Name _____ Date _____

Aquatic Health of WNY Ecosystems

Background: Lake Erie and Lake Ontario are the two "lower" Great Lakes. All of the water as well as the pollutants it contains, must pass through the entire Great Lakes system before it reaches them. In addition, the Niagara River watershed has historically been a dumping ground for many chemical companies. The old slogan, "the solution to pollution is dilution" rang true in our area for many decades. Recently, we have become more aware of the damage that our past actions have caused and we are beginning to see a turnaround in our area bodies of water. However, numerous chemicals continue to end up in our water from many point and non-point sources that present an ongoing issue for all.

Objectives:
- Use sensors in a hydrolab to take measurements of various water samples in area bodies of water in the Tonawanda and Grand Island area
- Construct bar graphs based on the data compiled

Materials:
- Hydrolab containing the following sensors: Depth, temperature, pH, dissolved oxygen, turbidity
- Field notebook to record data

Procedure:
- Predicting certain data about the locations prior to the samples being collected
- Record collected data
- Graph data for each location
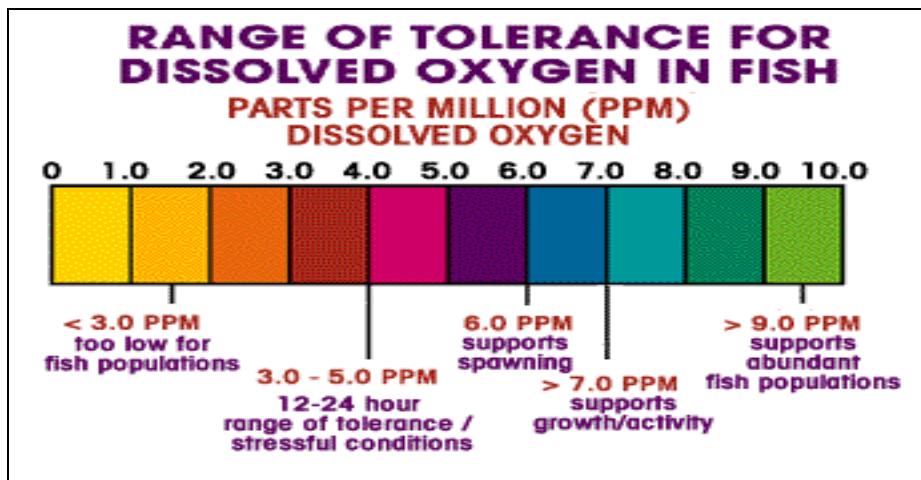- Answer conclusion and extension questions based on the lab

Reference:

pH Scale: The pH scale measures how acidic or basic a substance is. The pH scale ranges from 0 to 14. A pH of 7 is neutral. A pH less than 7 is acidic. A pH greater than 7 is basic.
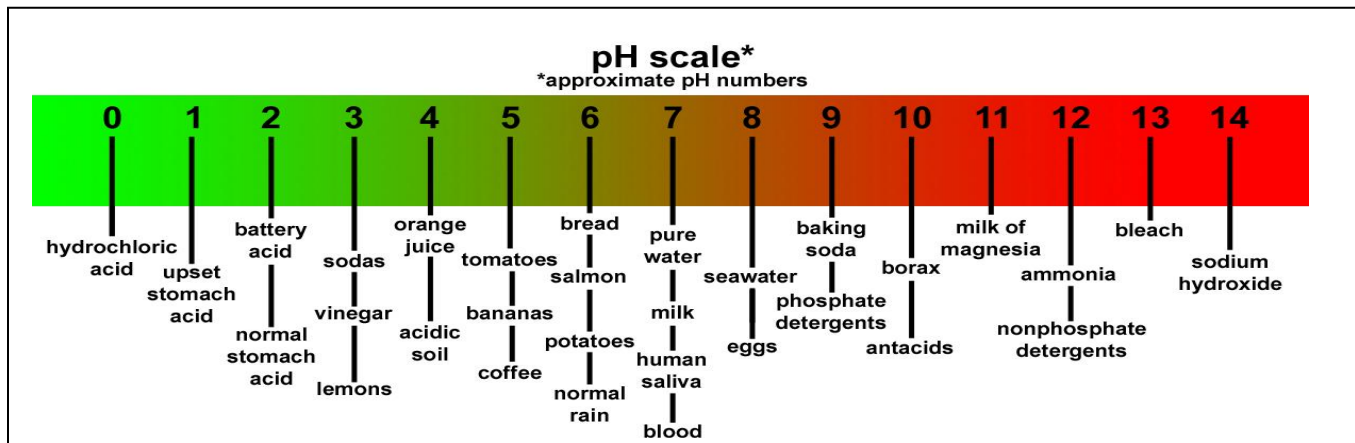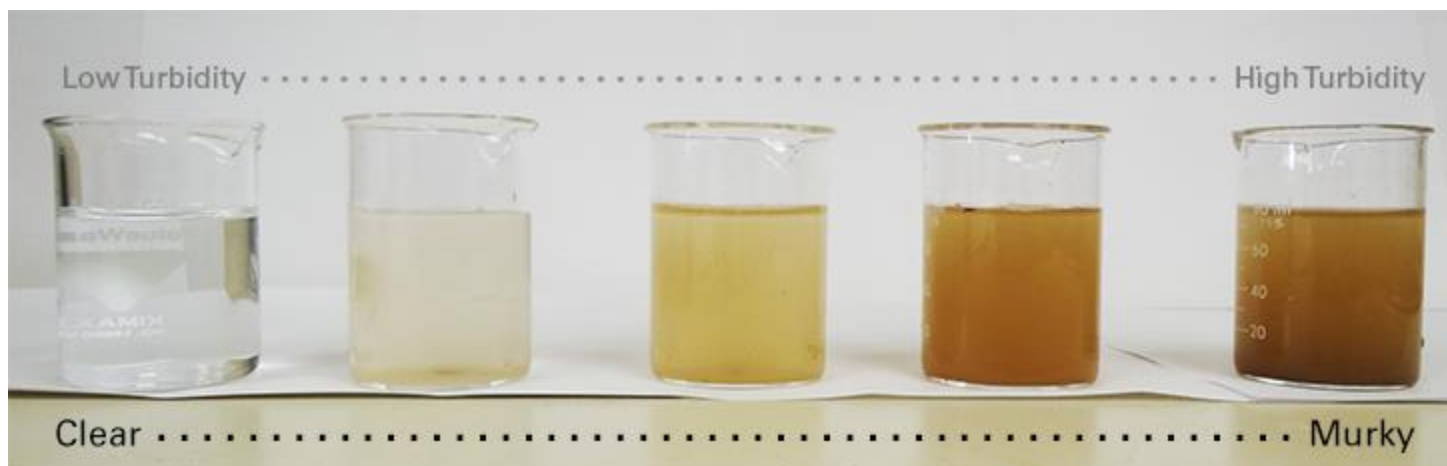

Dissolved Oxygen:

The measure of how much oxygen is dissolved in water. Although water molecules contain an oxygen atom, this oxygen is not what is needed by aquatic organisms living in natural waters. Rapidly moving water tends to contain a lot of dissolved oxygen, whereas stagnant water contains less.

RANGE OF TOLERANCE FOR DISSOLVED OXYGEN IN FISH
PARTS PER MILLION (PPM)
DISSOLVED OXYGEN

0 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10.0

< 3.0 PPM
too low for
fish populations

3.0 - 5.0 PPM
12-24 hour
range of tolerance /
stressful conditions

6.0 PPM
supports
spawning

> 7.0 PPM
supports
growth/activity

> 9.0 PPM
supports
abundant
fish populations

Turbidity:

Turbidity is the relative clarity of a liquid. The higher the intensity of scattered light, the higher the turbidity. During a rainstorm, particles from the surrounding land are washed into the river making the water a muddy brown color, indicating water that has higher turbidity values. Also, during high flows, water velocities are faster and water volumes are higher, which can more easily stir up and suspend material from the stream bed, causing higher turbidities.

Low Turbidity · High Turbidity

Clear · Murky

Pre-lab questions: Predict which Tonawanda and Grand Island stations will have the lowest and highest pH, temperature, dissolved oxygen and turbidity.

Tonawanda Locations: Two Mile Creek, Niagara River (Nia-Wanda Park), Eric Canal, Ellicott Creek

Grand Island Locations: Niagara River (South GI Bridge), Beaver Island Marina, Big 6, Spicer Creek

Lowest pH: _____   Highest pH: _____

Lowest temperature: _____   Highest temperature: _____

Lowest dissolved oxygen: _____   Highest dissolved oxygen: _____

Lowest turbidity:_____   Highest turbidity: _____

Data Collection:

Tonawanda Location Data:

Station #1 Two Mile Creek

Depth	
Temperature	
pH	
Dissolved O_2	
Turbidity	

Station #3 Erie Canal

Depth	
Temperature	
pH	
Dissolved O_2	
Turbidity	

Station #2 Niagara River

Depth	
Temperature	
pH	
Dissolved O_2	
Turbidity	

Station #4 Ellicott Creek

Depth	
Temperature	
pH	
Dissolved O_2	
Turbidity	

Grand Island Location Data:

Station #1 Niagara River (South GI Bridge)

Depth	
Temperature	
pH	
Dissolved O_2	
Turbidity	

Station #3 Big 6

Depth	
Temperature	
pH	
Dissolved O_2	
Turbidity	

Station #2 Beaver Island Marina

Depth	
Temperature	
pH	
Dissolved O_2	
Turbidity	

Station #4 Spicer Creek

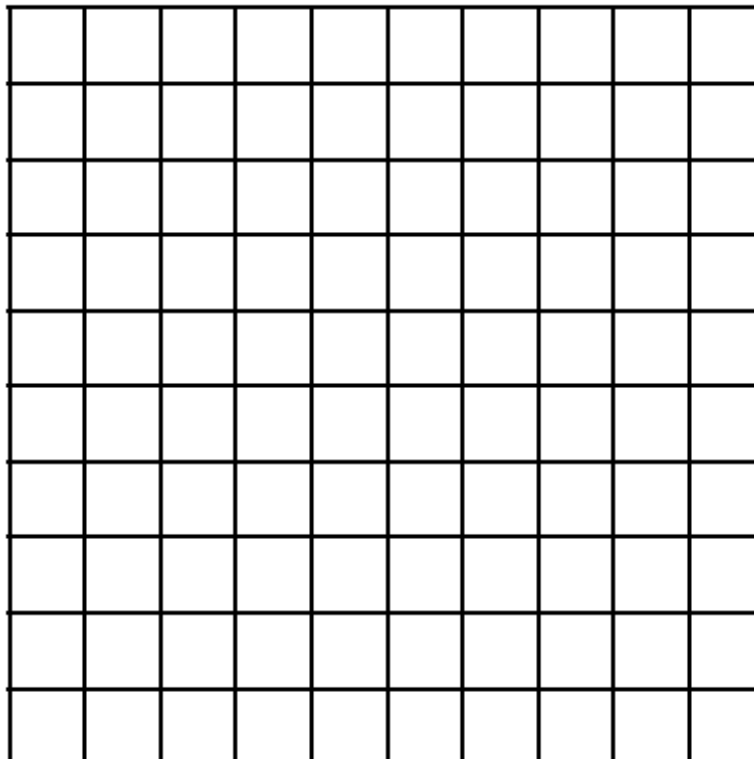|	
Depth	
Temperature	
pH	
Dissolved O_2	
Turbidity	

Graphing: Construct a bar graph for each of the following sets of data: temperature, pH and dissolved oxygen, and turbidity for each of the stations. Label the dependent and independent variables on the x and y axes of each graph.

Temperature

pH

Dissolved Oxygen

Turbidly
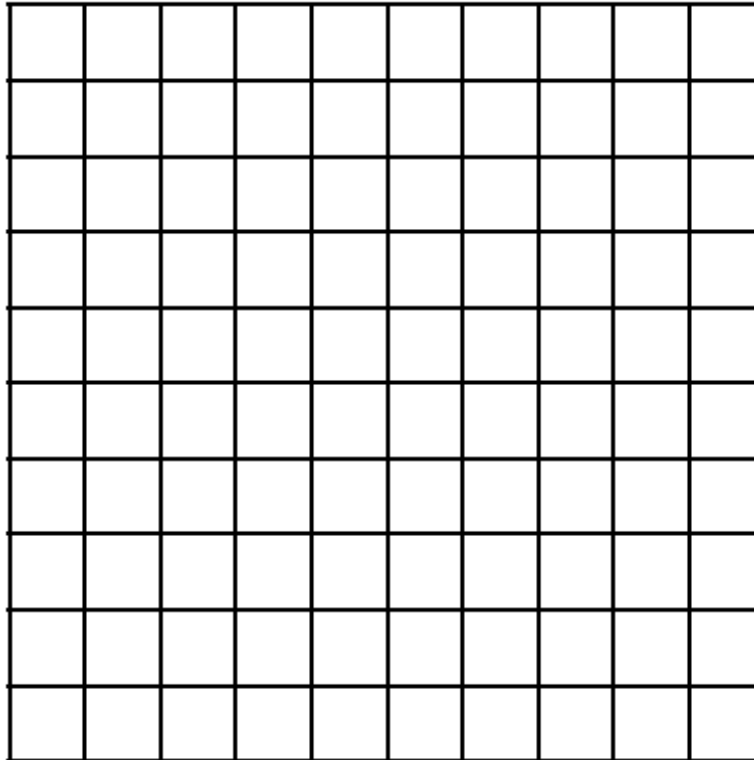
Post-lab questions:

1. Did the data support any of your predictions? _____ Explain.

2. Which station appears to be the healthiest? _____ Why do you think this is the case?

3. Which station appears to be the dirtiest? _____ Why do you think this is the case?

4. What species of fish found in various locations of the Niagara River would probably not be found in Ellicott Creek or Two Mile Creek? _____ _____

   Why? _____

Extension: There are numerous contaminants found in found in bodies of water including those that can make the water system harmful even though the other data suggest it may be healthy. List three other contaminants and explain the problems that each cause within the water as well as within the human body.

Contaminate	Water Problems	Human Health Problems