resourceful. naturally.
engineering and environmental consultants

BARR

Memorandum

To: Bassett Creek Watershed Management Commission
From: Barr Engineering Co.
Subject: Item 6B: Evaluation of Long-Term Carp Control Options for Schaper Pond and Sweeney Lake
BCWMC September 16, 2021 Meeting Agenda
Date: September 7, 2021

Recommendation:

1. Direct Commission Engineer and Administrator to implement an adaptive management approach to resurvey the carp population in 2022 and assess how quickly the carp population might rebound in the Sweeney Lake and Schaper Pond system. Summarize 2022 carp survey results and develop carp control recommendations for consideration by the Commission.
2. Utilize up to $8,000 of Schaper Pond Diversion Project CIP funding to implement the adaptive management approach.

1.0 Project Background and Purpose

Several investigations in 2017 and 2018 identified problems with stormwater treatment in Schaper Pond and found carp populations exceeding the 100 kg/ha threshold associated with impacts on water quality (Bajer et al., 2009). In 2019, the Commission was awarded grant funding for the Sweeney Lake Water Quality Improvement Project, which included a goal to reduce carp biomass in Sweeney Lake and Schaper Pond during the spring and summer of 2020. In addition, this project intended to track carp movement to 1) assess the likelihood that carp from Sweeney Lake could re-populate Schaper Pond, and 2) assess the need to prevent movement of juvenile and adult carp from Schaper Pond to Sweeney Lake. The Commission Engineer hired Carp Solutions, LLC as its subconsultant on this investigation (and all previous investigations) to analyze carp impacts in the Sweeney Lake-Schaper Pond system.

At the February 2021 Commission meeting, the Commission Engineer presented the results of the carp removal efforts including:

- Sweeney Lake: 452 carp removed, representing an estimated 43.5% reduction in population; reduction in biomass from 122 kg/ha (kilograms per hectare) to 68 kg/ha (note: carp biomass greater than 100 kg/ha = threshold for impacts to water quality)
- Schaper Pond: 152 carp removed representing an estimated 76% reduction in population; reduction in biomass from 321 kg/ha to 75 kg/ha

Overall, the recent data suggest that carp biomass in both Sweeney Lake and Schaper Pond is currently below 100 kg/ha, with no signs of carp recruitment detected in either water body in 2020. However, based on the PIT antenna data and the fact that 6 carp tagged in Sweeney Lake in the spring of 2020 were later captured in Schaper Pond in the summer and fall of 2020 suggests that carp from Sweeney Lake could easily re-populate Schaper Pond and use it as a

nursery, which would compromise stormwater treatment in the pond. As a result, the Commission Engineer and Carp Solutions recommended design and installation of a barrier to prevent movement of juvenile and adult carp from Schaper Pond to Sweeney Lake.

At the February 2021 meeting, the Commission directed Commission and Golden Valley staff to evaluate the feasibility, maintenance, liability and long-term efficacy/costs of carp control options for the Sweeney Lake and Schaper Pond system and bring results to a future Commission meeting.

Of the carp control options recommended by the Commission Engineer for further evaluation, the Commission selected the following carp control options for further consideration and evaluation:

- Carp removal through winter seining
- Carp removal through box netting and/or electrofishing
- Construction of a low-voltage electric barrier between Sweeney Lake and Schaper Pond
- Construction of a physical barrier between Sweeney Lake and Schaper Pond

2.0 Long-Term Control Options and Recommendations

Golden Valley staff and the Commission Administrator met with Commission Engineers earlier this summer to discuss various long-term carp management options. Commission Engineers were asked to develop a matrix of options, costs, and impacts. Table 1 provides a comparison of physical and non-physical migration barriers, along with future carp removals, carp population/migration surveys (as needed) and/or other options, that were considered for long-term control of carp in the Sweeney Lake and Schaper Pond system to minimize the potential for future negative impacts to water quality. (Introduction of toxins with bait was previously discussed but eliminated from further consideration due to concerns of commissioners, lack of a proven track record for efficacy and permitting concerns.)

After evaluation of the various options and discussions with city staff and the Administrator, and considering many of the options require significant investment and construction of barriers, etc., the Commission Engineer recommends implementing an adaptive management approach (carp control option #6 in Table 1) to assess how quickly the carp population rebounds in the Sweeney Lake and Schaper Pond system. It is likely that carp populations in Schaper Pond and Sweeney Lake will begin to rebound as adults migrate from upstream of Schaper Pond or downstream of Sweeney Lake. However, it is difficult to estimate how quickly that will happen. It is expected that just a few adult carp spawning in Schaper Pond could result in the carp population rebounding to past (high) levels within a few years. Gathering additional electrofishing data by re-surveying Schaper Pond in late-summer 2022, to determine how many adult and young-of-year carp are present, would improve our understanding of how quickly the population could rebound after last year's removals.

At a minimum, this adaptive management approach is recommended for 2022 to re-confirm the need and potential timing for future installation of carp control options. Long-term management efforts can be reassessed after the 2022 surveys.

Table 1 Comparison of Long-Term Carp Control Options for Schaper Pond – Sweeney Lake (#6 is recommended option for 2022)

Carp Control Option	Feasibility	Operation & Maintenance Needs	Liability & Limitations	Long-Term Efficacy	Initial Capital Costs	Annual Costs	Related Implementation Examples	Additional Comments
1. Removal through baited box netting and/or electrofishing	Approach was successfully implemented in both Sweeney Lake and Schaper Pond during 2020, resulting in corresponding carp populations of 68 kg/ha and 75 kg/ha, respectively; both below 100 kg/ha threshold associated with water quality impacts	More study of subsequent changes to carp population is needed, but it is expected that carp would be able to reproduce in Schaper Pond and eventually re-populate the pond and Sweeney Lake	We don't currently know how long it would take for carp population to return to pre-removal levels	Depending on the future costs of carp removal and timing for re-population of carp in Sweeney Lake and Schaper Pond, it is possible that this option will be the most cost-effective approach in the long-term	None	$5,000—$20,000 Estimated range of costs assume that baited box netting would be required every two to eight years; does not include ongoing monitoring/survey costs	Kohlman Lake, Ramsey-Washington Metro Watershed District	
2. Removal through winter seining (assumed to occur one time)	Approach has been successfully applied at several locations throughout Minnesota, but is typically dependent on commercial fisherman identifying high numbers of carp within manageable area of the lake	More study of subsequent changes to carp population is needed, but it is expected that carp would be able to reproduce and eventually re-populate Schaper Pond and Sweeney Lake	We don't currently know how effective this approach will be at removing significant numbers of carp and how long it would take for the carp population to return to pre-removal levels	Expected to decrease population of common carp below the threshold at which they negatively impact water quality	None	$9,000—$10,000 Costs will likely be limited to on-going monitoring and surveys to assess efficacy ($7,000-$8,000 per year), plus any incentives necessary to attract commercial fisherman (up to $2,000)	Spring Lake, Prior Lake-Spring Lake Watershed District	This method is economical, but not reliable, as it's susceptible to failure, typically as seines snag debris and sediment on the bottom of lakes; carp become better at avoiding seine nets over time
3. Install physical barrier between Sweeney Lake and Schaper Pond	A physical barrier could be installed at or near the existing skimmer/footbridge crossing for the Schaper Pond outlet	Due to high loadings of debris and vegetation that is flushed through Schaper Pond, it is expected that this option will require extensive maintenance or cleaning of barrier every year and/or following large storm events	Debris/vegetation buildup or blockages have the potential to exacerbate potential flooding in Schaper Pond	Expected to maintain the population of adult common carp below the threshold at which they negatively impact water quality unless barrier becomes plugged or is overtopped	$100,000—$200,000 for initial construction and installation	$1,000—$2,000 for maintenance and cleaning of barrier	Rondeau Lake, MN	Existing skimmer at footbridge crossing already requires maintenance a couple times per year after high water events. Alterations to Schaper Pond water level fluctuations could alter function of diversion curtain and adversely impact aesthetics
4. Install low-voltage electric barrier between Sweeney Lake and Schaper Pond	Approach has been successfully implemented in several Minnesota lakes and could likely be installed at or near the existing skimmer/footbridge crossing for the Schaper Pond outlet	While the electrodes are submerged, it is likely that buildup of debris/vegetation will need to be removed; also, the electrodes need to be removed and power-washed on an annual basis	Signage regarding electrical current will need to be posted and public access limited by buoys/gates/fencing to further minimize the low risk of electric shock	Expected to decrease the population of common carp below the threshold at which they negatively impact water quality and maintain that low-level population	$5,000—$7,000 for initial installation and materials	$15,000—$18,000, including renting equipment, maintenance, and electricity (~$100 per month), along with the cost to design and replace in-stream electrode array	Rice Creek Lino Lakes chain of lakes and Long Lake, Rice Creek Watershed District	An option to purchase the equipment and materials (approximately $80,000) can also be pursued if warranted by cost-effectiveness
~~Introduction of toxins with bait~~	Eliminated due to permitting concerns and concerns about proven track record and accepted approach for similar settings							
5. Reduce successful carp spawning with panfish predation by aerating Schaper Pond to improve panfish habitat	Preventing winter anoxia and winterkill of panfish promotes carp egg predation and can reduce or eliminate carp reproduction. If the nursery habitat is relatively small and isolated, preventing winter anoxia with aeration and sustaining a significant sunfish population is possible	Aeration systems have notoriously high maintenance costs and personnel requirements	Additional considerations include insurance needs (MNDNR requires specific insurance policies before granting aeration permits) and public safety, as winter aeration creates thin ice and/or open water during winter	Expected to maintain the population of common carp below the threshold at which they negatively impact water quality, as long as the stocked panfish stay in Schaper Pond long enough to feed on the carp larvae during the spring or early summer period	$12,000—$20,000 for initial installation	$2,000—$3,000, including electricity, maintenance, insurance and fish stocking costs	Rice Marsh Lake, Riley-Purgatory-Bluff Creek Watershed District; Casey Lake and Markham Pond, Ramsey-Washington Metro Watershed District	Schaper Pond does not currently have the habitat necessary to support panfish reproduction so it is expected that panfish would need to be stocked every year for this option to be successful. Could also be combined with MDNR fishing pier and fish stocking
6. Adaptive Management (monitor only) **	Gather additional electrofishing data by re-surveying (adult and young-of-year) carp in Schaper Pond during late-summer 2022 to compare to past surveys and improve understanding of how quickly the population could rebound after last year's removals	None	Carp populations may rebound very quickly (even in 2022) without barriers or other long term control measures. This "monitor only" option may result in poorer water quality until a permanent solution is implemented.	Long-term water quality benefits of recent carp control efforts will not be maintained due to sediment resuspension and excretion by carp in Schaper Pond and Sweeney Lake	None	$7,000—$8,000, for carp survey and PIT monitoring	Past Sweeney Lake and Schaper Pond surveys lay the groundwork for this option to run smoothly.	Costs do not include water quality monitoring

** Recommended option for 2022