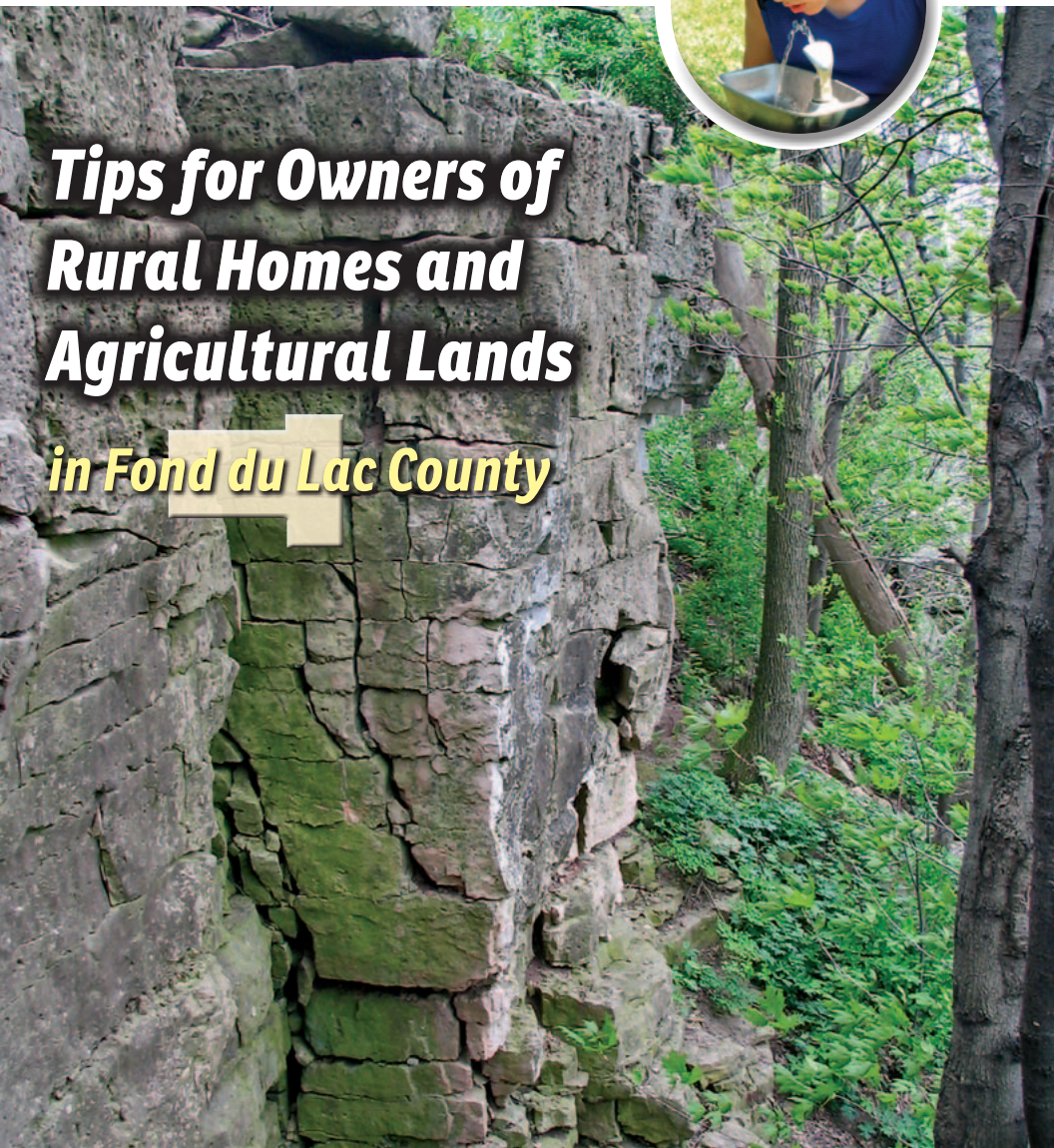


# Protect the Water You Drink



## **Tips for Owners of Rural Homes and Agricultural Lands in Fond du Lac County**



**UW**  
**Extension**

*Fractured bedrock combined with thin soils creates a high potential for water contamination.*



A large surface crack in Fond du Lac County bedrock is cleared to locate a sinkhole outlet.



Spring runoff flows to a large sinkhole, where it descends underground.

## In Fond du Lac County, drinking water has a high potential for contamination

All Fond du Lac County residents rely on groundwater, rather than surface water, for drinking. Sampling results have shown that in Fond du Lac County approximately one in five private wells produce water not safe for drinking. Groundwater typically moves less than 1 foot per day, but in areas of thin soil and fractured bedrock, water and pollutants can move 100 feet or more per day. One sinkhole contamination incident showed that water moved one mile in an hour! Such rapid movement means wells can test safe one day and be contaminated the next.

**The groundwater that is pumped by your well likely began as rain or snow falling on the land you see from your home.**

There are significant health concerns when pollutants reach residential wells, beaches, lakes, rivers, and streams. Pollution on the surface of the land can directly and quickly impact water underground.



Woodlands help protect exposed and cracked bedrock from runoff.

Protect the water you drink – Learn about it

## Shallow soils over fractured bedrock allow water and contaminants to travel rapidly

The unique geology and soils of Fond du Lac County present challenges in protecting groundwater. The upper layer of bedrock is a type of rock that is easily dissolved by water. Extensive networks of vertical and horizontal fractures (cracks) in the bedrock are continuously forming. Sinkholes, disappearing streams, and caves are visible examples of places where bedrock has dissolved.

**The term "karst" refers to areas where bedrock is dissolved by water, resulting in features like cracks, fractures and sinkholes.**

In some areas of Fond du Lac County, the soil is very shallow, which increases the risk of contamination of our drinking water supply (see map on pages 4-5). Soil is important for protecting water quality, because it naturally filters contaminants picked up by rainwater and snowmelt before they reach groundwater, rivers, lakes and streams. In areas of shallow soil, there is little to no natural filtering of contaminants.



# How Susceptible is Your Drinking Water?

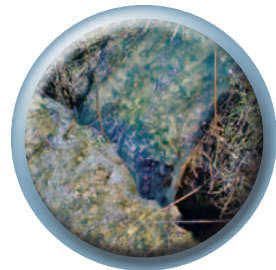
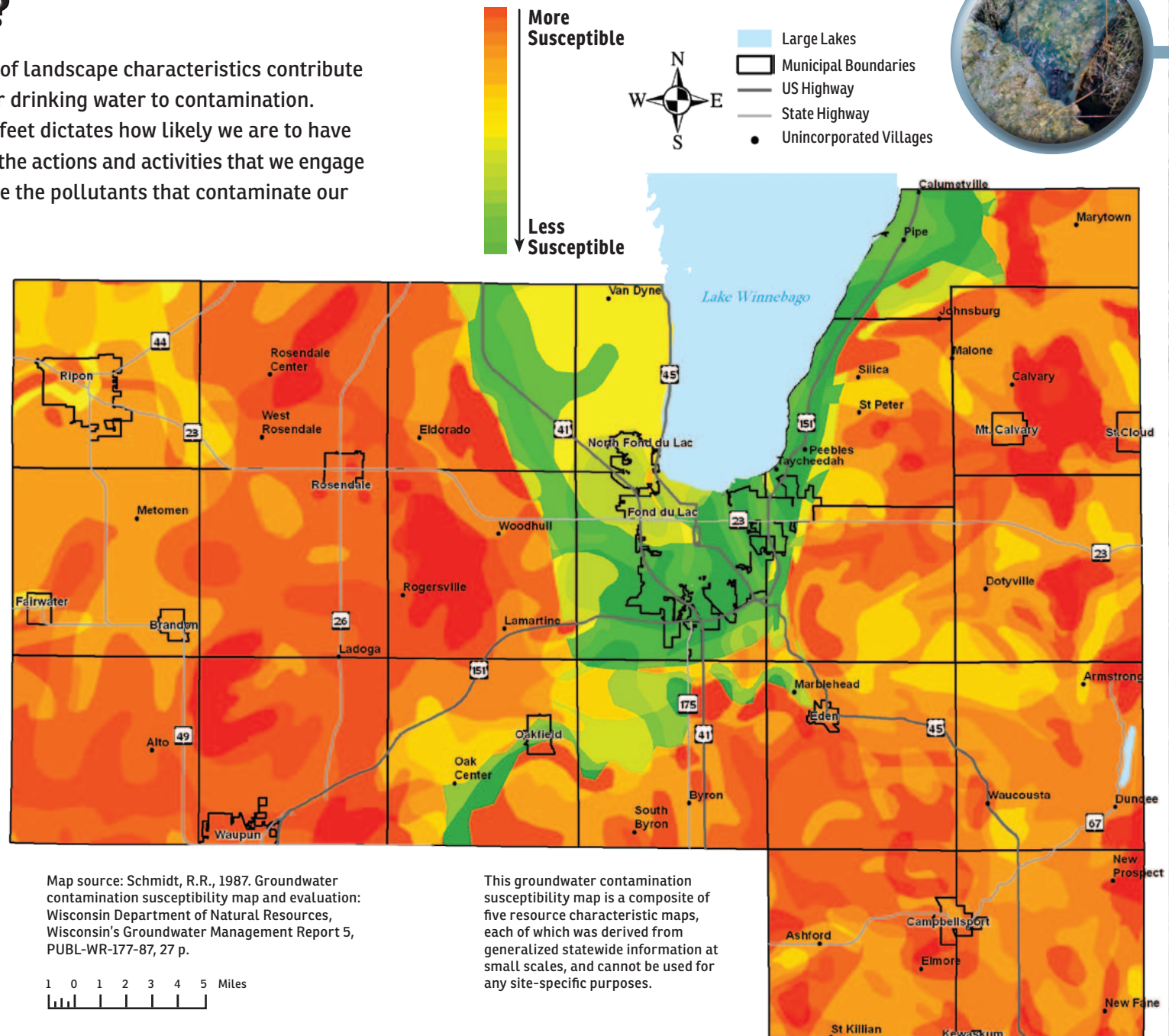
In Fond du Lac County, a number of landscape characteristics contribute to the overall susceptibility of our drinking water to contamination. While the landscape beneath our feet dictates how likely we are to have contaminated drinking water, it is the actions and activities that we engage in on the land surface that provide the pollutants that contaminate our drinking water.

The five most important characteristics include:

- Depth of soil on top of underlying bedrock
- Type of the soil on top of the bedrock
- Type of bedrock
- Permeability or ease of water movement through the soil
- Depth to water table



## Fond du Lac County Groundwater Contamination Susceptibility Analysis



## TRUE STORIES: Examples of groundwater contamination in Fond du Lac County

**Contaminated wells that are replaced** with deeper wells and casing, often up to 300 feet, are still found to be susceptible to contamination.

**Groundwater lesson:** If land use does not change and bedrock fractures connect, a well may continue to be contaminated no matter how deep it is drilled and cased. The way to avoid contaminated water is to identify and stop the contamination source.

**There are homes in Fond du Lac County** where the well water turns brown from manure in spring.

**Groundwater lesson:** If manure is spread near bedrock fractures, sink-holes or improperly abandoned wells, there is a risk of the manure polluting the groundwater. Be aware of karst features in and near your property so that you can avoid spreading manure, fertilizers and herbicides near them. Avoid spreading manure on frozen or snow-covered ground.

**One resident found elevated arsenic levels** in their well water when none of their neighbors had similar results.

**Groundwater lesson:** Each well is unique in its construction and the geologic conditions of its location. Well owners should consistently sample their well water and not rely on sampling results from neighbors to determine the quality of their own well.

**Due to unsafe well water,** a farming family lost all of their livestock herd and ultimately lost their farm.

**Groundwater lesson:** People are not the only creatures that rely on safe drinking water. Land use practices immediately surrounding your well often have the biggest impact on your well water quality.

**If you suspect your drinking water is contaminated, stop drinking it immediately, switch to bottled water, and contact the Fond du Lac County Health Department. See page 15 for contact information.**

## Examples of groundwater pathogens and pollutants

Depending on the pollution source, contaminated groundwater may have bacteria, viruses, pharmaceutical waste, heavy metals, cleaning solutions or other chemicals that make the water unsafe. Resulting illnesses may be short-lived and not serious, while others may be long-term or life-threatening. The chart below includes some of the most common pathogens and pollutants found when drinking water is contaminated. It is not an all-inclusive list.

Contaminants	Sources	Symptoms
<b>BACTERIA</b>		
<i>Escherichia coliform (E. coli)</i> <i>Salmonella</i> <i>Campylobacter</i> <i>E. coli</i> 0157 (Requires a special water test for detection. Causes similar, but more serious illness than other E.coli strains. Requires medical treatment.)	<ul style="list-style-type: none"> <li>• Infected human and animal feces</li> <li>• Manure</li> <li>• Septic systems</li> <li>• Sewage</li> </ul>	<ul style="list-style-type: none"> <li>• Gastrointestinal illness</li> <li>• Low-grade fever</li> <li>• Begins 12 hrs - 7 days after exposure</li> </ul>
<i>Leptosporidia</i>	<ul style="list-style-type: none"> <li>• Urine of livestock, dogs and wildlife</li> <li>• Manure</li> </ul>	<ul style="list-style-type: none"> <li>• High fever, severe headache and red eyes</li> <li>• Gastrointestinal illness</li> <li>• Begins 2-28 days after exposure</li> </ul>
<b>MICROSCOPIC PARASITES</b>		
<i>Cryptosporidia</i> <i>Giardia</i>	<ul style="list-style-type: none"> <li>• Infected human and animal feces</li> <li>• Manure</li> <li>• Septic systems</li> <li>• Sewage</li> </ul>	<ul style="list-style-type: none"> <li>• Gastrointestinal illness</li> <li>• Begins 2-14 days after exposure</li> </ul>
<b>VIRUSES</b>		
Norovirus	<ul style="list-style-type: none"> <li>• Infected human feces and vomit</li> <li>• Septic systems</li> <li>• Sewage</li> </ul>	<ul style="list-style-type: none"> <li>• Gastrointestinal illness</li> <li>• Low-grade fever &amp; headache</li> <li>• Begins 12-48 hrs after exposure</li> </ul>
<b>CHEMICALS</b>		
Nitrate	<ul style="list-style-type: none"> <li>• Fertilizers</li> <li>• Manure</li> <li>• Bio-solids</li> <li>• Septic systems</li> </ul>	<ul style="list-style-type: none"> <li>• Methemoglobinemia or "Blue Baby Syndrome"</li> <li>• Elevated nitrate levels in well water may be an indication of other contaminants.</li> </ul>
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.	<p>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.</p> <p>Long-term exposure above MCL may cause: weight loss, cardiovascular damage, retinal and some muscle degeneration; cancer.</p>

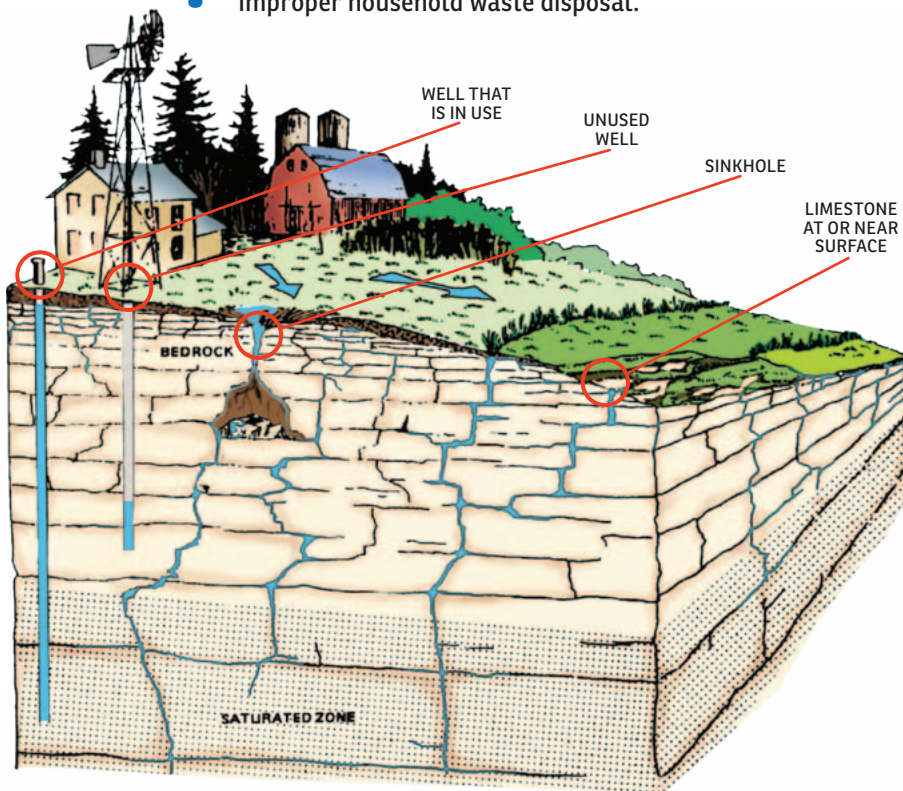
Information Sources: United States Department of Health and Human Services – Centers for Disease Control and Prevention ([www.cdc.gov](http://www.cdc.gov)) and United States Environmental Protection Agency ([www.epa.gov](http://www.epa.gov))

# Tips to keep your water clean

## Know the threats: Minimize your risks

If you are aware of the threats, you can take action to reduce the risks of contaminating your water and that of your neighbors. Water resources can be contaminated by:

- 💧 Barnyards and other areas where manure accumulates.
- 💧 Cropland and lawns where fertilizers, chemicals or manure are applied.
- 💧 Malfunctioning septic systems.
- 💧 Rainwater or snowmelt runoff from roads and other paved areas.
- 💧 Improper household waste disposal.



**Karst regions** have bedrock with connecting cracks and layers between rocks that easily transport water and pollutants to the groundwater.

## Test your well water

As a homeowner with a private well, it is your responsibility to have your water tested regularly and to know it is safe to drink. **It is recommended that all private wells be tested at least once per year for coliform bacteria and more often if changes in water taste, odor or color are noticed.** Fond du Lac County well owners may benefit from more frequent testing to detect seasonal or weather-related trends. There may be additional tests for you to conduct, based on activities around you, or if bacteria levels indicate that your well is vulnerable to contamination. If test results show elevated levels of contaminants, you should contact the Fond du Lac County Health Department for guidance on corrective actions.

Testing for pesticides can be expensive, but many labs offer a test for Atrazine or an Atrazine derivative that is much less costly and can indicate whether additional pesticide testing is warranted.

**COST (generally):** \$ = less than \$25    \$\$ = \$25-\$75    \$\$\$ = over \$75

ADDITIONAL WELL WATER TESTS TO CONSIDER		
Contaminant/ general cost	Which wells or homes should be tested?	How often should I test?
Nitrate \$	<ul style="list-style-type: none"> <li>• All newly constructed wells, or wells with no previous test history.</li> <li>• Wells within ¼ mile of fertilized fields or animal feed lots and wells that had levels close to 10 ppm.</li> <li>• Wells used by pregnant women or infants.</li> </ul>	<ul style="list-style-type: none"> <li>• Two tests spaced 6 months apart.</li> <li>• Test annually.</li> <li>• Test before pregnancy and at time of birth.</li> </ul>
Pesticides \$-\$\$\$	<ul style="list-style-type: none"> <li>• Well is within ¼ mile of agricultural fields, or pesticide manufacturing, storage or mixing facilities.</li> </ul>	<ul style="list-style-type: none"> <li>• Once every 5-10 years.</li> </ul>
VOCs (solvents, gasoline, fuel oil) \$\$	<ul style="list-style-type: none"> <li>• Wells within ¼ mile of a landfill, underground fuel or gasoline tank and wells within ¼ mile of where solvents have been used (drycleaner, automotive garage, body shop, etc.).</li> </ul>	<ul style="list-style-type: none"> <li>• Test once every 5-10 years or when solvent or gasoline taste or odor is noticed.</li> </ul>
PCBs \$\$\$	<ul style="list-style-type: none"> <li>• Water with an oily sheen or petroleum odor, and submersible pump installed before 1979.</li> </ul>	<ul style="list-style-type: none"> <li>• Test once if needed.</li> </ul>
Arsenic \$	<ul style="list-style-type: none"> <li>• Every well.</li> </ul>	<ul style="list-style-type: none"> <li>• Test once.</li> <li>• Test annually if arsenic is present.</li> <li>• Re-test if iron levels increase or if water changes in taste or odor.</li> </ul>
Lead \$	<ul style="list-style-type: none"> <li>• Homes with copper plumbing installed before 1985 (lead solder) or with brass fixtures; and naturally-soft water.</li> </ul>	<ul style="list-style-type: none"> <li>• Consider one-time test.</li> </ul>
Copper \$	<ul style="list-style-type: none"> <li>• Water used to prepare infant formula or if any resident in home experiences repeated symptoms of nausea, diarrhea or abdominal cramps. Homes most at risk have new copper plumbing or naturally-soft water.</li> </ul>	<ul style="list-style-type: none"> <li>• Homes with new copper plumbing should be re-tested in 6 months.</li> <li>• Test before and after flushing the faucet for 2-3 minutes.</li> </ul>

Source: WDNR publication, Tests for Drinking Water from Private Wells. PUBL-DG-023 2007



This summer aerial view makes bedrock cracks obvious. In places like this, extra care is needed to prevent surface pollution from entering groundwater.



Report observations of water suddenly disappearing in a road ditch to the township or county road department. This may indicate a new sinkhole.

## Minimize risks of groundwater contamination

### ON YOUR FARM

- Develop and follow a nutrient management plan for your land to optimize yields without using more fertilizer than needed. Inquire at the Fond du Lac County LWCD for assistance and cost-sharing opportunities.
- Do not apply manure, fertilizers, septic tank waste, pesticides or other wastes near wells, sinkholes, fractures or ditches.
- Do not apply manure during frozen or snow-covered conditions.
- Incorporate manure into the soil immediately upon application.
- Properly fill and seal unused and abandoned wells (current regulations require that this must be done by licensed pump installers or well drillers). Information can be obtained from the Fond du Lac County LWCD. Certain wells may be eligible for cost-sharing through the LWCD.

**Wisconsin DNR Spill Hotline: (24 hours/day)**  
**1-800-943-0003**  
 Report fuel, manure, pesticide, and other hazardous and solid waste spills immediately!  
 Your call will activate professional response and clean-up crews. A spill itself is not illegal, but failing to report a spill is!

(continued on pg. 12)



**Abandoned wells** may still have visible structures such as windmills and hand pumps, while others may be almost hidden because structures have been removed. However, they all pose direct threats to groundwater if not properly filled and sealed.



**Old well casings** should be properly sealed with bentonite (above). Contact the Fond du Lac County Land and Water Conservation Department for information about licensed professionals who fill and seal wells.





Runoff from surrounding land may temporarily collect at a sinkhole.



Runoff from 300 acres flowed into this large sinkhole and drained to groundwater. The sinkhole was capped with soil, and a pipe was installed to divert the runoff.

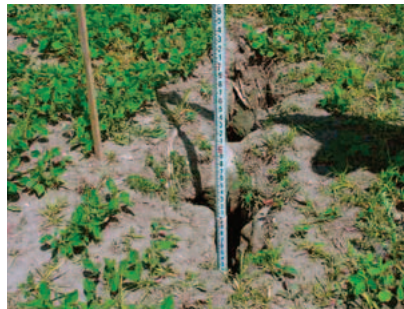


Yards may need to be re-worked to divert runoff from sinkholes, fractures or old wells. Here a man-made pond collected polluted runoff from the surrounding fields, yard and road ditch, but never held water for long. It drained through a bedrock fracture, repeatedly contaminating groundwater. The pond had to be filled-in and the yard graded to stop the contamination.

### Minimize risks of groundwater contamination

#### ON YOUR FARM (continued)

- Build berms, contours, grass buffers or grassed waterways to divert water away from sinkholes, fractures and ditches.
- Properly stabilize sinkholes. It may be possible to continue farming over a properly stabilized sinkhole.
- Do not dispose of chemical containers, dead animals, or any trash in sinkholes, in areas with shallow soil, or nearby streams or lakes.



Cracks and sinkholes in fields quickly route polluted runoff down to the groundwater.



Sinkholes must not be used as dumps. This poses a serious contamination threat.

#### IN YOUR HOME & YARD

- Do not apply fertilizer or pesticides near sinkholes, fractures or wells in your yard.
- Minimize use of lawn chemicals and fertilizers to save money AND protect the environment, since most lawns do not need very much fertilizer to stay healthy and green.



Minimize use of fertilizers and pesticides.

- Test your lawn's soil to avoid over-applying fertilizer.
- Build berms or grade your yard to direct water away from sinkholes, fractures and wells. Sinkholes can be filled and sealed by a professional if the circumstances permit.



A soil testing kit.

(continued on next page)



A downspout and swale control the direction of roof runoff.



A new septic system replaces one that was malfunctioning.

**Minimize risks of groundwater contamination  
IN YOUR HOME AND YARD (continued)**

- 💧 Direct downspouts to your lawn, rain garden or rain barrel, away from pavement.
- 💧 Have your septic system or holding tank(s) inspected and pumped every three years or less, as per county regulations, by a certified septic installer to be sure everything functions properly.
- 💧 Properly dispose of household and hazardous waste (paint, drained oil, old fertilizers, herbicides, cleaning solutions, etc.) at collection sites and events. Watch for annual "Clean-Sweep" announcements.
- 💧 Test your well water each year.
- 💧 Dispose of expired or unused medications at an appropriate disposal site or collection event. The county maintains a 24/7 drug disposal site at the City Police Department, 126 N. Main St., Fond du Lac. [www.drugfreefdl.com](http://www.drugfreefdl.com)



A rain barrel is a low-cost way to reduce runoff from the roof.



Collection site for household and hazardous waste.

**Who can help?**

AGENCY & CONTACT INFORMATION	TYPE OF ASSISTANCE
<p><b>Fond du Lac County Land &amp; Water Conservation Department (LWCD)</b>                      (920) 923-3033 ext. 3  <a href="http://www.fdlco.wi.gov">www.fdlco.wi.gov</a></p>	<p>Information, technical assistance and cost-sharing opportunities for:</p> <ul style="list-style-type: none"> <li>• Diverting water from sinkholes, fractures, wells and ditches</li> <li>• Properly filling and sealing unused wells</li> <li>• Nutrient management planning</li> <li>• Stabilizing sinkholes</li> </ul>
<p><b>Wisconsin Department of Natural Resources (DNR)</b>                      Service Desk (888) 936-7463  <a href="http://www.dnr.wi.gov/org/water/dwg">www.dnr.wi.gov/org/water/dwg</a></p>	<p>Information and publications on:</p> <ul style="list-style-type: none"> <li>• Licensed professionals for drilling, sampling, evaluations, repairs and abandonment</li> <li>• Drinking water contaminants</li> <li>• Wells and groundwater</li> </ul>
<p><b>Fond du Lac County Code Enforcement</b>                      (920) 929-3139  <a href="http://www.fdlco.wi.gov">www.fdlco.wi.gov</a></p>	<ul style="list-style-type: none"> <li>• Septic system information</li> <li>• Private well water test kits</li> <li>• Groundwater</li> <li>• Guidance on well maintenance</li> </ul>
<p><b>Fond du Lac County Public Health Dept.</b>                      (920) 929-3085  <a href="http://www.fdlco.wi.gov">www.fdlco.wi.gov</a></p>	<ul style="list-style-type: none"> <li>• Well water tests kits for bacteria and nitrates</li> <li>• Interpretation and guidance on well test results</li> </ul>
<p><b>USDA Natural Resources Conservation Service (NRCS)</b>                      (920) 923-3033  <a href="http://www.wi.nrcs.usda.gov">www.wi.nrcs.usda.gov</a></p>	<p>Technical assistance and cost-sharing opportunities for nutrient management, manure storage, water diversions and other conservation practices on agricultural lands.</p>
<p><b>Fond du Lac County UW-Extension Office</b>                      (920) 929-3170  <a href="http://fonddulac.uwex.edu">fonddulac.uwex.edu</a>  <a href="http://sustainfdlcounty.org">sustainfdlcounty.org</a></p>	<p>Information and publications for:</p> <ul style="list-style-type: none"> <li>• Soil analysis</li> <li>• Environmentally-conscious yard care and agricultural practices</li> <li>• Rain gardens</li> <li>• Groundwater</li> <li>• Stormwater management at the home</li> </ul>
<p><b>Wisconsin Department of Commerce</b>                      Fond du Lac County contact (608) 267-1401  <a href="http://www.commerce.wi.gov/php/sb-ppalopp/contam_alpha_list.php">www.commerce.wi.gov/php/sb-ppalopp/contam_alpha_list.php</a></p>	<p>Information on approved drinking water treatment devices.</p>



# Protect the Water You Drink

## *Tips for Owners of Rural Homes and Agricultural Lands*

### *in Fond du Lac County*

Because your well doesn't serve the public, there are no state or federal requirements that you stop using your water, regardless of test results. Whether or not to continue using your water is a personal decision that you will make, based on the health risks and other factors such as cost and convenience of corrective actions.



Revisions for Fond du Lac County by: Chad Cook, UW-Extension Basin Education Initiative, Wendy Giese, Fond du Lac County Code Enforcement, Diana Tscheschlok, Fond du Lac County UW-Extension, and Liz Heinen, Wisconsin Department of Natural Resources.

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Photos courtesy of: Door County Soil and Water Conservation Department, Manitowoc County Soil and Water Conservation Department, Peggy Compton, Jeffrey J. Strobel, Deb Beyer, Fond du Lac County Code Enforcement and Fond du Lac County UW-Extension.

