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## **The Effect of Carp on Overall Water Quality**

### **Abstract**

This project was done to study the effects of a carp enclosure on the overall water quality. We decided to take on this endeavor because of the carp enclosure project and the interest we had on the carp's effect of the water quality in Lake Wingra seeing as though it is a non-native species. By collecting algae contents, chloride contents, and secchi disk readings, we found that the overall water quality inside the carp enclosure is better than the water outside of the carp enclosure based on those three variables. Although there were few errors made while conducting the experiments, we are confident that these results shown are true and can be useful for future projects to determine the health of Lake Wingra in regards to the water quality.

### **Introduction:**

Lake Wingra is located in the center of Madison in a very urban area. It is the smallest of all of the five Madison lakes. Native Americans used this lake and the area around it extensively for many years. In the last 200 years the condition of Lake Wingra has changed very dramatically. This lake is now full of run off chemicals and pollutants. This is the only known watershed to have caused a death by exposure to blue-green algae by a swimmer. There are many problems facing Lake Wingra currently, some of these issues are: worsening habitats, reduced spring flow and groundwater levels along with the introduction of non-native plant and animal species. (WRM Workshop 1999). The health of Lake Wingra is vital to the community around the lake. Lake Wingra has tremendous recreational value as well as wildlife, springs and landmarks.

Carp were introduced by the US government as a food source in a very large and successful stocking effort; they were introduced to Lake Wingra in the 1880's (Baumann, Kitchell, Magnuson and Kayes). In 1930 Carp were the dominant fish in Lake Wingra (WRM Workshop 1999). During the following decades Carp almost wiped out all rooted vegetation in Lake Wingra. During the 1950's there was an intensive restocking of Lake Wingra in an effort to reduce the Carp population (Baumann, Kitchell, Magnuson and Kayes). Carp have been linked to problems such as loss of submerged vegetation and overall sickness to the eco-systems they live in. This has become a concern in Lake Wingra because we know there is a large population in this lake.

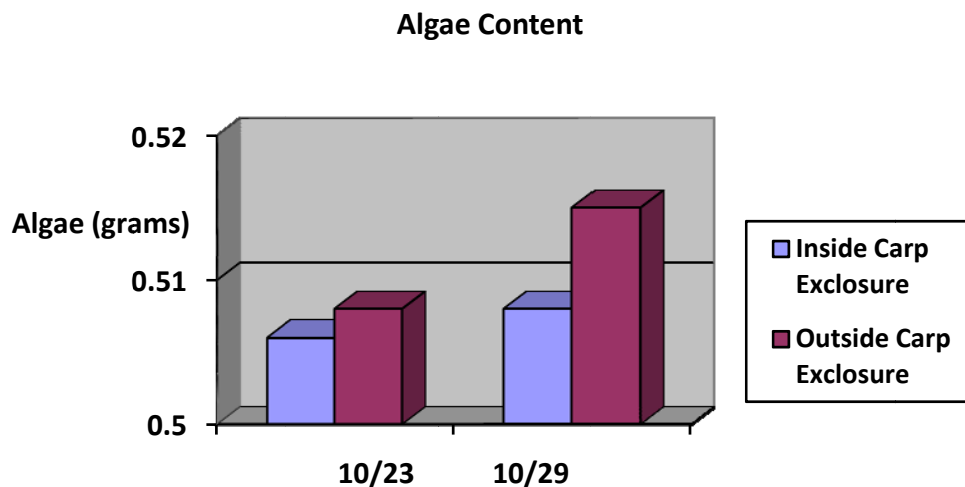
In the past, there have been major biological adjustments and carp removals since they were introduced. In 2005, an experiment was conducted by implementing a non-carp enclosure. The carp enclosure separates Lake Wingra into two different areas: inside the carp enclosure and outside the carp enclosure. Inside the enclosure the carp have been removed. This experiment is being done to see the effects of the carp on the native macrophytes that live in Lake Wingra. Samples are taken both inside and outside the enclosure. In doing our research we are trying to find out whether or not the carp is the reason for the poor health of Lake Wingra. Our project focuses on taking samples of algae to see what different kinds or how much algae exists in and out of the carp enclosure. We believe the water inside the carp enclosure zone is healthier in terms of

phosphorous content, algae content, chloride levels, and secchi disk readings than the water outside the carp enclosure zone.

### Methods:

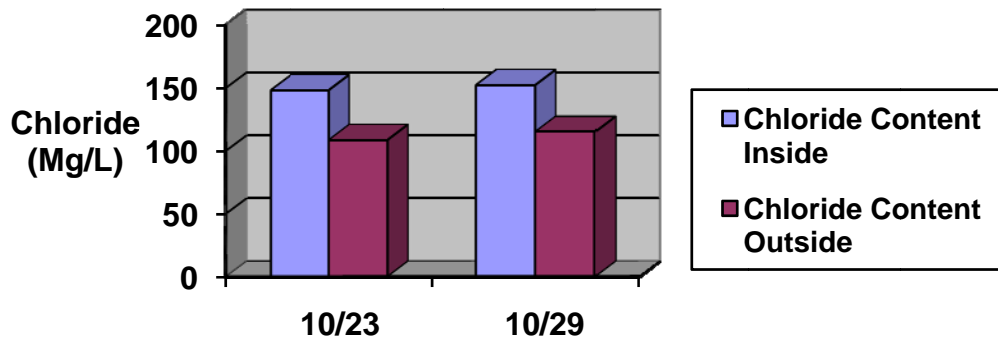
We tested the lake's clarity on three different days in three different random locations in the lake each time. We tested the water clarity using the secchi disk. We decided to do this because the difference in water clarity is a factor in the health of the water. We looked at the secchi disk readings from the LTER database to compare our results to theirs. We also took samples of the water to later test chloride levels using the HACH test-kit, another factor in healthy water. We took samples of the algae using the Schindler Plankton Trap. Each time we took a sample we dropped it into the lake exactly one meter. These samples were then mixed with ethanol to preserve the algae. After three different samples were taken we took our samples into the lab. We weighed dry filter paper. We did this to later see if the algae would cause the filter paper to weigh more. We poured the algae onto filter paper then used a vacuum tube to remove excess water so only algae remained. We put the filter paper in the oven 60 degrees Celsius for three days. When the paper was dry we took the filter paper out to weigh it again to see what the difference was. We also put filter paper with nothing on it in the oven to see if they had any water weight in them, which would affect our results. It would affect our results because if the filter paper weighed different amounts to begin with, the results would have different meanings because some would weigh more due to the weight of the paper, while others would weigh more due to the amounts of algae content on them. We then took our chloride samples and tested them using a chloride testing kit.

### Results:



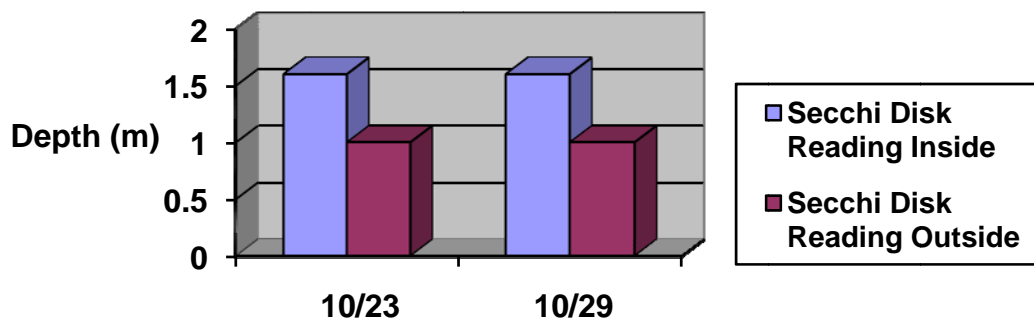
The algae content was higher each day outside the carp enclosure (Figure 1).

## Chloride Contents Inside and Outside the Lake Wingra Carp Enclosure



The chloride content was lower inside the carp exposure on both test dates (Figure 2).

## Secchi Disk Readings Inside and Outside the Lake Wingra Carp Enclosure



The water clarity was much higher inside the carp exposure (Figure 3).

### Discussion

Our results show, along with the “Lake Wingra Enclosure Project” which was conducted in December, 2007, found that the water clarity was better inside the carp enclosure than in Lake Wingra. The first thing which we had issues with occurred while using the Schindler Plankton Trap. Some of our results may have contained more water than others which may have altered the drying out process. Another source of error could have come while using the secchi disk. The secchi disk readings may have had human error and done with the naked eye, however, this percent of error would have been very

small and the same for both measurements. Another source of error was caused by the filter paper we used for the algae samples. After removing the samples from the oven, several of the samples lost weight due to the different weights of the filter paper to start with. High chloride levels can cause harmful outcomes to plant life, wild life, and aquatic life because of the presence of sodium chloride. The chloride samples may have been inaccurate because it was only our second time conducting the test and we could have left it in the refrigerator too long in the ethanol alcohol. The implications of our results are that removing carp from the entire lake would increase the water clarity, but not much else would be significantly different. Future studies should pay more attention to detail when conducting chloride and algae samples to see whether or not the enclosure does more to Lake Wingra's health besides making the water more clear. We speculate that if more attention to detail during such experiments as algae and chloride content was done, that they would find results concluding that indeed the carp enclosure does help in these two areas as well. In doing so, would conclude the carp enclosure as a healthier source of water than the entire lake itself.

### Works Cited

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