What Does That Data Mean? *Handout*

Download data and analyze using tables, time-history graphs and spatial graphs.

Introduction:

After you collect your water quality data, the next step is to organize it into Data Tables. Well-organized data tables help you analyze the data, and are often used to quickly spot data errors and water quality violations. Graphs are visual tools that help you see trends and correlations among your data.

Data Tables:

A Data Table is simply an organized way to display all of your water quality data, and will usually be included in the report you write about your sampling results. Data tables may be hand-written or typed in a word processor, but are most useful when created using computer spreadsheet and database programs. Spreadsheet programs (Excel, LibreOffice Calc, iWork Numbers) allow you to print tables, perform calculations, and develop graphs with your data. Database programs go a step further by allowing you to do automated searches through your data (for instance, "Find all values that exceed Class AA water quality standards").

Data tables may be organized in many ways, depending on what kind of problem you are examining. One common approach is to create one table for each sampling location. The columns of the table would then be the various water quality parameters, and the rows would be the results for each sampling date:

Example Table 1: Water Quality Data at River Mile 10 of the St. Johns River

Date	***Dissolved Oxygen mg/l***	***Water Temperature degrees C***	***BOD mg/l***	***Fecal Coliform #/100ml***
3/1/98	10	11	1.1	120
4/1/98	10.5	13	0.5	150
5/1/98	9.2	12	0.8	70
6/1/98	8.5	15	1	30
7/1/98	6.1	20	3.1	20
8/1/98	4.3	20	3.1	20
9/1/98	6.4	19	2.2	25

This kind of table is especially useful if you are trying to see how different parameters are related to each other.

A second common method is to create one table for each water quality parameter. In this case the columns would be the various sampling locations, and the rows would be the results for each sampling date:

Example Table 2: Dissolved Oxygen (mg/l) for the St. Johns River

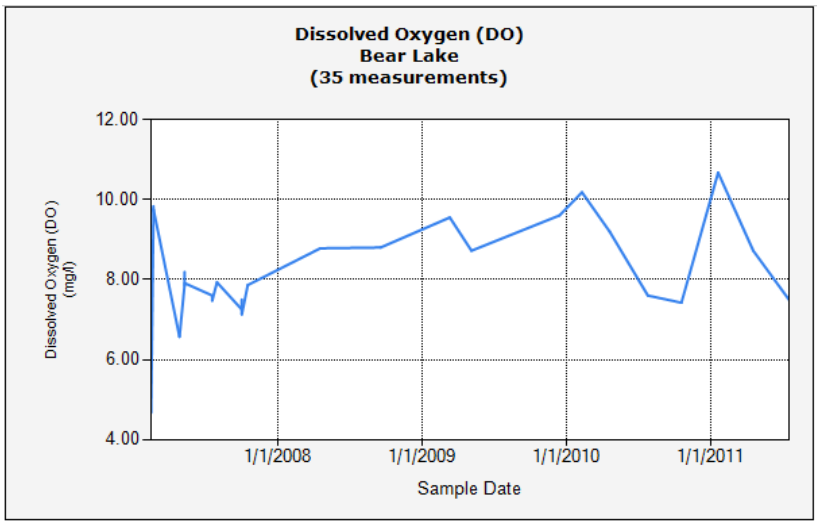
Date	***River Mile 8***	***River Mile 9***	***River Mile 10***	***River Mile 11***	***River Mile 12***
3/1/98	10.2	9.8	9.9	10.2	10.3
4/1/98	10.1	10.1	10.5	10.3	9.5
5/1/98	9.2	8.2	9.2	9.1	10.2
6/1/98	9.3	9.1	8.5	9.2	9.2
7/1/98	7.4	6.5	6.1	7.3	8.1
8/1/98	7.1	5.4	4.3	5.9	7.9
9/1/98	8.1	6.8	6.4	6.8	8.1

This kind of table helps you look at trends in your data, such as how a parameter changes over time at one location, or how it changes as you move downriver on a given sampling date.

An important part of Quality Control is to make sure that your tables are transcribed accurately from your original water quality data. All tables should be carefully proofed and checked against your original laboratory and field notes.

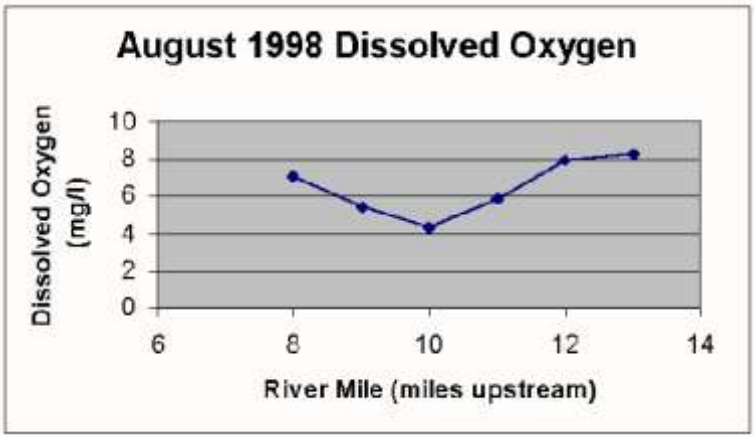
Graphs:

Graphing is an excellent way to display your data, and is very helpful when you are analyzing trends and correlations. There are many kinds of graphs, and you are encouraged to be creative in finding different ways of looking at data. The following are some examples of the kinds of graphs often done in water quality studies.



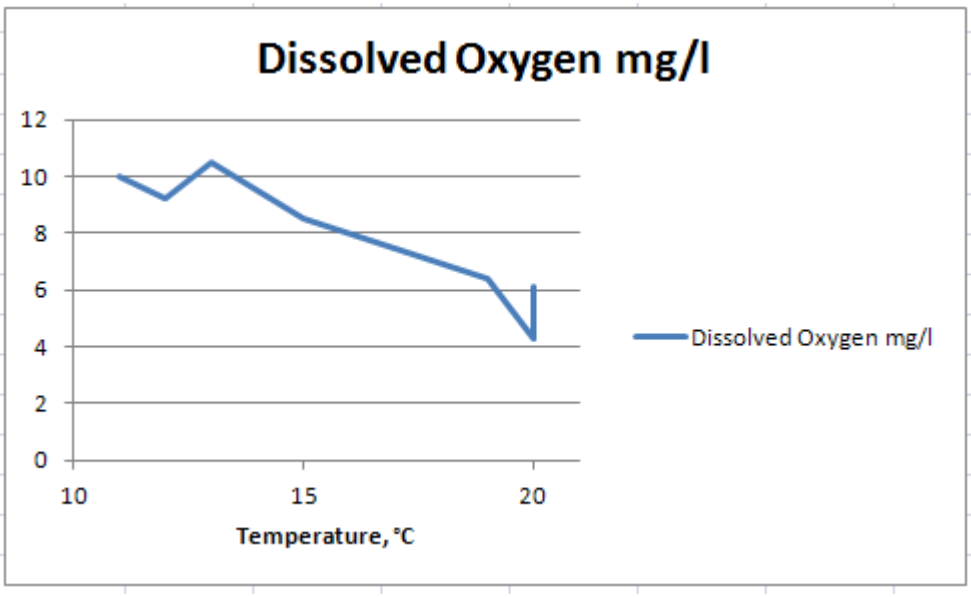
Time-history graphs are graphs that show how a physical or chemical parameter changes with time at a sampling location. For instance, the graph to the left is a time-history graph of dissolved oxygen for Bear Lake. This graph shows that, during the 4 ½ years shown, dissolved oxygen was at its lowest level in spring of 2007, and at its highest level early in 2011.

Another type of graph is the spatial-trend graph. This is simply a plot of how a water quality parameter changes as you move upriver. For example, the following graph shows dissolved oxygen levels at all sampling stations for the August 1998 data:



The low dissolved oxygen at River Mile 10 is called the DO-sag point and could indicate impacts from an upstream pollution source (such as a sewage treatment plant discharging ammonia and BOD).

A correlation plot is used to see if there is a relationship between two physical or chemical parameters. For instance, you could use the data from Example Table 1 to plot Dissolved Oxygen vs. Temperature:



This plot shows that for the most part Dissolved Oxygen decreases as Temperatures become higher (warm water holds less oxygen than does cold water).

It's Your Turn…

Materials:

- Internet access
- Spreadsheet program (Microsoft Excel or equivalent)

Procedure:

1. Create a Time-History graph of the nearest body of water to your school using the website www.Seminole.WaterAtlas.org
2. From the graph, prepare a data table using a spreadsheet tool like Microsoft Excel. Make sure to include units (e.g., mg/l).
3. Create a Spatial-Trend graph either using different points along the St. Johns River OR using temperature vs. dissolved oxygen for the nearest body of water to your school.
4. Under each graph, describe the data in 1 to 2 sentences (e.g., "The temperature decreased during the spring months.").
5. Make sure each graph and data table is titled.
6. Turn in 2 graphs and 1 data table.