Bone Lake Management District
Polk County, Wisconsin

Bone Lake Watershed

Fact Sheet

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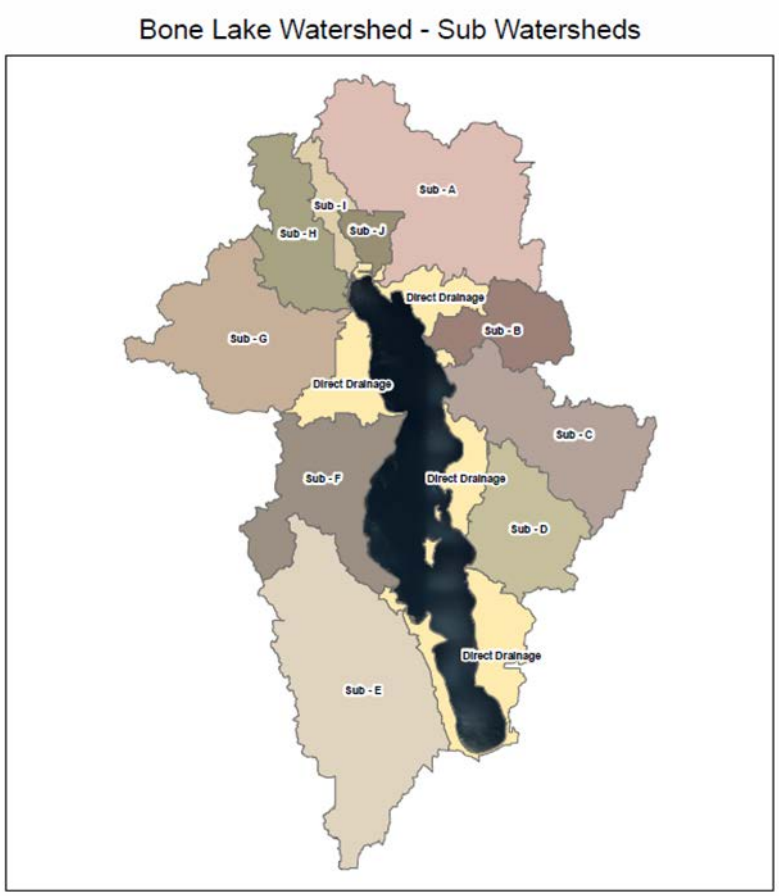
WATERSHED CHARACTERISTICS

The area of land that drains to a lake is called a watershed. The Bone Lake Watershed (HUC12 070300050703)[1] is located within the St. Croix Basin (HUC6: 070300). The area of land contributing to Bone Lake is 10,284 acres (11,993 acres including Bone Lake).

The DNR Healthy Watersheds, High-Quality Waters (HWHQW) assessment identifies priority watersheds (HUC12) and high-quality lakes, rivers, streams, and wetlands throughout Wisconsin. The 30% healthiest watersheds in the state and in each major drainage basin (HUC6) are the geographic protection priorities for the HWHQW Action Plan. With 57% percent natural cover in the watershed (as measured by WDNR), the Bone Lake watershed does not meet the criteria for the healthiest watersheds in the state.

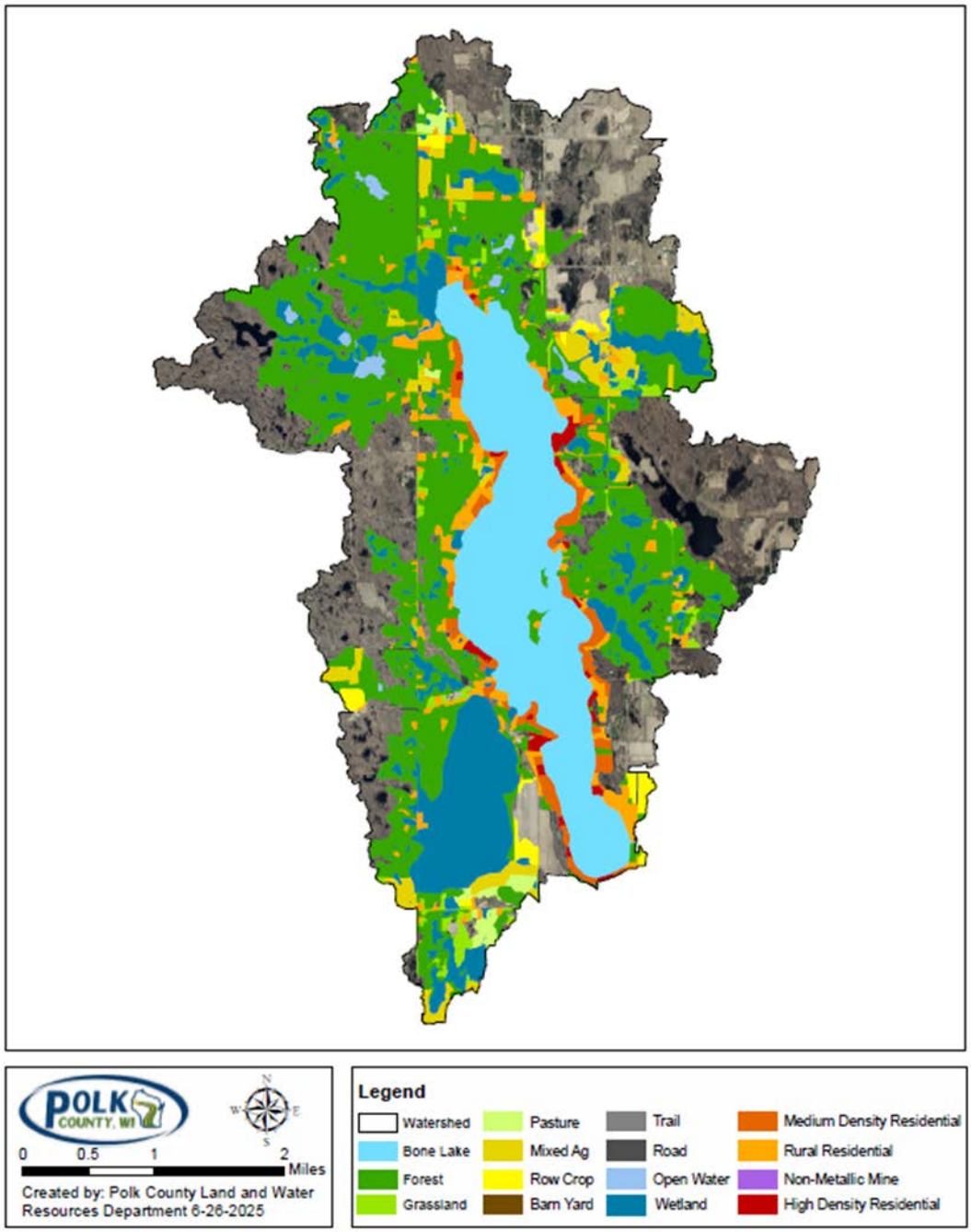
The Polk County Land and Water Resources Department conducted a detailed analysis of Bone Lake watersheds in 2025 with updated delineation of boundaries, water flow paths, internally drained areas, and land use. The Bone Lake Watershed was divided into eleven sub watersheds. Sub watershed boundaries were determined by examining where intermittent streams meet on the landscape. **Sub watershed delineation** allows watershed managers to analyze and prioritize areas to allocate funds. **Flow paths** and channels carry water to Bone Lake during heavy rains and spring snow melt. Flow path identification is crucial to the siting of conservation best management practices.

[1] A HUC12 (Hydrologic Unit Code 12) is a 12-digit numerical identifier representing the smallest, most detailed level (subwatershed) in a nested, hierarchical watershed classification system used by the United States Geological Survey, Natural Resources Conservation Service, and the Wisconsin Department of Natural Resources. A HUC6 is a larger watershed.



Internally drained areas are depressions on the landscape that accumulate water during rainfall events and spring snowmelt. These depressions are deep enough that water cannot exit the depression. Therefore, water that accumulates in internally drained areas infiltrates into the ground rather than contributing to overland runoff/flow to a lake or river. In total, 4,366 acres (42%) of the Bone Lake Watershed is internally drained. If 4.2 inches (or less) of rain falls in the watershed within a 24-hour timeframe these acres will not contribute runoff to Bone Lake. One way to prioritize project installation would be to focus more effort on the land within the watershed that contributes runoff/flow to the lake during lower intensity/duration events. **Land use**/cover is used to create a nutrient budget (estimate nutrients entering the lake). Land use was delineated using Polk County 2020 leaf off aerial imagery.

Bone Lake Watershed - Landuse Excluding Internally Drained Areas



Land cover influences the amount of runoff of nutrients and sediment that reach the lake from sub watersheds. Land cover types such as row crop agriculture and high-density residential areas generate the most runoff and highest concentrations of nutrients in runoff. Forested and wetland areas generate the lowest. Residential areas generate more runoff because of impervious surfaces such as roofs, parking areas, driveways and sidewalks. Crop fields can also generate high amounts of runoff.

Bone Lake Progress

Reducing Watershed Nutrient Loading

Phosphorus is the nutrient which determines the amount of algae growth in Bone Lake, so it is the focus of nutrient reduction efforts. Reducing the amount of runoff also reduces the amount of phosphorus that enters the lake. The Bone Lake Management District focused on reducing runoff from waterfront properties and watersheds with the implementation of the 2009 Bone Lake Management Plan. Waterfront installations included native plantings, rain gardens, diversions, and rock infiltration systems. The most recent was installed in the fall of 2021. After that time, grants were more difficult to obtain, and no additional projects were tracked and installed with funding assistance. There were also several larger-scale practices installed in the sub watersheds. The most recent watershed project was a large rain garden installed at Wilkins Bar & Resort in 2020.

The BLMD has offered free technical assistance to property owners interested in installing practices to reduce waterfront runoff since 2010. There have been very few requests for technical assistance in the past five years. There are about 556 residential properties on Bone Lake, and the BLMD supported site visits for about 150 (some of the visits listed below include repeated visits in subsequent years). Mitigation projects were installed on 49 waterfront properties (9 percent of total). An objective in the 2015 lake management plan was to complete installations on 25 percent of waterfront properties.

The BLMD offers incentives to replace failing septic systems by providing professional analysis of a potentially failing system and a payment of up to $2,500 when failing systems are upgraded. Several (47) upgraded systems have been installed.

Waterfront Runoff Mitigation Progress to Date

	2010 to 2014	2015 to 2020	2021 to 2025
Technical assistance site visits	75	73	5
Runoff mitigation projects installed	18	11	5
Native plantings installed	10	25	0
Septic system upgrades	17	12	18

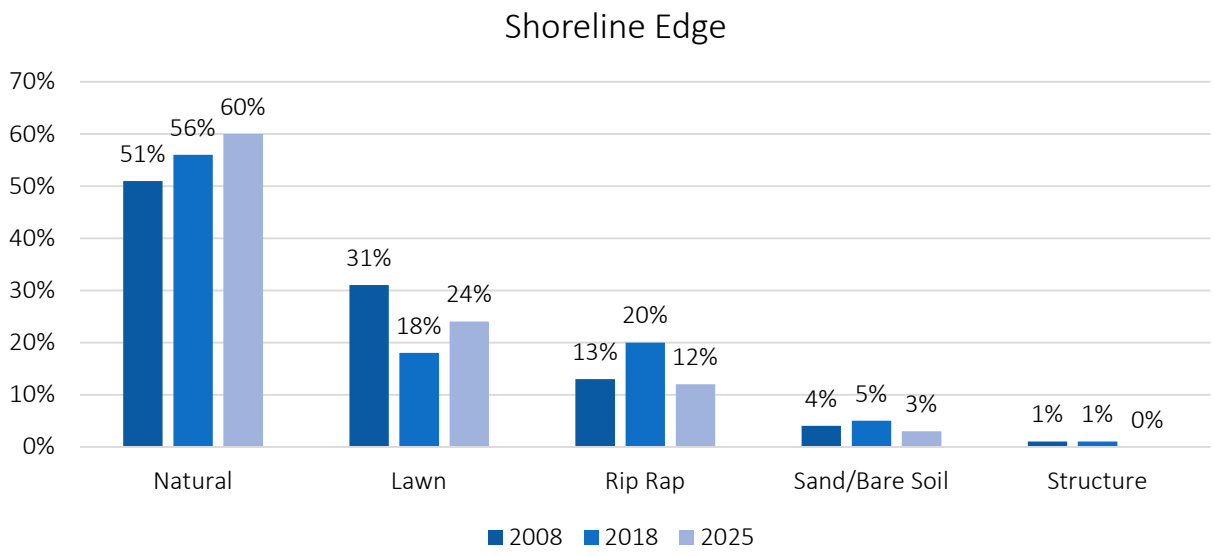
Watershed Projects Mitigation Progress to Date

Stream stabilization	3
Culvert replacement	3
Settling pond	3
Rain Garden	1

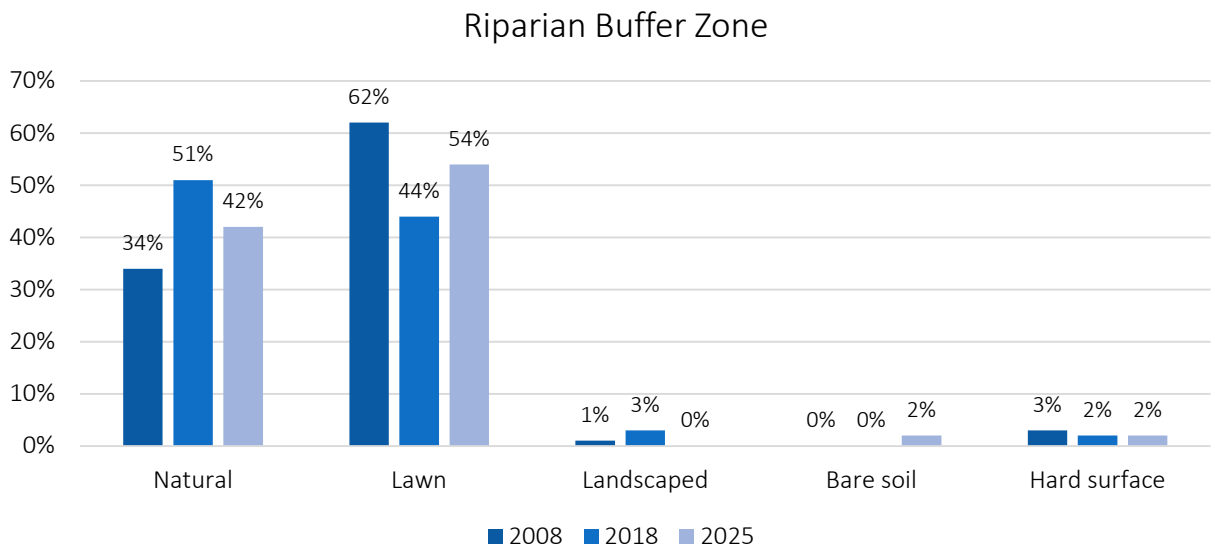
Natural Vegetation near the Water's Edge

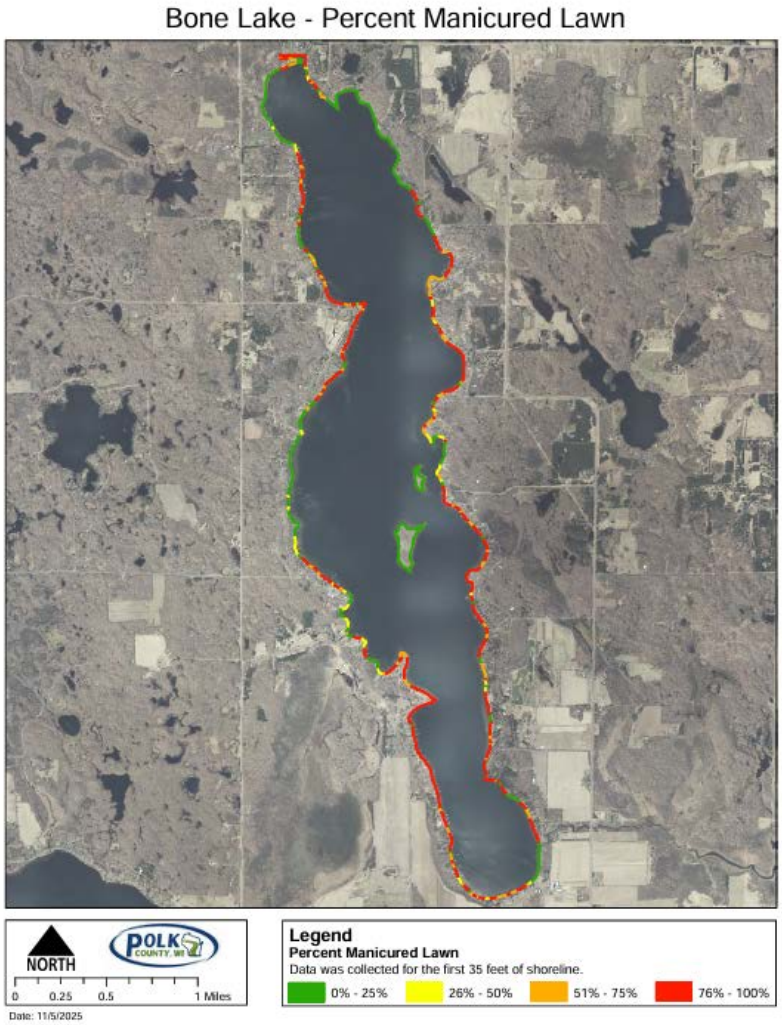
The objectives of the native planting projects are to improve habitat next to the water, reduce runoff from waterfront properties, and stabilize shorelines with deep roots of native plants. Some lake residents simply allow vegetation along the shoreline to grow which can accomplish the same objectives. Shoreline surveys completed in 2008, 2018, and 2025 provide a progress report for Bone Lake. In all three surveys, natural vegetation was the

predominant ground cover at the water's edge, with the amount of natural vegetation increasing each year since 2008.



However, when considering the entire area from the water's edge to 35 feet from it (the riparian buffer zone), the amount of natural ground cover increased from 2008 to 2018 then decreased from 2018 to 2025. Conversely, the amount of lawn in the riparian buffer zone decreased from 2008 to 2018 and increased from 2018 to 2025.





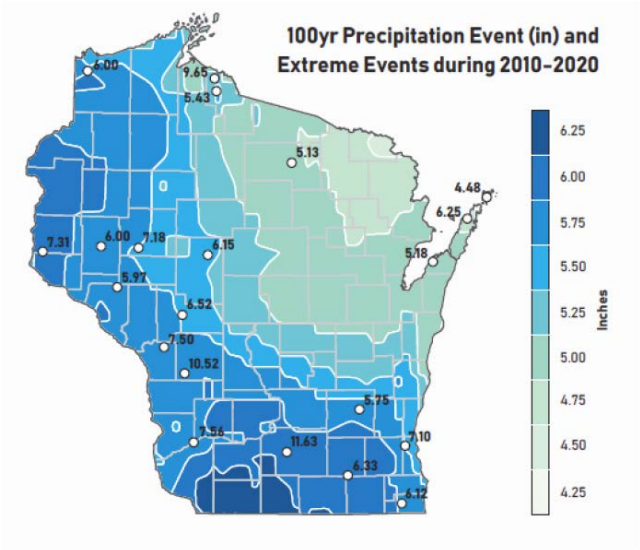
A high percentage of the Bone Lake riparian buffer zone (first 35 feet from the water's edge) is lawn. Buffer zones for lots indicated in red consist of at least 76% lawn – a cover that tends to shed runoff and increase erosion at the water's edge.

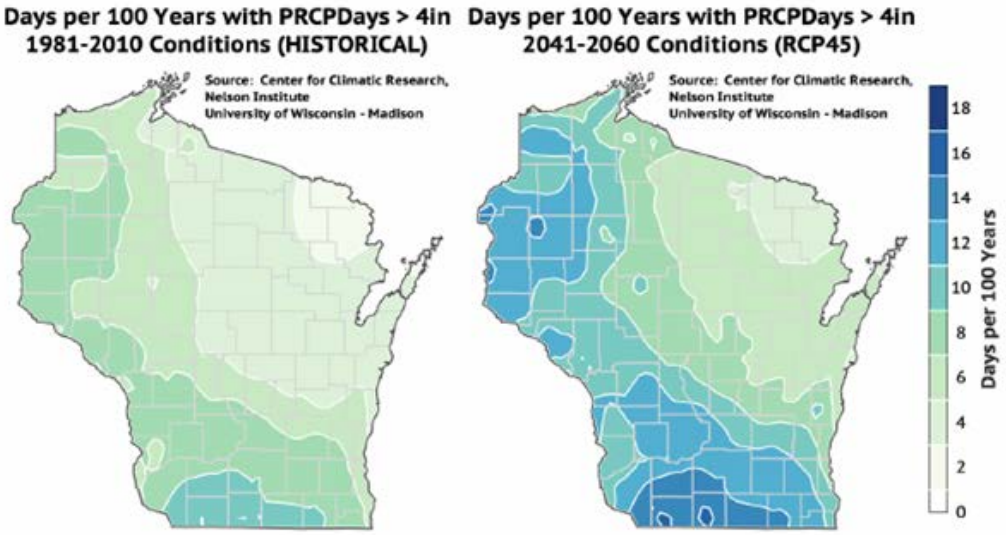
Targeting Agricultural Phosphorus Reduction

The Agriculture Conservation Planning Framework (ACPF) is a tool used to identify and prioritize conservation best management practices on the landscape at a watershed scale. Hard conservation practices include grass waterways and water and sediment control basins, whereas soft practices include no-till and cover crops. ACPF determines exact locations for hard practices and ACPF outputs can be interpreted to identify fields suitable for soft practices. Implementing a combination of hard and soft practices will have a positive impact on water quality in the Bone Lake Watershed. Information from ACPF could be used by Polk County Land and Water Resources with support from the Bone Lake Management District to identify priorities and work with farmers to install conservation practices in priority areas.

Changing Weather Patterns

Extreme precipitation amounts and frequency are likely to increase in coming years and have already increased when compared with past decades. Increased frequency of high precipitation events will increase runoff to Bone Lake. Increases in air and therefore lake temperature and summer storms can make the lake more susceptible to mixing which has a deleterious effect on Bone Lake water quality. Since residents and lake users cannot directly control these potential changes, the implementation of management practices to reduce runoff could mitigate the impacts of increased storm intensity and frequency.





SOURCES

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