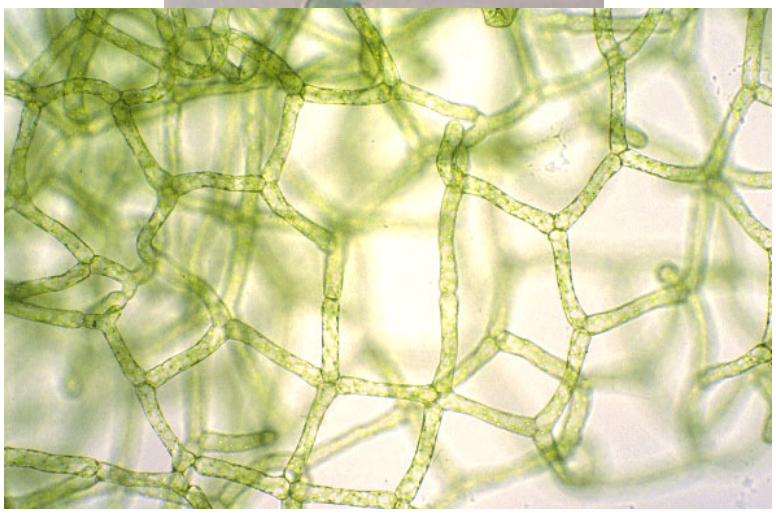
What Does Algae Have To Do With It?

- The photosynthetic cyanobacteria, A.K.A. blue-green algae, constitute a major component of the photoplankton and are discussed throughout this treatment as functionally similar to planktonic algae
- Algae and cyanobacteria are found in all bodies of water in non-detrimental amounts.

Basic Algal Information



- Simple prokaryote cell
- Occur in unicellular, filamentous, and colonial forms
- Green algae are almost totally freshwater in distribution
- Generally reproduce asexually, vegetatively
  - Occurs mostly at night
- Production controlled through water temperature, light, nutrients (particularly P), residence time, and predator activity

What Does This Mean For You?

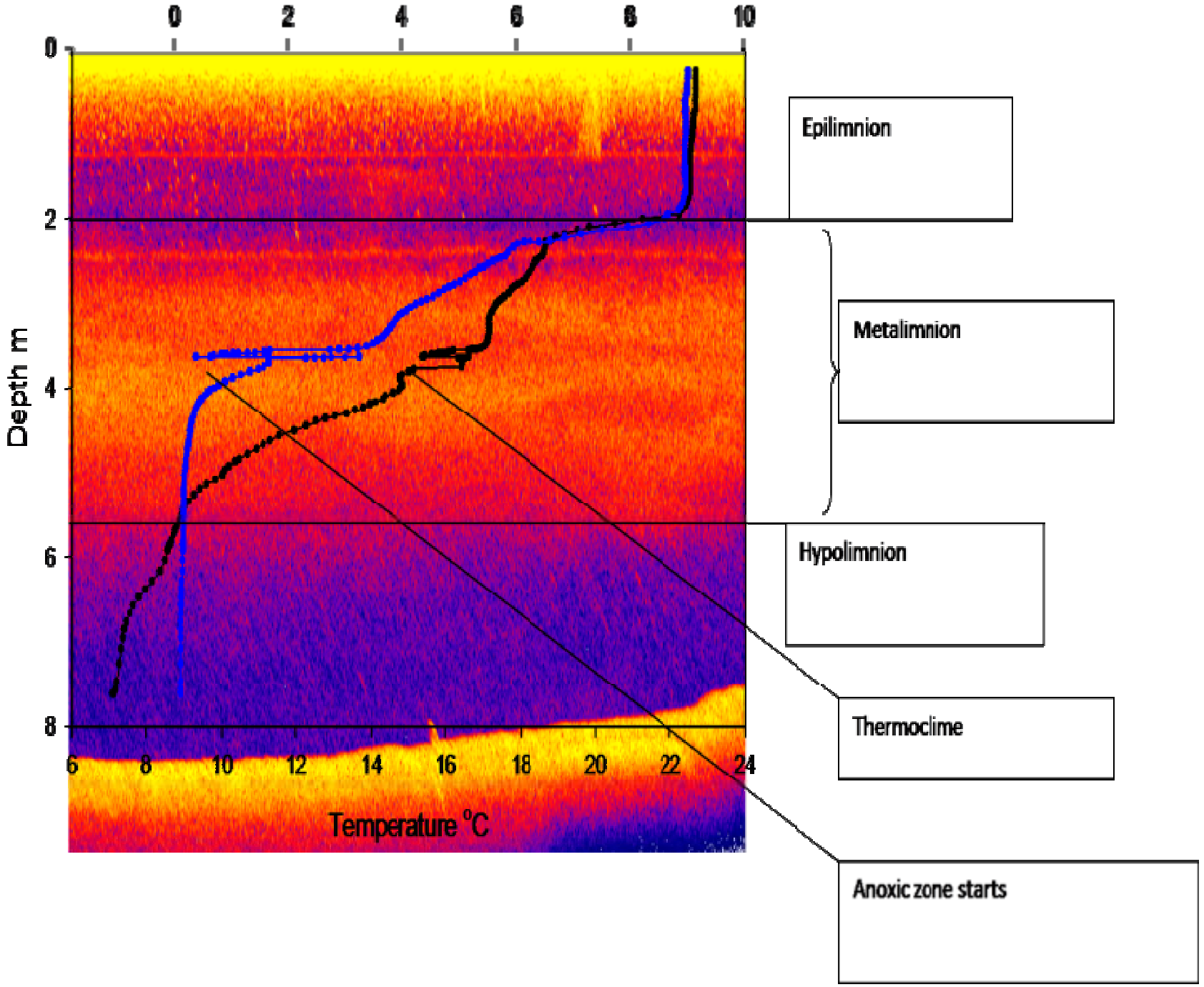
- Algae is becoming a nuisance
  - Water discoloration and scum formation
  - Filamentous mats can form at the bottom and float to the surface
    - You don’t know there is a high quantity until its at the surface
  - Poor taste and odor of the water
  - Toxins – kill animals and cause illness in humans
  - Combination of algal organic matter and chlorine disinfectant can form potential carcinogenic byproducts

Your Health

- Health effects associated with exposure to high concentrations of cyanobacterial toxins include:
  - stomach and intestinal illness;
  - trouble breathing;
  - allergic responses;
  - skin irritation;
  - liver damage; and
  - neurotoxic reactions, such as tingling fingers and toes
- Scientists are exploring the human health effects associated with long-term exposure to low levels of cyanobacterial toxins. Some studies have suggested that such exposure could be associated with chronic illnesses, such as liver cancer and digestive-system cancer.

Depth	0.5	1.5	2.5	3.5	4.5	5.5	6.5	Species Total counts
Anabaena	3	3	4	14	7	2		33
Aphanocapsa	50	15			4			69
Coelosphaerium	51		51		7		3	112
Microcystis	100	33	34	100		71	2	340
Tabelllaria		1						1
Asterionella							1	1
Oscillatoria	1			100	72	24		197
Mallomonas						1	1	2
Melosira					2			2
Dinobryon	2		1					3
Synura	1							1
Ceratium	100	34	100		1	1		236
Pediastrum	1	1						2
Staurastrum	50	10	20	46	7		1	134
Total counts	359	97	210	260	100	99	8	1153

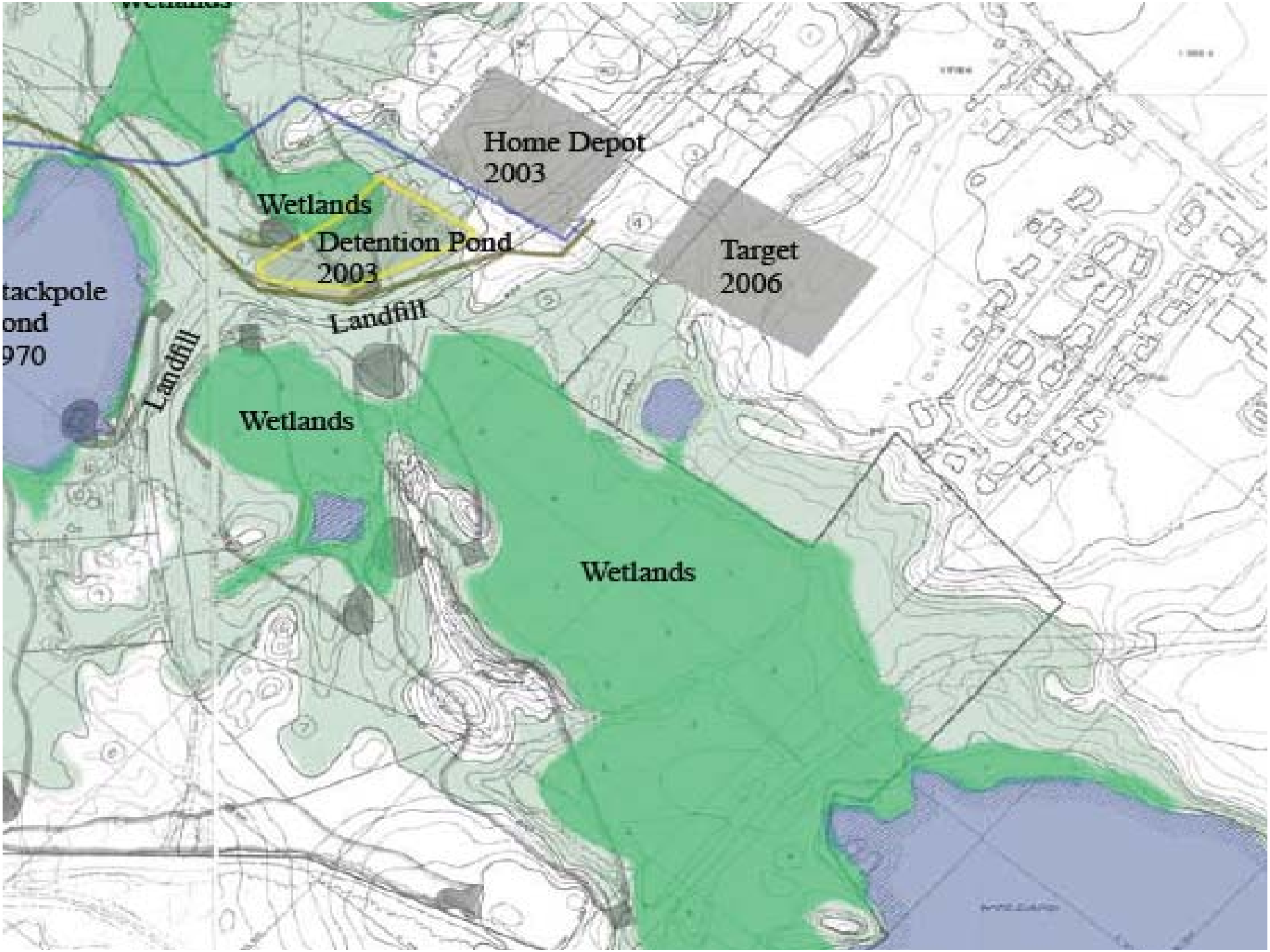
Willand Pond's Sources of Phosphorus


0
2
4
6
8
10
Depth m
0
2
4
6
8
6
8
10
12
14
16
18
20
22
24
Temperature °C
Epilimnion
Metalimnion
Hypolimnion
Thermoclime
Anoxic zone starts

How Willand Pond's Morphometry affects Phosphorus

Precipitation

Runoff


Home Depot
2003
Wetlands
Detention Pond
2003
Target
2006
Landfill
Landfill
Wetlands
Wetlands

Phosphorus Data ($\mu g\ L^{-1}$)

September 2007

- Sample was taken at deepest spot in the lake 3m below the surface

23.4

April 2008

- Staples drain:

193.

- Shore (behind Staples drain)

(2

84.3

- Boat Launch Shore:

64.3

- Behind Retention Pond:

569.2

Solutions for Willand Pond:

- Need a formal monitoring program involving residents, lakes association and coordination with state biologists.
  - Gather more data on lake natural nutrient cycling
  - VLAP with NH DES
  - NH LLMP with the University of New Hampshire
- Physical changes or treatments possibly needed for Willand Pond:
  - Alum treatment
  - Selective draining
  - Construction of an outlet
  - Decreasing external phosphorus sources
  - Hypolimnetic aeration or oxygenation

NH VLAP:

- Volunteer Lakes Assessment Program (VLAP) through NH DES.
  - Program serves a dual purpose by establishing a regular volunteer-driven lake sampling program to assist DES in evaluating lake quality throughout the state, and by empowering volunteer monitors and lake residents with information about the health of their waterbody.
  - Usually done several times on a monthly basis throughout the summer months (June-August).
  - Environments monitored: Groundwater, Lake or Pond, Land, Reservoir, River or Stream, Wetland
  - Data is interpreted and compiled into a report for each lake.

NH VLAP Sampling and Testing:

- Environments monitored:
  - Lake or Pond, Land, and Reservoirs.
  - Physical/chemical monitoring:
  - Conductivity, Alkalinity, pH, Phosphorus, Secchi transparency, and Turbidity.
  - Biological monitoring:
    - Bacteria, and Chlorophyll.

NH LLMP:

- New Hampshire Lakes Lay Monitoring Program (LLMP) through the University of New Hampshire.
  - Program dedicated to preservation and sound management of lakes through citizen-based monitoring and research.
  - Founded in 1978, LLMP is administered jointly through the Cooperative Extension and the Center for Freshwater Biology at the University of New Hampshire.
  - Provides better view of overall system health by using more extensive testing and sampling.
  - Through its integration of research, outreach and teaching, the LLMP provides valuable data on the lakes of New Hampshire, broad community service and a unique opportunity for hands-on learning and employment of students.