Aquatic Habitat of Swan Lake

Aquatic Health

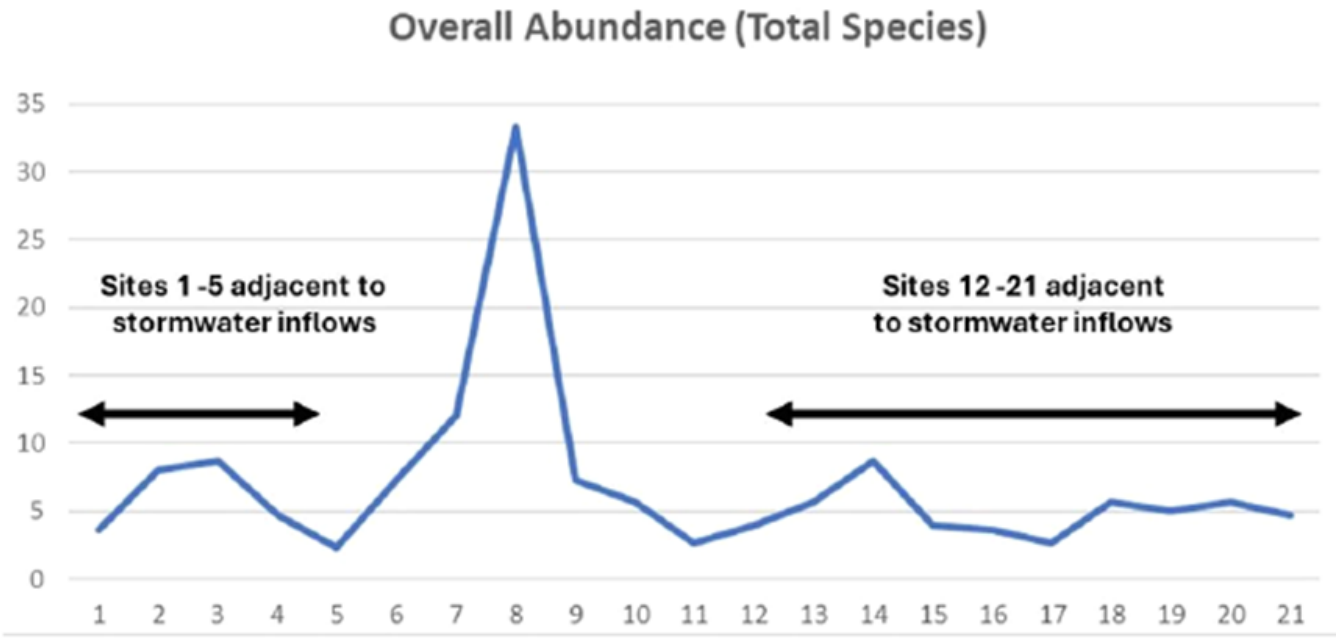
Swan Lake has a high chloride content from road salt. It is expected that the high chloride levels impair the health of lower-level aquatic species such as zooplankton as well as the aquatic plants in the lake.

Benthic macroinvertebrates are small organisms that live on the bottom of streams, rivers, and lakes. They are useful as water quality indicators because they have relatively long lifespans and are sensitive to changes in the aquatic environment. Benthic macroinvertebrates can include insects, worms, mollusks, and crustaceans.

FOSLP asked Markham to undertake an inventory of the lower-level forms of aquatic life to provide a benchmark for monitoring planned improvement in the aquatic health of the lake. The request was denied by staff, noting that the information would not alter their current management plan and was not considered necessary.

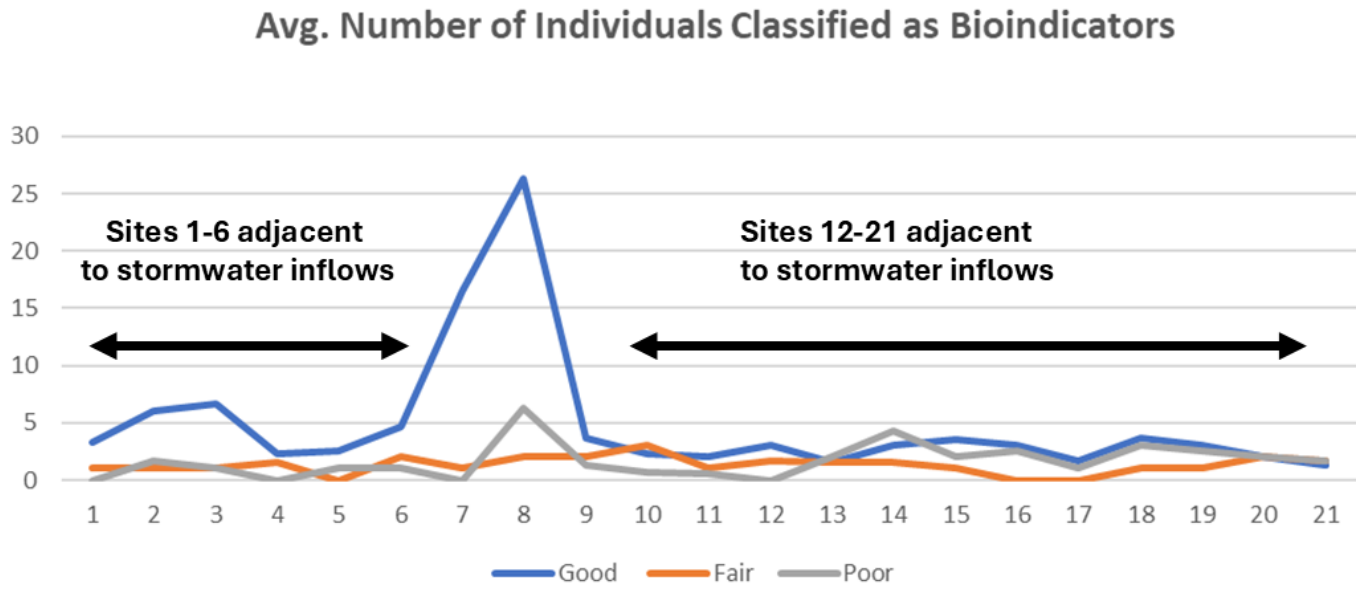
In 2023, FOSLP engaged Chris Reeves to conduct a Benthic Invertebrate survey. The presence of Ephemeroptera (Mayfly), Plecoptera (Stonefly) and Trichoptera (Caddisfly), or EPT, are indicators of good water quality and overall ecosystem health and can be considered a good benchmark for monitoring future progress.

The results indicated that the number of species identified was notably lower near the stormwater inflow sites. The report concludes that Swan Lake, given the taxa found and percentage of EPT, is currently of fair or intermediate water quality.



Swan Lake is host to 16 taxonomic classes, these were categorized as good, fair or poor as bioindicators.

- Ephemeroptera (Mayflies), Trichoptera (Caddisflies), and Anisoptera (Dragonflies) were identified and categorized as bioindicators of good water quality.
- Gerridae (Water Strider), Zygoptera (Damselflies) Amiphipoda (scuds), Isopoda (Isopods) were categorized as fair water quality bioindicators.
- Diptera [this includes 2 species of Midge, as well as Aedes sp. (Mosquito), Corixidae (Water Boatmen), Gastropods (Snails), and Nematoda sp. (Nematode worm) were categorized as poor or low water quality.
- Species that could not be used as water quality bioindicators included Ranatra (Water scorpion), and Coleoptera (2 different species of Water Beetle).
- Although Ranatra and Coleoptera were removed as water quality indicators their presence has been associated with elevated levels of salinity, also water boatmen and water striders are also associated with saline rich environments.



The TRCA has been actively involved in the rehabilitation of the water quality in Swan Lake since 2021. They have undertaken projects such as removal of phragmites, planting of wild celery as a pilot project to restore aquatic life, a fish inventory program and a proposal to redesign the shoreline which included recommendations related to preserving the habitat for resident turtles and other species.

The TRCA was engaged to undertake a fish inventory and removal of bottom feeding fish such as carp and goldfish from Swan Lake. The following table summarizes the fish species identified through 2024. Brown Bullhead, Common Carp and Goldfish are euthanized while Fathead minnows are returned to the lake.

Date	Fish Species	Number of Fish
April 2021 (3 days electrofishing + 2 days nets)	Brown Bullhead	210
	Common Carp	7
	Fathead Minnow	>10,000
August 2022 (1 day electrofishing, 1 day nets)	Brown Bullhead	80
	Common Carp	20
	Fathead Minnow	875
August 2023 (1 day electrofishing)	Brown Bullhead	84
	Common Carp	103
	Fathead Minnow	14
	Goldfish	2
April 2024 (1 day electrofishing, 1 day net)	Brown Bullhead	193
	Common Carp	1
	Fathead Minnow	1521
	Goldfish	13
	Common Carp x Goldfish	59
	Emerald Shiner	1

The long-term plan has provisions for restocking the lake with a variety of fish species when the water quality is amendable. In spring of 2025, 500 small largemouth bass were added.

Aquatic Plants

Drone Imagery of Wild Celery May 2025

In 2023, Markham introduced submerged aquatic vegetation (macrophytes) to improve algae levels. The TRCA was engaged to initiate a pilot program of planting Wild Celery ("Vallisneria americana") in four restricted areas. The report notes that Wild Celery has proven to be effective in absorbing nutrients for algae control and for stabilizing sediments to reduce turbidity.

The TRCA reports attribute the lack of success of the 2023 plantings to turbidity which prevented light from penetrating to the greater depths and to the fluctuating lake levels. The report makes no reference to whether high chloride levels in the lake were a possible factor.

The TRCA preliminary comments on the program note that:

a) In 2023, the 1500 stems were planted at 0.3 – 1.0 m deep, the mid-point for optimal growing depths for Wild Celery. Approximately 90% beyond the 30 cm. mark were

absent in 2024 with a few persisting in deeper nodes. Only about 30% of the plantings were found at 30 cm depth.

b) Another 1500 stems were planted in 2024 between 20 – 40 cm.
c) Recommendation is to observe the success of the 2024 plantings through 2025 and if successful follow up with more plantings in 2026 in adjacent areas and other shallow areas.

The following tables list the aquatic plantings that were proposed in the 1993 Environmental Management Study[1]. An asterisk* denotes species existing at that time.

Open Waters: 0.5 m to 1.5 m deep	
pond lily	*Nuphar variegatum*
water lily	*Nymphaea odorata*
pondweed	*Potamogeton richardsonii*
pondweed	*Potamogeton pectinatus*
Lake margins and waters to 0.75 m deep	
bur-reed	*Sparganium eurycarum*
sweet flag	*Acorus calamus*
soft-stem bulrush	*Scirpus validus*
Shores and waters to 0.5 m deep	
narrow-leaved cattail	*Typha angustifolia**
wide-leaved cattail	*Typha latifolia*
giant reed	*Phragmites australis**
river bulrush	*Scirpus fluviatilis*
Shores and waters to 0.25 m deep	
blue flag	*Iris veriscolor*
pickerelweed	*Pontedaria cordata*
arrowhead	*Sagittaria latifolia*
water plantain	*Alisma plantago-aquatica*

Lake riparian zone

bulrush	*Scirpus atrovirens*
bulrush	*Scirpus cyperinus*
rush	*Juncus effusus*
spike rush	*Eleocharis palustris*
reed canary grass	*Phalaris arundinacea**
sedges	*Carex lacustris**
Joe-Pye-weed	*Eupatorium maculatum*
rice cutgrass	*Leersia oryzoides*
marsh milkweed	*Asclepias incarnata*
ninebark	*Physocarpus opulifolius*
red-osier dogwood	*Cornus stolonifera**
nannyberry	*Viburnum lentago*
highbush cranberry	*Viburnum trilobum*
willow	*Salix eriocephala**

Actions Recommended:

1) While increased plantings may be beneficial in reducing algae and reducing turbidity, an assessment is required as to how impactful this is as a lake management option to reduce algae. How much of the lake would need to be planted and how long would it take compared to future chemical treatments or other lake management options?
2) Undertake an extensive Benthic Monitoring survey for use as a benchmark for monitoring improvements.
3) Review shoreline and other areas for improvements in habitat for fish, turtles and other aquatic life.
4) Implement an aquatic and shoreline planting strategy
5) Stock lake with lower-level aquatic species to help control algae
6) Implement options to minimize chloride inflows

Read the 2023 Benthic Invertebrate Report