

The effect of aeration on algae and dissolved oxygen in ponds

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NOTE: This project was considered at the 54th annual Edison Science Fair in 2011. Katie received the first award from the CHNEP for a project that helps implement the CHNEP *Comprehensive Conservation and Management Plan*.

Reports in the Stoneybrook community newsletter discussed concerns regarding the lakes in the community. I became interested in these ponds and wanted to investigate why the ponds on the golf course were experiencing signs of algae growth.

When algae take in dissolved oxygen (*DO*) through respiration, the algae takes away *DO* from fish, which they need to survive. I looked at two methods commonly used to address the amount of *DO* in lakes: aerators and fountains. An aerator is a pipe at the bottom of a lake that pumps air through the lake thus moving the water and cooling off the water making it easier for fish to live. Fountains are thought to be somewhat effective towards this cause as well because they move water at the top layer of the lake.

The purpose of the experiment was to see which method is the most effective to increase *DO* and algae. The research question is: What is the effect of aeration on algae biomass and dissolved oxygen in lakes on the Stoneybrook golf course?

I tested six lakes on the Stoneybrook golf course: two with aerators, two with fountains and two with neither. The experiment began by using a sampling tool to collect a cup of water from each of the lakes. Then the probe of the DO200 (a tool used to measure *DO*) was put into the cup of water to get the dissolved oxygen reading. A transect was used to measure algae so that each lake would have an equal sampling area. Next I went to the northernmost, southernmost, easternmost, and westernmost points of the lake and collected all of the algae that floated on the top of the lake at each location. All of the algae from the lake were combined and put on a screen outside for a day to dry. When it was dry the algae was placed on a scale. This procedure was repeated three times, once in August, once in September and once in October of 2010.

During the last sample, the dissolved oxygen in the lakes rose significantly. Matthew Nieder, (Stoneybrook Golf Course Superintendent) relayed information that copper sulfate was added to the golf course lakes prior to sampling. Copper sulfate is an algaecide, herbicide, germicide, and fungicide. It also contains dye to indicate which lakes already had copper sulfate applied. Copper sulfate also works as a stimulus for dissolved oxygen. So the sample for October did not show the same lake with the same chemical composition as was being tested in previous months, but a lake that copper sulfate was applied to, which caused the dissolved oxygen to rise.

In conclusion, the hypothesis was valid. The lakes with aerators had the most dissolved oxygen (*DO*) and the most algae in all the lakes that were sampled. Aerators (4.95 PPM) had the most dissolved oxygen, next lakes with nothing (4.86 PPM), and fountains (4.23 PPM) had the least. As temperature went down so did *DO*. I also concluded that algae grow most in lakes

with aerators (61.67 g), next lakes with fountains (6.67 g) and lastly lakes without aeration (6.17 g). I believe that this is because of the *DO* level. The more *DO* a lake has the more life it can support. Although the copper sulfate in October did influence the outcome, the aerators had the most *DO* and algae by the end of the second sample. Also the study shows that the less algae present the more *DO* because algae consumes *DO*. I think that all lakes (in developed areas) should have aerators, not only because aerators increase the amount of dissolved oxygen but because out of all the lakes, I saw the most life in aerated lakes. Lakes should have aerators instead of fountains, because aerators are relatively the same price as fountains, but aerators perform better than fountains and make a significant difference because they pump air instead of water. Aeration greatly impacts aquatic life and makes for a healthier ecosystem.