

ECOLOGICAL STUDY

HIDDEN LAKE, 2006

HADDAM, CT



Prepared by

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For

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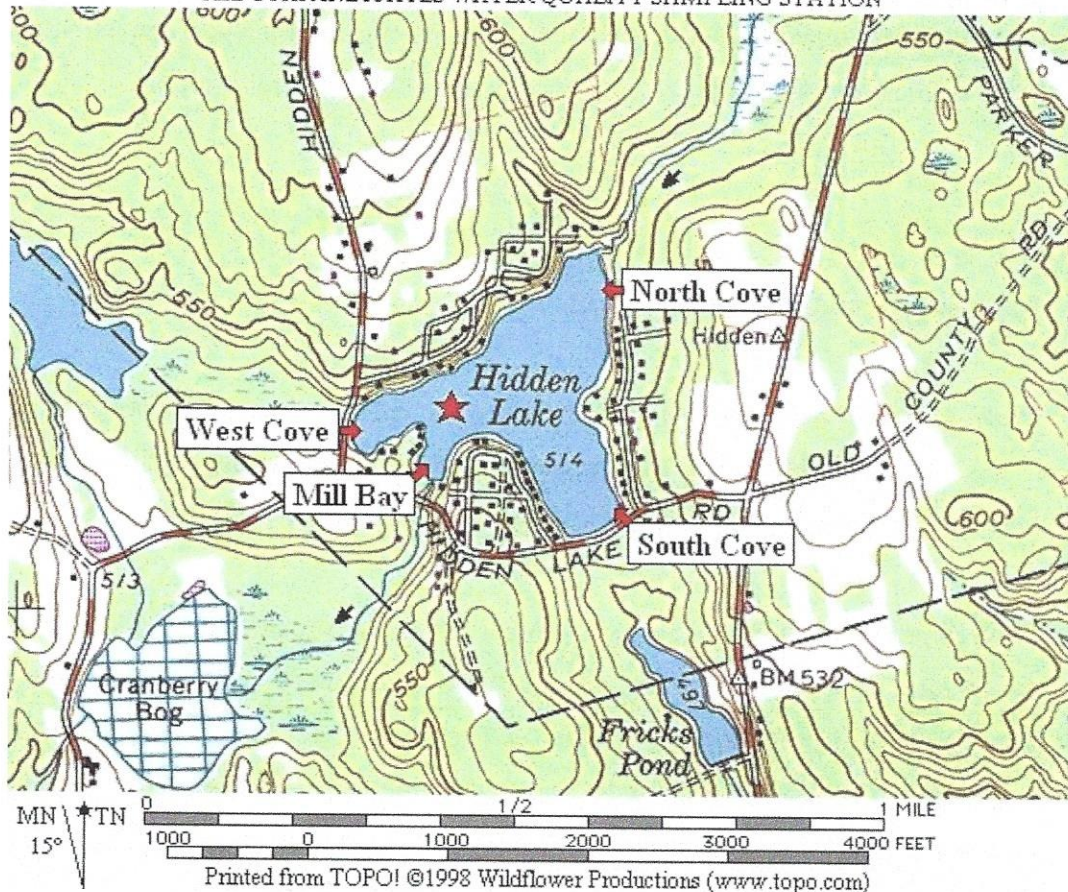
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INTRODUCTION

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From

RED STAR INDICATES WATER QUALITY SAMPLING STATION



U.S.G.S. Topographical Map, Haddam Quadrangle

as the concentration of chlorophyll a using a Turner fluorometer and buffered acetone extractions. Zooplankton were collected using a 80 μ m mesh net towed horizontally for

Total phosphorus is the most important nutrient limiting algal growth in many aquatic systems. In the lake, total phosphorus ranged from undetectable in August 1995 to 0.020 mg/l in 2006. As will be discussed below, Hidden Lake has benefited from these consistently low phosphorus concentrations.

years intervening between the two studies. Apparently, the condition of the lake has remained stable over this period.

Table 2 TROPHIC LIMITS

Status	Total Phos. (mg/L)	Total Nitrogen (mg/L)	Chlorophyll a (ug/L)
Oligotrophic	<0.010	<0.200	<2
Early Mesotr.	0.010 - 0.015	0.200 - 0.300	2 - 5
Mesotrophic	0.015 - 0.025	0.300 - 0.500	5 - 10
Late Mesotr.	0.025 - 0.030	0.500 - 0.600	10 - 15
Eutrophic	>0.030	>0.600	>15

HIDDEN LAKE AVERAGE DATA FOR JUNE, JULY AND AUGUST

Year	Total Phosphorus (mg/L)	Total Nitrogen (mg/L)	Chlorophyll a (ug/L)	Trophic Status
1995	0.013	Not Done	7.373	Mesotrophic
2006	0.013	0.518	5.522	Mesotrophic

Limited water quality data were developed by the Connecticut Agricultural Experiment Station (CAES) during their invasive plant survey of the lake in 2005 (Appendix B). Although their study found slightly higher conductivity, together with lower alkalinity and pH, the data generally corroborated the findings of the 1995 and 2006 reports, indicating that the lake is a well oxygenated mesotrophic soft water system with acceptable phosphorus levels.

PLANKTON

The plankton are microscopic organisms which inhabit the open waters of a lake or pond. This term includes both plants and animals - phytoplankton and zooplankton.

Phytoplankton

Phytoplankton are microscopic algae which swim or float in the open water. Dense populations of phytoplankton can color the water green and increase turbidity. Total numbers of phytoplankton were generally low during both studies. The dominant algae were the

The absence of invasive plants is an extremely important feature of Hidden Lake. The CAES investigators did a very thorough search of the lake and found none. Only a few lakes in the state remain free of these weeds. The 1995 report discussed characteristics of Eurasian water-milfoil, *Myriophyllum spicatum*, and included an illustration. However, two other invasive species are now widespread in Connecticut Lakes and are seriously affecting recreation: variable-leaf water-milfoil *Myriophyllum heterophyllum*; and fanwort *Cabamba caroliniana*. These plants form dense bushy growth up to and across the surface, interfering with boating and fishing activities. They reproduce primarily by fragmentation, and are carried from lake to lake on motors and boat trailers. Upon reaching a lake, the plant fragments take root and can spread throughout the lake within a few years. They tend to fill in rapidly where native plants have been removed by harvesting or herbicide applications.

Other invasive species include curlyleaf pondweed *Potamogeton crispus*; the naiad *Najas minor*, and water chestnut *Trapa natans*. Curlyleaf is a spring form which dies back early in the summer. Naiad grows prolifically but remains near the bottom. Water chestnut has floating leaves and produces many large spiny seeds which curtail swimming activities. Thus far, it is not widespread in the state.

RECOMMENDATIONS

The 1995 report discussed a variety of recommendations, all of which are still valid. The report can be found on the Hidden Lake Association web page (www.hiddenlakect.org). Management recommendations within the watershed included maintenance of septic systems, reduction of fertilizers, discouragement of Canada geese, prevention of soil erosion and limitation of additional beach sand. Discussions of in-lake plant management measures included grass carp (not recommended), herbicides, benthic barriers, plant harvesting and winter drawdown. Other possible options included aeration and dredging.

Existing Association Programs

It is also important that homeowners be aware of other sources of nutrients which may originate on their property. Soil erosion can occur due to lawn replacement, gardening activities, construction, uprooted trees during storms, etc. Any areas of open soil should be surrounded by silt fence or hay bales and stabilized with mulch until vegetative cover can be established. Residents in the vicinity of the lake should be urged not to have liquid fertilizers applied to their lawn. Only slow release types designed for lakeside lawns should ever be used. Lawn and garden herbicides and pesticides should be used sparingly, or not at all. Cars, lawn furniture, etc. should be washed in grassy areas. This will ensure that the wash water will filter through vegetation into the soil rather than flow into a storm drain or stream leading to the lake. Power washing a house with high phosphate detergent can release significant phosphorus to the environment.

Enteric Bacteria Testing

For many years the Association has been conducting tests during the summer to determine the safety of the water for swimming. Samples are collected at East Shore Beach, West Shore Beach and Shore Beach. Samples are also collected in North Cove, West Cove, South Cove and Mill Cove. The tests include fecal coliform and E. coli bacteria, together with nitrate, nitrite and total phosphorus.

Other Existing Programs

The Association has developed an internet web page to disseminate information to members (www.hiddenlakect.org). Bacterial testing results and various lake reports are posted on this site. Communication by e-mail is also an important tool. Participation by all of the neighborhood residents is essential for protecting the lake.

Tree stumps were removed from West Cove and South Cove to improve boating and fishing. The lake was stocked with 125 large mouth bass.

the water as much as possible, and removed from the shoreline. This method offers some relief, but is labor intensive and is best limited to fairly small areas.

Draw down

The by-laws of the Association require that the lake be drawn down to allow for the repair of docks and other shoreline structures. The lake is drawn down every other year between October 1 and January 1, and the basin refills quickly in the spring. When a lake is drawn down during the winter, many soft bodied plants, including *Potamogeton* species, die back due to drying and freezing. The heavy leaves, stems and rhizomes of water lilies are less affected. The success of drawdown for plant control depends on the severity of a particular winter. Drawdown has lake-wide impacts. Shoreline and bottom invertebrates will be adversely affected. However, water levels in lakes vary naturally from year to year and, in general, drawdown is a benign method of plant control. Plants and animals surviving under water off shore will eventually move back into the near shore areas. Since the drawdown of Hidden Lake is an ongoing program, it is possible that plants resistant to freezing and drying have already been selected for, and that the effectiveness of the method may be decreasing with time.

Herbicides

Lake wide use of herbicides is not recommended. Masses of dead plants decompose in the lake and oxygen depletion can result. Fish shelter and breeding habitat is lost. However, because of plant density, access to open water is restricted in front of many of the shoreline residences. Small scale use of appropriate herbicides could be carried out in specific limited areas, with the understanding that chemical applications provide only temporary control. A pesticides permit from the CTDEP is required. Herbicides must be applied by a licensed professional who will recommend the most appropriate chemical and calculate the needed concentration. As with harvesting, invasive plants can be introduced into the lake on boats used for chemical applications.

such resources, however, the cost of large scale dredging is beyond the financial capabilities of most lake associations.

SUMMARY

The 2006 study indicates that the condition of Hidden Lake has not changed significantly since 1995. Oxygen levels are adequate to sustain fish and other aquatic animals. Conductivity, alkalinity and pH are within the range expected for a soft water lake. The water is clear but very dark in color due to the presence of natural humic substances. Phytoplankton numbers and levels of chlorophyll a (phytoplankton biomass) are moderate to low. The zooplankton community is dominated by small forms, especially rotifers. Total nitrogen, total phosphorus and chlorophyll a levels indicate that the lake is mesotrophic. This classification has not changed since 1995. The majority of lakes in Connecticut fall within the mesotrophic range. Hidden Lake is shallow and an abundance of aquatic plants naturally results from this characteristic. Plant surveys in 2006 and 1995, together with a 2005 study by the Connecticut Agricultural Experiment Station, indicate the presence of a large number of plant species. Diverse beds of aquatic plants are important to lake ecology, providing food and cover to amphibians, reptiles and fish. However, floating leaved plants in many areas of Hidden Lake have become dense, affecting its appearance and recreational value. A plant management program should include the continuation of winter drawdown, together with the possible small scale use of chemicals and limited plant cutting in specific areas. Although Hidden Lake is shallow with an abundance of plants, it remains a vigorous and stable ecosystem.

REFERENCES

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