Ensuring Data Quality in MiCorps' Volunteer Stream Monitoring Program and the Cooperative Lakes Monitoring Program

MiCorps Conference 2025

Dr. Paul Steen
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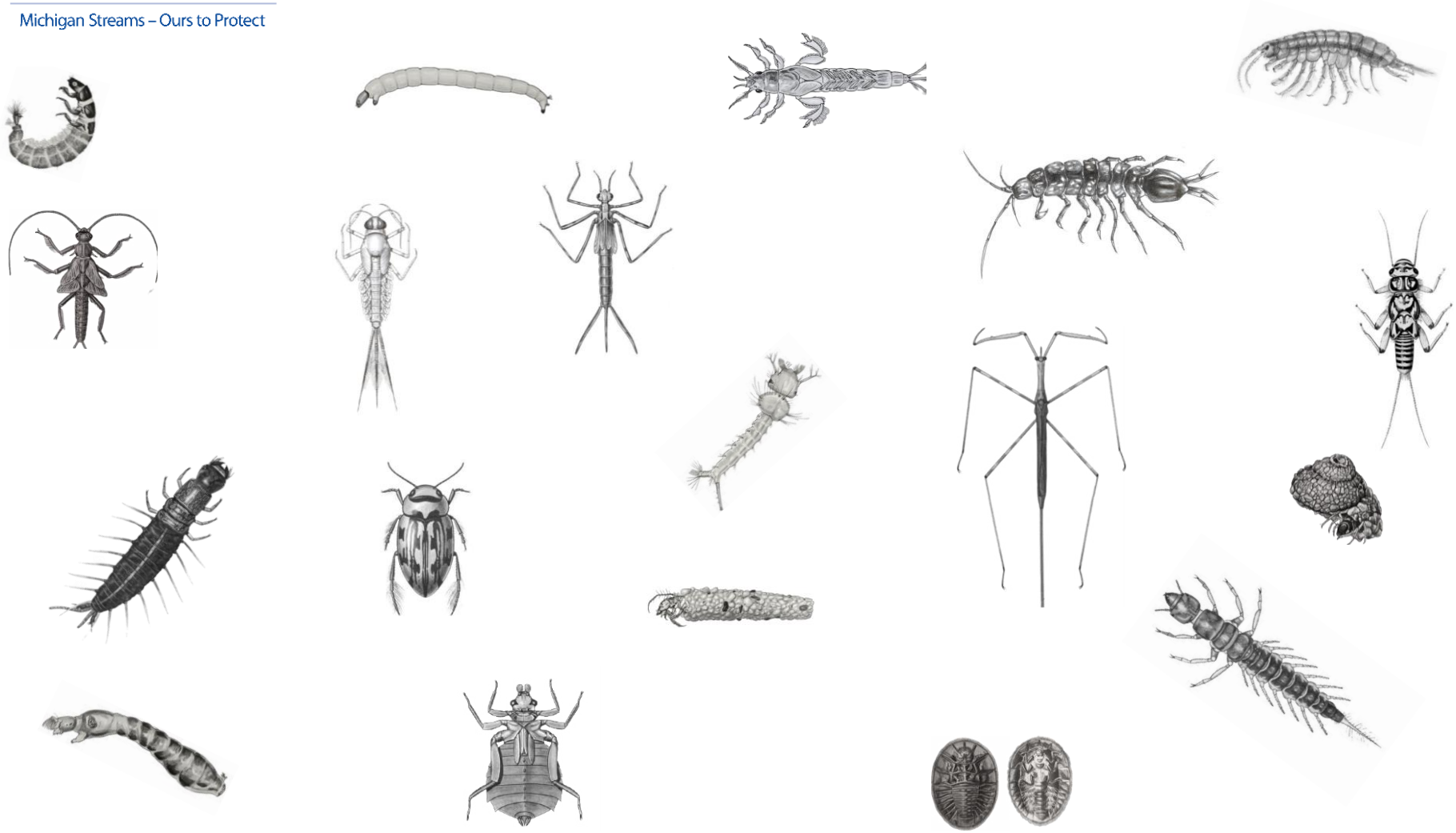
Volunteer Stream Monitoring Program

Michigan Streams – Ours to Protect

What do we monitor for and why in the VSMP?

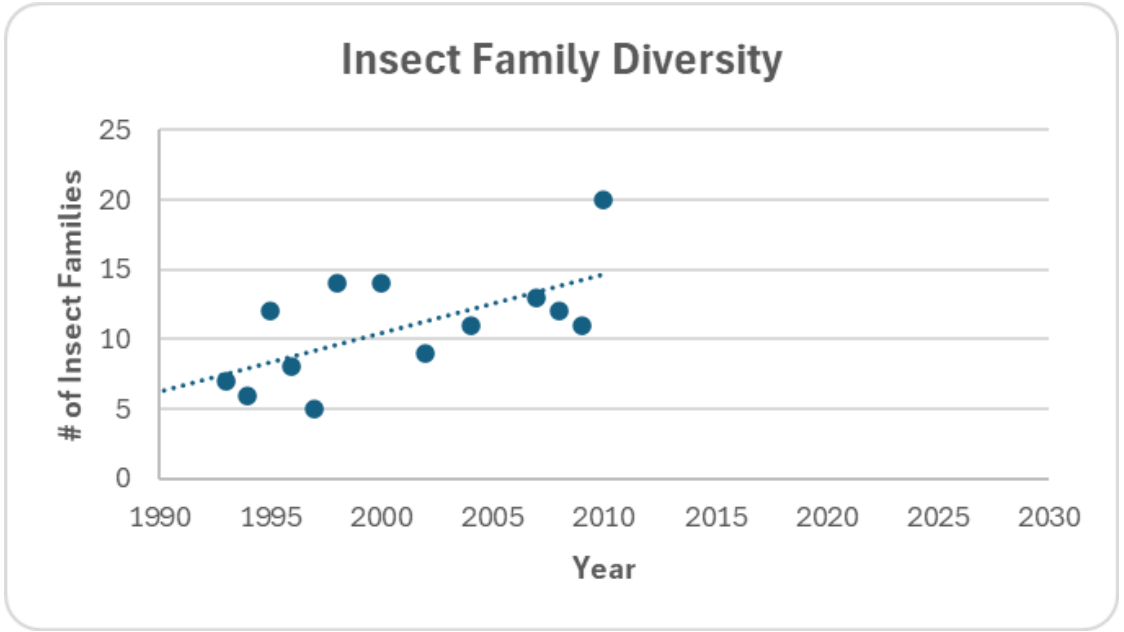


Dealing with messy data decisions

- https://data.micorps.net/view has thousands of data points for the VSMP and hundreds of thousands of CLMP points.
- We all want to **say something** about scientific results so that they can be used to help make decisions.
- None of us want to leap to conclusions and push a narrative that isn't backed up by solid evidence.
- Macroinvertebrate data is very messy, and it makes these decisions hard.
- CLMP data is also messy… but not AS messy.
- Excel is fun and awesome and not just for nerds.

Dealing with data decisions

Is your site getting better, or are you dealing with a team of exceptionally enthusiastic volunteers that aren't quite following directions?



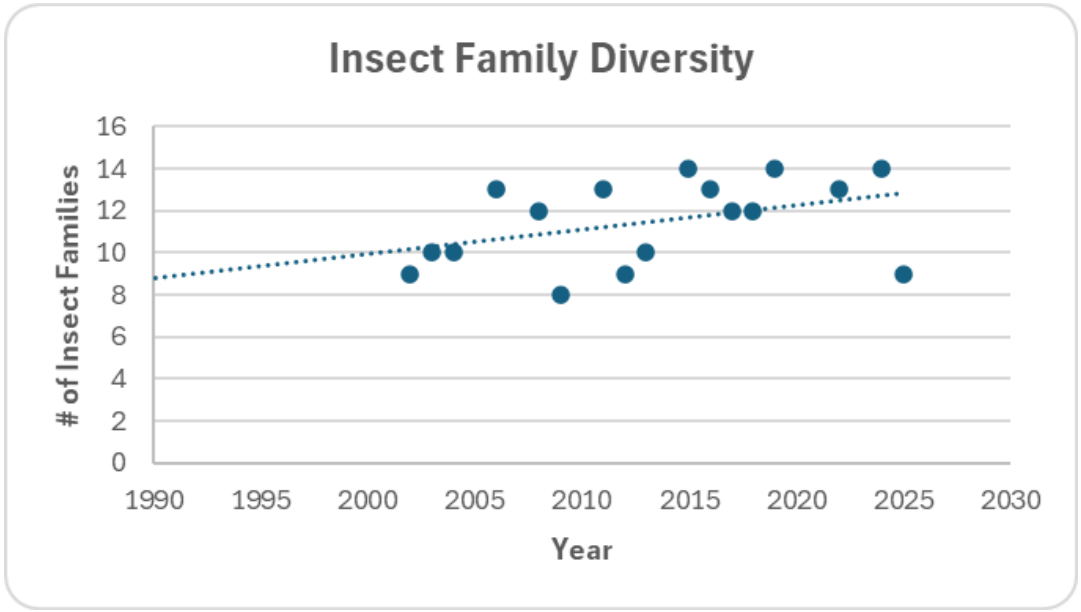
Are they sticking to the procedures or going rogue?
Are they collecting too long?
Are they keeping too many?
Are even in the right spot???

Maybe… conditions are actually improving here.

Dealing with data decisions

Did your site suddenly get worse, or are you dealing with:

- A poor performing collector, team, or
- Bad Weather?

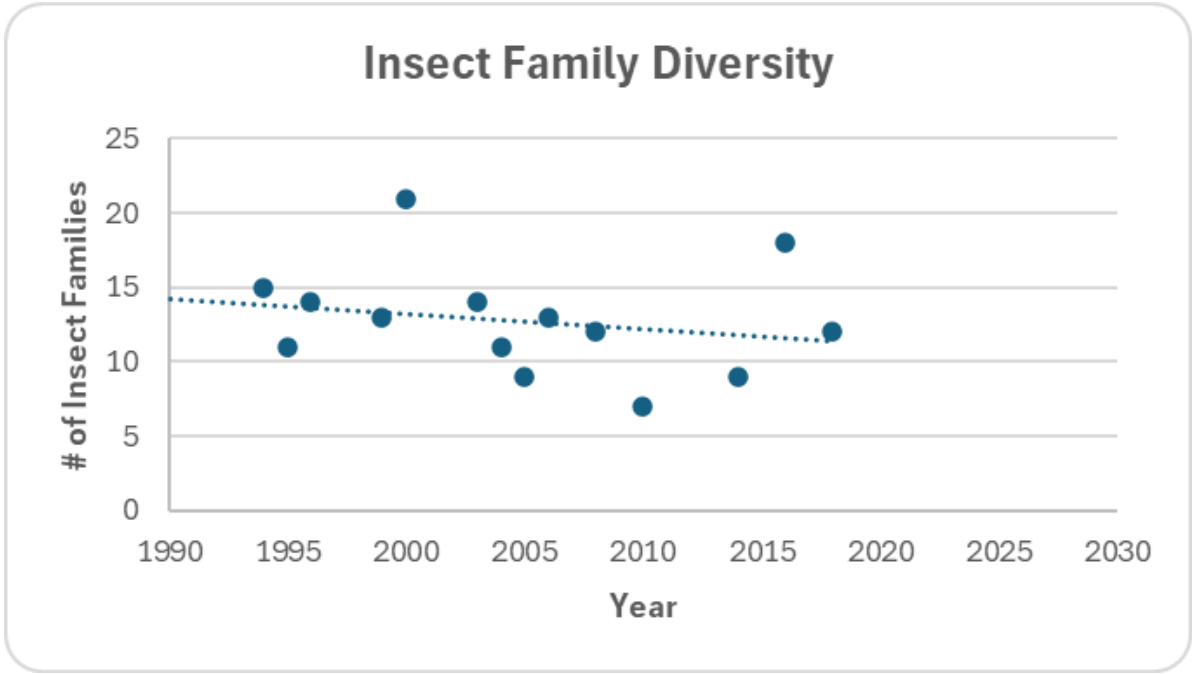


Are they sticking to the procedures or going rogue?
Are they collecting long enough?
Are they keeping too few?
They aren't sampling in a flood, but maybe they aren't sampling in representative conditions…?

Maybe… habitat or water quality is actually getting worse here.

Dealing with data decisions

Is this slow decline actually happening?



(Is the trend seen in the data truly reflective of real life?)

Quality Assurance Checks

What is a QAPP? Quality Assurance Project Plan

Think of a QAPP as the guidebook for your future replacement. It includes:

- Why you monitor *(What problems are you trying to solve?)*
- Where you monitor *(your site list with specific locations)*
- How you monitor *(Specific procedures and datasheets. MiCorps affiliated organizations with approved QAPPs follow the same procedures with some variation on minor decisions)*
- Handling your gear *(Lists of equipment, decontamination procedures)*
- Quality Assurance checks *(Guides decision making)*
- How do you share your data? *(Reporting, uploading)*

QAPPs work! We keep them updated every two years.

Data quality language in a QAPP

> "A **relative percentage difference (RPD) calculation between the new measure and the median of past measures should be less than 40%** for Abundance, MiCorps WQR, and various insect metrics such as Total Diversity. If the sample falls outside this range, then the Project Manager will conduct a more thorough investigation to determine if a team or individual is at fault, if weather and bad sampling conditions are at fault, or if the site is actively changing in its habitat and/or water quality."

Note: Being outside this 40% marker doesn't mean the data is bad--- it is just a trigger to look at it more carefully.

40% is a typical standard in EPA guidance.

Data examples in Excel.

Points gone over using Excel, not this powerpoint:

1.Treat fall and spring data different
2. Easy to automate the 40% relative difference boundaries
3. The further you get away from 40%, the more suspicious the datapoint is.
4. Have a separate sheet for outliers

Following up on possible errors

- Talk to your collectors– would anything account for a large drop or increase in the data?
- Weather is often the cause of large sudden changes. And sometimes, there is reason to believe team didn't do a good job.
- Very gradual drops or increase are more likely to be reflections of reality.
- If it is a weather-related error, remove the record from your long term but hold it in a different place. Don't enter it into the MiCorps database.

Following up on possible errors

- If you suspect the collector or team, retrain the procedures before they go out again. If they still have poor samples, go out with them and observe. Don't enter collections into the MiCorps database if they have been collected poorly.

- Resample the site if you are still within the normal 2 week window of sampling.

- Until you have several samples, you need to keep everything to establish your baseline data and understand how the site naturally varies (5 years worth minimum). You could consider striking old, bad results once you have a long data record and can better understand how those old results are bad.

- You can always email me to ask me to delete bad entries from the MiCorps database.

Wrap Up: Action Items for Paul

- Standardize QAPP language on these data quality checks
- Consider other ways that our monitoring groups can standardize how we handle the data; for example:
  - What metrics to use beyond Water Quality Rating (WQR)?
  - How to detect significant trends?
- Turn this spreadsheet into a tool for any monitoring group

Action Items for Program Managers

- Tell me your ideas and opinions as we think about moving the program toward more uniform treatment of data

Ensuring Data Quality in the MiCorps' Cooperative Lakes Monitoring Program

Erick Elgin

CLMP Manager

Cooperative Lakes Monitoring Program

Erick Elgin,

CLMP Lake Program Manager

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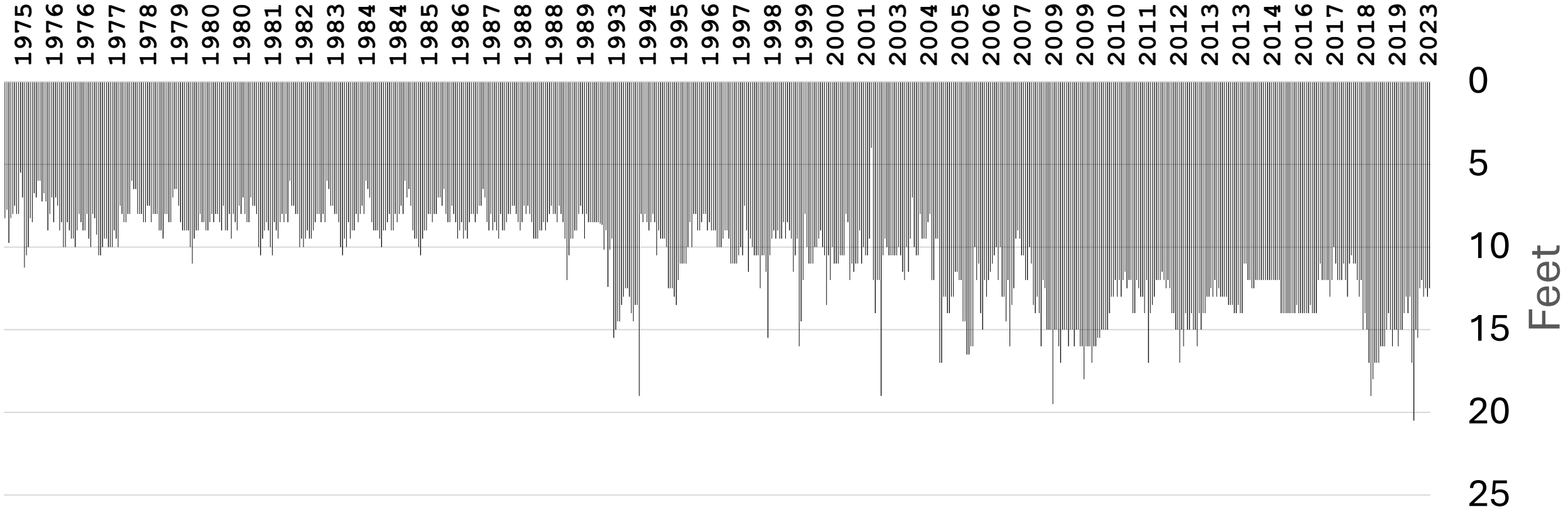
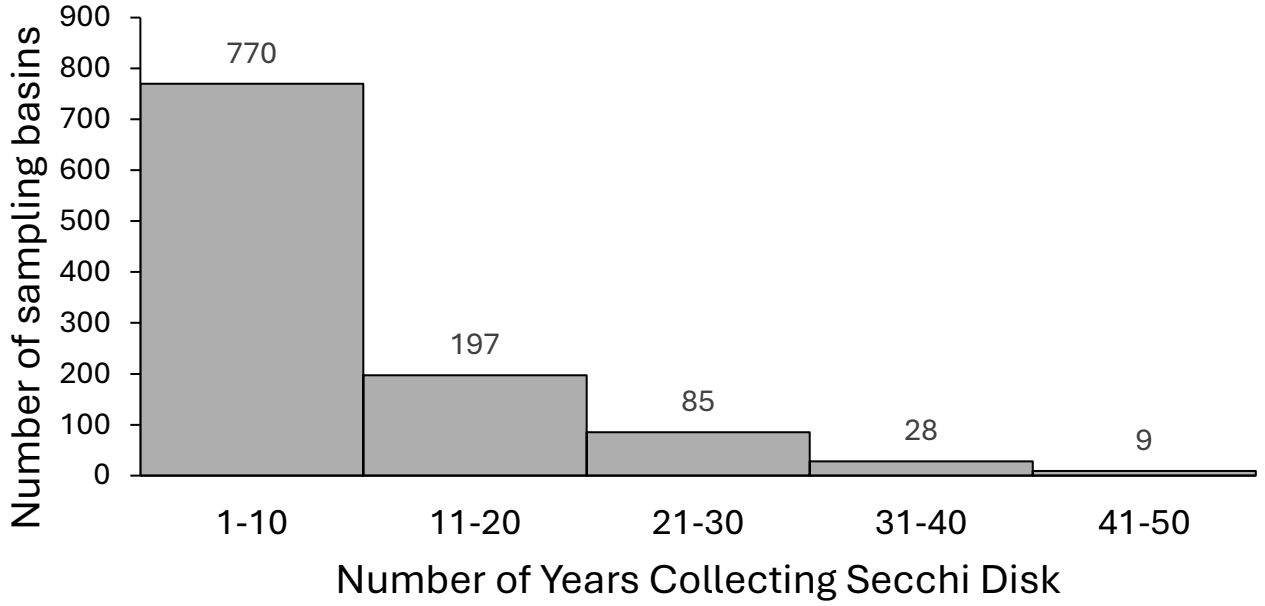
Long term lake monitoring requires…

… consistency in protocol and collections to maintain data quality and reliability



CLMP has a rich dataset

- 136,749 Secchi measurements and counting
- 4,423 summer phosphorus samples collected in 650 lake basins
- 4,257 frozen spring phosphorus arms
- 13,214 chlorophyll samples filtered in Michigan kitchens
- 332 invasive plant detections
- 1,191 temperature and DO profiles
- 13,479 docks counted in 106 lakes



To err is human…

- Collecting and handling samples
- Recording data
- Analyzing samples
- Entering data
- Quality control of data

It Takes a Village to Raise a Dataset

Collecting Samples: Training is Key

- In person trainings
- Virtual trainings
- Protocol videos
- Written protocols
- Written reminders and tips
- Frequent communications
- Personnel are available to assist throughout the season

Collecting Samples: Procedures and Schedules

- Established sampling windows - Summer P
- Inspect and calibrate equipment - DO/Temp
- Designated sampling materials from state lab, sent on a schedule - Phosphorus
- Quality control samples:
  - Field replicates
  - Side by side (professional replicate)
  - Images of AIS

Michigan Clean Water Corps

SUMMER PHOSPHORUS
2025 Sample Collection and Turn-in Schedule

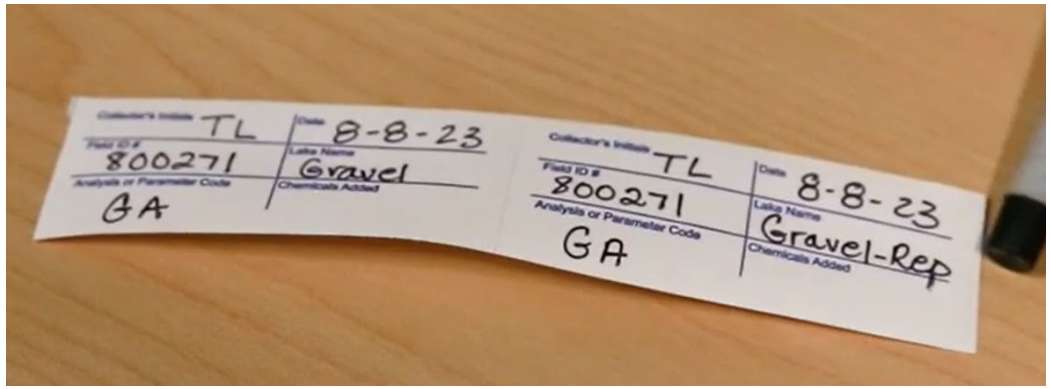
Cooperative Lakes Monitoring Program

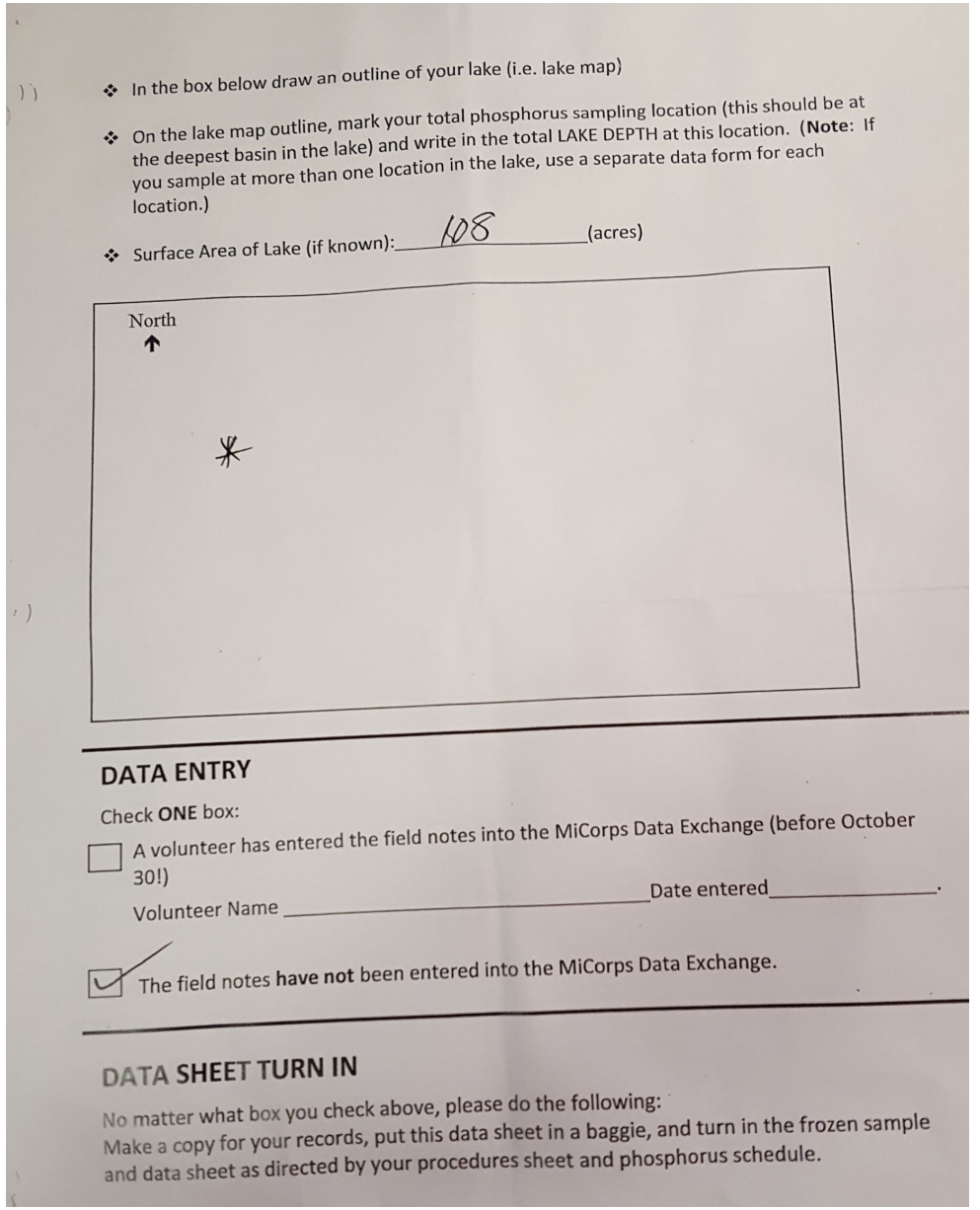
Summer Phosphorus samples must be collected within your 5-day sampling window and turned in (frozen) between **8 am – Noon** on the date and location listed for your county in the table below. Call the appropriate phone number below if other arrangements must be made (phone numbers to be determined at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

COUNTY	*TURN-IN ADDRESS (EGLE unless noted otherwise)*	*SAMPLING DATES*	*TURN-IN DATES*
Allegan, Kalamazoo, Barry, Van Buren, Berrien, Cass, St. Joseph	EGLE Kalamazoo District Office 7953 Adobe Road Kalamazoo, MI 48909 Deana Mercs: 269-330-8571	Sept 18-22	8 am-Noon September 23

Recording Data

- Carefully designed data sheets
- Specify which units to use
- Give guidance on the proper pens to use
- Copies of data sheets archived





- In the box below draw an outline of your lake (i.e. lake map)
- On the lake map outline, mark your total phosphorus sampling location (this should be at the deepest basin in the lake) and write in the total 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): 108 (acres)

North

DATA ENTRY

Check **ONE** box:

☐ A volunteer has entered the field notes into the MiCorps Data Exchange (before October 30!)

Volunteer Name _____ Date entered _____.

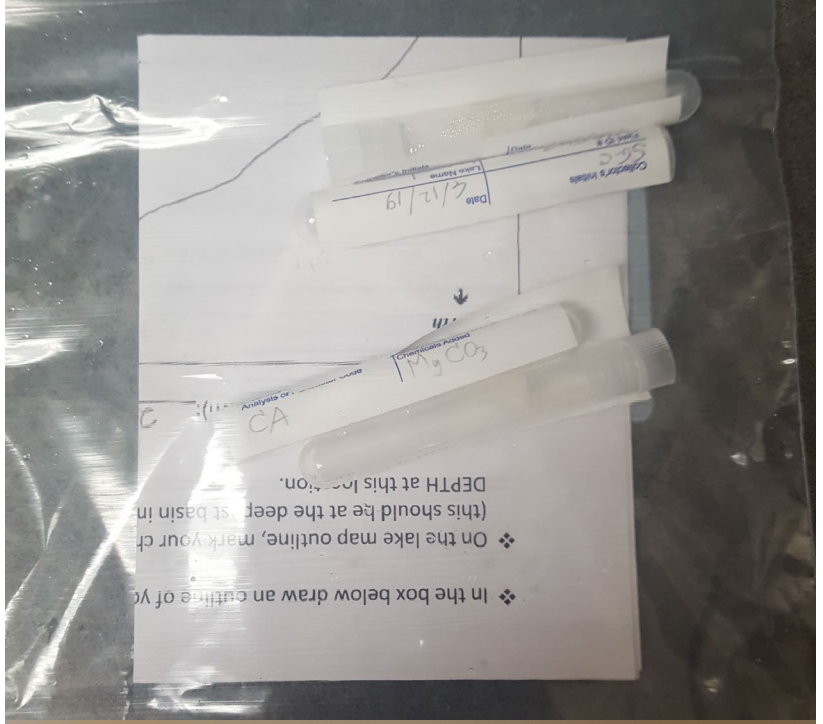
☑ The field notes **have not** been entered into the MiCorps Data Exchange.

DATA SHEET TURN IN

No matter what box you check above, please do the following:
Make a copy for your records, put this data sheet in a baggie, and turn in the frozen sample and data sheet as directed by your procedures sheet and phosphorus schedule.

Sample Handling and Analysis

- We confirm that sample labels and data sheets match and that schedules are met
- Analyses are done in a state-run lab using standard protocols
- Plant identifications are confirmed by us



Making a list and checking it twice: Entering Data

- Designed controls in online data entry
  - The online entry form mirrors the data sheet
  - Must fill out required information
  - Maximum value restrictions
- **Submit** button followed by a **Confirmation** button
- Data can be double checked immediately upon confirmation

Quality Control of Entered Data

- Data is looked at in a composite and at the individual level for outliers and potential errors
- Outliers, unusual values, and discrepancies between replicates and side by side are identified
- Data sheets are used to figure out suspected errors

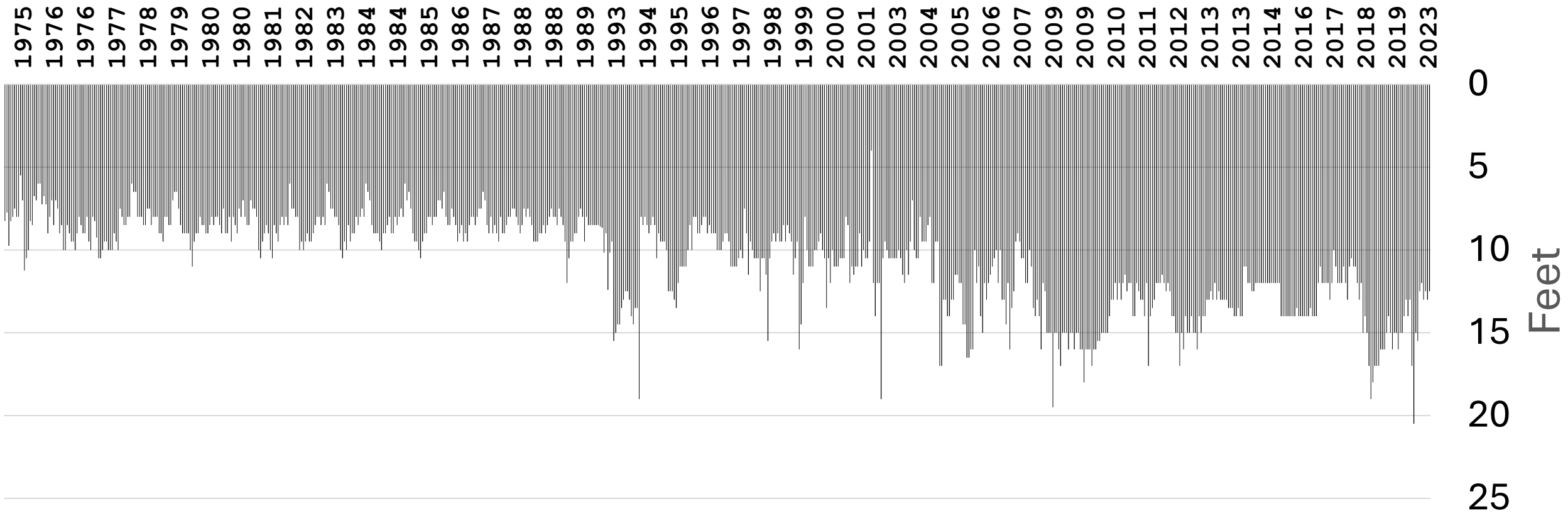
	A	B	C	D	E	F	G	H	I	J	K	L	
1	Lake Name	County	STORETID	Latitude	Longitude	Watershed	Surface Area	Datum	GPS Source	Date Samplec	Time Samplec	Secchi Depth	Weath
135338	Stone Ledge	Wexford	830186	44.180833	-85.39111	4060102	82	NAD83/WGS8	Other	1987-06-21	12:00:00	4.5	
135339	Stone Ledge	Wexford	830186	44.180833	-85.39111	4060102	82	NAD83/WGS8	Other	1987-06-14	12:00:00	4.5	
135340	Stone Ledge	Wexford	830186	44.180833	-85.39111	4060102	82	NAD83/WGS8	Other	1987-06-07	12:00:00	6.5	
135341	Stone Ledge	Wexford	830186	44.180833	-85.39111	4060102	82	NAD83/WGS8	Other	1987-05-31	12:00:00	9	

Continual Improvement

- Always learning from mistakes
- Volunteer survey at training events
- Professional assessment during side by sides
- Volunteer feedback during side by sides

Updates to data entry in the works

The CLMP is committed to maintaining data integrity



Questions?

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

MiCorps.net

EGLE
MICHIGAN DEPARTMENT OF ENVIRONMENT, GREAT LAKES, AND ENERGY

MICHIGAN STATE UNIVERSITY | Extension

Huron River Watershed Council

MICHIGAN LAKES AND STREAMS ASSOCIATION