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MEMO

TO: Nine Mile Creek Board of Managers
FROM: Randy Anhorn
DATE: April 28, 2021
RE: Summary of 2020 Water Quality Monitoring Program Report

Background/Information

Lakes
Attached is the Summary of the District's 2020 Water Quality Monitoring Report.

The primary goal of the Nine Mile Creek Watershed District (District) is to protect and enhance the surface water quality of the lakes and streams of the District. To help accomplish this goal, the District operates an extensive lake and stream management program. Generally, the program includes:

- Data collection (monitoring)
- Assessment (e.g., studies)
- Implementation of projects and programs

The District monitors the water quality of its lakes on a rotating basis and in 2020 monitored nine lakes: Arrowhead, North and South Cornelia, Edina, Holiday, Indianhead, Normandale, Rose and Wing. Each lake was monitored on six occasions for selected parameters including: total phosphorus, soluble reactive phosphorus (ortho phosphorus), total nitrogen, total Kjeldahl nitrogen, nitrate plus nitrite nitrogen, pH, chlorophyll *a*, chloride, dissolved oxygen, temperature, specific conductance, turbidity, oxidation reduction potential (ORP), phytoplankton, and zooplankton. Aquatic plant (macrophyte) surveys were performed during June and August.

The District is planning on monitoring the following lakes in 2021: North and South Cornelia, Edina, Mirror, Normandale, Northeast Anderson, Southeast Anderson and Southwest Anderson. The District will also conducting some in-lake monitoring of Lake Nancy and Lake Otto (upstream of lake Cornelia) to determine if they may have internal loading issues. In addition, the city of Eden Prairie plans on monitoring Birch Island for the District.

Stream
Because the primary use of Nine Mile Creek is ecological – a place for fish and aquatic life to live – the focus of the Nine Mile Creek stream monitoring program is evaluation of the stream's fish and aquatic life community as well as the ecosystem components essential for the survival of

fish and aquatic life. In 2020 the District continued to monitor eight at set ecological monitoring stations along the North Branch, South Branch and Main Stem of Nine Mile Creek. Monitoring included:

- Annual monitoring of the fish community during summer.
- Annual monitoring of the macroinvertebrate community during October.
- Annual habitat monitoring during summer (i.e., stream substrate type, depth of fine sediment, percent
- embeddedness, and length of eroded streambank).
- March through October monthly measurements of specific conductance, dissolved oxygen, pH, temperature, turbidity, and flow.

The collected data are then evaluated to determine whether:

- Specific conductance, dissolved oxygen, pH, and temperature, levels meet MPCA standards for Class 2B waters published in Minnesota Rules 7050.
- Flow and water quality data were consistent with historical values.
- The fish and aquatic life communities were consistent with the stream's ecological use determined from past assessments.

In addition, three of the sites, N1, N2 and N3, are included in the Metropolitan Council's Watershed Outlet Monitoring Program (WOMP) where water quality and flow (base and continuous) data are also collected, summarized and reported through their program.

Some highlighted findings include:

- Monitoring Program – 8 lakes, Nine Mile Creek at 10 locations, lake levels at 29 lakes, and groundwater levels at 6 locations
- Additional sampling of blue-green algal blooms – late September in Arrowhead Lake; late September and October in Lake Cornelia, Lake Edina, and Lake Holiday
- 2020 Lake monitoring results
    - Chlorides
        - North basin of Lake Cornelia exceeded Minnesota Pollution Control Agency (MPCA) chronic criteria in April, but met MPCA acute criteria; all other chloride values from the north basin met both MPCA acute and chronic chloride criteria
        - All chloride values from all other lake monitoring locations met MPCA chronic and acute chloride criteria
    - Summer average total phosphorus, chlorophyll *a*, and Secchi disc transparency
        - Normandale Lake and Lake Rose summer average total phosphorus concentrations exceeded the State water quality criteria for shallow lakes, but summer average chlorophyll a concentrations and Secchi disc transparency depths met the State water quality criteria
        - Summer average total phosphorus, chlorophyll a, and Secchi disc transparency from all other monitored lakes (Arrowhead, Cornelia, Edina, Holiday, Indianhead, Wing) did not meet MPCA water quality criteria for shallow lakes

- Blue-Green Algae
    - Severe blue-green algae bloom in Arrowhead Lake on September 9, but not at the routine monitoring location; blue-green numbers above World Health Organization (WHO) threshold for moderate probability of adverse health effects; blue-green algae bloom not observed during a late September monitoring event
    - Blue-green numbers above WHO threshold for moderate probability of adverse health effects at routine sampling location(s) in Lake Cornelia (August and September), Lake Edina (July through September), Lake Holiday (June and September), and Indianhead Lake (July)
- Aquatic plants
    - The aquatic plant community did not meet MDNR Plant IBI thresholds during the June and August sample events in Arrowhead Lake, Lake Holiday, Indianhead Lake, and Wing Lake; Aquatic plant data did not meet MDNR Plant IBI thresholds during the June sample event in Lake Rose.
    - Both the number of plant species and the quality of the plant community measured by FQI increased in Lake Rose during August and both were better than the MDNR Plant IBI thresholds in August.
    - The aquatic plant community met the MDNR Plant IBI thresholds in Normandale Lake
    - Normandale Lake water quality improvement project resulted in reduced frequency and biomass of curly-leaf pondweed
    - Biomass of total plant community in Normandale Lake lower in 2019 after drawdown, but increased to lower end of pre-drawdown range by August 2020
    - In Normandale Lake, the 3 species with highest average wet weight per sample point in 2020 (coontail, common waterweed, and white water lily) were generally the 3 species with highest average wet weight per sample point prior to drawdown
    - Filamentous algae occurrence in Normandale Lake was more frequent in 2020 than previous monitored years

- 2020 Nine Mile Creek monitoring results
    - All Nine Mile Creek temperature and pH measurements, 90 percent of dissolved oxygen measurements, and 56 percent of specific conductance measurements met MPCA criteria in 2020; North Fork sampling locations met the specific conductance criteria less frequently than South Fork and Main Stem sampling locations
    - Low dissolved oxygen value at the upstream Main Stem location, ECU-7A, on July 3, 2020 did not support the designated attainable ecological use of intolerant forage fish for this location. All flow, habitat, and water quality data from all other locations fully supported their designated attainable ecological uses.
    - MPCA has added a Fish Index of Biotic Integrity (FIBI) and a Macroinvertebrate Index of Biotic Integrity (MIBI) to State water quality standards
    - MPCA FIBI was used to assess Nine Mile Creek to determine whether fish community met MPCA criteria

        - FIBI scores from upstream South Fork location, ECU-3A, downstream North Fork location, ECU-2A, and downstream Main Stem location, ECU-7A, met MPCA FIBI criteria in 2020
        - The FIBI score from the upstream Main Stem location, ECU-7A, did not meet MPCA FIBI criteria, but was within the confidence limits and fairly close to the threshold in 2020
        - The FIBI scores from the other sample locations did not meet MPCA FIBI criteria in 2020
        - All 2017-2020 FIBI scores from the downstream Main Stem location, ECU-7A, met MPCA FIBI criteria
        - FIBI scores from the two upstream North Fork locations, ECU-1A-1, and ECU-2, and the middle Main Stem location, ECU-7B, did not meet MPCA FIBI criteria during 2017-2020, but one or more scores were within the confidence limits and fairly close to the threshold
        - FIBI scores from the other 4 sample locations met MPCA FIBI criteria during at least 2 years during 2017-2020
    - MPCA MIBI was used to assess Nine Mile Creek to determine whether macroinvertebate community met MPCA criteria
        - MIBI scores from all locations failed to meet applicable MIBI criteria. However, MIBI values from the downstream North Fork location, ECU-2A, and the downstream Main Stem location, ECU-7A, were within the confidence limits indicating the values were relatively close to the threshold.

- Lake Level Monitoring
    - During 2020, all monitored lake levels dropped from beginning to end of year, with exception of Lake Nancy, which showed no net change.
    - The lowered lake levels reflect that 2020 was a drier year, as compared with 2019 which was the wettest year on record for the Twin Cities metropolitan area.
    - The declining lake levels also generally reflect that groundwater levels in the region were also declining in the latter part of 2020.
    - The most notable net drop in lake level was Birch Island Lake in Eden Prairie, which dropped 3.6 feet from January 2020 to January 2021.

- Groundwater level monitoring
    - In 2020, the net change in groundwater elevation ranged from a 0.2 feet increase in Well 22 (south of Penn Lake in Bloomington) to a 1.5 foot drop in Well 35 (east of Braemar Golf Course in Edina).
    - The maximum fluctuation observed throughout 2020 ranged from an approximately 0.1 foot drop at Well 26 (east of Lake Edina in Edina) to a 3.2 feet drop at Well 35, with an average maximum fluctuation of 1.4 feet.

Request

No action required. The presented is for informational purposes to promote discussion.