

LCI Lake Water Quality Summary

Lake Name: Davis Lake

Location: Macomb Reservation State Park, Town of Peru, Clinton County

Basin: Lake Champlain Basin

Size: 23.3 hectares (=57.5 acres)

Lake Origins: Concrete/Earthen Dam

Major Tributaries: Salmon River

Lake Tributary to: Salmon River

Water Quality Classification: C (best intended use: secondary contact recreation)

Approximate Sampling Site: Latitude: 44.44.6176, Longitude: -73.60867

Sampling Access Point: Macomb Reservation State Park Campground

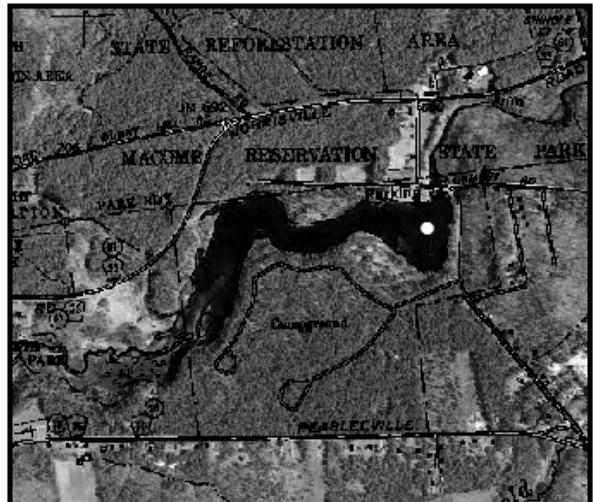
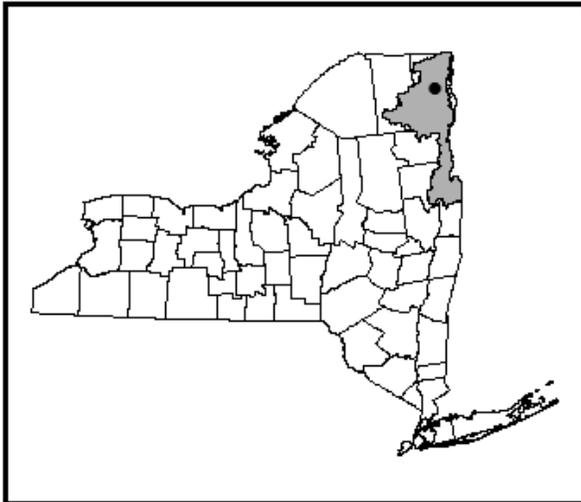
Monitoring Program: Lake Classification and Inventory (LCI) Survey

Sampling Date: 6/22/2009, 7/28/2009, 8/24/2009, & 9/22/2009

Samplers: Fred Dunlap, NYSDEC Division of Water, Raybrook
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Lake Map:
(sampling location marked with a circle)



Background and Lake Assessment:

Davis Lake is a 58 acre impoundment on the Salmon River in the southern portion of Macomb Reservation State Park in Clinton County. The State Office of Parks Recreation and Historic Preservation (OPRHP) operates a swimming beach and allows non-motorized boats and fishing in the lake. OPRHP also operates a campground on the southern shoreline of the lake. Much of the land surround in the lake is in Pitch Pine-Oak forest habitat. The majority of the greater watershed is forested with some interspersed agricultural lands. Davis Lake was included in the 2009 Lake Classification and Inventory (LCI) intensive (monthly sampling) survey of the Lake Champlain Basin at the request of the OPRHP. This request was made to give OPRHP additional water quality information for the lake. OPRHP also conducted monitoring of the lake during 2009 which included an assessment of the aquatic plant life and a water sample that was analyzed for total phosphorus.

Davis Lake can generally be characterized as *mesotrophic*, or moderately productive. The average total phosphorus reading (TSI = 47) and the average chlorophyll *a* reading (TSI = 45) are both typical of *mesotrophic* lakes. With the total phosphorus and chlorophyll *a* readings it is likely that water clarity readings were typical greater than 2 meters. These data also suggest that baseline nutrient levels do not support persistent algae blooms in the lake.

Four plant species were observed in the lake and included *Elodea canadensis* (common waterweed), *Ceratophyllum demersum* (coontail), *Potamogeton natans* (floating brownleaf pondweed), *Potamogeton amplifolius* (large leaf pondweed). All four are native and commonly found throughout most of New York State.

The only parameters of concern found through the LCI were total phosphorus and iron. Total phosphorus exceeded the State Department of Health's guidance value in two of the five samples that were collected and analyzed for total phosphorus. This may indicate slight nutrient enrichment, which would be consistent with the findings of the Stream Biomonitoring Unit's (SBU) survey on the Salmon River in Peesville in 2003. During this survey, the SBU found an invertebrate community that was somewhat altered from natural conditions with their impact source determination pointing to slight enrichment. The slightly elevated iron values may cause taste or odor issues. All of the other parameters analyzed though the LCI fell below water quality standards or guidance values.

Evaluation of Lake Condition Impacts to Lake Uses

Potable Water (Drinking Water)

Davis Lake is not classified for use as a potable water supply. Although the LCI data are not sufficient to evaluate potable water use, these data suggest that water withdrawals for drinking water purposes may be *stressed* by phosphorus and iron levels.

Contact Recreation (Swimming)

Davis Lake is not classified for contact recreation although OPRHP currently operates a swimming beach when conditions are suitable for swimming. The New York State Water Quality Classification of *Class C* states that "water quality shall be suitable for primary contact recreation, although other factors may limit the use for this purpose". Bacteria data are needed to

evaluate the safety of Bowman Lake for swimming; however, these are not collected through the LCI. OPRHP does collect these data at the swimming beach. The water chemistry data collected through the LCI indicate that swimming may be *threatened* by elevated nutrient levels.

Non-Contact Recreation (Boating and Fishing)

Davis Lake is classified for non-contact recreation, and does currently support this use. Non-motorized boating and fishing should continue to be supported.

Aquatic Life

No direct impacts to aquatic life were found during LCI sampling

Aesthetics

No impacts to the aesthetics of the Davis Lake were found.

Additional Comments

- Periodic surveillance for invasive exotic plant species may help to prevent the establishment and spread of any new invaders, given the escalating problems with exotic aquatic weeds.

Aquatic Plant IDs:

Exotic Plants:

Non observed

Native Plants:

Elodea canadensis (common waterweed)

Ceratophyllum demersum (coontail)

Potamogeton natans (floating brownleaf pondweed)

Potamogeton amplifolius (large leaf pondweed)

WQ Sampling Results

Surface Samples

	UNITS	N	MIN	AVG	MAX	Scientific Classification	Regulatory Comments
TP	mg/l	5	0.015	0.02	0.0275	Mesotrophic	40% of readings violate DOH guidelines
TSI-TP			44.9	48.2	51.9	Mesotrophic	No pertinent water quality standards
TSP	mg/l	4	0.0052	0.0082	0.0112	High % soluble Phosphorus	No pertinent water quality standards
NOx	mg/l	4	0.0044	0.05025	0.0258	Low nitrate	No readings violate DOH guidance value
NH4	mg/l	4	0.021	0.05	0.07	Low ammonia	No readings violate DOH guidance value
TKN	mg/l	4	0.38	0.43	0.55	Low organic nitrogen	No pertinent water quality standards
TN/TP	mg/l	3	42.71	44.37	46.06	Phosphorus Limited	No pertinent water quality standards
CHLA	ug/l	4	3.7	4.33	5.9	Mesotrophic	No pertinent water quality standards
TSI-CHLA			43.4	44.8	48.0	Mesotrophic	No pertinent water quality standards
Alkalinity	mg/l	4	50.7	57.6	64.2	Moderately Buffered	No pertinent water quality standards
TCOLOR	ptu	4	10	21.3	35	Weakly Colored	No pertinent water quality standards
TOC	mg/l	4	4.4	4.9	5.6		No pertinent water quality standards
Ca	mg/l	3	13.9	15.1	17.3	Minimally Supports Zebra Mussels	No pertinent water quality standards
Fe	mg/l	3	0.806	1.005	1.34	Taste or odor likely	33% of readings violate DOH guidelines
Mn	mg/l	3	0.0449	0.1423	0.202		No readings violate DOH guidance value
Mg	mg/l	3	4.28	4.76	5.55		No readings violate DOH guidance value
K	mg/l	3	ND	0.3	1.01		No pertinent water quality standards
Na	mg/l	3	2.97	3.14	3.45		No readings violate DOH guidance value
Cl	mg/l	4	3.8	4.08	4.4	Minor road salt runoff	No readings violate DOH guidance value
SO4	mg/l	4	3.7	4.28	5.2		No readings violate DOH guidance value

Legend Information

General Legend Information

Surface Samples	= integrated sample collected in the first 2 meters of surface water
N	= number of samples
SECCHI	= Secchi disk water transparency or clarity - measured in meters (m)
TSI-SECCHI	= Trophic State Index calculated from Secchi, = $60 - 14.41 * \ln(\text{Secchi})$

Laboratory Parameters

ND	= Non-Detect, the level of the analyte in question is at or below the laboratory's detection limit
TP	= total phosphorus- milligrams per liter (mg/l) Detection limit = 0.003 mg/l; NYS Guidance Value = 0.020 mg/l
TSI-TP	= Trophic State Index calculated from TP, = $14.42 * \ln(\text{TP} * 1000) + 4.15$
TSP	= total soluble phosphorus, mg/l Detection limit = 0.003 mg/l; no NYS standard or guidance value
NOx	= nitrate + nitrite nitrogen, mg/l Detection limit = 0.01 mg/l; NYS WQ standard = 10 mg/l
NH4	= total ammonia, mg/l Detection limit = 0.01 mg/l; NYS WQ standard = 2 mg/l
TKN	= total Kjeldahl nitrogen (= organic nitrogen + ammonia), mg/l Detection limit = 0.01 mg/l; no NYS standard or guidance value
TN/TP	= Nitrogen to Phosphorus ratio (molar ratio), = $(\text{TKN} + \text{NOx}) * 2.2 / \text{TP}$

CHLA	> 30 suggests phosphorus limitation, < 10 suggests nitrogen limitation = chlorophyll <i>a</i> , micrograms per liter (µg/l) or parts per billion (ppb) Detection limit = 2 µg/l; no NYS standard or guidance value
TSI-CHLA	= Trophic State Index calculated from CHLA, = $9.81 * \ln(\text{CHLA}) + 30.6$
ALKALINITY	= total alkalinity in mg/l as calcium carbonate Detection limit = 10 mg/l; no NYS standard or guidance value
TCOLOR	= true (filtered or centrifuged) color, platinum color units (ptu) Detection limit = 5 ptu; no NYS standard or guidance value
TOC	= total organic carbon, mg/l Detection limit = 1 mg/l; no NYS standard or guidance value
Ca	= calcium, mg/l Detection limit = 1 mg/l; no NYS standard or guidance value
Fe	= iron, mg/l Detection limit = 0.1 mg/l; NYS standard = 1.0 mg/l
Mn	= manganese, mg/l Detection limit = 0.01 mg/l; NYS standard = 0.3 mg/l
Mg	= magnesium, mg/l Detection limit = 2 mg/l; NYS standard = 35 mg/l
K	= potassium, mg/l Detection limit = 2 mg/l; no NYS standard or guidance value
Na	= sodium, mg/l Detection limit = 2 mg/l; NYS standard = 20 mg/l
Cl	= chloride, mg/l Detection limit = 2 mg/l; NYS standard = 250 mg/l
SO4	= sulfate, mg/l Detection limit = 2 mg/l; NYS standard = 250 mg/l

Field Parameters

Depth	= water depth, meters
Temp	= water temperature, degrees Celsius
D.O.	= dissolved oxygen, in milligrams per liter (mg/l) or parts per million (ppm) NYS standard = 4 mg/l; 5 mg/l for salmonids
pH	= powers of hydrogen, standard pH units (S.U.) Detection limit = 1 S.U.; NYS standard = 6.5 and 8.5
SpCond	= specific conductance, corrected to 25°C, milliohms per centimeter (mmho/cm) Detection limit = 1 µmho/cm; no NYS standard or guidance value
ORP	= Oxygen Reduction Potential, millivolts (MV) Detection limit = -250 mV; no NYS standard or guidance value

Lake Assessment

WQ Assessment	= water quality assessment , 5 point scale, 1= crystal clear, 2 = not quite crystal clear, 3 = definite algae greenness, 4 = high algae levels, 5 = severely high algae levels
Weed Assessment	= weed coverage/density assessment , 5 point scale, 1 = no plants visible, 2 = plants below surface, 3 = plants at surface, 4 = plants dense at surface, 5 = plants cover surface
Recreational Assessment	= swimming/aesthetic assessment , 5 point scale; 1 = could not be nicer, 2 = excellent, 3= slightly impaired, 4 = substantially impaired, 5 = lake not usable