

Project Name | Lower Sakatah Lake Shoreline Assessment

Date | 12/17/2021

To / Contact info | Ashley Gallagher, Dakota County SWCD Senior Resource Conservationist

Cc / Contact info | Cannon River Watershed Joint Powers Board

From / Contact info | Mike Majeski, Chris Long, Jay Michels

Regarding | Baseline Lakeshore Assessment

BACKGROUND

Emmons & Olivier Resources (EOR) was contracted by the Cannon River Watershed Joint Powers Board (CRWJPB) to conduct a baseline lakeshore survey of Lower Sakatah Lake as part of the Comprehensive Watershed Management Plan 2020-2030 being implemented by the CRWJPB. One activity identified 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: <http://www.riceswcd.org/cannon-river-watershed-joint-powers-board/>). One of the lakes chosen for a baseline shoreline assessment was Lower Sakatah Lake.

Lower Sakatah Lake is approximately 370-acres and is located near Waterville, Minnesota. A dam was installed along the Cannon River that resulted in the creation of Lower and Upper Sakatah Lake. The general geology of the area is comprised of hillslopes, outwash plains, and terraces with loam, silt loam, and sandy loam soils occurring in the upper soil horizons. General topography includes rolling hills and depressions; specifically, the west and east shorelines around the lake are relatively steep. The topography transitions to gentle slopes that contain broad, flat areas near the north end of the lake where large wetland complexes occur. Land use around the lake is comprised predominantly of undeveloped shoreline with approximately one-quarter of the shoreline in public (State) ownership and the remaining three-quarters in private ownership. A small group of developed lots occur at the east side of the lake. Large tracts of mature deciduous forest occur directly around the lake, with grasslands, hayfields, and agricultural fields occurring beyond the edge of the forested areas where steeper topography transitions to flatter areas. According to LakeFinder data from the Minnesota Department of Natural Resources (MNDNR), Lower Sakatah Lake has had a water level fluctuation of approximately 5.4 feet from 1939-1993. Recent water levels (after 2004) have not been recorded at Lower Sakatah Lake, but water levels measured at Upper Sakatah Lake (which is connected to Lower Sakatah Lake) show a water level fluctuation of approximately 6.0 feet between 1971-2021. The water elevation during the shoreline survey in 2021 (~999.5 feet) was near the record low water level for the lake system (997.69 feet in 1989). The water level bounce recorded in Lower Sakatah Lake appears to have had little influence on shoreline erosion and could be attributed to the quality lakeshore vegetation observed, soils composition, topography, and assumed minimal wave action compared to larger water bodies.

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 photography to document existing lakeshore conditions (Appendix A, Appendix C).

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 26 parcels were assessed around Lower Sakatah Lake, with two of the 26 parcels split in two shoreline assessments and one parcel split into three assessments due to discontinuous shoreline boundaries. The result was an assessment of 29 individual shorelines on 26 parcels (Table 1, Appendix B). Shoreline scores ranged from 79-200 points, with most shorelines scoring above 140 points. Most shorelines contained excellent upland and shoreline tree and shrub cover, shoreline ground cover, with at least some aquatic macrophyte growth and overhanging woody cover. Only two parcels scored below 100 points, primarily due to altered tree and shrub cover within the upland and shoreline areas, and limited presence of aquatic macrophytes. Despite these low scores, active shoreline erosion was not observed at these two parcels, nor was erosion observed at any of the other parcels assessed. Small cutbanks less than 1 foot in height were observed along several of the western shorelines but appeared to be the product of steep topography and an exposed lakebed from the low lake water level. Several shorelines scored a low aquatic emergent and/or submergent score and seemed to be the product of both lake bathymetry adjacent to the shoreline, water clarity, and possible lake bed "raking" by landowners. Significant algal blooms were observed across much of the lake, with water clarity (secchi value) less than 1 foot. Despite such low water clarity, submerged aquatic plant growth occurred in areas where lake depths were low, with dense aquatic macrophyte beds occurring in areas where water levels were less than 3 feet in depth.

Best Management Practices to address bank erosion were not vetted for Lower Sakatah Lake due to lack of observed shoreline erosion. However, several parcels contained riprap shorelines which indicate past erosion may have occurred on these parcels. The parcels with steep shorelines should be routinely monitored and addressed with appropriate BMP's should erosion start to occur. The developed parcels along the lake that had reduced upland habitat and aquatic scores could be improved by planting/ restoring upland and near-shore ground cover and reducing any aquatic vegetation removal activities (if presently being conducted by the landowners). Target areas to restore would be the near-shore areas within 50 feet from edge of water where a natural shoreline buffer would improve aquatic macrophyte beds, reduce overland runoff to the lake, and increase near-shore habitat.

Table 1. Score Your Shore Scores for 26 Parcels (29 Actual Shorelines) Assessed at Lower Sakatah Lake. The Parcel ID's in the Table are Listed Sequentially in Clockwise Rotation Starting at Parcel 1319226021.

Parcel ID	Approximate Shoreline Length (ft.)	Score Your Shore Total Points (range from 0-200)	Notes
1319226021	180	79	Low upland and shoreline cover (mostly lawn), low aquatic emergent score and no woody habitat
1319200001	2,730	145	Low aquatic emergent and submergent scores
1319100001	1,575	145	Low aquatic emergent and submergent scores
1320225001	1,910	165	Low aquatic emergent score
1317350002	1,730	190	High quality shoreline
1317350001	895	195	Exemplary high quality shoreline
1317325002	625	195	Exemplary high quality shoreline
1317325001	180	159	Low upland tree cover, no aquatic woody habitat
1317300001 (S)	1,850	138	Low upland tree cover, low aquatic emergent score
1317450001 (W)	1,345	178	Reduced upland tree cover, reduced aquatic emergent score
1317300001 (N)	3,080	180	High quality shoreline, reduced upland tree & shrub cover
1317125001	1,850	195	Exemplary high quality shoreline
1317300001 (E)	710	158	Reduced upland tree cover, low aquatic emergent score
1317450001 (E)	3,220	200	Exemplary high quality shoreline
1320127007	205	180	High quality shoreline, reduced aquatic emergent score
1320127006	200	175	Low aquatic emergent score
1320127015	195	150	Poor aquatic emergent score, no down woody cover
1320127005	205	155	Poor aquatic emergent score, reduced down woody cover
1320127004	200	180	High quality shoreline, reduced aquatic emergent score
1320127003	240	180	High quality shoreline, reduced aquatic emergent score
1320127002	275	180	High quality shoreline, reduced aquatic emergent score
1320127001	305	170	Low aquatic emergent score
1320277002	260	135	Reduced upland tree & shrub cover, low aquatic emergent & submergent score
1320277003	205	104	Low upland tree & shrub cover, low aquatic emergent & submergent scores
1320277004	210	116	Low upland tree & shrub cover, low aquatic emergent & submergent scores
1320277005	220	140	Reduced upland cover, low aquatic emergent score
1320275001	675	155	Low aquatic emergent score
1320325001	1,215	190	High quality shoreline, reduced aquatic emergent score
1319475001	5,040	200	Exemplary high quality shoreline

SHORELINE ORDINANCE REVIEW

Shoreland ordinances are in place to guide development in shoreland areas and are critical on waterbodies that lie in direct conflict with impending development. From review of the Rice County Zoning ordinance, it provides a balanced approach to protection and development on Lower Sakatah Lake, which is listed as a Natural Environment Shoreland (NES) lake. NES lakes are generally small, shallow and have limited capacity to assimilate the impacts of development. The ordinance meets the MDNR Dimensional Standards for NES Shoreland Districts and are clearly described in the ordinance. Other than two areas on the northwest and southeast corners of the lake where there is existing development and the potential of future development, Lower Sakatah Lake does not appear to be facing development pressure. The current Rice County shoreland ordinance was updated and approved by MDNR in 2015 and reflects the MNDNR shoreland standards at that time. The MNDNR model ordinance was most recently updated in late 2019 and additional language was added that could be reviewed and integrated into the current ordinance. Given the structure of the Rice County Zoning Ordinance, this is a significant undertaking as language in one section, even unrelated to shoreland development, can have a dramatic impact on other sections. In discussions with Rice County and MNDNR staff, the ordinance, and the county/agency interaction in application reviews is working well. The only exception being the number of variances that are being requested and approved.

Appendix A

Shoreline Photographs

The following shoreline photographs occur in sequential order (moving clockwise) starting at the southwest corner of Lower Sakatah Lake at Parcel ID 1319226021.

Parcel ID 1319226021



Parcel ID 1319200001



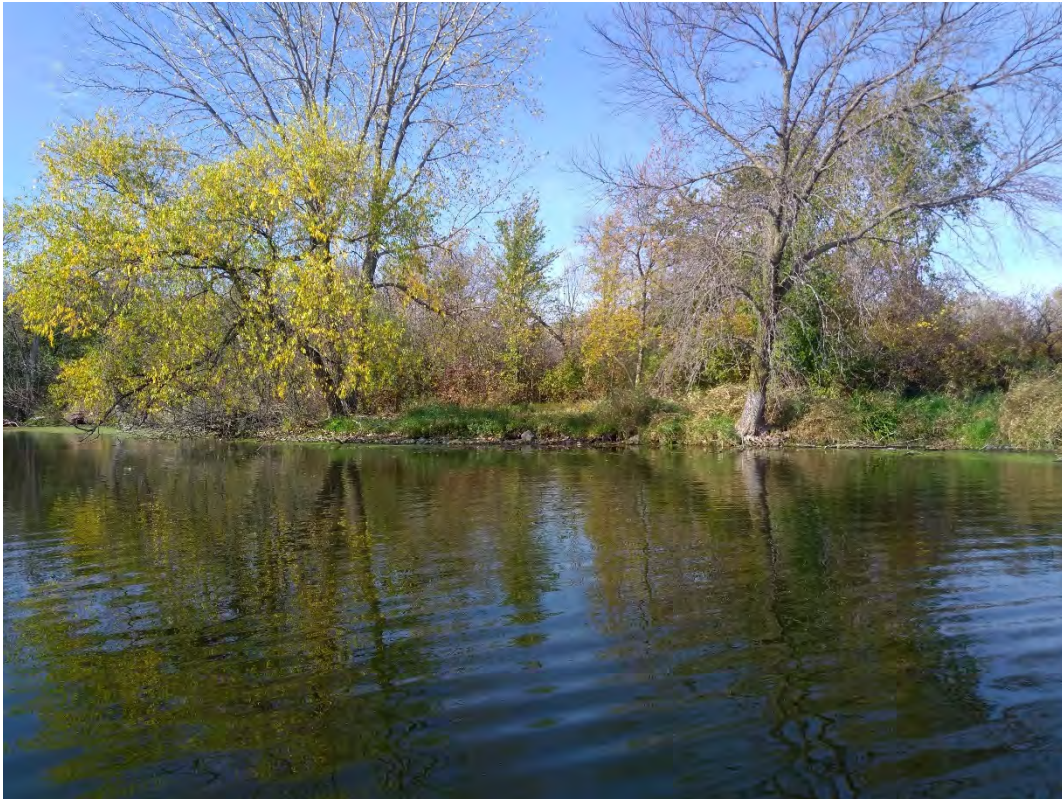
Parcel ID 1319100001



Parcel ID 1320225001



Parcel ID 1317350002



Parcel ID 1317350001



Parcel ID 1317325002



Parcel ID 1317325001



Parcel ID 1317300001 (South)



Parcel ID 1317450001 (West)



Parcel ID 1317300001 (North)



Parcel ID 1317125001



Parcel ID 1317300001 (East)



Parcel ID 1317450001 (East)



Parcel ID 1320127007



Parcel ID 1320127006



Parcel ID 1320127015



Parcel ID 1320127005



Parcel ID 1320127004



Parcel ID 1320127003



Parcel ID 1320127002



Parcel ID 1320127001



Parcel ID 1320277002



Parcel 1320277002 is the pier and the forested shoreline. The house is on the adjoining parcel.

Parcel ID 1320277003



Parcel 1320277003 includes the white house left of center.

Parcel ID 1320277004



Parcel 1320277004 includes the beige house right of center.

Parcel ID 1320277005



Parcel ID 1320275001



Parcel ID 1320325001



Parcel ID 1319475001



Appendix B

Lower Sakatah Lake "Score Your Shore" Data Summary

Parcel ID	Upland Tree Cover	Upland Shrub Cover	Upland Ground Cover	Shoreline Tree & Shrub Cover	Shoreline Ground Cover	Aquatic Emergent & Floating Leaf Plants	Aquatic Submerged Plants	Aquatic Openings in Plant Bed	Aquatic Overhead Woody Habitat	Aquatic Down Woody Habitat	Total Score
1319226021	9	0	0	5	15	10	35	5	0	0	79
1319200001	25	15	20	20	15	10	15	5	10	10	145
1319100001	25	15	20	20	15	10	15	5	10	10	145
1320225001	25	15	20	20	15	10	35	5	10	10	165
1317350002	25	20	20	20	15	30	35	5	10	10	190
1317350001	25	20	20	20	15	40	35	5	10	5	195
1317325002	25	20	20	20	15	40	35	5	10	5	195
1317325001	9	20	20	15	15	40	35	5	0	0	159
1317300001 (S)	13	10	20	15	15	10	35	5	10	5	138
1317300001 (N)	18	15	20	20	15	40	35	5	5	5	178
1317450001 (W)	25	20	20	20	15	20	35	5	10	10	180
1317125001	25	20	20	20	15	40	35	5	10	5	195
1317300001 (E)	13	20	20	20	15	10	35	5	10	10	158
1317450001 (E)	25	20	20	20	15	40	35	5	10	10	200
1320127007	25	20	20	20	15	20	35	5	10	10	180
1320127006	25	20	20	20	15	20	35	5	10	5	175
1320127015	25	20	20	20	15	0	35	5	10	0	150
1320127005	25	20	20	20	15	0	35	5	10	5	155
1320127004	25	20	20	20	15	20	35	5	10	10	180
1320127003	25	20	20	20	15	20	35	5	10	10	180
1320127002	25	20	20	20	15	20	35	5	10	10	180
1320127001	25	20	20	20	15	10	35	5	10	10	170
1320277002	25	15	15	20	15	10	15	5	10	5	135
1320277003	9	5	5	20	15	10	15	5	10	10	104
1320277004	9	5	5	15	12	10	35	5	10	10	116
1320277005	18	15	10	15	12	10	35	5	10	10	140
1320275001	25	15	15	15	15	10	35	5	10	10	155
1320325001	25	20	20	20	15	30	35	5	10	10	190
1319475001	25	20	20	20	15	40	35	5	10	10	200

Appendix C

Drone Flight Path with Video Time Stamps

A drone survey of the entire shoreline was conducted in 2021. A majority of the shoreline was flown by drone on October 11, 2021. Several parcels on the west side of the lake were flown again on November 20. The video from these flights were edited together into one continuous video. The following map shows the flight path of the drone with timestamps indicating the parcel boundaries.