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Invasive Species and Wakeboat Ballast Tanks

By Steve Johnson

It's often impossible to pinpoint exactly how Aquatic Invasive Species (AIS) enter a lake. Could it be a fishing boat, a personal watercraft, a wakeboat, or perhaps a motor's pump/impeller, bilge area, livewell, bait bucket, or fishing gear? The potential pathways are numerous and the stakes are high.

Historically, many AIS arrived in the United States through the ballast tanks of international ships. These vessels, traveling from ports worldwide, would discharge ballast water teeming with invasive species into the Great Lakes and other U.S. waterways. In response, the International Maritime Organization (IMO) adopted regulations in 2017 requiring ships to install ballast water management systems to curb the spread of AIS into foreign waters. This was a significant step forward.

Today, a parallel problem is emerging in Wisconsin's lakes, driven by wakeboat ballast tanks.

Wakeboats, as their name suggests, are engineered to produce large wakes for activities like wakesurfing. One key method to achieve this is by increasing the boat's weight, which deepens its draft and amplifies the wake. Early wakeboats used aftermarket ballast sacks—thick plastic bags filled with lake water and placed at the rear of the boat. Modern wakeboats, however, feature sophisticated built-in ballast tank systems. Hidden throughout the vessel, these tanks are filled and drained with lake water via pumps controlled at the touch of a button. Some models can hold up to 6,000 pounds of water—equivalent to 750 gallons. While these systems are impressive, they lack a critical design feature: the ability to prevent the spread of invasive species between waterbodies. Unlike the shipping industry, wakeboat manufacturers have not adopted measures to address this risk.

AIS, such as zebra mussel veligers, quagga mussels, spiny water fleas, VHS fish virus, and milfoil fragments, can easily hitch a ride in these ballast tanks. Applying Occam's Razor—the philosophical principle that the simplest explanation is often correct—the most likely vector for AIS transmission between lakes is wakeboat ballast tanks.

Wisconsin's Department of Natural Resources (DNR) regulation NR40.07(2) states: "No person may transport any boat or boating equipment from a waterbody without removing all water from the boat and equipment." Yet, most wakeboat ballast tanks cannot be fully drained. Studies, such as Campbell et al. (2016), show that wakeboat pumps leave behind an average of 8.37 gallons of water, and in some cases, up to 22.9 gallons. Manufacturers have not designed these systems to allow complete drainage or decontamination, creating a regulation, enforcement, and compliance problem.

Lake Minnetonka, spanning 59 million square meters, hosts an estimated 200,000 zebra mussels per square meter. With each mussel capable of producing up to a million zebra mussel veligers (microscopic larvae) annually, the math is staggering. Even a small volume of residual water in a ballast tank is virtually guaranteed to carry veligers, which are invisible to the naked eye.

Continued on page 3

Message from the President

Greg Younker – Burnett County Lakes and Rivers Association



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As we kick off the 2025 season, we at the BCLRA would like to thank all property owners who have become individual members. If you provided us an email address, it has been recorded but not used. We are working to find a way to send bulk email and keep the list private.

Today, we talk about two of my favorite lake related subjects, lake organizations and grants. In the past year, BCLRA has helped establish two new associations and responded to several requests for more information. Establishing a lake organization not only adds a social component to your lake community, it also qualifies you for DNR grant funding. Here is an example:

In 2023, the Round Lake Management District proposed a project to the Wisconsin DNR to build a kiosk style informational sign at the boat launch and purchase water monitoring equipment needed to support their newly established Lake District. In 2024 they were awarded a Surface Water Planning grant to support the project.

The grant was a cost sharing agreement where the DNR provided 67% of the project cost, and the lake organization was responsible for the remaining 33%. The 33% cost sharing component was satisfied with volunteer work. It takes time and energy to complete any project. Volunteers were needed to build the sign, collect water samples, monitor for invasives and document the project. The DNR provides \$15 credit for each hour volunteered to support a grant and Round Lake volunteers contributed over 300 hours (the equivalent of \$4,500) to complete the project. In summary, the DNR provided \$5000 cash to cover project expenses, and volunteers provided an equivalent of \$4500 to do the work... A perfect example of a win/win situation.

In 2025, they are doing it again, this time with a Surface Water Population Control grant to target invasive aquatic plants that grow out of control in their lake. Many grant opportunities are available from the Wisconsin DNR, and Burnett County is very active in this program. Grants are available to reduce nutrients entering the lake, provide healthy fish habitat, prevent the spread of invasives and develop management plans to preserve water quality and protect shoreline. If your organization would like more information on this valued program, BCLRA can get you everything you need to get started.

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Invasive Species and Wakeboat Ballast Tanks continued..

Consider this scenario: A wakeboat on Lake Minnetonka, a waterbody infested with zebra mussel veligers, fills its ballast tanks and spends the day wakesurfing. At day's end, the boater presses a button to drain the tanks, but approximately 23 gallons of water remain. The boat is then trailered to a pristine lake in Burnett County. Upon launching, the boater refills the tanks, and later drains them—releasing those 23 gallons of Lake Minnetonka water, along with any AIS, into the Burnett County lake. The result? Instant AIS contaminated lake.

This is a pressing issue, and the Wisconsin DNR has yet to devise an effective enforcement strategy for NR40.07 (2) specific to wakeboat ballast tanks. Meanwhile, the wakeboat industry is booming, growing at 20% per year. As awareness spreads, citizens are beginning to demand action from the DNR, state legislature, and local towns.

In response, 39 Wisconsin towns have enacted wakeboat or wakesurfing ordinances banning enhanced wakes, with many prohibiting ballast tank use entirely. Some ordinances, like those in the towns of Newbold and Drummond (home to Lake Owen), go further, requiring ballast tanks to be decontaminated by certified boat service facilities. This is currently the only reliable way to halt this AIS contamination vector.

Wakeboat ballast tanks pose a clear and present danger to the health of Burnett County's lakes. In November 2024, the Town of Scott passed a wakeboat ordinance restricting enhanced wakes and banning ballast tank use (see the Fall 2024 LakeLines article, "Enacting a Town Wakeboat Wakesurfing Ordinance"). Similar measures are being proposed across Burnett County towns, offering a proactive defense against both wake-related damage to lakes and AIS introduction via ballast tanks.

New county geology and groundwater maps produced as part of the Burnett County Groundwater Inventory *By Amy Wiersma Hydrogeologist; Wisconsin Geological and Natural History Survey*

In January 2025 the Wisconsin Geological and Natural History Survey (WGNHS) and the Center for Watershed Science and Education (CWSE), both within the UW-Madison Division of Extension Natural Resources Institute, shared preliminary results for the Burnett County Groundwater Inventory. The WGNHS produced maps related to the county's geology and groundwater resources, while the CWSE conducted well-water quality sampling. The shallow aquifer that supplies water to most wells in Burnett County is made up of loose surficial sediments that sit between the soil and solid rock. This material was deposited by glaciers and streams and can range in composition from clayey to sandy both spatially and with depth.

The maps produced by the WGNHS are a comprehensive look at the county's groundwater resources and can be used for future county planning efforts. These maps include:

- Surficial geology map: Improves understanding of the county's glacial history and the types of sediments the aquifer is made up of. Useful for siting wells.
- Water-table elevation map: Shows groundwater levels, direction of groundwater flow, and where groundwater contributes to streams and lakes. Useful for siting wells, landfills, other developments as well as conservation efforts related to groundwater quality and quantity.
- Depth to the water table map: Shows the distance between the land surface and the top of groundwater. The depth to groundwater is shallow (<25 ft) across much of the County, which means easy access to groundwater but also a higher tendency of flooding.
- Depth to bedrock map: Shows the distance between land surface and the top of solid bedrock or the thickness of the surficial sediments. For much of the county bedrock is >100 ft deep, with shallower areas along the St. Croix River and in the south.
- Groundwater recharge map: Shows the amount of local precipitation that makes it to the water table. In an average year, about 20% of local precipitation is incorporated into the groundwater system but this will vary year to year. The amount of recharge is greatest in high-elevation areas with sandy soil.
- Hydrogeologic cross sections: Cross sections are map "slices" that are helpful for visualizing the geologic layers and groundwater conditions in the subsurface across areas of interest. These were constructed for the towns of Trade Lake, Roosevelt, and Dewey.
- Groundwater susceptibility map: Conveys the likelihood that contamination at the ground surface will reach the water table. This map is created using the others mentioned above.

Trumpeter Swans in Burnett County

By: Chris Soutter—Nicaboyme Lake

Last Spring, for the first time in living memory, a pair of trumpeter swans (*Cygnus buccinator*) selected the boggy shoreline of Nicaboyme Lake as their nesting site. They were likely the same pair hanging out there in Fall 2023. A newly-mated pair will explore areas for nesting in the fall before breeding, often returning close to where the female was raised.

These swans chose a nesting site in a marshy area that provided cover for their nest, which was likely built on an old muskrat lodge surrounded by water. By early June, the adults could be seen on Nicaboyme Lake with four cygnets lined-up between them.

Trumpeter swans were extirpated in Wisconsin in the late 1880's, largely because of overhunting. In 1987, the Wisconsin Department of Natural Resources began a program to re-introduce trumpeter swans to the state. The program was so successful that trumpeter swans were removed from Wisconsin's Endangered Species list in 2009. Crex Meadows in southern Burnett County is now an important staging area for swans during spring and fall migration.

We can't control predation of young by eagles or snapping turtles, but what we can control what we do on the lake. To increase the success of swans raising their young:

Keep wakes from motorized boats from reaching the nest.

Keep a respectful distance from swans with young.

Leave submerged and emergent vegetation along lake shorelines.

Dr. David Wolfson, Swan Researcher at the University of Minnesota, says "One of the most important things people can do to protect swans is to use lead-free tackle when fishing." Swans can reach four feet below the surface into the lakebed when feeding on roots and tubers and can swallow lead sinkers in the process.

Wisconsin also has a non-native swan, the Mute Swan, introduced by European immigrants. These swans are similar in size to the Trumpeter Swan, one of the easily distinguishable characteristic to identify between the species is by the orange bull and prominent black fleshy knob extending from the base of the bill to the forehead in the non-native Mute Swan. Native Trumpeter and Tundra Swans have all dark bills.

Mute Swans can be feral and aggressive to people. During feeding, Mute Swans can be seen distributing more aquatic vegetation than they consume causing more damage to the aquatic habitat.

Native Trumpeter Swan Facts

- ◆ Live 20-30 years
- ◆ Mate for life
- ◆ Male is cob, female is pen, young are cygnets.
- ◆ Nesting begins in April.
- ◆ Courtship behavior: bobbing heads and fluttering wings
- ◆ Swan bills strain water as they eat aquatic vegetation.
- ◆ Need about 100 yards of open water as a runway to become airborne.
- ◆ Tundra (Whistling) swans may be seen in Burnett County during early and late migration seasons, but only Trumpeters nest here.
- ◆ It is illegal to hunt swans in Wisconsin.

Invasive Mute Swan Facts

- ◆ Mute Swans were introduced to North America to decorate ponds and lakes.
- ◆ Live 20-30 years
- ◆ Form long-lasting pair bonds.
- ◆ The black knob on bill swells during mating season and is noticeable larger than females.
- ◆ They can eat up to 8 pounds of aquatic vegetation a day.
- ◆ Mute Swans are extremely aggressively during nesting season frequently attacking people and other animals.
- ◆ The Mute Swan received its name because they are less vocal than other swans.
- ◆ They are not hunted but instead managed to control numbers from increasing.



Trumpeter Swan



Tundra Swan



Mute Swan

Beneficial Buffer Strips

By: Gary Loufek — Deep Lake

Buffer strips, also known as riparian buffers, are strips of vegetation planted along waterways to protect water quality and enhance wildlife habitat. These strips act as a natural filter, preventing pollutants from point and non-point sources, such as excess nutrients, pesticides, and sediment, from entering streams, lakes, and wetlands. Burnett County landowners can realize the benefits of implementing and maintaining buffer strips that extend beyond water quality; additionally, they provide a range of ecological and economic advantages.

The effectiveness of buffer strips depends on several factors, including width, plant composition, and the surrounding landscape. Wider buffers generally provide greater benefits, and forested buffers are often more effective than grass buffers. A manicured lawn to the water's edge is not considered a buffer strip; as a matter of consequence, maintaining a monoculture such as a grassy lawn to the water's edge negatively impacts the local water quality. The roots of plants in buffer strips help stabilize stream banks and shorelines, preventing erosion and maintaining the integrity of the waterway. The vegetation also provides shade, which helps regulate water temperature, creating a more suitable environment for aquatic species.

Buffer strips serve as important habitat for a variety of wildlife, providing food, shelter, and travel corridors for birds, reptiles, and other animals. They can also attract beneficial insects, such as dragonflies, which help control mosquito populations. In addition to their environmental benefits, buffer strips can also provide economic opportunities for landowners. They can be used for harvesting timber, firewood, and specialty woodland products, such as nuts, berries, and medicinal plants.

Burnett County stewardship best practices would elicit landowners to maintain a buffer of up to 35 feet along waterways, highlighting the importance of these strips in protecting water resources. Landowners can choose to plant pollinator-friendly grasses and plants, fruit and nut trees, or decorative woody florals, creating a buffer that benefits both the environment and their own aesthetic, and economic interests.

The benefits of buffer strips are well-documented by scientific research, demonstrating their significant role in protecting water quality, enhancing wildlife habitat, and providing economic opportunities. By establishing and maintaining buffer strips, we can help ensure the health and sustainability of our Burnett County waterways for generations to come.

Burnett County offers a shoreland program that follows closely with the Chapter 45 Shoreland Protection Ordinance, however, the program provides a combination of incentives, technical assistance, and outreach to waterfront property owners that the ordinance may not capture fully. The program encourages preservation and restoration of buffers for native vegetation along lakes and rivers in the county.

The program incentives are a unique approach to encouraging shoreline buffer preservation and restoration. Most notably, the incentives provided for each parcel enrolled into the program include an initial enrollment payment of \$250, an annual payment of \$50.00, a free site visit by an expert, an exclusive shirt or cap that identifies the landowner as a participant of the program and an optional sign to place along the shoreline.

If you have questions about preserving or restoring your shoreline, questions about the Shoreline Incentives program and enrolling, please contact the Burnett County Land Services Department at 715-349-2109 or Emily Moore, County Conservationist, directly at 715-349-2109 Ext. 2613.

You can also visit our website to find the application and native planting lists that work well in our sandy soil landscape: <https://www.burnettcountywi.gov/1123/Shoreline-Incentive-Program-SIP>

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ABOUT US

The Northwest Wisconsin Lakes Conference provides an annual opportunity for lake enthusiasts, local government officials, and others interested in protecting our water resources to take in educational presentations and network with conference attendees.

MORE INFORMATION COMING SOON

The Northwest Lakes Conference provides an annual opportunity for lake enthusiasts, local government officials, and others interested in protecting our water resources by providing presentations and educational booths.

This year, Burnett County has two lake association representatives, Ryan Knox (Des Moines Lake) & Steve Johnson (Fish Lake Association), presenting on the topic "Large Decontamination Station examples."

For more information and how to register visit the Northwest Lakes Conference's website: <https://nwwislakesconference.org/>

Youth Education: 2025 WI Land and Water Poster and Speaking Contest

This year marked the 68th Annual Conservation Poster and Speaking Contest. Every year Kindergarten through 12th grade students can enter a poster into the local Northwest Area Contest to be judged amongst 11 other counties within the Northwest Region. If chosen for first, the poster moves on to the State Championship to compete with all 72 other counties.

This year we had 3 posters from Grantsburg High School to compete in the 10-12 grade division and Aliya's poster won first place at the Northwest Area meeting!

If you have a child in a school district within Burnett County please inform them of this wonderful opportunity to help pass Wisconsin's rich conservation history into future generations.



Local Area Events

Burnett County Lakes and Rivers Association Annual Meeting

When: Saturday August 16, 2025
Where: Voyager Village
Time: 10AM in the Voyager Room at the clubhouse
Check www.bclra.org for details

Tabor Lake Aquatic Bug and Plant Workshop

When: No date, time or location set
Check www.bclra.org for details

Mud Hen Lake Aquatic Bug and Plant Workshop

When: Saturday June 14, 2025
Where: No time or location set
Check www.bclra.org for details

Trade Lake Aquatic Bug and Plant Workshop

When: Saturday June 28, 2025
Check www.tradelakeownersassoc.com for details

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Zebra mussels and mercury in fish: New study findings in Minnesota

By: *The University of Minnesota*

A groundbreaking study found that invasive zebra mussels significantly alter aquatic ecosystems, and are associated with elevated mercury concentrations in fish. Mercury, a potent neurotoxin, poses a serious threat to both aquatic life and human health.

Recently published in *Science of the Total Environment*, a team of researchers at the University of Minnesota College of Food, Agricultural and Natural Resource Sciences, Minnesota Aquatic Invasive Species Research Center, and the U.S. Geological Survey studied 21 Minnesota walleye lakes to assess the impact of zebra mussels on food webs and fish tissue mercury concentrations.

Researchers compared mercury concentrations of fish collected from lakes with and without zebra mussels and sampled water, zooplankton, invertebrates and fish from both nearshore and open water zones. They analyzed the data to provide critical insights into fish mercury concentrations, diets and habitat use.

The researchers found:

- Walleye exhibited 72% higher mercury concentrations in lakes invaded by zebra mussels compared to uninvaded lakes.
- Average-sized walleye were more than twice as likely to exceed mercury thresholds tied to human health.
- Walleye in zebra mussel-infested lakes reached mercury concentrations exceeding the Minnesota Department of Health threshold of 0.22 parts per million at a significantly smaller size (14 inches vs. 18 inches).
- Yellow perch exhibited 157% higher mercury concentrations in lakes invaded by zebra mussels. Average-sized yellow perch had a 50 times higher risk of exceeding mercury thresholds.
- Zebra mussel invasion led to shifts in fish resource use, with walleye and yellow perch relying more on nearshore feeding habitats.
- Increased mercury concentrations in fish add to a growing list of known negative effects of invasive zebra mussels and highlight how ecological stressors can alter contaminant cycling within inland lakes to affect the environment and human health.

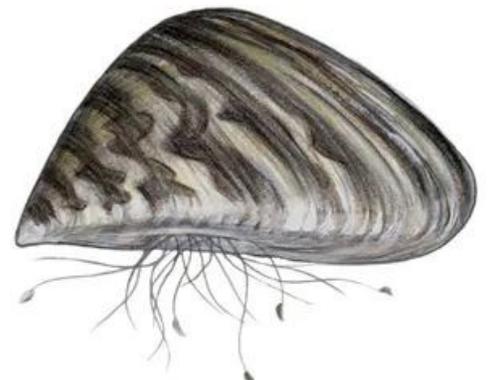
“We were surprised to find such a large effect of zebra mussels in fish tissue mercury concentrations, and we are eager to conduct further research to understand exactly the mechanism behind these patterns,” said senior author Gretchen Hansen, an associate professor in the Department of Fisheries, Wildlife and Conservation Biology.

Hansen emphasized these results do not mean that fish are unsafe to eat, but rather that they point to a need to assess contaminant loads in fish harvested for consumption in lakes invaded by zebra mussels.

Looking ahead, the research team is committed to further investigating the influence of zebra mussels on mercury levels. Collaborating with state and tribal natural resource agencies, researchers aim to develop predictive models to guide monitoring efforts and mitigate the impact of this aquatic invasive species.

Please remember to drain all water and decontaminate all watercraft and equipment before entering a new waterbody in order to stop the spread of aquatic invasive species.

Burnett County is fortunate in that only 2 of our 509 lakes harbor zebra mussels. Let's continue to preserve and protect our pristine Northwood's aquatic habitats by taking small steps in cleaning, draining, drying and new moving aquatic organisms.



Zebra mussel adult

Lake Association Updates

Ryan Knox, Des Moines Lake Association Volunteer, WINS an Invasive Species Action Award organized by the Wisconsin Invasive Species Council.

This award program recognizes individuals, groups and organizations for significant efforts to combat invasive species. Categories of recognition include volunteer and professional efforts focused on preventing, managing, or eradicating terrestrial and aquatic invasive species. Nominees for the categories must demonstrate exceptional contributions to protecting Wisconsin's native wildlife, wetlands, forests, prairies and waterbodies around the State of Wisconsin.

This year awards were given out to 7 professional individuals, 6 volunteer individuals and 1 professional group. To nominate a professional individual, volunteer or group you can find the nomination for on the Invasive Species Council's website with more information: <https://dnr.wisconsin.gov/topic/invasives/InvasiveSpeciesCouncil>

Ryan's dedication to preventing the spread of Aquatic Invasive Species (AIS) is evident in his leadership and hands-on work in designing and constructing a state-of-the-art hot water, high-pressure decontamination station. With no existing blueprint from the Wisconsin DNR, Ryan spent over 80 hours researching, consulting with AIS experts, and conceptualizing a system tailored for smaller lakes like Des Moines and Long. His innovative approach meets the rigorous standards of larger water bodies like the Great Lakes but is scaled for local needs. Since the project began, he has remained dedicated to ensuring its success, making this vital initiative a reality.

Thanks to Ryan's expertise and commitment, other lake associations—even as far as Madison, WI—have taken an interest in replicating this system. The Watercraft Decontamination System (WDS) is a critical step in protecting Des Moines and Long Lakes from the spread of AIS. With Burnett County's AIS ordinance requiring decontamination when materials are present and research confirming local lakes' susceptibility, Ryan's work has provided a crucial defense against infestation, ensuring the long-term health these cherished waterways.

Congratulations!

Photo: Ryan Knox is on the bottom right, installing sand point well with other volunteers.



Local Marine Shop involved in a new program to keep Burnett County Lakes cleaner!

Suzuki Marine started a 4-4-2 Program (meaning 4-stroke for 2-stroke) in order to help dealers move boaters into cleaner, more fuel efficient 4- stroke outboards while properly recycling their old 2-strokes.

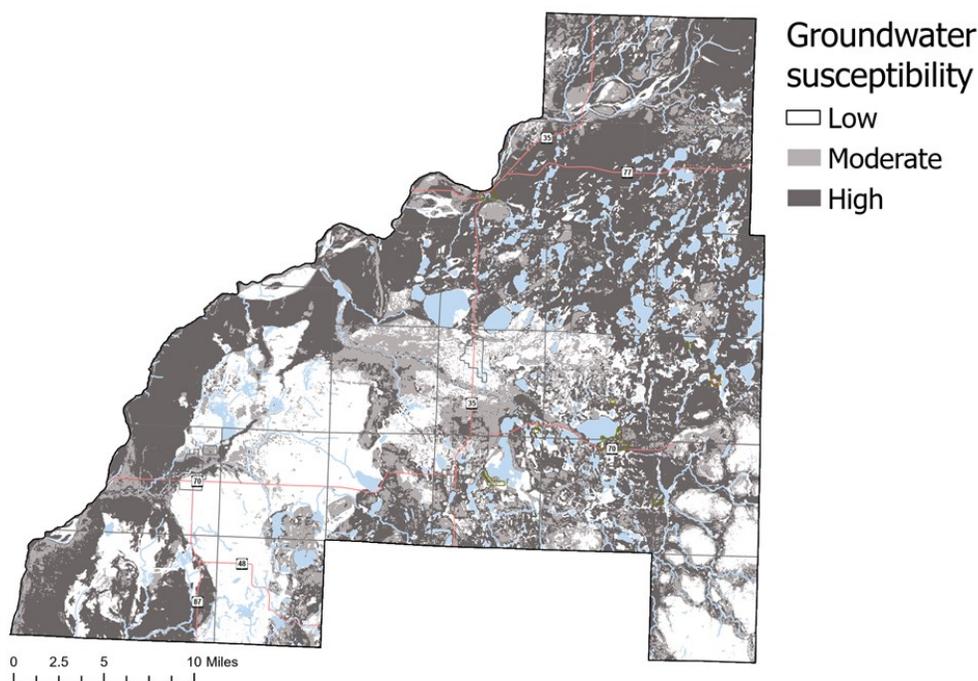
Boone Docks Marine, in Siren, Wisconsin has partnered with Suzuki Marine and is donating money to local environmental non-profits, notably local Lake Associations. Boone Docks Marine has been removing polluting 2-stroke outboards from boats & pontoons, and replacing them with quiet, clean running, fuel efficient, new Suzuki outboards. While doing so, Suzuki is providing special trade-in allowances to dealers and customers. The savings that are provided on these new 4 stroke motors allow Boone Docks Marine to donate some of the proceeds to local area Lake Associations. If your lake association would like to be on the donation list, please contact Boone Docks Marine at info@boonedocksmarine.com or call (715) 866-7850.

New county geology and groundwater maps produced as part of the Burnett County Groundwater Inventory continued

Burnett County's groundwater is vulnerable to contamination from activities at the land surface due to the sandy soils and sediments and shallow depth to the water table, with the **most vulnerable areas in the northern part of the county and along the St Croix River**. With that being said, we all need to do our part to protect the shallow Burnett County aquifers by being aware of our land use practices, what we are putting into the ground and implementing storm water practices to limit the amount of dirty runoff water from entering our lakes, rivers and streams.

Burnett County has a combination of shallow groundwater and sandy soils that make the county particularly susceptible to groundwater contamination. Sandy soil types have large pores and low surface areas that allow water to drain rapidly, which can easily pollute high groundwater tables like ours. Groundwater in more than 75% of the county is less than twenty feet below the land's surface, so what we do on our properties could end up in our water supply! Some common sources of groundwater contamination include landfills, effluents released from industries or wastewater treatment plants, old leaky septic systems and sewers, fertilizers/pesticides, construction sites, animal waste and more.

The products produced by the WGNHS will be accompanied by a technical report that will undergo peer review, with an anticipated publish date of spring 2026. If you have questions about the preliminary findings of the WGNHS groundwater inventory for Burnett County, contact Amy Wiersma (amy.wiersma@wisc.edu). If you missed the Groundwater Conservation Event this month, you can watch the recording on YouTube by following this link: <https://www.youtube.com/watch?v=2X4iFga6TAM&t=3s>



Example preliminary map of Groundwater susceptibility in Burnett County, where the white areas represent areas that are low to contamination and dark grey areas are high for contamination.

This map may be used for decision-making about land use and drinking-water quality. In areas with high groundwater susceptibility, activities that can release contaminants may warrant increased planning, safeguards, and monitoring. The Burnett County Land Services Zoning/Land Use and Conservation Department will be able to utilize these products for future planning efforts across the county.



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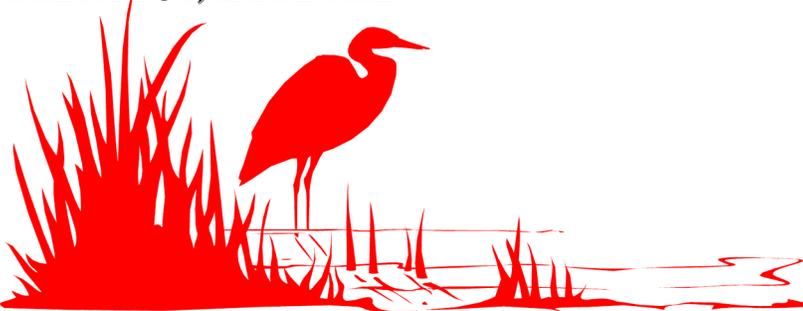
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LAKELINES

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LakeLines is featured online at www.burnettcountywi.gov/1106/Conservation-Division



LAKE LINES

Burnett County Lakes & Rivers Association
Burnett County Land Services