NH Department of Environmental Services Volunteer Lake Assessment Program

Current Year Chemical and Biological Data

BAXTER LAKE - FARMINGTON

8/6/2018

Station ID	Station Name	Zone	Depth	Startdate	Activity ID	Color	Cl	Chl-a	EC	ANC	PH	TP	Secchi		Cond	Turb
													NVS	VS		
BAXFARB1	Baxter Lake-Beach 1			6/13/2018	2018-932				1							
				7/12/2018	2018-2237				7.40							
BAXFARB2	Baxter Lake-Beach 2			6/13/2018	2018-933				4.10							
				7/12/2018	2018-2238				2							
BAXFARB3	Baxter Lake-Beach 3			6/13/2018	2018-934				3							
				7/12/2018	2018-2239				35.50							
BAXFARCB	Baxter Lake-Cruze Brook			6/13/2018	2018-929		14.10		86		6.78	0.0082			110.60	2.28
BAXFARD	Baxter Lake-Deep Spot	Comp	3M	6/13/2018	2018-938			2.47								
				7/12/2018	2018-2243			3.09								
		Epi	2M	6/13/2018	2018-927	60	11.40			5.10	6.84	0.0145	2.6250	3.50	63.60	0.66
					2018-940	70	10.20			4.80	6.84				57.70	0.64
				7/12/2018	2018-2236	60	11.70			-0.20	4.79	0.0119	2.25	3.6250	92.20	0.79
BAXFARDB	Baxter Lake-Dinneen Brook			6/13/2018	2018-928		27.40		41		6.62	0.0071			151.60	0.33
BAXFARGV1	Baxter Lake-Grandview Beach 1			6/13/2018	2018-935				<10							
				7/12/2018	2018-2240				4.10							
BAXFARGV2	Baxter Lake-Grandview Beach 2			6/13/2018	2018-936				<10							
				7/12/2018	2018-2241				2							
BAXFARGV3	Baxter Lake-Grandview Beach 3			6/13/2018	2018-937				<10							
				7/12/2018	2018-2242				5.20							

Please Note: pH (units), TP (mg/L) (ND = < 0.005 mg/L), Cond (UMHOS/cm), Secchi (M) VS = ViewScope, NVS=NonViewScope, EC = E. coli (cts/100mL), Turbidity (NTU), ANC (mg/L), Chloride (mg/L), Chl-A (mg/M3), Color is Apparent Color (PCU)

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BAXFARO	Baxter Lake-Outlet			6/13/2018	2018-930						6.70	0.0133			64.80	0.72
					2018-931						6.69				62.90	0.56

Please Note: pH (units), TP (mg/L) (ND = < 0.005 mg/L), Cond (UMHOS/cm), Secchi (M) VS = ViewScope, NVS=NonViewScope, EC = E. coli (cts/100mL), Turbidity (NTU), ANC (mg/L), Chloride (mg/L), Chl-A (mg/M3), Color is Apparent Color (PCU)

VLAP CHEMICAL PARAMETER EXPLANATIONS

pH

Definition: pH is measured on a logarithmic scale of 0 to 14. Lake pH is important to the survival and reproduction of fish and other aquatic life. A pH below 5.5 severely limits the growth and reproduction of fish.

pH (units)	Category
<5	Acidified
5.0-5.4	Critical
5.5-6.4	Endangered
6.5-8.0	Satisfactory

Acid Neutralizing Capacity (ANC)

Definition: Buffering capacity or Acid Neutralizing Capacity (ANC) describes the ability of a solution to resist changes in pH by neutralizing the acidic input to the lake. Historically, the waters of NH have had low ANC because of the prevalence of granite bedrock. The relatively low ANC values mean that NH surface waters are vulnerable to the effects of acid precipitation.

ANC (mg/l as $CaCO_3$)	Category
<0	Acidified
0-2	Extremely Vulnerable
2.1-10	Moderately Vulnerable
10.1-25	Low Vulnerability
>25	Not Vulnerable

Turbidity

Definition: Turbidity in the water is caused by suspended matter (such as clay, silt, and algae) that cause light to be scattered and absorbed, not transmitted in straight lines through water. High turbidity readings are often found in water adjacent to construction sites. Also, improper sampling techniques (such as hitting the bottom sediments or sampling streams with little flow) may also cause high turbidity readings. The Class B standard for a water quality violation is 10 NTUs over the lake background level.

Statistical Summary of Turbidity Values for NH Lakes and Ponds:

Turbidity (NTUs)	Category
<0.1	Minimum
22.0	Maximum
1.0	Median

Total Phosphorus

***Note:** The phosphorus results during the summer are reported by the DES State Chemistry lab with the units **"mg/L"**. To convert to **"ug/L"**, move the decimal point over **three** places to the right.*

Definition: Phosphorus is the most important water quality parameter measured in our lakes. It is the nutrient that limits algae's ability to grow and reproduce. Phosphorus sources around a lake typically include septic systems, animal waste, lawn fertilizer, erosion from roads and construction sites, and natural wetlands.

Total Phosphorus (TP) Ranges for New Hampshire Lakes and Ponds:

TP (ug/L)	Category
1-10	Low (good)
11-20	Average
21-40	High
>40	Excessive

Conductivity

Definition: Conductivity is the numerical expression of the ability of water to carry an electrical current. It is determined by the number of ionic particles present. The soft waters of New Hampshire have traditionally had low conductivity values. High conductivity may indicate pollution from such sources as road salting, septic systems, wastewater treatment plants, or agriculture runoff.

Note: Specific categories of good and bad levels can not be constructed for conductivity, because variations in watershed geology can result in natural fluctuations in conductivity. However, values in NH lakes exceeding 100 uMhos/cm generally indicate human disturbance.

Chloride

The chloride ion (Cl^-) is found naturally in some surface ground waters and in high concentrations in seawater. Research has shown that elevated chloride levels can be toxic to freshwater aquatic life. In order to protect freshwater aquatic life in New Hampshire, the state has adopted acute and chronic chloride criteria of 860 and 230 mg/L respectively. The chloride content in New Hampshire lakes is naturally low, generally less than 2 mg/L in surface waters located in remote areas away from habitation. Higher values are generally associated with salted highways and, to a lesser extent, with septic inputs.

VLAP BIOLOGICAL PARAMETER EXPLANATIONS

CHLOROPHYLL-A

Definition: VLAP measures chlorophyll-a, a pigment found in plants, as an indicator of algal abundance. Because algae is a plant and contains chlorophyll-a, the concentration of chlorophyll-a found in the water provides an estimation of the concentration of algae.

Chlorophyll-a (ug/L)	Category
0-5	Good
5.1 – 15	More than desirable
>15	Nuisance Amounts

WATER CLARITY (SECCHI-DISK TRANSPARENCY)

Definition: The Secchi-disk is a 20cm disk with alternating black and white quadrants used to measure water clarity (how far a person can see into the water). Transparency, a measure of water clarity, is affected by the amount of algae, color, and particulate matter within a lake.

Water Clarity (m)	Category
< 2	Poor
2-4.5	Good
> 4.5	Exceptional

Note: Clarity may vary depending on the maximum depth of the lake/pond. For example, if the maximum depth of the pond is 3 meters, a good clarity reading would be 2-3 meters.

APPARENT COLOR

Definition: A visual measure of the color of water. This color is generally caused by decaying organic matter or by naturally occurring metals in the soils, such as iron and manganese. A highly colored lake generally has extensive wetlands along the shore or within the watershed, and often a mucky bottom, conditions often associated with eutrophic waters.

Color (PCU)	Category
0-25	clear
25-40	light tea color
40-80	tea color
>80	highly colored

DEFINITION OF UNITS

cts/100ml= Counts per 100 millileters. *E. coli* concentration.
m= meters. Used to measure Secchi disk depth.
mg/L = Milligrams per liter. Acid neutralizing capacity, chloride, and dissolved oxygen concentrations.
NTUs = Nephelometric turbidity unit.
ug/L = Micrograms per liter. Total phosphorus and Chlorophyll-a concentration.
uMhos/cm = Micromhos per centimeter. Conductivity measure.
PCU = Platinum cobalt unit. Apparent Color measure.

BACTERIA (*E. COLI*)

Definition: *E. coli* is a natural component of the intestines in humans and other warm-blooded animals. *E. coli* is used as an indicator organism for bacteriological monitoring because it is easily cultured and its presence in the water in defined amounts indicates that sewage MAY be present. If sewage is present in the water, potentially harmful pathogens may also be present.

The state standards for Class B waters specify no more than 406 *E. coli* cts /100mL in any one sample, or a geometric mean based on at least 3 samples obtained over a 60-day period be greater than 126 *E. coli* cts/100mL. For designated beach areas, more stringent standards apply: 88 *E. coli* cts/100 mL in any one sample, or a geometric mean of 3 samples over 60 days of 47 *E. coli* cts/100 mL.

PHYTOPLANKTON

(Note: Phytoplankton results will be included in the annual VLAP Report)

Definition: Phytoplankton are microscopic algae floating in the water column. The type of phytoplankton present in a lake can be used as an indicator of general lake quality. An abundance of cyanobacteria (such as *Anabaena, Aphanizomenon, Oscillatoria*, or *Microcystis*) may indicate excessive phosphorus concentrations or that the lake ecology is out of balance. Diatoms (such as *Asterionella, Melosira*, and *Tabellaria*) and golden-brown algae (such as *Dinobryon* or *Chrysosphaerella*) are typical of NH's less productive lakes.

DISSOLVED OXYGEN

Definition: Dissolved Oxygen or "DO" refers to the volume of oxygen contained within the water. Much of the DO in lakes comes from the atmosphere, inflowing streams and photosynthesis. Fish and other aquatic life depend on DO to survive. Seasonal changes can affect DO concentrations throughout the year. Warmer temperatures during the summer speed up the rates of photosynthesis and decomposition. When plants and algae die and decompose, oxygen is consumed. This decreases the amount of oxygen, especially in the un-circulated hypolimnion (lower) water layer. In the winter, under ice cover, the DO content can also deplete due to the lack of circulation from the atmosphere.

DO levels above 5.0 mg/L are considered sufficient for most aquatic life, although some cold water fish species require higher DO levels.

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NHDES-W-07-022

2018 Lake Sampling Field Data Sheet
New Hampshire Volunteer Lake Assessment Program

RSA 487:31

Lake Name: Baxter Lake Town: Farmington

Field Monitors: JIM MELCHIONDA, DEB FORNIER, JACK WINER Date Sampled: July 6-12-2018

Time Sampled: 8:37 am

Bottom Depth at Deep Spot (FT 13.0) (m 3.962)

WEATHER CONDITIONS *(Circle one for each):*

Cloud Cover	Air Temperature	Wind Conditions	Water Surface	Lake Level
Clear	<40° cold	Calm	Calm	High
Hazy	41°-60° cool	Breezy	Ripples	Normal
Partly cloudy	61°-80° warm	Strong	Small waves	Low
Overcast	>80° hot	Gusty	Moderate waves	
			White Caps	

PRECIPITATION CONDITIONS *(Check off all that apply):*

Rain while sampling: ___ Rain previous 24 hrs.: ___ Rain previous 48 hrs.: ___ Rain previous 72 hrs.: ___

Indicate how much rain: ___ OR No rain for past 14 days

SAMPLING REMINDERS don't have one

1. Bring your VLAP Field Manual for reference, and a clipboard to secure field data sheets.
2. Complete the Field Sampling Procedures Checklist.
3. Bring aquatic plant ID references and submit samples of suspicious looking plants to lab for identification.
4. Notify the lab when you plan to return samples. (VLAP Coordinator: 271-2658, sara.steiner@des.nh.gov; or DES JCLC 271-4793; or CSC Lab: 526-3486, teriko.macconnell@colby-sawyer.edu)

VOLUNTEER TRAINING QUALIFICATIONS:

Did one monitor who sampled today attend the VLAP Refresher Workshop this spring? YES (NO)

If "NO": Did at least one monitor who sampled today already sample with the DES Biologist during the annual visit? (YES) NO

If "NO": Were you trained by another experienced volunteer this season? YES NO

If "YES", please list name of volunteer who trained you: ?

If you answered "NO" to the above three questions, please briefly describe your training:

DEEP SPOT SAMPLES *(One Large White and One Small Brown Bottle (with acid) at each depth, collected with Kemmerer bottle):*

2018 Sample Depths (meters): 2, ___, ___ ~~1, 2, 3~~

2017 Sample Depths (meters): ___, ___, ___

CHLOROPHYLL-A SAMPLE *(One Large Brown Bottle, does not contain acid):* 1, 2 and 3 meter composite

Method: Composite ☑ Integrated Tube ☐ Starting Sample Depth: 3 m

Note: In lakes with 3 thermal layers, start at the mid-point of the middle layer & collect sample at each meter up to 1 meter. In other lakes, start at 2/3 of the depth and collett at each meter up to 1m.

SECCHI DISK TRANSPARENCY *(conduct at least two readings and take the average)*

Without Viewscope (required)

Please take reading on SHADY side of boat.

		Disk visible on bottom?
2.5 m	2.0 m	___ yes X no
2.5 m	2.5 m	
___ m	___ m	

Average: 2.25 m

With Viewscope (required)

Please take reading on SUNNY side of boat.

		Disk visible on bottom?
4.0 m	3.5 m	___ yes X no
3.5 m	3.5 m	
___ m	___ m	

Average: 3.625 m

NHDES-W-07-022

TRIBUTARY SAMPLES COLLECTED *One large white and one small brown (contains acid) at each station. Optional: one small white (E. coli). List the station name, stream flow and conditions at time of sampling. Check off appropriate column for samples collected.*

Station Name	Stream Flow Conditions and Observations (Dry, Stagnant, Low, Moderate, High)	Large White Bottle (pH, turb., cond., chloride)	Sm. Brown Bottle (phosphorus)	Sm. White Bottle (*E. coli*)
all tributaries - NOT Running				

NEW SAMPLING LOCATION:

Did you sample at a new location this sampling event? (Circle one) YES (NO)

If "Yes", provide a map with the station location accurately marked and complete a station identification form for each new sampling station and submit with samples.

Print or submit a Station Identification Form from the NH On-line Forms System at https://forms.nh.gov/onlineforms/FormVersion/e55bfb97-f73f-442f-80c6-d636e7083bb8#!/

If you do not have a station identification form, please provide the following information:

Station Name: _____

Type of Station *(specify in-lake, culvert, tributary)*: _____

Station Location: *(Please provide one of the following):*

1. **Latitude/Longitude Coordinates:** GPS coordinates: _____ °N Lat _____ °W Long

   Specify make and model of GPS: _____

2. **Include a map indicating the approximate location of station and station name.**

FIELD OBSERVATIONS *(Please note any watershed observations, areas of erosion and sedimentation, recent storms/droughts, algal blooms, suspicious looking plants, wildlife observed, sampling problems, equipment problems, and areas of concern):*

☐ Please check and leave phone # if VLAP Coordinator should note immediately.

VLAP VOLUNTEER MONITOR FIELD SAMPLING PROCEDURES CHECKLIST

(TO BE COMPLETED BY THE VOLUNTEER AND TO BE FILED WITH ORIGINAL FIELD DATA SHEET)

Lake Name: BAXTER LAKE **Town:** ROCHESTER/FARMINGTON

Date: 7-12-2018 **Time:** 8:38 am

Volunteer Monitors: JIM MELCHIONDA DEB FORNIER JACK WINER

SAMPLING TASK	TASK COMPLETE	COMMENTS
I. PREPARATION FOR SAMPLING		
1. Anchor with enough line to anchor at deep spot	✓	
2. Life vests for everyone on the boat	✓	
II. DEEP SPOT SAMPLING		
Locating the Deep Spot(s):		
1. Indicate method used to locate deep spot: *circle: triangulation, GPS, depth finder, depth measurement with Kemmerer bottle, other (specify):* _____	✓	
2. If using Kemmerer bottle to determine deep spot depth: • Kemmerer bottle set up properly and filled with water used to check the bottom depth (*this is called sounding*)	✓	LOWRANCE
3. Depth of deep spot recorded on data sheet	✓	3.9624
Sample Collection:		
Deep spot samples (in general):		
1. White bottle rinsed with sample before filling		
2. White bottles filled to the neck		
3. Total phosphorus bottles were ***not rinsed***		
4. Total phosphorus bottles were filled from white bottle		
5. Total phosphorus bottles were filled to the shoulder		
6. Samples collected at the appropriate depths Depths pre-determined by the DES biologist and recorded on data sheet *OR* Depths determined based upon temperature profile and thermal layering		
Bottom (Hypolimnion) samples:		
1. After sounding, bottom sediments allowed to settle out before collecting deepest sample		
2. Bottom (hyoplimnion) sample checked for sediment before filling bottles		
Chlorophyll-a sample:		
1. Indicate method used to collect sample (*composite or integrated sampler*):	✓	
2. Bucket rinsed with lake water and discarded		
Composite method:	✓	
1. Kemmerer bottle lowered to appropriate depth	✓	
2. Water collected at each meter to surface and composited in a bucket. Ex.: 1, 2, 3, and 4 m samples for a 4 m composite.	✓	
3. Brown bottle rinsed with sample before filled	✓	
4. Brown bottle filled to the neck with sample		
Integrated sampler method:		
1. Weighted end of tube & chain lowered to appropriate depth (depth markers on the water's surface with no slack in tube or chain)	✓	
2. End of tube crimped tightly	✓	
3. Weighted end hauled up by chain only (not tube)	✓	

SAMPLING TASK	TASK COMPLETE	COMMENTS
4. Weighted end placed in bucket. Crimped end lifted above head and un-crimped *(open end of tube should always higher than water level in tube)*	↘	
5. Brown bottle rinsed with sample before filled	↘	
6. Brown bottle filled to the neck with sample	↘	
Transparency		
1. Non-viewscope readings taken on the **shady** side of boat		
2. Viewscope readings taken on the **sunny** side of the boat		
3. Disk lowered until it just disappears		
4. Disk pulled up until white portion just appears		
5. Chain grabbed at water level and depth estimated to tenths of a meter		
6. One reading taken by at least two monitors		
III. TRIBUTARY SAMPLING		
1. Sample not collected if tributary is not flowing or is too shallow to avoid disturbance to bottom and noted on data sheet	↘	Not flowing
2. Sample collected upstream if sediment disturbed		
3. Tributary flow noted and recorded on field data sheet		
3. White bottle was rinsed with sample by scooping into stream flow, discarded downstream, and then bottle refilled		
4. TP bottle was ***not rinsed*** with sample		
5. TP bottle was filled to ***shoulder*** from white bottle and not over-filled		
6. White bottle was refilled or topped-off to the neck of the bottle		
IV. BACTERIA SAMPLING		
1. Sterile small white bottle used for collection		
2. Cap was removed just prior to sample collection		
3. Care was taken to avoid touching the neck, inside the bottle, or cap		
4. Lake water: sample taken at approx. knee depth		
5. Flowing stream: sample taken midway b/w top & bottom of water, in upstream direction		
6. Mouth of bottle pointed towards water surface, submerged completely, and then used to scoop water in an upward "U-shaped" motion away from the person taking the sample		
7. Bottle was ***not rinsed*** with sample to avoid contamination		
8. Bottle was filled completely allowing some air space at top of bottle.		
9. Efforts made to avoid getting sediment and debris in sample		
V. SAMPLE LABELING		
1. Bottles properly labeled with waterproof pen *lake name, station, date, time, depth (for deep spot)*		
VI. FIELD DATA SHEET		
All sections of the data sheet were properly filled out		
One field data sheet per deep spot submitted		

Signature (monitors): _____

_____

VLAP SAMPLE RECEIPT CHECKLIST 2018

(TO BE COMPLETED BY LABORATORY STAFF ONLY AND THEN TO BE FILED WITH ORIGINAL FIELD DATA SHEET)

Lake Name: Barker Lake — Town Name: Farmington

Date Samples Received: 7/12/18 — Date Samples Collected: 7/12/18

Time Samples Received: 11:45 am — Time Samples Collected: 8:37 am

SAMPLE ISSUE/SAMPLE REJECTION CRITERIA	YES	NO	SAMPLES ACCEPTED OR REJECTED
1. HOLDING TIME			
Were samples returned to the lab within 24 hours? *Sample Rejection Criteria: If samples were returned between 24-48 hours after collection, note in the Log-in system and notify VLAP Coordinator. If returned after 48 hours, reject samples for analysis and notify VLAP Coordinator. If E. coli samples – reject after 24 hours.*	X		*If "No" then indicate how many hours since samples were taken:* _____ *Were samples rejected?* Yes___ No X
Were samples "cooled" after collection? *Sample Rejection Criteria: If no attempt was made to "cool" samples for the period after collection and until brought into lab, note in Log-in system. If returned after 24 hours and not cooled the samples should be rejected for analysis.*	X		*Temperature:* 13 *Method for cooling:* *ice___ cold pack___ refrigerated cooler* X *nothing___ other (specify):* _____ *Samples Rejected? Yes___ No___*
2. FIELD DATA SHEET			
Was the data sheet adequately & completely filled out?	X		*Specify problems:*
Were at least two Secchi Disk readings taken via both methods?	X		
Was one field data sheet submitted per deep spot?	X		
Did monitors complete the Sampling Procedures Checklist?	X		
3. COMPLETENESS OF SAMPLE SETS			
How many samples were collected? # big white bottles: 3 # TP bottles: 1 # plankton bottles:___ # Chlorophyll bottles: 1 # E. coli bottles: 6 # Chloride bottles:___			
Were complete sets of samples collected? *(1 TP sample for every big white bottle and 1 chlorophyll sample per deep station?)*		X	*Specify problems:* No TPs for DeepSpot - Poured from white bottle into TP
4. CONDITION OF SAMPLES			
Were the correct bottles used for sample collection? *Sample Rejection Criteria: Samples that were not collected in the proper bottles should be rejected for analysis.*			*Were samples rejected? Yes___ No___* *Specify Samples rejected:*
large white bottle = pH, ANC, conductivity, turbidity, chloride	X		
small brown bottle = TP			
big brown bottle = chlorophyll-a	X		
sterile small white bottle = E. coli	X		
small white bottle = chloride			
Were bottles adequately & completely labeled? *(lake name, station, depth)*		X	*Specify problems:* No depth, no lake name, no date
Was the condition of samples acceptable? *(leakage?)*	X		*Specify problems:*
5. SAMPLE VOLUME			
Do the bottles contain the appropriate volume of sample?			
Big white bottles: up to the neck of the bottle?	X		
TP bottles: up to the shoulder of the bottle?	—		
Do TP bottles appear to have been overfilled?	—		
6. SAMPLE CLARITY (Please complete back page of this form)			
7. SAMPLE PRESERVATION			
Is the pH of each TP sample 2 or less?	X		*If "No", preserve samples immediately.*
8. CORRECTIVE ACTIONS			
Did monitors follow all proper sampling procedures?		X	
If "no", were the monitors contacted about problems?	X		
Specify who and when contact was conducted: Jim Melchiondi			
Specify how contact was conducted *(in-person, phone, email, mail)*:			
Indicate monitor's response: will re-sample___ will improve future performance ✓ other *(specify)*: _____			