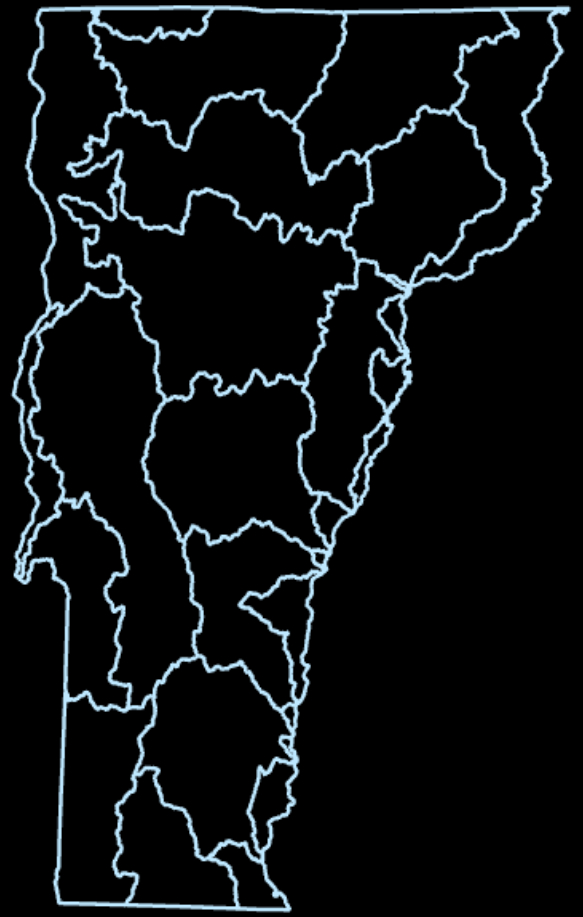
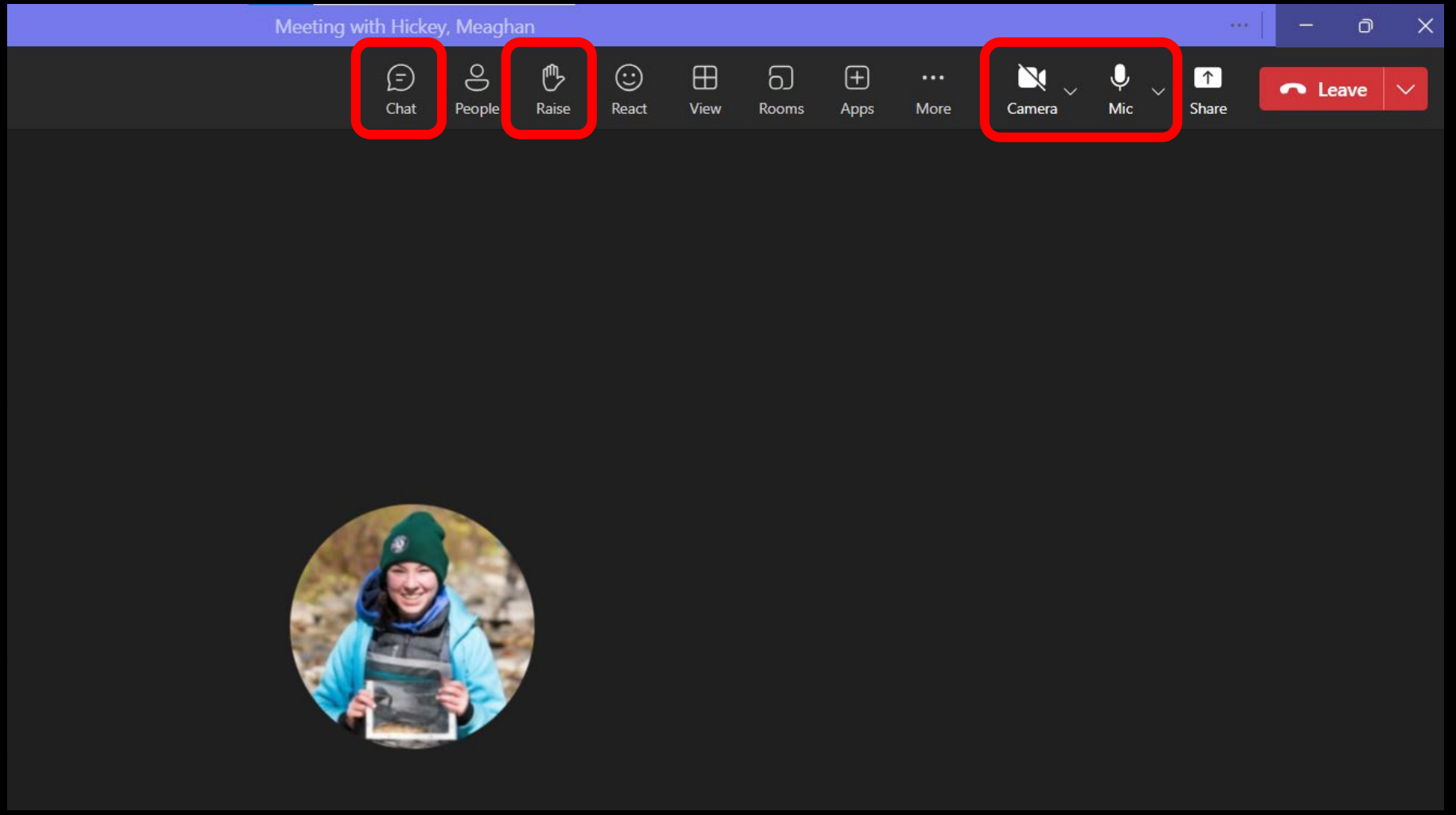
ANNUAL PARTNER TRAINING 2024

LAROSA PARTNERSHIP PROGRAM

VERMONT

VERMONT DEPARTMENT OF ENVIRONMENTAL CONSERVATION
WATERSHED MANAGEMENT DIVISION
MONITORING & ASSESSMENT PROGRAM

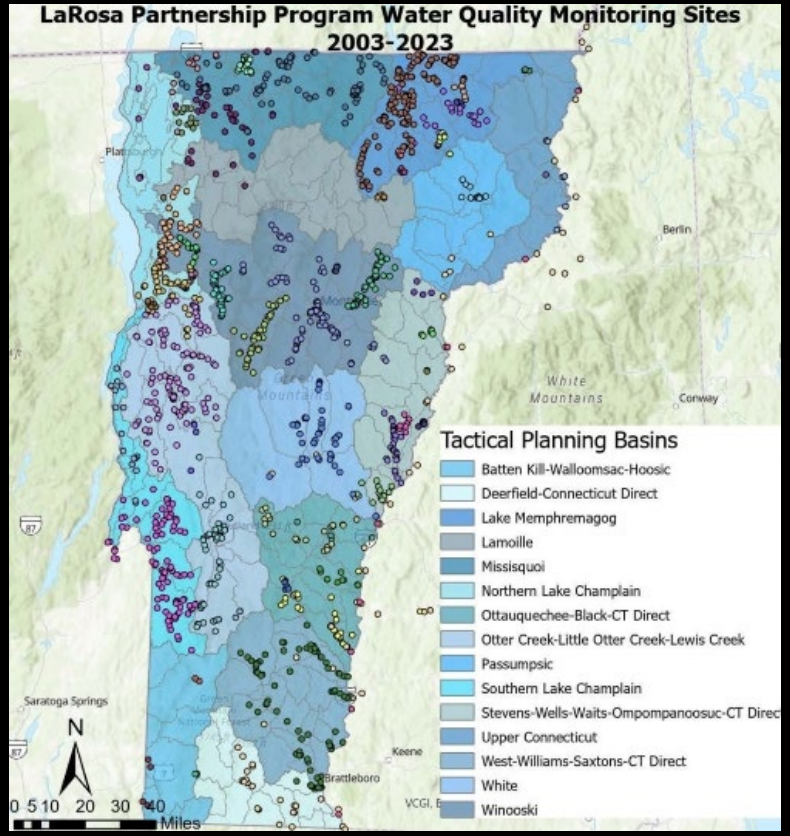



Meeting with Hickey, Meaghan
Chat
People
Raise
React
View
Rooms
Apps
More
Camera
Mic
Share
Leave

INTRODUCTIONS

In the chat:

- Name
- Organization
- Watershed or water body



AGENDA

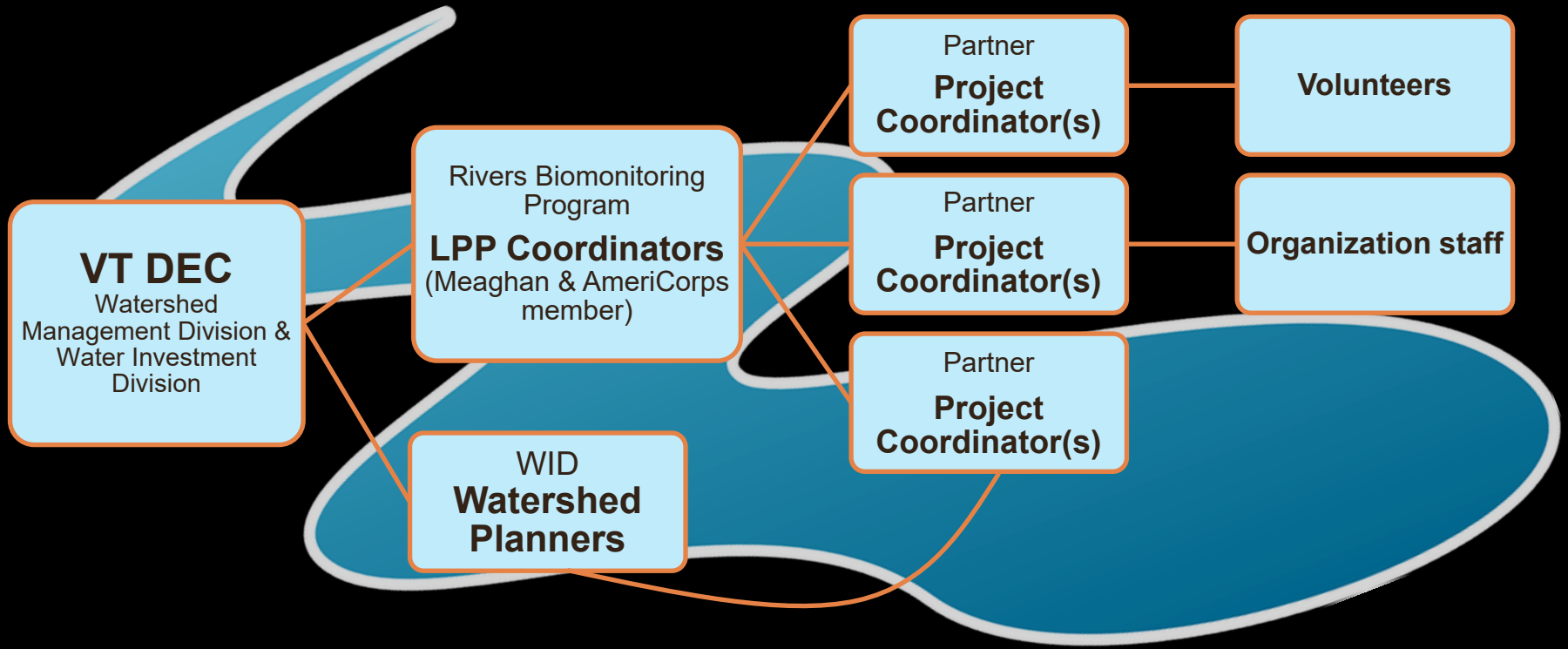
9:00 – 9:10	Welcome & Introductions
9:10 – 9:15	Program Communications, Overview, & Updates
9:15 – 9:30	LPP Sample Plan Overview
9:30 – 10:05	Sampling Procedures
10:05 – 10:15	Break
10:15 – 10:55	Flow Observations & Survey123
10:55 – 11:05	Sample Storage & Preservation
11:05 – 11:10	Safety in the Field
11:10 – 11:15	Break
11:15 – 11:25	LPP Sample Analysis Results & Accessing Data
11:25 – 12:00	Data Collection Purposes and Examples of Data Use


Thank You!

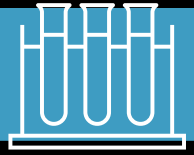
Program Updates

- ECO AmeriCorps member starting in May
- Jeff doing sample pickups
- Lake trib sites now part of the lakes Lay Monitoring Program (mostly)
- **20 participating partner groups**; 13 lake trib LMP collaboration groups
- **226** LPP sites, **55** LMP collab sites, **5900** samples

Program Structure



Parameters



Total Phosphorus

Total Nitrogen

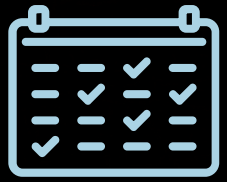
Chloride

Flow Observations
(level and type)

Sample Plan

- **Eight total biweekly sampling events**
- Typically sample on the same day of week each sample period (groups with teams of volunteers may sample on multiple days)
- Sampling starts after **Monday, April 15th**
- Last sample before **August 6th/8th**

SAMPLING SCHEDULE



Dates	Event
End of week of April 8th	LPP staff deliver supplies to partners
Monday, April 15th	Sampling season begins
End of April – Early August	Biweekly sample pickups: ❖ Tuesday, April 30th and Thursday, May 2nd ❖ Tuesday, May 14th and Thursday, May 16th ❖ Tuesday, May 28th and Thursday, May 30th ❖ Tuesday, June 11th and Thursday, June 13th ❖ Tuesday, June 25th and Thursday, June 27th ❖ Tuesday, July 9th and Thursday, July 11th ❖ Tuesday, July 23rd and Thursday, July 25th ❖ Tuesday, August 6th and Thursday, August 8th

High Flow Sampling

- Aim for **two targeted high flow sample events**; may collect any day during any biweekly sample period
- Replaces regularly scheduled sample event – **only collect one set of samples per sample period** (at all sites)
- May not be possible to coordinate with volunteers; do so if you can
- If can't, regular sampling likely to coincide with high flows throughout course of season

High Flow Sampling

- When **water levels are well above typical level of flow** due to runoff from rainfall or snowmelt
- Water flowing faster and level usually **close to or at "bankfull"**
- Often **noticeable turbidity** from sediment transported by runoff
- Goal to capture the **range of nutrient and Cl concentrations impacting the stream** under different flow conditions

When do I collect high flow samples?

- Typically need at least **0.5 to 1 inch of rain**
- High flow events more common during spring – don't wait until end of sampling season
- If in doubt, sample during any predicted rain event, you can try again if flows aren't high enough

Reminders

If you already collected samples for a sampling period and a high flow event occurs later, **no need to collect more samples that sample period.**

If you reschedule a sample event to capture high flows but they don't occur, this is okay.

Key Takeaways

- Collect **one set of samples** per biweekly sample period whether high flow or not
- **Aim for 2 high flow sample events** (if you can)
- **Collect at all sites** even if only some experience high flows – don't skip samples (unless dry or dangerous/not accessible)
- Safety is top priority! **Do not sample if dangerous**

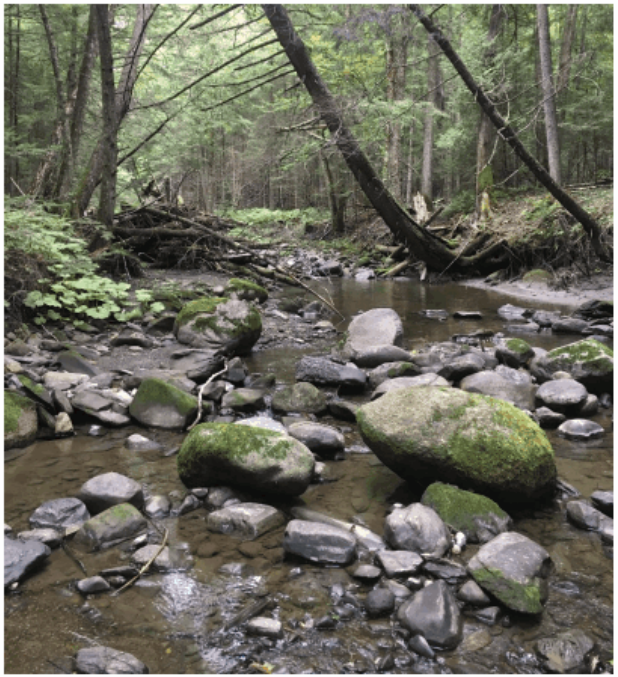
ANY QUESTIONS?

FIELD SAMPLING

Training Resources
Equipment
Sampling Procedures
Duplicates
Flow Observations

LaRosa Partnership Program

Partner Guide

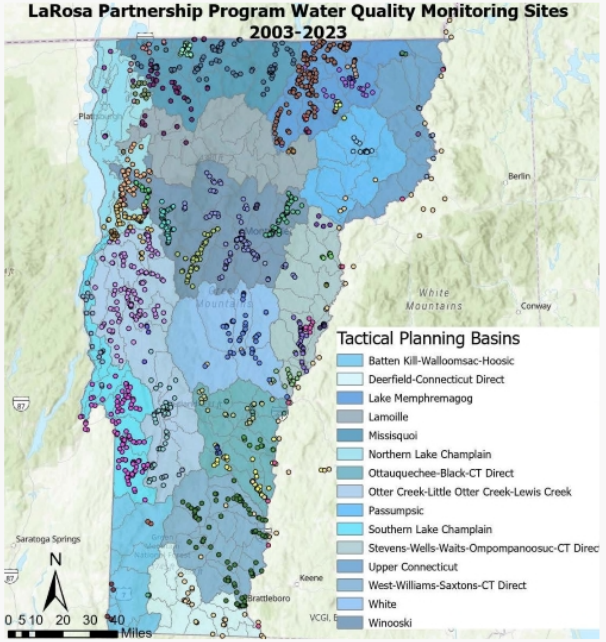


Commissioner's Office
Administration and Innovation
Air Quality and Climate
Drinking Water and Groundwater
Environmental Assistance
Environmental Enforcement
Geological Survey
Waste Management and Prevention
Water Investment
Watershed Management
Application, Permitting, and Compliance Forms
Protecting Vermont's Waters
Restoring Vermont's Waters
Business and Operations
CAFO
Lakes and Ponds
Monitoring and Assessment
Program Overview
Monitoring
Acid Rain

This water quality sampling allows community members to engage with their local streams and rivers firsthand, learn about water quality issues and where they may be occurring, and identify areas in need of protection or remediation. Additionally, by improving the geographic extent and frequency of water chemistry monitoring, the data collected by the LPP partners strengthens the VT DEC's Water Quality Database and furthers the achievement of the VT DEC's water monitoring goals outlined in the Water Quality Monitoring Program Strategy.

PROGRAM ANNOUNCEMENTS

- **Site nominations for the 2024 season are now closed.** Final site lists will be released by the end of February.
- Access flow Survey123 submissions using the LPP Flow Data Dashboard. For guidance on how to use the Flow Data Dashboard, view the Flow Data Dashboard video tutorial.
- View two examples of outreach tools created by our partners using data collected through LPP:
  - South Chittenden River Watch (Lewis Creek Association) 2021-22 StoryMap
  - Friends of Little Averill 2022 StoryMap



QUICK LINKS

- Frequently Asked Questions
- LPP Partner Guide
- 2023 Interactive Map of Stream Sampling Sites
- PowerBI LPP Data Presentation Tool
- LPP Flow Data Dashboard / Flow Data Dashboard video tutorial
- Flow Observation Survey123 App Tutorial
- 2023 Annual Partner Training Slideshow presentation



Business and Operations
CAFO
Lakes and Ponds
Monitoring and Assessment
Program Overview
Monitoring
Acid Rain
Biomonitoring
Fish Samples and Metrics
Macroinvertebrates, Processing and Metrics
Special Studies
Community Science
LaRosa Partnership Program
Get Involved with LPP
LPP Data & Reports
Reports from LaRosa Partners
LPP Newsletters
LPP Training & Education
LaRosa Partners Past & Present

- Frequently Asked Questions
- LPP Partner Guide
- 2023 Interactive Map of Stream Sampling Sites
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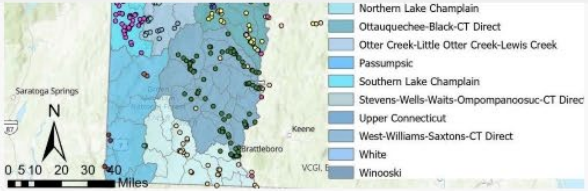


GET INVOLVED

PROGRAM MODEL

TRAININGS & PROTOCOLS

DATA & REPORTS

NEWSLETTERS

VAEL

Home
About DEC
Contact Us
Commissioner's Office
Administration and Innovation
Air Quality and Climate
Drinking Water and Groundwater
Environmental Assistance
Environmental Enforcement
Geological Survey
Waste Management and Prevention
Water Investment
Watershed Management
Application, Permitting, and Compliance Forms

LPP Trainings & Protocols

For a comprehensive guide on LPP program participation, please refer to the 2024 LPP Partner Guide. The Partner Guide provides detailed information on monitoring site selection and test parameters, sampling and quality assurance procedures, flow observations, and data access.

LPP Parameters

- Chloride levels are on the rise in Vermont's waters. Read our explanation of the when, where, and why of chloride monitoring.

2023 Annual Partner Training & Orientation

- Slideshow presentation

Field Sampling

- Sulfuric acid Safety Data Sheet
- The Addison County River Watch Collaborative has created this video to demonstrate proper water quality sampling techniques:

SAMPLING KITS

BOTTLES & PRE-PRINTED LABELS

SAMPLE RACKS

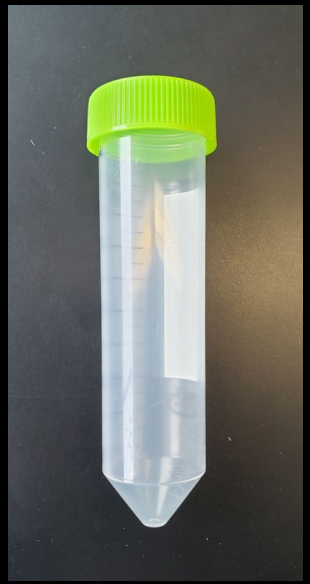
VAEL FIELD SHEETS

TN ACIDIFICATION KITS

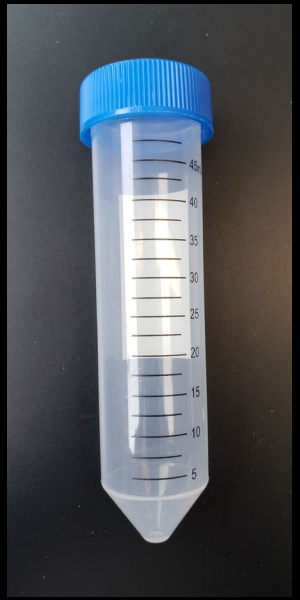
SAMPLING CHECKLIST

RIVER DIPPERS

SAMPLE BOTTLES



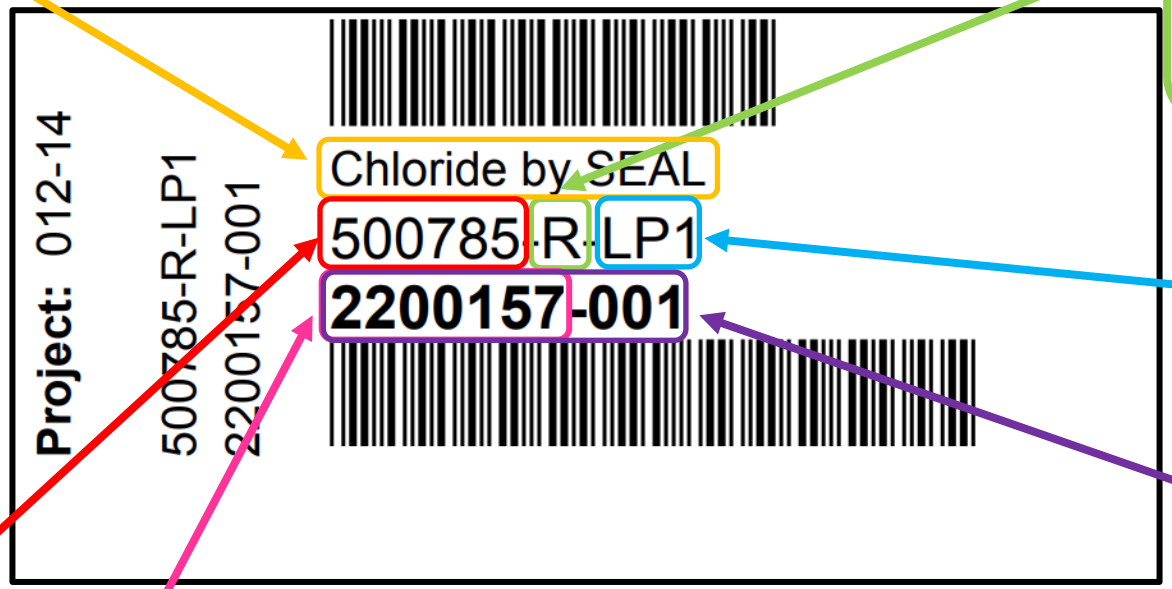
CHLORIDE



NITROGEN

PHOSPHORUS

BOTTLE LABELS



Parameter

QC Code (R = regular, D = duplicate)

LaRosa Site ID

VAEL Lab Sample ID (24XXXXX-XXX)

VT DEC Location ID (5XXXXX)

VAEL Order Number

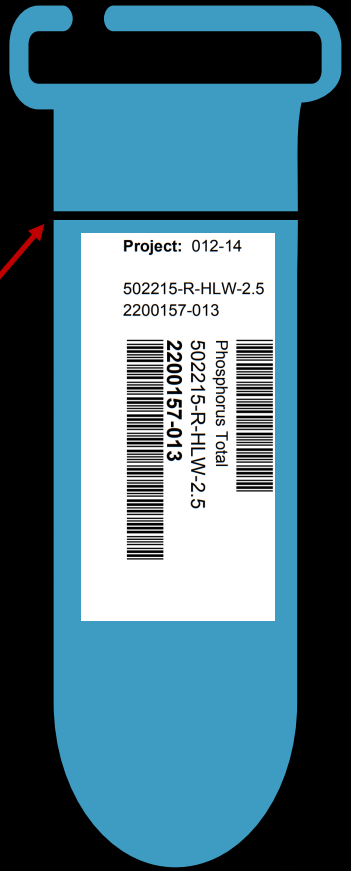
HOW TO: LABEL BOTTLES

Apply all labels before you go out in the field!

Ensure bottles are **dry** before applying.

Place labels **vertically**.

Place TP labels **below black line**.



HOW TO: VAEL FIELD SHEETS

VERMONT
VAEL Vermont Agriculture and Environmental Laboratory

Field Sheet
Order ID: 2200158
Page 1 of 2

VAEL Use Only

Temperature (°C): _____ ☐ On-Ice?

Received By : _____

Date/Time Received: _____ @ _____ AM / PM

VAEL ID: 2200158-001
Project: 012-32-Ticklenaked Pond

Customer Sample #: 508456-R-SB2.5

Date and Time Collected: 4/16/22 12:35pm **Collected By:** Meaghan Hickey

Comments: TP bottle accidentally rinsed

Test	Container	Preservative	Filtered/Acidified?
Nitrogen Total	50 mL Plastic Blue Cap	H2SO4 to pH < 2; Cool 4 °C	Yes / No / NA
Phosphorus Total	60 mL Glass Vial	None	Yes / No / NA

Always fill out date and time!

IF A SITE IS NOT SAMPLED

VERMONT
VAEL Vermont Agriculture and Environmental Laboratory

Field Sheet
Order ID: 2200158
Page 1 of 2

VAEL Use Only

Temperature (°C): _____ ☐ On-Ice?

Received By : _____

Date/Time Received: _____ @ _____ AM / PM

VAEL ID: 2200158-001
Project: 012-32-Ticklenaked Pond
Customer Sample #: 508456-R-SB2.5

Delete

Date and Time Collected: _____ **Collected By:** _____

Comments: _____

Test	Container	Preservative	Filtered/Acidified?
Nitrogen Total	50 mL Plastic Blue Cap	H2SO4 to pH < 2; Cool 4 °C	Yes / No / NA
Phosphorus Total	60 mL Glass Vial	None	Yes / No / NA

INDIVIDUAL SAMPLE NOT TAKEN

VERMONT
VAEL Vermont Agriculture and Environmental Laboratory

Field Sheet

Order ID: 2200158

Page 1 of 2

VAEL Use Only

Temperature (°C): _____ ☐ On-Ice?

Received By : _____

Date/Time Received: _____ @ _____ AM / PM

VAEL ID: 2200158-001
Project: 012-32-Ticklenaked Pond

Customer Sample #: 508456-R-SB2.5

Date and Time Collected: **Collected By:**

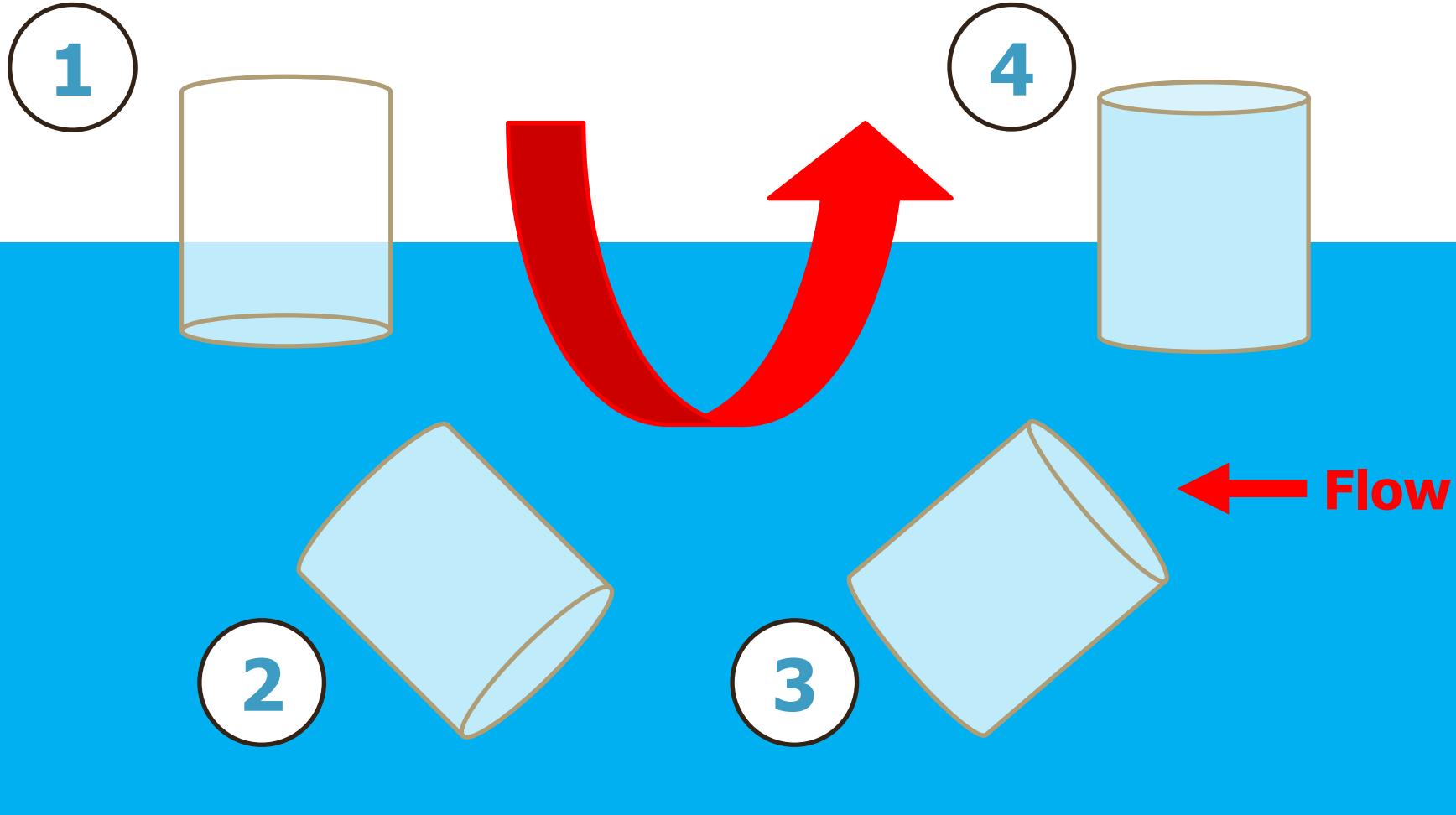
Comments: TP bottle broken/leaked

Test	Container	Preservative	Filtered/Acidified?
Nitrogen Total	50 mL Plastic Blue Cap	H2SO4 to pH < 2; Cool 4 °C	Yes / No / NA
~~Phosphorus Total~~	~~60 mL Glass Vial~~	~~None~~	~~Yes / No / NA~~

Delete

INSTREAM BOTTLE GRAB

1. Wade into the center of the stream's flow.
2. Wait for **disturbed sediment to flow downstream**
3. Always **face upstream**.
4. Rinse **TN** and **Cl** plastic bottles with stream water **3 times**.
5. Do **not rinse TP** glass bottle.
6. Dip bottles midway between the surface and the bottom in a **U-shaped motion**.


1
4
2
3
Flow

IMPORTANT

Do **NOT** sample if:

- **Dry** or stream is **stagnant puddle**
- **So low** you can't sample without disturbing sediment – need 3-4 inches
- **Flows are too swift and/or deep** to sample safely (unless you have a river dipper)
- Flow is backing up from larger water body- **walk upstream** until no longer backing up

Do NOT Sample!

DO Sample!

IMPORTANT

Rinse TN and Cl bottles
Rinse 3 times each

DO NOT RINSE
TP bottles.

RIVER DIPPER

Store in plastic bag when not in use

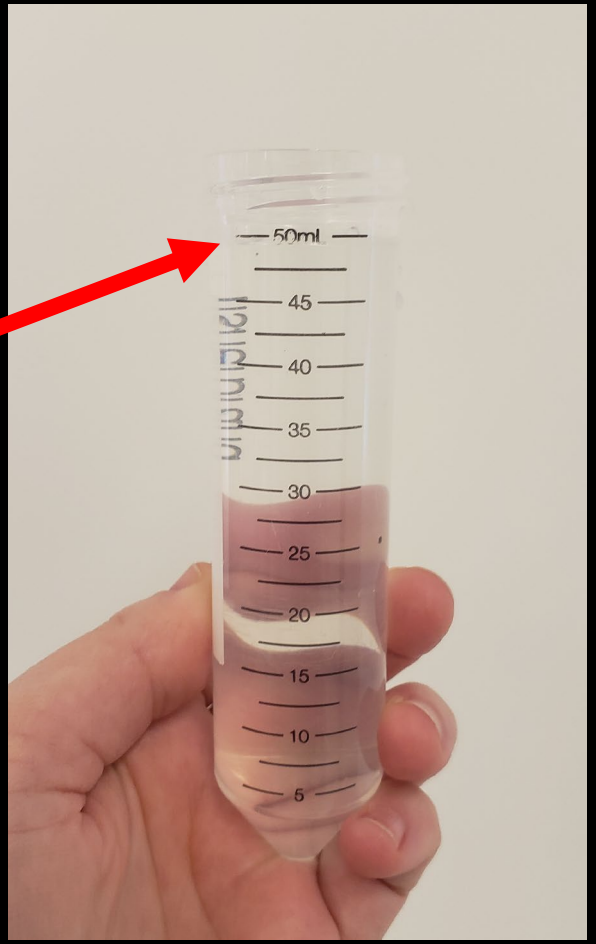
1. Rinse the **river dipper bottle 3x** with river water
2. Use the pole to reach out into center of the stream flow, dip **upstream** using the same **U-shaped motion**

RIVER DIPPER

3. Use the river water in the river dipper to **rinse the sample bottle and cap** (if rinsing is required) **3x**
    a. **Do not rinse TP bottles**.
    b. Can refill river dipper container as needed
4. Pour water from the river dipper into the sample bottle to the designated fill line

- Pour off samples to required volume before capping
- **Carefully flick** bottle to remove small amounts of water
- If you over pour off a **TP sample** below fill line, **do <u>not</u> redo sample!**
  - Fill cap with sample water to pour into sample bottle
  - **Can redo for TN/Cl**

- **Fill TN and Cl to 50mL line**



ANY QUESTIONS?

REVIEW - TRUE OR FALSE

1. All parameters can be sampled using the same bottles. **FALSE**

2. Always face upstream when sampling. **TRUE**

3. Total phosphorus bottles must be rinsed three times. **FALSE**

REVIEW - TRUE OR FALSE

1. Bottle dippers or buckets must be rinsed three times before sampling.	**TRUE**
2. If you pour off a TP sample below the fill line, you must redo the whole sample.	**FALSE**
3. If you only have a bit of water left in your bottle dipper or bucket, you should still fill a sample partway.	**FALSE**

REVIEW - TRUE OR FALSE

1. You should dump sample rinsing water downstream

TRUE

2. You accidentally get some sediment from the stream bed in a TN sample. You should leave the sample as is and make a note on the field sheet.

FALSE

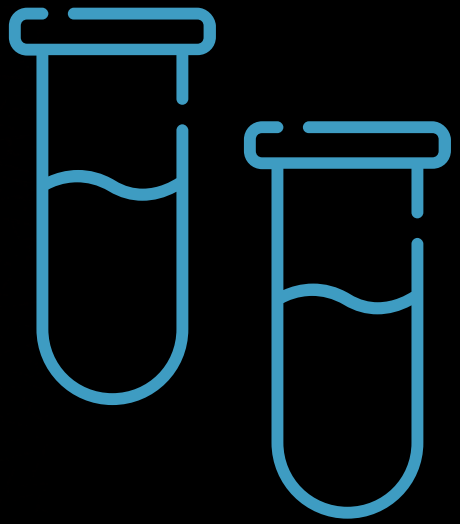
For TN, you should dump out the sample and retake it, because the sediment could introduce excess TN. It would essentially be an extra rinse. No need to make a note. **For TP, redo the sample and make a note.**

QAQC

- Site Visits
- Field Duplicates

SITE VISITS

- Review sampling protocol, field sheets, flow observations, and sample preservation
- Get to know partners and their sites
- Provide or receive any assistance or feedback
- Take samples for additional data or quality assurance

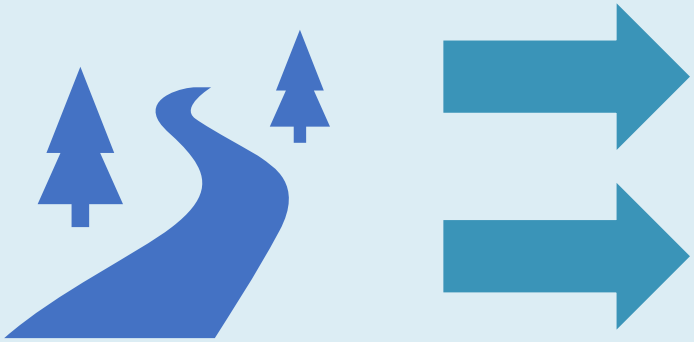


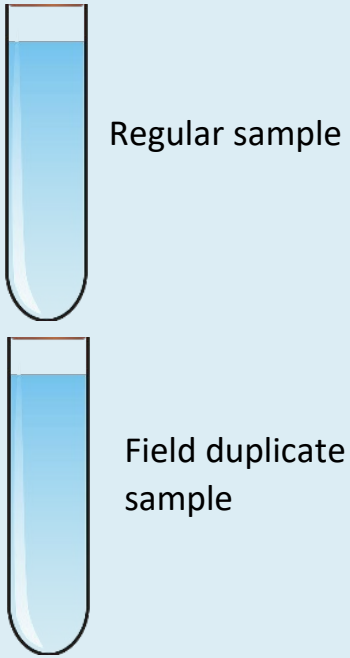
FIELD DUPLICATES

- Sample **immediately after regular samples using the same sampling procedure** (including rinsing)
- Used to identify issues with sample collection, including contamination
- 10% all samples, preassigned by LPP staff, highlighted in yellow
- Cannot be skipped, and should be taken at assigned sites

FIELD DUPLICATES

Collect 2 discrete samples
(rinse each bottle 3x if TN/Cl!)





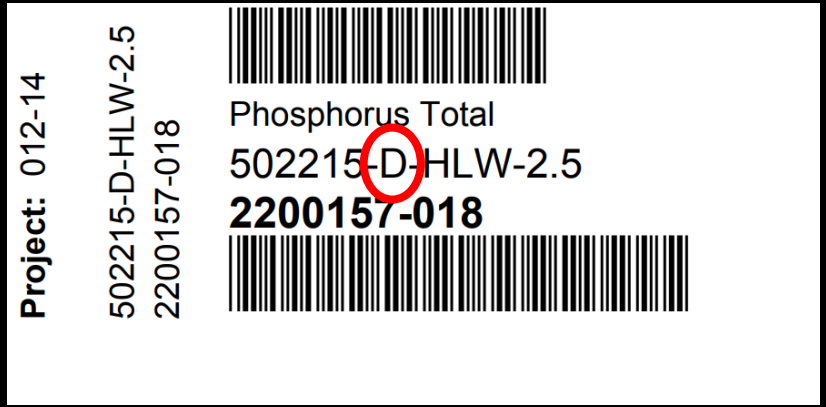
If using a river dipper or bucket, the dipper container or bucket should be rinsed three times **in between collecting the regular sample and the duplicate**

FIELD DUPLICATES

Labeled with **"D"** instead of "R"

Highlighted in yellow

At end of VAEL order



ANY QUESTIONS?

REVIEW

1. Field duplicate bottles should be collected _____ regular samples.

a **At the same time as**

b **Immediately after**

REVIEW

2. When sampling field duplicates with a river dipper, the dipper collection container should be rinsed _____ total for both samples.

a **6 times**

b **3 times**

REVIEW

3. Field duplicates can be taken at any site.

a **FALSE**

b **TRUE**

BREAK

FLOW OBSERVATIONS

FLOW LEVEL	FLOW TYPE	VISIBLE TURBIDITY
LOW	BASE	YES
MODERATE	FRESHET	NO
HIGH	HYDRO	
FLOOD		

FLOW LEVEL - LOW

Low - conditions are low relative to the entire range of flows experienced at site

- Generally occur during late winter and summer
- Streambed typically partially dry with gravel bars exposed
- May be possible to walk along the dry edge of streambed

FLOW LEVEL - MODERATE

Moderate - mid-level streamflow conditions; most typical flows experienced

- Can occur any time of year
- Majority of stream bed is underwater but not up to top of stream bank
- May also occur when flow speed is very slow even if water level is at the top of stream bank

FLOW LEVEL - HIGH

High - Stream is well above a typical level of flow

- Generally occur during spring and fall, but can occur due to rainfall any time of year
- Stream is full from bank to bank but not spilling onto floodplain

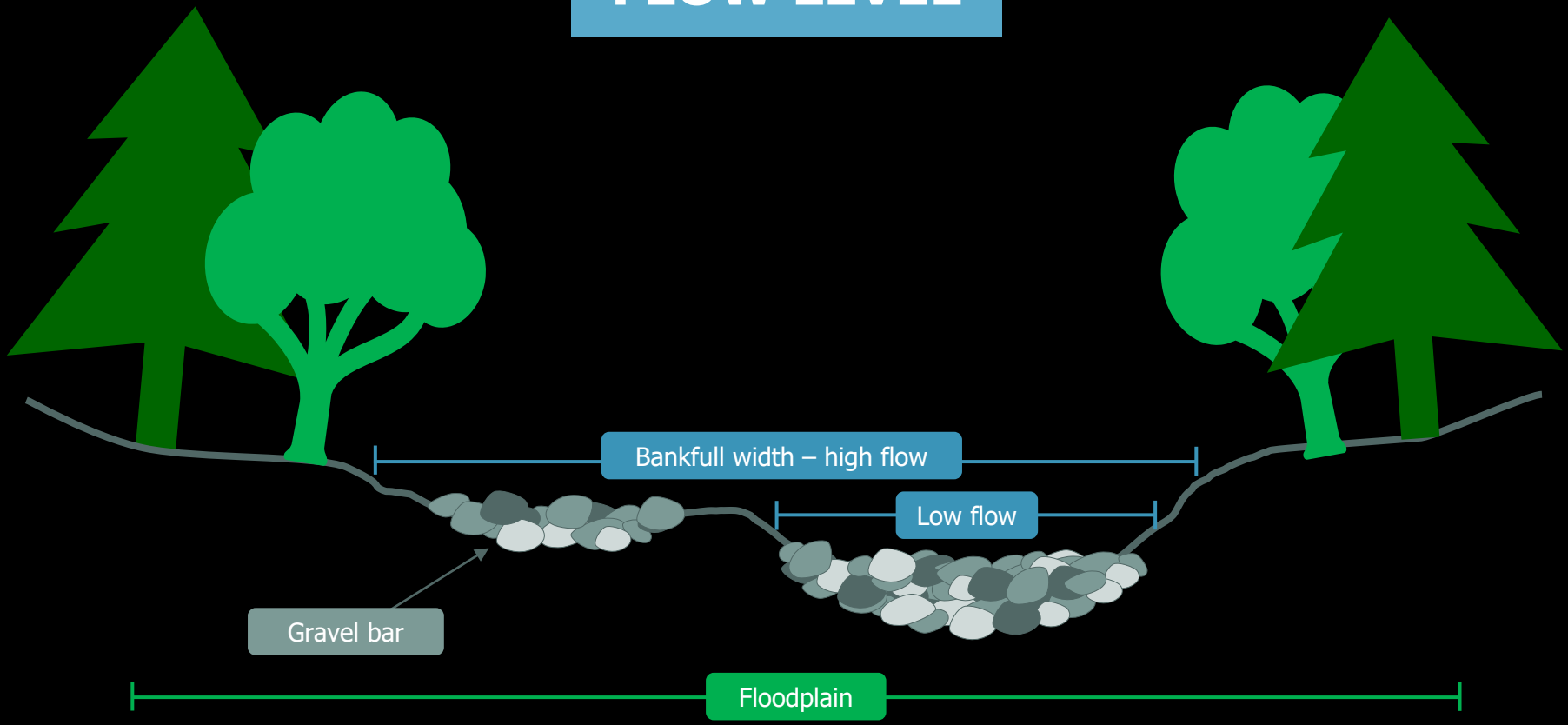
FLOW LEVEL - FLOOD

Flood – Stream exceeds bankfull and accesses the floodplain

- Generally occur less than 5% of time
- Also indicated by submergence or active transport of terrestrial and woody vegetation

Do not sample during flood conditions due to safety concerns

FLOW LEVEL



ANY QUESTIONS?

LOW, MODERATE, HIGH, OR FLOOD?

MODERATE

LOW

LOW, MODERATE, HIGH, OR FLOOD?

HIGH

LOW

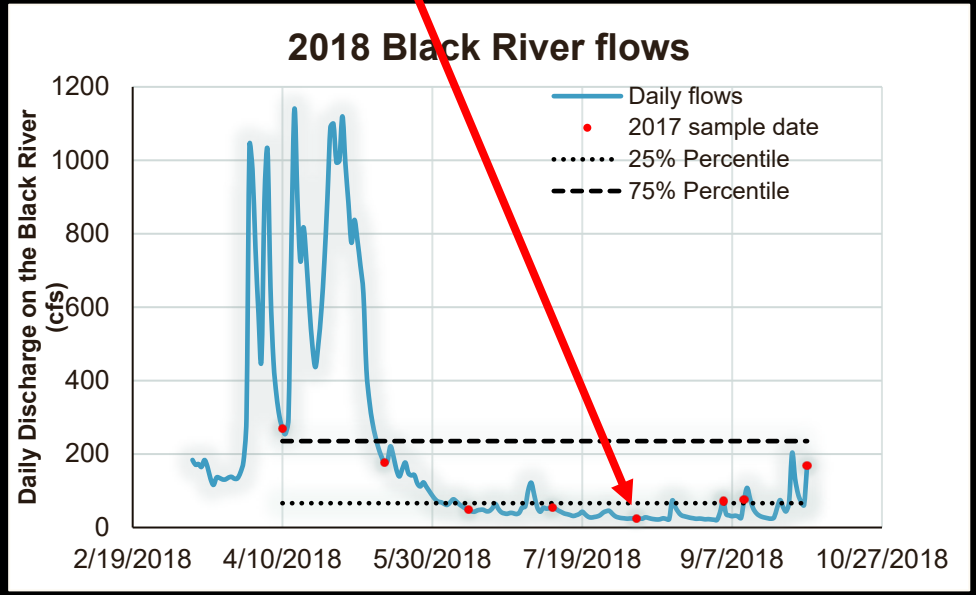
LOW, MODERATE, HIGH, OR FLOOD?

FLOOD

MODERATE

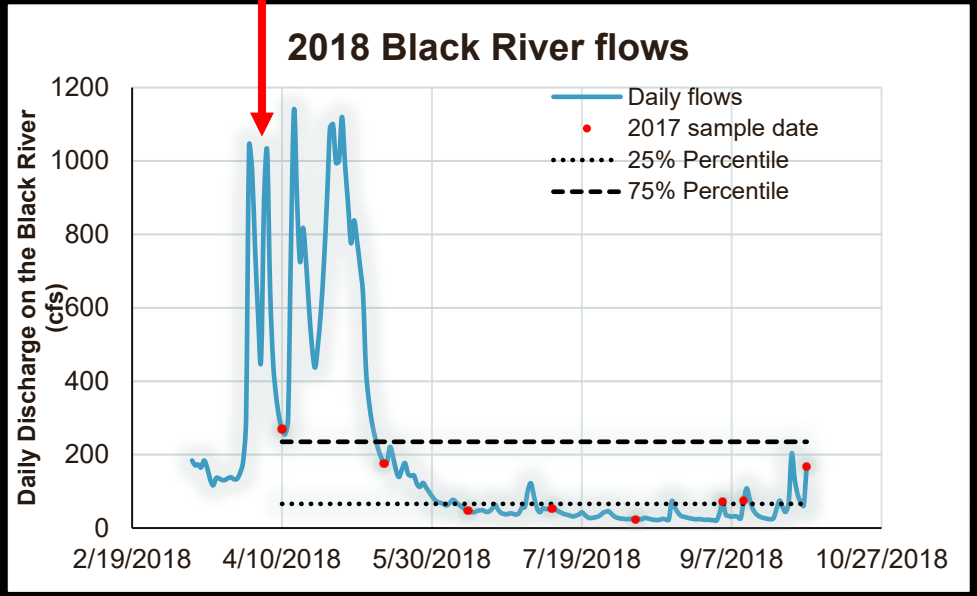
FLOW TYPE – BASE

- **Water level is relatively constant** and not rising or falling
- Subsurface flows account for almost all water reaching streams
- Typically co-occur with low and moderate flow levels, but not under flood levels



FLOW TYPE - FRESHET

- Water level is **actively rising or falling in response to a rain event or snowmelt**
- Water can be turbid due to stormwater runoff and re-suspension of stream bed sediments
- Can co-occur with all flow levels



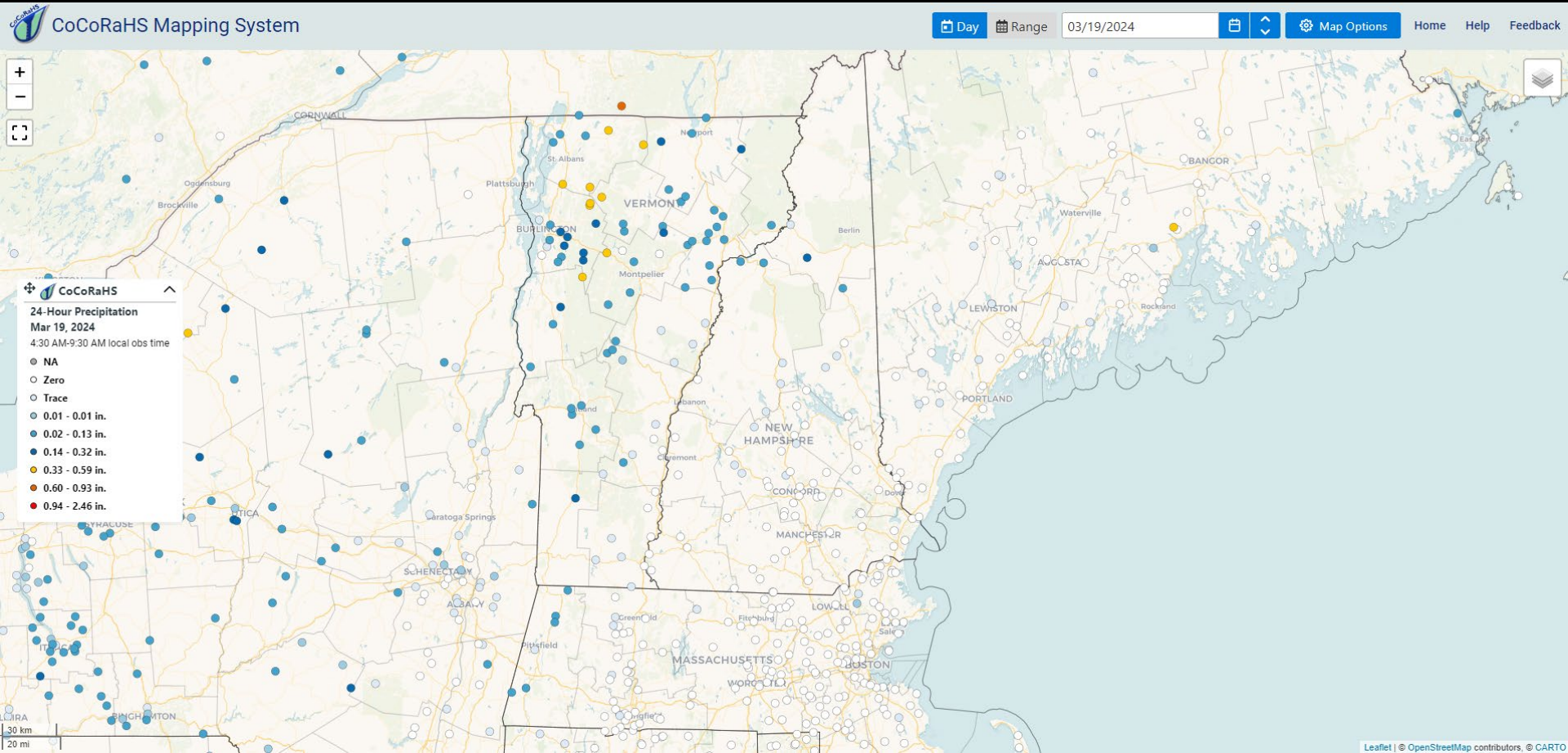
FLOW TYPE - HYDRO

- **Water level is rapidly rising or falling solely due to the release of water from an upstream dam**
- Indicated by a rise in streamflow with no recent precipitation or snow melt and no similar rises on local stream gauges
- Check the watershed protection layer on the ANR atlas to identify dams and when they are operated for electricity generation

FLOW TYPE – NO FLOW

- Indicates that stream is completely dry or flow levels are so low it is more of a stagnant, mud puddle
- **Do not collect sample** – high likelihood of contamination from sediment
- Fill out Survey123 form for site and **select "no flow"** option for flow type/level
- **Only use "no flow" if did not sample**, not to describe slow flow

CoCoRaHS Precipitation Data



TURBIDITY

ANY QUESTIONS?

REVIEW

1. During a freshet, the water level can rise in response to _____ .

a **a rain event**

b **snowmelt**

c **both a and b**

REVIEW

2. You collected your first sample on April 17th. A rain event is predicted on April 30th (your next sample pick up is May 2nd). Should you go out and collect a sample?

a **Yes! Capture that high flow event!**

Yes, but only collect at the sites where flows are high

c **No, you already collected your samples for that sample period**

REVIEW

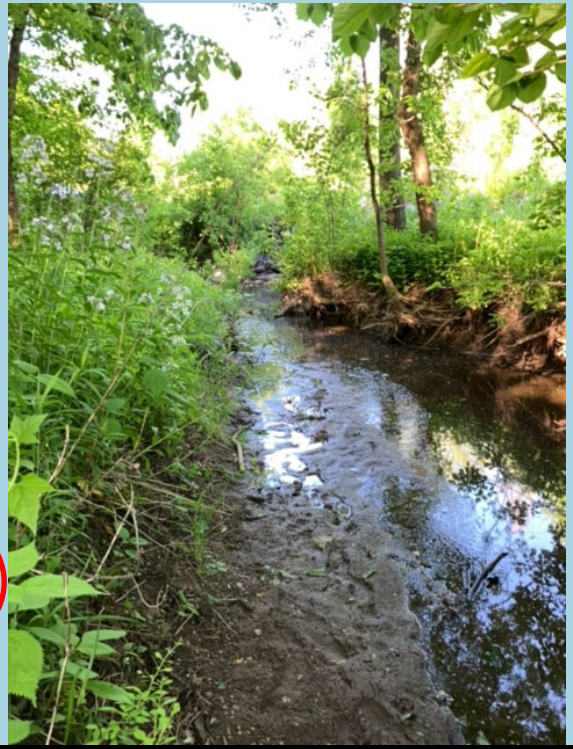
3. Should you collect a sample if your site looks like this?

a **YES**

b **NO**

REVIEW

4. Should you collect a sample if your site looks like this?



a YES

b NO

REVIEW

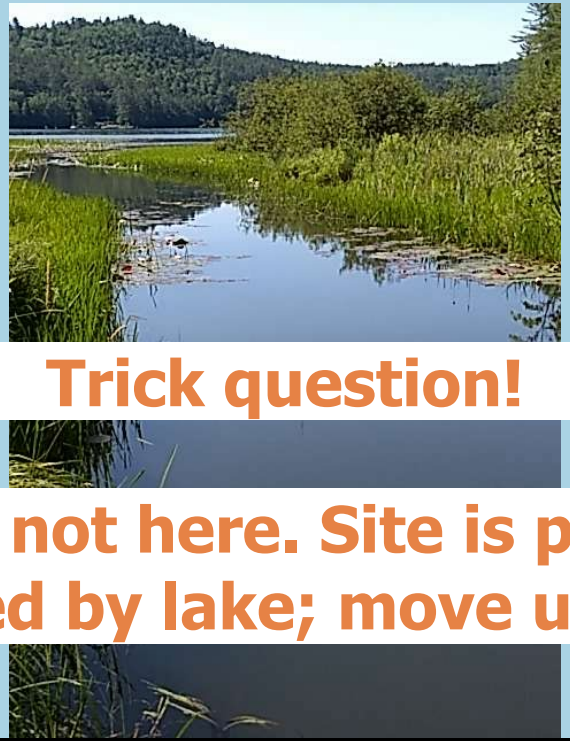
5. Should you collect a sample if your site looks like this?

a YES

b NO

REVIEW

6. Should you collect a sample if your site looks like this?



Trick question!

a

Yes, but not here. Site is probably influenced by lake; move upstream

NO

REVIEW

7. Should you collect a sample if your site looks like this?

Sample below dam if can

a YES

b NO

REVIEW

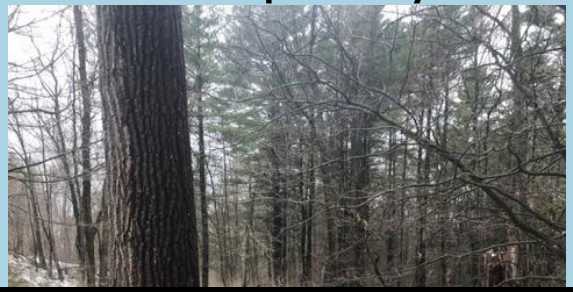
8. Should you collect a sample if your site looks like this?

a **YES**

b **NO**

REVIEW

9. Should you collect a sample if your site looks like this?



Do not sample due to dangerous conditions

a **YES**

b **NO**

Survey123 Flow Data Survey

SURVEY123 APP

- Free and no account needed
- More user-friendly design
- Works on smartphones, computers, and tablets
- Useable **offline/no cell service** required
- View/edit **past submissions**
- Can **copy submissions** into new survey

Survey123
Flow Data Survey

LaRosa Partnership Program

Complete one survey for every flow observation site and event. For a refresher on procedures, click here.

Sampler name
First and last

Partner*

Site*
-Please select-

Date & time*
If you are not completing this at the time of sampling, you will need to change the date/time
3/22/2024 04:36 PM

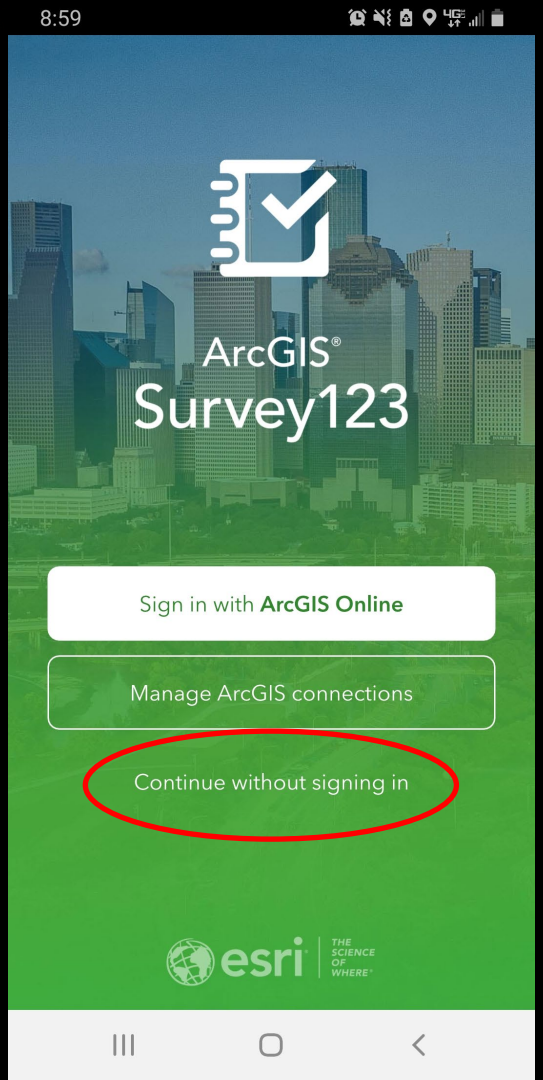
Sample location

SURVEY123 APP

https://arcg.is/1PXuTe0

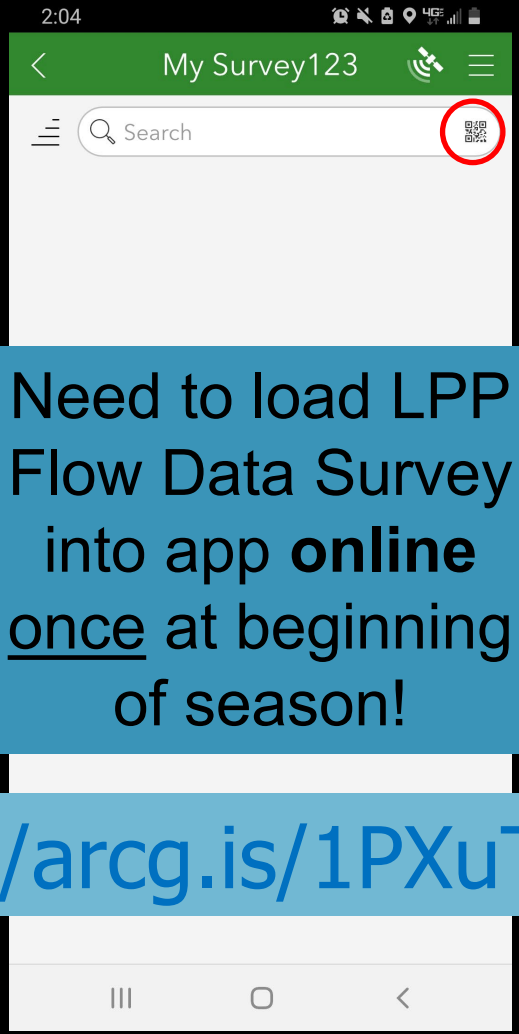
HOW TO – SURVEY123 APP

1. Open Survey 123 app
2. Click **“Continue without signing in”**



HOW TO – INSTALL LPP SURVEY

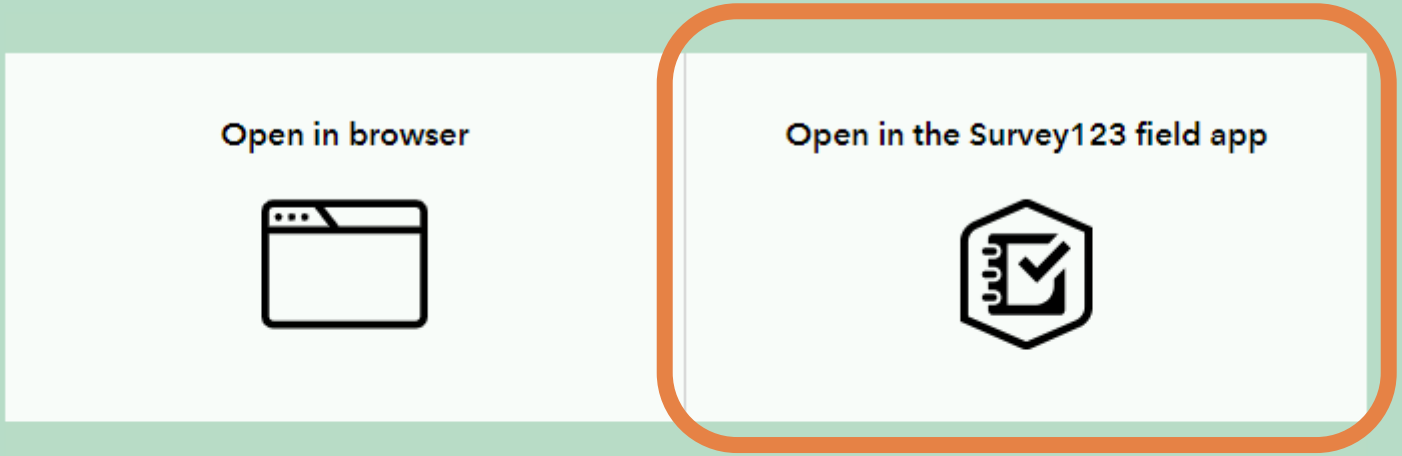
1. Click the QR code symbol next to search bar
2. Align QR code with camera
3. Click **"Open in Survey123 field app"**



Need to load LPP Flow Data Survey into app **online** once at beginning of season!

https://arcg.is/1PXuTe0

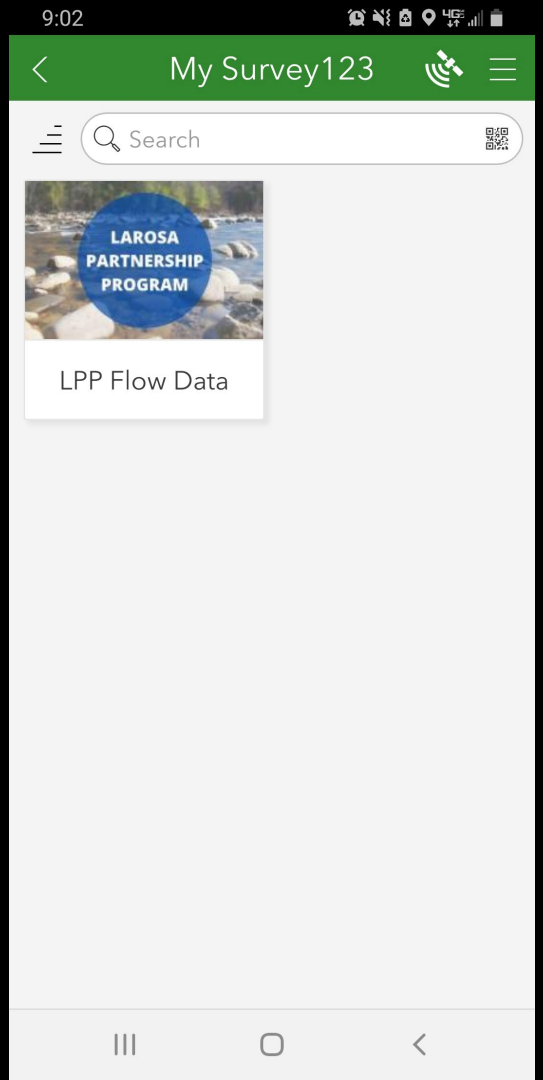
SURVEY123

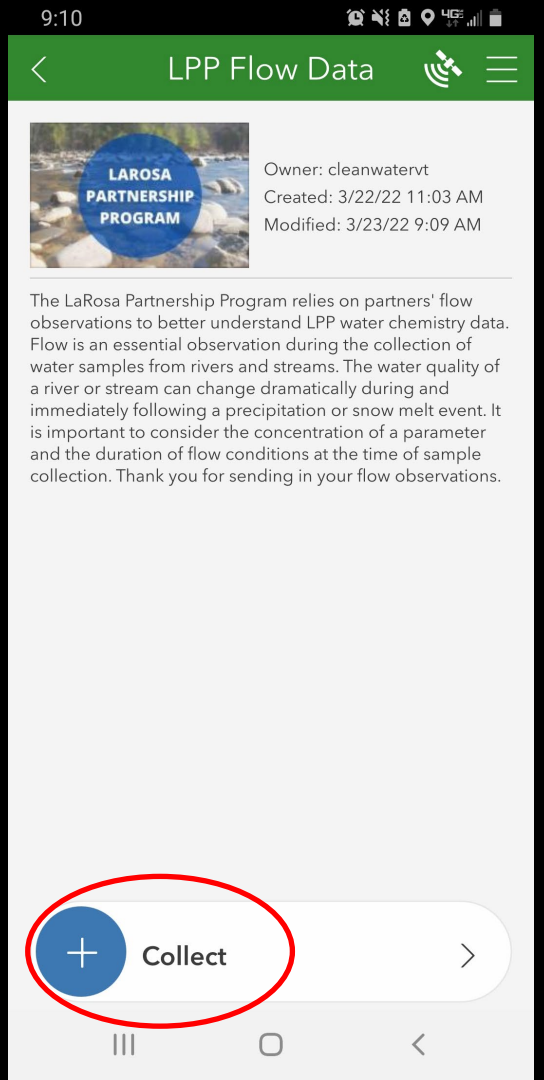


*Can be used on computers!

HOW TO – SUBMIT SURVEY

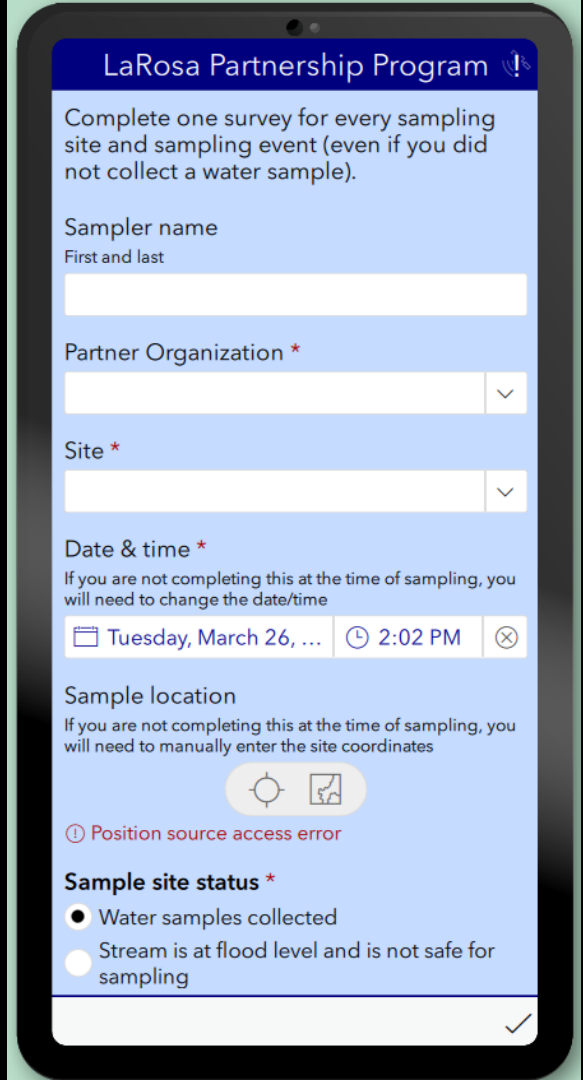
3. Click **“LPP Flow Data”**
4. Click **“Collect”**





HOW TO – SUBMIT SURVEY

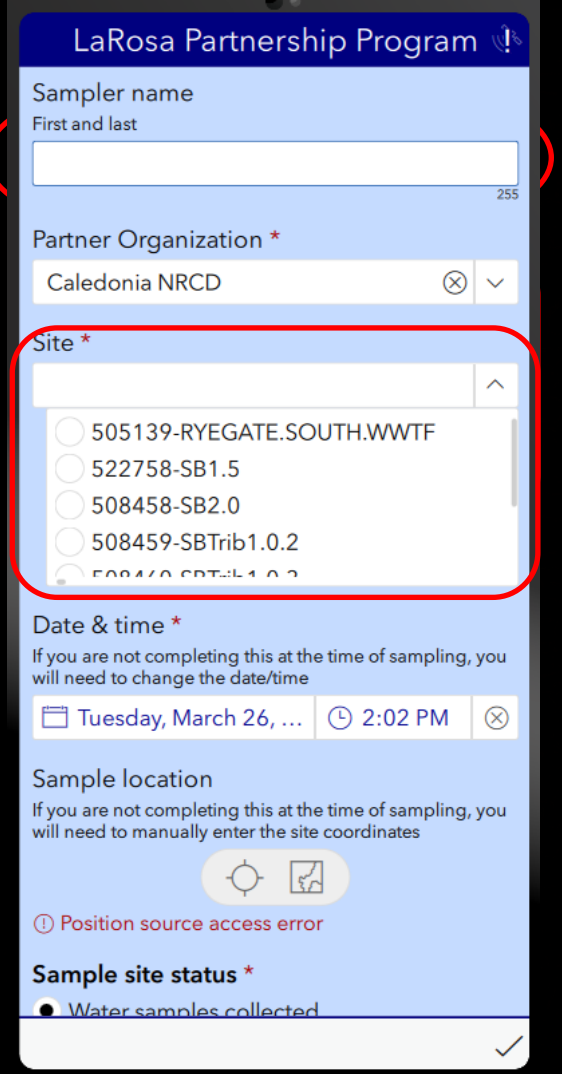
Please fill out the survey **once per site for every sampling event**, regardless of whether the site was sampled.



HOW TO – SUBMIT SURVEY

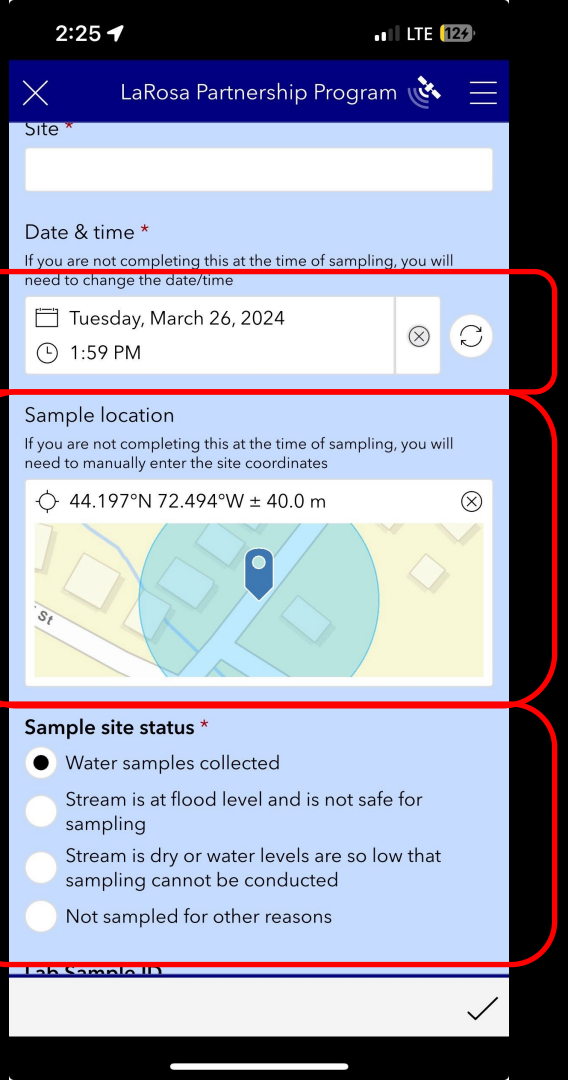
5. Type in sampler name
6. Choose partner name
7. Choose site name

Site names for your organization will be prepopulated based on the chosen partner name



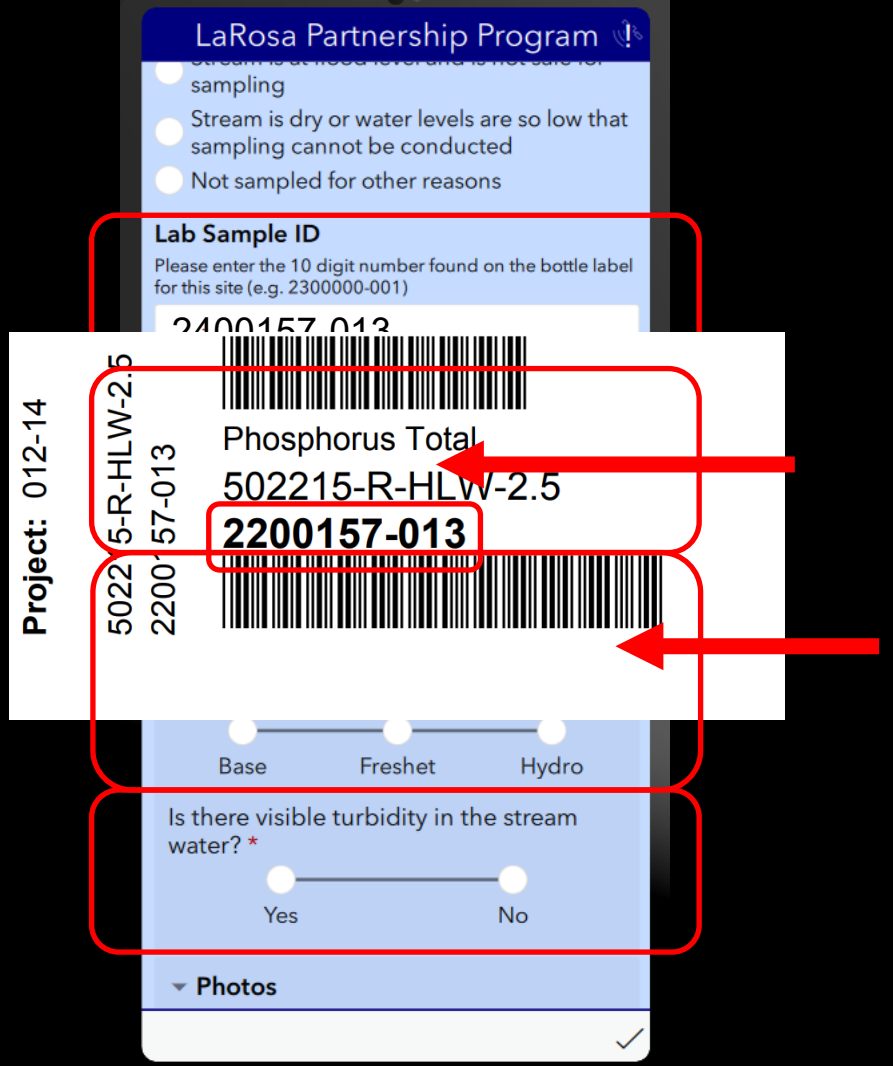
HOW TO – SUBMIT SURVEY

8. Location, date and time prepopulate automatically
9. Select site status – will auto-populate certain fields based on response



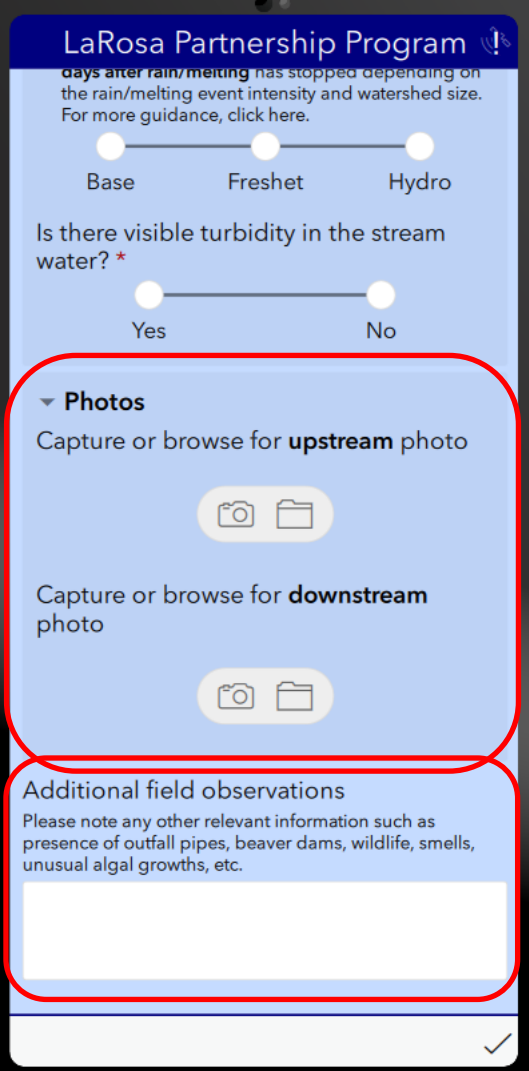
HOW TO – SUBMIT SURVEY

10. Type Lab Sample ID – bolded on sample label (**24XXXXX-XXX**)
11. Choose flow observations



HOW TO – SUBMIT SURVEY

12. Take upstream & downstream photos
13. Note anything relevant to sampling or unusual, potential sources of error, field observations



SUBMIT FLOW SURVEY

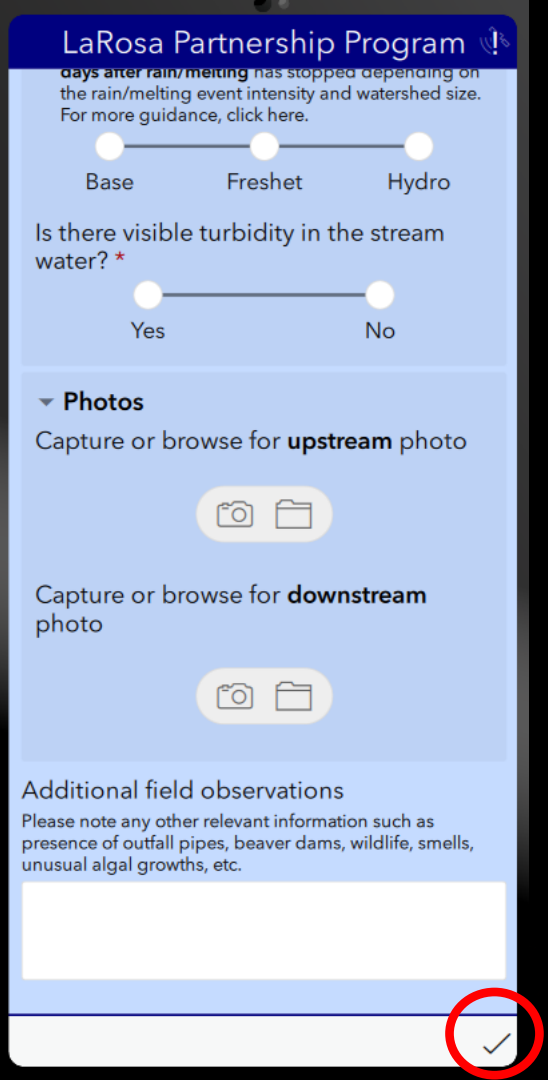
Finished?

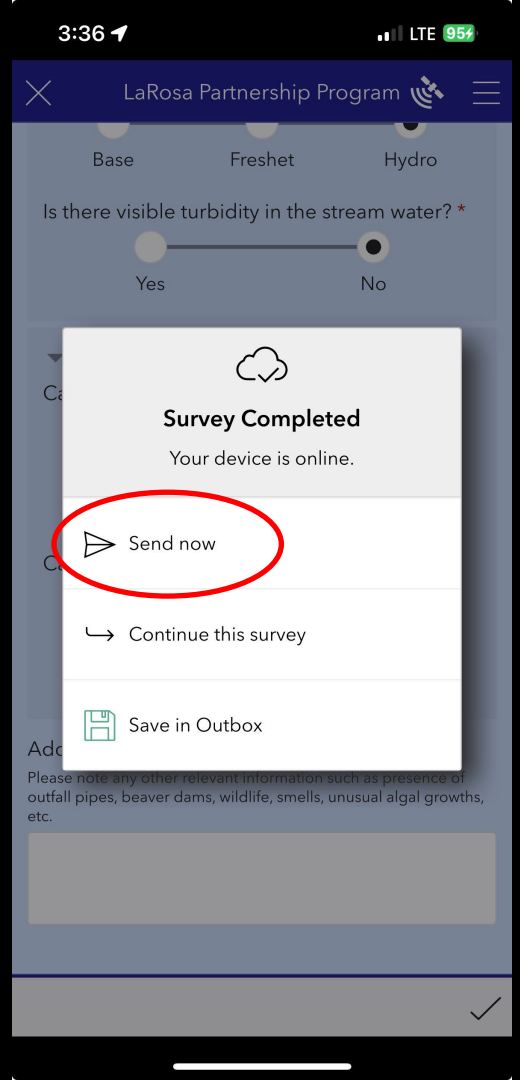
14. Click ✓ at bottom right

(Keyboard may hide ✓

press **“done” or “return”**)

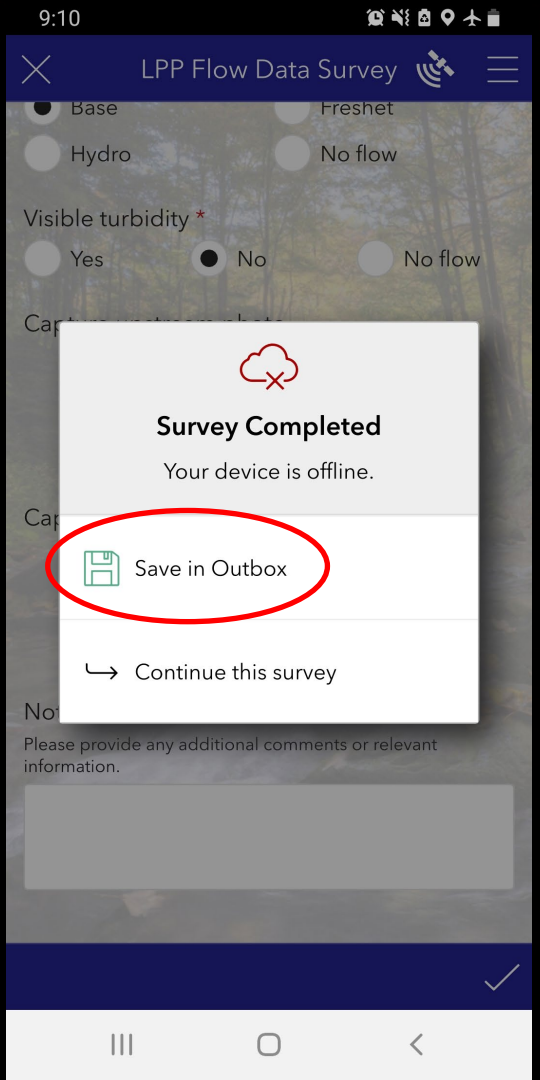
15. If online, click **“Send now”**





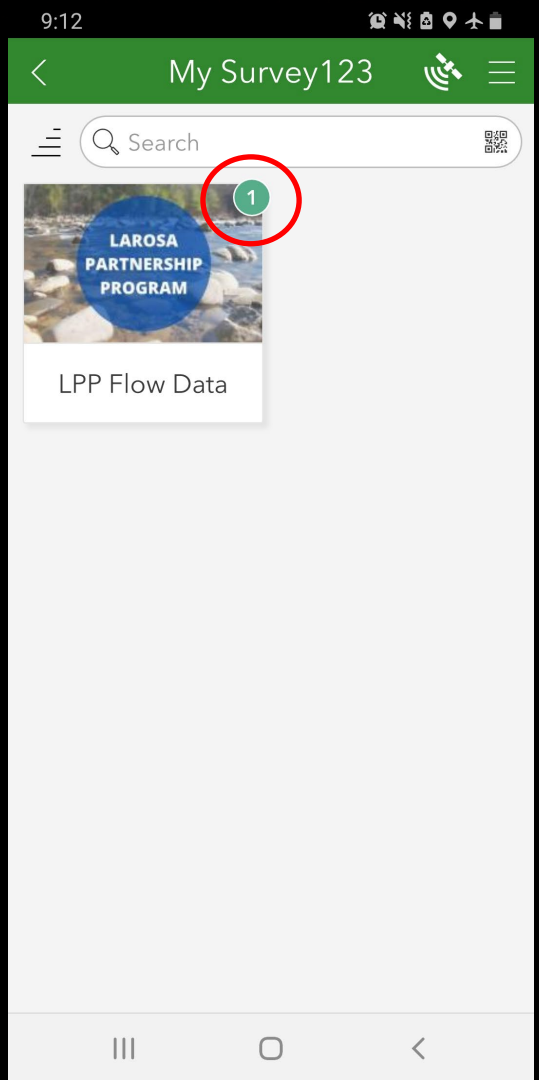
SUBMIT FLOW SURVEY

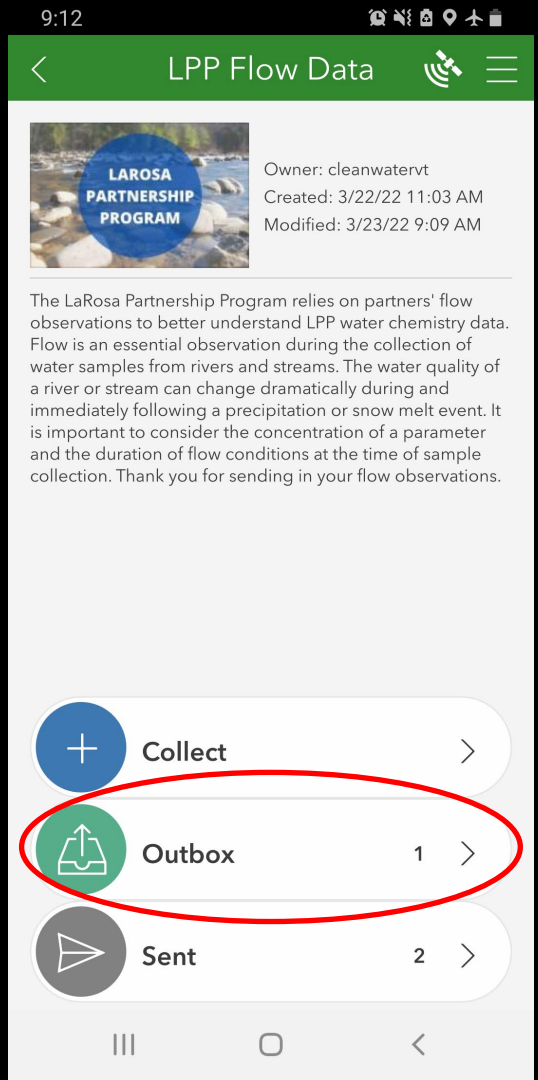
16. If offline, click **“Save in Outbox”**



SUBMIT FLOW SURVEY

Always remember to check your outbox after returning from the field!

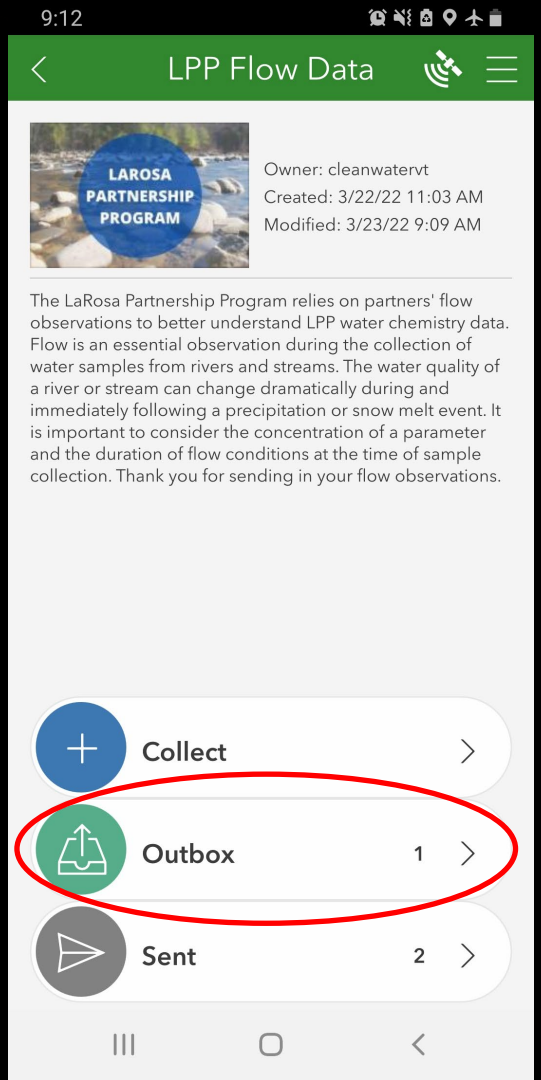


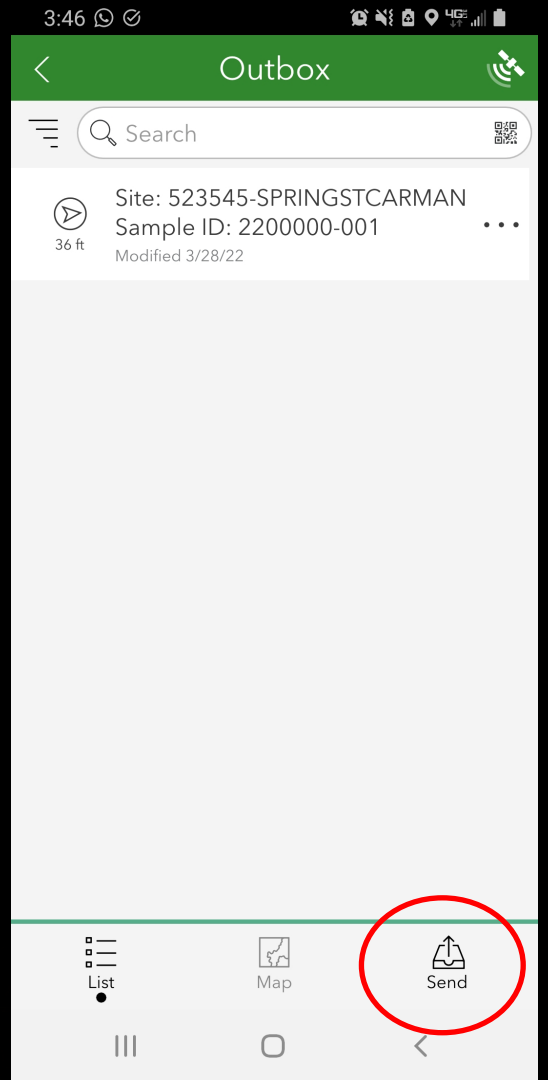


SUBMIT FLOW SURVEY

Click on Outbox.

Send remaining submissions.





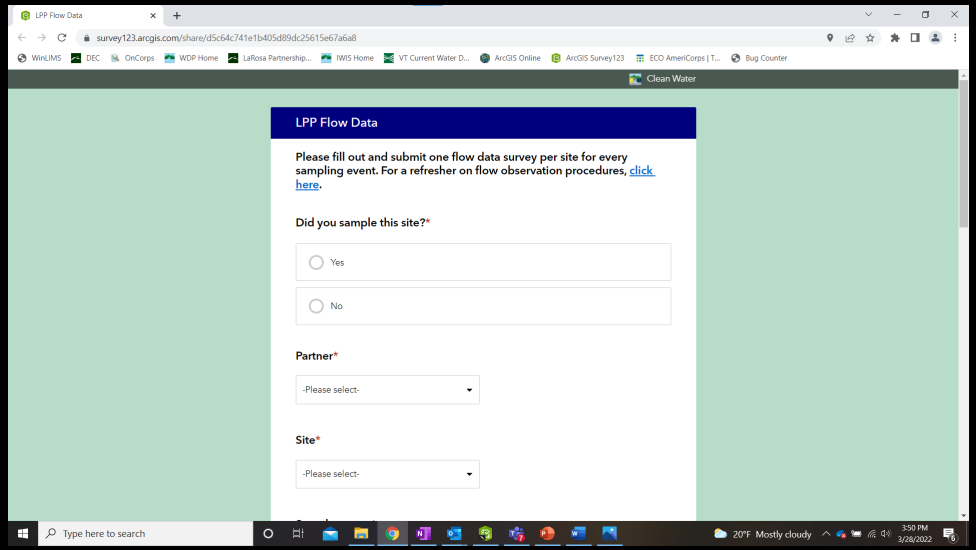
If uncomfortable using devices in field, flow data can be submitted from home via app or browser

Must record flow observations in field using paper.

After returning from sampling, **complete survey with field notes** following the same directions in previous slides using computer app, phone app, or webform.

Always correct the date and time.

Upstream and downstream photos **not required**.



https://arcg.is/1PXuTe0

LPP Flow Observation Data

Sample Year: 2022 | 2023

Partner Organization: None selected

Sampling Dates: None Selected

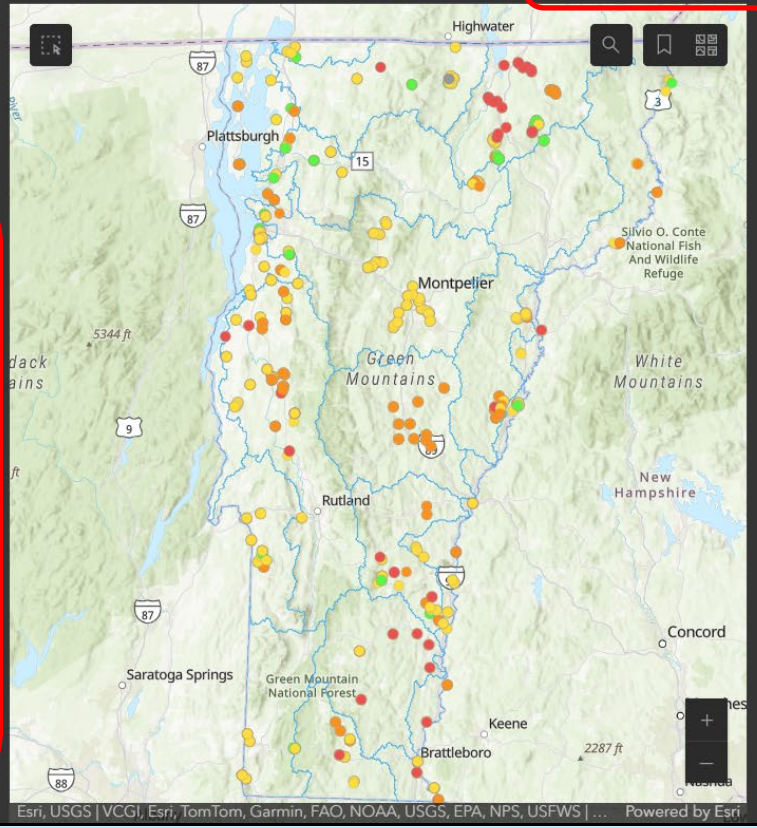
Sites Observed

274

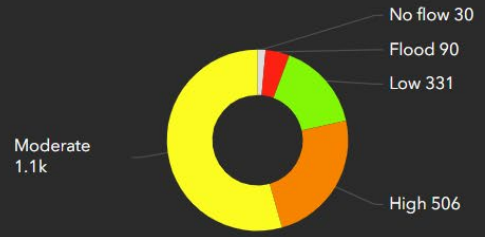
Sites	Observation Count
500698-MDC1.2	8
500699-MDC4	8
500728-OTRVF	8
500796-LP9	8
500807-MH2	8
500819-CA06	8
500862-VT-WDS_04.8	7
500989-Coche Brook	8
501000-Clyde - Rt 105	8
501099-SFR	8

Total Flow Observations

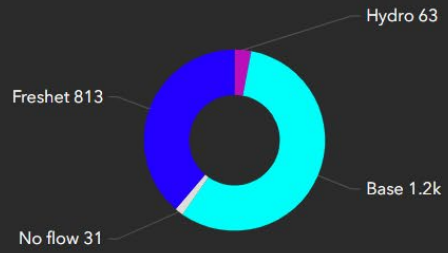
2.1k



Flow Level



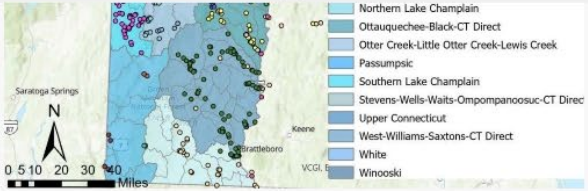
Flow Type



LPP Flow Data Dashboard

Business and Operations
CAFO
Lakes and Ponds
Monitoring and Assessment
Program Overview
Monitoring
Acid Rain
Biomonitoring
Fish Samples and Metrics
Macroinvertebrates, Processing and Metrics
Special Studies
Community Science
LaRosa Partnership Program
Get Involved with LPP
LPP Data & Reports
Reports from LaRosa Partners
LPP Newsletters
LPP Training & Education
LaRosa Partners Past & Present

- Frequently Asked Questions
- LPP Partner Guide
- 2023 Interactive Map of Stream Sampling Sites
- PowerBI LPP Data Presentation Tool
- LPP Flow Data Dashboard / Flow Data Dashboard video tutorial
- Flow Observation Survey123 App Tutorial
- 2023 Annual Partner Training Slideshow presentation



GET INVOLVED

PROGRAM MODEL

TRAININGS & PROTOCOLS

DATA & REPORTS

NEWSLETTERS

VAEL

ANY QUESTIONS?

SAMPLE PRESERVATION

TN/Cl have hold time of **28 days, TP 21 days**

Store in sample rack in order

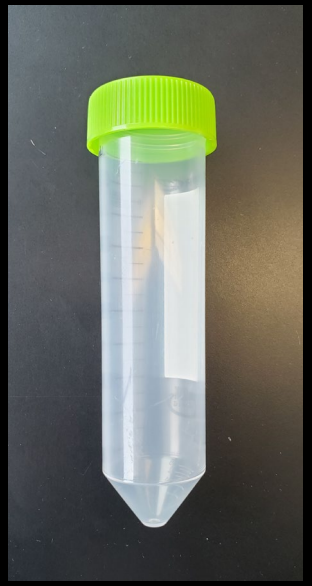
Keep in a safe place- label TN as hazardous

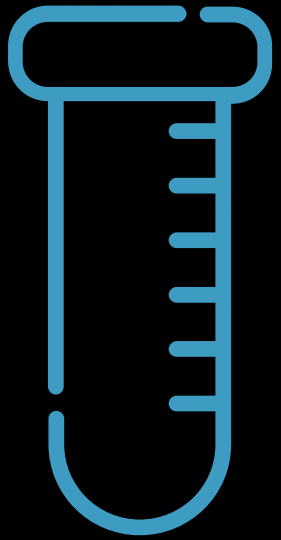
TOTAL NITROGEN

- Store TN samples **on ice or refrigerated** after collecting
- Acidify TN samples within **24 hours**

TP and Cl

Do not need to be kept cold or acidified





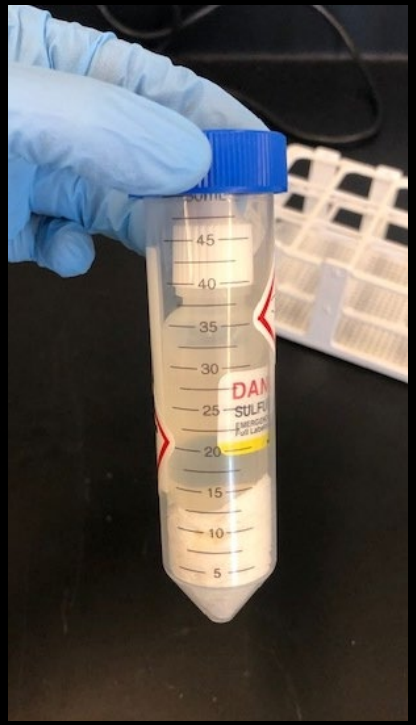
NITROGEN ACIDIFICATION

- **Read Safety Data Sheet & sign safety agreement**.
- **Wear provided disposable gloves and safety glasses** when handling acid. Tie back long hair and remove baggy clothing.
- DO NOT put gloved hands near eyes or mouth.
- **DO NOT acidify in the field**. Choose a safe location near sink.
- If you spill the acid, absorb with paper towel and dispose in plastic bag. Wash area of spill with soap and water.
- If you spill acid on skin or clothes, **remove clothing**, **rinse with water for 15 min & contact medical professional.**

Acidification should only be performed by project coordinators or volunteers that have been approved and trained by LPP staff.

ACIDIFICATION PROCEDURE

1. Put on **safety goggles** and **gloves**
2. Choose a safe location near sink (no pets or children)
3. Secure samples in test tube rack
4. **Uncap** all samples **prior** to opening acid
5. Open acid dropper & dispense **2 drops** in each sample
6. Immediately recap the acid dropper and replace in secondary container
7. Cap the acidified samples and **gently invert** 5x to mix
8. Carefully remove gloves so as not to touch exterior side of glove with bare hands and dispose in a safe container – **do not reuse gloves**!
9. Store samples **in fridge/on ice** & wash hands



ANY QUESTIONS?

REVIEW

1. Nitrogen must be acidified within _____ hours of sample collection.

a 48

b 24

REVIEW

2. TP, TN, and Cl have hold times of

_____ .

a 28 days

b 18 days

REVIEW

3. All volunteers can perform nitrogen acidification.

a **True**

b **False**

REVIEW

4. How many drops of sulfuric acid are required to acidify one nitrogen sample?

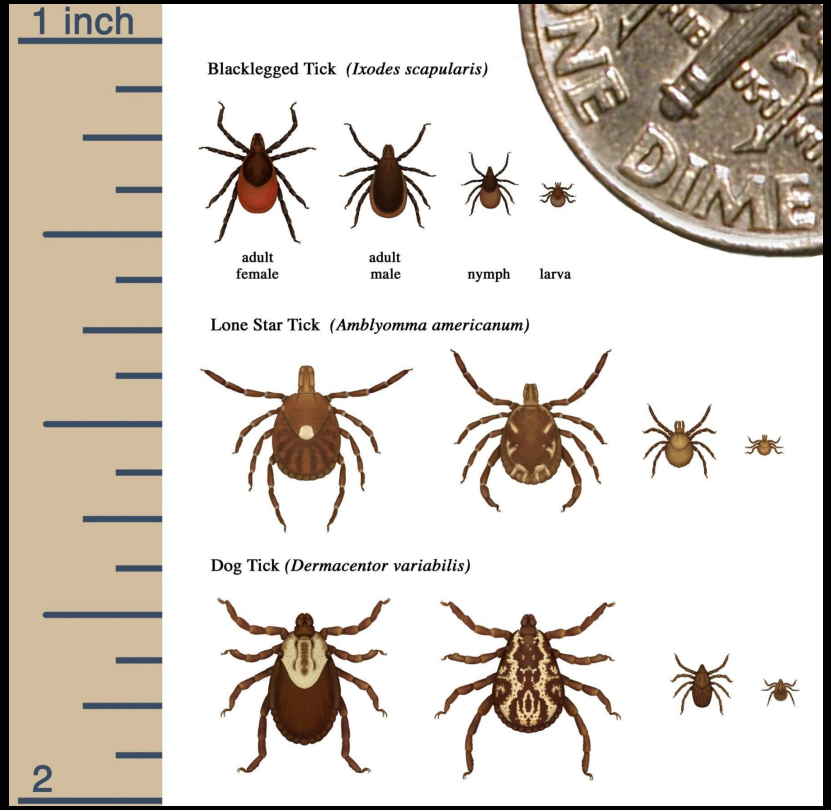
a **One**

b **Two**

SAFETY IN THE FIELD

- Carry a cell phone, sample with a partner, and let someone know where you are, when you intend to return, and what to do if you do not return on time.
- Honor private property rights. **Never cross a landowner's property without permission.**
- Never wade in swift or high water. **Do not monitor if the stream is at flood stage.**
- If possible, have a **first aid kit** and medical form for each volunteer.
- Be aware of the nearest hospital and how to get there.
- Listen to weather reports. **Never monitor if severe weather is predicted.**
- Do not walk on unstable stream banks.
- Be aware of wildlife, insects, and skin irritating plants.

TICK SAFETY



POISON PARSNIP
POISON IVY

BREAK

ACCESSING DATA

- Will be emailed PDF copies of **raw** data from VAEL
- Takes about a month from sample receipt

These data have not gone through the full QAQC process and should not be shared with the public

Report of Results

VERMO
VAEL Vermont Agricultu
Environmental Lab

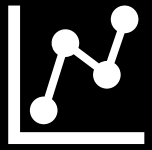
Sample ID: 501945-R-WRCasellas **VAEL Sample ID:** 2301426-001

Collected On: 08/23/23 09:30
Collected By: Shawn White
Sample Comments:

Matrix: Water
Received On: 08/24/23 12:31

Analyte	Method	Sample Result	Anal. Date	Rem	Comments
Chloride	SM 4500-Cl- E	10.3 mg/L	08/30/23 12:58		
Total Nitrogen	VAEL SOP SM 4500-N C	0.29 mg-N/L	09/08/23 10:12		
Total Phosphorus	VAEL SOP SM 4500-P H	16.8 µg P/L	09/13/23 13:37		

ACCESSING DATA

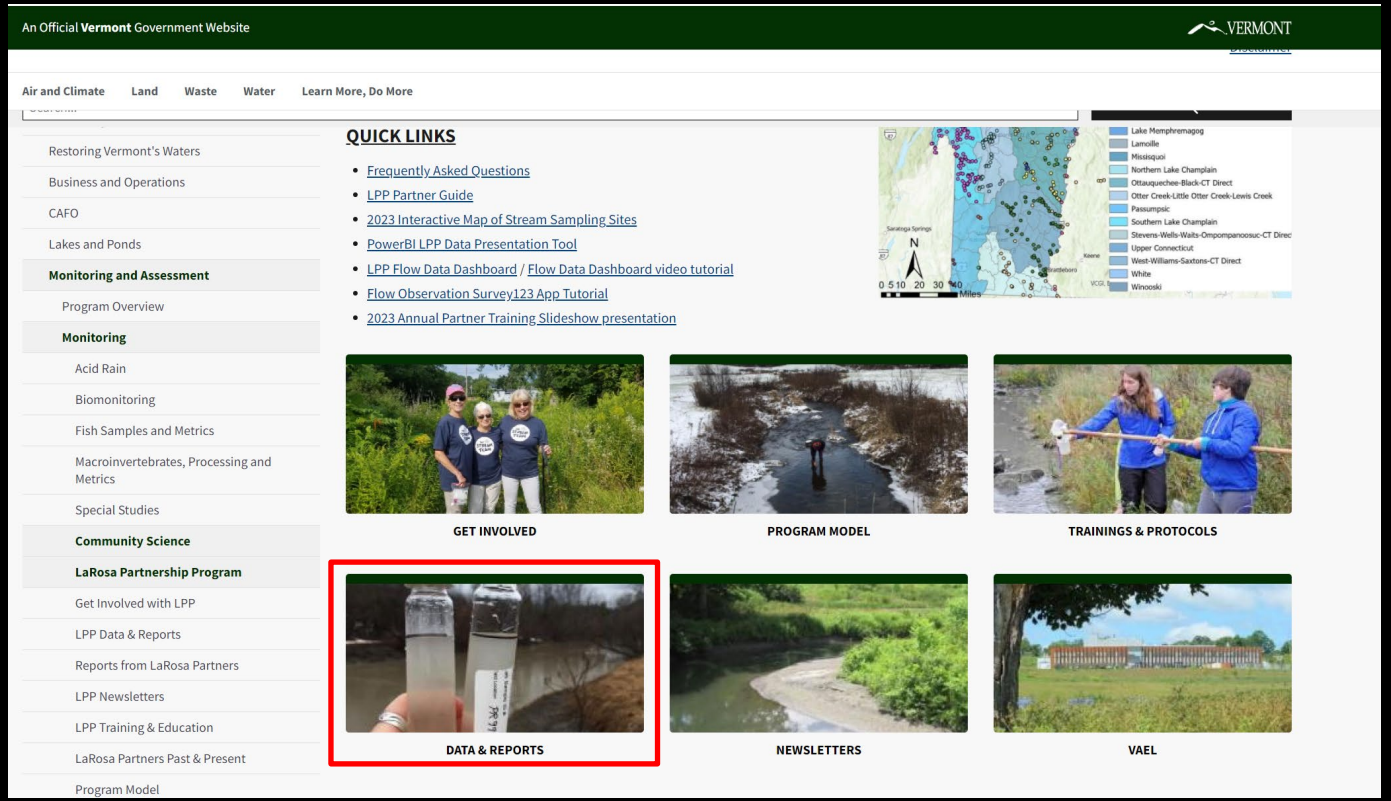


<u>Should</u> skim PDFs for suspect data:

- Check for **extreme values** (freshet runoff events often cause higher values for TP and TN and lower Cl)
- Wildly **differing duplicate samples** beyond 30% difference
- Don’t forget to check for **missing flow survey** submissions in Flow Dashboard!

Consistent anomalies in data may indicate improper sampling methods or contamination & should be addressed ASAP

ACCESSING LPP DATA



ANR Flood Recovery Resources

Find updates and information on the recent flood.

LPP Data & Reports

LPP Flow Data Dashboard - a presentation of all flow observation submissions by year displayed on a graphic with a list of sampling sites, a map of the flow observation locations, and flow level/type pie charts.

LPP Power BI Data Presentation - a visual presentation of historic LPP data created by VT DEC staff. The presentation includes dot plots and box plots of water chemistry data, flow observations, and land use data.

Monitoring Site Details Report - an IWIS database report where you can view and export LPP monitoring site names and details by organization. The sites are listed under the new naming conventions introduced with the 2021 program redesign.

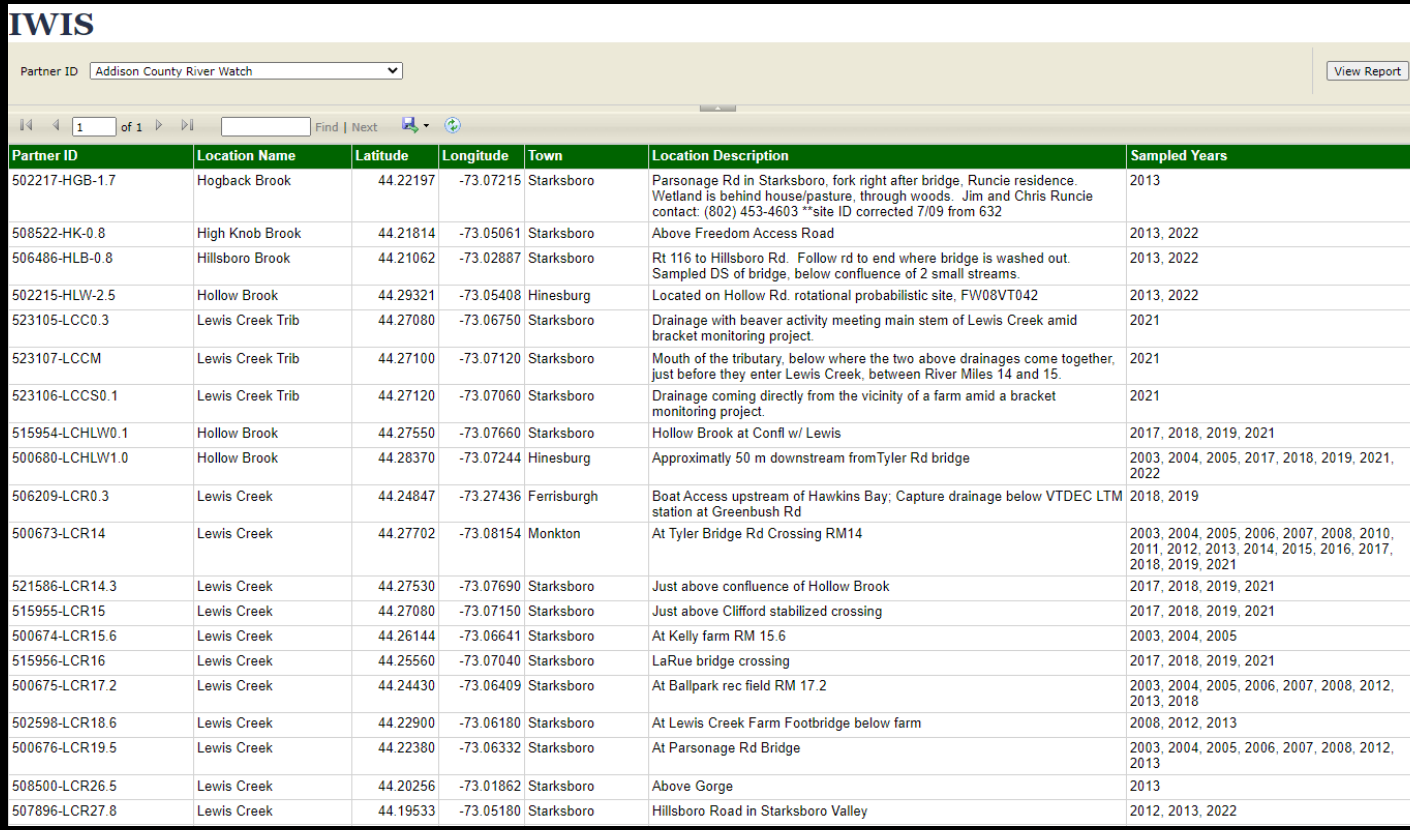
Water Chemistry Data Report - an IWIS database report where you can query watershed associations' data by site and export it. This data has been thoroughly reviewed.

VERMONT INTEGRATED WATERSHED INFORMATION SYSTEM

PARTNER REPORTS

ANR ATLAS

MONITORING SITE DETAILS REPORT



IWIS

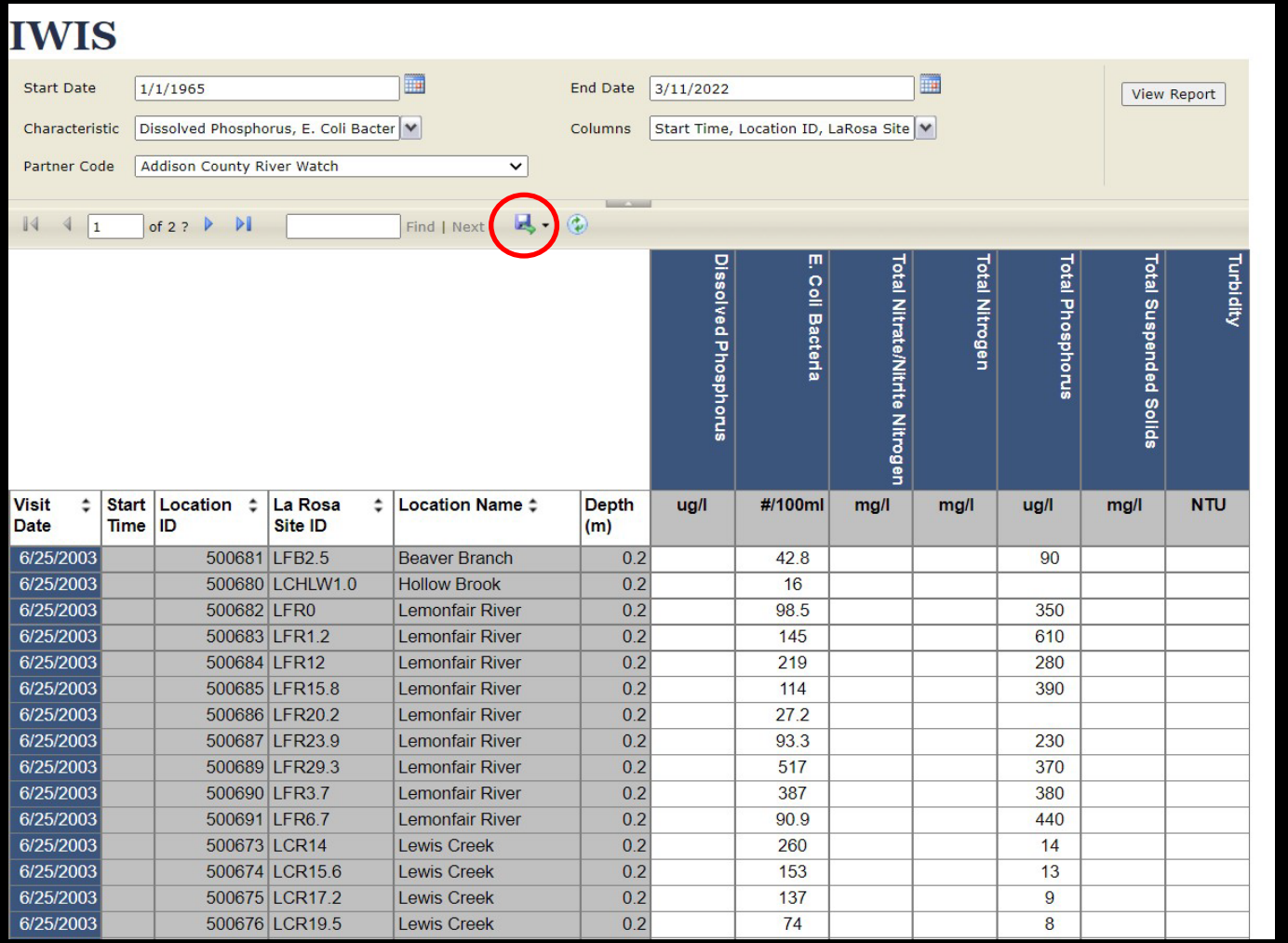
Partner ID: Addison County River Watch

View Report

1 of 1 Find | Next

Partner ID	Location Name	Latitude	Longitude	Town	Location Description	Sampled Years
502217-HGB-1.7	Hogback Brook	44.22197	-73.07215	Starksboro	Parsonage Rd in Starksboro, fork right after bridge, Runcie residence. Wetland is behind house/pasture, through woods. Jim and Chris Runcie contact: (802) 453-4603 **site ID corrected 7/09 from 632	2013
508522-HK-0.8	High Knob Brook	44.21814	-73.05061	Starksboro	Above Freedom Access Road	2013, 2022
506486-HLB-0.8	Hillsboro Brook	44.21062	-73.02887	Starksboro	Rt 116 to Hillsboro Rd. Follow rd to end where bridge is washed out. Sampled DS of bridge, below confluence of 2 small streams.	2013, 2022
502215-HLW-2.5	Hollow Brook	44.29321	-73.05408	Hinesburg	Located on Hollow Rd. rotational probabilistic site, FW08VT042	2013, 2022
523105-LCC0.3	Lewis Creek Trib	44.27080	-73.06750	Starksboro	Drainage with beaver activity meeting main stem of Lewis Creek amid bracket monitoring project.	2021
523107-LCCM	Lewis Creek Trib	44.27100	-73.07120	Starksboro	Mouth of the tributary, below where the two above drainages come together, just before they enter Lewis Creek, between River Miles 14 and 15.	2021
523106-LCCS0.1	Lewis Creek Trib	44.27120	-73.07060	Starksboro	Drainage coming directly from the vicinity of a farm amid a bracket monitoring project.	2021
515954-LCHLW0.1	Hollow Brook	44.27550	-73.07660	Starksboro	Hollow Brook at Confl w/ Lewis	2017, 2018, 2019, 2021
500680-LCHLW1.0	Hollow Brook	44.28370	-73.07244	Hinesburg	Approximatly 50 m downstream fromTyler Rd bridge	2003, 2004, 2005, 2017, 2018, 2019, 2021, 2022
506209-LCR0.3	Lewis Creek	44.24847	-73.27436	Ferrisburgh	Boat Access upstream of Hawkins Bay; Capture drainage below VTDEC LTM station at Greenbush Rd	2018, 2019
500673-LCR14	Lewis Creek	44.27702	-73.08154	Monkton	At Tyler Bridge Rd Crossing RM14	2003, 2004, 2005, 2006, 2007, 2008, 2010, 2011, 2012, 2013, 2014, 2015, 2016, 2017, 2018, 2019, 2021
521586-LCR14.3	Lewis Creek	44.27530	-73.07690	Starksboro	Just above confluence of Hollow Brook	2017, 2018, 2019, 2021
515955-LCR15	Lewis Creek	44.27080	-73.07150	Starksboro	Just above Clifford stabilized crossing	2017, 2018, 2019, 2021
500674-LCR15.6	Lewis Creek	44.26144	-73.06641	Starksboro	At Kelly farm RM 15.6	2003, 2004, 2005
515956-LCR16	Lewis Creek	44.25560	-73.07040	Starksboro	LaRue bridge crossing	2017, 2018, 2019, 2021
500675-LCR17.2	Lewis Creek	44.24430	-73.06409	Starksboro	At Ballpark rec field RM 17.2	2003, 2004, 2005, 2006, 2007, 2008, 2012, 2013, 2018
502598-LCR18.6	Lewis Creek	44.22900	-73.06180	Starksboro	At Lewis Creek Farm Footbridge below farm	2008, 2012, 2013
500676-LCR19.5	Lewis Creek	44.22380	-73.06332	Starksboro	At Parsonage Rd Bridge	2003, 2004, 2005, 2006, 2007, 2008, 2012, 2013
508500-LCR26.5	Lewis Creek	44.20256	-73.01862	Starksboro	Above Gorge	2013
507896-LCR27.8	Lewis Creek	44.19533	-73.05180	Starksboro	Hillsboro Road in Starksboro Valley	2012, 2013, 2022

WATER CHEMISTRY DATA REPORT



IWIS

Start Date 1/1/1965 End Date 3/11/2022 View Report

Characteristic Dissolved Phosphorus, E. Coli Bacter Columns Start Time, Location ID, LaRosa Site

Partner Code Addison County River Watch

1 of 2 ? Find | Next

Visit Date	Start Time	Location ID	La Rosa Site ID	Location Name	Depth (m)	Dissolved Phosphorus ug/l	E. Coli Bacteria #/100ml	Total Nitrate/Nitrite Nitrogen mg/l	Total Nitrogen mg/l	Total Phosphorus ug/l	Total Suspended Solids mg/l	Turbidity NTU
6/25/2003		500681	LFB2.5	Beaver Branch	0.2		42.8			90		
6/25/2003		500680	LCHLW1.0	Hollow Brook	0.2		16					
6/25/2003		500682	LFR0	Lemonfair River	0.2		98.5			350		
6/25/2003		500683	LFR1.2	Lemonfair River	0.2		145			610		
6/25/2003		500684	LFR12	Lemonfair River	0.2		219			280		
6/25/2003		500685	LFR15.8	Lemonfair River	0.2		114			390		
6/25/2003		500686	LFR20.2	Lemonfair River	0.2		27.2					
6/25/2003		500687	LFR23.9	Lemonfair River	0.2		93.3			230		
6/25/2003		500689	LFR29.3	Lemonfair River	0.2		517			370		
6/25/2003		500690	LFR3.7	Lemonfair River	0.2		387			380		
6/25/2003		500691	LFR6.7	Lemonfair River	0.2		90.9			440		
6/25/2003		500673	LCR14	Lewis Creek	0.2		260			14		
6/25/2003		500674	LCR15.6	Lewis Creek	0.2		153			13		
6/25/2003		500675	LCR17.2	Lewis Creek	0.2		137			9		
6/25/2003		500676	LCR19.5	Lewis Creek	0.2		74			8		

ANY QUESTIONS?

Program Purpose & Goals

- **Goal**: Provide **meaningful water quality data** for **both** the Vermont Department of Environmental Conservation (**VT DEC**) **and partner** organizations through **community science**

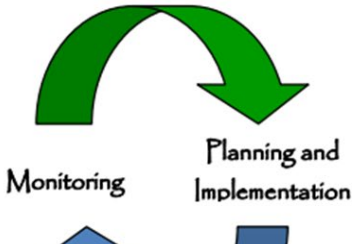
- **Purpose**: **Improve understanding of water quality** conditions in VT streams across a spatial and temporal basis; **fill data gaps** and **strengthen database**

- **Purpose**: Assist partners, their communities, and local, state, and federal governments in **stream conservation, protection, and remediation efforts**, effective **resource allocation**, watershed **planning**, etc.

Goal 1: To monitor and assess the physical, chemical and biological condition of Vermont's surface waters to maintain, protect, enhance and restore their integrity and uses.

Objectives

A. Determine the status and trends in the condition of Vermont's waterbodies.
B. Determine if surface waters are meeting the Vermont Water Quality Standards.
C. Use probability assessments to provide an understanding of statewide surface water conditions.
D. Learn what stressors threaten the integrity and uses of Vermont waters.
E. Adapt monitoring efforts to identify and track pollutants in addition to emerging stressors.
F. Respond to public complaints and emergency situations regarding Vermont surface waters.
G. Evaluate effectiveness of management actions and



Goal 2: To interpret, analyze and communicate monitoring and assessment results within the Agency of Natural Resources and outside groups to support the development of good management decisions for Vermont surface waters.

Objectives

A. Expand accessibility and use of water quality assessments within the ANR, by other state and federal entities, and by the general public.
B. Provide information to support and evaluate Agency and Department planning, management and regulatory programs, including the development of environmental indicators.
C. Communicate, collaborate and coordinate on a regular basis with organizations, agencies, municipalities, and the general public to assure complementary monitoring programs.

Program Purpose & Goals

- **Goal**: Provide **meaningful water quality data** for **both** the Vermont Department of Environmental Conservation (**VT DEC**) **and partner** organizations through **community science**
- **Purpose**: **Improve understanding of water quality** conditions in VT streams across a spatial and temporal basis; **fill data gaps** and **strengthen database**
- **Purpose**: Assist partners, their communities, and local, state, and federal governments in **stream conservation, protection, and remediation efforts**, effective **resource allocation**, watershed **planning**, etc.
- **Purpose**: Further the **achievement of the VT DEC's water monitoring goals** outlined in the Water Quality Monitoring Program Strategy

Program Purpose & Goals

- **Goal**: Provide **meaningful water quality data** for **both** the Vermont Department of Environmental Conservation (**VT DEC**) **and partner** organizations through **community science**
- **Purpose**: **Involve, engage, and educate the public about stream health**

LPP Monitoring Matrix

- Outlines current overarching state monitoring priorities
- Partner groups (with help of watershed planners) nominate sites with specific monitoring priorities that **fit under the umbrella of matrix categories**

LPP Monitoring Matrix

1. Characterize conditions upstream of **wastewater treatment facilities**
2. Assess **lake tributary** contribution to nutrient and chloride loading in lakes
3. Identify **potentially high-quality waters**
4. Identify **stressed or impaired waters** and/or refine the extent and/or source of the stressor
5. Evaluate the effectiveness of **remediation efforts**

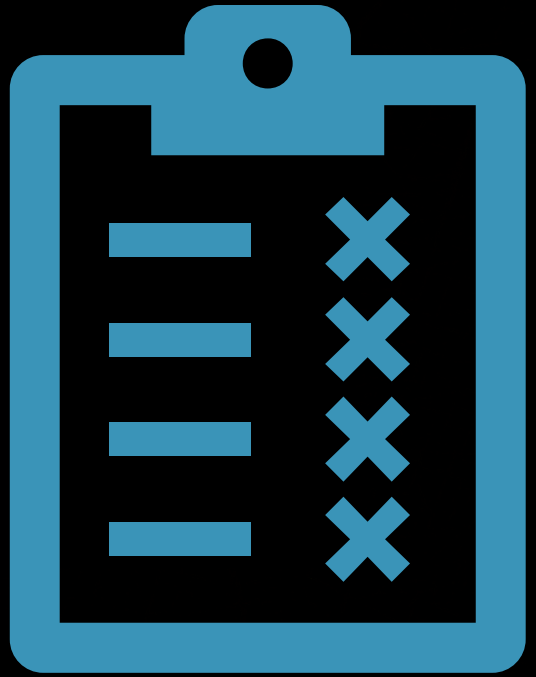
How Does VT DEC Use LPP Data?

1. Wastewater Treatment Facility permitting
2. Lake Watershed Action Plans (LWAP)
3. Screen for high quality waters
4. Support/screening for waters to be listed as impaired on EPA's 303(d) list
5. Project effectiveness

VT Impaired Waters List

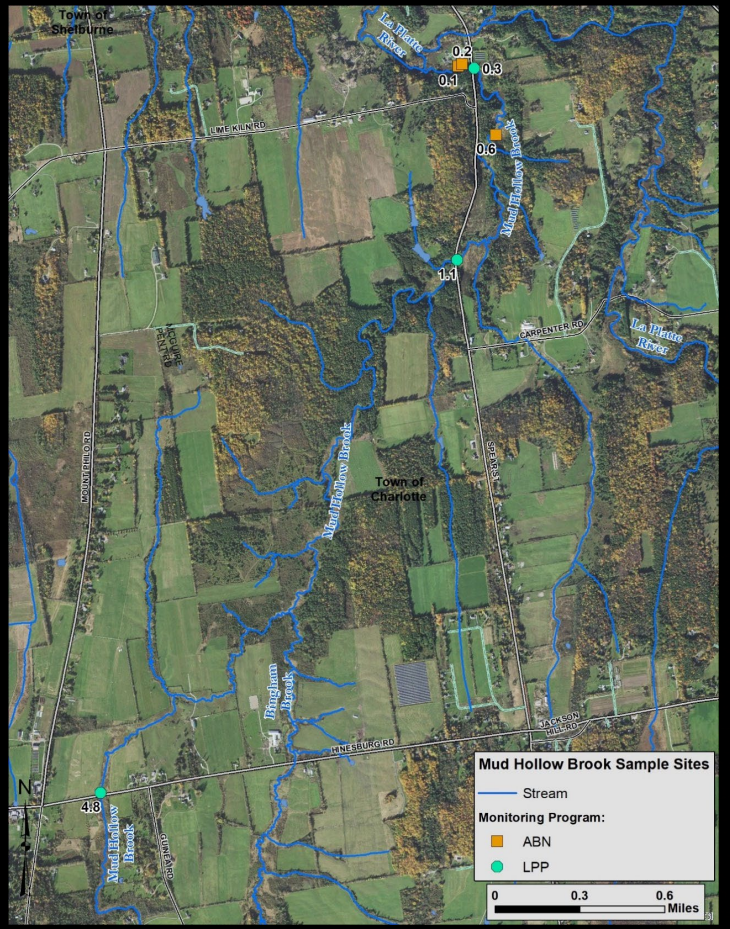
- **Impaired by one or more pollutants if does not meet Water Quality Standards**
- Involves collection, analysis, and evaluation of water quality monitoring data and other info
  - Mainly use chemical, physical, and/or biological data collected using standardized protocols
- **Requires development and implementation of Total Maximum Daily Load** (TMDL) plan designed to achieve Water Quality Standards
- Submit every 2 years to Environmental Protection Agency

EPA United States Environmental Protection Agency



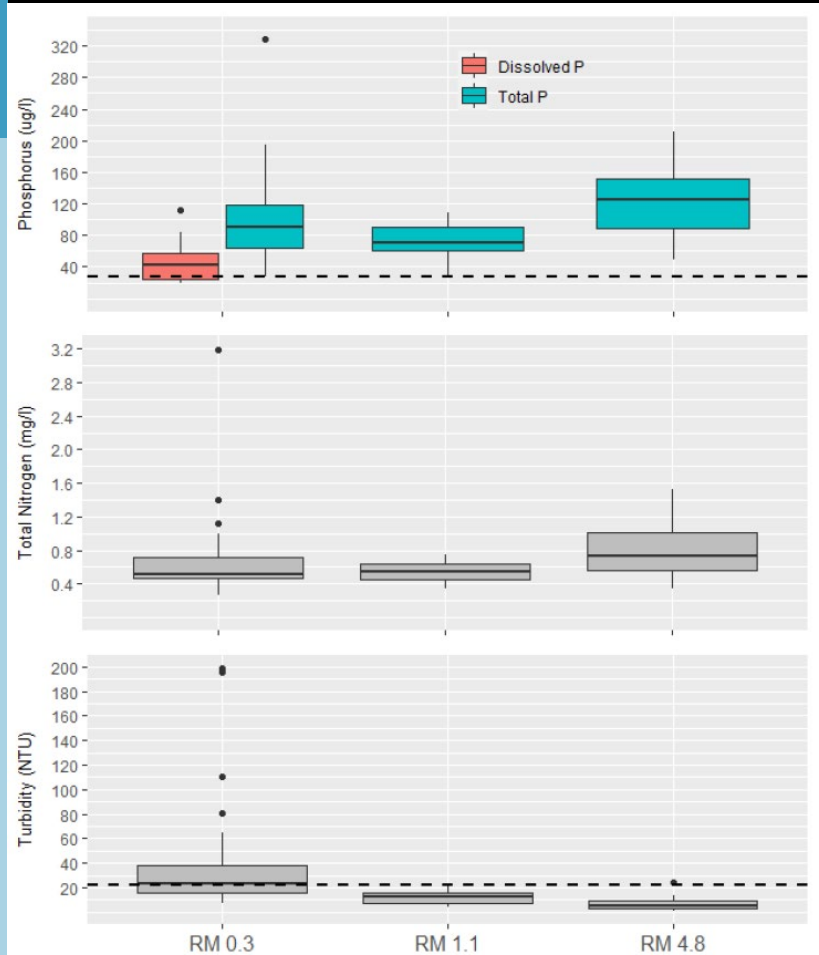
Listed Stream: Mud Hollow

- Entire stream recommended for **aquatic biota impairment** by biomonitoring team (ABN)
- Organic matter pollution and **nutrient enrichment primary cause** of biological degradation



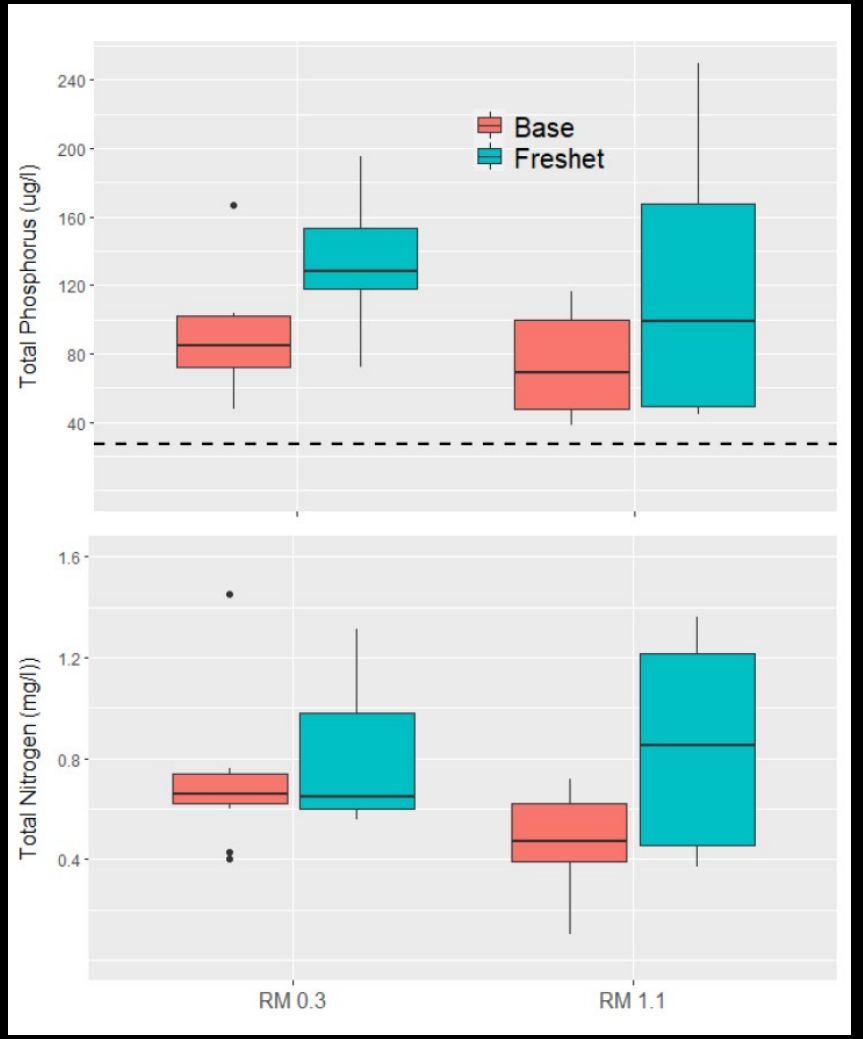
Listed Stream: Mud Hollow

- 2004-08, **LPP collected turbidity, chloride, total nitrogen, and dissolved and total phosphorus** at river mile (RM) 0.3, 1.1, & 4.8
- 2021-23, **LPP collected TP, TN, and Cl** with flow observations at RM 0.3 & 1.1



Listed Stream: Mud Hollow

"Dozens of water quality samples collected by the ABN and LPP over the last 20 years at multiple stations have shown highly elevated nutrient concentrations with total phosphorus exceeding the WWMG nutrient criteria of 27 µg/L in every instance."



Listed Stream: Mud Hollow

- ABN **macroinvertebrate, fish, chemistry, and habitat data** at river mile 0.1 (2009, 2021)
- ABN water quality (3x- summer ‘23) and macroinvertebrate data at river mile 0.2 & 0.6 (fall 2023)
- Macroinvertebrates failed to meet Water Quality Standards

Kate Kelly

Program Manager
Lewis Creek Association

Ben Copans

Watershed planner for the Passumpsic River, Upper Connecticut River, and Lake Memphremagog watersheds

VT DEC Water Investment Division

Watershed planner use of LaRosa Data in coordination with LaRosa groups.

- Planners can support LaRosa groups in prioritizing sampling sites based on our WQ knowledge, and in some cases can support data analysis
- Planners work with partners to use data to guide project identification, and implementation priorites.
- Where feasible, planners can advise groups how to best support the evaluation of project effectiveness.

Evaluating BMP effectiveness is challenging

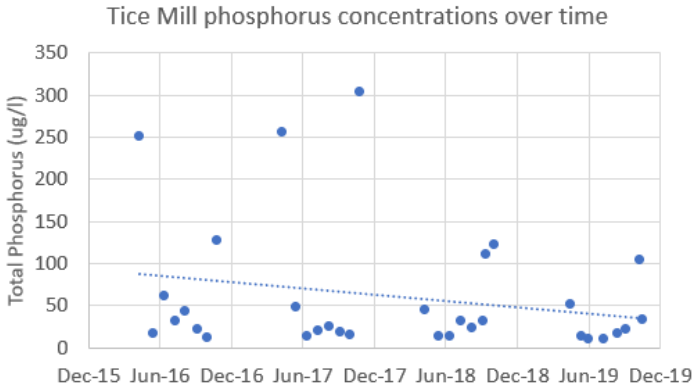
- Requires:
  - a substantial source of pollution
  - Must be able to be effectivly reduced through a best management practice (BMP) supported by the farmer
  - water flows into a small enough stream where the impact of this change has the potential to be measured (Generally above a 50% reduction).
- The Orleans County NRCD works directly with farmers in the Lake Memphremagog watershed
  - To identify and then address nutrient sources
  - Monitoring results and do statistical analysis
  - Present information to the farmer to guide work and demonstrate impacts.
- The Caledonia County NRCD has done similar work in the Ticklenaked Pond Watershed

Monitoirng set up

- Use students T-Test or nonparametric test
- Pre vs post below BMP

or

- Pre vs post difference between above and below BMP



- Tice Mill data alone only suggest a 50% chance reductions are true ie. not statistically significant.
- Lower site shows nearly a 99% chance of reductions comparing to pre vs post over the fall.
- The difference between the upper and lower sites in fall pre vs post BMP shows a 99.97% chance that there is a reduction over time by nearly 85%.
- This reinforces that the closer sites are to BMPs the better but above and below sites provides the best chances of showing improvements with limited data.

USDA

NONPOINT SOURCE
POLLUTION SUCCESS STORY

Installing Livestock Exclusion Best Management Practices Reduces Phosphorus

PROBLEM:
The Morin farm is in the town of Holland within the Stearns Brook watershed. Stearns Brook flows northeasterly and is listed on the VT Dept of Environmental Conservation 2016 stressed waters list for agricultural and gravel road runoff and morphological instability. Stearns Brook drains to Quebec's Lake Massawippi which has elevated levels of phosphorus.

The coordination efforts of Orleans County Natural Resources Conservation District (NRCD) and other partners focused efforts have improved water quality conditions by implementing best management practices throughout the watershed.

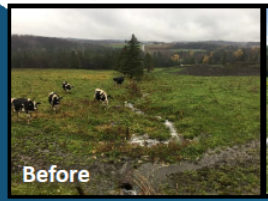
Elevated levels of phosphorus in the unnamed waterway that runs through the Morin farm were discovered by the Orleans County Conservation District through the LaRosa Volunteer Water Quality Monitoring program. Samples were collected 8 times per year including 2 rain events in 2017, 2018 and 2019 at two locations, above and below the farm.

PROJECT HIGHLIGHTS:
Andre Morin bought his 116-acre home farm from his parents in 1992, who had purchased it in 1984. In 2016, he started working with the Vermont Land Trust and the Vermont Housing & Conservation Board to place a permanent conservation easement on his farm.

In 2016, Andre also voluntarily agreed to participate in the Orleans County Conservation District's monitoring program to determine the effectiveness of BMPs as they were implemented. As part of this cooperative monitoring effort, elevated levels of **phosphorus** in the unnamed waterway that runs through the Morin farm were discovered by the OCNRCD through the VT DEC LaRosa Volunteer Water Quality Monitoring program.

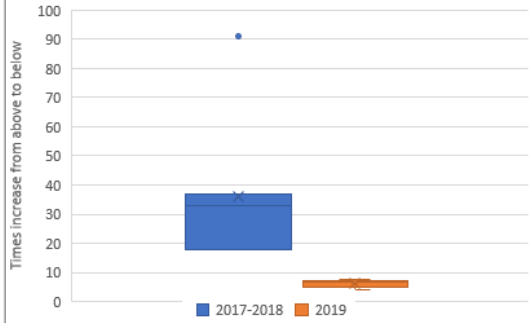
In 2019, with funding from the VT Agency of Agriculture, Food and Markets' BMP program, Andre completed a new barn yard project for a heavy use area adjacent to the waterway running through the farm. He also installed exclusion fencing, alternative watering, stream crossings and laneway projects with funding from the OCNRCD USDA Regional Conservation Partnership Program to bring the farm into compliance with the RAPs.

The installation of these BMPs in summer of 2019 appears to have dramatically reduced the phosphorus loading from the farmstead and pasture areas. Analysis suggests that there was an 85% reduction in phosphorus levels.
Andre sold his cows in the winter of 2020 because of his personal health limitations but his brother John will continue to use the facilities, pastures and crop fields so the

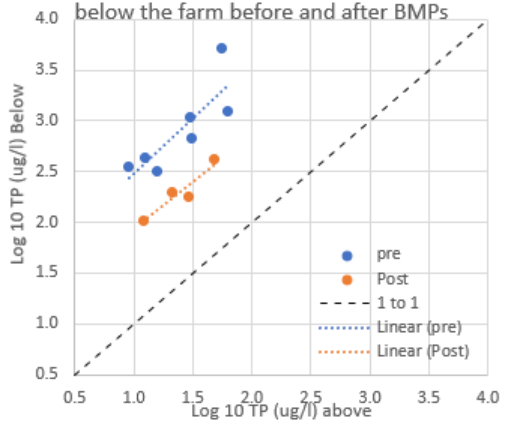


For additional information contact:
VTDEC Watershed Coordinator, Ben Copans 802 751 2610
Orleans County NRCD Manager, Sarah Damsell 802 334 6090x 7008

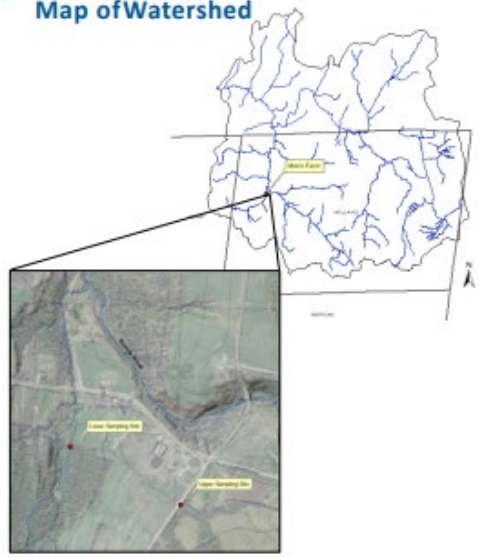
Times increase from above to below the farm in all before and after BMPs during late summer/fall



Relationship in fall between TP above and below the farm before and after BMPs



Map ofWatershed



This analysis has been helpful in many ways,

1. Providing data to farmers to motivate action.
2. To compare water quality improvements with tracking.
3. To identify situations where the BMP's didn't solve the problem.
4. Field observations provide useful informaiton
5. To tell success stories that help to build support for this work.

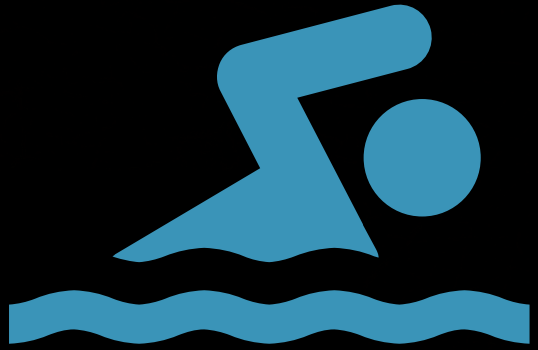
ANY QUESTIONS?

Wastewater Treatment Facility Sampling

- Characterizes upstream conditions of wastewater discharge receiving waters
- Used to calculate (along with effluent and biomonitoring data) downstream conditions
- **Determines if WWTF is meeting water quality standards**
- Very useful for informed WWTF permitting

Lake Watershed Action Plans

- **Assessment and planning tool used to identify greatest threats to a lake ecosystem**
- Clarify how land uses are impacting water resources and priorities for addressing water quality concerns
- LWAP includes:
  - assessment of shoreland, **tributaries**, and hydrologically connected roads
  - identification of sources of nutrient and sediment runoff within watershed and threats to wildlife
  - prioritization and ranking of the severity of identified sources of pollution and impacts
  - recommendations for restoration and protection



In Progress Lake Watershed Action Plans

DEC Funded LWAPs

- Maidstone Lake, Maidstone
- Lake Fairlee, Fairlee
- Lake Willoughby, Westmore
- Shadow Lake, Glover
- Lake Morey, Fairlee

LCBP Funded LWAPs

- Caspian Lake, Greensboro
- Keelor Bay, South Hero
- Lake Iroquois, Hinesburg
- Lake St. Catherine, Poultney
- Fairfield Pond, Fairfield