

## **Spring and Summer Phosphorus**

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# Phosphorus is an important nutrient

- Key to primary productivity (algae and plants)
- Often the limiting nutrient
- Can cause problems when in excess







## **Cultural Eutrophication**

 Higher algal biomass
Reduced aesthetics
Increased anoxia
Reduced economic value and possible HABS







## Harmful and Nuisance Algal Blooms

- Can Produce Toxins
- Potential Health Risk to People and Animals







### Phosphorus is used to calculate trophic status

| Trophic Status | Carlson's TSI | TP (ppb or ug/L) | Description   |
|----------------|---------------|------------------|---|
| Oligotrophic   | < 38          | < 10             | Clear water, oxygen<br>throughout the year in the<br>hypolimnion.                             |
| Mesotrophic    | 38 - 48       | 10 - 20          | Water moderately clear;<br>increasing probability of<br>hypolimnetic anoxia during<br>summer. |
| Eutrophic      | 48 - 61       | 21 - 50          | Anoxic hypolimnia,<br>macrophyte problems<br>possible.  |
| Hypereutrophic | > 61          | > 50             | Blue-green algae dominate,<br>algal scums and macrophyte<br>problems.                         |

### Spring and Summer Phosphorus

### Spring Phosphorus (parts per billion)

| Year                   | # Samples | Min  | Max   | Average | Std.<br>Dev |
|------------------------|-----------|------|-------|---------|-------------|
| 2019                   | 1         | 12.0 | 12.0  | 12.0    | NA          |
| 2014-2018              | 5         | 13.0 | 20.0  | 16.4    | 2.7         |
| 2011-2013              | 4         | 11.0 | 20.0  | 13.5    | 4.4         |
| 2019 All<br>CLMP Lakes | 220       | <= 3 | 100.0 | 14.9    | 11.0        |



### Summer Phosphorus (parts per billion)







### So why do we collect phosphorus in Spring and Summer?







### Spring Samples

- Lake is well mixed, including P
- Is representative of the whole water column
- Helps us understand long term buildup in the system
- Can be influenced by snow melt

Phosphorus distributed throughout water column







- Lake is stratified, and so can P
  - Summer P is representative of the epilimnion and not the whole lake
- Helps us understand summer algae
- Used to calculate Trophic Status
- High values can indicate external loading issues

## **Summer Samples**

In deep lakes, phosphorus can become stratified in summer

SUMMER







## Phosphorus Protocol







## What you get in the mail

- Monitoring instructions
- Sampling and sample turn-in schedule and locations
- Data form
- Bottle labels (3)
- Two 250ml sampling bottles with caps on
  - One is the actual sample and the other is a replicate





# Other materials needed: Cooler bag, ice pack, zip lock baggies of different sizes, a pencil/Sharpee







## Spring phosphorus is measured during spring mixing

- Within 14 days after ice-out (March/April/May)
- Volunteer determines ice-out
  - \*\*\*Important to write down on data sheet\*\*\*
- Surface grab sample
- Representative of whole lake
- Shows nutrient enrichment trends





### Summer phosphorus is measured during summer stratification

- Late summer early fall (Aug. Sept.)
  - Depends on latitude
- Surface grab sample
- Indicates the phosphorus available to plants/algae in the growing season.
- Used to calculate trophic state





### When: Phosphorus Schedule



SUMMER PHOSPHORUS 2025 Sample Collection

and Turn-in Schedule



Summer Phosphorus samples must be collected within your 5-day sampling window and turned in (frozen) between **8 am – Noon** on the date and location listed for your county in the table below. Call the appropriate phone number below if other arrangements must be made (phone numbers to be determined at a later date).

| COUNTY  | TURN-IN ADDRESS<br>(EGLE unless noted otherwise)   | SAMPLING<br>DATES | TURN-IN<br>DATES          |
|---|--|-------------------|---------------------------|
| Allegan, Kalamazoo, Barry, Van<br>Buren, Berrien, Cass, St. Joseph      | EGLE Kalamazoo District Office<br>7953 Adobe Road<br>Kalamazoo, MI 48909<br>Deana Mercs: 269-330-8571            | Sept 18-22        | 8 am-Noon<br>September 23 |
| Calhoun, Jackson, Washtenaw,<br>Branch, Hillsdale, Lenawee              | EGLE Jackson District Office<br>301 E. Louis B. Glick Hwy.<br>Jackson, MI 49201<br>Brittany Santure 517-740-6504 | Sept 18-22        | 8 am-Noon<br>September 23 |
| St. Clair, Macomb, Oakland, Wayne,<br>Monroe                            | EGLE Warren District Office<br>27700 Donald Court<br>Warren, MI 48092<br>Jack Catrone 248-763-1994               | Sept 18-22        | 8 am-Noon<br>September 23 |
| Ottawa, Kent, Montcalm, Ionia,<br>Muskegon, Oceana, Newaygo,<br>Mecosta | EGLE Grand Rapids District Office<br>350 Ottawa St. NW, Unit 10, 5th Floor<br>Grand Rapids, MI 49503             | Sept 11-15        | 8 am-Noon<br>September 16 |

### Spring P: Turn in June 24<sup>th</sup>

**Summer P**: Sampling and drop off dates depend on your location

 UP lakes sample in August; southern counties: end of September





## Step 1: Fill out labels

- Fill out and stick to bottle <u>before</u> you sample
- Use pencil or permanent marker

NOTE: On second label for replicate sample, include all above plus "REP" in the Location box along with the Lake Name.







# **Step 2.** Drift your boat over the deepest part of the lake

Remove cap and rinse the bottle twice

NOTE

- Only use the bottle we provided
- Make sure not to contaminate bottle or cap







### Step 3. Collect sample

Holding the bottle upside down, lower the bottle below the surface to 1-2 foot depth and then tilt upward. Hold until bottle is full.

• Repeat with second bottle









Step 4. Pour water out until bottle is filled to <sup>3</sup>/<sub>4</sub> full to avoid cracking the bottle when frozen.







# **Step 5.** Place bottles in labeled baggie and place in cooler.







### Step 6: Fill out datasheets

**NOTE**: Datasheet goes into its own baggie and then into the baggie with the samples.









### SPRING TOTAL PHOSPHORUS 2023 Data Form



| Lake Name:                          | County:       | Towns              | ship:                 |
|-------------------------------------|---------------|--------------------|-----------------------|
| Lake Sampling Site (Field ID) Numbe | r:            | (see reverse and r | mark location on map) |
| Latitude:                           | Longitude: _  |                    | Circle<br>GPS / Map   |
| Volunteer Monitor Name(s):          |               |                    |                       |
| Date of Ice-Out:                    |               |                    |                       |
| Date Sampled:                       |               | Time:              |                       |
| Weather Conditions (sunny, cloudy,  | windy, etc.): |                    |                       |
| Unusual Conditions? (heavy rain, bo | ating, etc.): |                    |                       |
| Date of Sample Turn-In:             |               |                    |                       |
| Comments:                           |               |                    |                       |





- In the box below, draw an outline of your lake (i.e., lake map). Or attach a copy of a lake map.
- On the lake map, mark your total phosphorus sampling location (this should be at the deepest location in your lake) and write the LAKE DEPTH at this location. (Note: If you sample at more than one location in the lake, use a separate data form for each location.)
- Surface Area of Lake (if known): \_\_\_\_\_(acres)



### DATA ENTRY

If you can, please enter your data into the MiCorps Data Exchange by October 31st.

### DATA SHEET TURN IN Protocol

Please do the following:

- (1) Make a copy of your field data sheets to keep for your records,
- (2) Put one copy in a baggie to keep it dry and
- (3) Deliver the frozen total phosphorus samples together with the data sheet copy to the designated drop-off location on the designated turn-in date (according to the Spring Phosphorus Sampling Schedule).







## **Step 7:** Store in freezer until Turn-in Date







### Step 8. Turn in:

Michigan Clean

Water Corps

Turn in your **frozen bottles** with your data forms to the designated location.

### **Drop off location and time in Phosphorus Schedule**





## **Common Reasons for Sample Rejection**

### Sample collected at the wrong time

- Spring P— samples collected >2 weeks after ice-out will be flagged for error, >4 weeks will be rejected.
- Summer P samples collected more than a week outside the assigned interval will be rejected

### Incorrect delivery

 If you forget or can't turn your samples to the drop-off location on the assigned date, that can cause problems. CONTACT US for instructions on safe shipping. Unexpected shipments will thaw and be rejected.

### Cracked bottles/caps

Be sure to leave headroom in the bottle for expansion





## Common Reasons for Sample Rejection

### Wrong bottles used

• We ONLY accept samples in the sterile bottles we send you







COOPERATIVE LAKES MONITORING PROGRAM SPRING TOTAL PHOSPHORUS







## New procedure video!



# **Questions?**

To learn more about the Cooperative Lakes Monitoring Program, visit:

## MiCorps.net



MICHIGAN DEPARTMENT OF ENVIRONMENT, GREAT LAKES, AND ENERGY







Working Together to Protect Lakes

