
Wangumbaug
Robert (Bob) Kortmann, Ph.D.
Ecosystem Consulting Service, Inc.
www.EcosystemConsulting.com

Principle #1 for the Practitioner:

Above all, do no harm!

Acute or Chronic?

"If it isn't broken, don't try to fix it!"


Wangumbaug: Ice-Out
A Wind-Swept Shoal defines a lake.

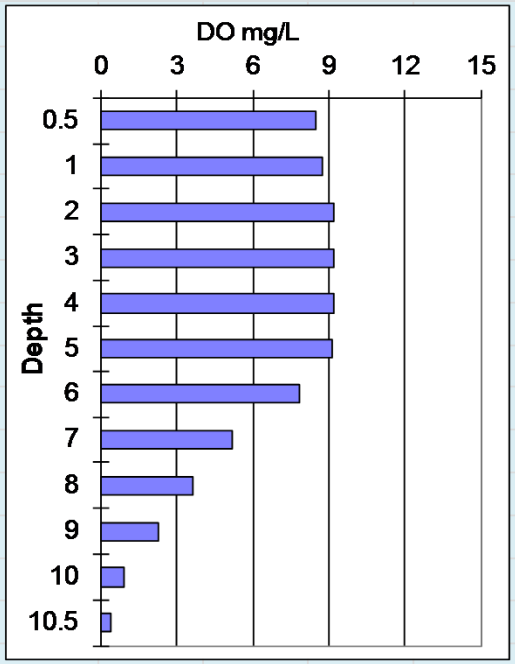
Coventry

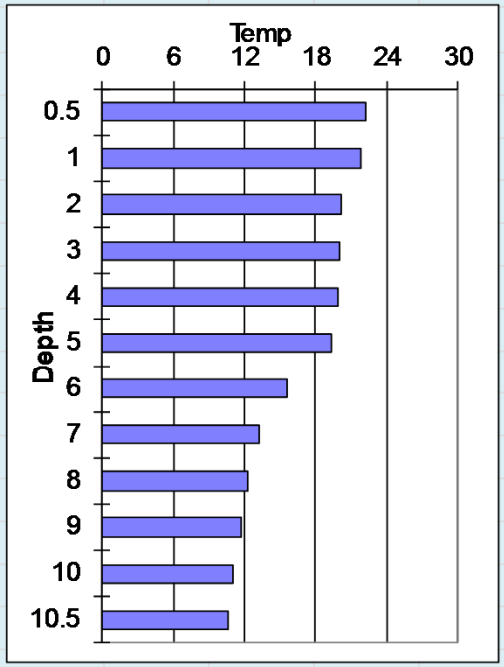
Station	Deep		
Date	6/16/2014		
SECCHI	5.9	meters	19.4 ft
Compensation Depth	11.8	meters	
Anoxic Boundary	9.93	meters	
Sum RTRM	234		

Depth (m or ft)	Temp	DO	%Sat	RTRM	RVG
0.5	22.2	8.5	97	0	0
1	21.9	8.8	100	8	12
2	20.2	9.2	101	43	64
3	20.0	9.2	101	8	12
4	19.9	9.2	101	2	4
5	19.4	9.2	99	12	20
6	15.6	7.8	78	83	152
7	13.2	5.2	49	41	175
8	12.3	3.6	34	15	86
9	11.7	2.3	21	8	51
10	11.0	0.9	8	8	51
10.5	10.6	0.4	3	5	34

ECOSYSTEM CONSULTING SERVICE, INC.

Legend	
DO	Dissolved Oxygen Concentration
RTRM	Relative Thermal Resistance to Mixing
%SAT	DO Saturation as a function of Temperature
RVG	Relative Viscosity Gradient





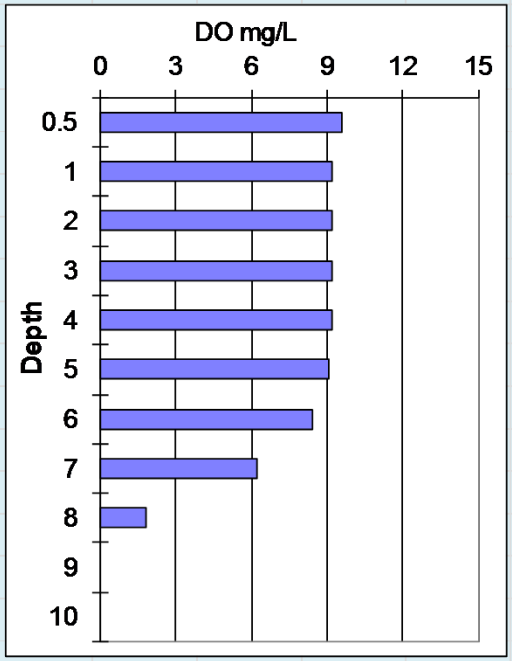
Coventry

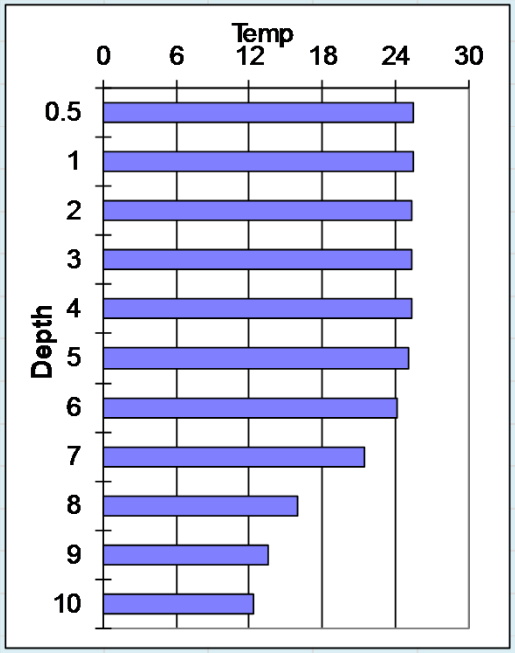
Station	Deep		
Date	8/6/2014		
SECCHI	4.1	meters	13.5 ft
Compensation Depth	8.2	meters	
Anoxic Boundary	8.44	meters	
Sum RTRM	361		

ECOSYSTEM CONSULTING SERVICE, INC.

Legend	
DO	Dissolved Oxygen Concentration
RTRM	Relative Thermal Resistance to Mixing
%SAT	DO Saturation as a function of Temperature
RVG	Relative Viscosity Gradient

Depth (m or ft)	Temp	DO	%Sat	RTRM	RVG
0.5	25.5	9.6	117	0	0
1	25.5	9.2	112	0	0
2	25.4	9.2	112	3	4
3	25.4	9.2	112	0	0
4	25.3	9.2	112	3	4
5	25.1	9.1	110	6	8
6	24.2	8.4	100	28	36
7	21.4	6.2	70	81	112
8	16.0	1.8	18	128	216
9	13.6	0.0	0	44	161
10	12.4	0.0	0	19	103
0	0.0	0.0	0	48	1177





Coventry Lake: Water Chemistry Data 2014

Total Phosphorus as P (µg/L)						
Depth (m)	28-Feb	14-Apr	16-Jun	5-Aug		
1m	7	11	5	7		
Mid	10	11	9	7		
OB	11	13	20	47		

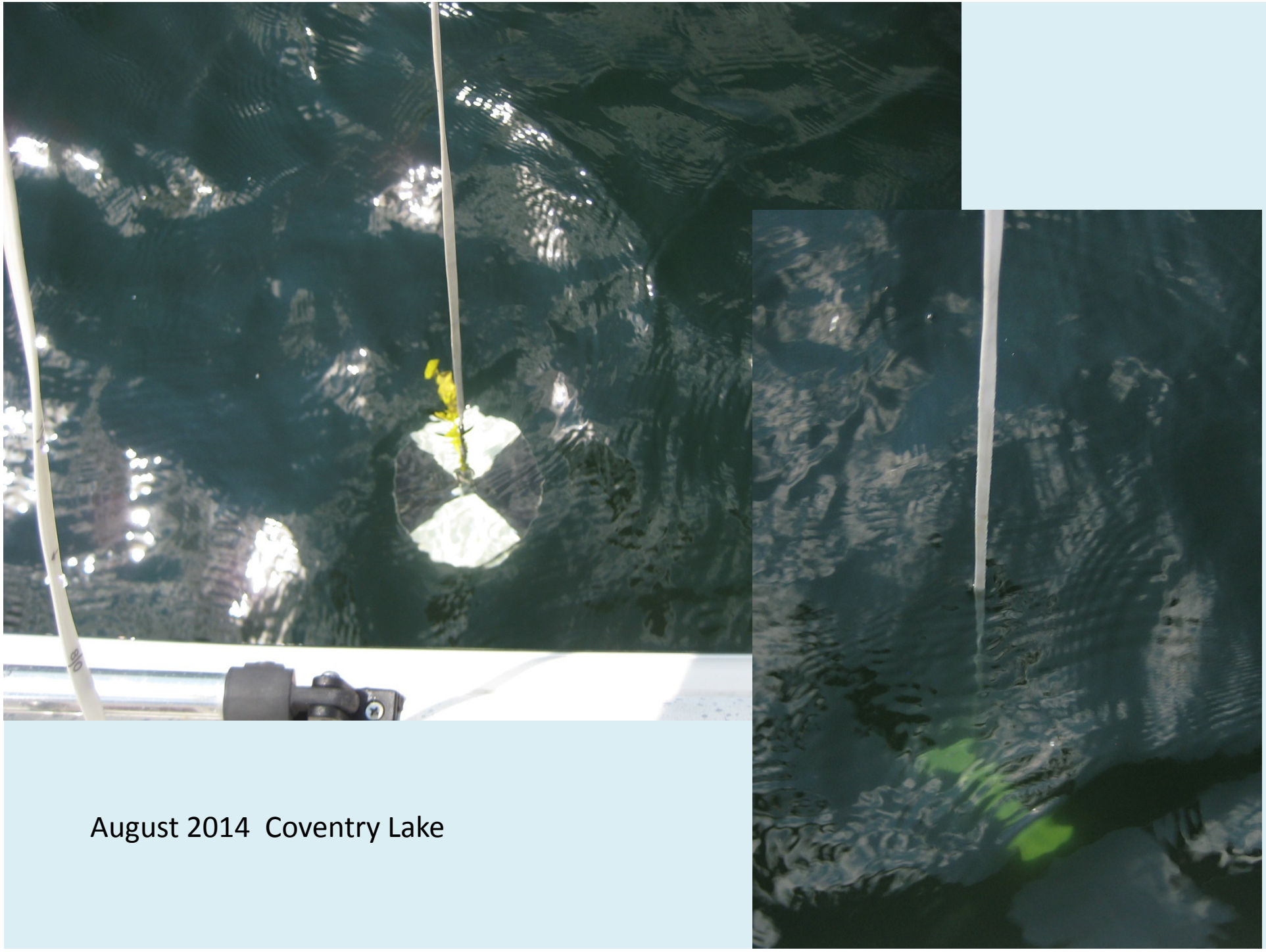
Ammonia as N (µg/L)						
Depth (m)	28-Feb	14-Apr	16-Jun	5-Aug		
1m	74		15	<10		
Mid	71		20	<10		
OB	101		410	163		

Nitrite / Nitrate (µg/L)						
Depth (m)	28-Feb	14-Apr	16-Jun	5-Aug		
1m	59	59	23	<10		
Mid	55		28	<10		
OB	134		<10	<10		

Silica (mg/L)				
Depth (m)	28-Feb	14-Apr	16-Jun	5-Aug
1m	0.13	0.81	0.20	0.59
Mid	0.21			
OB	1.4			

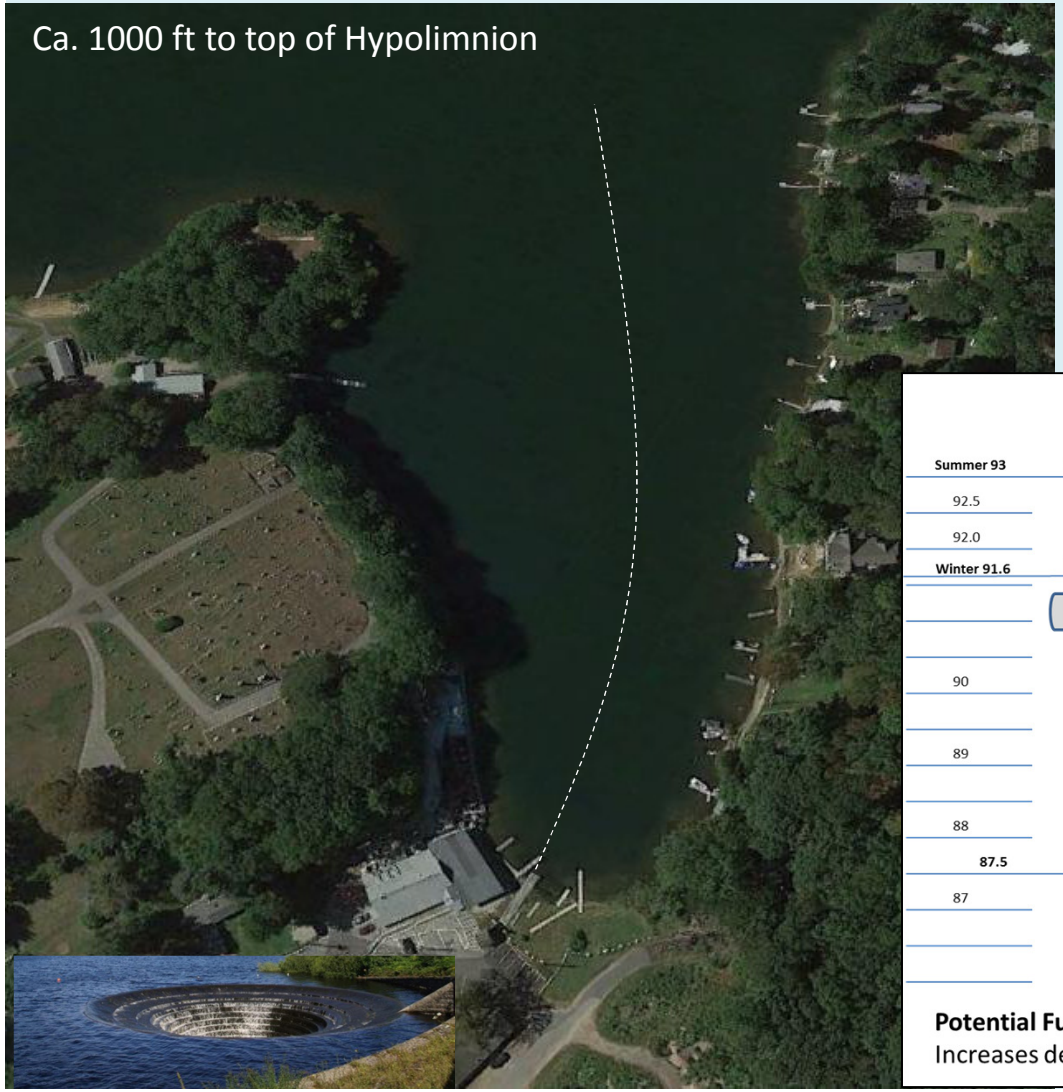
Iron (mg/L)				
Depth (m)	28-Feb	14-Apr	16-Jun	5-Aug
OB	0.11		1.3	0.65

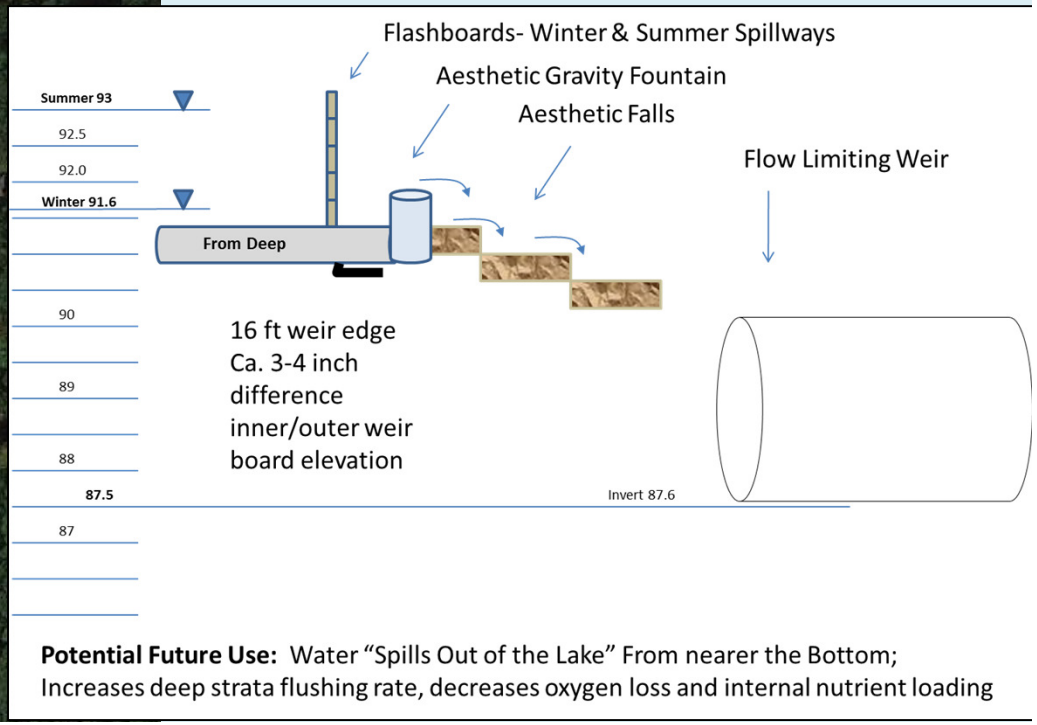
Manganese (mg/L)				
Depth (m)	28-Feb	14-Apr	16-Jun	5-Aug
OB	0.16		1.4	2



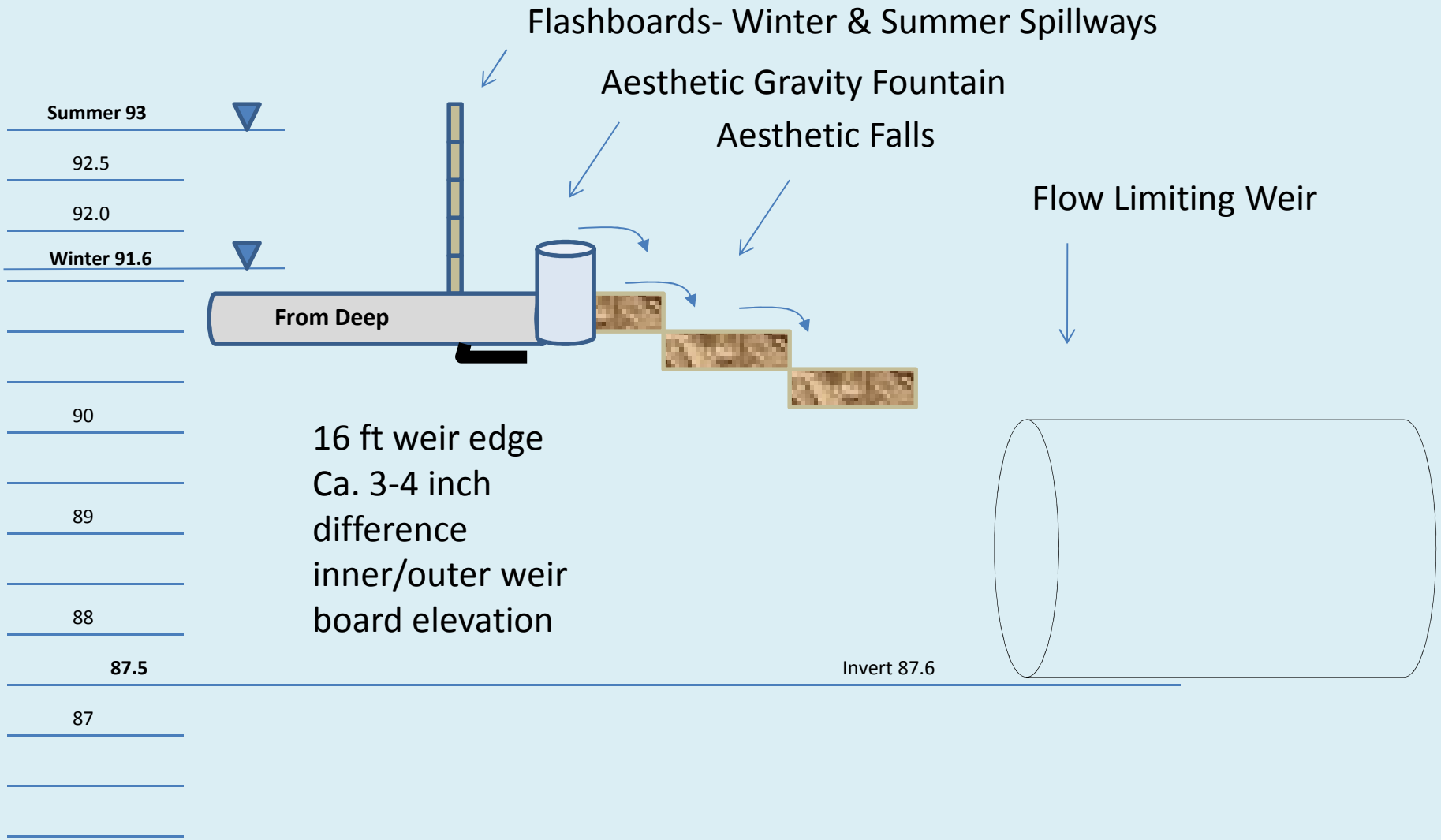
August 2014 Coventry Lake

- Dan Safety, Passing Required Flows, Minimize Leaks
- Lake Management- More Stable Winter and Summer Elevations (Flashy Watershed)-
  - Long Weir (to Capacity Downstream)
- Aesthetic Features- Gravity Fountain, Cascade Re-Aeration Steps
- Future potential- Depth-Selective Outflow





Potential Future Use: Water "Spills Out of the Lake" From nearer the Bottom; Increases deep strata flushing rate, decreases oxygen loss and internal nutrient loading



Potential Future Use: Water "Spills Out of the Lake" From nearer the Bottom; Increases deep strata flushing rate, decreases oxygen loss and internal nutrient loading


LIFE GUARD
ON DUTY


THIS BEACH RESERVED FOR THE
EXCLUSIVE USE OF
THE COVENTRY LAKE WATER SKI CLUB, INC.
PLEASE KEEP OUT
No Swimming, No Fishing, No Vessel Parking
No Landing on Beach
POLICE TAKE NOTICE
Coventry
Parks and Recreation
BY PERMIT FROM
COVENTRY PARKS & REC. DEPT.

We routinely use **Cargill Clearlane**

due to market and supply issues used some **straight salt**, and a medium to moderate amount of **IcebGone** from International salt during 2013-14. Application rates target 300/500 lbs. per lane mile.

Approximately 14 lane miles

(ca. 3 tons per treatment)

“Rough computation of oxygen demand" for a 14 lane mile application of Icebgone is about the oxygen content in 20 acre feet of lake water. The lake covers 370+ acres, 36 ft deep.

Material Safety Data Sheet

1. CHEMICAL PRODUCT AND COMPANY INFORMATION

Product Name: ClearLane® enhanced deicer
Chemical Name: Sodium Chloride mixed with Magnesium Chloride
Formula: $NaCl$, $MgCl_2$, $(HOCH_2CH_2)_3N$
Molecular Weight: NaCl = 58.44, MgCl2 = 95.22, $(HOCH_2CH_2)_3N$ = 149.19

Manufacturer Name & Address: **Cargill Deicing Technology**
24950 Country Club Blvd., Ste 450
North Olmsted, OH 44070
800-600-7258 www.cargill.com

Emergency Telephone Contact Number: CHEMTREC (800) 424-9300 24 hours a day

2. COMPOSITION/INFORMATION ON INGREDIENTS

Hazardous Ingredients(*)	% weight	CAS No.	OSHA PEL	OSHA STEL	ACGIH TWA	ACGIH STEL
Sodium chloride	91.0-96.0	7647-14-5	None	None	None	None
Water	2.6-4.0	7732-18-5	None	None	None	None
Magnesium Chloride	0.87-1.40	7786-30-3	None	None	None	None

Sears Ecological Applications Co, LLC

MATERIAL SAFETY DATA SHEET

ICE B'GONE I

SECTION I - MATERIAL IDENTIFICATION AND USE:

MATERIAL NAME
ICE B'GONE, ICE B'GONE MAGIC, DCS_{50}

CLASSIFICATION/WHMIS
Not Controlled

MANUFACTURERS' NAME AND ADDRESS
Sears Petroleum & Transport Corp
1914 Black River Blvd, Rome, NY 13440

EMERGENCY PHONE NUMBERS
(315) 337-1235

CHEMICAL NAME	CHEMICAL FAMILY	CHEMICAL FORMULA
Magnesium Chloride and Distillers Condensed Solubles (DCS)	N/A	N/A

TRADE NAMES & SYNONYMS	MOLECULAR WEIGHT	MATERIAL USE
ICE B'GONE, ICE B'GONE MAGIC, Distiller Solubles, DCS,	N/A	Deicing, anti-icing

SECTION II - HAZARDOUS INGREDIENTS OF MATERIAL:

CHEMICAL IDENTITY	CONCENTRATION %	C.A.S.#	LD_{50}	LC_{50}
Magnesium Chloride	50-60%	7786-30-3	N/A	N/A
Distillers Condensed Solubles	40-50%	N/A	N/A	N/A

What is Ice B'Gone®?

- Ice B'Gone is a highly effective ice melting product. It melts to minus 35°F. You can expect to “burn off” up to 2 inches of snow without having to plow. Ice B'Gone works faster and last longer than ordinary deicers, saving you up to 30% - 50% in salt use. Ice B'Gone is less corrosive, biodegradable and environmentally friendly.
- Ice B'Gone is safer to use on concrete and other hardscape products, is less corrosive, and will not harm curbside grassed areas or plants when used as directed.
- Ice B'Gone starts out as ordinary **rock salt**, which is then treated with a liquid, **agricultural by-product of the distilling process** blended with **magnesium chloride**. This patented liquid is trademarked as Ice B’Gone Magic Liquid and dramatically transforms rock salt into a new de-icing material.
- Ice B’Gone Magic Liquid is a highly effective de-icing agent made from a patented blend of magnesium chloride and condensed distiller soluble. It is non-toxic, bio-degradable and has a corrosion index lower than distilled water.
- Ice B'Gone can be supplied in bulk or can be made on your site by transforming rock salt or sand/salt mixture stockpiles with Ice B'Gone.

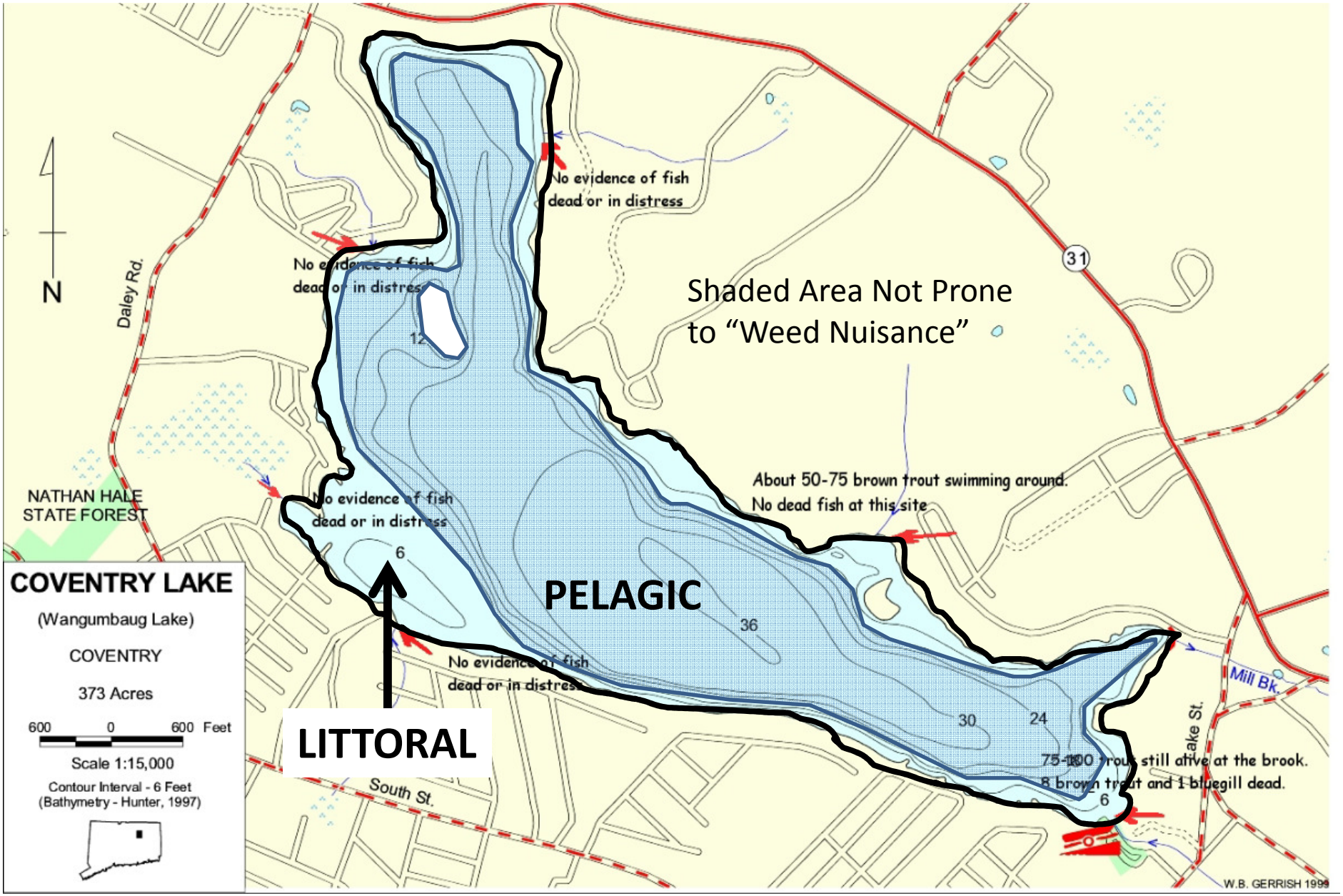
Winter Road Treatments – Potential Lake Impacts

Acute vs. Chronic Impacts

- Increased Oxygen Demand (Organic Products)
- Trace Metal Mobilization (Zn Cd,…)
- Roadside Soil Infertility (esp. Na; displaces other cations)
- Can Alter the Timing and Duration of Stratification
  - Meromictic Tendency
  - Can Alter Ice-cover
- Can Alter the Phytoplankton Community
  - Chloride-Sensitive Diatoms
  - Cyanobacteria can increase

- Lakes impacted more than Streams
  - Longer Residence Time = Greater Impact Potential
- Na Greater Impact Potential than Mg

Public Safety is Paramount, Road Treatments are Necessary



Source: CT DEP Fisheries Unit Notes August 2009

2009 **Trout were stressed by Temperature-Oxygen Conditions in August 2009**

Allelopathic: excretes substances that inhibit growth of phytoplankton (including Cyanobacteria)

Ceratophyllum demersum

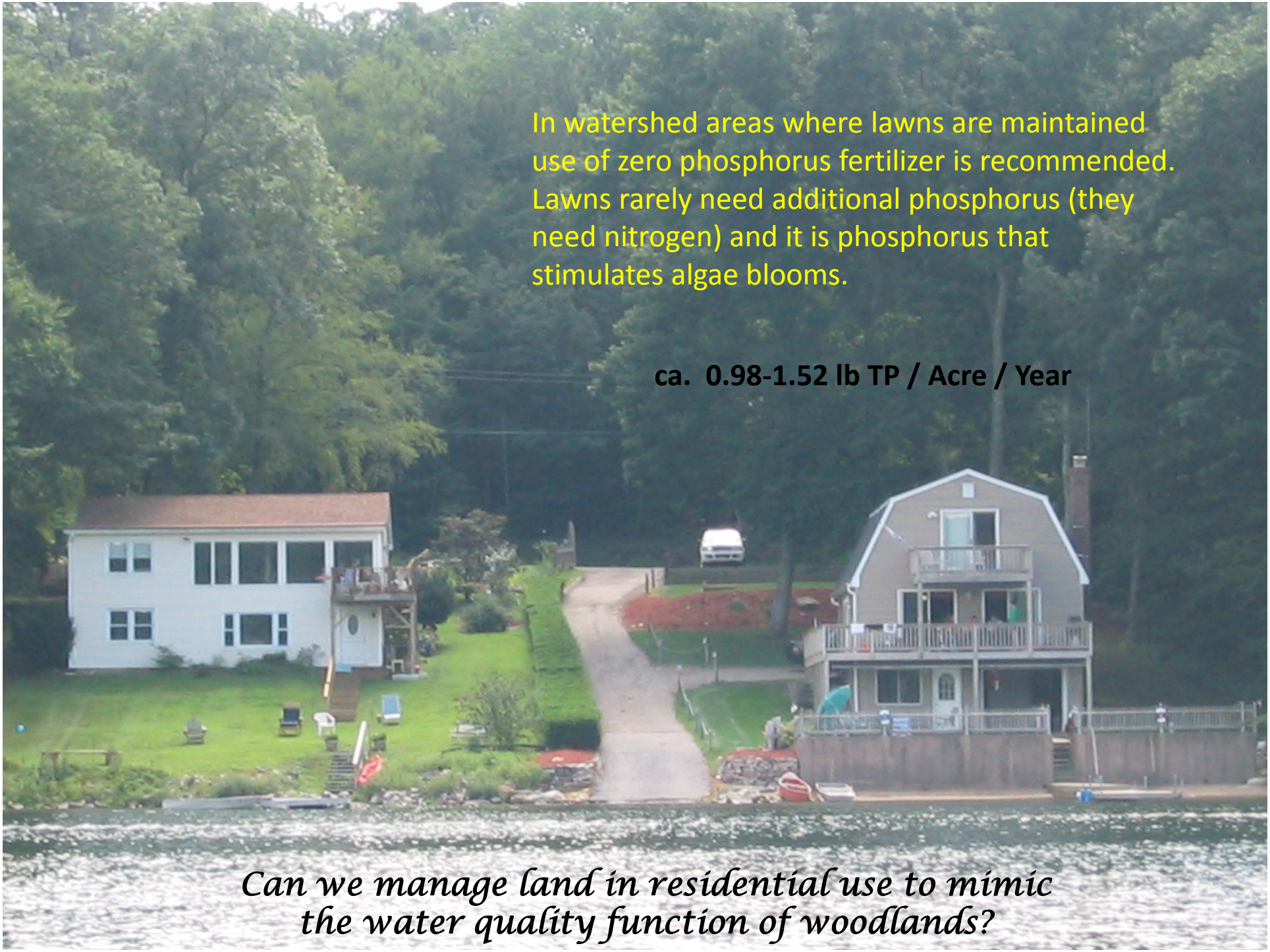
Mono Pond, Columbia, CT

Fanwort

Cabomba caroliniana


Atmosphere
Landscapes
More TP= More Algae, More Oxygen Demand, and Less Clarity
Lake Bottom


Zero Phosphorus Fertilizers
Amend State Statutes?
DONE!
Your lawn needs nitrogen…not phosphorus; and we need to minimize phosphorus in the lake to reduce algae blooms and weed abundance. You are a part of the lake ecosystem, and you can help!


In watershed areas where lawns are maintained use of zero phosphorus fertilizer is recommended. Lawns rarely need additional phosphorus (they need nitrogen) and it is phosphorus that stimulates algae blooms.
ca. 0.98-1.52 lb TP / Acre / Year
Can we manage land in residential use to mimic the water quality function of woodlands?

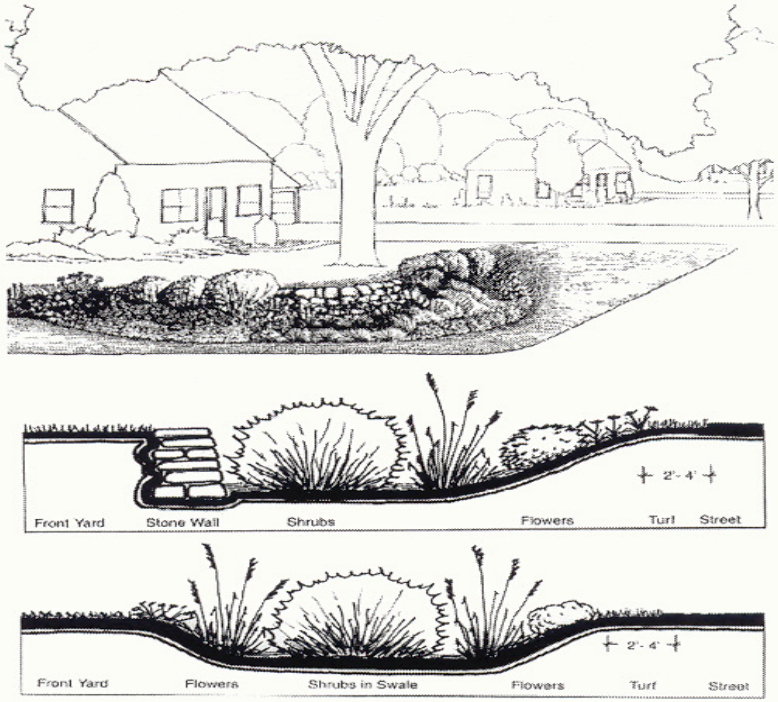
Yes, we can.

This is an example of an excellent lakefront landscape (the only exception being the length of the "seawall"). View corridors, heavily vegetated, lakeside amenities that "disappear" into natural cover.

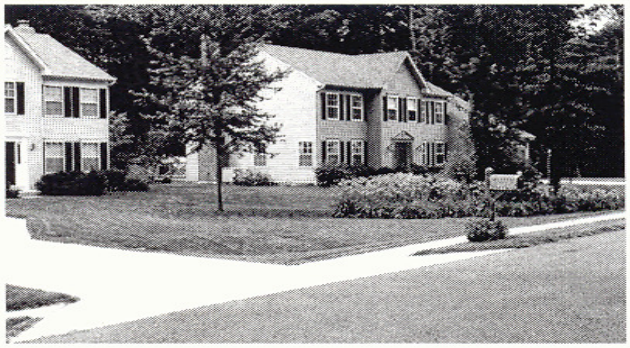
First ½ Inch
0.40 lb P / Acre / Year
First 1 Inch
0.20 lb P / Acre / Year

Figure 4-6. Residential Rain Gardens

Typical Residential Rain Garden (With and Without Masonry Wall)

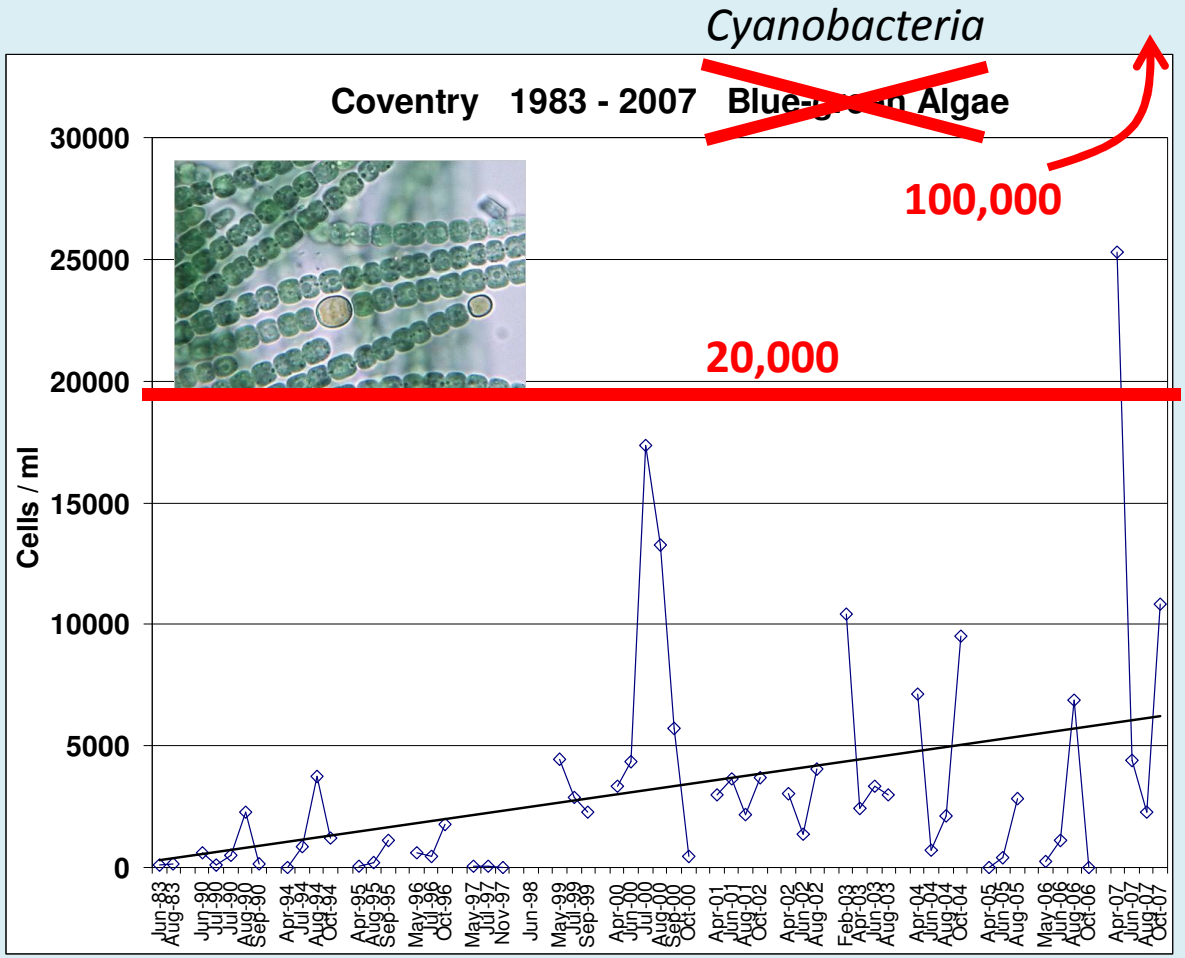


Examples of Residential Rain Gardens

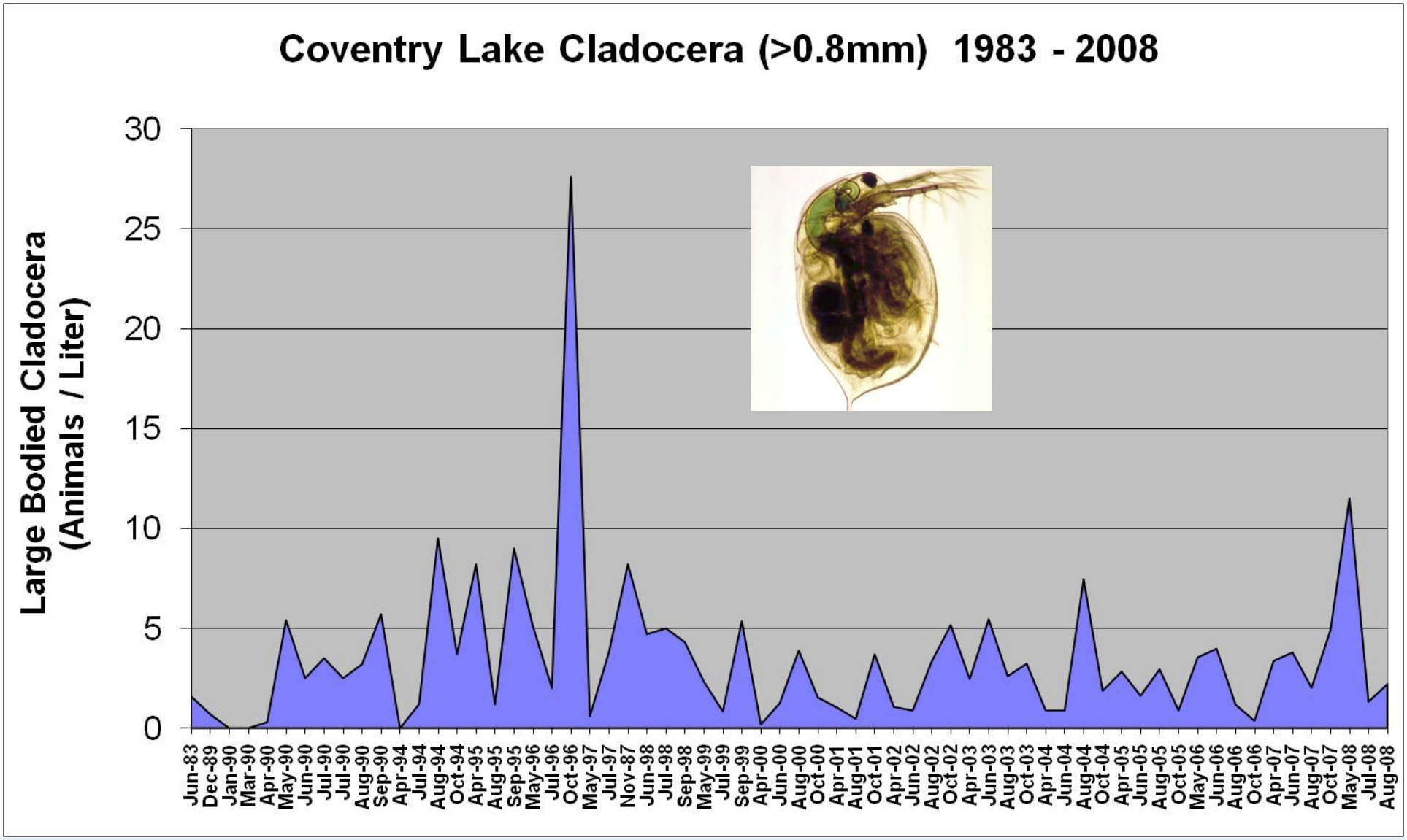


Source: Metropolitan Council, 2001 (Adapted from Nassauer et al., 1997) and Low Impact Development Center (www.lowimpactdevelopment.org), 2001.

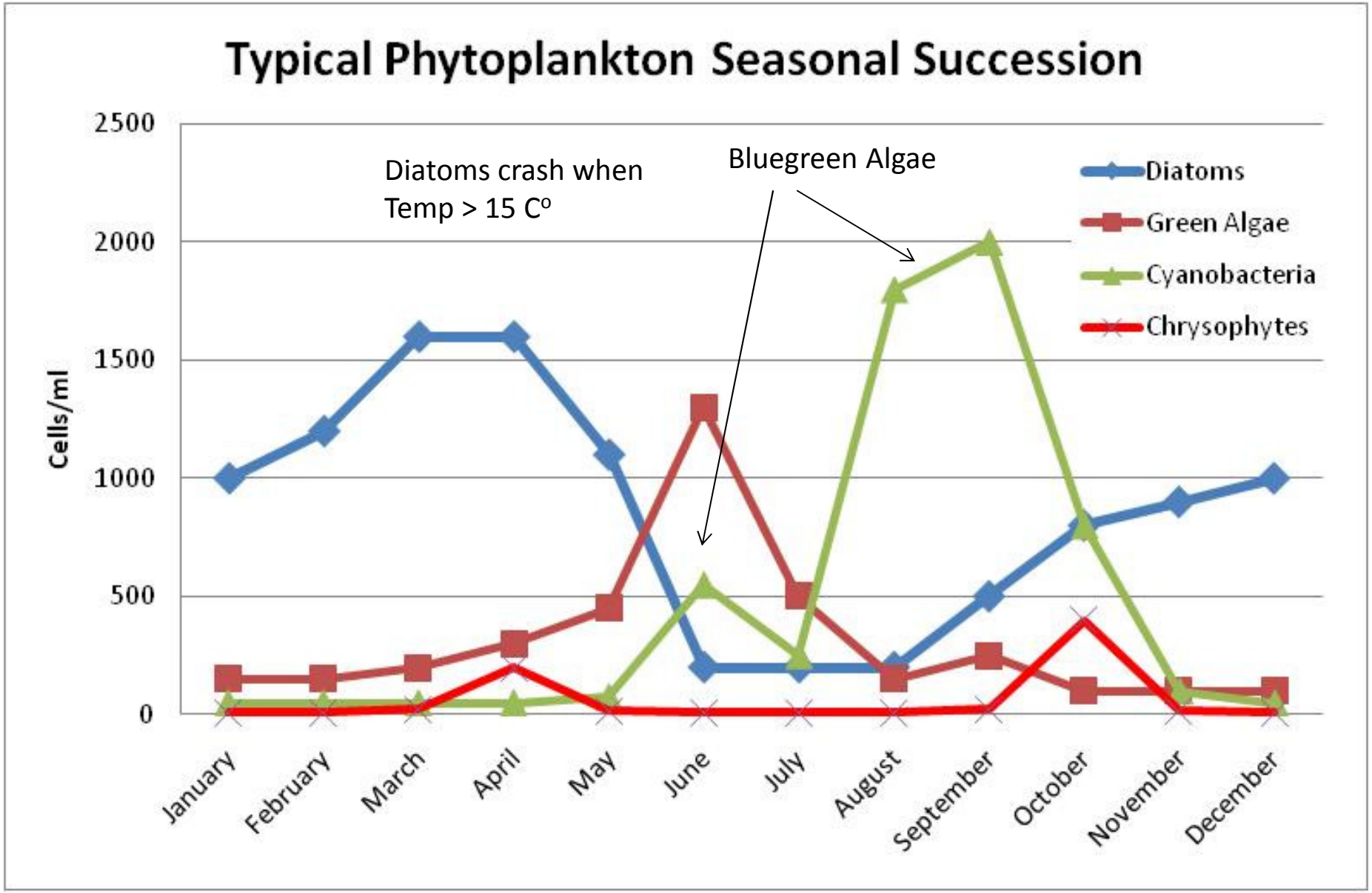
LAKE OR RESERVOIR NAME		Coventry	Coventry
STATION NAME OR NUMBER			
DATE		21-May	25-Jun
2009 DEPTH		0-5m	0-5m
ALL NUMBERS IN CELLS PER ML			
SPECIES			
BACILLARIOPHYCEAE			
Asterionella formosa		293	
Cyclotella spp.		6	15
Cyclotella striata			6
Melosira granulata			24
Tabellaria spp.		98	91
total	0.00	396.37	136.17
DINOPHYCEAE			
Ceratium spp.		2	
Glenodinium spp.			15
total	0.00	2.36	15.25
CYANOPHYCEAE			
Anabaena spp.		30	1494
Aphanizomenon spp.			366
Aphanocapsa spp.			188
Gloeothece spp.		415	1677
Gomphosphaeria spp.			389
total	0.00	445.15	4114.06
EUGLENOPHYCEAE			
Trachelomonas spp.			15
total	0.00	0.00	15.25
CHLOROPHYCEAE			
Chlamydomonas spp.		6	
Closteriopsis spp.		5	
Gloeocystis spp.		75	
Kirchneriella lunaris			15
Quadrigula spp.		61	
Scenedesmus spp.		12	
Schroederia spp.			15
total	0.00	159.65	30.49
CRYPTOPHYCEAE			
Cryptomonas spp.		195	442
total	0.00	195.14	442.11
CHRYSOPHYCEAE			
Dinobryon spp.		226	91
Synura spp.			61
total	0.00	225.63	152.45
NANNOPLANKTON			
unidentified microphytoflagellates		366	991
total	0.00	365.88	990.93
TOTAL	0.000	1790.176	5896.685
ALL NUMBERS IN CELLS PER ML			



Relatively low algae densities were observed in June 2009; however approximately 70% of the cells were Cyanobacteria (bluegreen algae)



Large-bodied cladocera continue to persist at significant population levels, with a peak following the diatom maximum in Spring. The food-web and grazing mechanism continues to be a healthy feature.



DIATOMS ⟶ GREENS ⟶ BLUEGREENS ⟶ DIATOMS

Littoral Zone

Manage **to reduce the** ***nuisance*** **posed by rooted aquatic vegetation**
Protect **against new Invasive Species infestation**

EAST HAMPTON

Algae Keeping Lake Closed

No Swimming At Pocotopaug

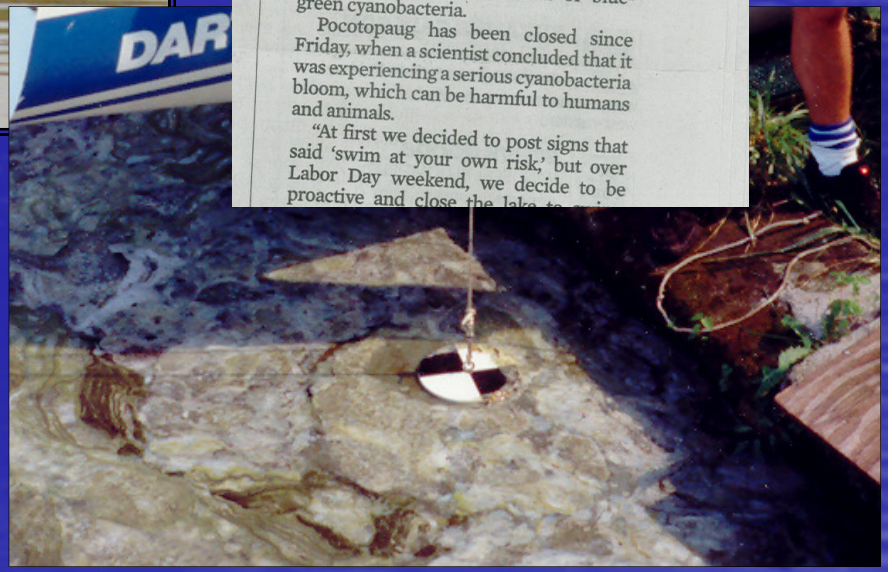
By ERIK HESSELBERG
Special to The Courant

EAST HAMPTON — Lake Pocotopaug was eerily quiet Tuesday morning after the lake's beaches were closed because of a late-summer bloom of harmful blue-green algae.

Despite the sweltering heat, no one was in the water and no boats could be seen on the 512-acre lake, turned a murky green from the proliferation of blue-green cyanobacteria.

Pocotopaug has been closed since Friday, when a scientist concluded that it was experiencing a serious cyanobacteria bloom, which can be harmful to humans and animals.

"At first we decided to post signs that said 'swim at your own risk,' but over Labor Day weekend, we decide to be proactive and close the lake to



Cyanobacteria Blooms can rapidly alter the Nature of a Lake Ecosystem.

Restoration is much more difficult to accomplish than Preservation!

e.g. Lake Pocotopaug, East Hampton, CT
Lower Bolton Lake, Bolton

Wangumbaug

Summer 2014:

Excellent Water Quality

Excellent Habitat Quality

More Plant Growth than Typical

"The Lake Isn't Broken!"

(Let's not break it.)

Questions?