Draft Chazy Lake Management Plan

July 2020

Prepared by the Lake Champlain Lake George Regional Planning Board for the Chazy Lake Watershed Initiative, with funding assistance from NYSDEC through the Environmental Protection Fund (EPF).

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Chazy Lake at-a-Glance:
Town of Dannemora, Clinton County, New York

Elevation	1541 feet
Area	1807 acres
Shoreline Length	11 miles
Length	~3.5 miles
Maximum Depth	72 feet
Mean Depth	33 feet
Maximum Width	~1.5 miles
Flush Rate (times/year)	0.33
Thermocline	~30 feet

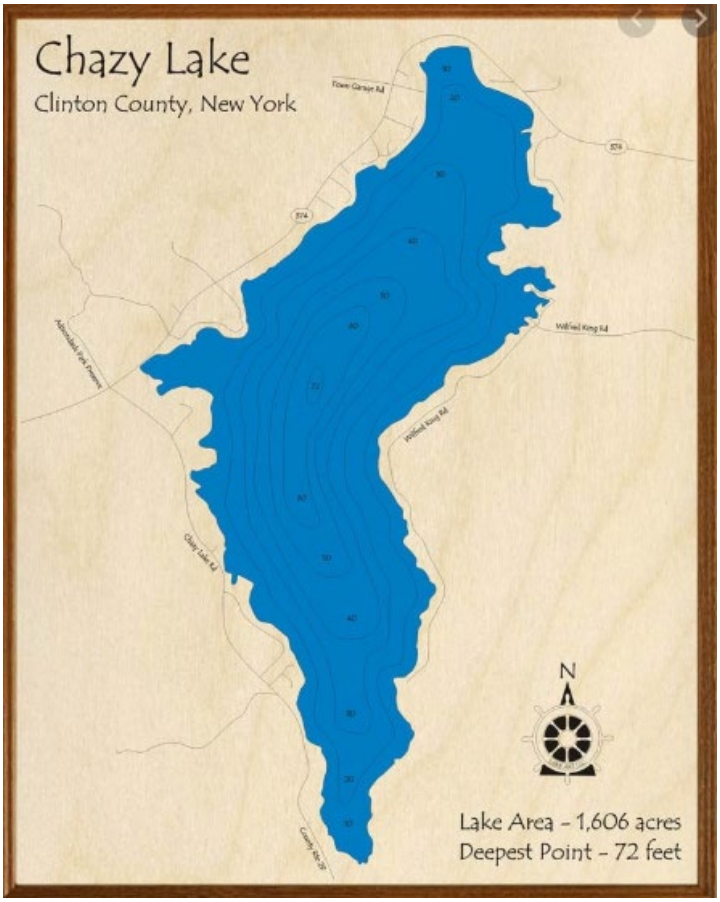

Photo 1: Contour Map of Chazy Lake.
Source: lakehourselifestyle.com

Introduction

Chazy Lake is set in the valley between Lyon and Ellenburg mountains in the Clinton County Town of Dannemora. A dam is located at the northern end of the lake near Ledger Corner and was once used for hydropower. The original dam was built in the early 1870s and was washed out in the spring of 1898 or 1899 and was reconstructed in the 1920s. The lake runs north to south and boasts a healthy fishery that is very popular among anglers. Chazy Lake is mesotrophic which is an intermediate classification between oligotrophic indication a low productivity lake and eutrophic meaning a lake with high biological productivity.

Chazy Lake Watershed Initiative

Insert narrative about group and mission.

Lake Characteristics

The watershed of Chazy Lake lies in the Adirondack Mountains and is in part of the Lake Champlain Basin and the Great Chazy River Watershed sub-basin. The lake's watershed is 14,085 acres and is steeply sloping with elevations ranging from 1,541 at the lake's surface to 3,830 feet above sea level at

Figure 1: Chazy Lake and Watershed Boundary.
Source: Adirondack Lake Assessment Program Chazy Lake Report, 2017

the summit of Lyon Mountain. The lake has a surface area of 1,606 acres and a steeply sloping watershed of 14,085 acres. The maximum depth is 21.9 meters (72 feet) and the mean depth is 10.1 meters (33 feet). The bottom of Chazy Lake slopes rapidly away from the shoreline in most places, providing limited areas for the growth of aquatic plants.

Chazy Lake serves as the headwaters to the south branch of the Great Chazy River which together with the Little Chazy River forms one of the main tributaries to Lake Champlain.

Waterbody Assessments and Classifications.

The New York State Department of Environmental Conservation (NYSDEC) Division of Water utilizes information gathered through its monitoring programs to assess the health of New York State's waterbodies and the watersheds draining them. Watershed-wide water quality reports are a compilation of periodic health assessments and help the NYSDEC prioritize protection and restoration activities in waterbodies. Following the last monitoring and assessment of Chazy Lake, the NYSDEC found no use impairments to the lake.

Chazy Lake (1002-0009) **NoKnownImpct**

Waterbody Location Information Revised: 04/28/2009

Water Index No:	C- 3 (portion 6)/P20	**Drain Basin:**	Lake Champlain
Hydro Unit Code:	02010006/080 **Str Class:** AA(T)		Great Chazy/Saranac
Waterbody Type:	Lake (Unknown Trophic)	**Reg/County:**	5/Clinton Co. (10)
Waterbody Size:	1827.8 Acres	**Quad Map:**	ELLENBURG MTN. (B-25-3)
Seg Description:	entire lake		

Water Quality Problem/Issue Information (CAPS indicate MAJOR Use Impacts/Pollutants/Sources)

Use(s) Impacted	Severity	Problem Documentation
NO USE IMPAIRMNT		

Type of Pollutant(s)

Known:	- - -
Suspected:	- - -
Possible:	- - -

Source(s) of Pollutant(s)

Known:	- - -
Suspected:	- - -
Possible:	- - -

Figure 2: Excerpt from NYSDEC Waterbody Inventory/Priority Waterbodies List (WI/PWL). Source: NYSDEC.gov

New York State waterbodies are also assigned a “best use” classification. Chazy Lake is a Class AA(T) waterbody. Class AA indicates that it’s best uses are as a source of water for drinking, culinary or food processing purposes; primary and secondary contact recreation; and fishing. This classification is given to those waters that meet the New York State Department of Health’s drinking water standards and are considered safe and satisfactory for drinking water purposes. The additional T classification means that the waterbody supports trout populations or trout spawning. The NYSDEC stocks Chazy Lake with rainbow trout, lake trout, and landlocked salmon. Best use classifications help develop water quality standards that specify a maximum amount of a pollutant that can be preset in a waterbody and still allow it to achieve its best use classification.

The lake has excellent water clarity and a productive cold-water fishery. Lake sampling in 1999 found some low dissolved oxygen in deeper waters, however these conditions do not impact the fishery and are thought to represent natural lake conditions.

Photo 2: Chazy Lake's classification of Class AA(T) indicates that the water is suitable for trout habitat and spawning. Source: NYSDEC

Soils

The soils surrounding Chazy Lake are predominantly sand and sandy loam with steep rocky mountain surrounds. The soil conditions here combined with the steep topography lend the area to an increased risk of erosion during heavy rain events.

Geography

Chazy Lake drains an area of approximately 22 square miles. The drainage from the southwest side is primarily from Lyon Mountain which rises to an elevation of 3,830 feet and from the southeast from Johnson Mountain with an elevation of about 2,500 feet and Ellenburg Mountain to the north with an elevation about 2,500 feet.

Land Use

The total watershed area of Chazy Lake is just over 14,000 acres. The greatest land use/land cover in the watershed is deciduous forest which covers 61% of the land area, followed by 16% of evergreen forest, 11% surface water, 2% wetlands, 1% residential and 0% agricultural uses. There are just over ten miles of local roads and five miles of state roads within the watershed.

Photo 3: Lyon Mountain rises to an elevation of 3,830 feet on the southwest side of Chazy Lake.
Photo Source: Pat Mercier via Pinterest.

Photo 4: Chazy Lake's abundant fishery attracts anglers and wildlife alike. Photo Source: Owen Ryan.

Current Use of the Lake

In addition to private residences, the lake is accessible by NYSDEC boat launch and the Chazy Lake Beach, both in the Village of Dannemora. Chazy Lake is used for recreational purposes including swimming, boating and fishing. Lake trout, landlocked salmon, rainbow trout, smallmouth bass, northern pike, brown bullhead, yellow perch, rainbow smelt, and pumpkin seed are all present in the lake. Chazy Lake is stocked by the NYSDEC with approximately 7,000 – 7,400 rainbow trout, 1,000 lake trout, and 200 landlocked salmon annually

State of the Lake

Chazy Lake supports a diverse native plant community with twenty-five submersed species, two rooted floating-leaf species and six native emergent species. One species found to be present in the lake, *Myriophyllum alterniflorum,* is on the New York State Rare Plant list and a second species, *Utricularia geminiscapa*, is on the New York State Watch List. The presence of these species indicates that there is a species richness present in Chazy Lake. One submersed species is a non-native invasive species *Myriophyllum spicatum L*, commonly known as Eurasian watermilfoil. Despite the wide distribution of the invasive species, native species remain dominant in the lake. An aquatic plant species survey performed by the Darrin Freshwater institute over a ten-year period found the following species present in Chazy Lake:

Table 1. Aquatic plant species present in Chazy Lake

Source: Darrin Fresh Water Institute, 2015

Species	Common Name	2008	2012	2015
Chara/Nitella	muskgrass, chara	X	X	X
Eleocharis acicularis (L.) Roemer & Schultes	needle spike-rush	X	X	X
Elodea canadensis Michx.	elodea	X	X	X
Eriocaulon septangulare With.	pipewort	X	X	X
Isoetes echinospora Dur.	quillwort		X	X
Myriophyllum alterniflorum L.	little watermilfoil	X	X	
Myriophyllum spicatum L.	Eurasian watermilfoil	X	X	X
Myriophyllum tenellum L.	leafless watermilfoil	X	X	X
Najas flexilis (Willd.) Rostk. & Schmidt.	bushy pondweed	X	X	X
Najas guadalupensis (Spreng.) Magnus	Southern naiad	X	X	X
Nuphar variegatum Engelm. ex Durand	yellow pondlily	X	X	X
Nymphaea odorata Ait.	white pondlily	X	X	X
Pontederia cordata L.	pickerelweed	X	X	X
Potamogeton amplifolius Tuckerm.	largeleaf pondweed	X	X	X
Potamogeton gramineus L.	variable-leaf pondweed	X	X	X
Potamogeton illinoensis L.	Illinois pondweed	X	X	X
Potamogeton natans L.	pondweed	X	X	X
Potamogeton praelongus Wulfen	white-stem pondweed	X	X	X
Potamogeton pusillus L.	small pondweed	X	X	X
Potamogeton richardsonii (Ar. Benn.) Rydb.	Richardson's Pondweed	X	X	X

Table 1 (Continued). Aquatic plant species present in Chazy Lake

Source: Darrin Fresh Water Institute, 2015

Species	Common Name	2008	2012	2015
Potamogeton robbinsii Oakes	Robbins' pondweed	X	X	X
Potamogeton spirillus Tuckerm.	narrow-leaf pondweed	X		X
Potamogeton zosteriformis Fern.	flat-stem pondweed	X	X	X
Ranunculus reptans L.	creeping spearwort	X	X	X
Sagittaria graminea Michx.	arrowhead	X	X	X
Scirpus sp.	rush	X	X	X
Sparganium angustifolium Michx.	burreed	X	X	X
Typha sp.	cattail	X	X	X
Utricularia geminiscapa Benj.	bladderwort	X	X	X
Utricularia gibba L.	humped bladderwort		X	X
Utricularia purpurea Walt.	purple bladderwort	X		
Vallisneria americana L.	wild celery	X	X	X
Zosterella dubia Jacq.	water stargrass	X	X	X

Milfoil Harvesting

Narrative about eradicator and Chazy Lake milfoil harvesting program.

Adirondack Lake Assessment Program (ALAP)

ALAP is a highly successful citizen science lake monitoring program that connects volunteers with the technology and expertise offered by scientists in the environmental field. Citizen science programs are quickly becoming a modern-day model for advancing large scale research and monitoring projects. Chazy Lake has participated in the ALAP citizen science program since 2006. ALAP assessments analyze a number of indicators of water quality including transparency, chlorophyll-a, phosphorus, color, pH and alkalinity, and sodium and chloride.

Transparency

Transparency or clarity is a great indicator of lake condition because it is influenced by many factors related to water quality and human perception. Transparency is measured using a secchi disk reading which is attained by lowering a black and white disk into the water until it is no longer visible from the surface. The distance measured before the disk can no longer be seen is known as the secchi reading. Reduction in the transparency of water can be a result of the presence of a large amount of algae or suspended inorganic materials, such as sediment. The transparency of many lakes in the Adirondacks is influence by the amount of colored dissolved organic material in the water. Monitoring of Chazy Lake has shown a significant downward trend in transparency, decreasing at a rate of approximately 20cm/year.

Chlorophyll-a

Chlorophyll-a is used to measure the algae levels that are present in a lake. Algae are naturally present in every lake system, and are beneficial as a food source, however, excess algae can create a host of issues within a waterbody. There is also a strong correlation between chlorophyll-a levels and clarity, as the more algae present in the water column, the less clear the water will be. Sampling data show that there has been a slight, but significant increase in chlorophyll-a levels in Chazy Lake over time.

Phosphorus

Phosphorus is a limiting nutrient within a freshwater system in New York State, meaning that it comes from very few sources within the environment. Phosphorus increases in a lake is usually a result of human activity. Within the Great Chazy River Watershed, the main sources of phosphorus loading are agricultural and runoff from developed lands. ALAP analysis has not established a trend for phosphorus in Chazy Lake, however testing did observe an unusually high concentration of the nutrient at Eagle Point during the July 2017 testing period.

Photo 5: Chazy Lake. Photo Source: Owen Ryan.

Color

The observed color of a lake is a visual property that results from light being scattered upwards. Analysis of color can provide us with information about the quantity of dissolved organic matter in the water. ALAP testing has observed an increasing trend in color overtime in Chazy Lake.

pH and Alkalinity

pH, which has a range from 0-14, is the measurement of how acidic a waterbody is. A pH reading from 0-6 is considered acidic, a reading of 7 is neutral, and a reading of 8-14 is basic. Lakes can become acidified when they are influenced by organic acid from wetlands and bogs or when acid rain falls on a poorly buffered watershed.

Alkalinity is a function of the amount of calcium carbonate in the water which is derived mainly from the watershed and serves as a measure of the capacity of a waterbody to neutralize acids and thereby resist changes in pH and. Most Adirondack lakes are located in areas with granitic bedrock that has a slow rate of calcium carbonate generation, and therefore a lower acid neutralizing ability. The alkalinity of the water in Chazy Lake averaged 20.6 mg/L indicating that the lake is adequately buffered and is not sensitive to acid deposition.

Sodium and Chloride

Adirondack lakes have naturally low concentrations of chloride and sodium; however, widespread use of road deicers have significantly increased the concentrations of these chemicals in the environment. Each year approximately 98,000 metric tons of road deicers are spread across state roads in the Adirondacks and concentrations of sodium and chloride in Adirondack lakes have been found to be directly proportional to the density of state roads within the watershed. Assessment of sodium and chloride concentrations in a waterbody may serve as an index for the level of hydrologic connectivity a lake has with salted roads in tis watershed. Sodium levels in the lake averaged 5.6 mg/L while chloride concentrations averaged 9.4 mg/L, indicating that the chemistry of the lake is influenced by the 15.5 miles of roads in the watershed. The chloride concentration of Chazy Lake is greater than 72% of participating ALAP lakes.

Issues Overview

Non-Native Invasive Species.

Non-native invasive species are species that are introduced beyond the borders of their historic range, reproduce rapidly, and displace native species. Invasive species can affect Chazy Lake and its watershed by inhibiting recreation, degrading fisheries, impacting forestry and agricultural resources, carrying disease, contaminating drinking water, decreasing property values, degrading wildlife habitat, displacing native species, altering food webs and reducing biodiversity. Invasive species are considered one of the greatest threats to global biodiversity, second only to habitat loss.[1] At a regional level, invasive species present numerous challenges to both nature and people.

With no natural population controls, such as predators, parasites or pathogens, invasive plants and animals can proliferate quickly. Invasive species can establish a competitive advantage or adaptation which allows them to outcompete their native counterparts.

The diversity and magnitude of impacts posed by invasive plants and animals will vary by species, type of habitat invaded, scale of infestation, and associated stressors, among others. Rapidly identifying and addressing invasive species is critical to increase opportunities for successful management and to minimize impacts on the ecology and vitality of the watershed. As an invasive population increases in size, it demands greater resources for management and inflicts greater impacts. Expansive populations are unlikely to be eliminated even with sustained treatment efforts. Some species, once established, have no known control methods.

In 2006, the Adirondack Park Invasive Plant Program (APIPP) identified Eurasian watermilfoil (*Myriophyllum spicatum L*) in Chazy Lake. Shoreline surveys by volunteers identified extensive growth of Eurasian watermilfoil throughout the lake, with dense growth at the south end of the lake and in one cove on the west side. Surveys performed by the Darrin Fresh Water Institute in 2008 and 2012

[1] Park, K., 2004. Assessment and management of invasive alien predators. Ecology and Society 9(2): 12. [online] URL: http://www.ecologyandsociety.org/vol9/iss2/art12.

Photo 6: Eurasian watermilfoil is found in areas throughout Chazy Lake. Photo Source: Lake George Association.

confirmed extensive growth, most notable at the north and south ends of the lake and in coves on the east and west shore.

In an effort to control the Eurasian watermilfoil present in Chazy Lake, the Town of Dannemora utilizes the dam to lower the lake by 2.5 feet every 3 years. A lake level drawdown has occurred in the winters of 2011-2012, 2014-2015, and 2017-2018. After each drawdown, the Darrin Fresh Water Institute conducts a vegetative survey to make sure the method is working. The surveys have concluded that the drawdowns are working, and the quantity of shallow-water milfoil has been reduced by this method without negatively impacting native vegetative species. Deep-water milfoil continues to thrive, however, because the current drawdown level only effects milfoil at a depth of up to 5.5 feet.

Municipal Road Salt

Road salt can have direct and indirect effects on aquatic ecosystems and can also negatively impact drinking water supplies by seeping through the soil into household wells. Contaminants from road salt enter water resources by infiltration to groundwater, runoff to surface water and through storm drains. Water contaminated with road salt will have a higher density and will settle in the deepest part of the waterbody, this can lead to a chemical stratification which can impede turnover and mixing, preventing the dissolved oxygen within the upper layers of the water from reaching the bottom layers and nutrients

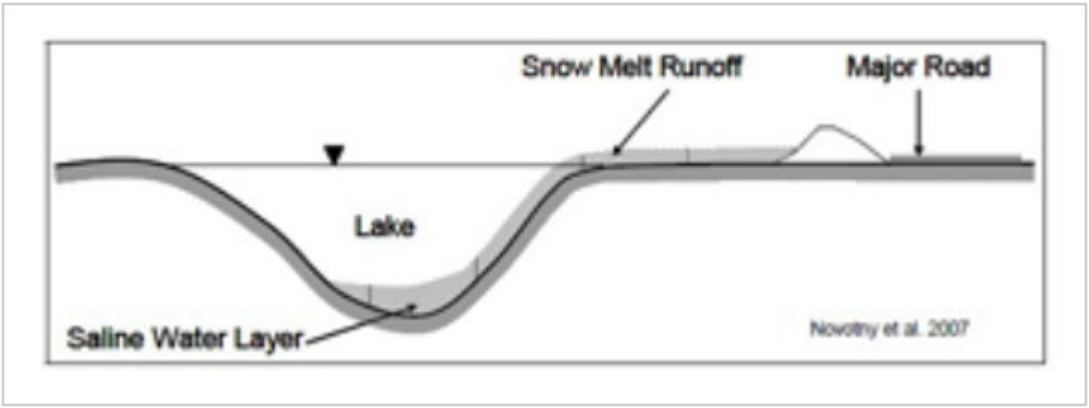

Figure 3: Process by which road salt enters a waterbody. Source: New Hampshire Department of Environmental Services

within the bottom layers from reaching the top layers. This leads to the bottom layer of the waterbody becoming void of oxygen and unable to support aquatic life.

On-Site Septic Systems

Aging on-site septic systems and outdated technology can have significant impacts on water quality, public health and the local economy. Approximately 23% of US households have on-site septic systems and the USEPA estimates that there is an average 20% failure rate for on-site systems nationwide. Many homeowners rely on their septic systems for safe and effective treatment of their wastewater which is treated by the system before it filters into the soil. Recycled water from a septic system can help replenish groundwater supplies, but if the system is not working right it can contaminate nearby waterbodies and wells. Aging and antiquated septic systems are among the main sources of increasing nutrients in waterbodies.

On-site septic system issues can only be meaningfully addressed through local or state legislation. The first step a municipality can take is to require a septic system inspection upon sale or transfer of property. This would not only assist localities in identifying failing systems for the protection of the lake, but also for the protection of the new owner.

Stormwater Runoff

Stormwater runoff, or non-point source pollution (NPS), is one of the major inputs of phosphorus into a lake system. Stormwater runoff is water from rain or snowmelt that does not soak into the ground and instead travels over the landscape, eventually discharging into the nearest surface water either directly or through a stormwater conveyance system like a sewer pipe. As the water travels over the landscape, it picks up pollutants such as oil, gas, litter, sediment, animal waste, fertilizers and road salt and deposits them into surface waters. This pollutant loading has a negative impact on receiving waters and can cause a host of impairments including increased algal growth, bacterial loading that may be harmful to human and animal health, and aesthetic detractions. Additional adverse impacts on stormwater runoff include contaminated drinking water, decreased biodiversity, flooding, soil erosion, decreased water quality, sedimentation, pollution, and bacteria transport. The issue of polluted stormwater runoff is exacerbated by the continual development of undeveloped lands. Undeveloped land, those with natural grass cover and plants, promote the infiltration and evaporation of stormwater runoff, therefore lessoning runoff. Developed lands, which are covered with impervious surfaces such as roads, driveways, sidewalks and buildings, eliminate the ability for stormwater to infiltrate into the ground, therefore promoting polluted runoff into nearby surface waters.

In New York State, stormwater accounts for the majority of pollutants identified from non-point sources in our waterbodies; as much as 63% or more (NYSDEC WI/PWL). Unchecked stormwater runoff can not only impact surface waters by contaminating drinking water, decreasing biodiversity and transporting bacteria, but it can also cause flooding, which hosts its own problems from destruction of property to increase pollutant loading in floodwaters. Therefore, in terms of the impact that human activity and development can have, controlling the quantity and quality of stormwater is a critical objective of stormwater management.

Erosion

Erosion is the geologic process by which earthen materials are worn away and transported by natural means. While erosion is a natural process, human activity can cause of increase it. The alteration of the

vegetation of an area is perhaps the biggest human factor contributing to erosion. Trees and plants hold soil in place and when they are cut down or plowed over the soil becomes more vulnerable to being washed or blown away. Some of the natural factors impacting erosion in a landscape include climate, topography, vegetation and tectonic activity. Eroding soils can become a major source of phosphorus loading to a waterbody because phosphorus particles can easily bind to eroding sediment particles which are then carried into a nearby waterbody by stormwater running over the land.

The steep mountain slopes and the sand and sandy loam soil types found in the Chazy Lake Watershed contribute to the high erosion potential especially during heavy rain events.

Recommendations

Listing of short, medium and long-term projects and programs to improve the health of Chazy Lake and its watershed including responsible parties, funding acquisition, time frame, etc

- Work with Municipal and County Officials to establish a road salt reduction program for State and County Roads.
- Continue to seek funding for milfoil harvesting/reduction program
- Implement a lakeshore vegetative buffer program to reduce stormwater inputs into Chazy Lake
- Work with Clinton County to continue septic replacement program
- Work with Town of Dannemora to implement a septic pump-out program
- Work with NYSDOH and Clinton County Department of Health to create a Drinking Water Source Protection Plan (DWSP2) for Chazy Lake.