

4.0 Identification of Goals and Expectations

4.1 NMCWD Goals for Lake Holiday, Wing Lake, and Lake Rose

The Nine Mile Creek Watershed District (NMCWD) Plan (Barr, 2007) currently lists the water quality conditions (and corresponding TSI indices) for selected lakes within the District, and has established water quality goals based on the beneficial uses (Level I through Level IV). The NMCWD has established targets for the following water quality parameters based on level: total phosphorus (TP) and chlorophyll *a* (Chl *a*) concentrations, Secchi disc (SD) transparencies, and Carlson's Trophic State Index based on Secchi disc (TSI_{SD}). Lake Holiday, Wing Lake, and Lake Rose have not been classified according to NMCWD level and do not yet have assigned water quality goals.

4.1.1 Water Quantity Goals

The water quantity goals for Lake Holiday, Wing Lake and Lake Rose are to provide sufficient water storage during a regional flood. Currently, each lake provides sufficient storage to meet the water quantity goal with no additional action.

4.1.2 Water Quality Goals

The NMCWD Plan (Barr, 2007) does not include specific water quality goals for Lake Holiday, Wing Lake, or Lake Rose. Current water quality levels place Lake Holiday within the NMCWD's Level IV classification, which indicates the lake is generally intended for runoff management and has limited recreational use value. The specific NMCWD goal for this lake classification is to achieve and maintain a TSI_{SD} greater than 70. The long term (1993-2008) summer-average TSI_{SD} value for Wing Lake falls within the Level III category. The long term summer-average TP concentration for Wing Lake is greater than the range specified for Level III, but the long term averages of chlorophyll *a* and Secchi disc transparency fall within Level III. Lake Rose demonstrates long term average water quality that falls within the Level III classification for TSI_{SD}, TP, chlorophyll *a*, and SD. Level III corresponds to beneficial uses including fishing and aesthetic viewing.

Although the NMCWD Plan does not establish specific water quality goals for Lake Holiday, Wing Lake, or Lake Rose, it does include a policy that states the following: "All major water bodies will be managed for non-degradation of water quality, with allowance for natural variability" (Policy 4.2.4-2). The list of major water bodies provided in the plan includes Wing Lake and Lake Rose.

In addition to NMCWD goals, the MPCA has developed assessment methodologies, conducted extensive sampling of lakes, and ultimately derived ecoregion-based lake eutrophication standards for deep and shallow lakes for total phosphorus, chlorophyll *a*, and Secchi depths (MPCA, 2005). These standards are outlined in Minnesota Rules, Chapter 7050 (Standards for the Protection of Waters of the State). For shallow lakes in the North Central Hardwood Forests (NCHF) ecoregion, which includes the Holiday-Wing-Rose Chain of Lakes, the summer-average total phosphorus criterion established by the MPCA requires concentrations of no more than 60 µg/L. The summer-average chlorophyll *a* criterion is 20 µg/L and the summer-average Secchi disc transparency criterion is 1.0 meters. Wing Lake and Lake Rose are included on the Draft 2010 Impaired Waters 303(d) List as impaired for aquatic recreation due to nutrients, eutrophication, and biological indicators. As a result of this listing, the MPCA will be required to develop a TMDL for Wing Lake and Lake Rose to determine the necessary pollutant load reductions to meet the MPCA's shallow lakes criteria for this region. Lake Holiday is not included in the Draft 2010 303(d) Impaired Waters List.

The MPCA shallow lakes criteria generally align with the NMCWD's Level II standards (see [Table 4-1](#)). If MPCA shallow lakes criteria are achieved in Wing Lake and Lake Rose, these waterbodies will likely fall under the NMCWD's Level II classification.

**Table 4-1
Lake Holiday, Wing Lake, and Lake Rose Management Table
Water Quality, Recreational Use and Ecological Classification, and Management Philosophies,
Referencing Carlson's Trophic State Index based on Secchi Disc Transparency (TSI_{SD})**

Lake	MPCA ¹ Shallow Lake Water Quality Standards	Summer Average Water Quality Conditions (TSI _{SD}) ²		MPCA* Swimmable Use Class					
				Potential District Water Quality Goal ³ (based on long-term water quality)	MPCA* Swimmable Use Class	Council Priority Waters Class	Municipal Use ⁴	MDNR* Ecological Class ⁵	District Management Strategy
Lake Holiday	N/A	Year of Record		IV Runoff management [TP] > 105 µg/L [Chl-a] > 60 µg/L 0.6 m ≤ [SD] TSI _{SD} > 70	Not Supporting	Unspecified	Unspecified	Unspecified	Unspecified
		1993 - 2008	2008						
Wing Lake	[TP] < 60 µg/L [Chl-a] < 20 µg/L SD > 1.0 m	Year of Record		III Fishing and aesthetic viewing 105 µg/L ≥ [TP] > 75 µg/L 60 µg/L ≥ [Chl-a] > 40 µg/L 0.6 m ≤ [SD] < 1.0 m 70 ≥ TSI _{SD} > 60	Not Supporting	Unspecified	Unspecified	Unspecified	Unspecified
		1993 - 2008	2008						
Lake Rose	[TP] < 60 µg/L [Chl-a] < 20 µg/L SD > 1.0 m	Year of Record		III Fishing and aesthetic viewing 105 µg/L ≥ [TP] > 75 µg/L 60 µg/L ≥ [Chl-a] > 40 µg/L 0.6 m ≤ [SD] < 1.0 m 70 ≥ TSI _{SD} > 60	Not Supporting	Unspecified	Unspecified	Unspecified	Unspecified
		1993 - 2008	2008						

¹ MPCA shallow lakes water quality standards are applicable to lakes listed on the MPCAs 2010 draft impaired waters 303(d) list.

² TSI_{SD} Carlson's Trophic State Index score. This index was developed from the interrelationships between summer average Secchi disc transparencies and epilimnetic concentrations of chlorophyll a and total phosphorus. The index results in scoring generally in the range between zero and one hundred. [District values calculated by Barr Engineering Company (from field data and water quality model predictions). MPCA values taken from the 1994 Clean Water Act Report to the U.S. Congress; and MDNR values taken from Schupp (1992) Minnesota Department of Natural Resources Investigational Report No. 417. An ecological classification of Minnesota lakes with associated fish communities.]

³ District

- I = Fully supports all water-based recreational activities including swimming, scuba diving and snorkeling.
- II = Appropriate for all recreational uses except full body contact activities: sailboating, water skiing, canoeing, wind surfing, jet skiing.
- III = Supports fishing, aesthetic viewing activities and wildlife observation
- IV = Generally intended for runoff management and have no significant recreational use values
- V = Wetlands suitable for aesthetic viewing activities, wildlife observation and other public uses.

⁴ Municipal Use

- SWIM = Public swimming beach
- FISH = Designated fishing resource

⁵ MDNR

* MPCA and MDNR TSI scores were provided by the agency without evaluation by the District.

4.1.3 Aquatic Communities Goal

In 1992, the MDNR categorized many Minnesota lakes according to the type of fishery each lake might reasonably be expected to support (*An Ecological Classification of Minnesota Lakes with Associated Fish Communities*; Schupp, 1992). The MDNR's ecological classification system takes into account factors such as the lake area, percentage of the lake surface area that is littoral, maximum depth, degree of shoreline development, Secchi disc transparency, and total alkalinity. However, the MDNR did not classify Lake Holiday, Wing Lake, or Lake Rose as part of its 1992 study. Since the MDNR did not specify the ecological classification for the Holiday-Wing-Rose Chain of Lakes, there is no specific fisheries related TSI goal. Currently, these lakes are not stocked with fish by the MDNR.

In general, it is the goal of the NMCWD to achieve water quality that will result in a diverse and balanced native ecosystem. This includes a diverse growth of native aquatic macrophytes. If NMCWD Level II water quality goals are applied to Wing Lake and Lake Rose, the lakes will also be intended to support aquatic life.

4.1.4 Recreational Use Goal

No specific recreational use goals have been established for Lake Holiday, Wing Lake, or Lake Rose. These lakes do not have public boat access, but many residents with lake access do use canoes, paddleboats, and other non-powered craft on the lakes. In accordance with the NMCWD's non-degradation policy, the lake shall be protected from significant degradation from point and nonpoint sources and shall maintain existing water uses, aquatic habits, and the necessary water quality to protect these uses. The implementation of potential BMPs will likely achieve the goal of non-degradation and enhance the lake's recreational uses.

If NMCWD Level II water quality goals are applied to Wing Lake and Lake Rose, the lakes will also be intended to support recreational use that does not involve full body contact, such as canoeing. Recreational boating in Wing Lake and Lake Rose is currently limited by the presence of waterlily in both lakes.

4.1.5 Wildlife Goal

Wildlife goals for Lake Holiday, Wing Lake, and Lake Rose have not yet been established by the NMCWD.

4.2 Expected Benefits of Water Quality Improvements

Lake Holiday, Wing Lake, and Lake Rose are important aquatic resources for the region. The management strategy for these lakes should be to restore and protect the resource, as feasible. If Lake Holiday water quality is restored and protected, the improvement and protection of water quality in Wing Lake and Lake Rose will more easily be achieved. Improved water quality will allow all recreational and aquatic habitat uses for the lakes to be maintained.

4.2.1 Enhancement of Recreational Use

The Holiday-Wing-Rose Chain of Lakes is not used for extensive recreation. The lakes are not connected by surface waterways and there is no public boat access to the lakes. A small park on the southeast side of Lake Holiday does allow public access to the lake. Wing Lake is only accessible through private land except where the lakes abut right of way. With the exception of a city-owned parcel of land on the northeast side of the lake, Lake Rose is only accessible through private land.

Decreases in phosphorus concentrations and resulting transparency improvements for Lake Holiday, Wing Lake, and Lake Rose will likely improve the lakes' aesthetic appeal and reduce the frequency of odor-producing algal blooms that thrive on over-fertilization of the waters. Such improvements will make the lake more pleasant for the residents that live adjacent the lake and others who enjoy the lake.

4.2.2 Improvements in Aquatic Habitat

Improving the eutrophic status of Lake Holiday, Wing Lake, and Lake Rose is expected to benefit the aquatic communities of the lakes. Reduction in the eutrophication process typically results in reduced algal concentrations (especially blue-green algae) and increased transparency. These changes allow for greater plant and animal diversity, as species with less tolerance for low light and low oxygen are once again able to populate the lake and its littoral regions. Higher diversity and improved habitat for the communities lowest on the food chain (algae, zooplankton, etc.) are reflected in benefits to higher-order species—from benthic invertebrates to birds and mammals.