

**Coventry Lake  
Cooperative Client Based Water Quality Monitoring Program**



**Designed to Maximize Information and Minimize Costs by Utilizing  
Client Based Data Collection**



**Ecosystem Consulting**  
a Division of GZA GeoEnvironmental, Inc.

## *Coventry Lake - Client Based Water Quality Monitoring Program*

### **Introduction**

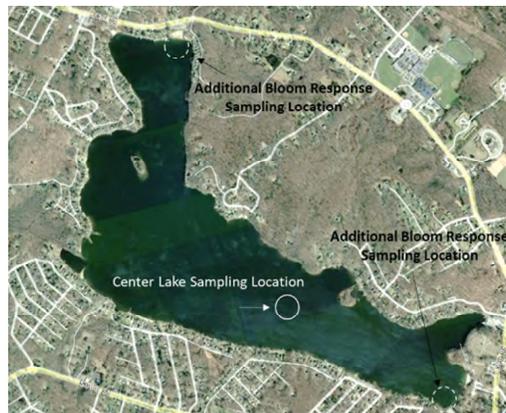
Coventry is initiating a Cooperative Lake Monitoring Program with GZA GeoEnvironmental, Inc. Comprehensive limnological sampling will continue to be performed monthly to include in the long-term monitoring database (over 3 decades). Monitoring will be initiated earlier in the Spring and continue later in Autumn to adjust to observed climate change effects. Some of the monthly samplings will be performed by GZA (coordinated with the Coop Lead), some will be performed by the Coventry Citizen Coop Program. There are a number of benefits to performing lake monitoring with a Coop Program:

GZA Provides the limnology and lake management expertise needed for diagnostic evaluation and feasibility assessment of management alternatives.

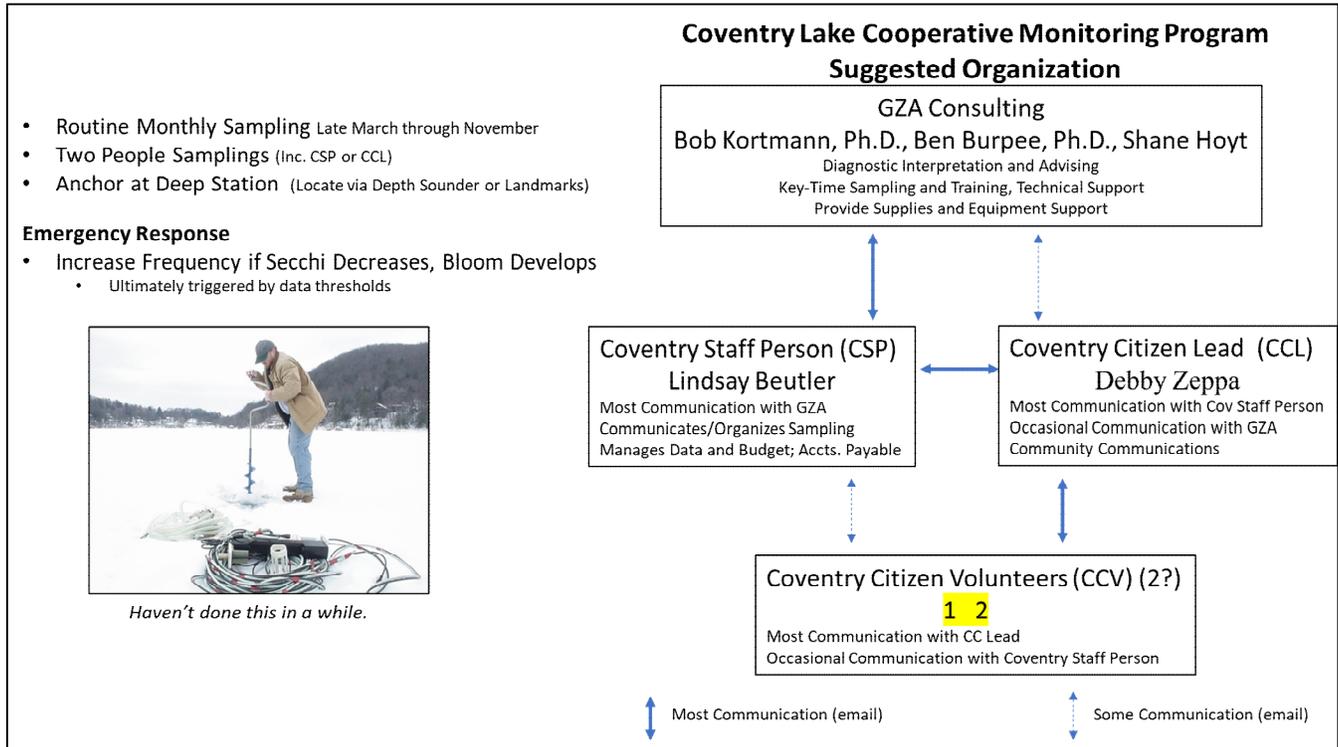
The Coop Program provides additional sampling, sample transport/shipping, and other necessary tasks that don't require limnology expertise (and costs of professional time).

The most important benefit of the Coop Program approach is that citizen volunteers participate in the study of the lake and become very aware of its Nature, vulnerability to water quality impacts, and management alternatives that can be considered.

Coventry Lake experienced an unusual cyanobacteria bloom in July 2022 which reached the level requiring a health advisory for potential cyanotoxins. Although cyanobacteria have been a significant component of the summer phytoplankton assemblage for many years, the 2022 bloom was the first time a bloom became intense enough to warrant a health advisory. Fortunately, Coventry has gathered monitoring data on the lake for decades. Data from 2022 indicated that nutrient content wasn't higher than historic levels. The bloom didn't indicate an overall eutrophication of the lake, it remains a high quality mesotrophic lake. Climatic patterns over recent years (climate change) was identified as a factor contributing to the July 2022 bloom. If such a bloom occurs again the Coop Monitoring Program will be very important for cost-effectively monitoring frequently for emergency response.



## Coop Monitoring Program Organization



### Routine Monitoring :

Secchi disk depth (m)

Profile using Sonde- Record Data

Collect Water Samples from selected depths: Surface, 6m, 10m

Chemistry Samples to CESE

Optical Suite Samples to Kortmann

Collect a Phytoplankton "Straw Sample" 0 to 5m

Collect a depth-discrete phytoplankton sample if triggered by the profile or wind-drift accumulation.

Fix Phytoplankton Samples with Lugol's

Fixed Samples to Kortmann

Enter Data to Excel Files

Email Data, Comments, Questions to GZA

### Emergency Bloom Response Sampling :

Secchi disk depth (m) Dock at Boat Ramp

Optical Suite Samples Dock at Boat Ramp, Lisicky Beach, Accumulations to Kortmann

Phytoplankton Samples as necessary

# *Client Water Quality Monitoring Sampling Protocol*

## **Step 1 - Secchi Depth**

1. Take reading on shady side of the boat to reduce glare
  - a. DO NOT wear sunglasses while taking reading
2. Lower disk until it disappears, then pull it slowly back up until you can just see the disk.  
Record the average of those depths

## **Step 2 – Conduct Temperature/Dissolved Oxygen Profile**

1. Record personnel, sampling location, date, and weather conditions on Field Data Sheet.
2. Lower probe and take first temperature and dissolved oxygen reading at 0.5m
  - i. Take second reading at 1m and remainder of readings at 1m increments
  - ii. Last reading should be taken 0.1m over bottom sediments  
OR take readings at project specified depth increments
3. Allow the instrument to stabilize between readings
4. Record the data onto the Field Data Sheet (and/or log the data in the display unit)

## **Step 3 - Water Samples**

### **For in lake sampling:**

1. Engage Van Dorn bottle and lower into water column to desired depth
2. Drop messenger weight to trigger mechanism
3. Pull into boat and vent the sampler to fill the sample bottle
  - a. Rinse the sample bottle with sample water and fill
4. Place sample in cooler for temperature control
  - a. Sample bottle should have location, date, and sample depth recorded on it
5. Empty and reset Van Dorn bottle for remaining samples
6. Normally sample at 1m, middle depth 6m, and 0.25m over bottom depth
  - a. Otherwise sample at project specified depths

### **For stream sampling:**

1. Place open sample bottle in direct flow of stream and rinse out at least twice
2. Take sample from direct current of stream, being careful not to allow large debris to enter sample bottle.

## **Step 4 - Algae Sample**

1. Slowly Lower algae straw to 5m allowing it to fill, or to just over bottom if water body is less than the 5m deep.
2. Crimp the hose tightly and quickly pull it in the boat placing the lower weighted end into the mixing container
3. Lift the crimped end of hose and release, allowing the water to flow into the container
4. Mix the water in the container and pour into the algae sample bottle

5. Add a full dropper (5-6mL) of Lugol's Solution to algae sample (to tea color)
6. Record location, date, depth of straw sample, and sample type (Algae Straw) on sample bottle
7. Record sample depth on sampling sheet

**Step 5 - Zooplankton Sample (During GZA Samplings Only)**

1. Make sure the hose on the zooplankton net end is crimped and secure
2. Lower the zooplankton net to 0.5 meters above the bottom sediment depth
3. Pull the net into the boat in a smooth, steady fashion
4. Wash the inside of the net with the wash bottle to get all of the debris into the end
5. Position the hose into the sampling bottle and uncrimp, allowing the sample to pass into the bottle
6. Preserve with Lugol's solution (to tea color)
7. Record location, date, depth of tow, and sample type (Zooplankton Tow) on sample bottle
8. Record sample depth on sampling sheet

**Step 8 - Sample Delivery**

1. Complete lab analyses sample parameter sheet Chain of Custody form
2. Deliver or ship samples to analytical lab
3. Record chain-of-custody information

**Step 9 – Data Reporting**

1. Enter all sampling data recorded into provided Reporting Worksheet (Excel File)
2. E-mail data worksheet to Ecosystem Consulting - GZA

**Make sure that all appropriate sampling equipment is rinsed and stored properly after every use**

# Client Water Quality Monitoring Field Data and Reporting Worksheets

Data is entered into these worksheets and sent via email attachment to Ecosystem Consulting - GZA

Coventry Lake Coop Monitoring Program							
Station	I						
Date	6/14/2023						
SECCHI	5.0		feet	1.5	meters		
Anoxic Boundary	7.92		feet				
Sum RTRM	126						

Depth (m or ft)	Temp	DO	pH	ORP	%Sat	RTRM	RVG
1	27	8.9	7.2	100.0	112	0	0
2	27	8.5	7.2	100.0	107	0	0
3	27	8.4	7.2	100.0	105	0	0
4	27	7.5	7.2	100.0	94	0	0
5	25.0	7.2	7.2	100.0	87	65	79
6	23	6.5	6.8	50.0	76	61	85
7	21.0	6.5	6.8	50.0	73	56	91
8	19	0.5	6.8	50.0	5	48	94
9	16.0	0.5	6.8	50.0	5	66	164
10	15.7	0.5	6.8	-25.0	5	6	18
11	15.4	0.5	6.8	-25.0	5	6	18
12	15.1	0.5	6.8	-25.0	5	6	18
13					0	93	1303
14					0	0	0
15					0	0	0
16					0	0	0

**Enter Data in these fields, other fields are computed**

RTRM = Relative Thermal Resistance to Mixing

RVG = Relative Viscosity Gradient (analogous to RTRM using viscosity change as a function of temperature.)

%Sat = % saturation of dissolved oxygen at the temperature

**Make NO ENTRIES in Non-Colored Fields**

**DO NOT ADD OR DELETE ROWS or COLUMNS**

## Client Monitoring Excel Calculation Worksheet

CESE CHAIN OF CUSTODY				Turn Around Time (circle)				Page 1 of 1					
Center for Environmental Sciences and Engineering				28 Day Regular	14 Day 25%	7 Day 50%	Other Surcharge						
3107 Horsebarn Hill Road, U-4210 Storrs, Ct 06269-5210				Price	Surcharge	Surcharge	may apply						
Phone: (860) 486-4015 Fax: (860) 486-5488													
Department/Organisation	GZA GeoEnvironmental			Project Contact	Shane.hoyt@gza.com			Billing Contact					
Project	Coventry Lake			PO#	05.0046790.00			Phone/Fax	Fax (860) 742-0715 Phone (203) 605-9018				
Address	135 Sheldon Road, Box 1, Unit 1			E-Mail	Shane.hoyt@gza.com			E-Mail					
City	Manchester	State	CT	Zip	6042	Reporting Request	email/excel	Purchase Order/Reference Number	N/A				
<b>SAMPLE TRANSFER (sign below)</b>								<b>Test Parameter or CAS Number</b>					
1. Relinquished By:		Date:		3. Relinquished By:		Date:		Total Phosphorus	Ammonia	NOx	Total Silica	T Fe	T Mn
(print/sign)		Time:		(print/sign)		Time:							
2. Received By:		Date:		4. Received By:		Date:							
(print/sign)		Time:		(print/sign)		Time:							
<b>Storage Location:</b> (W = Walk-in, M = Metals, N = Nutrients, O = Organic) <b>Refrigerator #:</b>													
Field Number	CESE ID	Collection Date	Matrix (Key Below)	Preservation (Key Below)	Number of Containers	Comments							
1	Coventry - 1m				1				X	X	X	X	
2	Coventry 6m				1				X	X	X		
3	Coventry - 10m				1				X	X	X	X	X
4													
5													
6													
<ul style="list-style-type: none"> <li>Chemistry COC Form Samples Delivered to CESE UConn</li> <li>Preserved Phytoplankton Samples Send to Taxonomist</li> <li>Optical Series Samples Delivered to Kortmann's (or GZA Manchester)</li> <li>Grab Samples- Off-Season Well Mixed and Wind-drift Accumulations</li> </ul>													

## Chain of Custody form for delivering water samples to the UConn CESE Lab