CSLAP 2010 Lake Water Quality Summary:
Cuba Lake

General Lake Information

Location	Town of Cuba
County	Allegany
Basin	Allegheny River
Size	183.9 hectares (454.2 acres)
Lake Origins	Augmented by Dam
Watershed Area	6,606 hectares (16,316 acres)
Retention Time	0.3 years
Mean Depth	5.2 meters
Sounding Depth	14.9 meters
Public Access?	boat ramp
Major Tributaries	Rawson Creek
Lake Tributary To…	Cuba Lake outlet to Oil Creek to Olean Creek to Allegheny River
WQ Classification	B (contact recreation = swimming)
Lake Outlet Latitude	42.236
Lake Outlet Longitude	-78.308
Sampling Years	1986-1988, 1990-1991, 1998-2010
2010 Samplers	Scott Barrey and Dana Harvey
Main Contact	Scott Barrey

Lake Map

Background

Cuba Lake is a 454 acre, class B lake found in the Town of Cuba in Allegany County (a small part of the lake is in Cattaraugus County) in western New York State. It was first sampled as part of CSLAP in 1986.

It is the only CSLAP lake among the more than 15 lakes found in Allegany County, and one of nine CSLAP lakes among the more than 50 lakes and ponds in the Allegheny and Chemung Rivers drainage basin.

Lake Uses

Cuba Lake is a Class B lake; this means that the best intended use for the lake is for contact recreation—swimming and bathing, non-contact recreation—boating, aquatic life, and aesthetics. The lake is used by lake residents and visitors for swimming, power boating and other recreation via shoreline properties and a state boat ramp.

Cuba Lake has been stocked with walleye by the state for many years, generally 2.5 million 0.4 inch fish. Fisheries netting and other surveys have identified bluegill, brown bullhead, carp, largemouth bass, northern pike, pumpkinseed sunfish, rock bass, smallmouth bass, walleye, and yellow perch in the lake.

General statewide fishing regulations are applicable in Cuba Lake. In addition, the open season for trout is April 1st thru October 15th, there is no minimum size limit, but a daily take limit of five fish, with no more than two more than 12 inches.

There are no lake-specific fish consumption advisories on Cuba Lake.

Historical Water Quality Data

CSLAP sampling was conducted on Cuba Lake from 1986 to 1988, 1990 to 1991, and 1998 to 2010. The CSLAP reports for Cuba Lake for several years are posted on the NYSFOLA website at www.nysfola.org, under NYS Lake Association Lake List.

Cuba Lake was sampled by the NYSDEC as part of the Lake Classification and Inventory (LCI) study of the lake in 1985, and was sampled by the county in 1990. These data showed that water quality conditions in 1985 at the deep hole were probably comparable to those measured through CSLAP. However, the 1993 Secchi disk transparency data also indicates that water quality conditions may be variable from one part of the lake to another- Site 1 corresponds to the northern cove, while Site 2 corresponds to the long arm along the southwest side of the lake (comparison of phosphorus data may not be appropriate given the differences in analytical methodologies between CSLAP labs and those used in other monitoring programs). The water quality differences in other parts of the lake are also apparent from bacteriological data collected by the county. This suggests that water quality assessments through CSLAP should be limited to the area associated with the deep hole near the dam.

Cuba Lake was one of the 12 NYS lakes sampled as part of the National Lake Assessment (NLA) conducted by the US EPA and the NYSDEC. Sampling in Cuba Lake was conducted on July 18th, 2007. The NLA results show the following:

1. Depth profiles showed that the lake is weakly stratified, with a slight temperature decrease below a depth of 5 meters. Hypoxia (reduced, but not depleted dissolved

oxygen levels) occurs from a depth of 5 meters to the lake bottom. Slightly lower pH and higher conductivity readings were found in the hypolimnion (bottom waters).

2. Enterococci was not found in the water samples collected near southwest shoreline.
3. The water samples collected from the center of the lake showed slightly less productive (lower phosphorus and higher water clarity) conditions than measured through CSLAP, although the CSLAP data showed lower lake productivity at this time of year than earlier and later in the summer. It is likely that the CSLAP and NLS water chemistry results are comparable. Turbidity and organic carbon levels are low, as expected given the high water clarity and low water color readings, respectively. Chloride levels are low, indicating minimal runoff from road salting operations.
4. The zooplankton community was dominated by large herbivorous rotifers (*Keratella*) and arthropods (*Daphnia*). This suggests that these zooplankton may help to keep algae in balance.
5. The sediment diatom core indicated "intermediate" disturbance, typical of moderately productive lakes

A detailed discussion of the NLA results can be found at http://www.epa.gov/lakessurvey/.

Rawson Creek in Rawson was sampled through the NYSDEC Rotating Intensive Basins (RIBS) program and the state stream macroinvertebrate monitoring program. The results from the macroinvertebrate monitoring program were reported as follows in 2001:

"*This small stream at Rawson was sampled at two sites in 2001, upstream (above Porter Road) and downstream (below Lyndon Center Road) of a recent spill of silage leachate. Although both sites were assessed as moderately impacted, a significant biological impairment was documented downstream of the spill site….the community was dominated by tolerant aquatic worms and leeches, and all metrics declined compared to upstream values. Dissolved oxygen levels in the stream declined from 7.8 mg/l upstream to 1.1 mg/l downstream. Impacts at the upstream site were likely due to impoundment effects. Re-sampling of the sites is planned to document recovery once the problem is remediated.*"

The RIBS sampling in 2002 was conducted during five sampling sessions between April 30th and November 5th, and indicated that phosphorus and nitrogen (particularly nitrate + nitrite) levels were higher than in the lake, and may contribute a significant load of nutrients to the lake. Phosphorus readings in 2002 in the lake were slightly higher than normal, but nitrate levels were not (despite the very high NO_x readings in the Rawson Creek samples throughout 2002). Calcium levels in Rawsons Creek are well above the threshold found to support zebra mussels, so although the open water calcium levels in the lake may not be adequate to allow zebra mussel colonization, mussel communities could survive at least in the portion of the lake near the creek inlet. It is not known if the water chemistry data from 2002 are indicative of normal conditions in Rawsons Creek.

The Cuba Lake outlet was also sampled through the macroinvertebrate monitoring program. The results from the 2001 survey were as follows:

"*This stream in the town of Cuba was sampled for macroinvertebrates in 2001. The site was one mile downstream of Cuba Lake, and impoundment effects persisted. The fauna was dominated by filter-feeding caddisflies, and water quality was assessed as slightly impacted.*"

Lake Association and Management History

Cuba Lake is served by the Cuba Lake District and the Cuba Lake Cottage Owners Association. The Cottage Owners Association conducts roadside cleanup and other projects. The District is legally defined as a Special District and rents the land from the state Office of General Services (OGS). The District conducts the following lake management activities:

- weed harvesting;
- water testing (bacteria and CSLAP);
- control of spillway;
- evaluate navigation law and work with the Allegany Sheriffs Department to enforce the existing law;
- publicize/explain regulations regarding dam safety;
- taxation (via the taxing district, although most funding comes from NYS OGS lease money);
- development and enforcement of land use regulations;
- dredging projects;
- sediment basin development and maintenance;
- maintain website

The Cuba Lake District maintains a website at www.cubalake.org.

Summary of 2010 CSLAP Sampling Results

Evaluation of Eutrophication Indicators

Total phosphorus readings were higher than normal in 2010, but both chlorophyll *a* and Secchi disk transparency readings were close to normal. None of these indicators has exhibited any clear long-term trends. The lake can be characterized as *mesoeutrophic*, or moderately to highly productive, based on water clarity, total phosphorus (both typical of *mesotrophic* lakes), and chlorophyll *a* readings (typical of *eutrophic* lakes). The trophic state indices (TSI) evaluation suggests that chlorophyll *a* readings are "outliers"—higher than expected range given the readings of the other indicators. This suggests that the lake may be susceptible to small changes in phosphorus readings. Phycocyanin levels were below the levels indicating susceptibility for harmful algal blooms (HABs) in 2009, but there was some evidence of blue-green algal blooms in 2010. Overall trophic conditions are summarized on the Lake Scorecard and Lake Condition Summary Table.

Evaluation of Potable Water Indicators

Algae levels may be high enough to render the lake susceptible to taste and odor compounds or elevated DBP (disinfection by product) compounds that could affect the potability of the water, but the lake is not used for drinking water. Hypolimnetic phosphorus and ammonia readings are higher than those measured at the lake surface, suggesting that deepwater intakes may be compromised for any "unofficial" potable water use. Potable water conditions, at least as measurable through CSLAP, are summarized in the Lake Scorecard and Lake Condition Summary Table.

Evaluation of Limnological Indicators

pH and conductivity readings were higher than normal in 2010, but none of these indicators has exhibited any clear long-term trends. It is likely that the small changes in each of the limnological indicators have been within the normal range of variability in the lake. Overall limnological conditions are summarized in the Lake Scorecard and Lake Condition Summary Table.

Evaluation of Biological Condition

Extensive macrophyte surveys have been conducted through CSLAP in Cuba Lake. At least 19 aquatic plant species have been identified in Cuba Lake, including at least one protected plant species (*Potamogeton confervoides,* water thread pondweed) and at least four exotic plant species (*Myriophyllum spicatum,* Eurasian watermilfoil; *Myriophyllum heterophyllum,* variable watermilfoil; *Najas minor,* brittle naiad; and *Potamogeton crispus,* curly-leafed pondweed) have been found in the lake. The modified floristic quality index (FQI) for the lake indicates that the quality of the aquatic plant community is "fair."

The composition of the fish community includes a mix of coolwater (at least four species), and warmwater (at least six species) fish species. It is likely that the lake is primarily a warmwater fishery. The health of the lake fisheries appears to be favorable, as evaluated by the NYSDEC in 2003 (http://www.dec.ny.gov/outdoor/27302.html).

Phytoplankton and zooplankton surveys have not been conducted through CSLAP at Cuba Lake. The macroinvertebrate and phytoplankton sampling results from the National Lake Assessment for Cuba Lake have recently been received but have not yet been interpreted. The zooplankton analyses were discussed previously.

Biological conditions in the lake are summarized in the Lake Scorecard and Lake Condition Summary Table.

Evaluation of Lake Perception

Aquatic plant coverage was more extensive than normal in 2010, although it is not known if this was due to more extensive growth of native or exotic plants. None of these indicators of lake perception has exhibited any clear long-term changes. Overall lake perception is summarized on the Lake Scorecard and Lake Condition Summary Table.

Evaluation of Local Climate Change

Water temperature readings in the summer index period were higher than normal in 2010, despite the lack of change in air temperature readings. Neither air nor water temperature readings has exhibited any clear long-term trends. It is not known if this is an indication of the lack of local climate change or if these changes cannot be well evaluated through CSLAP.

Lake Condition Summary

Category	Indicator	Min	86-10 Avg	Max	2010 Avg	Classification	2010 Change?	Long-term Change?
Eutrophication Indicators	Water Clarity	0.75	3.00	8.50	2.78	Mesotrophic	Within Normal Range	No Change
	Chlorophyll *a*	0.10	9.29	80.20	4.59	Eutrophic	Within Normal Range	No Change
	Total Phosphorus	0.003	0.016	0.062	0.023	Mesotrophic	Higher than Normal	No Change
Potable Water Indicators	Hypolimnetic NH4	0.03	0.58	1.48	0.55	Highly Elevated Deepwater NH4	Within Normal Range	Not known
	Hypolimnetic As							
	Hypolimnetic Iron							
	Hypolimnetic Mn							
Limnological Indicators	Hypolimnetic TP	0.013	0.167	0.785	0.115	Elevated Deepwater TP	Lower Than Normal	Not known
	Nitrate + Nitrite	0.00	0.06	0.30	0.04	Low NOx	Within Normal Range	No Change
	Ammonia	0.00	0.05	0.31	0.03	Low Ammonia	Within Normal Range	No Change
	Total Nitrogen	0.07	0.43	0.99	0.41	Low Total Nitrogen	Within Normal Range	No Change
	pH	5.36	7.62	8.85	7.98	Alkaline	Higher than Normal	No Change
	Specific Conductance	68	121	230	141	Softwater	Higher than Normal	No Change
	True Color	1	12	63	8	Intermediate Color	Within Normal Range	No Change
	Calcium	5.7	15.0	19.3	17.2	May be Susceptible to Zebra Mussels	Within Normal Range	No Change
Lake Perception	WQ Assessment	1	2.3	5	2.6	Not Quite Crystal Clear	Within Normal Range	No Change
	Plant Coverage	1	2.4	5	3.0	Subsurface Plant Growth	More Extensive than Normal	No Change
	Rec. Assessment	1	2.2	5	2.3	Excellent	Within Normal Range	No Change
Biological Condition	Phytoplankton					Not yet reported from the NLA	Not known	Not known
	Macrophytes					Fair quality of the aquatic plant community	Not known	Not known
	Zooplankton					Dominated by large rotifers and arthropods	Not known	Not known
	Macroinvertebrates					Not yet evaluated from the NLA	Not known	Not known
	Fish					Warmwater fishery	Not known	Not known
	Invasive Species					Eurasian watermilfoil, variable watermilfoil, brittle naiad, curly-leafed pondweed	Not known	Not known
Local Climate Change	Air Temperature	3	22.2	34	23.8		Within Normal Range	No Change
	Water Temperature	10	21.8	36	23.5		Higher Than Normal	No Change

Evaluation of Lake Condition Impacts to Lake Uses

Cuba Lake is presently among the lakes cited on the 2007 Allegheny River Basin Priority Waterbody List (PWL), with public bathing and recreation listed as stressed due to excessive algae and weed growth, and perhaps due to bacteria. The PWL listing for Cuba Lake is listed in Appendix C.

Potable Water (Drinking Water)

The CSLAP dataset at Cuba Lake, including water chemistry data, physical measurements, and volunteer samplers' perception data, is inadequate to evaluate the use of the lake for potable water, and the lake is not used for this purpose. These data indicate that potable water use may be compromised by excessive algae growth.

Contact Recreation (Swimming)

The CSLAP dataset at Cuba Lake, including water chemistry data, physical measurements, and volunteer samplers' perception data, suggests that swimming and contact recreation may be *threatened* by elevated nutrient levels and algal blooms, and lake district data indicate that bathing may be *threatened* by bacteria.

Non-Contact Recreation (Boating and Fishing)

The CSLAP dataset on Cuba Lake, including water chemistry data, physical measurements, and volunteer samplers' perception data, suggest that non-contact recreation should be fully supported, although these uses may ultimately be *threatened* by the presence of Eurasian watermilfoil, variable watermilfoil, brittle naiad, and curly-leafed pondweed.

Aquatic Life

The CSLAP dataset on Cuba Lake, including water chemistry data, physical measurements, and volunteer samplers' perception data, suggest that aquatic life may be *stressed* by deepwater hypoxia and *threatened* by exotic plants, although additional data are needed to evaluate the food and habitat conditions for aquatic organisms in the lake.

Aesthetics

The CSLAP dataset on Cuba Lake, including water chemistry data, physical measurements, and volunteer samplers' perception data, suggest that aesthetics may be *threatened* by occasional algal blooms.

Fish Consumption

There are no fish consumption advisories posted for Cuba Lake.

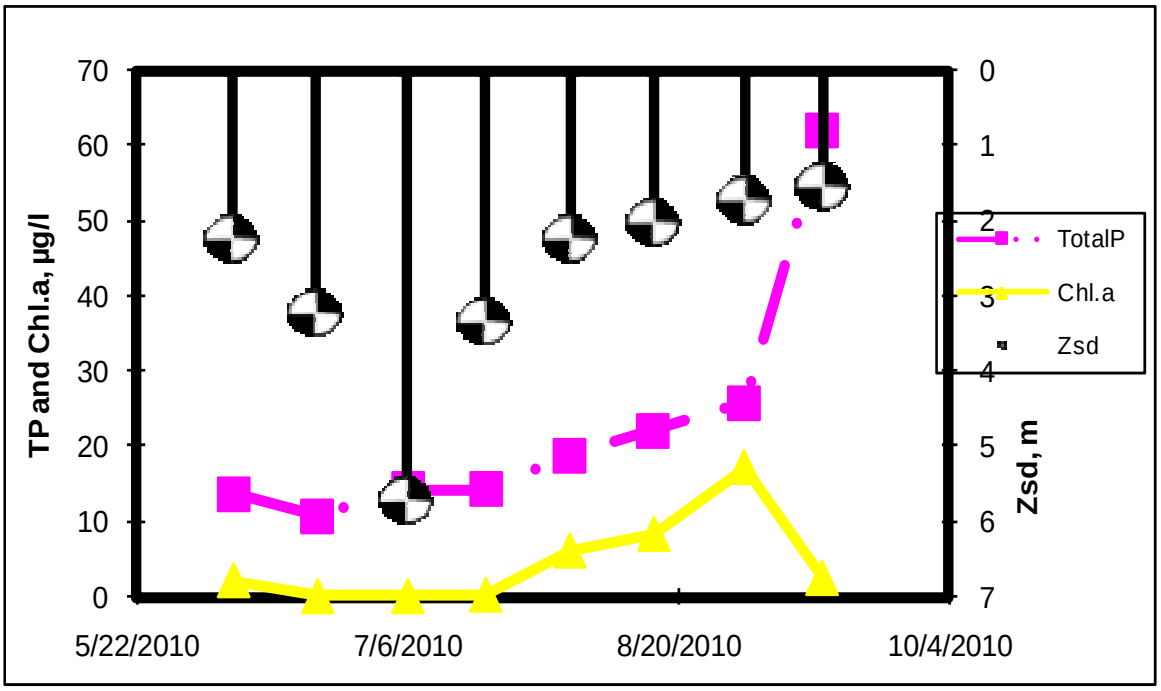
Additional Comments and Recommendations

Additional evaluation of the National Lake Assessment biological dataset will help to evaluate potential aquatic life impacts.

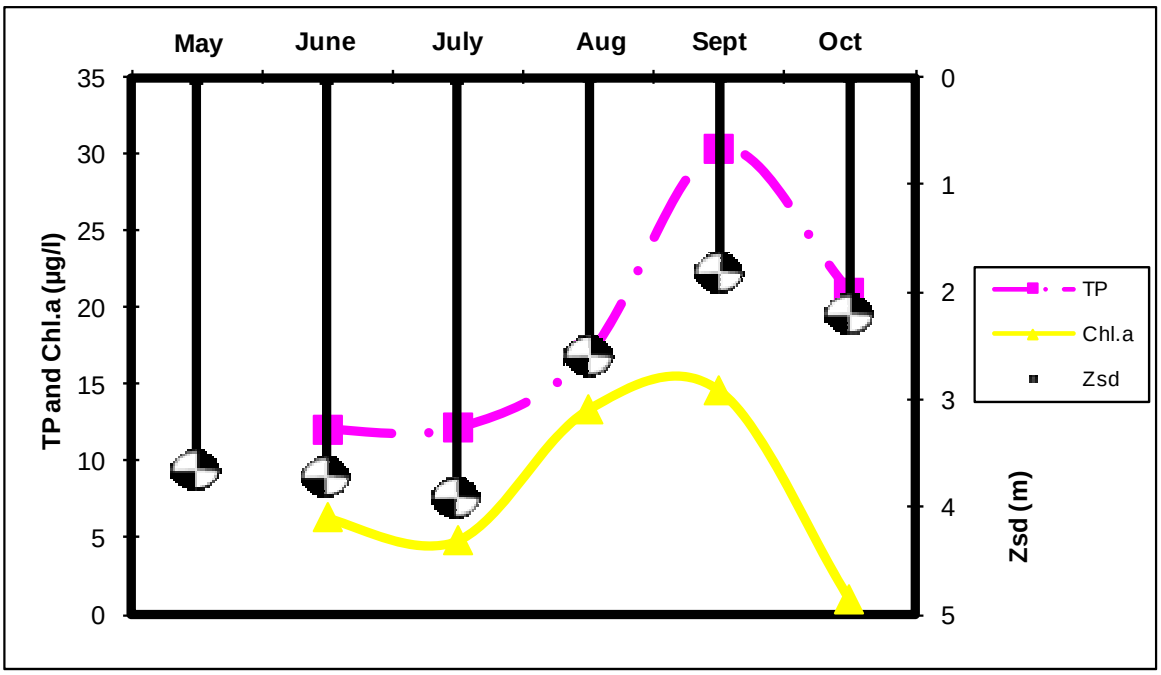
Aquatic Plant IDs-2010

None submitted for identification.

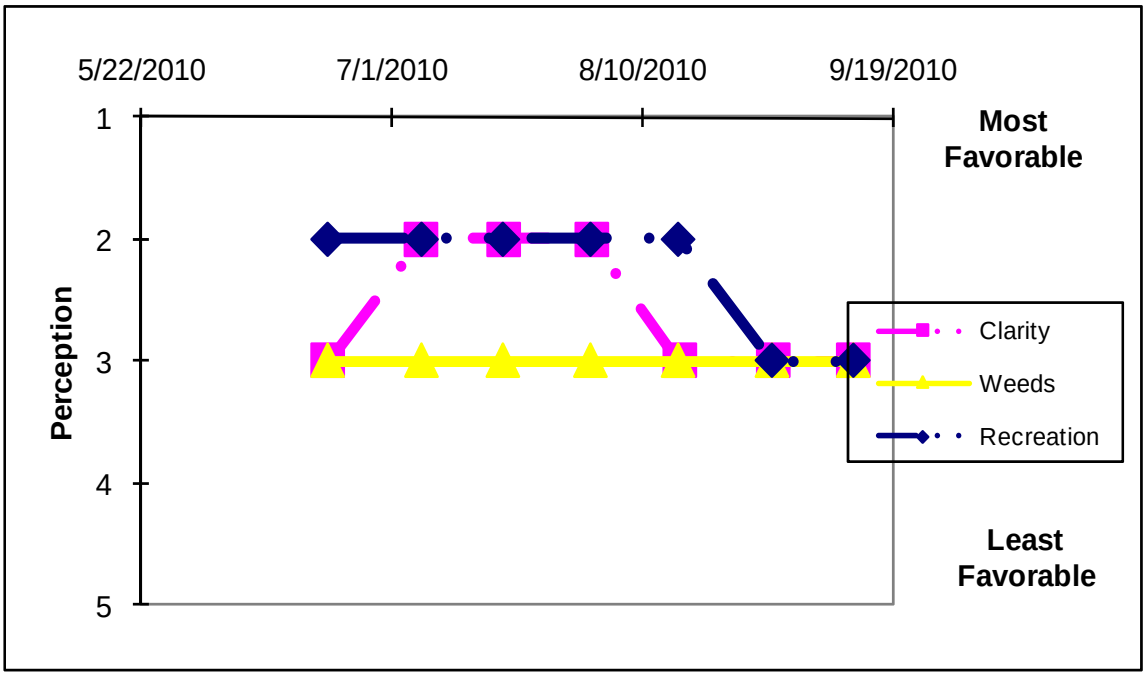
Time Series: Trophic Indicators, 2010



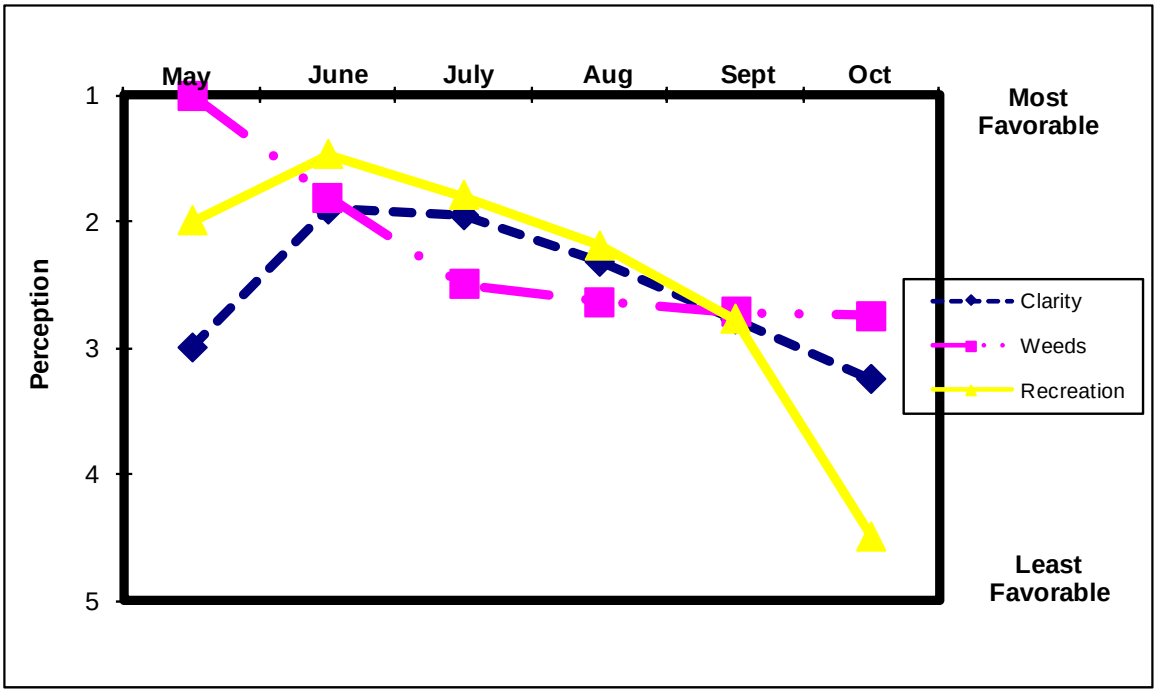
Time Series: Trophic Indicators, Typical Year (1986-2010)



Time Series: Lake Perception Indicators, 2010



Time Series: Lake Perception Indicators, Typical Year (1986-2010)



Appendix B- CSLAP Water Quality Sampling Results for Cuba Lake

LNum	PName	Date	Zbot	Zsd	Zsamp	Tot.P	NO3	NH4	TDN	TN/TP	TColor	pH	Cond25	Ca	Chl.a
23	Cuba L	6/14/1986	13.5	4.25	1.5	0.008	0.20				5	7.33	114		1.70
23	Cuba L	6/20/1986	12.5	3.00	1.5	0.011	0.15				2	7.44	119		2.15
23	Cuba L	6/27/1986	12.5	4.63	1.5	0.007	0.14				5	7.38	118		1.63
23	Cuba L	7/4/1986	12.5	3.38	1.5	0.008	0.08				5	8.85	112		8.50
23	Cuba L	7/14/1986	12.5	3.25	1.5	0.010	0.08				2	7.65	118		1.70
23	Cuba L	7/18/1986	12.5	3.00	1.5	0.010	0.03				5	7.68	125		3.11
23	Cuba L	7/25/1986	12.5	4.00	1.5	0.011	0.03				5	7.94	118		1.92
23	Cuba L	8/1/1986	12.3	3.50	1.5	0.013	0.03				10	7.65	119		3.03
23	Cuba L	8/8/1986	12.3	2.50	1.5	0.014	0.03				10	8.30	104		5.33
23	Cuba L	8/15/1986	12.5	1.75	1.5	0.017	0.03				18	8.18	121		11.80
23	Cuba L	8/22/1986	12.5	1.50	1.5	0.023	0.03				5	7.30	131		5.55
23	Cuba L	8/29/1986	12.5	1.25	1.5	0.014	0.03				2	7.90	125		5.99
23	Cuba L	9/5/1986	12.5	1.50	1.5	0.018	0.03				8	7.45	131		17.70
23	Cuba L	9/16/1986	12.5	0.75	1.5	0.017	0.03				12	7.60	130		19.60
23	Cuba L	9/19/1986	12.5	1.00	1.5	0.023	0.03				7	7.33	133		14.90
23	Cuba L	6/8/1987	12.5	3.00	1.5	0.013	0.23				5	7.62	112		
23	Cuba L	6/15/1987	12.5	2.50	1.5	0.011					4	7.48	111		
23	Cuba L	6/22/1987	12.5	5.00	1.5	0.005	0.01				10	8.16	108		
23	Cuba L	6/29/1987	12.5	3.50	1.5	0.011	0.17				10	7.73	113		5.70
23	Cuba L	7/6/1987	12.0	3.30	1.5	0.015	0.13				15	7.56	113		12.50
23	Cuba L	7/13/1987	12.1	4.50	1.5	0.013					14	7.44	114		5.60
23	Cuba L	7/20/1987	12.5	3.00	1.5	0.003	0.01				14	7.55	115		7.60
23	Cuba L	7/27/1987	12.5	2.50	1.5	0.015					10	7.40	117		19.20
23	Cuba L	7/30/1987	12.5	2.00	1.5	0.019	0.01				9	7.14	119		24.40
23	Cuba L	8/10/1987	12.5	1.50	1.5	0.015	0.01				12	6.78	122		31.10
23	Cuba L	8/17/1987	12.5	0.80	1.5	0.020					12	7.48	130		66.60
23	Cuba L	8/24/1987	12.5	0.95	1.5	0.019	0.01				8				80.20
23	Cuba L	8/31/1987	12.6	0.80	1.5	0.018					7	7.38	119		72.00
23	Cuba L	9/8/1987	12.1	1.60	1.5	0.016	0.03				6	6.95	136		
23	Cuba L	9/20/1987	12.3	0.85	1.5	0.028	0.02				8	7.09	133		37.00
23	Cuba L	6/20/1988	12.5	7.50	1.5	0.010	0.12				12	7.48	123		1.65
23	Cuba L	7/7/1988	12.0	8.50	1.5	0.009	0.07				10				1.63
23	Cuba L	8/1/1988	12.0	5.25	1.5	0.006	0.03				6	8.22	125		1.72
23	Cuba L	8/4/1988	12.0	5.88	1.5	0.010	0.01				6	7.99	130		1.58
23	Cuba L	8/11/1988	12.5	6.75	1.5	0.009	0.01				5	8.16	127		1.06
23	Cuba L	7/18/1990	12.8	3.75	1.5	0.010	0.14				8	8.08	114		4.75
23	Cuba L	8/2/1991	14.0	4.50	1.5		0.01				5	7.69	132		4.00
23	Cuba L	6/2/1998	7.7	3.15	1.0	0.020	0.28				11	6.66	118		3.03
23	Cuba L	6/15/1998	7.6	2.85	1.0		0.27				6	6.81	115		3.52
23	Cuba L	6/30/1998	7.8	1.85	1.0		0.22				4	6.62	132		2.14
23	Cuba L	7/15/1998	7.6	3.60	1.0		0.16				10	7.35	117		1.73
23	Cuba L	7/27/1998	8.4	3.70							6	7.98	121		3.92
23	Cuba L	8/25/1998	8.0	3.45	1.0						6	7.72	126		8.72
23	Cuba L	9/16/1998	7.7	1.20	2.0	0.024					8	7.53	129		22.90
23	Cuba L	9/30/1998	7.3	1.55	1.5	0.011					16	7.31	129		24.50
23	Cuba L	6/2/1999	9.4	5.00	1.5	0.007	0.30				7	6.73	128		1.94
23	Cuba L	6/16/1999	11.2	4.60	1.5	0.010	0.23				13	7.83	127		2.44
23	Cuba L	7/13/1999	11.5	6.80	1.5	0.006	0.12				6	7.76	125		1.25
23	Cuba L	7/29/1999	11.4	5.75	1.5	0.008	0.02				3	7.7	127		1.15
23	Cuba L	8/10/1999	11.3	2.10	1.5	0.012	0.01				6	6.84	132		11.20
23	Cuba L	8/18/1999	11.8	2.35	1.5	0.009	0.01				3	7.28	137		16.80
23	Cuba L	9/7/1999	11.5	1.70	0.6	0.015	0.01				8	6.42	151		16.40
23	Cuba L	9/22/1999	11.5	1.30		0.029	0.01				6	6.78	137		46.80
23	Cuba L	6/12/2000		3.80	1.5	0.013	0.28				32	5.36	126		12.00
23	Cuba L	6/28/2000		3.10	1.5	0.022	0.28				17	6.58	119		71.00
23	Cuba L	7/23/2000		4.15	1.5	0.016	0.13				14	7.66	126		1.25
23	Cuba L	8/8/2000		2.65	1.5	0.025	0.04				8	7.89	131		7.70
23	Cuba L	8/29/2000		2.40		0.028	0.01				16	7.85	134		5.50
23	Cuba L	5/23/2001	12.0	3.65											
23	Cuba L	6/13/2001	12.7	3.60											
23	Cuba L	6/27/2001	12.6	6.85											
23	Cuba L	7/12/2001	13.0	4.45											
23	Cuba L	7/24/2001	12.7	6.20											

LNum	PName	Date	Zbot	Zsd	Zsamp	Tot.P	NO3	NH4	TDN	TN/TP	TColor	pH	Cond25	Ca	Chl.a
23	Cuba L	8/8/2001	12.8	4.85											
23	Cuba L	8/22/2001	13.3	2.50											
23	Cuba L	9/1/2001	13.0	2.20											
23	Cuba L	9/19/2001	12.8	1.85											
23	Cuba L	10/3/2001	12.0	1.65											
23	Cuba L	08/21/02	23.2	2.05	23.2	0.019	0.02	0.05	0.53	60.65	7	8.02	123		4.47
23	Cuba L	08/28/02	21.0	1.80	21.0	0.015	0.00	0.20	0.78	112.16	13	7.63	126		
23	Cuba L	09/12/02		2.40			0.01	0.04	0.55						
23	Cuba L	09/29/02	18.0	1.55			0.01	0.03	0.60						
23	Cuba L	10/01/02	14.2	2.45		0.021			0.57	58.53	8	7.34	136		0.85
23	Cuba L	10/18/02	17.0	2.45	57.6		0.02	0.19	0.90		8	7.50	129		0.92
23	Cuba L	10/24/02	12.0	2.30			0.04	0.18	0.60						1.05
23	Cuba L	6/3/2003	13.4	3.05		0.013	0.27	0.02	0.49	86.24	7	7.72	175	14.0	
23	Cuba L	6/17/2003	13.4	3.15		0.019	0.21	0.03	0.39	45.66	13	7.73	116.2		3.204
23	Cuba L	7/7/2003	13.4	3.70		0.015	0.12	0.02	0.44	65.49	13	7.73	125		5.237
23	Cuba L	7/30/2003	13.3	1.45		0.029	0.12	0.00	0.17	12.83	35	7.62	117		2.579
23	Cuba L	8/12/2003	13.1	1.00		0.021	0.02	0.00	0.28	29.02	63	8.21	114.7	14.0	11.59
23	Cuba L	8/27/2003	13.1	1.55		0.024	0.02	0.02	0.39	35.46	13	7.71	119.8		13.88
23	Cuba L	9/10/2003	13.1	2.35		0.021	0.06	0.03			48	7.91	122.8		3.614
23	Cuba L	9/30/2003	13.1	1.20		0.027	0.04	0.10	0.27	21.61	16	7.63	123.9		19.26
23	Cuba L	6/17/2004		4.10	1.5	0.013	0.14	0.04	0.50	82.07	20	7.19	114	14.7	
23	Cuba L	6/29/2004	12.9	2.90	1.5	0.012	0.18	0.05	0.29	52.17	15	6.75	125		0.9
23	Cuba L	7/12/2004	12.5	4.60	1.5	0.007	0.14	0.02	0.63	188.01	13	6.95	125		0.1
23	Cuba L	7/30/2004	12.5	3.40	1.5	0.017	0.04	0.03	0.30	38.54	9	8.07	104		6.2
23	Cuba L	8/10/2004	12.8	2.60	1.5		0.06	0.02	0.21		6	7.59	94	16.5	6.8
23	Cuba L	8/25/2004	13.1	2.70	1.5	0.022	0.01	0.02	0.07	7.41	14	8.2	127		17.6
23	Cuba L	9/6/2004	13.1	3.60	1.5	0.018	0.02	0.03	0.39	47.38	19	7.05	115		5.6
23	Cuba L	9/22/2004	13.1	3.20	1.5	0.021	0.03	0.03	0.99	105.34	20	7.59	101		4.0
23	Cuba L	6/1/2005	13.1	5.80	1.5	0.007	0.04	0.09	0.27	78.83	9	7.86	123	5.7	1.4
23	Cuba L	6/15/2005	13.1	4.00	1.5	0.008	0.02	0.16	0.35	94.43	6	7.22	93		1.8
23	Cuba L	7/13/2005	13.7	7.70	1.5	0.010	0.03	0.06	0.29	65.35	16	7.44	95		
23	Cuba L	8/3/2005	13.4	4.20	1.5	0.009	0.01	0.01	0.35	82.13	12	8.24	125		0.6
23	Cuba L	8/15/2005	13.7	3.50	1.5	0.017	0.03	0.01	0.32	41.27	7	7.80	94	15.1	7.5
23	Cuba L	8/29/2005	13.7	2.35	1.5	0.017	0.01	0.01	0.30	39.69	15	8.03	230		8.5
23	Cuba L	9/12/2005	12.8	2.30	1.5	0.016	0.02	0.01	0.27	37.30	8	7.84	124		8.2
23	Cuba L	9/27/2005		1.75		0.020	0.02	0.01	0.19	21.47	5	7.75	133		10.7
23	Cuba L	6/9/2006	13.3	1.25	1.5	0.016	0.02	0.02	0.54	76.52	18	7.71	124	15.1	2.78
23	Cuba L	6/14/2006	13.7	2.30	1.5	0.015	0.02	0.05	0.39	59.39	16	8.08	119		1.80
23	Cuba L	6/28/2006	13.7	2.70	1.5	0.017	0.02	0.17	0.65	86.79	12	8.37	68		9.36
23	Cuba L	7/12/2006	13.7	3.12	1.5	0.022	0.01	0.03	0.52	52.79	18	7.93	93		10.16
23	Cuba L	7/26/2006	13.7	1.70		0.007	0.03	0.02	0.58	180.50	24	8.02	96	17.1	4.27
23	Cuba L	8/10/2006	13.7	1.75		0.017	0.01	0.02	0.81	104.71		8.01	136		18.92
23	Cuba L	8/23/2006	13.7	1.40	1.5	0.023	0.01	0.03	0.64	61.05	14	7.97	87		10.03
23	Cuba L	9/21/2006	13.7	1.45	0.9	0.021	0.01	0.01	0.61	63.54	2	7.58	104		23.42
23	Cuba L	7/9/2007		2.46		0.008	0.06	0.03	0.39	109.63	5	8.1	124	13.6	1.37
23	Cuba L	7/25/2007	13.7	2.40	1.5	0.011	0.03	0.04	0.43	87.24	9	8.2	105		1.14
23	Cuba L	8/6/2007	13.7	2.30	1.5	0.015	0.01	0.01	0.55	81.76	7	7.9	98		4.71
23	Cuba L	8/21/2007		2.20	1.5	0.019	0.01	0.02	0.50	58.73	14	7.6	127		6.04
23	Cuba L	9/4/2007		2.20	1.5	0.016	0.01	0.01	0.72	96.28	11	7.7	94	15.3	3.85
23	Cuba L	9/17/2007		2.15	1.5		0.02	0.01	0.50	4.47	41	7.9	117		20.30
23	Cuba L-1	6/16/2008	13.9	3.95	1.5	0.010	0.03	0.02	0.25	58.30	9	7.44	88	14.1	
23	Cuba L-1	6/30/2008	14.7	3.90	1.5	0.014	0.03	0.03	0.28	43.18	8	7.64	106		0.38
23	Cuba L-1	7/14/2008	13.0	3.85	1.5	0.011	0.02	0.01	0.17	35.11	9	8.14	127		0.60
23	Cuba L-1	7/28/2008	12.7	2.35	1.5	0.013	0.01	0.03	0.28	46.63	22	7.75	77		1.20
23	Cuba L-1	8/11/2008	14.9	1.95	1.5	0.015	0.01	0.04	0.25	35.99	25	7.83	119	14.1	2.40
23	Cuba L-1	8/25/2008	14.7	1.65	1.5	0.022	0.00	0.06	0.28	27.73	15	8.12	121		4.00
23	Cuba L-1	9/8/2008	13.6	1.70	1.5	0.022	0.00	0.01	0.35	35.81	14	7.64	94		0.20
23	Cuba L-1	9/22/2008	13.5	1.70	1.5	0.019	0.02	0.02	0.28	32.36	12	6.90	111		3.77
23	Cuba L-1	06/22/2009	13.4	2.65	1.5	0.014	0.04		0.52	83.34	12			16.3	1.65
23	Cuba L-1	07/06/2009	13.2	3.60	1.5	0.011	0.03	0.31	0.67	130.25	12				0.48
23	Cuba L-1	07/20/2009	13.1	5.55	1.5	0.017	0.02	0.19	0.57	75.81	15				0.49
23	Cuba L-1	08/06/2009	13.1	3.65	1.5	0.017	0.03	0.02	0.25	31.74	19				0.10
23	Cuba L-1	08/17/2009	12.5	2.75	1.5	0.016	0.01	0.02	0.28	37.85	24	8.23	94	19.3	0.70
23	Cuba L-1	08/31/2009	13.2	1.90	1.5	0.027	0.01	0.05	0.38	30.57	35	7.28	102		8.30
23	Cuba L-1	09/14/2009	13.4	2.65	1.5	0.023	0.02	0.03	0.35	33.00	24	7.55	80		0.90
23	Cuba L-1	09/30/2009				0.032	0.01	0.08	0.43	29.13	22	7.31	130		1.99

LNum	PName	Date	Zbot	Zsd	Zsamp	Tot.P	NO3	NH4	TDN	TN/TP	TColor	pH	Cond25	Ca	Chl.a
23	Cuba L	6/7/2010	12.2	2.25	1.5	0.014	0.11	0.03			5	7.74	134	15.3	2.20
23	Cuba L	6/21/2010	13.2	3.25	1.5	0.011	0.09	0.02	0.64	132.21	7	8.12	141		0.10
23	Cuba L	7/6/2010	12.1	5.75	1.5	0.014	0.05	0.05	0.37	56.55	5	8.13	139		0.10
23	Cuba L	7/19/2010	13.1	3.35	1.5	0.014	0.01	0.02	0.24	36.77	7	8.13	131		0.30
23	Cuba L	8/2/2010	13.0	2.25	1.5	0.019	0.01	0.02	0.37	42.94	12	7.96	139	19.0	6.10
23	Cuba L	8/16/2010	13.2	2.05	1.5	0.022	0.06	0.06	0.42	41.90	9	8.14	145		8.30
23	Cuba L	8/31/2010	13.1	1.75	1.5	0.026	0.01	0.02	0.44	37.75	19	8.14	148		17.10
23	Cuba L	9/13/2010	13.1	1.55	1.5	0.062	0.01	0.03	0.42	14.88	1	7.46	152		2.50
23	Cuba L	6/2/1998				0.020									
23	Cuba L	7/15/1998				0.018									
23	Cuba L	7/27/1998				0.023									
23	Cuba L	08/21/02	23.2	2.05	1.5		0.03	0.25	0.76						
23	Cuba L	08/28/02	21.0	1.80	1.5	0.112	0.00	0.37	0.94	8.39					
23	Cuba L	09/12/02		2.40	1.5		0.00	0.43	0.85						
23	Cuba L	09/29/02	18.0	1.55	1.5		0.00	0.79	1.08						
23	Cuba L	10/01/02	14.2	2.45	1.5	0.027			1.16	43.02					
23	Cuba L	10/18/02	17.0		1.5		0.03	0.24	0.72						
23	Cuba L	10/24/02	12.0	2.30	1.5		0.03	0.18	0.58						
23	Cuba L	6/3/2003				0.301	0.28	0.26	0.52	1.73					
23	Cuba L	6/17/2003				0.115	0.07	0.54	0.36	3.14					
23	Cuba L	7/7/2003				0.311	0.01	0.84	0.60	1.93					
23	Cuba L	7/30/2003			12.0	0.061	0.03	0.51	0.30	4.95					
23	Cuba L	8/12/2003				0.221	0.01	1.02	0.86	3.90					
23	Cuba L	8/27/2003			12.6	0.177	0.00	1.07	0.18	1.02					
23	Cuba L	9/10/2003			12.6	0.244	0.02	1.18							
23	Cuba L	9/30/2003			12.6	0.231	0.01	1.38	0.00						
23	Cuba L	6/17/2004			12.8	0.072	0.08	0.56	0.70	9.73					
23	Cuba L	6/29/2004	12.9		12.9	0.051	0.07	0.35	0.34	6.69					
23	Cuba L	7/12/2004	12.5		9.4		0.01	0.51	0.29						
23	Cuba L	7/30/2004	12.5		12.5	0.092	0.32	0.08	0.56	6.07					
23	Cuba L	8/10/2004	12.8		12.8	0.019	0.01	0.47	0.44	22.62					
23	Cuba L	8/25/2004	13.1		12.6	0.286	0.02	0.89	0.35	1.24					
23	Cuba L	9/6/2004	13.1		13.1	0.264	0.01	0.84	0.36	1.38					
23	Cuba L	9/22/2004	13.1		13.1	0.472	0.02	1.21	0.57	1.20					
23	Cuba L	6/1/2005			13.1	0.033									
23	Cuba L	6/15/2005			13.1	0.037									
23	Cuba L	7/13/2005			13.7	0.098									
23	Cuba L	8/3/2005			13.1	0.239									
23	Cuba L	8/15/2005			13.7	0.219									
23	Cuba L	8/29/2005			13.7	0.201									
23	Cuba L	9/12/2005			12.2	0.304									
23	Cuba L	9/27/2005			12.2	0.284									
23	Cuba L	6/9/2006	13.3		12.8	0.013									
23	Cuba L	6/14/2006	13.7		13.3	0.019									
23	Cuba L	6/28/2006	13.7		13.3	0.157									
23	Cuba L	7/12/2006	13.7		13.3	0.281									
23	Cuba L	7/26/2006	13.7		13.3	0.016									
23	Cuba L	8/10/2006	13.7		13.1	0.026									
23	Cuba L	8/23/2006	13.7		13.3	0.314									
23	Cuba L	9/21/2006	13.7		13.1	0.262									
23	Cuba L-1	6/16/2008	13.9		12.9	0.043									
23	Cuba L-1	6/30/2008	14.7		13.2	0.015									
23	Cuba L-1	7/14/2008	13.0		11.5	0.176									
23	Cuba L-1	7/28/2008	12.7		11.7	0.542									
23	Cuba L-1	8/11/2008	14.9		13.4	0.586									
23	Cuba L-1	8/25/2008	14.7		13.2	0.376									
23	Cuba L-1	9/8/2008	13.6		12.1	0.405									
23	Cuba L-1	9/22/2008	13.5		12.0	0.785									
23	Cuba L-1	06/22/2009			12.4	0.022		0.50							
23	Cuba L-1	07/06/2009			12.5	0.063		0.68							
23	Cuba L-1	07/20/2009			12.6	0.386		0.67							
23	Cuba L-1	08/06/2009			12.5	0.014		0.36							
23	Cuba L-1	08/17/2009			11.5	0.033		0.03							
23	Cuba L-1	08/31/2009			12.7	0.387		1.48							
23	Cuba L-1	09/14/2009			12.5	0.161		0.82							
23	Cuba L-1	09/30/2009				0.041		0.08							

LNum	PName	Date	Zbot	Zsd	Zsamp	Tot.P	NO3	NH4	TDN	TN/TP	TColor	pH	Cond25	Ca	Chl.a
23	Cuba L-1	6/7/2010	12.2		12.2	0.018		0.46							
23	Cuba L-1	6/21/2010	13.2		12.9	0.016		0.24							
23	Cuba L-1	7/6/2010	12.1		12.0	0.015		0.21							
23	Cuba L-1	7/19/2010	13.1		12.6	0.164		0.34							
23	Cuba L-1	8/2/2010	13.0		12.8	0.050		0.51							
23	Cuba L-1	8/16/2010	13.2		12.8	0.213		0.88							
23	Cuba L-1	8/31/2010	13.1		12.8	0.182		0.70							
23	Cuba L-1	9/13/2010	13.1		12.5	0.266		1.03							
23.2	Cuba L-2	6/16/2008	8.0	4.15	1.5	0.008	0.04	0.03	0.27	78.43	12	7.50	85	12.6	
23.2	Cuba L-2	6/30/2008	7.4	4.25	1.5	0.010	0.02	0.02	0.28	63.58	10	7.42	100		0.95
23.2	Cuba L-2	7/14/2008	7.1	2.70	1.5	0.015	0.13	0.01	0.15	21.59	10	7.91	125		0.91
23.2	Cuba L-2	7/28/2008	7.4	3.15	1.5	0.013	0.01	0.03	0.36	64.15	22	7.56	83		0.20
23.2	Cuba L-2	8/11/2008	7.7	2.05	1.5	0.017	0.01	0.03	0.31	40.18	13	7.55	125	14.7	2.02
23.2	Cuba L-2	8/25/2008	8.4	1.60	1.5	0.021	0.00	0.02	0.30	32.51	31	8.00			3.72
23.2	Cuba L-2	9/8/2008	8.4	1.45	1.5	0.023	0.00	0.01	0.34	31.84	11	7.80	111		3.96
23.2	Cuba L-2	9/22/2008	7.6	2.35	1.5	0.018	0.01	0.01	0.32	39.18	8	7.49	113		2.85
23.3	Cuba L-3	6/16/2008	5.0	3.85	1.5	0.008	0.05	0.04	0.29	82.89	16	7.41	82	13.9	
23.3	Cuba L-3	6/30/2008	4.8	2.15	1.5	0.011	0.02	0.03	0.32	62.12	8	7.77	90		0.69
23.3	Cuba L-3	7/14/2008	4.4	2.10	1.5	0.018	0.01	0.02	0.17	20.36	11	7.71	118		1.06
23.3	Cuba L-3	7/28/2008	4.9	2.35	1.5	0.014	0.01	0.02	0.23	36.00	16	7.65	84		0.77
23.3	Cuba L-3	8/11/2008	4.8	1.65	1.5	0.019	0.01	0.04	0.28	33.11	10	7.50	126	15.4	2.72
23.3	Cuba L-3	8/25/2008	4.5	1.70	1.5	0.020	0.00	0.06	0.22	23.79	12	7.47	125		2.72
23.3	Cuba L-3	9/8/2008	3.9	1.35	1.5	0.029	0.00	0.02	0.37	28.78	14	7.61	107		3.93
23.3	Cuba L-3	9/22/2008	4.9	2.15	1.5	0.018	0.01	0.01	0.27	32.84	12	7.37	118		2.61

LNum	PName	Date	Zbot	Zsd	Zsamp	Site	TAir	TH20	QA	QB	QC	QD
23	Cuba L	6/14/1986	13.5	4.25	1.5	epi	17	21				
23	Cuba L	6/20/1986	12.5	3.00	1.5	epi	20	20				
23	Cuba L	6/27/1986	12.5	4.63	1.5	epi	19	21				
23	Cuba L	7/4/1986	12.5	3.38	1.5	epi	15	20				
23	Cuba L	7/14/1986	12.5	3.25	1.5	epi	18	22				
23	Cuba L	7/18/1986	12.5	3.00	1.5	epi	22	22				
23	Cuba L	7/25/1986	12.5	4.00	1.5	epi	24	25				
23	Cuba L	8/1/1986	12.3	3.50	1.5	epi	19	23				
23	Cuba L	8/8/1986	12.3	2.50	1.5	epi	19	24				
23	Cuba L	8/15/1986	12.5	1.75	1.5	epi	22	21				
23	Cuba L	8/22/1986	12.5	1.50	1.5	epi	18	20				
23	Cuba L	8/29/1986	12.5	1.25	1.5	epi	11	18				
23	Cuba L	9/5/1986	12.5	1.50	1.5	epi	20	19				
23	Cuba L	9/16/1986	12.5	0.75	1.5	epi	17	10				
23	Cuba L	9/19/1986	12.5	1.00	1.5	epi	14	16				
23	Cuba L	6/8/1987	12.5	3.00	1.5	epi	20	18				
23	Cuba L	6/15/1987	12.5	2.50	1.5	epi	16	19				
23	Cuba L	6/22/1987	12.5	5.00	1.5	epi	17	20				
23	Cuba L	6/29/1987	12.5	3.50	1.5	epi	16	18				
23	Cuba L	7/6/1987	12.0	3.30	1.5	epi	20	18				
23	Cuba L	7/13/1987	12.1	4.50	1.5	epi	23	23				
23	Cuba L	7/20/1987	12.5	3.00	1.5	epi	22	22				
23	Cuba L	7/27/1987	12.5	2.50	1.5	epi	20	23				
23	Cuba L	7/30/1987	12.5	2.00	1.5	epi	25	25				
23	Cuba L	8/10/1987	12.5	1.50	1.5	epi	20	23				
23	Cuba L	8/17/1987	12.5	0.80	1.5	epi	24	21				
23	Cuba L	8/24/1987	12.5	0.95	1.5	epi	16	21				
23	Cuba L	8/31/1987	12.6	0.80	1.5	epi	14	18				
23	Cuba L	9/8/1987	12.1	1.60	1.5	epi	20	18				
23	Cuba L	9/20/1987	12.3	0.85	1.5	epi	18	19				
23	Cuba L	6/20/1988	12.5	7.50	1.5	epi	29	22				
23	Cuba L	7/7/1988	12.0	8.50	1.5	epi	34	24				
23	Cuba L	8/1/1988	12.0	5.25	1.5	epi	24	25				
23	Cuba L	8/4/1988	12.0	5.88	1.5	epi	26	28				
23	Cuba L	8/11/1988	12.5	6.75	1.5	epi	33	26				
23	Cuba L	7/18/1990	12.8	3.75	1.5	epi	27	23				
23	Cuba L	8/2/1991	14.0	4.50	1.5	epi	28	24				

LNum	PName	Date	Zbot	Zsd	Zsamp	Site	TAir	TH20	QA	QB	QC	QD
23	Cuba L	6/2/1998	7.7	3.15	1.0	epi	21	21	2	2	2	5
23	Cuba L	6/15/1998	7.6	2.85	1.0	epi	22	20	2	2	2	
23	Cuba L	6/30/1998	7.8	1.85	1.0	epi	26	26	2	3	2	
23	Cuba L	7/15/1998	7.6	3.60	1.0	epi	28	25	2	2	1	
23	Cuba L	7/27/1998	8.4	3.70		epi	22	24	2	2	1	
23	Cuba L	8/25/1998	8.0	3.45	1.0	epi	22	27	2	2	2	
23	Cuba L	9/16/1998	7.7	1.20	2.0	epi	21	23	3	2	3	
23	Cuba L	9/30/1998	7.3	1.55	1.5	epi	16	20				
23	Cuba L	6/2/1999	9.4	5.00	1.5	epi	19	20	1	1	1	
23	Cuba L	6/16/1999	11.2	4.60	1.5	epi	13	20	1	1	1	
23	Cuba L	7/13/1999	11.5	6.80	1.5	epi	18	23	2	2	1	
23	Cuba L	7/29/1999	11.4	5.75	1.5	epi	29	25	2	2	1	
23	Cuba L	8/10/1999	11.3	2.10	1.5	epi	16	22	3	3	3	1
23	Cuba L	8/18/1999	11.8	2.35	1.5	epi	22	24	2	3	2	
23	Cuba L	9/7/1999	11.5	1.70	0.6	epi	22	21	2	3	3	2
23	Cuba L	9/22/1999	11.5	1.30		epi	12	16	3	2	3	5
23	Cuba L	6/12/2000		3.80	1.5	epi	20		2	1	1	5
23	Cuba L	6/28/2000		3.10	1.5	epi	21	24	3	1	3	1
23	Cuba L	7/23/2000		4.15	1.5	epi	19	23	2	3	1	
23	Cuba L	8/8/2000		2.65	1.5	epi	27	24	2	3	2	
23	Cuba L	8/29/2000		2.40		epi	23	23	3	2	2	
23	Cuba L	5/23/2001	12.0	3.65		epi			3	1	2	6
23	Cuba L	6/13/2001	12.7	3.60		epi			3	1	2	6
23	Cuba L	6/27/2001	12.6	6.85		epi			2	2	1	
23	Cuba L	7/12/2001	13.0	4.45		epi			2	3	2	5
23	Cuba L	7/24/2001	12.7	6.20		epi			2	3	2	2
23	Cuba L	8/8/2001	12.8	4.85		epi			2	5	2	2
23	Cuba L	8/22/2001	13.3	2.50		epi			2	3	2	
23	Cuba L	9/1/2001	13.0	2.20		epi			3	3	3	1
23	Cuba L	9/19/2001	12.8	1.85		epi			3	3	4	1
23	Cuba L	10/3/2001	12.0	1.65		epi			3	3	5	1
23	Cuba L	08/21/02	23.2	2.05	23.2	hypo	29		3	2	3	8
23	Cuba L	08/28/02	21.0	1.80	21.0	hypo	22	24	3	1	2	
23	Cuba L	09/12/02		2.40		epi	24	23				
23	Cuba L	09/29/02	18.0	1.55		epi	19	21	5	3	4	135
23	Cuba L	10/01/02	14.2	2.45		epi	24	21	4	2	4	38
23	Cuba L	10/18/02	17.0	2.45	57.6	epi	15	14	3	3	4	5
23	Cuba L	10/24/02	12.0	2.30		epi	3	11	3	3	5	58
23	Cuba L	6/3/2003	13.4	3.05		epi	20	16	2	1	1	5
23	Cuba L	6/17/2003	13.4	3.15		epi	22	19	2	1	1	
23	Cuba L	7/7/2003	13.4	3.70		epi	22	24	2	2	2	
23	Cuba L	7/30/2003	13.3	1.45		epi	25	22	3	2	3	146
23	Cuba L	8/12/2003	13.1	1.00		epi	29	24	3	3	4	1456
23	Cuba L	8/27/2003	13.1	1.55		epi	27		2	3	2	
23	Cuba L	9/10/2003	13.1	2.35		epi	27	22	2	3	2	
23	Cuba L	9/30/2003	13.1	1.20		epi	17	16	3	3	2	
23	Cuba L	6/17/2004		4.10	1.5	epi	23	22	1	1	1	0
23	Cuba L	6/29/2004	12.9	2.90	1.5	epi	22	20	2	1	2	0
23	Cuba L	7/12/2004	12.5	4.60	1.5	epi	33	23	2	2	1	0
23	Cuba L	7/30/2004	12.5	3.40	1.5	epi	30	22	2	3	2	0
23	Cuba L	8/10/2004	12.8	2.60	1.5	epi	23	22	3	2	2	0
23	Cuba L	8/25/2004	13.1	2.70	1.5	epi	27	22	2	3	2	0
23	Cuba L	9/6/2004	13.1	3.60	1.5	epi	28	23	2	3	2	0
23	Cuba L	9/22/2004	13.1	3.20	1.5	epi	28	20	3	2	1	0
23	Cuba L	6/1/2005	13.1	5.80	1.5	epi	23	18	1	1	1	0
23	Cuba L	6/15/2005	13.1	4.00	1.5	epi	23	24	2	1	1	0
23	Cuba L	7/13/2005	13.7	7.70	1.5	epi	32	26	1	1	1	0
23	Cuba L	8/3/2005	13.4	4.20	1.5	epi	31	36	2	3	1	0
23	Cuba L	8/15/2005	13.7	3.50	1.5	epi	34		2	3	2	0
23	Cuba L	8/29/2005	13.7	2.35	1.5	epi	21	22	3	3	2	0
23	Cuba L	9/12/2005	12.8	2.30	1.5	epi	25	21	3	3	3	1
23	Cuba L	9/27/2005		1.75		epi	20	20	3	3	4	1

LNum	PName	Date	Zbot	Zsd	Zsamp	Site	TAir	TH20	QA	QB	QC	QD
23	Cuba L	6/9/2006	13.3	1.25	1.5	epi	21	19	3	3	2	0
23	Cuba L	6/14/2006	13.7	2.30	1.5	epi	26	20	3	3	3	123
23	Cuba L	6/28/2006	13.7	2.70	1.5	epi		24	2	1	2	0
23	Cuba L	7/12/2006	13.7	3.12	1.5	epi	22	24	2	3	3	5
23	Cuba L	7/26/2006	13.7	1.70		epi	27	24	2	3	2	0
23	Cuba L	8/10/2006	13.7	1.75		epi	21	25	3	3	3	0
23	Cuba L	8/23/2006	13.7	1.40	1.5	epi	25	23	3	3	2	0
23	Cuba L	9/21/2006	13.7	1.45	0.9	epi	16	18	3	3	3	5
23	Cuba L	7/9/2007		2.46		epi	30	24	2	3	1	5
23	Cuba L	7/25/2007	13.7	2.40	1.5	epi	25	25	2	2	2	0
23	Cuba L	8/6/2007	13.7	2.30	1.5	epi	28	27	2	3	2	0
23	Cuba L	8/21/2007		2.20	1.5	epi	17	21	2	2	2	0
23	Cuba L	9/4/2007		2.20	1.5	epi	28	24	2	3	2	0
23	Cuba L	9/17/2007		2.15	1.5	epi	20	20	2	3	4	1
23	Cuba L-1	6/16/2008	13.9	3.95	1.5	epi	21	23	2	3	2	8
23	Cuba L-1	6/30/2008	14.7	3.90	1.5	epi	23	22	1	3	1	8
23	Cuba L-1	7/14/2008	13.0	3.85	1.5	epi	21	24	1	3	2	8
23	Cuba L-1	7/28/2008	12.7	2.35	1.5	epi	25	24	2	3	2	8
23	Cuba L-1	8/11/2008	14.9	1.95	1.5	epi	18	23	2	2	2	0
23	Cuba L-1	8/25/2008	14.7	1.65	1.5	epi	26	24	2	2	2	0
23	Cuba L-1	9/8/2008	13.6	1.70	1.5	epi	22	22	3	2	2	0
23	Cuba L-1	9/22/2008	13.5	1.70	1.5	epi	17	19	2	2	2	0
23	Cuba L-1	06/22/2009	13.4	2.65	1.5	epi	23	21	2	2	1	0
23	Cuba L-1	07/06/2009	13.2	3.60	1.5	epi	22	21	2	3	2	1
23	Cuba L-1	07/20/2009	13.1	5.55	1.5	epi	21	21	2	4	2	0
23	Cuba L-1	08/06/2009	13.1	3.65	1.5	epi	20	22	2	3	2	0
23	Cuba L-1	08/17/2009	12.5	2.75	1.5	epi	32	26	2	2	2	0
23	Cuba L-1	08/31/2009	13.2	1.90	1.5	epi	16	20	2	2	2	0
23	Cuba L-1	09/14/2009	13.4	2.65	1.5	epi	21	20	3	3	3	0
23	Cuba L-1	09/30/2009				epi						
23	Cuba L	6/7/2010	12.2	2.25	1.5	epi	17	21				
23	Cuba L	6/21/2010	13.2	3.25	1.5	epi	25	23	3	3	2	0
23	Cuba L	7/6/2010	12.1	5.75	1.5	epi	30	25	2	3	2	0
23	Cuba L	7/19/2010	13.1	3.35	1.5	epi	25	26	2	3	2	0
23	Cuba L	8/2/2010	13.0	2.25	1.5	epi	25	25	2	3	2	0
23	Cuba L	8/16/2010	13.2	2.05	1.5	epi	25	25	3	3	2	0
23	Cuba L	8/31/2010	13.1	1.75	1.5	epi	24	24	3	3	3	0
23	Cuba L	9/13/2010	13.1	1.55	1.5	epi	19	19	3	3	3	1
23	Cuba L	08/21/02	23.2	2.05	1.5	hypo	29		3	2	3	8
23	Cuba L	08/28/02	21.0	1.80	1.5	hypo	22	24	3	1	2	
23	Cuba L	09/12/02		2.40	1.5	hypo	24	17				
23	Cuba L	09/29/02	18.0	1.55	1.5	hypo	19	16	5	3	4	135
23	Cuba L	10/01/02	14.2	2.45	1.5	hypo	24	14	4	2	4	38
23	Cuba L	10/24/02	12.0	2.30	1.5	hypo	3	14	3	3	5	58
23	Cuba L	6/17/2004			12.8	hypo		12				
23	Cuba L	6/29/2004	12.9		12.9	hypo		13				
23	Cuba L	7/12/2004	12.5		9.4	hypo		15				
23	Cuba L	7/30/2004	12.5		12.5	hypo		13				
23	Cuba L	8/10/2004	12.8		12.8	hypo		14				
23	Cuba L	8/25/2004	13.1		12.6	hypo		15				
23	Cuba L	9/6/2004	13.1		13.1	hypo		14				
23	Cuba L	9/22/2004	13.1		13.1	hypo		13				
23	Cuba L	6/1/2005			13.1	hypo		11				
23	Cuba L	6/15/2005			13.1	hypo		12				
23	Cuba L	8/3/2005			13.1	hypo		13				
23	Cuba L	8/15/2005			13.7	hypo		12				
23	Cuba L	8/29/2005			13.7	hypo		12				
23	Cuba L	9/12/2005			12.2	hypo		13				
23	Cuba L	9/27/2005			12.2	hypo		13				
23	Cuba L	6/9/2006	13.3		12.8	hypo		13				
23	Cuba L	6/14/2006	13.7		13.3	hypo		12				
23	Cuba L	6/28/2006	13.7		13.3	hypo		14				

LNum	PName	Date	Zbot	Zsd	Zsamp	Site	TAir	TH20	QA	QB	QC	QD
23	Cuba L	7/12/2006	13.7		13.3	hypo		13				
23	Cuba L	7/26/2006	13.7		13.3	hypo		14				
23	Cuba L	8/10/2006	13.7		13.1	hypo		16				
23	Cuba L	9/21/2006	13.7		13.1	hypo		13				
23	Cuba L	7/9/2007			13.4	hypo		12				
23	Cuba L	7/25/2007			13.1	hypo		14				
23	Cuba L	8/6/2007			13.7	hypo		18				
23	Cuba L	8/21/2007			13.4	hypo		12				
23	Cuba L	9/4/2007			13.7	hypo		13				
23	Cuba L	9/17/2007			13.7	hypo		13				
23	Cuba L-1	6/16/2008	13.9		12.9	hypo		14				
23	Cuba L-1	6/30/2008	14.7		13.2	hypo		15				
23	Cuba L-1	7/14/2008	13.0		11.5	hypo		14				
23	Cuba L-1	7/28/2008	12.7		11.7	hypo		15				
23	Cuba L-1	8/11/2008	14.9		13.4	hypo		12				
23	Cuba L-1	8/25/2008	14.7		13.2	hypo		15				
23	Cuba L-1	9/8/2008	13.6		12.1	hypo		14				
23	Cuba L-1	9/22/2008	13.5		12.0	hypo		11				
23	Cuba L-1	06/22/2009			12.4	hypo		17				
23	Cuba L-1	07/06/2009			12.5	hypo		16				
23	Cuba L-1	07/20/2009			12.6	hypo		14				
23	Cuba L-1	08/06/2009			12.5	hypo		17				
23	Cuba L-1	08/17/2009			11.5	hypo		17				
23	Cuba L-1	08/31/2009			12.7	hypo		14				
23	Cuba L-1	09/14/2009			12.5	hypo		16				
23	Cuba L-1	09/30/2009				hypo						
23	Cuba L-1	6/7/2010	12.2		12.2	hypo		13				
23	Cuba L-1	6/21/2010	13.2		12.9	hypo		14				
23	Cuba L-1	7/6/2010	12.1		12.0	hypo		15				
23	Cuba L-1	7/19/2010	13.1		12.6	hypo		15				
23	Cuba L-1	8/2/2010	13.0		12.8	hypo		14				
23	Cuba L-1	8/16/2010	13.2		12.8	hypo		14				
23	Cuba L-1	8/31/2010	13.1		12.8	hypo		14				
23.2	Cuba L-2	6/16/2008	8.0			hypo		23				
23.2	Cuba L-2	6/30/2008	7.4			hypo		23				
23.2	Cuba L-2	7/14/2008	7.1			hypo		23				
23.2	Cuba L-2	7/28/2008	7.4			hypo		25				
23.2	Cuba L-2	8/11/2008	7.7			hypo		23				
23.2	Cuba L-2	8/25/2008	8.4			hypo		24				
23.2	Cuba L-2	9/8/2008	8.4			hypo		21				
23.2	Cuba L-2	9/22/2008	7.6			hypo		19				
23.3	Cuba L-3	6/16/2008	5.0			hypo		23				
23.3	Cuba L-3	6/30/2008	4.8			hypo		22				
23.3	Cuba L-3	7/14/2008	4.4			hypo		23				
23.3	Cuba L-3	7/28/2008	4.9			hypo		24				
23.3	Cuba L-3	8/11/2008	4.8			hypo		21				
23.3	Cuba L-3	8/25/2008	4.5			hypo		24				
23.3	Cuba L-3	9/8/2008	3.9			hypo		21				
23.3	Cuba L-3	9/22/2008	4.9			hypo		19				

Legend Information

Indicator	*Description*	*Detection Limit*	*Standard (S) / Criteria (C)*
General Information			
Lnum	lake number (unique to CSLAP)		
Lname	name of lake (as it appears in the Gazetteer of NYS Lakes)		
Date	sampling date		
Field Parameters			
Zbot	lake depth at sampling point, meters (m)		
Zsd	Secchi disk transparency or clarity	0.1m	1.2m (C)
Zsamp	water sample depth (m)	0.1m	none
Tair	air temperature (C)	-10C	none
TH20	water temperature (C)	-10C	none
Laboratory Parameters			
Tot.P	total phosphorus (mg/l)	0.003 mg/l	0.020 mg/l (C)
NOx	nitrate + nitrite (mg/l)	0.01 mg/l	10 mg/l NO3 (S), 2 mg/l NO2 (S)
NH4	total ammonia (mg/l)	0.01 mg/l	2 mg/l NH4 (S)
TN	total nitrogen (mg/l)	0.01 mg/l	none
TN/TP	nitrogen to phosphorus (molar) ratio, = (TKN + NOx)*2.2/TP		none
TCOLOR	true (filtered) color (ptu, platinum color units)	1 ptu	none
pH	powers of hydrogen (S.U., standard pH units)	0.1 S.U.	6.5, 8.5 S.U. (S)
Cond25	specific conductance, corrected to 25C (umho/cm)	1 umho/cm	none
Ca	calcium (mg/l)	1 mg/l	none
Chl.a	chlorophyll a (ug/l)	0.01 ug/l	none
Fe	iron (mg/l)	0.1 mg/1	1.0 mg/l (S)
Mn	manganese (mg/l)	0.01 mg/l	0.3 mg/l (S)
As	arsenic (ug/l)	1 ug/l	10 ug/l (S)
Lake Assessment			
QA	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		
QB	aquatic plant assessment, 5 point scale; 1 = no plants visible, 2 = plants below surface, 3 = plants at surface, 4 = plants dense at surface, 5 = surface plant coverage		
QC	recreational assessment, 5 point scale; 1 = could not be nicer, 2 = excellent, 3 = slightly impaired, 4 = substantially impaired, 5 = lake not usable		
QD	reasons for recreational assessment, 8 choices; 1 = poor water clarity, 2 = excessive weeds, 3 = too much algae, 4 = lake looks bad, 5 = poor weather, 6 = litter/surface debris, 7 = too many lake users, 8 = other		

Appendix B: Priority Waterbody Listing for Cuba Lake

Cuba Lake (0201-0016) MinorImpacts

Waterbody Location Information

Revised: 02/26/2007

Water Index No:	Pa-53-54-11- 5-P115			**Drain Basin:**	Allegheny River
Hydro Unit Code:	05010001/100	**Str Class:**	B		Upper Allegheny
Waterbody Type:	Lake			**Reg/County:**	9/Allegany Co. (2)
Waterbody Size:	454.4 Acres			**Quad Map:**	CUBA (M-07-2)
Seg Description:	entire lake				

Water Quality Problem/Issue Information

(CAPS indicate MAJOR Use Impacts/Pollutants/Sources)

Use(s) Impacted	Severity	Problem Documentation
Public Bathing	Stressed	Known
Recreation	Stressed	Known

Type of Pollutant(s)

Known: NUTRIENTS (phosphorus)
Suspected: D.O./OXYGEN DEMAND, PATHOGENS
Possible: - - -

Source(s) of Pollutant(s)

Known: - - -
Suspected: AGRICULTURE, FAILING ON-SITE SYST, Streambank Erosion
Possible: - - -

Resolution/Management Information

Issue Resolvability: 1 (Needs Verification/Study (see STATUS))
Verification Status: 4 (Source Identified, Strategy Needed)
Lead Agency/Office: ext/WQCC **Resolution Potential:** Medium
TMDL/303d Status: n/a ( )

Further Details

Recreational use in Cuba Lake are known to experience minor impacts due to nutrient loads and resulting plant and algae growth. This assessment is based primarily on long-term sampling at a single site in the lake. It has been suggested that conditions vary in other parts of the lake and this possibility should be investigated. The impact of water quality conditions on public bathing use and aquatic life support should also be more fully evaluated. Nonpoint source nutrient loads from agricultural activities in the watershed and inadequate onsite wastewater treatment systems serving lakeside residences are the suspected sources of impacts to the lake.

Cuba Lake has been sampled as part of the NYSDEC Citizen Statewide Lake Assessment Program (CSLAP) beginning in 1986 thru 1990 and from 1998 thru the present. An Interpretive Summary report of the findings of this sampling was published in 2006. These data indicate that the lake continues to be best characterized mesoeutrophic, or moderately to highly productive. This most recent assessment is consistent with assessment from previous years, although water quality conditions reflected in the CSLAP sampling have been variable from year to year; ranging from oligotrophic (1988) to eutrophic (1987, 2000, 2003). Phosphorus levels in the lake occasionally (23% of the samples collected) exceed the state guidance values indicating impacted/stressed recreational uses. Corresponding transparency measurements rarely fail to meet what is minimally recommended for swimming beaches. Readings for pH typically fall within the state water quality standard range of 6.5 to 8.5. The bottom waters of Cuba Lake have elevated nutrient (phosphorus and ammonia) levels, consistent with oxygen depletion near the lake bottom (and reports of hydrogen sulfide

odors in bottom samples, also associated with oxygen depletion). It is not known if this has resulted in any fisheries impacts. (DEC/DOW, BWAM/CSLAP, February 2006)

Public perception of the lake and its uses is also evaluated as part of the CSLAP effort. These assessment indicate recreational suitability of the lake to be highly favorable, consistent with previous assessments. The recreational suitability of the lake is described most frequently as "could not be nicer" or "excellent." The lake itself is most often described as "not quite crystal clear," an assessment that is slightly more favorable than suggested by measured water quality characteristics. Assessments have noted that aquatic plants only occasionally grow to the lake surface but do not significantly impact recreational uses. Aquatic plants are dominated by a mix of native and non-native species. (DEC/DOW, BWAM/CSLAP, February 2006)

This lake waterbody is designated class B, suitable for use as a public bathing beach, general recreation and aquatic life support, but not as a public water supply. Water quality monitoring by NYSDEC focuses primarily on support of general recreation and aquatic life. Samples to evaluate the bacteriological condition and bathing use of the lake or to evaluate contamination from organic compounds, metals or other inorganic pollutants have not been collected as part of the CSLAP monitoring program. Monitoring to assess potable water supply and public bathing use is generally the responsibility of state and/or local health departments.

Previous assessments have cited inadequate on-site septic systems that serve about 300 seasonal and some year-round lakeside residences as suspected/possible sources of water quality impact. The most recent investigations have not identified obvious septic systems failures, but small lot sizes and poor soils limit properly designed systems. A recent sewer district proposal was narrowly accepted by local voters. Nonpoint agricultural sources are also suspected of contributing to impacts in the lake. (DEC/DOW, Region 9, March 2007)

Continued sampling of the lake through the NYSDEC CSLAP effort is expected. This future sampling is being discussed and planned with an emphasis on the need for more current data that is targeted toward specific issues (particularly the impact of on-site septic systems) as well as bacteriological sampling - not typically a part of CSLAP - that reflects the specific data needs (e.g., frequency) associated with existing water quality standards. In addition, sampling at additional sites in order to provide a more comprehensive whole lake assessment is also being considered. (DEC/DOW, BWAM/RIBS, March 2007)