MINNESOTA POLLUTION CONTROL AGENCY

Volunteer Water Monitoring Program

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Agenda

- **Volunteer Water Monitoring Program introduction**
- **Ensuring high-quality, usable data**
  - Volunteer Training
  - QA/QC Methods
- **Uses for volunteer-collected clarity data**
  - Trends
  - Assessments
- **Volunteer appreciation**

Celebrating 50 years of volunteer water monitoring

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50 Years!

Minnesota Volunteer Lake & Stream Monitoring

50+ years of volunteer-collected water clarity data

Volunteers take water clarity readings at an assigned location weekly to monthly using a Secchi disk or tube. Additionally, they:

- ✓ Rate algae/sediment levels
- ✓ Record water color and stream stage
- ✓ Take surface water temperature readings

Volunteers are Local Water Advocates

- ✓ They possess invaluable place-based historical knowledge
- ✓ They are invested emotionally and financially
- ✓ They feel the impact of degraded water quality on their community

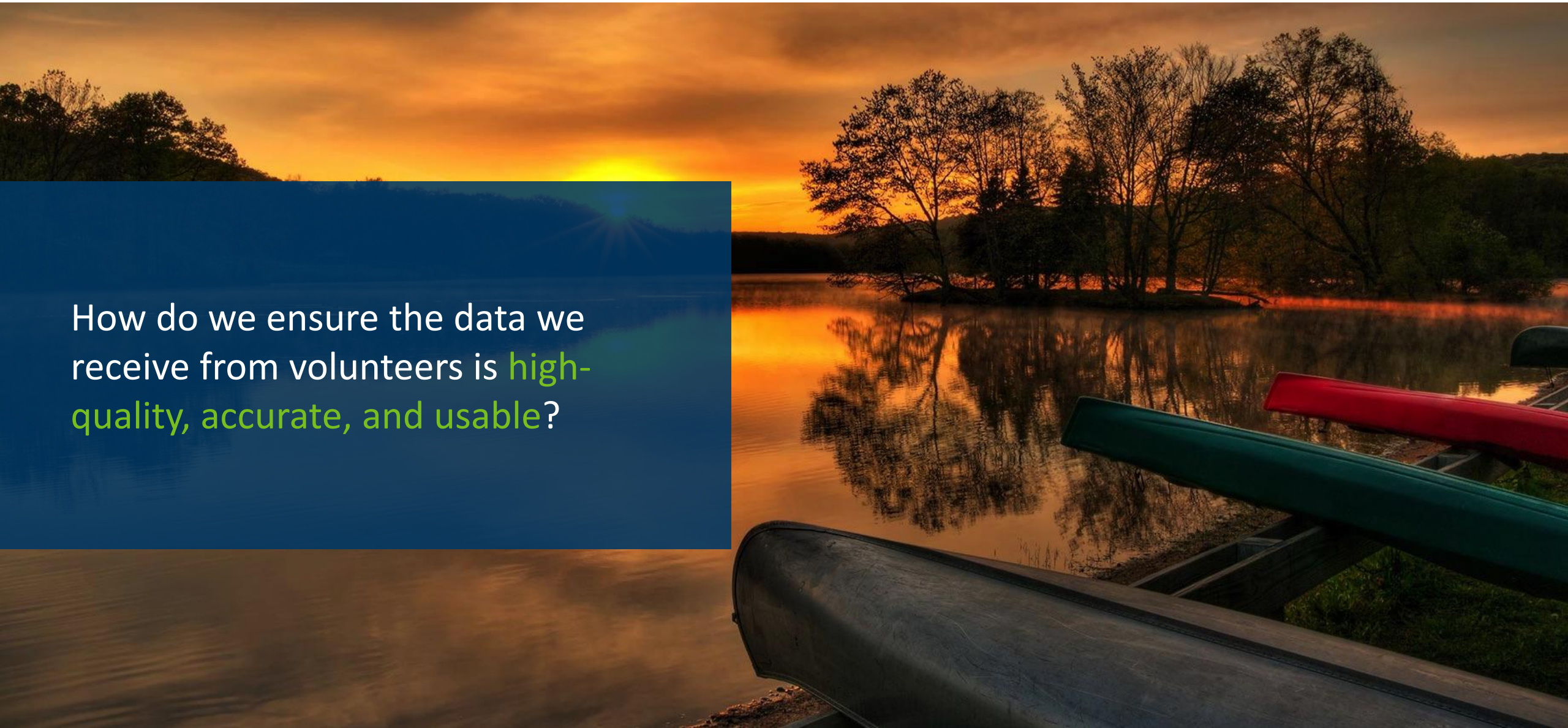
Volunteers are Important Data Collectors

- ✓ They extend state agency capacity beyond what staff can accomplish
- ✓ Their data is used directly in MPCA water quality assessments
- ✓ They contribute longevity and consistency to local monitoring

2023 Statewide Numbers

- 1,145 volunteers
  - 801 lakes
  - 441 stream sites

Volunteer Training & QA/QC



How do we ensure the data we receive from volunteers is high-quality, accurate, and usable?

Online Volunteer Training Module

Engaging

Videos, volunteer quotes, knowledge checks, photos

Quick

Takes less than 20 minutes to complete

Mobile-friendly

Can be taken on the computer or smart phone

Interactive

Quizzes, flashcards, clickable charts

https://www.pca.state.mn.us/get-engaged/volunteer-training

Field Guides

Volunteer water monitor

Stream field guide

How to record accurate readings for your site

For each of these columns, please select only one number. Do not record ranges or fractions.

Important: Record appearance and recreational suitability before measuring transparency.

Appearance

Each day that you sample, please record the one number that best describes the appearance of stream water within one meter of your site.

- **1A = Crystal clear water.**
- **1B = Tea-colored** — transparent water that is colored by dissolved organic matter.
- **2 = Cloudy** — not quite crystal clear, but not too muddy; light brown, cloudy, gray.
- **3 = Muddy** — cloudy brown due to high sediment levels.
- **4 = Green** — from algae due to excess nutrients.
- **5 = Muddy AND green** — A combination of cloudy brown from high sediment and green from algae.

Recreational suitability (RS)

Each time you sample, please select the number that best describes how suitable the stream is for recreation and enjoyment.

- **1 = Very Good** — beautiful, could not be better.
- **2 = Good** — minor aesthetic problems: excellent for body-contact recreation (swimming, wading, frog catching, etc.).
- **3 = Fair** — swimming/boating and aesthetic enjoyment slightly impaired.
- **4 = Poor** — swimming/boating and aesthetic enjoyment substantially reduced (would not swim but would boat/canoe).
- **5 = Very Poor** — swimming/boating and aesthetic enjoyment nearly impossible.

How to take a Secchi tube reading

1. Collect your water sample in a clean bucket or bottle at mid-stream and depth:

   Wading or from streambank: Always sample safely. Don't wade into fast-moving water or areas of unknown depth. If you cannot sample safely, do not monitor. If a sample from mid-stream and depth is not possible, avoid stagnant water and sample as far from the shoreline as is safe.

   - Try not to stir up the bottom.
   - Face upstream as you fill your bucket.
   - Avoid collecting sediment from the stream bottom or materials from the water surface.

   Atop a bridge or culvert: With a rope tied to its handle, lower bucket down to the stream, collect water, and pull the bucket back up.
2. Take your tube readings in open conditions (not shady). Avoid direct sunlight by turning your back to the sun if necessary.
3. Pull up the inside string to remove the black & white Secchi disk from the tube.
4. Fill the tube with water from your bucket. Let the water level drain to the zero mark on the tape measure.
5. While looking down into your tube from the top, slowly lower the Secchi disk down into it until the disk disappears from sight. When it does, stop lowering.
6. While continuing to look down the top of the tube, slowly pull the string to raise the disk until it reappears. Lower and raise the disk until you have found the midpoint between disappearance and reappearance of the disk.
7. Pinch the string against the side of the tube to hold the disk at the midpoint depth. Look at the side of the tube, across the top of the disk, to see the closest cm mark on the tape.
8. Write down this depth, to the nearest cm, on your stream data sheet under "Secchi tube depth." If the disk does not disappear, and you see it clearly sitting on the bottom of the tube, record "greater than 100".

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Stream temperature

Take the surface water temperature at your monitoring location. Submerge the tip of the program-issued thermometer into the stream water (or bucket of water) for two minutes. Remove and immediately read and record results to the nearest degree Fahrenheit.

Comments and photo

Record any unusual observations during a sampling visit. If possible, take one upstream and one downstream photo of your site per month. If unusual conditions occur, also take a photograph. Please label the photos with the naming convention provided in the online training before emailing to staff.

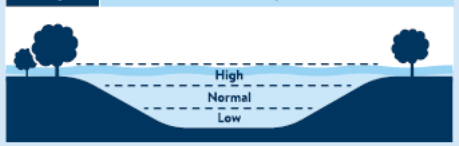
Rain event (Y/N)

Check "Y" in the column if you are sampling a significant rainfall event. Check "N" if you are taking a weekly measurement.

Stream stage estimate (L, N, H, Z, D)

This refers to the relative amount of water flowing in the stream channel as shown by a rough visual estimate of the water level. The categories are broad so don't agonize too much over which category to choose.

L = low	Water covers 1/3 or less of the distance from the stream bottom to the top of the bank.
N = normal	Water covers 1/3 to 2/3 of the distance from the stream bottom to the top of the bank.
H = high	Water covers 2/3 or more of the distance from the stream bottom to the top of the bank. Water may be over the stream bank — flooding — at some point.
Z = no flow	Disconnected stagnant pools or puddles without observable flow.
D = dry	The stream channel is dry.



Be safe on the water

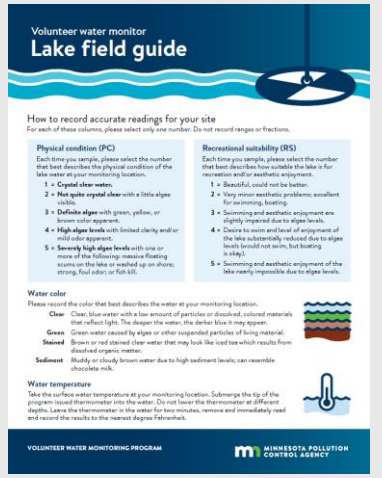
What may seem like simple, routine monitoring can turn dangerous very quickly.

1. Use the buddy system to reduce danger in case of an emergency.
2. Before monitoring, let someone know your itinerary, where you are going and when you'll be back. Then if you have trouble, another person knows where to start looking for you.
3. Whenever possible, take along someone else when you monitor.
4. If the weather is dangerous, don't go out to do stream monitoring.
5. If you wade in a stream to take measurements, never enter fast-moving water or areas of unknown depth.

   If there is any question about your safety, DO NOT take a reading.
6. Always wear a personal flotation device whenever you enter a stream.
7. Wear a traffic safety vest if you are sampling from a bridge in traffic.

Do not wear sunglasses while taking a Secchi reading — they will affect your results. If you wear photochromic prescription glasses, try to prevent them from darkening by wearing a wide brimmed hat or visor.

If you monitor more than one location (site), each site must have a seperate datasheet.


Volunteer water monitor

Lake field guide

How to record accurate readings for your site

For each of these columns, please select only one number. Do not record ranges or fractions.

Physical condition (PC)

Each time you sample, please select the number that best describes the physical condition of the lake water at your monitoring location.

1 = **Crystal clear water.**
2 = **Not quite crystal clear** with a little algae visible.
3 = **Definite algae** with green, yellow, or brown color apparent.
4 = **High algae levels** with limited clarity and/or mild odor apparent.
5 = **Severely high algae levels** with one or more of the following: massive floating scums on the lake or washed up on shore; strong, foul odor; or fish kill.

Recreational suitability (RS)

Each time you sample, please select the number that best describes how suitable the lake is for recreation and/or aesthetic enjoyment.

1 = Beautiful, could not be better.
2 = Very minor aesthetic problems; excellent for swimming, boating.
3 = Swimming and aesthetic enjoyment are slightly impaired due to algae levels.
4 = Desire to swim and level of enjoyment of the lake substantially reduced due to algae levels (would not swim, but boating is okay).
5 = Swimming and aesthetic enjoyment of the lake nearly impossible due to algae levels.

Water color

Please record the color that best describes the water at your monitoring location.

Clear — Clear, blue water with a low amount of particles or dissolved, colored materials that reflect light. The deeper the water, the darker blue it may appear.

Green — Green water caused by algae or other suspended particles of living material.

Stained — Brown or red stained clear water that may look like iced tea which results from dissolved organic matter.

Sediment — Muddy or cloudy brown water due to high sediment levels; can resemble chocolate milk.

Water temperature

Take the surface water temperature at your monitoring location. Submerge the tip of the program-issued thermometer into the water. Do not lower the thermometer at different depths. Leave the thermometer in the water for two minutes, remove and immediately read and record the results to the nearest degree Fahrenheit.

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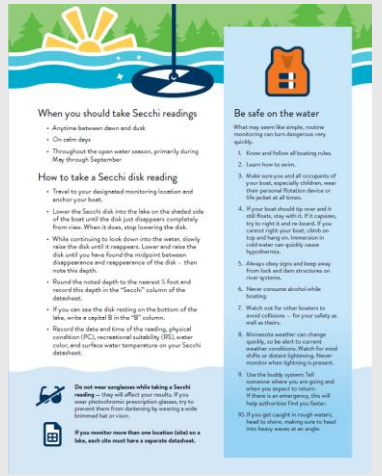

When you should take Secchi readings

- Anytime between dawn and dusk
- On calm days
- Throughout the open water season, primarily during May through September

How to take a Secchi disk reading

- Travel to your designated monitoring location and anchor your boat.
- Lower the Secchi disk into the lake on the shaded side of the boat until the disk just disappears completely from view. When it does, stop lowering the disk.
- While continuing to look down into the water, slowly raise the disk until it reappears. Lower and raise the disk until you have found the midpoint between disappearance and reappearance of the disk – then note this depth.
- Round the noted depth to the nearest ½ foot and record this depth in the "Secchi" column of the datasheet.
- If you can see the disk resting on the bottom of the lake, write a capital B in the "S" column.
- Record the date and time of the reading, physical condition (PC), recreational suitability (RS), water color, and surface water temperature on your Secchi datasheet.

Be safe on the water

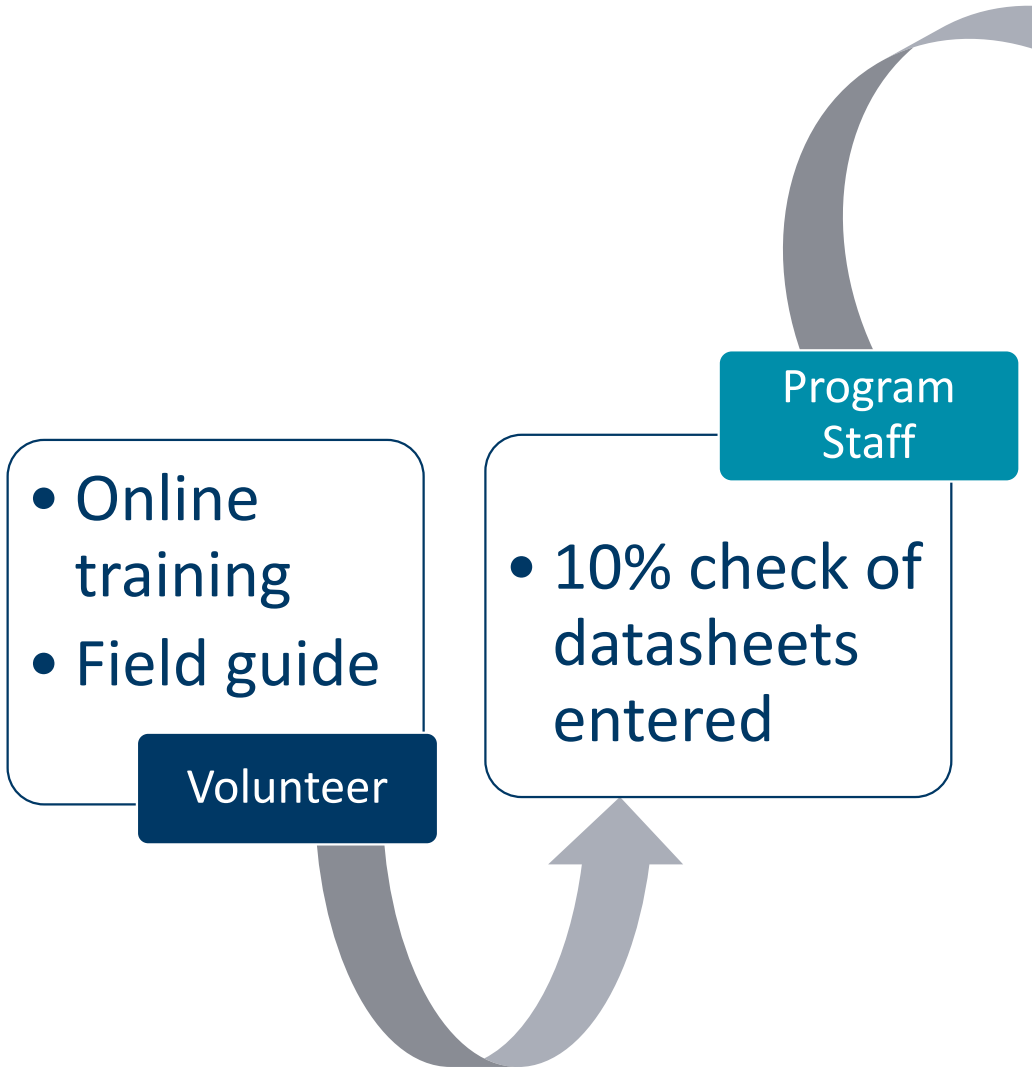
What may seem like simple, routine monitoring can turn dangerous very quickly.

1. Know and follow all boating rules.
2. Learn how to swim.
3. Make sure you and all occupants of your boat, especially children, wear their personal flotation device or life jacket at all times.
4. If your boat should tip over and it still floats, stay with it. If it capsizes, try to right it and re-board. If you cannot right your boat, climb on top and hang on. Immersion in cold water can quickly cause hypothermia.
5. Always obey signs and keep away from lock and dam structures on river systems.
6. Never consume alcohol while boating.
7. Watch out for other boaters to avoid collisions – for your safety as well as theirs.
8. Minnesota weather can change quickly, so be alert to current weather conditions. Watch for wind shifts or distant lightening. Never monitor when lightning is present.
9. Use the buddy system: Tell someone where you are going and when you expect to return. If there is an emergency, this will help authorities find you faster.
10. If you get caught in rough waters, head to shore, making sure to head into heavy waves at an angle.

Do not wear sunglasses while taking a Secchi reading – they will affect your results. If you wear photochromic prescription glasses, try to prevent them from darkening by wearing a wide brimmed hat or visor.

If you monitor more than one location (site) on a lake, each site must have a seperate datasheet.

QA/QC Methods



- **QA/QC 1st Round – Formatting data for EQuIS**
  - Remove perfect duplicates
  - Broad graphical range checks of secchi depth ranges, date ranges
  - Site IDs are checked for character length
- **QA/QC 2nd Round – Upload Process to EQuIS**
  - Site verification and another round of duplicate checks
- **QA/QC 3rd Round – Final Checks**
  - Prelim data are pulled from the internal database and run through R code to flag potential outliers
  - Potential outliers are manually checked via a Tableau workbook of the R output
  - Any errors are fixed before data are moved to "finalized" status

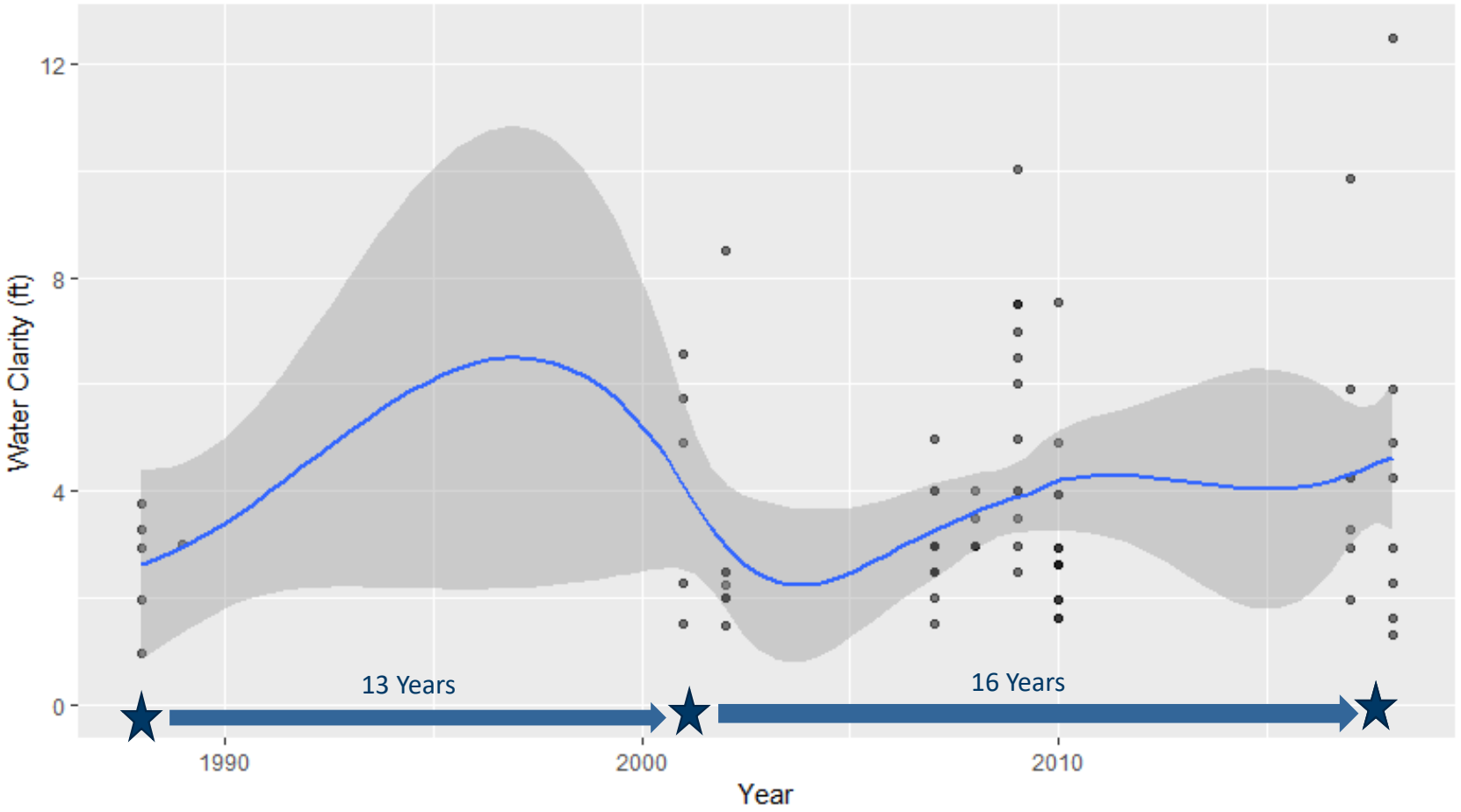
Analytical Staff

Volunteer-Collected Data Directly Informs Watershed Management

Volunteer data helps the MPCA answer 2 important questions:

1. Is lake or stream water clarity **changing over time?**
2. Is a lake or stream meeting **state water quality standards?**

Water Clarity Trends



8 years + 50 data points

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MPCA only monitors every 10 years

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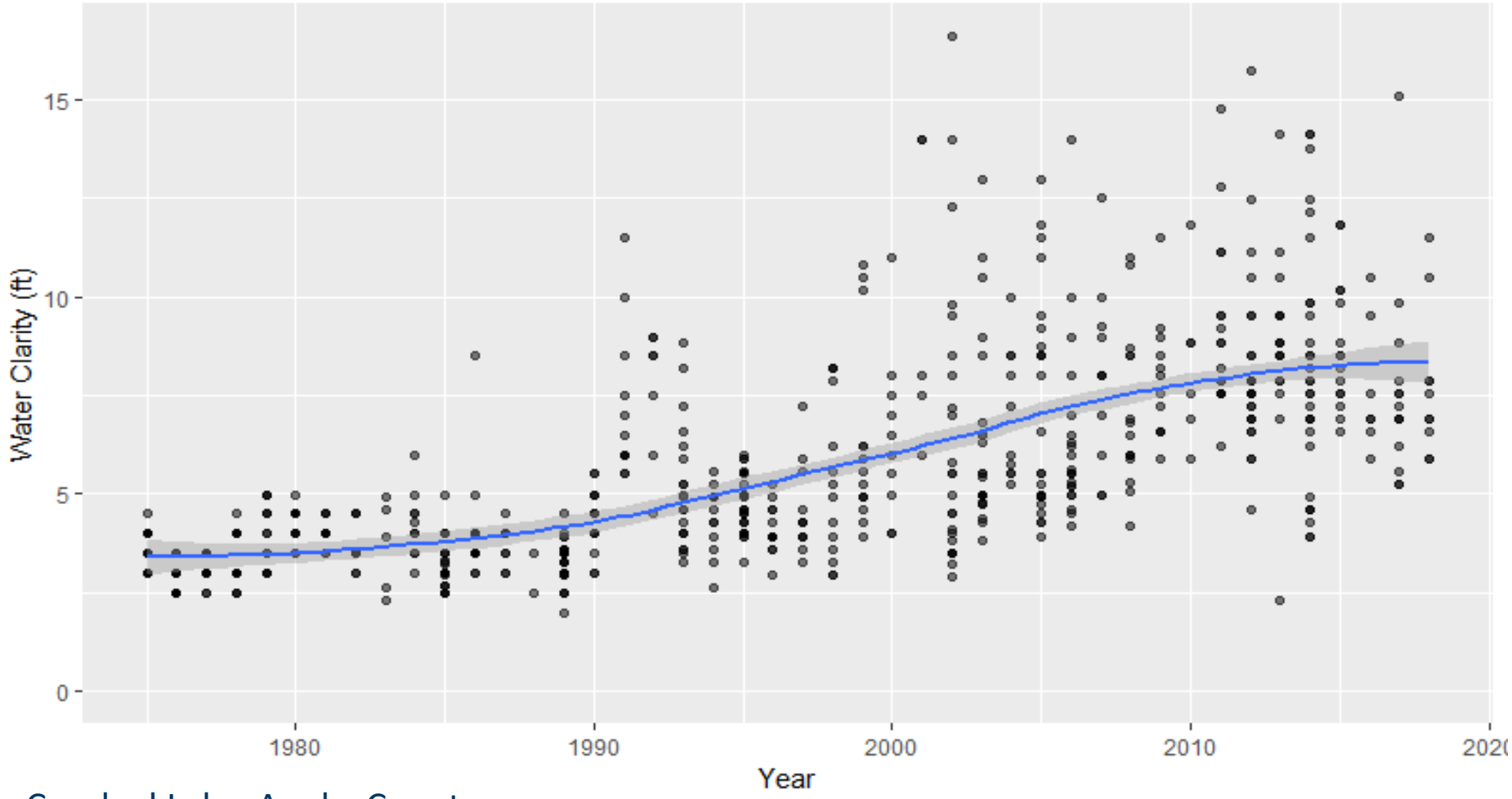
Insufficient for trend analysis

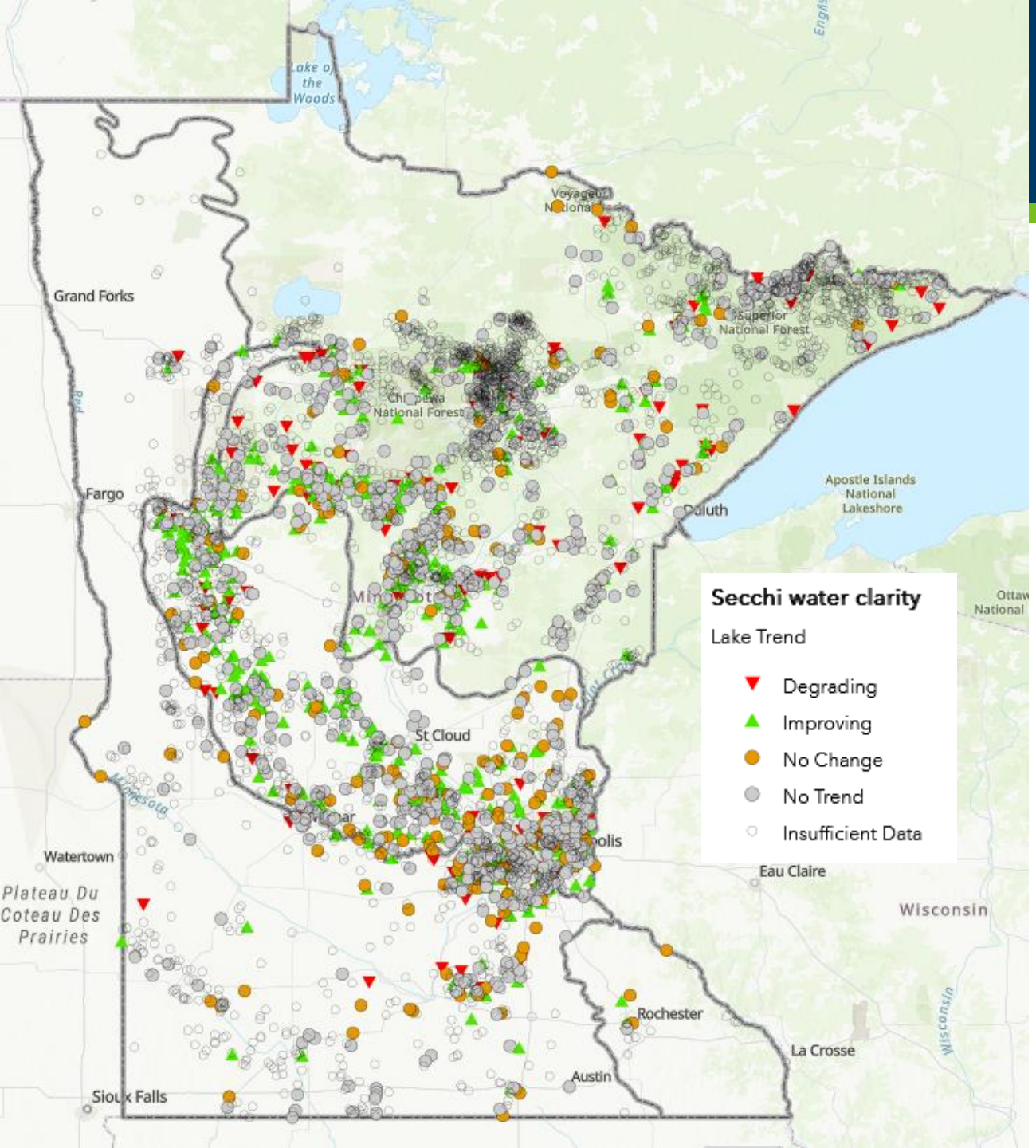
Hall Lake, Martin County

Trends Require Lots of Data



Crooked Lake, Anoka County

2022 Lake Clarity Trends



Trend Description	2022	% of lakes with trends
Degrading	157	9%
Improving	533	31%
No Trend	788	45%
No Change	254	15%
Insufficient Data	3,144	
Total # of lakes with data	4,876	
Total # of lakes with a trend	1,732	

How's the Water?
Water Quality Assessments

Lakes

- Volunteer water clarity readings help determine if swimming standards are being met by combining them with phosphorus and chlorophyll-a (algae) data.

Streams

- Volunteer water clarity readings help determine if sediment standards are being met.

Volunteer Appreciation and Engagement

Thank you!

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