

Lake Status

Overall Strategy: Routine Watershed Management

Water Quality Rating: A: Secchi – 11.6 ft.;

TP (2007) – 24 µg/L

Impairment: *Aquatic consumption* due to mercury in fish tissue.

Water Quality Trend: Secchi and TP – No Trend

Shoreland Classification: Recreational Development

Subwatershed Land Cover: 11% developed, 24% forests and woodlands, 6% grassland/shrubland/sparse vegetation, 37% lakes and open water wetlands, 15% planted or cultivated, 7% wetlands.



BASIC FACTS

DNR ID	82005200
Section	32
Township	32
Range	20
Lake Area	1800 acres
Subwatershed Area	5241 acres
Outlet Elevation	940.80 ft.
Low Water Level	935.79 (’61)
High Water Level	942.89 (’82)
Ordinary High Water	942.20
100-Yr. Flood Elev	942.5 (FEMA)
Greatest Depth	59 ft.

Control Structures:
Outlet weir at south end of lake at County Road 4

Fish Species:
Black Bullhead, Black Crappie, Bluegill, Hybrid Sunfish, Largemouth Bass, Northern Pike, Pumpkinseed Sunfish, Walleye, White Sucker, Yellow Bullhead, Yellow Perch (2004).

Aquatic Nuisance Species:
Purple Loosestrife, Eurasian Water Milfoil (EWM), Narrow Leaf Cattail

CMSCWD References:
BM Lake Assoc. Lake Vegetation Management Plan (’09 Draft)
WCD Water Monitoring Report (’08)
DNR Lake Information Report
MN Statewide Mercury TMDL (’07)

Resource Goals

Short Term Goals – Year 2015

- Maintain a water quality rating of A.
- Achieve a five-year mean summer phosphorus concentration at or below 20 µg/L ± 4%.
- Achieve a mean summer secchi depth no less than 11 ft.
- Encourage an active Lake Association (LA) for teaming on lake management and education.
- Work with LA to reduce EWM to less than 10-acres.

Long Range Goals - Year 2020

- Maintain a water quality rating of A.
- Achieve a five-year mean summer phosphorus concentration at or below 20 µg/L ± 4%.
- Achieve a mean summer secchi depth no less than 11 ft.
- Work with LA to control EWM to less than 10-acres.
- Conduct watershed management in consideration of the area’s statewide importance to the Blanding’s turtle.

DNR Fisheries Lake Management Plan (2007)

- Long Range Goal: Provide a walleye catch rate of 6-fish/gillnet lift and largemouth bass catches at or above 75% quartile for the lake class 24.
- Operational Plan: Lake survey in 2012 and population assessments in even number years with gillnets only; Biennial stocking of walleye fingerlings at a rate of 1 lb/littoral acre in even numbered years; Protect centrachid spawning area by environmental review process; Monitor fishing tournaments results as needed.
- Mid Range Objective: Maintain a walleye catch rate of 2-fish/gillnet lift and largemouth bass catches at or above the 50% quartile for lake class 24.
- Potential Plan: Creel or recreational use survey; Install a fishing pier.

Implementation

Operational Priorities

Routine Watershed Management

Education

Routine Watershed Education Program

Regulatory

Activities impacting Big Marine Lake will be regulated by the watershed district through its *Rules of the District*. Regulatory efforts will be coordinated with Scandia Township, May Township, Washington County, and the Minnesota DNR, where applicable.

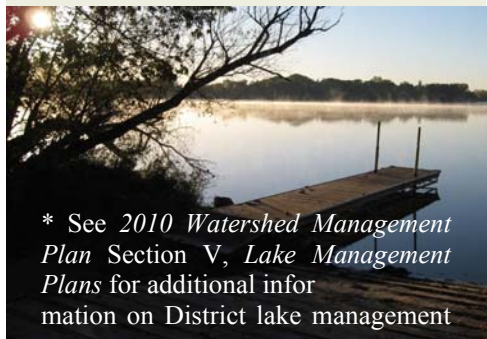
Projects

Current:

- Routine Watershed Water Quality Monitoring
- Routine Watershed Best Management Practices (BMP) Program
- Ongoing Monitoring of BMPs
- Permitting Program
- Work with Lake Association to control Eurasian Water Milfoil in an environmentally appropriate manner

Future/Potential:

- None at this time.



* See 2010 Watershed Management Plan Section V, Lake Management Plans for additional information on District lake management

Big Marine Lake is an exceptionally clean lake with excellent recreational opportunities that include the Big Marine Park Reserve, located in the southwest corner of the lake. Residents have expressed their appreciation for the opportunities the lake provides them to interact with nature. The shoreline is partially developed and experiencing ongoing redevelopment pressure as small seasonal cabins are converted to year-around residences. Lake levels have been generally stable since the 1985 completion of the District outlet to the St. Croix River, but does rise and fall moderately with fluctuations in annual precipitation. Citizens are primarily concerned with protecting lake water quality, controlling spread of invasive aquatic species like Eurasian Water Milfoil (EWM), controlling lake levels, restoring wildlife and the reducing shoreline damage.

Some of the factors (other than atmospheric deposition) affecting the water quality of Big Marine Lake are the land use around the lake, such as inadequate structure setback, insufficient lot size, and impervious lot coverage's. Other influences on Big Marine Lake from runoff non-point source pollution and recreational boat traffic. Big Marine Lake are listed on the EPA's 303(d) list of impaired waters due to the mercury content in fish. In 2007 the MPCA completed a statewide Total Maximum Daily Load (TMDL) study and implementation plan to address the state's mercury impairments.

Based on findings from the 1998 Aerial Lakeshore Analysis, this lake became a high priority for protection from degradation. The District implemented shoreline BMPs, increased permitting efforts including review and comment on shoreline setback variance requests, educated landowners on the environmental damage associated with suburban style lawns and investigated areas of filling of wetlands and lakebed. In addition, the District implemented purple loosestrife control and in 2009 started working with the Lake Association to reduce and control EWM in an environmentally appropriate manner.

In 2001, the Carnelian Marine Watershed District completed a paleolimnological investigation of trophic changes in four lakes in the watershed: Big Carnelian Lake, Big Marine Lake, East Boot Lake, and Loon Lake. The purpose of the investigation was to establish the baseline trophic conditions existing in the lake prior to European settlement in the mid-1800s. The diatom-inferred total phosphorus (TP) values may be less reliable due to the re-filling of Big Marine following the 1930s drought, rising water levels eroding the former lake-bottom and transporting these materials to deeper regions where the core was taken. In general, an increase in TP is inferred from around 20 µg/L before 1900 to peak concentrations around 27 µg/L in 1944, coinciding with the regional peak in farming activity around 1930. Early 20th century reconstructions give TP values of 22-23 µg/L, within the median for other metro-area lakes and today's average in-lake TP. It is possible that trophic conditions in the distant past in Big Marine were never much better than they are today.

Though Big Marine Lake has not yet achieved 2010 goals of a five-year mean summer phosphorus concentration at or below 20 µg/L ± 4%, it has achieved a mean summer secchi depth no less than 11 ft and the Lake has achieved a water quality rating of 'A' according to the 2008 WCD Water Monitoring Report. Routine District programs will continue to be implemented.