated groundwater
Unconfined aquifer
Confining bed


Bear Creek
Spring Green
Sauk County
February 2013
Watershed Boundary
Streams
Lakes/Reservoirs
Wetlands
State/US Highways
Other Roads
Town Boundaries
Municipalities
Honey Creek
Watershed
Bear Creek
Watershed
BEAR CREEK
FRANKLIN
PLAIN
SPRING GREEN
LONE
ROCK
SPRING
GREEN
130
G
GG
N
B
JJ
WC
23
60
14
0 2 4 6 Miles
0 2 4 6 Kilometers
N
Sauk
County
Groundwater Center
Center for
Watershed Science
and Education


Bear Creek
Spring Green
Sauk County
February 2013
Elevation:
(meters)
High : 380
Low : 200
0
2
4
6 Miles
0
2
4
6 Kilometers
N
Sauk
County
Groundwater Center
Center for
Watershed Science
and Education

Types of Wells

Drilled Well



Driven Point Well

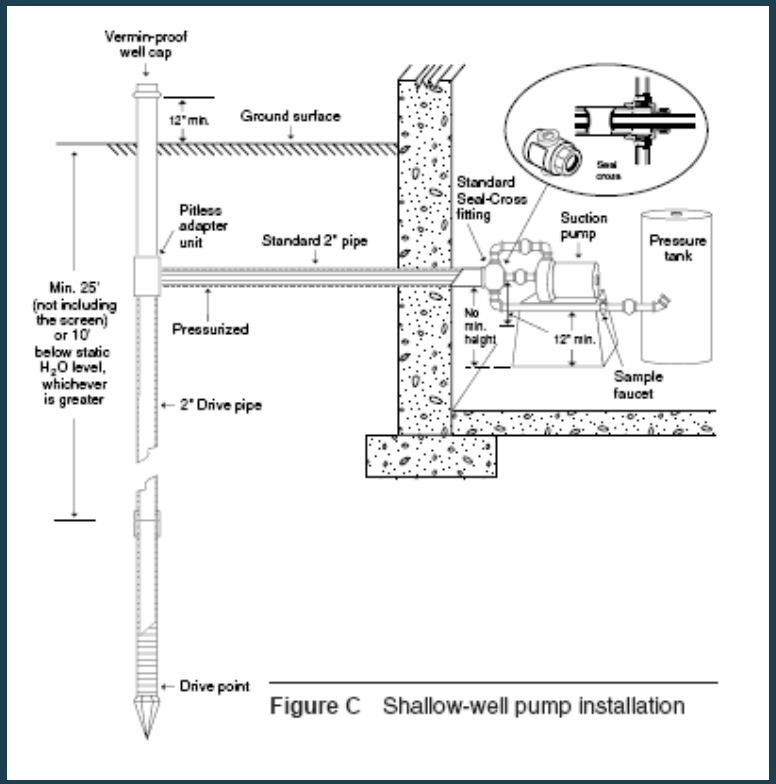
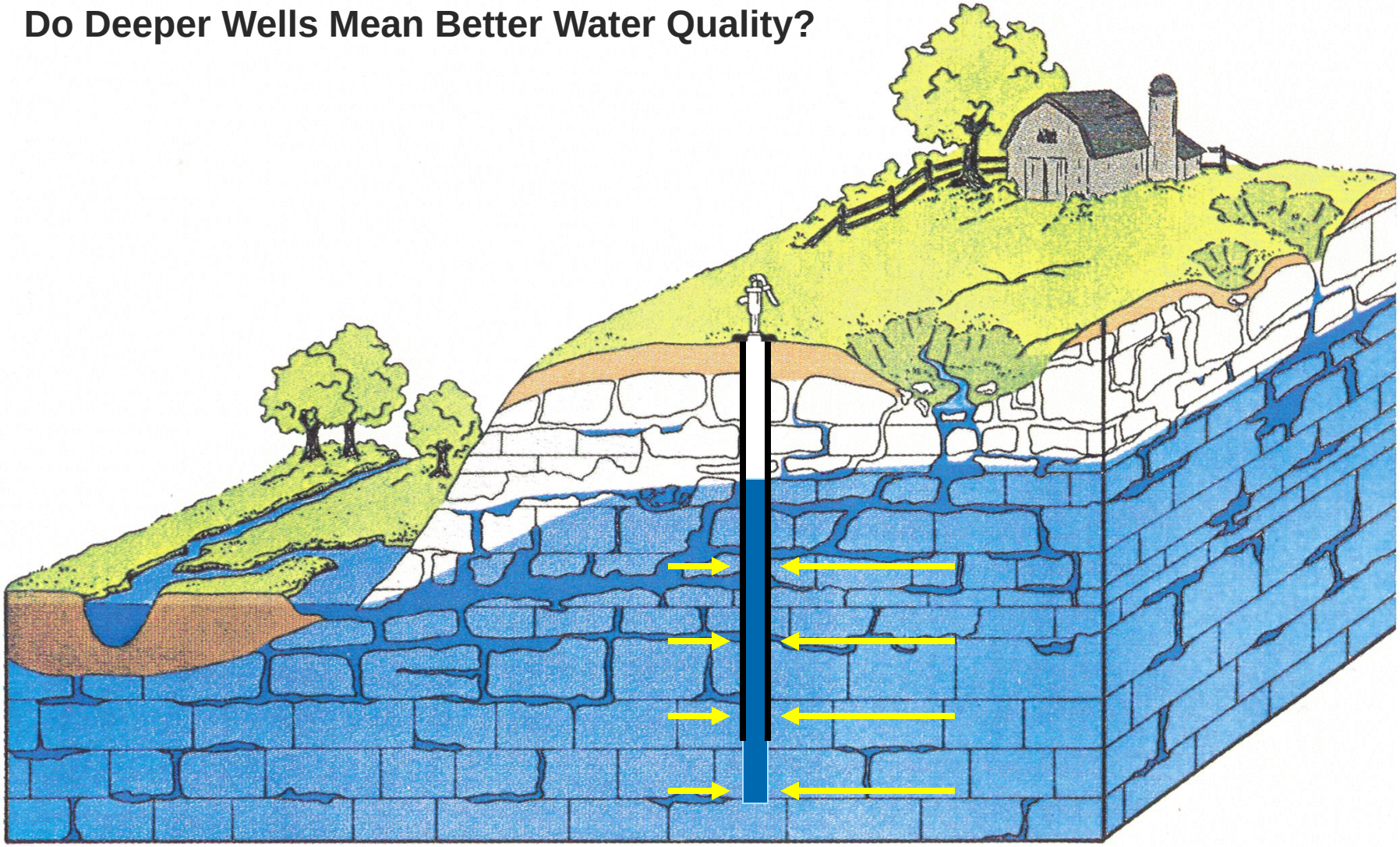
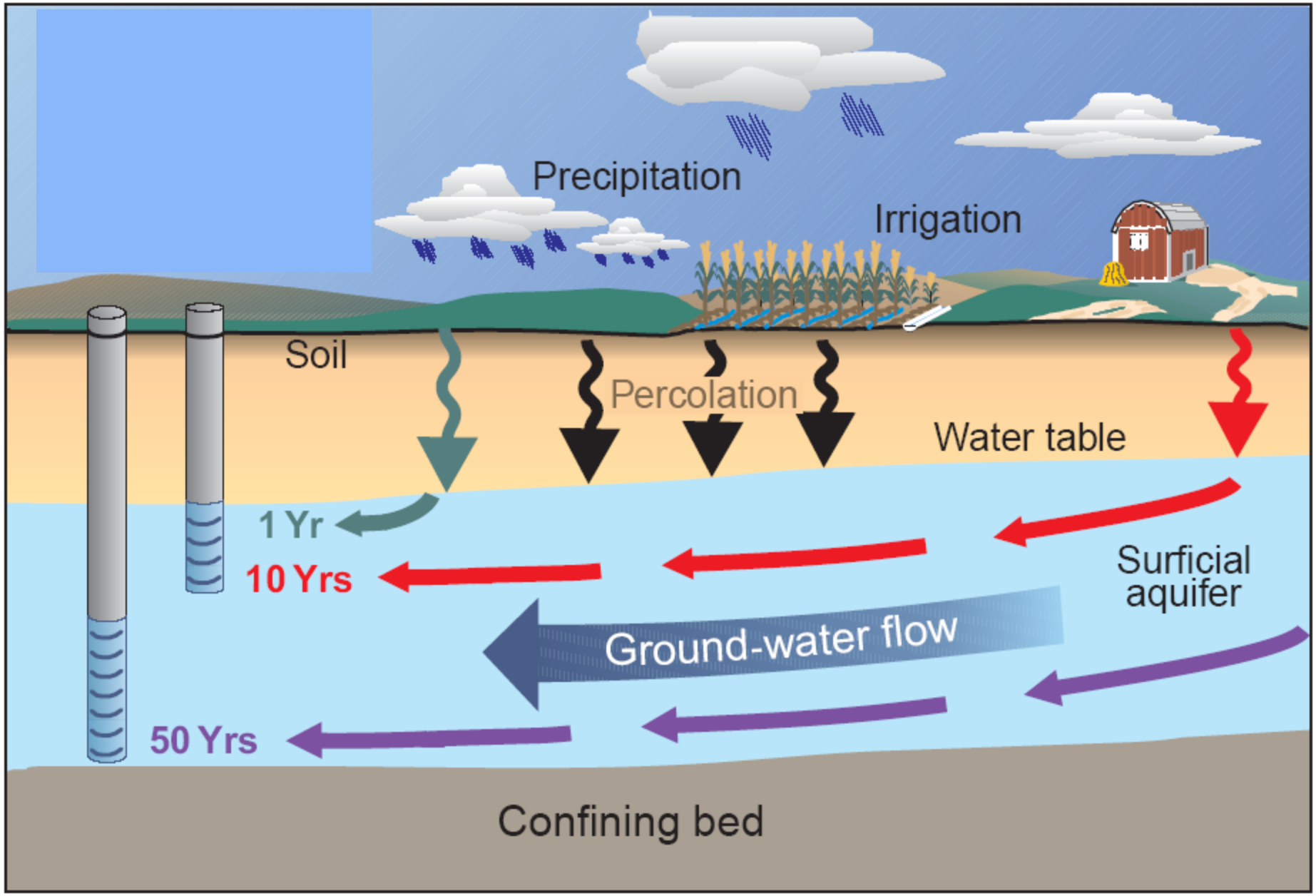


Figure C Shallow-well pump installation

Do Deeper Wells Mean Better Water Quality?




Precipitation
Irrigation
Soil
Percolation
Water table
1 Yr
10 Yrs
Surficial aquifer
Ground-water flow
50 Yrs
Confining bed

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.

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

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

8. Grout or Other Sealing Material

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

DNR USE ONLY	9. Geology Type, Caving/Noncaving, Color, Hardness, Etc.	From (ft.)	To (ft.)
	Clay	surface	18
	Sandy clay	18	66
	Lime rock	66	100
	Sand Stone	100	140
	Water bearing		

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

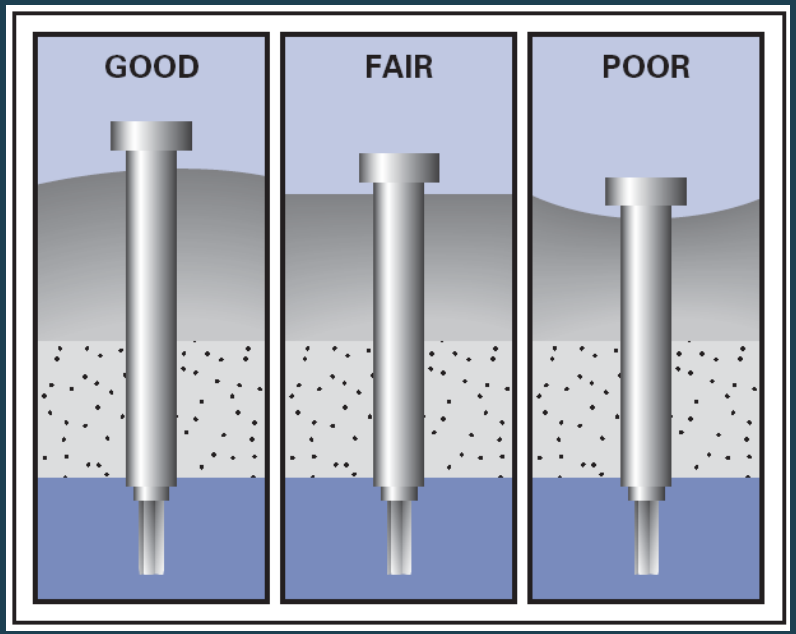
12. Well Is:
☑ Above Grade ☐ Below
10 in.
Developed? ☐ Yes ☐ No
Disinfected? ☑ Yes ☐ No
Capped? ☑ Yes ☐ No

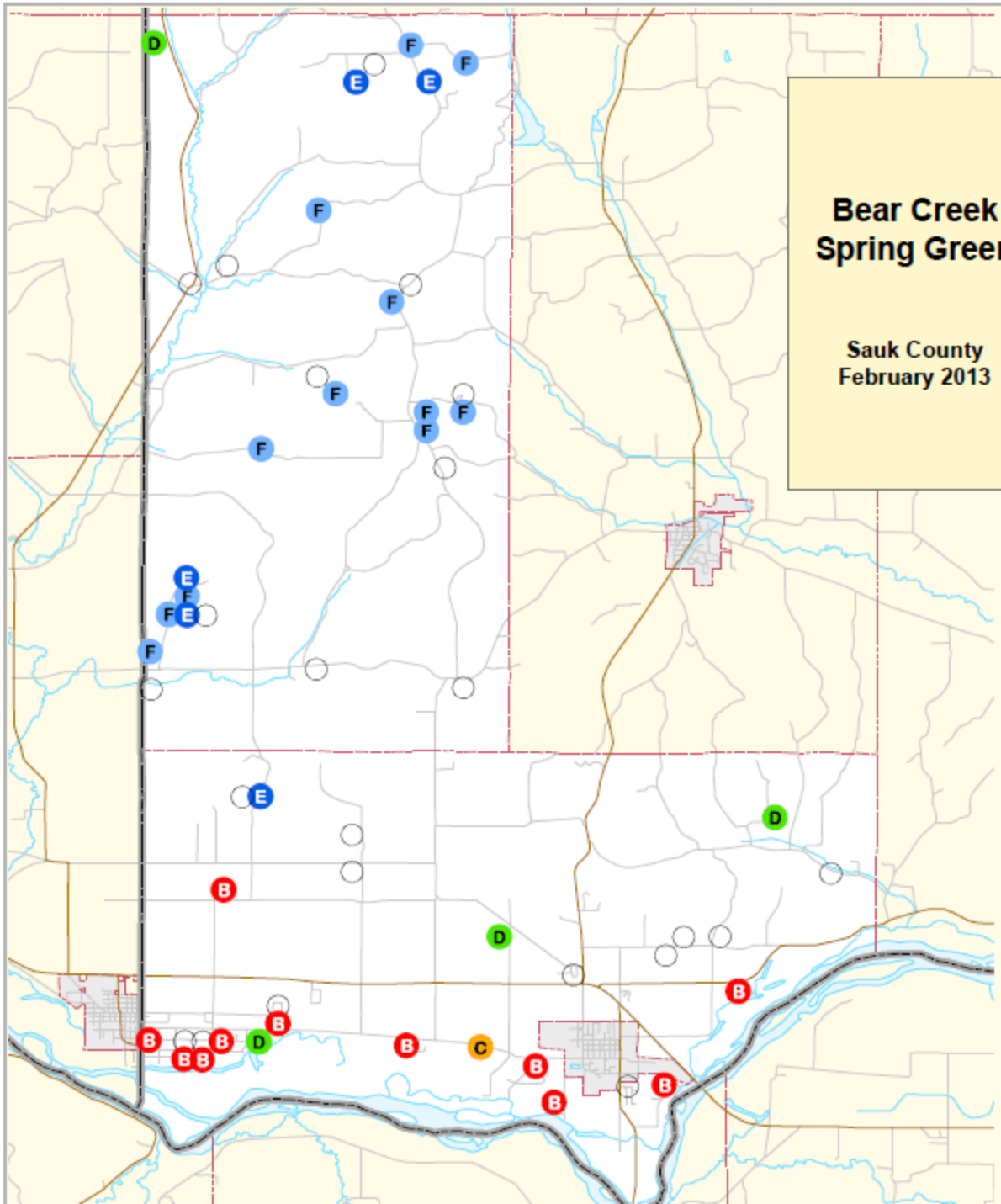
13. Did you permanently seal all unused, noncomplying, or unsafe wells? ☐ Yes ☐ No If no, explain ___

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





Bear Creek
Spring Green

Sauk County
February 2013

DEPTH OF WELL (ft)

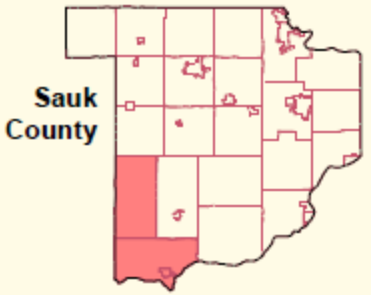
A	… 25	2 %
B	26-50	18 %
C	51-100	0 %
D	101-150	9 %
E	151-200	8 %
F	201 …	18 %

Mapped value is the average.

0 2 4 6 Miles

0 2 4 6 Kilometers

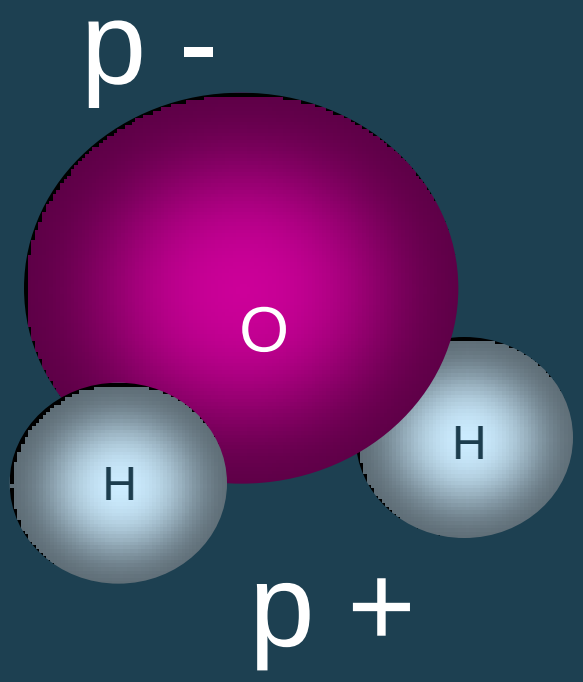
N



Groundwater Center
Center for Watershed Science and Education

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

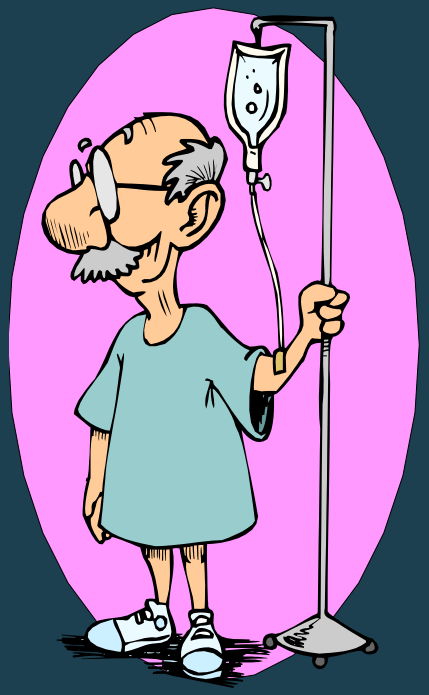
What are the Health Concerns?

- Acute Effects – Usually seen within a short time after exposure to a substance.

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

- Chronic Effects – Results from exposure to a substance over a long period of time.

  (ex. Arsenic or pesticides can increase the chance of developing certain types of cancer)



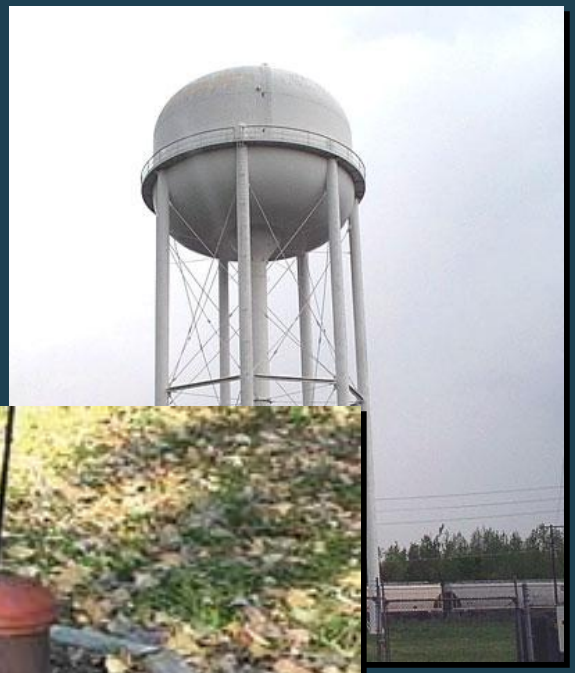
Private vs. Public Water Supplies

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.



Understanding Risk…?

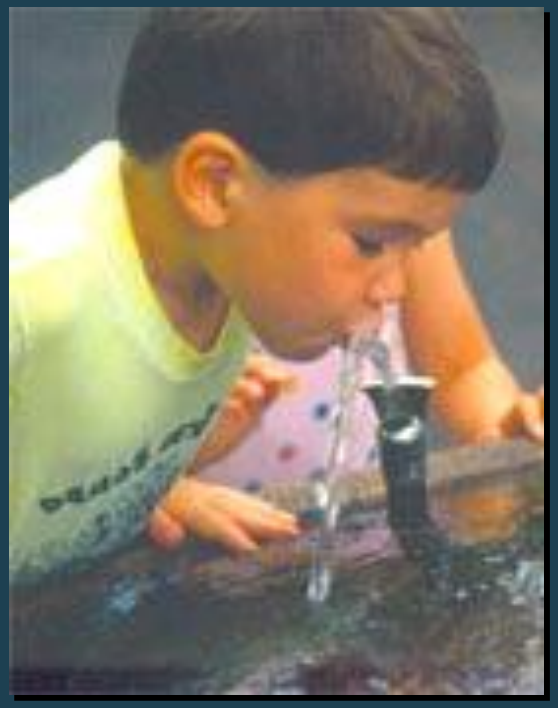
Dying from a lightning strike.	0.013 in 1,000 chance.
0.010 mg/L of arsenic in drinking water.	3 out of 1,000 people likely to develop cancer.
2 pCi of indoor radon level.	4 out of 1,000 people likely to develop lung cancer.[1]
Dying in a car accident.	4 in 1,000 chance.
2 pCi of indoor radon combined 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

Why do people test their water?

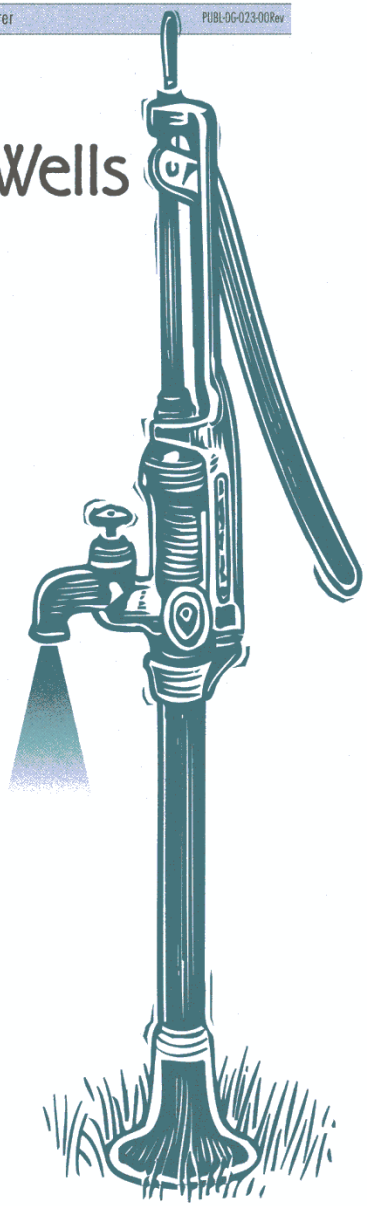
- Installed a new well
- Change in taste or odor
- Buying or selling their home
- Plumbing issues
- Want to know if it's safe to drink.



No one test tells us everything we need to know about the safety and condition of a water supply

Wisconsin Department of Natural Resources, Bureau of Drinking Water and Groundwater PUBL-DG-023-00Rev

Tests for Drinking Water from Private Wells



Why should I test my well?

As one of Wisconsin's 700,000 private well owners or private well water consumers, you probably use groundwater for doing your family's laundry, drinking, cooking, bathing and watering your garden. Municipalities are required to test their water supplies regularly to ensure the water is safe to drink. Since there is no requirement to test a private well except for bacteria when it is first drilled or the pump is changed, you are responsible for making sure your water is safe.

Most private wells provide a clean, safe supply of water; however, contaminants can pollute private wells, and unfortunately you cannot see, smell or taste most of them. Consequently, you should test your water on a regular basis. The decision on what to test your water for should be based on the types of land uses near your well.

This brochure gives information about several common contaminants found in private wells. It should help you decide when to sample your well and how often, how to find a certified laboratory and who to call for help.

What tests should be done on my water?

Total Coliform Bacteria and E.coli

Coliform bacteria live in soil, on vegetation and in surface water. Coliform bacteria found in the intestines of warm-blooded animals and their feces are called E.coli. Some strains of coliform bacteria can survive for long periods in soil and water and can be carried into well casings by insects. Bacteria washed into the ground by rainwater or snowmelt are usually filtered out as the water seeps through the soil, but they sometimes enter water supplies through cracks in well casings, poorly sealed caps, fractures in the underlying bedrock, and runoff into sinkholes. Coliform bacteria are the most common contaminants found in private water systems. A 1994 Wisconsin survey found them in 23% of the wells tested and E.coli in 2.4% of the wells.

Most coliform bacteria do not cause illness, but indicate a breach in the water system. However, since E.coli bacteria are found in fecal material, they are often present with bacteria, viruses and parasites that can cause flu-like symptoms such as nausea, vomiting, fever and diarrhea. Private wells should be tested at least once a year for

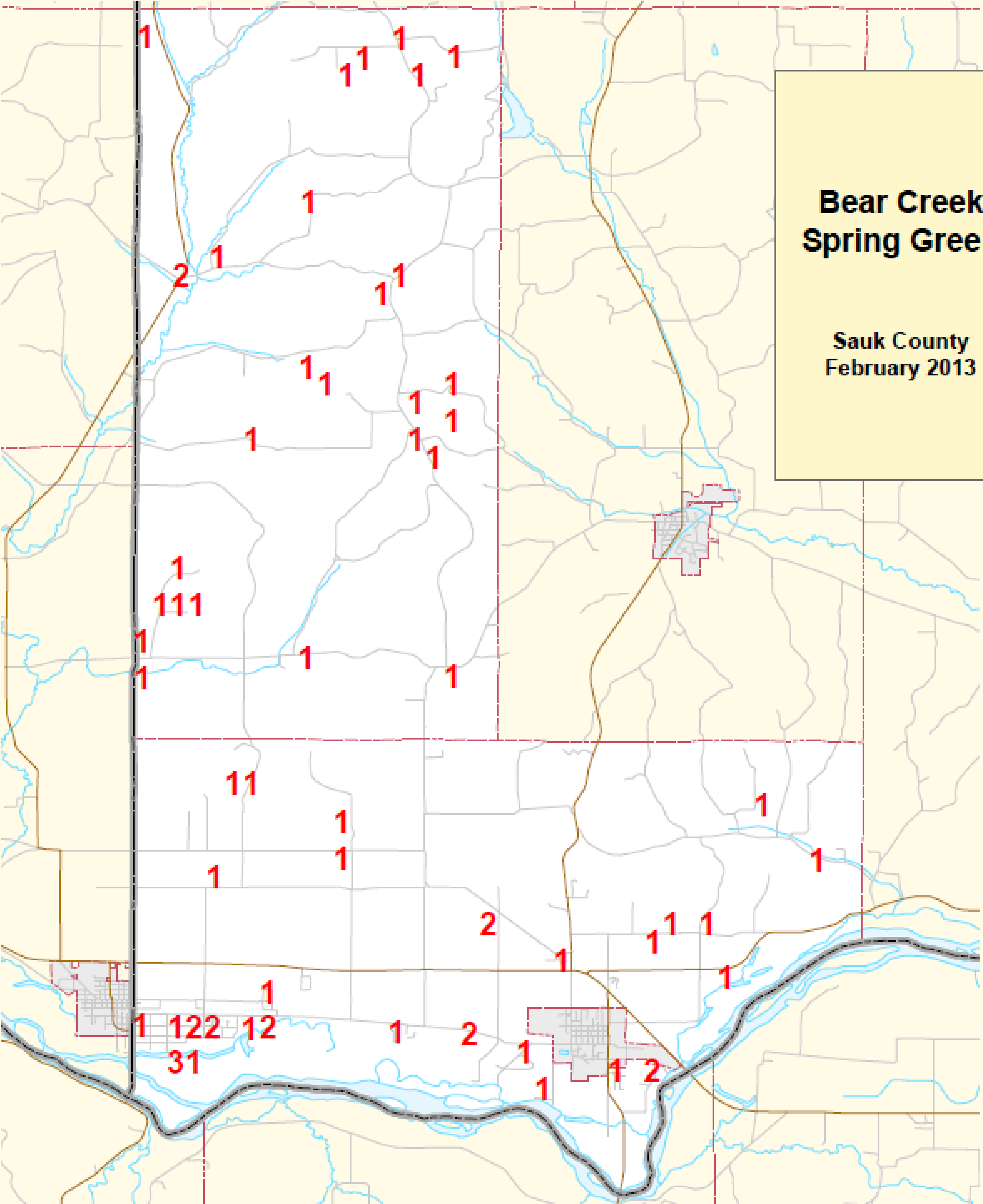
PRINTED ON RECYCLED PAPER

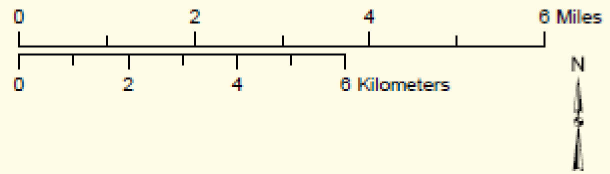
Bear Creek Spring Green

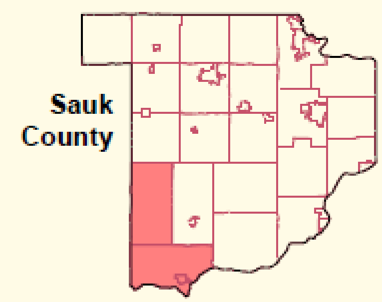
Sauk County
February 2013

SAMPLE DISTRIBUTION

NUMBER OF SAMPLES per 1/4 1/4 SECTION







Groundwater Center
Center for Watershed Science and Education

12/09/08 **Water and Environmental Analysis Lab, UW-Stevens Point** Page 1
Room 200, College of Natural Resources, (715) 346-3209

Sample ID:
Lab Number:
Group: **FDL/DODGE CO 08NOV**

Occupant:	Owner:	Mailing:
Last	Last	Last
F/MI	F/MI	F/MI
Add	Add	Add
City	City	City
State **WI** Zip	State Zip	State Zip
Phone	Phone	Phone
Yrs Residence **31**	Yrs Ownership	No. Wells: **NA**
Well Construction:	Last Water Quality Test:	Sample Taken:
Date **un**	Date **un**	Date **11/17/08**
Drill **Un**	Lab **un**	Time **16:00**
Add	For **un**	Treatment Systems:
Casing Diam: **NA** in	Well Location:	Softener? **Yes**
Method:	County **FOND DU LAC**	Other
Depth:	Twnshp **Waupun**	Tap Samples:
of Casing **NA** ft	Legal	Tap Loc **kitchen, pump**
to Water **NA** ft	**SWSW S27 T14N R15E**	Before Treat **Yes**
of Well **NA** ft		Well Depth Changed **No**
Distance To:	Map Coord **0: 0**	Date Change
Septic Tank **NA** ft		Problems Observed:
Tile Field **NA** ft	Water Source:	Color Taste Corr
Seepage Pit **NA** ft	**Private**	Odor Health None **x**
Oth	Other	Oth

Laboratory Results:

Parameter	Qualifier	Result	Units
Homeowners Package:			
Bacteria-Coliform		**Present**	(see note below)
Hardness-Total		**520**	mg/l CaCO3
Alkalinity		**312**	mg/l CaCO3
Conductivity		**1012**	umhos/cm
pH		**7.82**	std units
Saturation Index		**0.9**	(Corrosivity Balanced)
Nitrogen-Nitrate/Nitrite	**Less Than**	**0.1**	mg/l N (None Detected)
Chloride		**104.0**	mg/l
Homeowners Metal Package:			
Arsenic (VISTA-ICP-0.003)	**Less Than**	**0.003**	mg/l (None Detected)
Calcium (VISTA-ICP)		**0.7**	mg/l
Copper (VISTA-ICP)		**0.461**	mg/l
Iron (VISTA-ICP)		**0.005**	mg/l
Lead (VISTA-ICP)		**0.006**	mg/l
Magnesium (VISTA-ICP)		**0.3**	mg/l
Manganese (VISTA-ICP)	**Less Than**	**0.001**	mg/l (None Detected)
Potassium (VISTA-ICP)		**0.6**	mg/l
Sodium (VISTA-ICP)		**248.9**	mg/l
Sulfate (VISTA-ICP)		**88.1**	mg/l
Zinc (VISTA-ICP)		**0.105**	mg/l

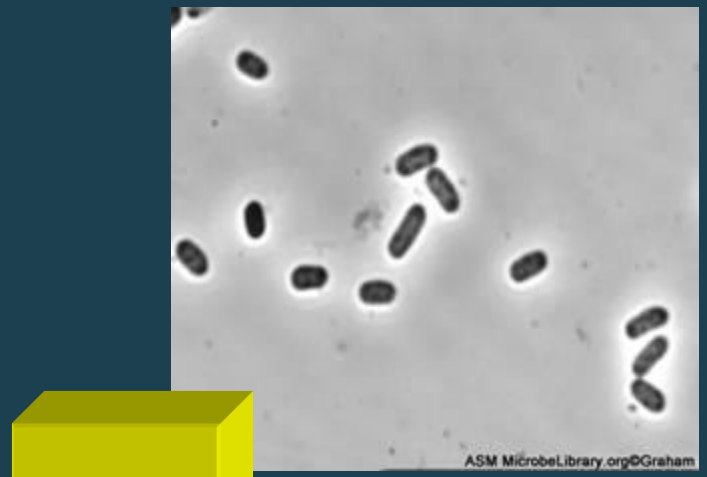
(Continued)

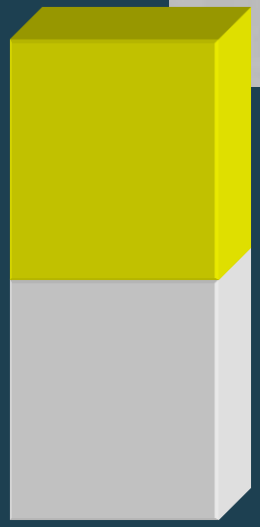
milligrams per liter (mg/l) = parts per million (ppm)

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
- Sanitary water supply should not contain any coliform bacteria
- 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





Present =Unsafe

Absent = Safe

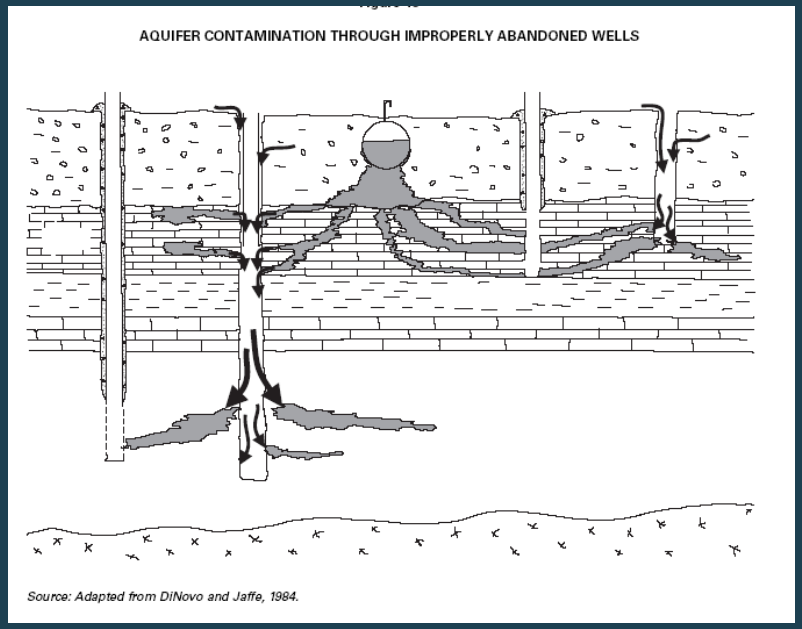
If coliform bacteria was detected, we also checked for e.coli bacteria test

- 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)

Some Common Pathways for Bacteria to Enter Your Water System



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.**

Rock and Soil Impacts on Water Quality

Tests for Aesthetic Problems

Hardness

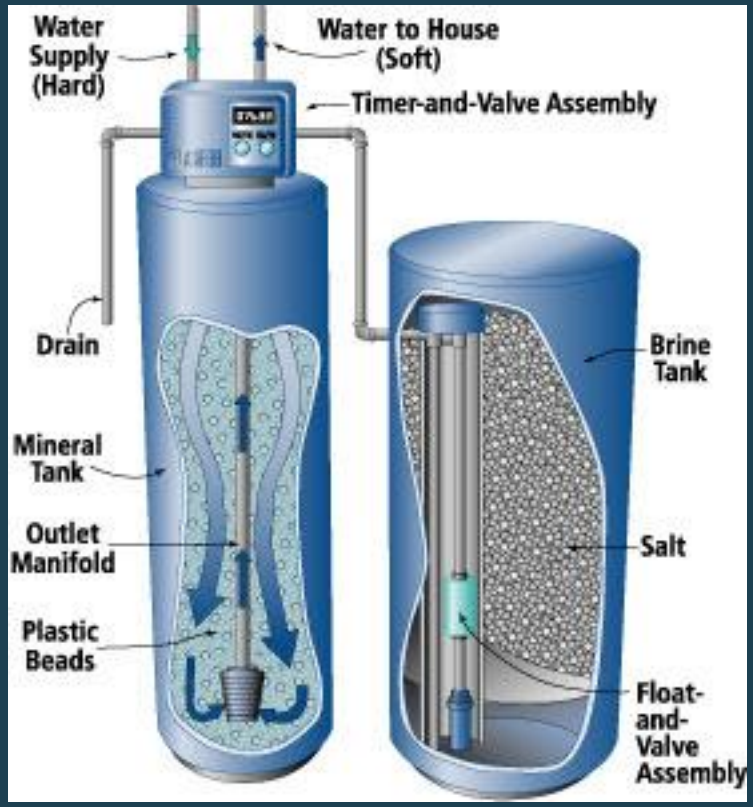
- Natural (rocks and soils)
- Primarily calcium and magnesium

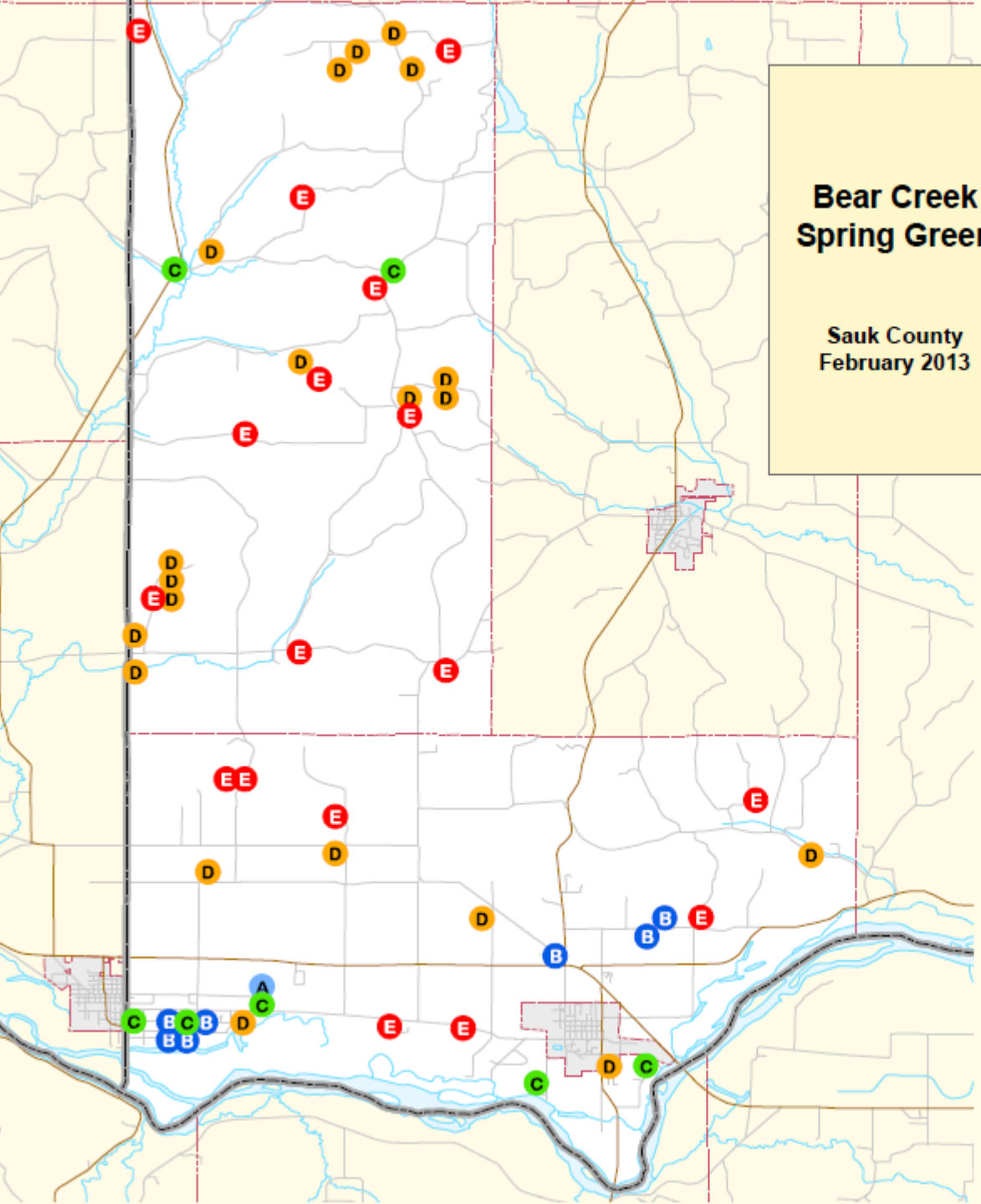
- Problems: scaling, scum, use more detergent, decrease water heater efficiency

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.**





Bear Creek
Spring Green

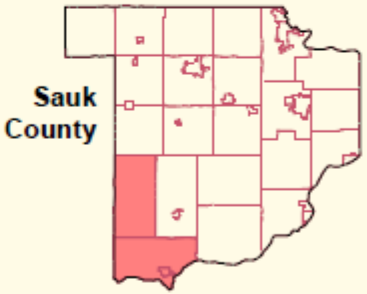
Sauk County
February 2013

TOTAL HARDNESS (ppm CaCO3)

A	… 50	5	8%
B	51 - 100	8	12%
C	101 - 200	11	17%
D	201 - 300	23	36%
E	301 - 400	17	27%
F	401 …	0	0%

Mapped value is the average unless otherwise indicated.
Treated samples not mapped.

0 2 4 6 Miles
0 2 4 6 Kilometers
N



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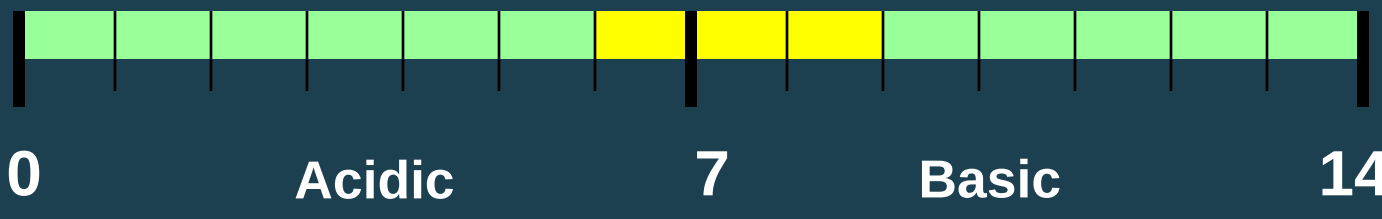
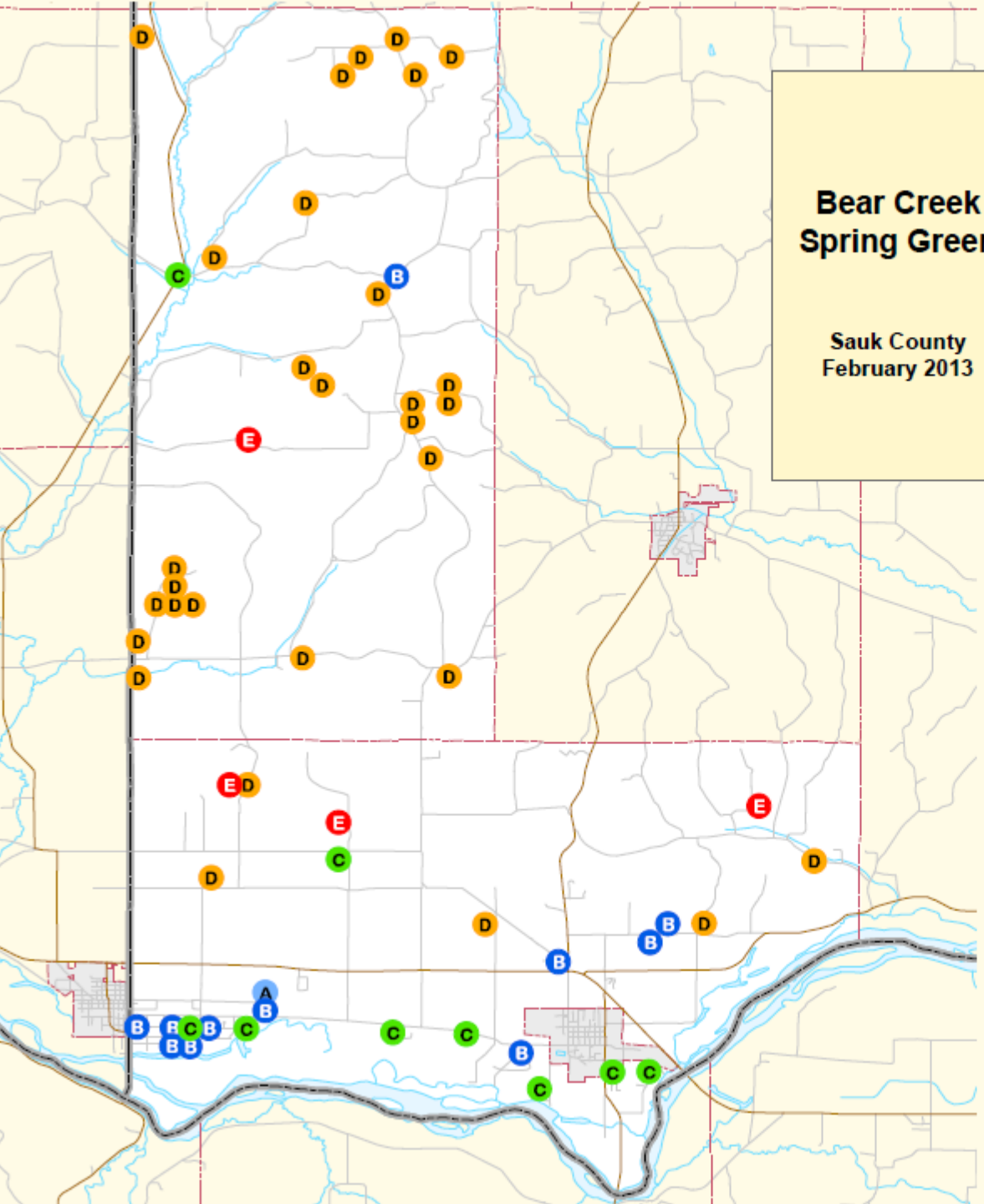
Tests for Overall Water Quality

- 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





Bear Creek
Spring Green

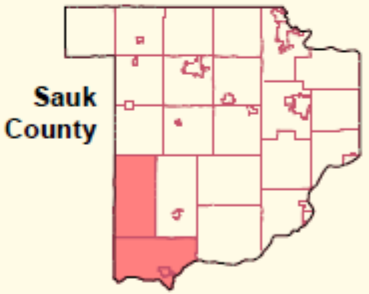
Sauk County
February 2013

ALKALINITY (ppm CaCO3)

A	… 50	1	2 %
B	51 - 100	15	23 %
C	101 - 200	12	19 %
D	201 - 300	32	50 %
E	301 - 400	4	6 %
F	401 …	0	0 %

Mapped value is the average unless otherwise indicated.
Treated samples not mapped.

0 2 4 6 Miles
0 2 4 6 Kilometers
N



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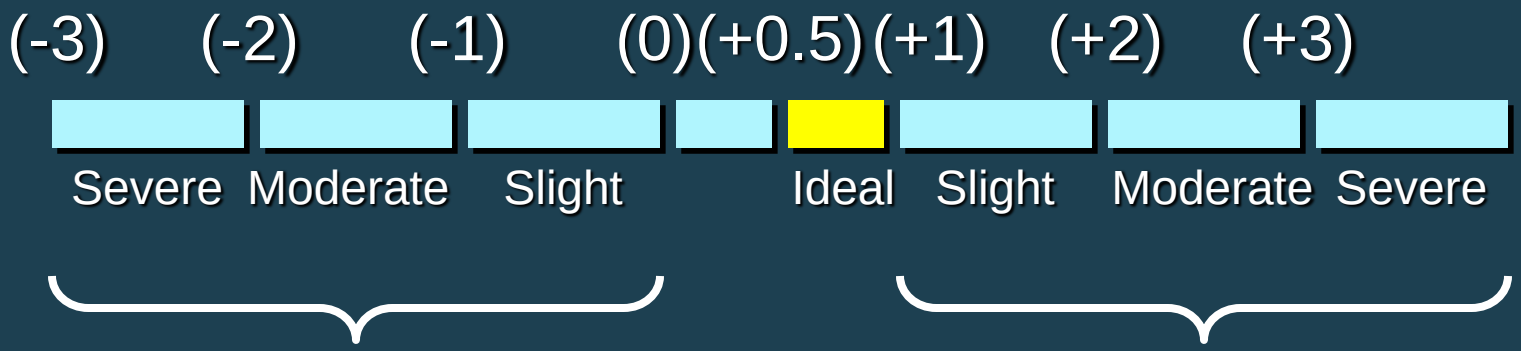
Tests for Overall Water Quality

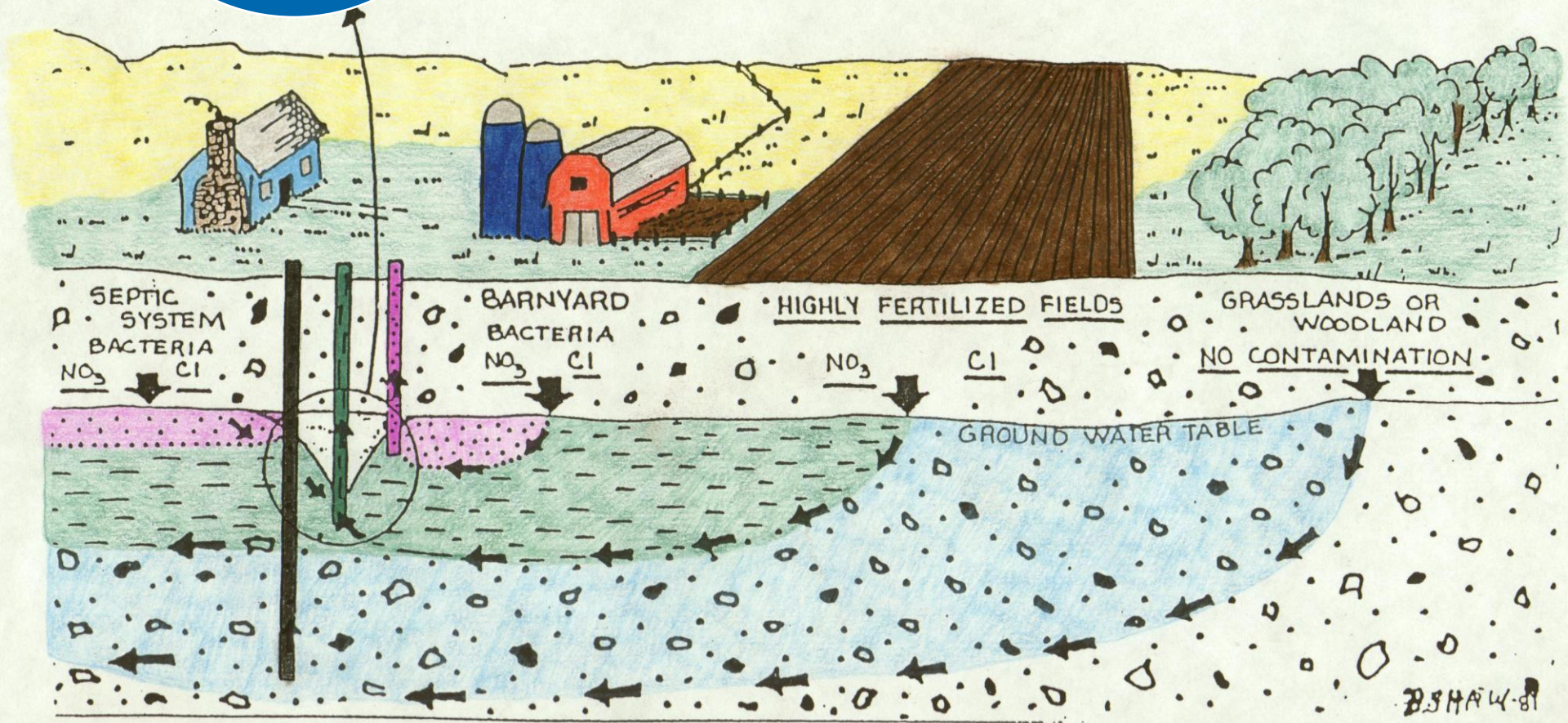
Saturation Index

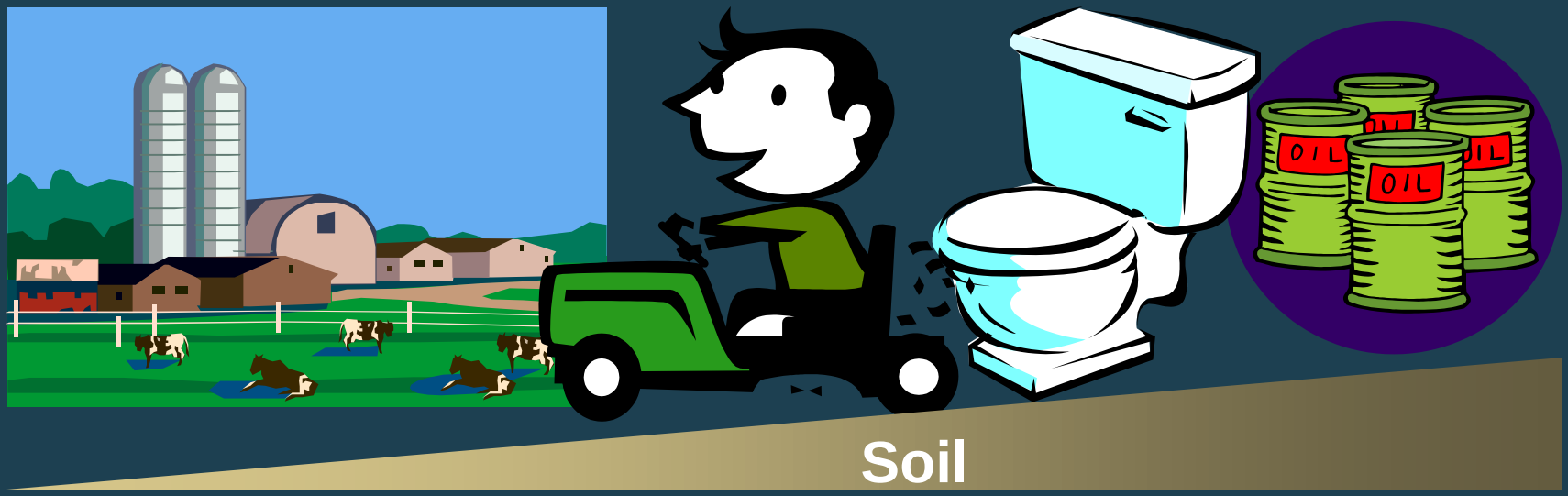


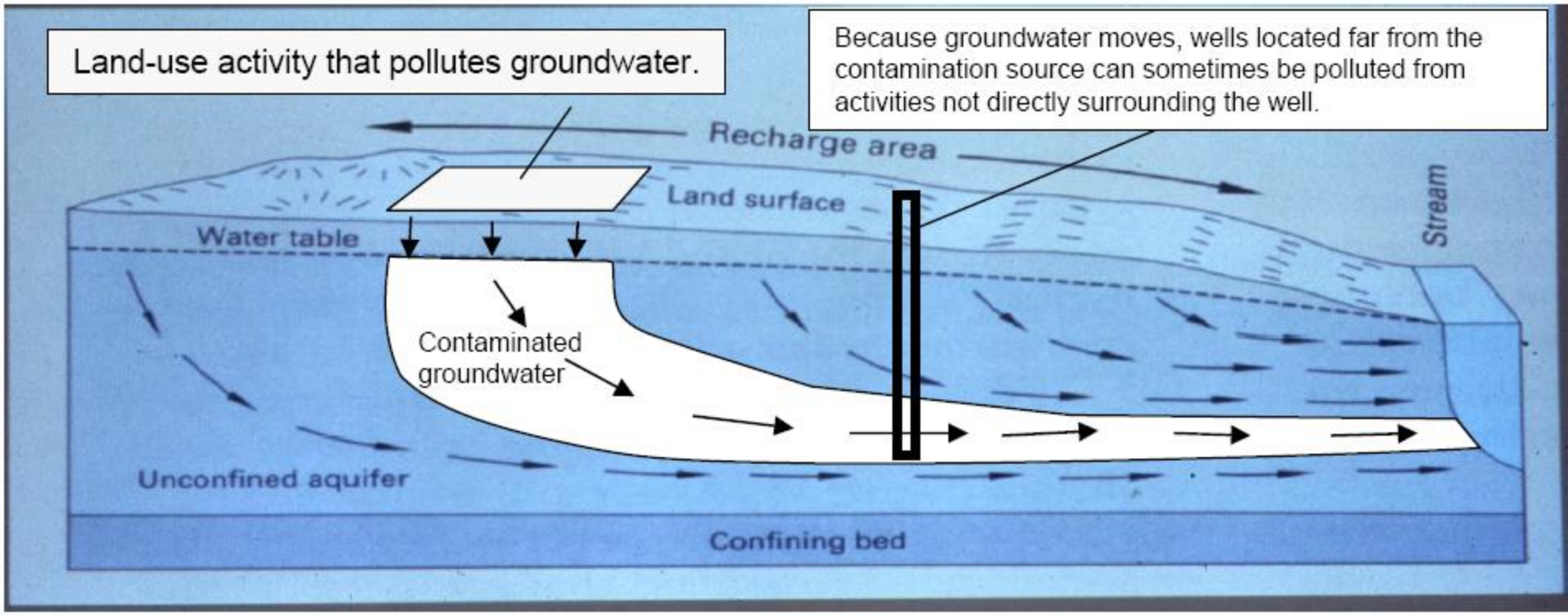
Corrosion occurs

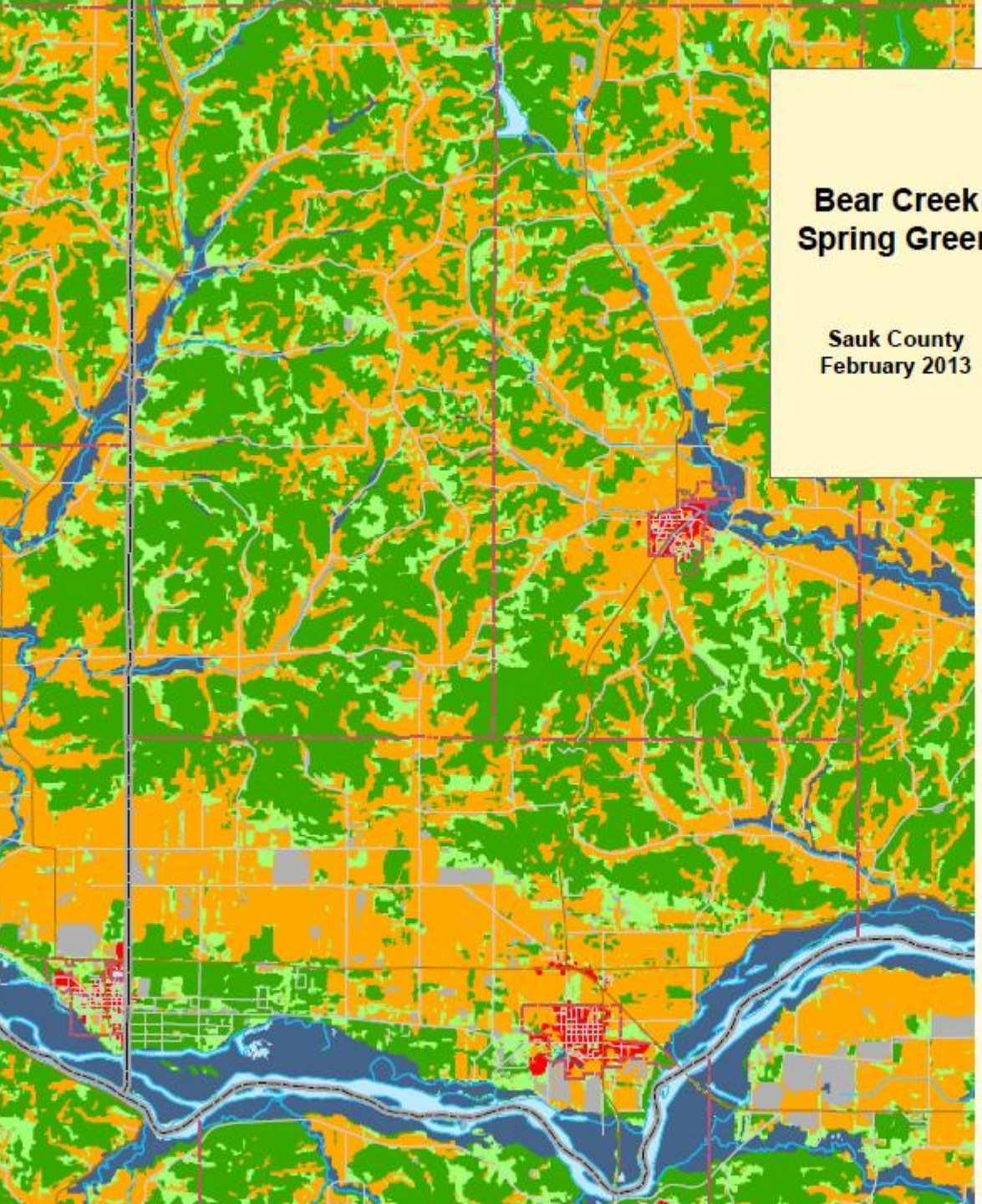
Scaling occurs

Land Use and Water Quality




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



Bear Creek
Spring Green

Sauk County
February 2013

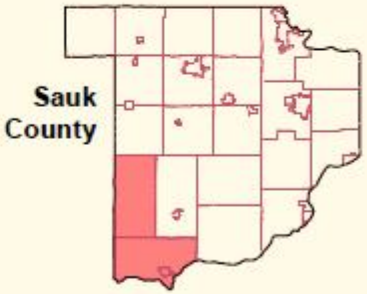
Land Use:

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

0 2 4 6 Miles

0 2 4 6 Kilometers

N



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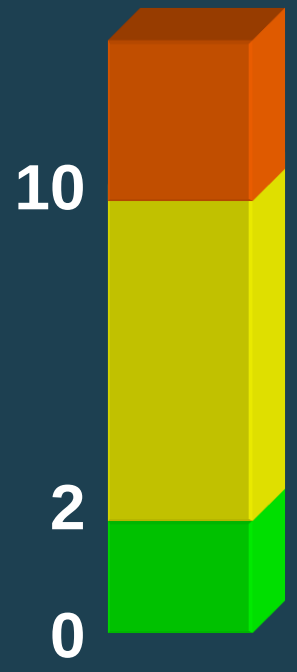
Watershed Science
and Education

N
Spring Green, WI 53588, USA
Image USDA Farm Service Agency
Image © 2012 TerraMetrics
Image NOAA
© 2012 Cnes/Spot Image
Google earth
Imagery Date: 6/27/2010
43°14'02.47" N 90°07'36.79" W elev 974 ft
Eye alt 24908 ft

Test Important to Health

Nitrate Nitrogen

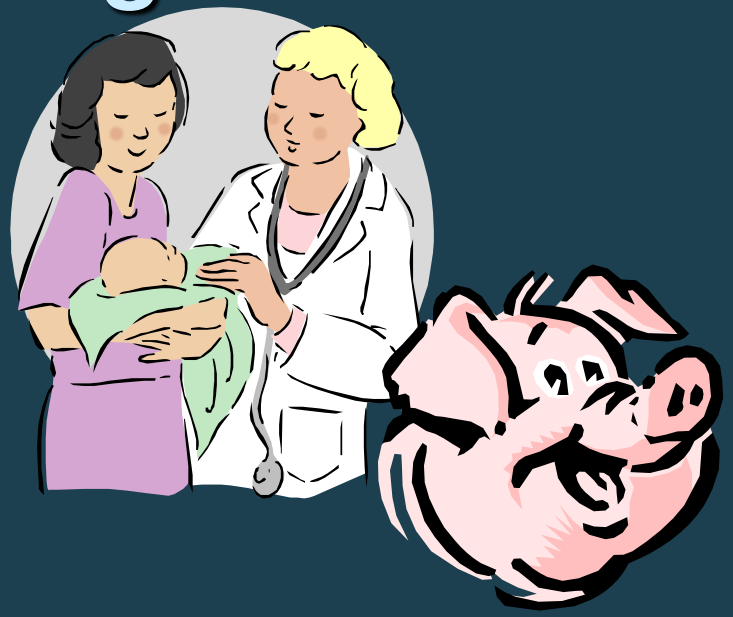
- **Greater than 10 mg/L**
  Exceeds State and Federal Limits for Drinking Water
- **Between 2 and 10 mg/L**
  Some Human Impact
- **Less than 2.0 mg/L**
  "Transitional"
- **Less than 0.2 mg/L**
  "Natural"



UNSAFE - for infants and pregnant women; everyone should avoid long term consumption.

"NATURAL"

Nitrate-Nitrogen

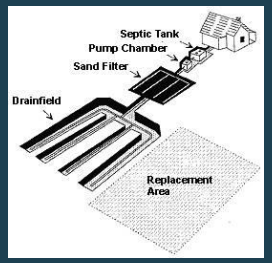


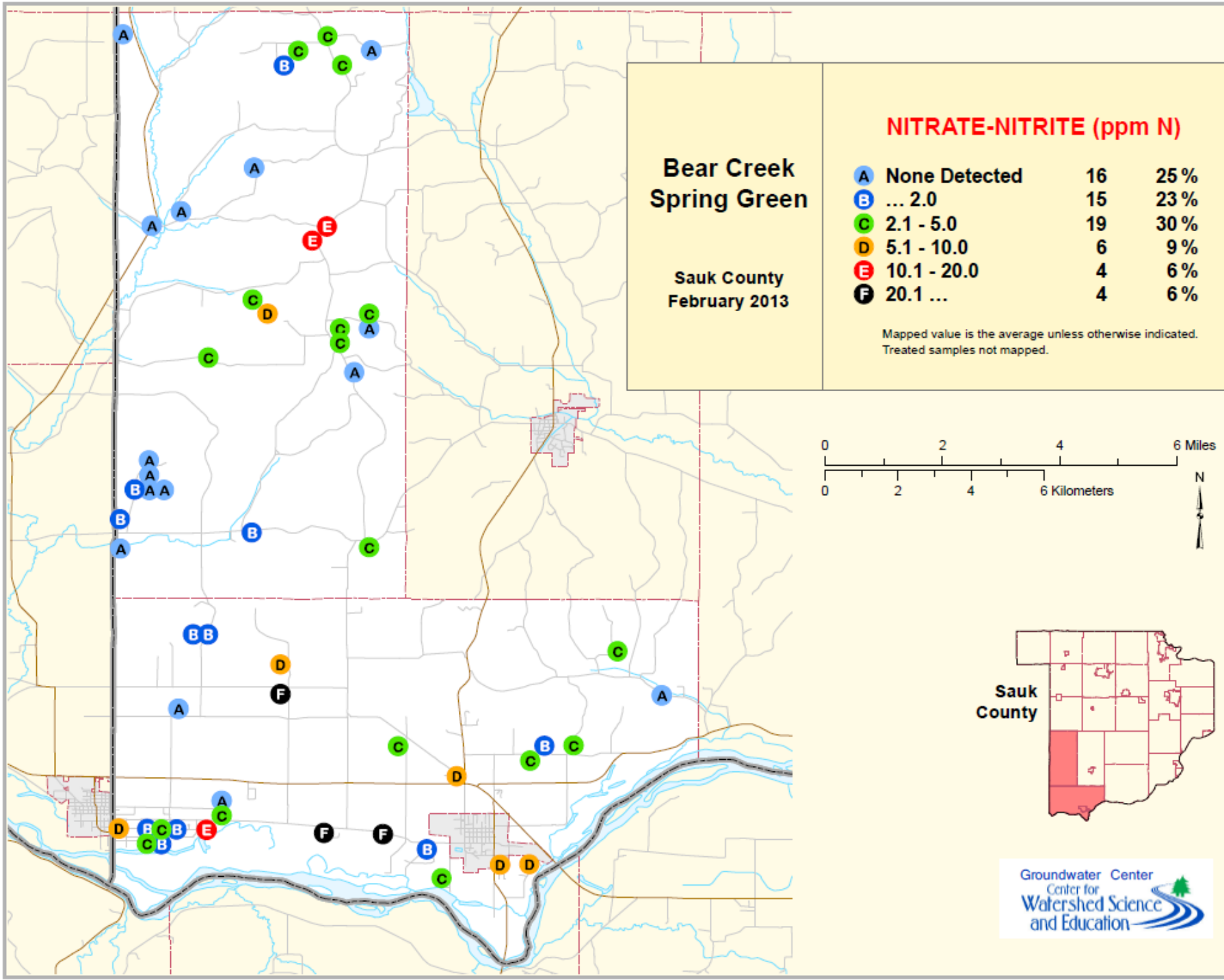
Health Effects:

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

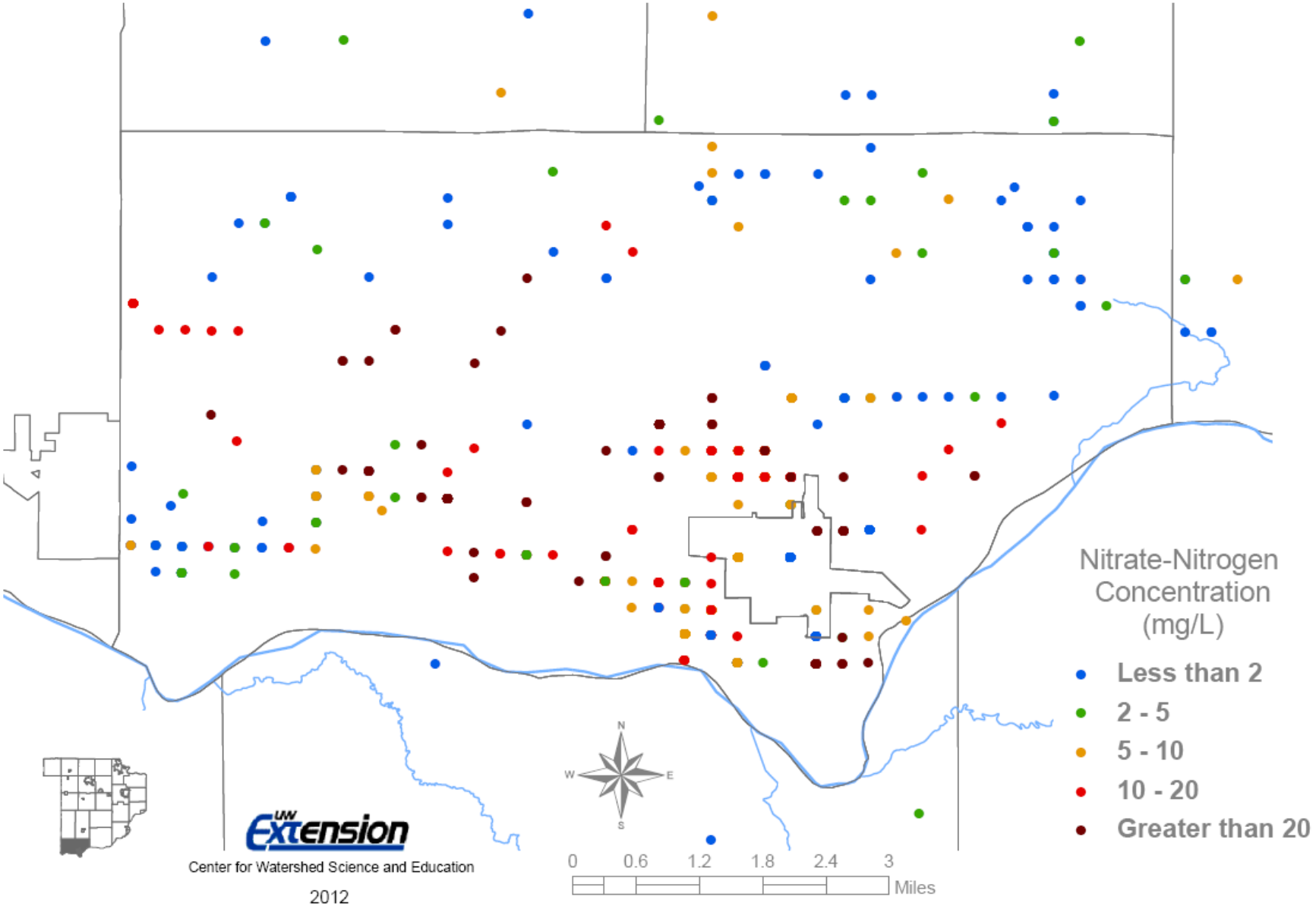
Sources:

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




Bear Creek
Spring Green
Sauk County
February 2013
NITRATE-NITRITE (ppm N)
A None Detected 16 25 %
B ... 2.0 15 23 %
C 2.1 - 5.0 19 30 %
D 5.1 - 10.0 6 9 %
E 10.1 - 20.0 4 6 %
F 20.1 ... 4 6 %
Mapped value is the average unless otherwise indicated.
Treated samples not mapped.
0 2 4 6 Miles
0 2 4 6 Kilometers
N
Sauk County
Groundwater Center
Center for Watershed Science and Education

Town of Spring Green, Sauk County, WI



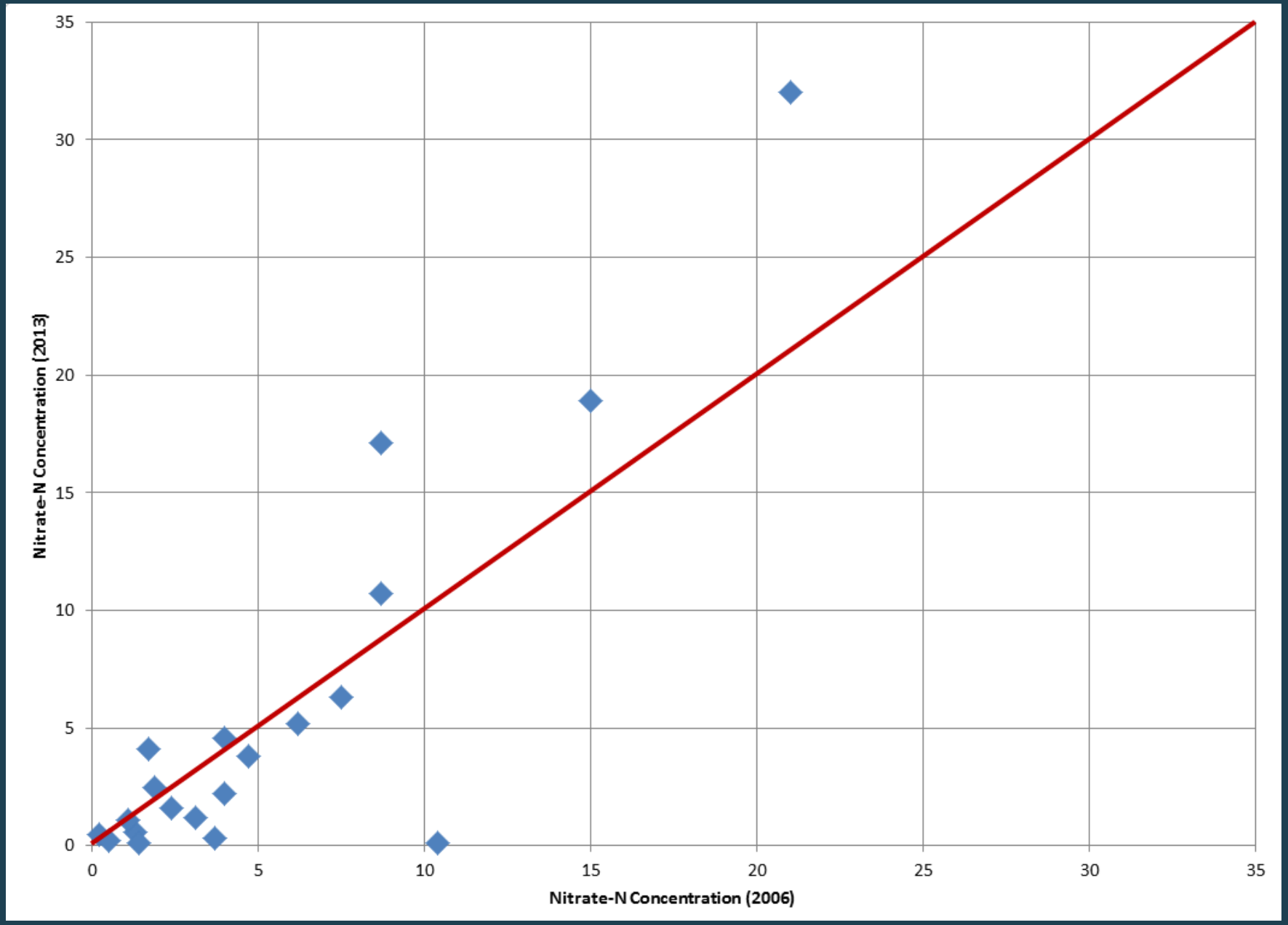
UW Extension

Center for Watershed Science and Education

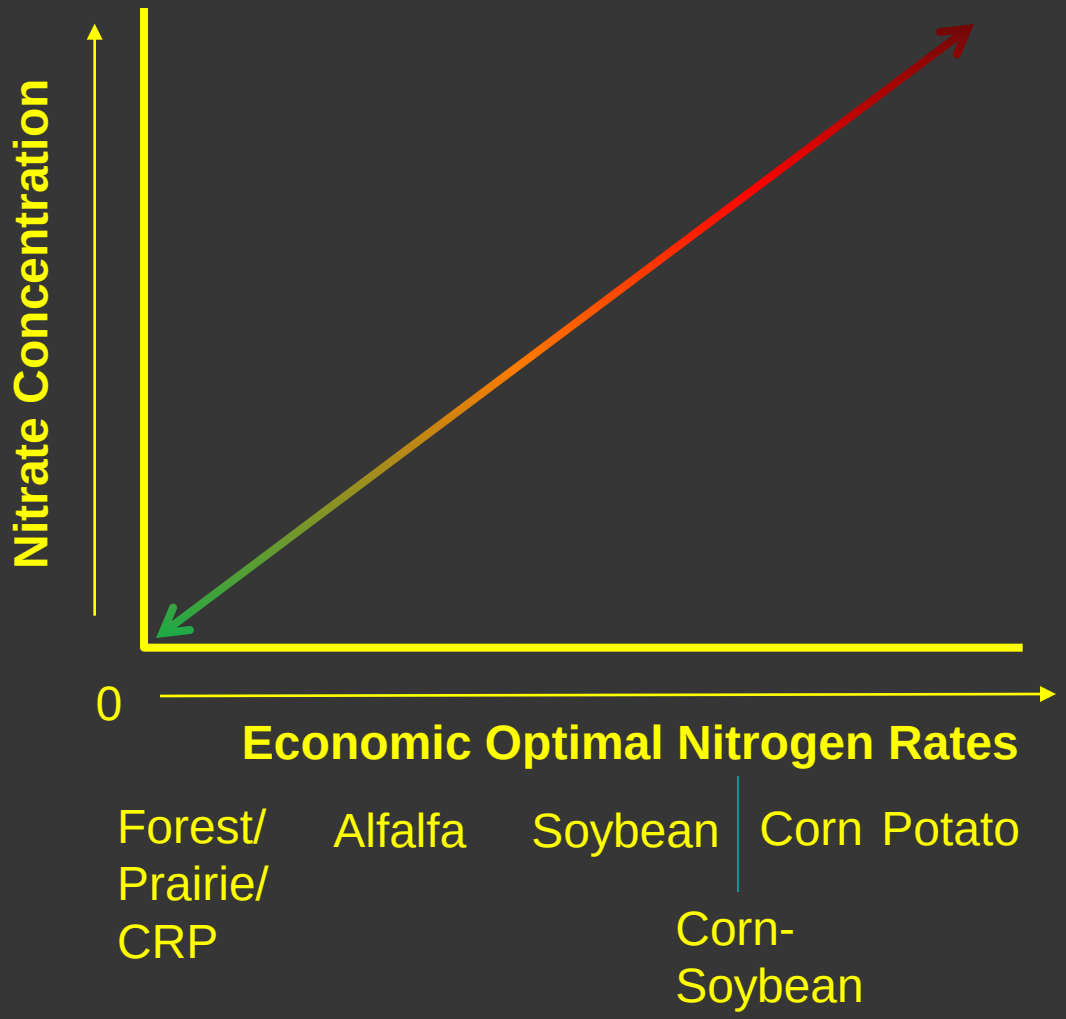
2012

Disclaimer: This map contains voluntarily submitted private well water data from the Center for Watershed Science and Education. It also contains data from the Wisconsin Dept. of Natural Resources Groundwater Retrieval Network. It does not represent all wells and is not considered a scientific study.

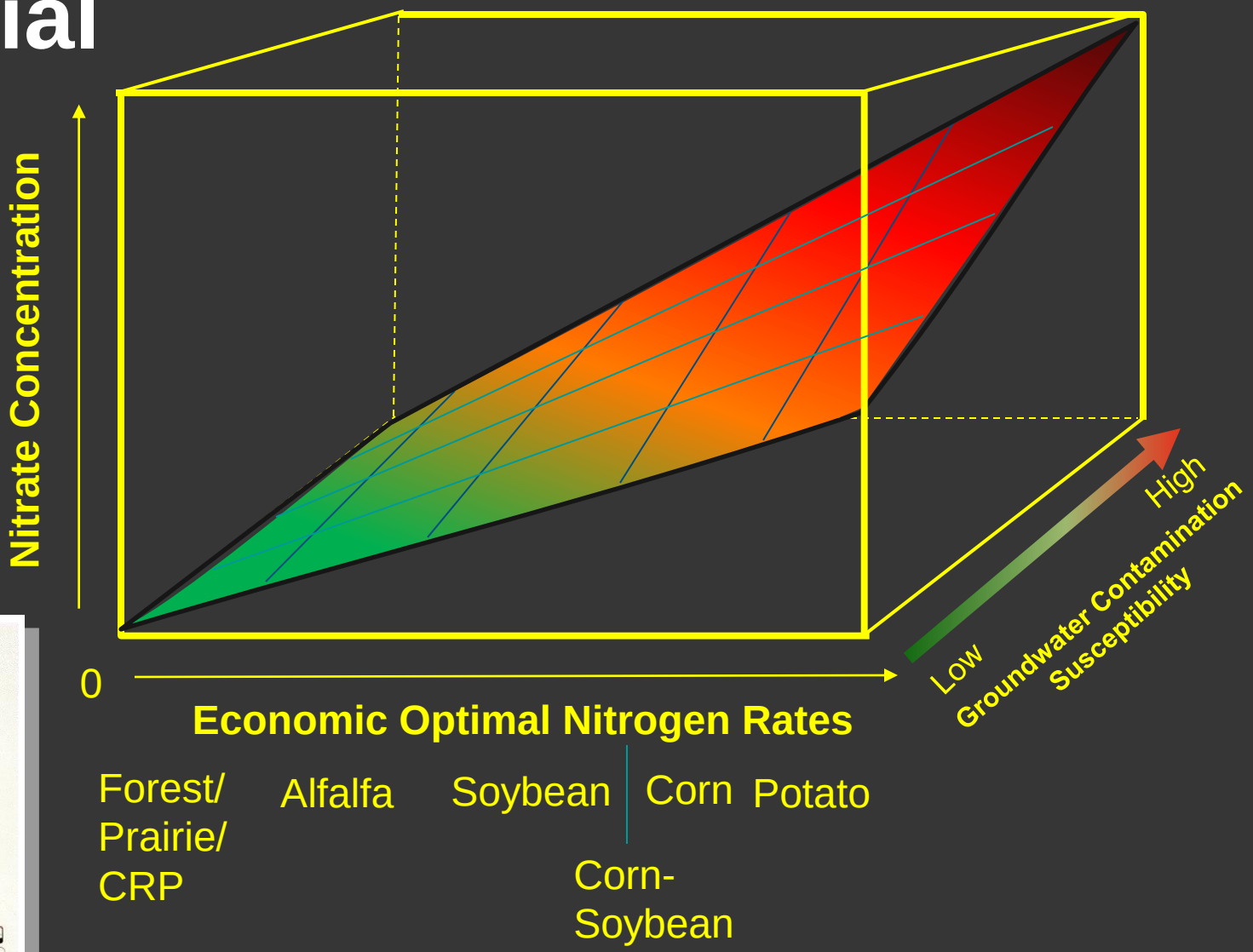
Wells that have been sampled in both programs

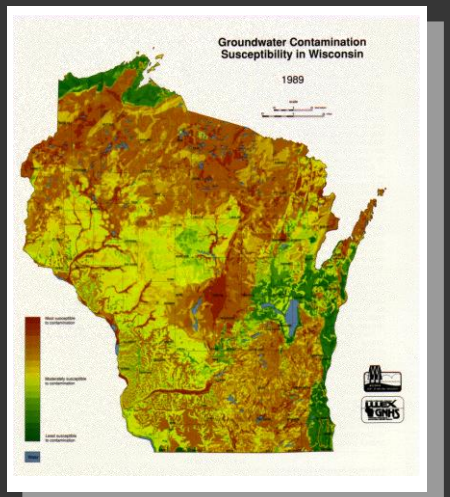


Generalized Nitrate Leaching Potential



Generalized Nitrate Leaching Potential





Masarik, UW-Extension

What can I do to reduce my nitrate levels?

Solution:

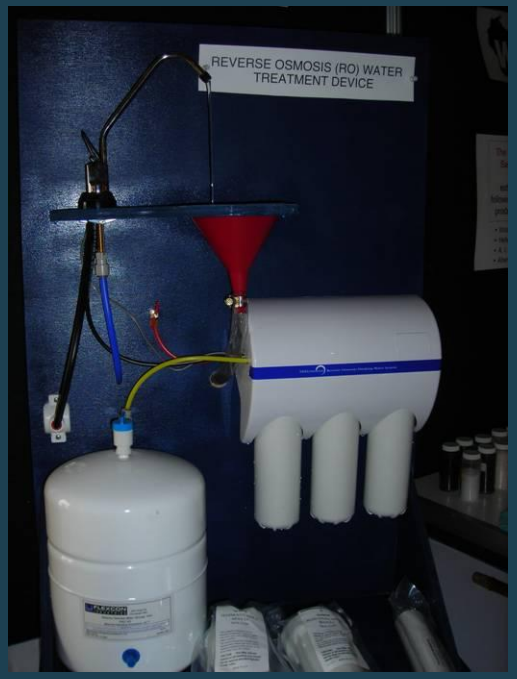
- **Eliminate contamination source or reduce nitrogen inputs**

Short term:

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

What can I do to reduce my nitrate levels?

- **Long-term:**
  - **Reduce or eliminate nitrogen inputs**
- **Short term** (Lewandowski et. al. 2008)
  - **Change well depth or relocate well (not guaranteed) - $7,200**
  - **Bottled water - $190/person/year**
  - **Water treatment devices - $800 + 100/yr**
    - **Reverse osmosis**
    - **Distillation**
    - **Anion exchange**

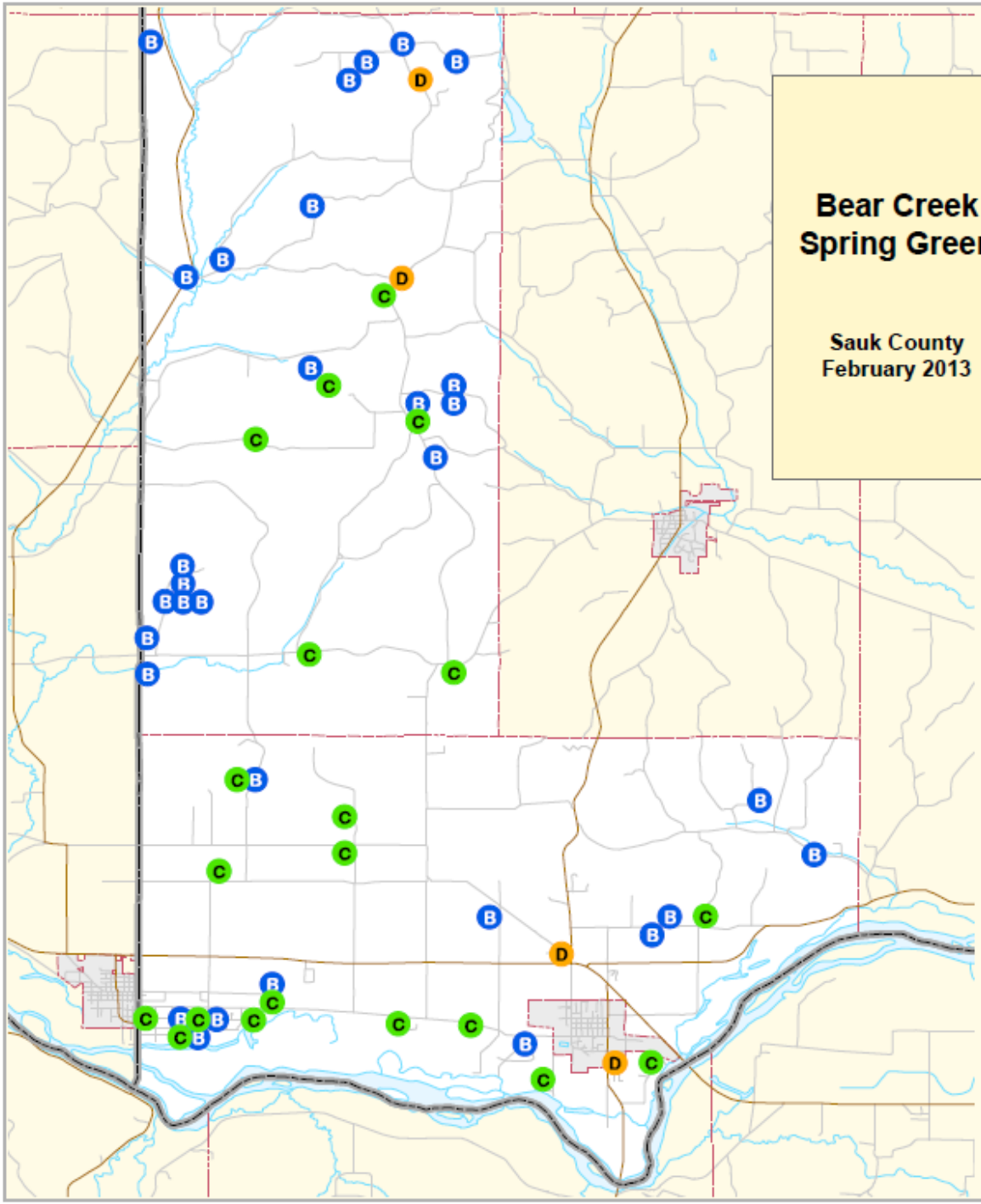


Tests for Aesthetic Problems

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

  "Natural" in much of WI



Bear Creek
Spring Green

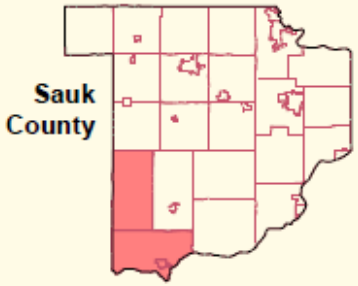
Sauk County
February 2013

CHLORIDE (ppm)

A	None Detected	0	0 %
B	... 10	36	56 %
C	11 - 50	24	38 %
D	51 - 100	4	6 %
E	101 - 200	0	0 %
F	201 ...	0	0 %

Mapped value is the average unless otherwise indicated.
Treated samples not mapped.

0 2 4 6 Miles
0 2 4 6 Kilometers
N



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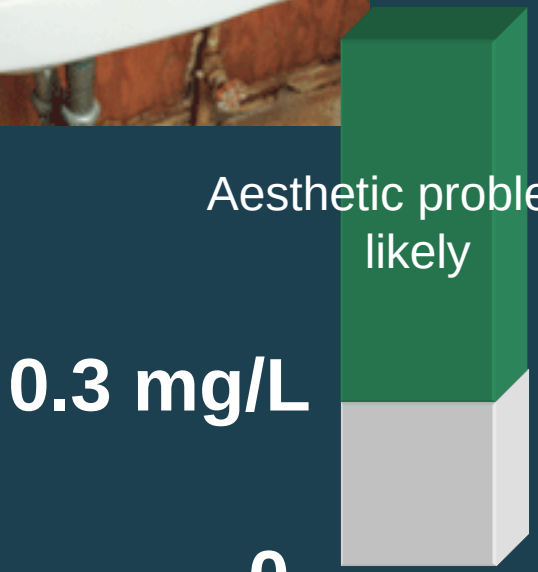
Tests for Aesthetic Problems

Iron

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

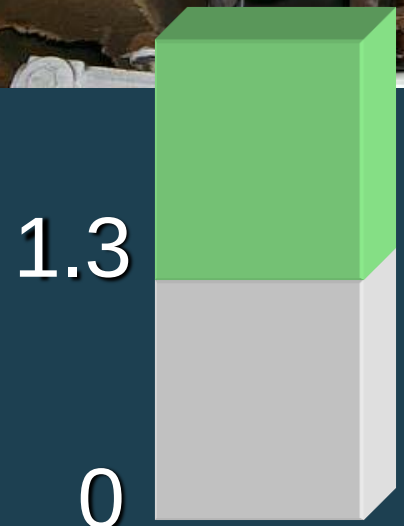


- Potential for iron bacteria
  - Slime, odor, oily film

Test Important to Health

Copper

- **Sources: Copper water pipes**
- **Standard: 1.3 mg/L**



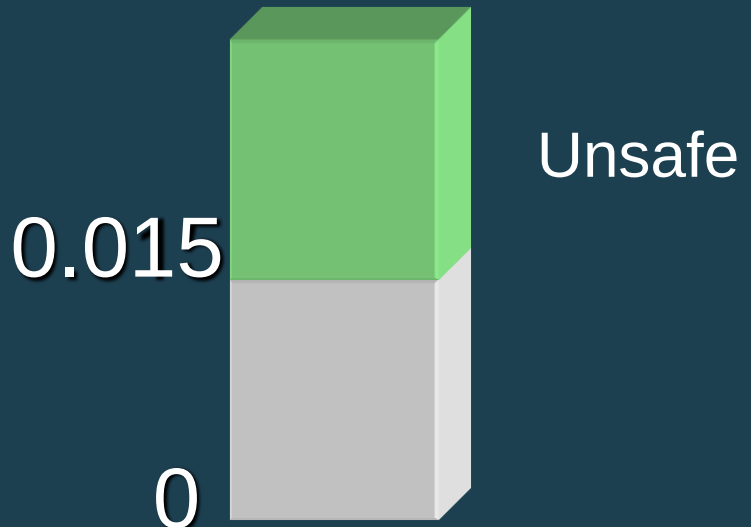
Health Effects:

- **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)**
- **Standard: 0.015 mg/L (15 ppb)**



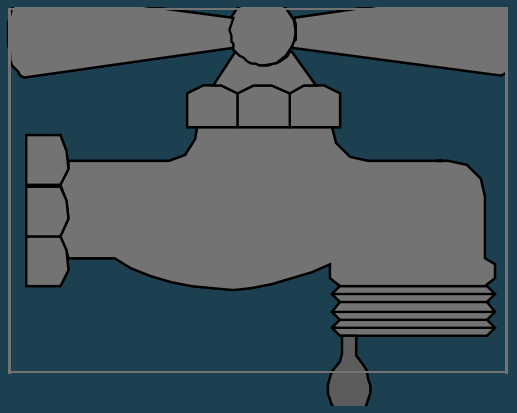
Health Effects:

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

Lead and Copper

Solutions:

- **Run water until cold before drinking.**
- **Use a treatment device.**



Pesticides in Drinking Water

- 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..

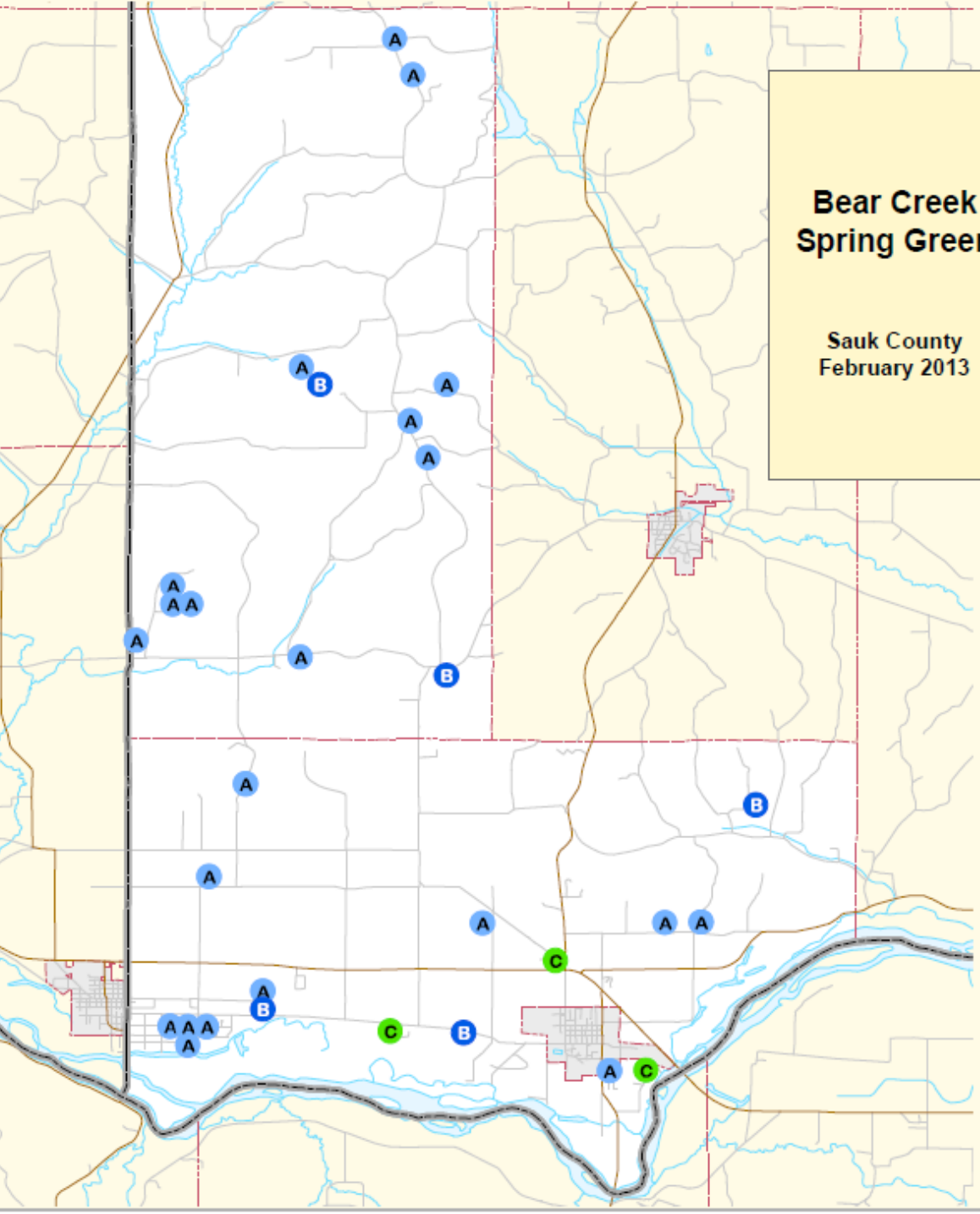
- Most frequently detected pesticides in WI:
  - Alachlor* and its chemical breakdown products
  - Metolachlor and its chemical breakdown products
  - Atrazine** and its chemical breakdown products
  - Metribuzin
  - Cyanazine and its chemical breakdown products.

- * WI public health groundwater standard for breakdown component Alachlor ESA.
- ** WI public health groundwater standard is for the total chlorinated atrazine residue

Tests Important to Health

DACT Screen

- Sources: Triazine pesticides (mainly atrazine used on corn crops)
- 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)



Bear Creek
Spring Green

Sauk County
February 2013

DACT (ug/l)

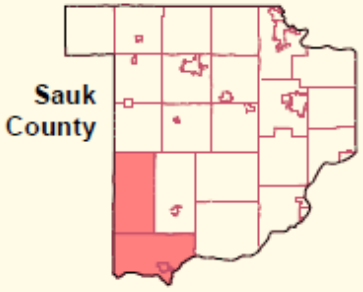
Maximum value for the 1/4 1/4 section.

A	None Detected	24	73 %
B	... 0.3	6	18 %
C	0.4 - 1.0	3	9 %
D	1.1 - 2.0	0	0 %
E	2.1 - 3.0	0	0 %
F	3.1 ...	0	0 %

0 2 4 6 Miles

0 2 4 6 Kilometers

N



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Improving water quality

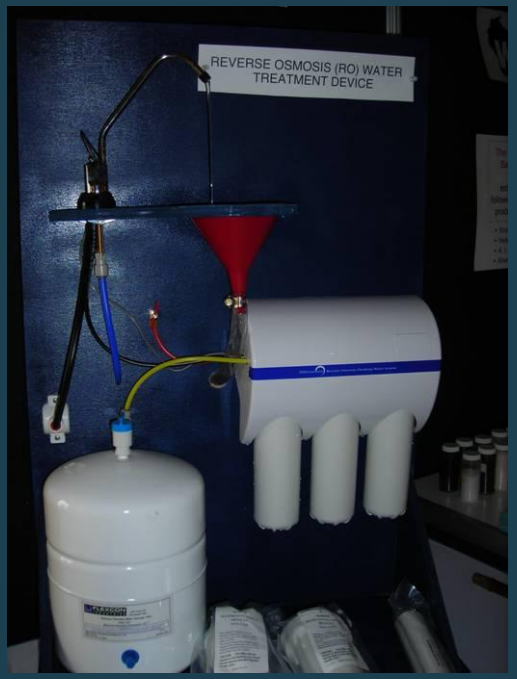
- **Long-term improvements**
  - Eliminate sources of contamination
- **Short-term improvements**
  - Repair or replace existing well
  - Connect to public water supply or develop community water system
  - Purchase bottled water for drinking and cooking
  - Install a water treatment device
    - Often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

understanding water treatment

- **Advantages:**
  - + Reduce level of contaminants and other impurities
  - + Improve taste, color and odor

- **Disadvantages:**
  - – Require routine maintenance.
  - – Can require large amounts of energy.
  - – Testing is often the only way to know it is functioning properly for most health related contaminants.

- **Cautions:**
  - Treatment methods often selective for certain contaminants
  - Multiple treatment units may be necessary
  - Treatment may also remove beneficial elements from water in the process.



Before investing in treatment….

- Always have water tested at a certified lab before investing in water treatment.
  - Know the types and amounts of chemicals you would like removed.

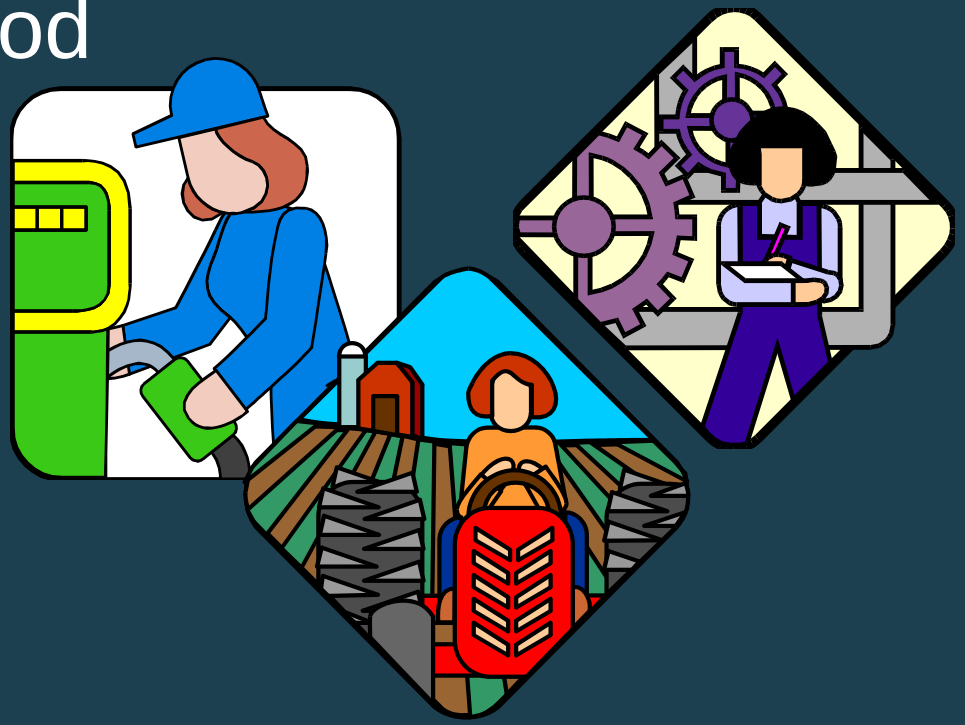
- Choose a device that has been approved by the Wisconsin Department of Commerce.
  - Ask for a copy of the approval letter.
    - or
  - Check the agency's Drinking Water Treatment Product Approval website:
    - http://commerce.wi.gov/php/sb-ppalopp/contam_alpha_list.php

Next Steps

- Test well annually for bacteria, or if water changes color or clarity.
- If levels are elevated, test again in 15 months for nitrate.
- If you detected pesticides, you may want to perform a more extensive and accurate pesticide analysis.

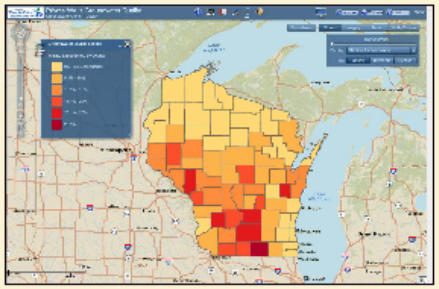
Next Steps

- Test for known or potential contaminants in your neighborhood
  - Gasoline?
  - Pesticides?
  - Solvents?



Check for known contamination sites in Sauk County at:
http://dnr.wi.gov/org/aw/rr/gis/index.htm

WI Well Water Quality Interactive Viewer



Use the Interactive Well Water Quality Viewer

Homeowners and local units of government can use this tool to:

- See what we know about general well water quality in Wisconsin.
- Compare water quality in your area to nearby towns or counties.
- Raise awareness of local groundwater quality issues.
- Promote testing and outreach efforts.
- Encourage well testing in areas where little data exists.
- Highlight the importance of testing well water on a regular basis.

Disclaimer: The viewer summarizes private well water quality data from the Center for Watershed Science and Education, the WI Dept. of Ag, Trade and Consumer Protection, and the WI Department of Natural Resources Groundwater Retrieval Network. It is not considered a scientific study and does not represent well water quality information for all known private wells.

This information is not intended to be a substitute for well water testing and does not provide site specific information for an individual well or property. The Center for Watershed Science and Education is not responsible for misuse or misinterpretation of the data.

Direct questions on using and interpreting this information to Kevin Masarik.

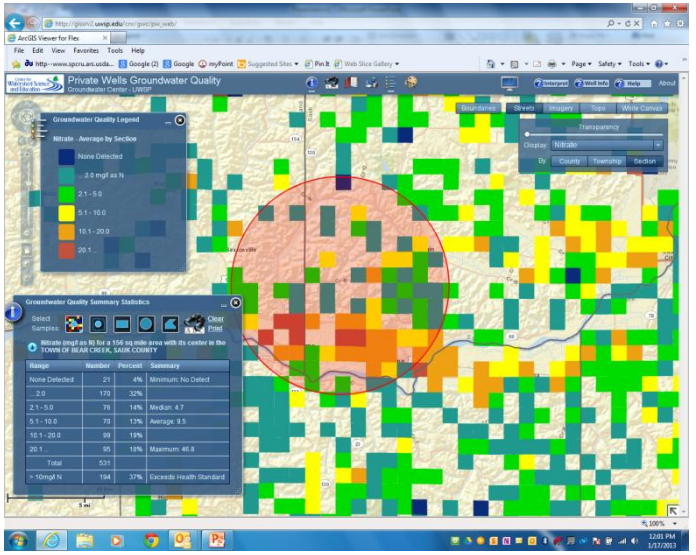
Interactive Well Water Quality Viewer 1.0 created by David Mechenich, Center for Watershed Science and Education

WI Well Water Quality Viewer

Nearly 900,000 households rely on private wells as their primary water supply. Homeowners with private wells are encouraged to have wells tested on a regular basis to determine the safety of the water supply for purposes such as drinking and cooking. While testing is the only way to determine the types and amount of contaminants in a well water system, homeowners, health professionals and local officials often want to know more about water quality issues in their community.

Features

- Search for information on 14 different water quality parameters
    - Health related contaminants:
        - Nitrate
        - Arsenic
        - Atrazine
        - Lead
        - Copper
- View water quality information at a county, town or section level detail
- Generate groundwater quality summaries by county, town or any user defined area greater than 1 sq. mile

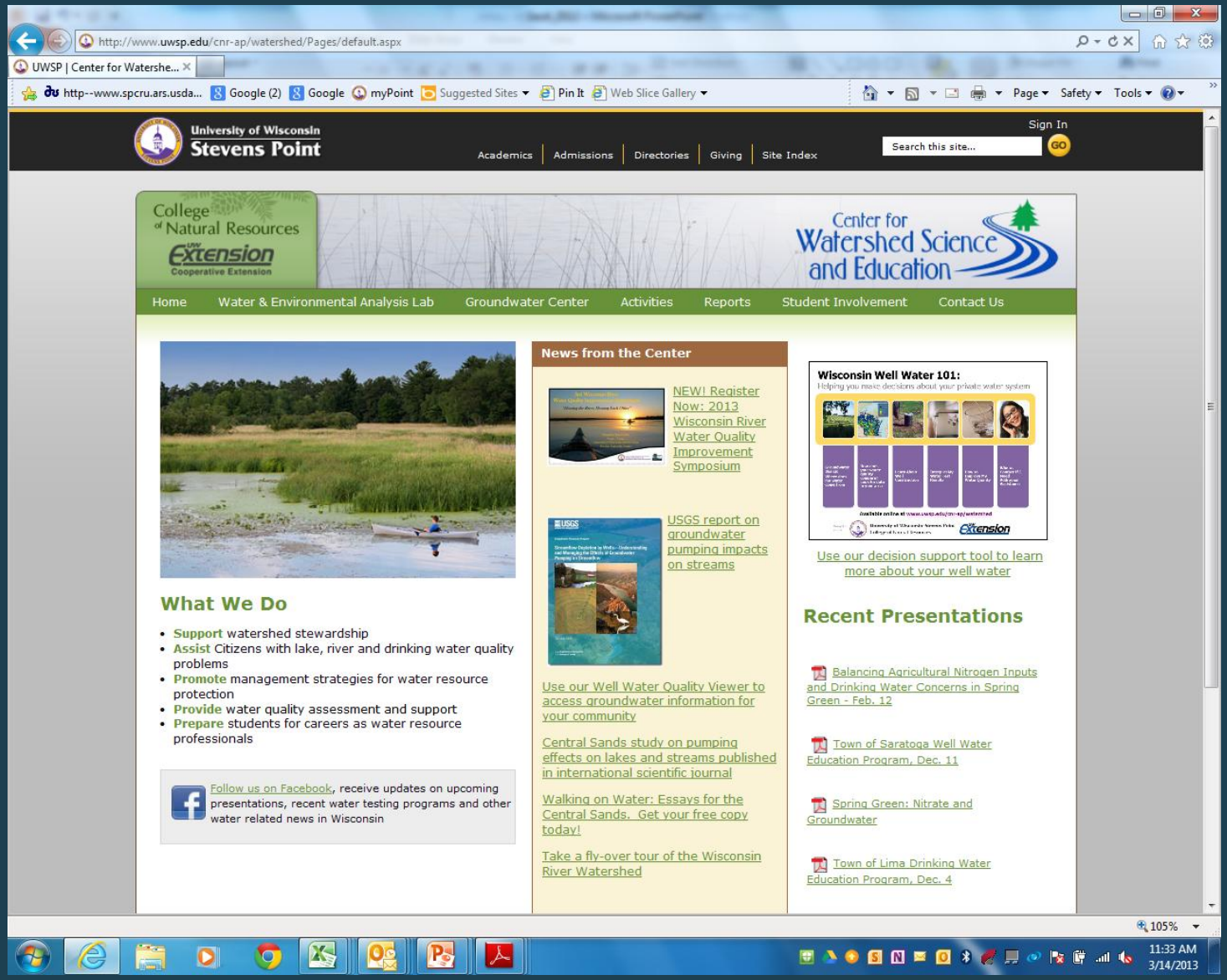


Available online at:
http://www.uwsp.edu/cnr-ap/watershed/Pages/wellwaterviewer.aspx

UW Extension

University of Wisconsin-Stevens Point
College of Natural Resources

www.uwsp.edu/cnr-ap/watershed



UW Extension

Center for Watershed Science and Education

Thanks to the following for helping sponsor this program:

- **Towns of Bear Creek and Spring Green**
- **Sauk County Land and Water Conservation Department**
- **Sauk County UW-Extension**

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