Short Ears, Long Tales

Courte Oreilles Lakes Association

Issue #54 July 3, 2022

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Water Quality

By Jim Coors
COLA Board of Directors

[*Heads up! This is a long, detailed report on water quality that was presented at the 2022 COLA Annual Meeting. Sorry, but LCO's water-quality situation deserves full treatment.*]

We know what "water" is, but what does "quality" really mean? Quality for whom? For what purpose? So, let's simplify the issue, start out with a simple description of water quality, and go from there: "Water quality is something most of us don't really understand or care about until it's bad. Then, we realize what we've lost, but it might be too late to do anything about it."

Our conundrum is that we can't easily see good water quality, but bad is pretty obvious. All is well until excessive nutrients promote exuberant plant growth making swimming unpleasant and boat navigation difficult. Toxic algal blooms proliferate, killing fish and other animals. Higher temperatures and low oxygen concentration in LCO's water eliminate fish habitat. A lot of suffering happens as ecosystems fall apart.

So, we need to address the issue of water quality early on before things get out of control. That's where the LCO lakes are right now–not out of control, and remedies are still possible.

First, who's watching out for the LCO lakes?

Fortunately, the LCO lakes are being monitored from multiple directions. First, the Wisconsin Department of Natural Resources establishes the regulatory framework for protection of Wisconsin lakes, and WDNR tasks its own biologists with monitoring fishery health and water quality. WDNR is the conduit by which legislative remedies to environmental threats become real.

Second, even though only one third of the LCO lakes is on Tribal land, the LCO Conservation Department has taken on the essential role looking after the entire lake system. The LCOCD oversees most of the weekly/biweekly water sampling and analysis at multiple lake locations throughout the summer (see diagram below). LCOCD has done this for decades resulting in a trusted database for scientific inquiry and responsible decision-making. LCOCD provides the reliable "on the water" eyes and ears.

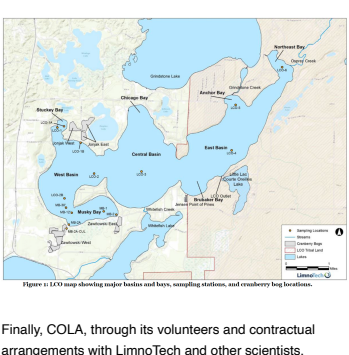


Figure 1: LCO map showing major basins and bays, sampling stations, and cranberry bog locations.

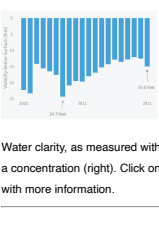
Finally, COLA, through its volunteers and contractual arrangements with LimnoTech and other scientists, assesses water-quality data generated by LCOCD and relates these findings to the legal framework set by WDNR to protect the lakes. COLA also communicates this information to a broad audience and proposes/conducts protective actions.

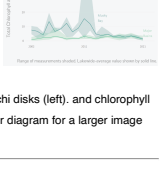
So, where are the LCO lakes water quality-wise? Four indicators of water quality are sufficient to provide an overview of LCO's status in 2021: clarity, chlorophyll a (an indicator of algal growth), health of the cold-water fishery, and phosphorus.

Clarity and Chloropyhll a

Two of the indicators in 2021, clarity and chlorophyll a are neutral to encouraging. At the East Basin deep hole, average water clarity during the recreational season increased, when compared to the previous five years, to 15.6 ft. However, there is still a significant long-term downward trend from 2008.

Chlorophyll a provides a measure of algal mass and the potential for algal blooms, which are difficult to predict because they occur suddenly due to rapidly shifting local conditions. Water temperature, nutrient concentration, wind, and water currents vary widely across the many bays in LCO, and algae growth can rapidly explode and then dissipate in a matter of days. The good news is that the LCO lakes show no propensity for extraordinary algal blooms. Not to say that we haven't had them in the past (see 2016 report), but algal blooms, unless excessive, are part of nature's pattern.





Water clarity, as measured with Seechi disks (left). and chlorophyll a concentration (right). Click on either diagram for a larger image with more information.

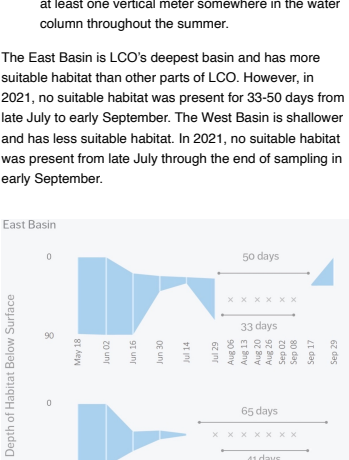
Fish Habitat

LCO's cold-water fishery is in decline. Warming temperatures and decreasing oxygen concentrations have eliminated suitable habitat for cisco and lake whitefish throughout the season. This has been the situation since 2013, perhaps earlier. Lac Courte Oreilles is a two-story cold-water fishery with a distinct upper layer of warm water and a deeper, oxygen-poor cold layer. The narrow interface provides the cold temperature and adequate oxygen to support cisco and lake whitefish. As water temperature increases through the summer, these cold-water fish must move downward to colder water, but oxygen concentrations become limiting. As aquatic plants die, sink to the bottom, and begin to decay, microbial activity further depresses oxygen. The big squeeze is on from both the top and the bottom.

To get into the details: preliminary WDNR standards for a cold-water fishery such as LCO's require:

- a minimum dissolved oxygen concentration of 6 mg/L, and
- a maximum water temperature of 66 degrees F for at least one vertical meter somewhere in the water column throughout the summer.

The East Basin is LCO's deepest basin and has more suitable habitat than other parts of LCO. However, in 2021, no suitable habitat was present for 33-50 days from late July to early September. The West Basin is shallower and has less suitable habitat. In 2021, no suitable habitat was present from late July through the end of sampling in early September.

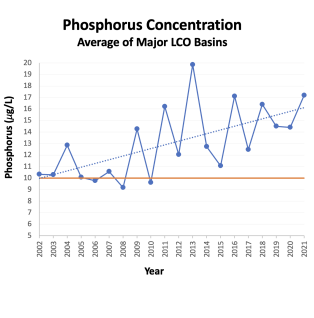


There may be few, if any, lake whitefish left in the LCO lakes, and cisco are also under severe stress. We don't know for sure since there hasn't been a full-on survey for cold-water species for some time.

Temperatures are increasing because of climate change. Lake oxygen is decreasing because of exuberant plant growth of both native and invasive aquatic species. Why the excessive plant growth?

Phosphorus

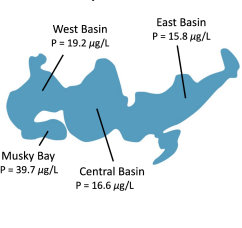
Phosphorus concentrations throughout LCO were higher in 2021 than in previous years. As shown in the following graph, over the last 20 years, the average phosphorus concentration of LCO's major basins has increased from around 10 μg/L to over 17 μg/L This represents an annual rate of 0.3 μg/L, which is highly significant statistically as well as being quite alarming. The proposed protective upper limit for the phosphorus criterion is 10 μg/L as shown by the orange line.



Here are the main findings of the 2021 WisCALM report prepared for COLA by LimnoTech:

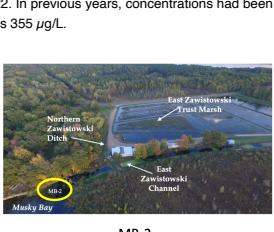
- The area-weighted lake-wide average (including minor basins) phosphorus concentration (18.2 μg/L) was 20% higher than the overall weighted average during the entire 2017-2021 assessment period (15.2 μg/L).
- The station specific phosphorus concentrations in 2021 were consistently the highest or second highest in the past 3 to 5 years.
- All Major Basin sampling locations had average phosphorus concentrations exceeding the current two-story fishery maximum criterion set by WDNR (15 μg/L).
- Musky Bay phosphorus concentrations (39.7 μg/L) did not exceed the shallow drainage lake criterion set by WDNR (40 μg/L), but Musky Bay's phosphorus concentration has increased consistently over the past 3 years, up 41% from 2018.

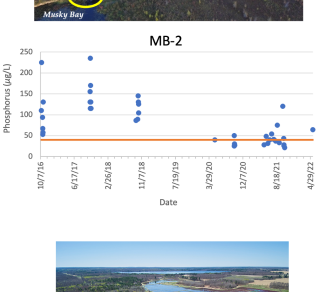
Phosphorus concentrations in 2021 increased from the east to the west across LCO's Major Basins. The closer to Musky Bay, the higher the phosphorus.

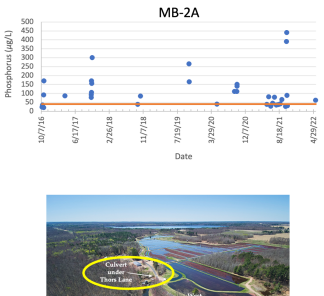


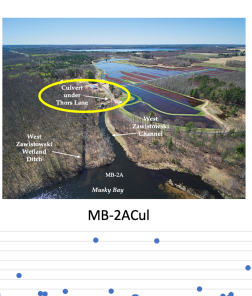
The LCOCD has been sampling water near discharge channels leading from the two cranberry marshes on Musky Bay since 2016. Water samples were usually collected on or around those days when water was being discharged into Musky Bay.

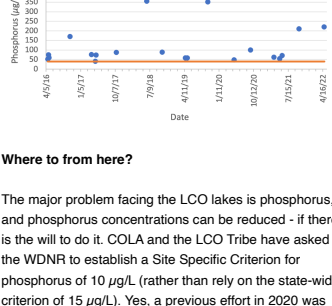
An irrigation return flow system was installed on the eastern marsh in 2015. It may have taken a few years, but it seems that at least since 2018, phosphorus concentrations have decreased at the MB-2 sampling sight (see diagrams below). However, the phosphorus concentrations at the larger (75 acre) western bog have been as high as 440 μg/L (10/14/21, MB-2A) and are typically substantially higher than the 40 μg/L upper limit set by WDNR (orange line). In spring 2022, the phosphorus concentration at MB-2ACul reached 220 on 4/29/22. In previous years, concentrations had been as high as 355 μg/L.











Where to from here?

The major problem facing the LCO lakes is phosphorus, and phosphorus concentrations can be reduced - if there is the will to do it. COLA and the LCO Tribe have asked the WDNR to establish a Site Specific Criterion for phosphorus of 10 μg/L (rather than rely on the state-wide criterion of 15 μg/L). Yes, a previous effort in 2020 was turned back by the Natural Resources Board chaired by Fred Prehn after a tie vote. But now we have more data, more analyses, and more support from EPA, WDNR, and LCOCD scientists. A final decision by the Natural Resources Board is due in January, 2023.

When the LCO lakes receive the more protective 10 μg/L criterion, a number of avenues will open up for taking action. Most important, the new criterion will be an obvious, emphatic statement that LCO needs help to restore, or at least preserve, what remains of its two-story, cold-water fishery. We can only hope.

MANY THANKS

To all who attended COLA's annual meeting - your input and support are greatly appreciated.

New and re-appoiinted Board of Directors

COLA Committees

Please join our efforts to protect the LCO lakes.

AIS BUOYS

Be on the lookout for COLA's new AIS buoys. They are placed in those parts of the LCO lakes with aquatic invasive species. The hope is to limit boat traffic in infested areas and the spread of AIS. COLA will provide more information in the near future.

HELP WANTED

COLA received a WDNR grant supporting the installation of the new Internet Landing Installed Device Sensor (I-LIDS) at the Hwy K ramp. WDNR encouraged COLA to recruit on-site inspectors to explain the purpose and function of the system.

If interested, contact COLA.

PREHN STAYS ON NRB

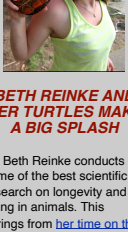
The Wisconsin State Supreme Court ruled that Fred Prehn can remain on the Natural Resources Board even though Governor Evers replaced him over one year ago. An astounding ruling with unsettling consequences for the LCO lakes. Here's what he did for us in 2020.

HAPPY INDEPENDENCE DAY!

Celebrate safely and please remember that permits are required for fireworks in Sawyer County

Under Wisconsin statues (Wisc. Stat. 167.10), a permit` is required if fireworks devices explode or leave the ground. More information.

Be considerate of your neighbors, wildlife, pets, and the LCO lakes by limiting fireworks to the July 4th weekend.

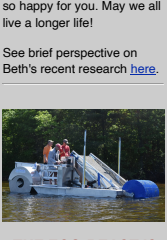


BETH REINKE AND HER TURTLES MAKE A BIG SPLASH

Dr. Beth Reinke conducts some of the best scientific research on longevity and aging in animals. This springs from her time on the shores of LCO surveying painted turtles. Thanks to all who provided the financial support for her work in 2018, Dr. Reinke was able to launch a research career that led to her team's groundbreaking June 24, 2022 article in Science. Science, a journal of the American Association for the Advancement of Science. This research has also been covered widely in the popular press (e.g., June 23, New York Times).

Congratulation, Beth. We are so happy for you. May we all live a longer life!

See brief perspective on Beth's recent research here.



THE ECO-BEAST IS ON THE PROWL

The Eco-Beast is on the prowl, prodded on by COLA volunteers and LCOCD staff. Musky Bay was the starting point, and the plans are to move to the rest of the lake soon. Curly-leaf pondweed and Eurasian watermilfoil are the target. If you see the Beast, wave and yell out your support!

THE ANNUAL LANDING BLITZ IS HERE

The annual Landing Blitz is happening right now, July 1st - 5th. It is one of the busiest boating weekends in the state!

Here is a handout explaining what the Landing Blitz is and the importance of **Inspect, Remove, Drain, and Never Move**.

For those newer to this event, boat landing inspectors hand out 1 white AIS towel per boat to say thanks and remind them of the motto (above).

2022 NATURAL HISTORY FIELD TRIPS

Here are this year's natural history field trips sponsored by the Extension Program at the Lac Courte Oreilles Ojibwe College near Hayward, Wisconsin. For more information, contact Cali Quaderer-Cuddy, Extension Program Coordinator, at cquaderer@Lco.edu

7/6 Lost Creek Falls
7/20 Little Girl's Point, MI
8/17 Brunsweiler Canyon
9/17 Hawk Ridge, Duluth, MN
9/24 Blue Hills Felsenmeer
9/8 Juniper Bluff
9/15 Morgan Falls/St. Peter's Dome- autumn colors

(more)

MIDWEST GLACIAL LAKES PARTNERSHIP

2022 WEBINARS

The Midwest Glacial Lakes Partnership (MGLP) brings together resource agencies, non-profit organizations, and other stakeholders to protect, rehabilitate, and enhance sustainable fish habitats in naturally formed lakes of the Midwest.

Note, in particular, the seminars/links to materials regarding the WI Shoreline Stabilization Outreach Project and the study of wakesurf and non-wakesurf boats and their effects on lake shore.

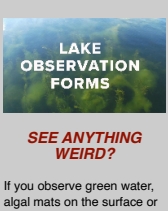
(more)

CABLE NATURAL HISTORY MUSEUM

The Cable Natural History Museum organizes informative natural history walks, talks, and other events. Support the museum while enjoying its offerings.

SEE ANYTHING WEIRD?

If you observe green water, algal mats on the surface or floating or dying fish - anything out of the ordinary - please take pictures and report this using COLA's observation forms immediately! COLA will alert the WDNR, the LCO Tribe, collect water samples, etc.



LCO NEEDS YOUR HELP

COLA is a ***volunteer organization.*** That means essential jobs don't get done unless someone steps up to help out. Contact communications@cola-wi.org if interested or you need more information.

Short Ears, Long Tales

ARCHIVED ISSUES OF SHORT EARS

A sampling of past articles from SELT relating specifically to water quality:

Issue 20 'COLA named Outstanding Partner in award for protecting Lac Courte Oreilles'

Issue 28 'Water quality—pure but not so simple'

Issue 36 'Beauty is Only Surface Deep'

Issue 40 'Protecting the Lakes: Aquatic Invasive Species Mapping and Management'

Issue 46 'Lac Courte Oreilles: Have we learned anything from the past?'

Issue 47 'The Early Voyages of the Eco-Harvester'

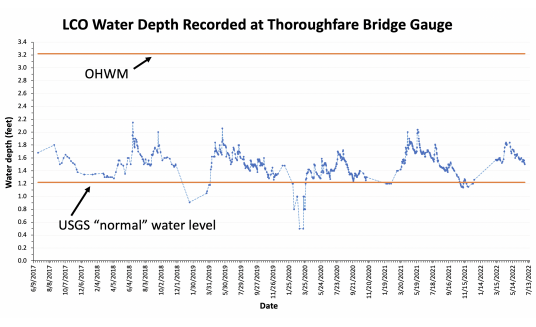
COLA NEEDS YOUR ONGOING SUPPORT

Please consider a tax-deductible donation today!

DONATE

Jim Coors is a member COLA's Board of Directors. He retired from the University of Wisconsin-Madison in 2007 where he was a professor in the Plant Breeding and Genetics program and the Department of Agronomy for 24 years. He is married to Ann Pollock whose great grandparents, Edward Cady Higbee and Grace Fassett Higbee, purchased the land now referred to as the "Camp at Reserve" on the east shore of Lac Courte Oreilles in 1919.

Questions, comments, or suggestions for future articles maybe sent to communications@cola-wi.org.



Volunteers regularly monitor the depth gauge at the Thoroughfare bridge. The gauge and the chart readings are in tenths of a foot (1/10 foot = 1.2 inches). The first point on the chart, June 27, 2017, was when the gauge was first installed. The gauge was moved to the upper end of the bridge abutment on 4/15/21. The USGS "normal" water surface elevation for big LCO is 1287 feet and is represented by the lower orange line.

The Ordinary High Water Mark (OHWM) is represented by the upper orange line. The OHWM establishes the boundary between public lakebed and private land, was established for big LCO in 1955 and is 1289.27 feet above mean sea level. The OHWM is "the point on the bank or shore up to which the presence and action of the water is so continuous as to leave a distinct mark either by erosion, destruction of terrestrial vegetation or other easily recognized characteristic."

Periodic readings are recorded as accurately as reasonable. The water itself is in perpetual motion, not only flowing downstream but rising and falling due to waves, the current in the channel, the wind which can actually push water and "stack" it toward one end of the lake or the other and the seiche effect caused by the gravitational pull of the moon and sun.

Share Tweet Forward

COLA Mission: 1) to protect, preserve and enhance the quality of Lac Courte Oreilles and Little Lac Courte Oreilles, their shorelands and surrounding areas, while respecting the interests of property owners and the rights of the general public; and 2) to consider, study, survey and respond to issues deemed relevant by COLA's membership.

The eNewsletter Editor can be reached at:

COLA
P.O. Box 702
Hayward, WI 54843
communications@cola-wi.org