

Bone Lake

Shoreline Inventory Report, 2025



Prepared by
Colton Sorensen & Katelin Anderson
Polk County Land and Water Resources Department
100 Polk County Plaza, Suite 120, Balsam Lake, WI 54810

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Introduction

In 2025, the Bone Lake Management District received a Wisconsin Department of Natural Resources Surface Water Grant to update their Lake Management Plan. Grant deliverables included a shoreline inventory using the Lake Shoreland and Shallows Habitat Monitoring Field Protocol developed by the Wisconsin Department of Natural Resources. The Bone Lake Management District contracted the Polk County Land and Water Resources Department to complete the survey. The coarse woody habitat inventory was completed on May 7th, 8th, and 9th, 2025 and the habitat assessment was completed between June 16th and July 28th, 2025. Data was collected for each of the four hundred and ninety-one parcels on Bone Lake.

Habitat Assessment

For each of the four hundred and ninety-one parcels on Bone Lake, percent canopy, human structures, runoff concerns, and bank zone factors were documented in the first 35 feet of the shoreline landward from the water's edge (riparian buffer zone). Additionally, human structures and aquatic plants were documented in the littoral zone (in the water) for each parcel.

Canopy Cover

Percent canopy cover was determined for the first 35 feet of shoreline at each parcel on the lake. Any large trees at least sixteen feet in height were considered. Canopy cover ranged from being absent (3% of parcels, n = 16) to full canopy (5% of parcels, n = 26) with the average canopy cover per parcel being 53%. Thirty-six percent of parcels (n = 177) had a canopy cover over 75%, while 28% of parcels (n = 135) had less than 25% canopy. When considering the entire riparian buffer zone area of Bone Lake, over half (60%) of the area had canopy cover.

Presence of Shrub and Herbaceous

Sixty-three percent (n = 307) of the parcels on Bone Lake had at least one shrub present within the first 35 feet of shoreline and seventy-nine percent (n = 390) of parcels had herbaceous vegetation present within the first 35 feet of shoreline.

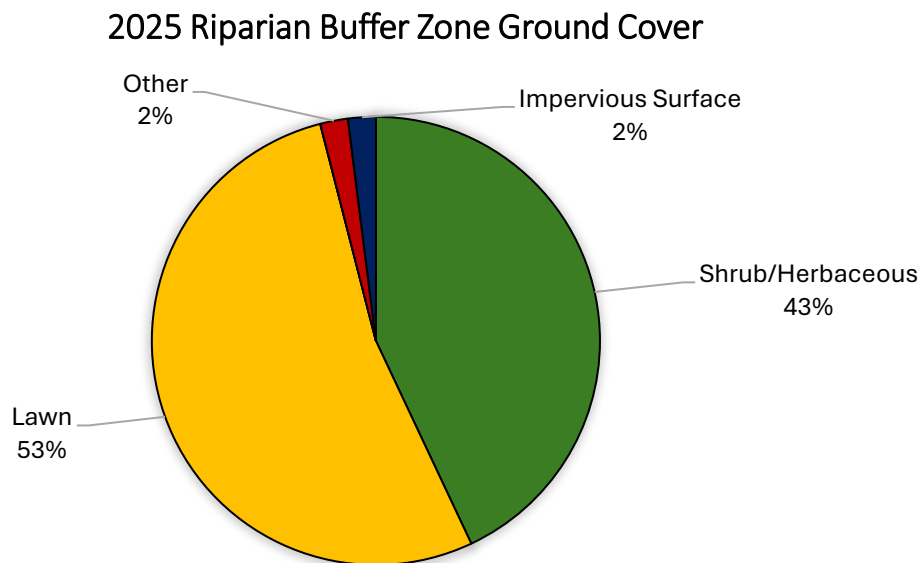
Percent Ground Cover

Percent ground cover for shrub/herbaceous, impervious surface, and manicured lawn were determined for the riparian buffer zone of each parcel. The average ground cover in the riparian buffer zone per parcel was 69% lawn, 26% shrub/herbaceous, 3% other, and 2% impervious.

The riparian buffer zone for many of the parcels on Bone Lake was predominantly lawn. Twelve percent of parcels (n = 58) were 100% lawn in the riparian buffer zone, sixteen percent of parcels (n = 77) were 95% lawn, and fourteen percent of parcels (n = 69) were 90% lawn. In total, 42% of the parcels on Bone Lake (n = 204) had at least 90% of the riparian buffer zone as lawn.

When considering the entire riparian buffer zone, the predominant ground cover on Bone Lake was lawn (53%), followed by shrub/herbaceous (43%). Two percent of the ground cover in the

riparian buffer zone was impervious surface and two percent was other ground covers (bare soil, landscaping, rock, dead grass, and artificial beach).



Human Structures

The shoreline inventory characterized human structures in the riparian buffer zone (first 35 feet of shoreline). In total, 91 buildings, 188 boats on shore, 135 firepits, and 50 other structures (campers, patios, ice houses, etc.) were observed in the riparian buffer zone. Most parcels on Bone Lake (83%, n = 408) didn't have a stair/trail leading to the lake. Parcels that were predominantly lawn in the riparian buffer zone generally didn't have stairs/trails to the lake.

The survey also determined human structures in the littoral zone. Eighty-six percent (n = 420) of the parcels on Bone Lake had at least one dock. Ten percent (n = 51) of parcels had more than one dock, bringing the total number of docks on Bone Lake to 505. Seventy-three percent (n = 360) of the parcels on Bone Lake had at least one boat lift. Forty-two percent (n = 208) of parcels had more than one boat lift, bringing the total number of boat lifts on Bone Lake to 741. Eighteen swim rafts were documented on Bone Lake and twenty-seven other structures were noted in the littoral zone including: kayak pads, boat tracks, slides, etc. Boathouses (over the water) and marinas were not present on Bone Lake.

Runoff Concerns

Runoff concerns on each parcel were also identified. One parcel had a point source, five parcels had channelized water flow/gully, four hundred and fifty-nine parcels had lawn/soil sloping to the lake, one-hundred parcels had bare soil, and five parcels had sand deposits.

One hundred and twenty-five parcels had a total of 9,236 linear feet of rip rap (12% of the shoreline), sixteen parcels had a total of 840 linear feet of artificial beach (1% of the shoreline),

one parcel has a sea wall totaling 141 feet, and one parcel had an erosion control structure totaling 40 feet.

Seventy-three parcels had a total of 3,208 linear feet of bank erosion less than 1 foot vertically and thirty-eight parcels had a total of 911 linear feet of bank erosion greater than 1 foot vertically. Combined, bank erosion is present on 5% of the shoreline of Bone Lake (4% less than 1 foot vertically and 1% greater than 1 foot vertically). Since the survey was completed during the active growing season when shrub/herbaceous vegetation was fully leafed out, it was difficult to quantify undercut banks on parcels with shrub/herbaceous at the water's edge. Consequently, survey results could underrepresent the loss of shoreline associated with undercut banks.

Aquatic Vegetation

Emergent aquatic vegetation was present at 53% of parcels on Bone Lake (n = 260) and floating leaf vegetation was present at 22% of parcels (n = 110). Aquatic plant removal was observed at 5 parcels on Bone Lake.

Aquatic Vegetation and Shoreline Erosion

Ninety-eight parcels on Bone Lake had bank erosion (greater and less than 1 foot). Forty percent of the parcels with bank erosion (n = 39) had emergent vegetation in front of their property, as compared to 53% of all parcels having emergent vegetation. Thirteen percent of parcels with bank erosion (n = 13) had floating leaf vegetation in front of their property, as compared to 22% of all parcels having floating leaf vegetation. As compared to the average parcel, the parcels with bank erosion were less likely to have emergent and floating leaf vegetation present.

Coarse Woody Habitat Inventory

When trees fall into a lake, fish and aquatic organisms use them as habitat. Over time, humans have greatly reduced the number of fallen trees along the shorelines of lakes. Undeveloped lakes have nearly 900 logs per mile of shoreline. The shoreline inventory identified pieces of wood in the water. To be counted, wood needed to be greater than four inches in diameter and at least five feet long. There were two hundred and thirty-eight pieces of wood along the shoreline of Bone Lake, or about seventeen pieces of wood per mile of shoreline. Most of the wood on Bone Lake (84%, n = 201) touched the shore and to a lesser extent had at least 5 feet of the log currently underwater (61%, n = 146). Branchiness of each piece of wood was also determined. Sixty-one percent of the pieces of wood (n = 144) had no branches, 25% (n = 60) had a few branches, and 14% (n = 34) had a full crown.

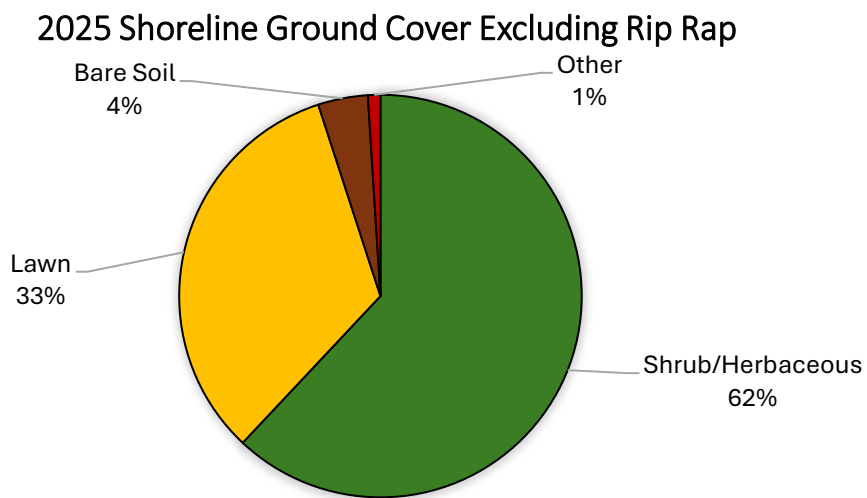
Comparison to the 2008 and 2018 Shoreline Inventory

The Bone Lake Management District completed a shoreline inventory using a different protocol in 2008 and 2018. Ground cover data for the shoreline edge and the riparian buffer zone (first 35 feet of shoreline) was collected by volunteers. The Lake Shoreland and Shallows Habitat

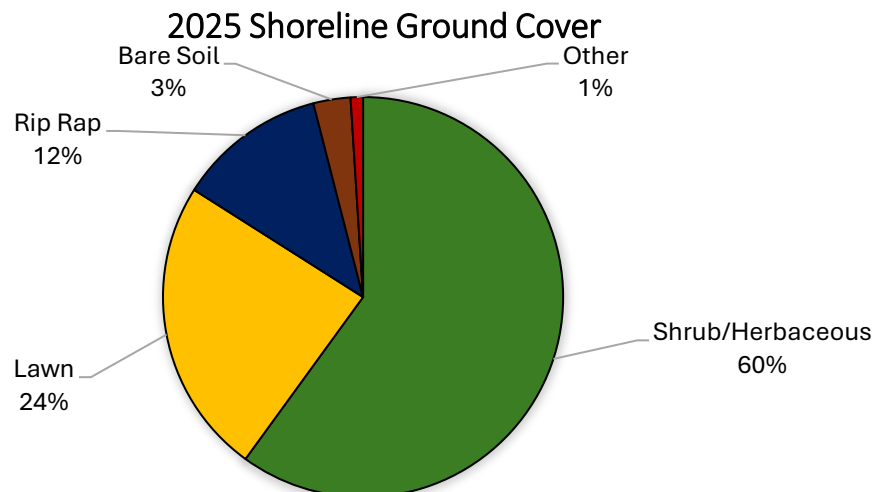
Monitoring Field Protocol only collects data for the riparian buffer zone. To make the surveys comparable, additional data for the shoreline edge was collected during the 2025 survey. The 2008 and 2018 surveys classified rip rap as a ground cover at the water's edge, whereas the 2025 survey classified the ground cover directly adjacent to rip rap.

Ground Cover Along the Water's Edge

The 2025 shoreline inventory found that 62% (47,436 feet) of the shoreline touching the water's edge on Bone Lake was shrub/herbaceous, 33% (25,072 feet) was manicured lawn, and 4% was bare soil (2,738 feet). Impervious surfaces, landscaping, sand deposits, and other landcovers made up the remaining 1% (709 feet). These calculations do not consider rip rap as a ground cover at the water's edge.

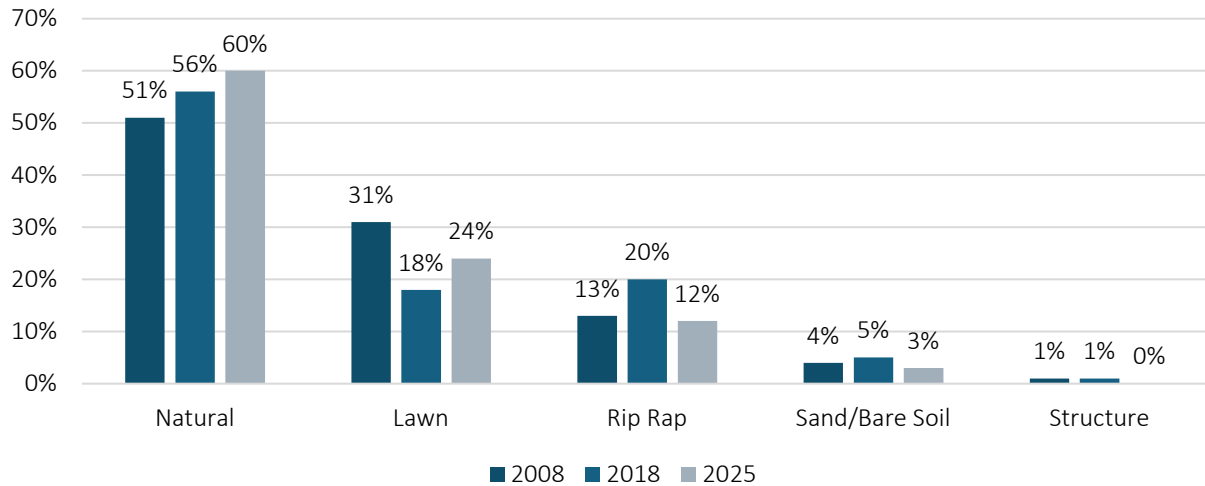


To make the two surveys comparable, rip rap was also calculated as a ground cover at the water's edge. This analysis found that 60% (45,951 feet) of the shoreline touching the water's edge on Bone Lake was shrub herbaceous, 24% (17,874 feet) was manicured lawn, 12% (9,236 feet) was rip rap, 3% (2,264 feet) was bare soil, and the remaining 1% was other land covers.



In all three surveys (2008, 2018, and 2025), natural vegetation was the predominant ground cover at the water's edge, with the amount of natural vegetation increasing each year since 2008. When comparing 2008 to 2025 the amount of lawn has decreased over time and the amount of rip rap has mostly stayed consistent. However, in 2018 the amount of lawn was less than in 2008 and 2025 and the amount of rip rap was more than in 2008 and 2025. The amount of sand/bare soil and structure/impervious surface has stayed consistent across all three surveys.

Shoreline Edge



Ground Cover in the Riparian Buffer Zone

The amount of natural ground cover in the riparian buffer zone increased from 2008 to 2018, and 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. The amount of landscaping, sand/bare soil, and structure/impervious surface has stayed consistent across all three surveys.

Riparian Buffer Zone

