info@partnersofscottcountywatersheds.org
facebook.com/partnersofscottcountywatersheds
563-336-3378

Our Mission
To improve the stewardship of Scott County watersheds through education, technical guidance, and volunteer opportunities

Partners of Scott County Watersheds

Site Visit Report

Site Location: [redacted]
Visit Date: April 15, 2022
Kelsi Massengale, Partners of Scott County Watersheds

Site Summary

The lake is a small body of water within a residential neighborhood in the western limit of Davenport. The lake was originally made in the 1970s as part of a farm, and was dredged to 17-20 feet deep when the subdivision was developed in the early 2000s. There are two primary upland drainage areas that feed into the lake and one overflow drain on the south shore that feeds into a small creek.

The lake is a popular location for wildlife; over the years, homeowners have observed a number of species take home in/near the lake, including waterfowl, raptors, turtles, fish, frogs, and muskrats. The area around the lake consists of mowed turf, grass buffers, large oaks, maples, and other trees that hang over the water. Some submergent vegetation was observed at the time of visit; landowners observe large amounts of duckweed and some algae during warmer months.

The lake is currently maintained by the Home Owners' Association; management practices include a 3 -5 foot grass buffer, three aerators, artificial fish habitat, fish stocking, Diquat applications, historic application of copper sulfate, and the introduction of bacteria.

Site Concerns

The HOA has identified three primary concerns: fish kills, excess aquatic vegetation, and a 'mucky' substrate. These issues are interconnected, and likely a result of both internal and external phosphorous loading. When excess phosphorus in the lake's system (from run off and leaf litter) is released into the water, it sparks the growth of aquatic vegetation, such as duckweed. When this vegetation is dense, it can reduce the amount of oxygen available in the water. The reduced dissolved oxygen in the water can then result in a fish kill. Furthermore, once the vegetation mat dies, the organic matter sinks to the bottom and requires additional oxygen to decompose. If there is not enough oxygen, the organic matter turns to a phosphorus-rich 'muck.'

The aerators are helping to restore the system's balance by increasing dissolved oxygen. Continued use of the aerators will help the organic matter to decompose (and dissolve the muck bottom), as well as support fish populations. The aerators, however, likely caused the most recent fish kill. After installation, the phosphorus-rich sediment and anaerobic water circulated throughout the lake, which resulted in decreased oxygen and the foul smell. This was part of the initial pond turnover, and should not be an issue moving forward.

The aerators and beneficial bacteria are helping to reduce the internal phosphorus levels; however, the lake issues will not be resolved if the external sources are not addressed.

Maps

Attached are several maps of the pond, including historic aerial images, a topographic map, and an aerial photo with 2-foot contours. These maps were created and analyzed to determine the pond's watershed, which is helpful in determining where pond pollutants may be originating from. The red line on the topographic and aerial photos is an estimation of the watershed boundary for the pond.

The watershed covers approximately 37 acres and includes agricultural, residential, and forested land. It is clear from the 2-foot contour map that the upland agricultural fields drain directly into the lake's northwest and northern tips. Residential lots adjacent to the lake also contribute to the water body.

Data Review and Analysis

Below is a tabulation of the data we collected at the site visit:

Test Date	Test Time	Water Temp	Nitrate (ppm)	Nitrite (ppm)	Ammonia (ppm)	pH	DO (ppm)	Trans. (cm)	Salinity (ppt)	TDS (ppm)	Chloride (ppm)
04/15/2022	4:00 PM	55.7°F	0	0	0	8.54	10	54	.33	472	66

Overall, the site appears to have good water quality. Below is a breakdown of each parameter:

- Water temp: normal for the season
- Nitrate/nitrite: normal for the season
- Ammonia: normal for the season
- pH: within ideal range of 4-9
- Dissolved Oxygen: within normal range of 5-12 ppm
- Transparency: very good
- Salinity: low, not a concern
- Total Dissolved Solids: low, not a concern
- Chloride: normal for the season

Altogether, this data indicates that the lake, at the time of testing, is of good quality. This sample is not indicative of the overall water quality, and does not account for pollutants that are present during the warmer months (e.g. nitrogen and phosphorous from fertilizers).

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Suggestions for Water Quality and Habitat Improvement

In order to reduce fish kills, duckweed mats, and the mucky substrate, efforts should be made to reduce both the internal and external phosphorus sources.

Internal Phosphorus Loads

The aerators have already started to reduce the internal phosphorus load by circulating oxygen and decomposing materials. It is outside of PSCW's expertise to determine if the bacteria has had an effect; it may be worthwhile to contact the bacteria manufacturers to determine how quickly the product should be working. Despite these efforts, however, there may be areas within the lake (e.g. close to shore and in far reaching 'fingers') that the aerators are not reaching, so circulation is not occurring. The reach of circulation could be determined using a dissolved oxygen meter at different depths; Dr. Anshu Signh from Riverside Global may be able to assist in this. More information can be found at https://riversideglobal.co/anshu-singh/

As an additional measure, PSCW recommends incorporating native wetland plants on the shoreline buffer and in the water. Not only will these wetland plants help to uptake excess nutrients, but they will also aid in flood prevention and provide habitat for wildlife. It is best to wait to plant native seeds until the fall; plugs can be planted in the spring/summer. Below are several suggested native species to plant around the pond:

- Swamp milkweed (*Asclepias incarnata)*
- Button bush (*Cephalanthus occidentalis)*
- Rose mallow (*Hibiscus laevis)*
- Broadleaf cattail (*Typha latifolia)*
- Wetland sedges

More suggested species and information can be found at https://secure.iowadot.gov/lrtf/docs/WetlandSeedlingGuide.pdf and at https://www.iowadnr.gov/Fishing/About-Fishing-in-Iowa/Iowa-Ponds/Pond-Plants

Native plant seeds and plugs can be purchased through Prairie Moon Nursery, Purple Violet Shop, Rock Island Soil and Water Conservation District (SWCD), Scott County SWCD, Iowa State Forest Nursery, and Guardians of the Forest and Prairie.

Another way to utilize wetland plants is through with floating islands. This can be a fairly cost-effective approach, as they can be "DIY-ed." Floating islands utilize wetland vegetation to naturally soak up nutrients from the water. These can be installed throughout the pond for optimum uptake and increased habitat. To be effective, a coverage of at least 10% of the pond surface by a floating island is needed. Depending on the type, they may need to be removed each winter.

External Phosphorus Load

While the current and suggested practices will help reduce the nutrient load, the lake's issues will not be resolved if external sources are still inputting pollutants.

One source of nutrients is from organic matter, such as leaf litter from the shoreline trees. To help reduce this input, homeowners around the lake could remove the small, woody vegetation (those <5" in diameter) and make an effort to reduce leaf litter on the hillside. It should be noted that it is not the goal to completely keep all leaves out of the pond, but rather reduce the leaf litter to an amount that is more manageable for the lake system to decompose.

Additionally, homeowners within the watershed (as identified in the maps) should be cautious if/when applying fertilizer, and ensure they are following application directions and conditions.

While these practices will help reduce phosphorus load, it is likely that the primary source of nutrients is from the upstream agricultural fields. A rocky path through a neighbor's yard runs directly from the field to a culvert and tile that drains to the lake (see Figure 1). It was noted that this area of the lawn used to be grassy and consistently wet, so the homeowner installed rocks for easier mowing. However, this, actually allows the nutrients from uphill to flow directly into the water. It is strongly recommended that a stretch of at least 10 linear feet of native grasses (listed in the section prior) are planted within this rock path. This will help to soak up nutrients, slow the water flow, and reduce sediment. Even if the homeowner were to install a few clumps of grasses throughout the path (as opposed to 10 linear feet) to maintain a more manicured look, it would be more beneficial than plain rock.

Figure 1: Rocky path at [redacted]

External Phosphorus Load, cnt.

As an additional measure, a small native grass buffer could be installed at the confluence on the edge of the field, right before entering the rocky path. This would further help to reduce nutrients and sediment entering the lake, but may require coordination between the agricultural producer and neighbor. Some local cost-share programs may be available to help cover costs; a list of funding options can be found at https://www.partnersofscottcountywatersheds.org/stewardship/funding/

Though less direct, there is an additional drainage path coming from the upland agricultural land and lawn on the northern reach of the lake. There is a considerably larger distance between the field and lake on this side, allowing for more filtration before reaching the lake. However, much of the area between is mowed turf, which is not as efficient at slowing and absorbing nutrients as native plants. To reduce the input coming from the north, a grass buffer and/or wetland plants could be planted at the northern shore (see Figure 2).

Figure 2: Northern end of the Lake from landowner's backyard.

The HOA has already taken important steps in bringing this lake system back into balance, but it external sources will continue to offset these efforts. A multi-prong approach is needed to fully address issues and improve the water quality of the Lake.