



Shoreline Assessment

Sabre Lake

Survey Completed October 2022
Report Created June 2023



Background

The Cannon River Watershed Joint Powers Organization (CRWJPO) conducted a baseline lakeshore survey of Dora Lake as part of the Comprehensive Watershed Management Plan 2020-2030. The activity in the Plan is to “establish a baseline of existing natural shoreline conditions and achieve no-net loss (from the baseline) of existing natural shoreline on 10 Natural Environment Lakes” (see page 155 of the Plan). One of the lakes chosen for a baseline shoreline assessment was Sabre Lake.

Sabre Lake is 258 acres of surface water with approximately 14,300 feet of shoreline and is approximately 5 miles north of Waterville, MN in Le Sueur County. Sabre Lake has an average depth of 3.3 feet and a maximum depth of 13 feet. There is a MNDNR access on the north side of the lake. All shoreline is in private ownership and there is very minimal development on the lake. The land surrounding the lake is primarily farmed.

The general geology of the area is dominated by three major bedrock aquifer systems: St. Peter-Prairie Du Chien-Jordan, Franconia-Ironton-Galesville, and the Mt. Simon-Hinckley. Glacial deposits almost completely conceal the bedrock surface. The St. Peter-Prairie Du Chien-Jordan Aquifer system underlines most of Le Sueur County and may vary greatly in distance due to major erosional unconformity. These three bedrock units function as a single aquifer system because all three are sources of groundwater and no regional confining bed separating them. The major bedrock aquifers in this system are the St. Peter and Jordan sandstones, which yield water from between individual grains, and the Prairie Du Chien dolomites, which yield water through fractures and crevices. The bedrock units of the St. Peter-Prairie Du Chien-Jordan aquifer system represent the shallow bedrock aquifers. The Franconia-Ironton-Galesville aquifer system is overlain by the St. Lawrence confining bed. The upper bedrock aquifer unit is Franconia glauconitic sandstone which yields moderate supplies of groundwater. The lower bedrock aquifer unit is the Ironton-Galesville sandstones which are generally a more productive aquifer. The Eau Claire formation separates the Franconia-Ironton-Galesville and Mt. Simon-Hinckley aquifer system. The Mt. Simon-Hinckley aquifer system is the deepest of the three bedrock aquifers within Le Sueur County. Little information is available of the geology and hydrology of this aquifer system due to a lack in deep well data.

Geology data from: Water Resources Center Mankato State University. 1991. Geologic Atlas Le Sueur County, Minnesota.

Sabre is considered a shallow flow-through lake, as the contributing watershed is large. The lake is described as a shallow-flow through lake due to the Cannon River. Due to the high watershed to lake area ratio Sabre Lake receives very high water and nutrient loading and often have very short water residence times. Their shallowness, combined with large surface areas (large fetch) make them susceptible to wind mixing. This mixing serves to keep fine sediments in suspension and may allow for recycling of nutrients from the sediments. This internal nutrient loading typically increases the severity of algal blooms which, in turn, decreases water clarity as the summer progresses. The shoreline survey was conducted during a drought and levels appeared low. There are not enough historical water level readings to determine the typical amount of fluctuation. Water levels can fluctuate both seasonally and annually on seepage lakes due to their strong connection with the water table. This would explain why the water level readings collected during the survey were low. Furthermore, since Sabre Lake is considered a shallow flow-through lake it is extremely susceptible to internal nutrient and sediment loading. The Cannon River and Judicial Ditch 38 Rice County flows in and out of Sabre Lake.

Hydrology data from: MPCA. 2014. Cannon River Watershed Monitoring and Assessment Report. & MN DNR. 2023. Lakefinder.

Lake Assessment Methodology

The MNDNR has developed a lakeshore assessment tool called “Score Your Shore” designed to be used by lakeshore property owners to evaluate their shoreland habitat. The tool provides a standardized method to evaluate the type, quantity, and quality of lakeshore habitats including upland, shoreline, and aquatic zone areas. The upland zone is defined as the area from the house (if present) to the top of the lakeshore bank, the shoreline zone is defined as the area from the top of the lakeshore bank to the edge of water, and the aquatic zone is defined as the area from the edge of water to the deep end of the macrophyte bed. Scores are assigned for each of the three main habitat types assessed, with a combined maximum point value of 100 for upland and shoreline zone areas and a maximum point value of 100 for the aquatic zone (for a maximum total of 200 points). The overall combined score provides an indication of lakeshore quality over a point range from 0-200, with 0 points indicating a severely degraded shoreline that does not provide any functional habitat, to 200 points indicating a very healthy and functional shoreline with intact habitat in all three habitat zones. To support the Score Your Shore assessment, photographs were taken in conjunction with drone videography to document existing lakeshore conditions.

Results

The following is a summary of the shoreline assessment and includes individual lakeshore scores derived from the Score Your Shore evaluation. A total of 9 parcels were assessed around Sabre Lake. The average score for the lake is 168. Most lots are not developed and those that are, have buildings that are set back from the lake. There are openings in vegetation for lake access in two locations. However, overall aquatic vegetation both emergent and submerged scored high. One factor that reduced the upland score was the lack of tree and shrub cover on developed parcels.

There was minimal need for installation of best management practices. No shoreline erosion was observed. Baseline conditions appear to be good, so the goal would be to maintain quality shoreline and make slight improvements in some upland areas.

Below is the table for Score Your Shore for the 9 parcels on Sabre Lake, listed counterclockwise starting at the MNDNR access. The flight path and time stamp of the video is also noted on the map in Appendix A. The drone video is posted on the CRWJPO YouTube page: <https://www.youtube.com/@crwjpo>

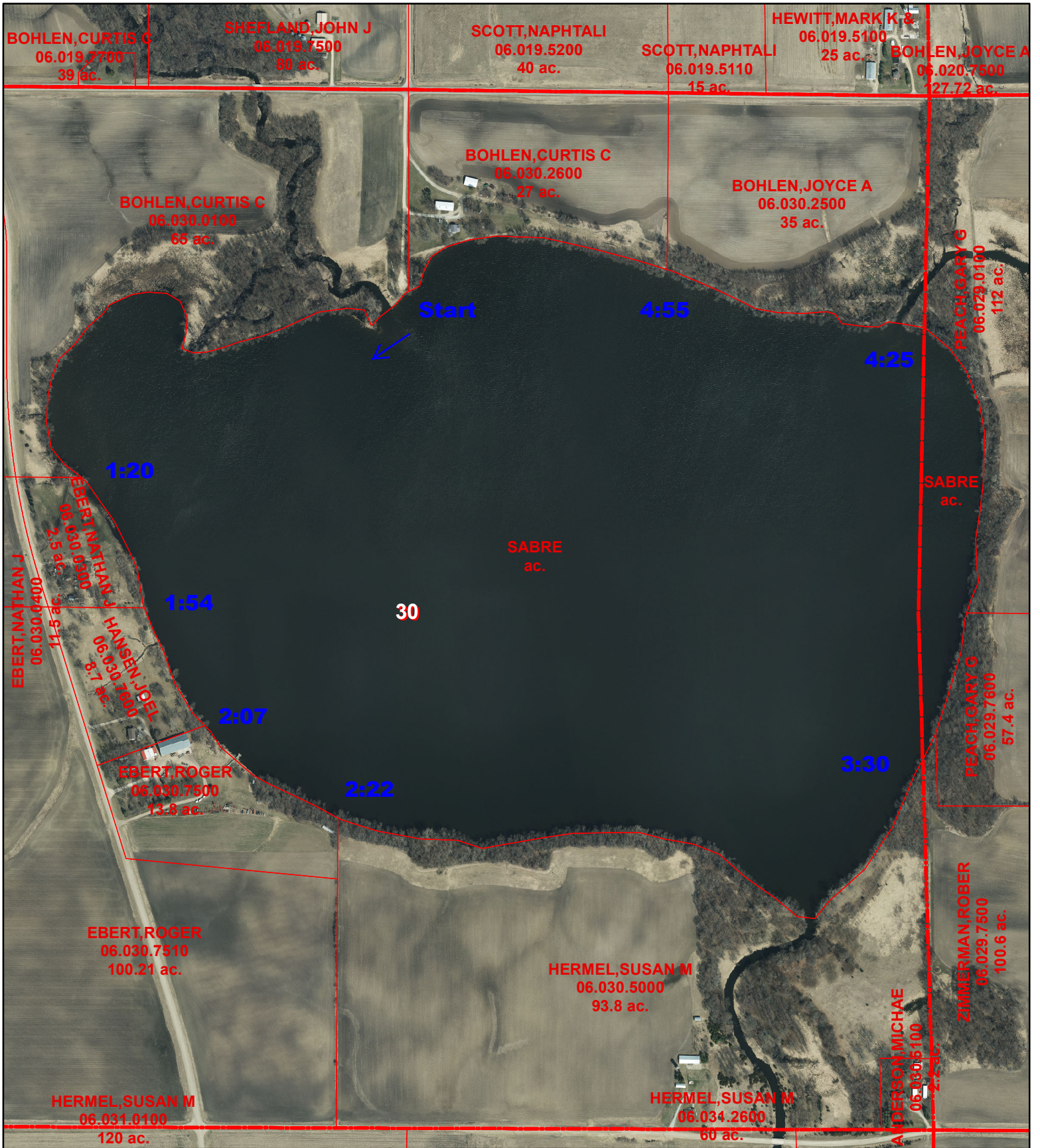
Parcel ID	Linear Feet	Upland Total	Shoreline Total	Aquatic Total	Total Score
06.030.0100	2,800	65	35	80	180
06.030.0300	800	53	35	60	148
06.030.7600	700	53	35	60	148
06.030.7500	900	53	30	65	148
06.030.5000	3,500	65	35	100	200
06.029.7600	750	65	35	80	180
06.029.0100	1,700	65	35	80	180
06.030.2500	1,200	65	35	80	180
06.030.2600	1,400	48	30	75	153

Shoreline Ordinance Review

Shoreland Ordinances are in place to guide and manage land use activities within in shoreland areas and are critical for protecting and improving water resources. From review of the Le Sueur County Zoning Ordinance, it provides a balanced approach to protection and development on Sabre Lake which is listed as a Natural Environment (NE) Lake. Natural Environment Lakes are generally small, shallow, and have limited capacity to assimilate the impacts of development. Furthermore, Sabre Lake’s shoreland land use district is described as Special Protection (SP) and Recreational Residential (RR). The intent of a Special Protection District is to guide the wise development and utilization of shorelands of public waters for the preservation of water quality, natural characteristics, economic values, and general health and safety and welfare of all public waters in the unincorporated areas of the County. Furthermore, the purpose of the district is to manage areas unsuitable for development due to wet soils, steep slopes, or large areas of exposed bedrock; and to manage areas of unique natural and biological characteristics. The intent of the Recreational Residential District is to preserve areas which have natural characteristics suitable for both passive and active recreational usage. Also, it is the intent of this district to manage areas suitable for recreational development of varying types including permanent and seasonal housing. Some nonresidential uses with minimal impacts on residential uses are allowed if properly managed. Since Sabre Lake has a few segments of its shoreline within the Recreational Residential District, which have a higher likelihood of being developed in those areas due to less restrictive rules and regulations. Sabre Lake does not appear to be facing development pressure. However, the existing upland vegetation was inadequate in some areas and could easily be addressed with establishment of native vegetation. The current Le Sueur County Zoning Ordinance-Shoreland District was updated and approved by the MN DNR in 2022 and reflects the MN DNR Shoreland and County standards at that time. The MN DNR model ordinance was recently updated in Spring of 2022 and additional language, standards, or visuals could be reviewed and integrated into the current

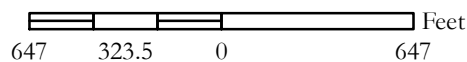
ordinance, plans, or other supporting documents and resources for Le Sueur County. In discussions with Le Sueur County and MN DNR staff, the ordinance, and the county/agency interaction is working well. The County has taken an adaptive management approach within the Shoreland District in order to better reflect existing and future land use changes and activities within the County as well as staff knowledge, expertise, and technical capacity.

Appendix A – Map of Flight Path



| Parcels (Certified)
 | Section
 LeSueur_Co_2021.sid
 RGB
 | Red: Band_1
 | Green: Band_2
 | Blue: Band_3

1:7,764 1 inch = 647 feet



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Maps are for graphical purposes only. They do not represent a legal survey.