Item 5B.
BCWC 7-17-14

Bassett Creek Watershed Management Commission

MEMO

To: BCWMC Commissioners
FROM: Laura Jester, Administrator
DATE: July 9, 2014

RE: Blue-green Algae on Sweeney Lake and Request from Golden Valley for Additional Monitoring

ADMINISTRATOR RECOMMENDATION: Commission approval of an expense not to exceed $1,100 for blue green algal toxin analysis and additional algal monitoring in Sweeney Lake in 2014 to come from the Commission's operating budget under Surveys and Studies.

BACKGROUND:
On June 25, 2014 residents on Sweeney Lake alerted the City of Golden Valley and the Commission to the possibility of a blue green algae bloom on the lake. Photos and descriptions were shared by several residents via email.

On June 26, 2014 at the request of Golden Valley staff, I directed the Commission Engineer to investigate Sweeney Lake residents' concerns. The Commission Engineer assumed they would find a typical *green* algae bloom, as it seemed too early in the season for a *blue-green* algae bloom (especially with our cooler weather this year). The Commission Engineer took advantage of the samples collected on June 18, 2014 as part of the Commission's regularly scheduled 2014 lake water quality sampling program for Sweeney and Twin Lakes. Barr staff examined the June 18th phytoplankton samples under a microscope and determined that they included a blue-green species of algae, Aphanizomenon flos aquae. Barr staff also examined the zooplankton samples collected on June 18 and noted that they contained a large quantity of algae – clumps of algae, blue-green in color. Zooplankton samples are collected by towing a net from the lake bottom to its surface and will concentrate clumps of algae when present in the lake. The large quantity of algal clumps in the zooplankton sample verified an observation by Barr lake monitoring staff that clumps of blue-green algae were observed throughout Sweeney Lake on June 18. Barr staff examined the algal clumps from the zooplankton samples under the microscope and found the algae to consist solely of *Aphanizomenon flos-aquae*. This blue-green species of algae can produce a neurotoxin, anatoxin-a. The samples were not submitted for toxin testing, so it is not known whether toxins were being produced by the blue-green algae in Sweeney Lake and, if so, whether the quantity of toxins in the water exceed the threshold for a public health threat.

POSSIBLE REASON FOR BLUE GREEN ALGAE BLOOM:
As for a possible reason for the algae bloom, we can only speculate. With the large amount of rain we've had, there has likely been a large influx of nutrients into Sweeney Lake. When a lake receives a large influx of phosphorus, the lake will respond by producing algae, either green, blue-green, or even both. We don't know exactly why Sweeney experienced a blue-green algae bloom instead of a green algae bloom, but there are theories about what may have happened. Although the lake water

doesn't need to be warmer for it to experience an algae bloom, what we typically see in a nutrient-rich lake is the following sequence:

- Soon after ice-out (i.e., cold water) – diatoms dominate, due to the high silica concentrations in the water
- A little later, but still cool water – green algae (often green filamentous algae) dominate
- Later yet, warmer water – blue-green algae dominate

A theory, supported by a recent journal article, states that green filamentous algae dominate when nitrate levels are high, whereas the type of blue-green algae found in Sweeney Lake dominate when nitrate levels are low, since this species fixes (creates) its own nitrogen and outcompetes species that do not. The blue-green algae (*Aphanizomenon*) bloom in Sweeney indicates nitrate levels are probably low relative to phosphorus levels. We should be able to confirm this theory when we review the detailed water quality monitoring data and can look at the nitrogen-to-phosphorus ratio.

HEALTH ALERT FROM GOLDEN VALLEY:
In response to the discovery that Sweeney Lake contained a large quantity of blue green algae that may produce toxins, the City of Golden Valley issued a health alert which was distributed to Sweeney Lake residents and was posted on the city's website. One question asked immediately by some residents: "Will the City notify residents when it is safe to return to the water?"

FUTURE PLANNED MONITORING:
Through its existing lake monitoring program, the Commission will collect phytoplankton (algae) and zooplankton samples every time lake water quality samples are collected on Sweeney Lake for the rest of the monitoring season including four more samples this summer: once in July, twice in August, and once in September. Samples will be analyzed to identify and count the numbers of species present. However, these samples are collected at the lake water sampling point, typically the deepest point in the lake. For our future sampling, if monitoring staff see algal mats or scum on the edges of the lake that are not observed at the sampling location, they will also collect samples at the edge locations in order to identify the species (i.e., blue-green or not). This will be done for identification only, not for counting.

REQUEST FOR ADDITIONAL MONITORING and TOXIN ANALYSIS:
On Monday June 30th I was asked by the City of Golden Valley if they could request additional monitoring of algae in Sweeney Lake this summer to more closely track algal species and populations. I indicated I would make such a recommendation to the Commission. The City received an estimate from the Commission Engineer for the following work and requests that the Commission fund these expenses.

- Collect additional sample (completed July 2nd) using the 2-person canoe method and send to specialist lab in Florida for toxin analysis. Estimated cost for this work is $900. This will provide a useful benchmark when comparing to other samples taken this summer.

- Send additional sample (from regular Commission monitoring) to the lab in Florida for toxin analysis if conditions warrant. Estimated cost for this work is $200.