

Merrimack River Water Quality Data Sheet

Your Names: _____

Test	Test Location #1		Test Location #2	
	Result	Healthy (H) or Unhealthy (U)	Result	Healthy (H) or Unhealthy (U)
Air Temperature				
Water Temperature				
Nitrates				
pH				
Dissolved Oxygen				
Total Dissolved Solids (TDS)				
Turbidity				

What does the data tell us about the health of the Merrimack River?

Dissolved Oxygen

1. Remove the plastic sample cup and one of the glass tubes filled with yellow liquid.
2. Fill your sample cup to the 25 ml mark with river water.
3. Place the small end of the glass tube into the water in the sample cup.
4. While the glass tube is under water, snap the tip by pressing the glass tube down towards the side of the sample cup. The glass tube will fill with water.
5. Remove the glass tube from the cup! Pour water from the cup into the wastewater bottle.
6. Holding the glass tube in the middle, make the air bubble travel from end to end by turning the glass tube upside down for two minutes.
7. Compare your glass tube to the 9 blue glass tubes in the box. Begin on the left and move your glass tube to the right, until you find one that is the same color.
8. Find the number written below the tube that matches your sample. Record your result.
9. Put the broken glass tube into the wastewater bottle.
10. Turn this sheet over to see what your results mean.

What do your results mean?

If your result is ...	The river is...
0-3 ppm	unhealthy - not enough oxygen to support life
3-5 ppm	unhealthy - only a few fish and aquatic insects can survive
6 ppm	healthy
7 ppm or more	healthy – supports growth and activity
9 ppm or more	healthy – supports abundant fish populations

What can affect the amount of dissolved oxygen in a river?

- river water that is warmer than normal
- surface water runoff from farms, homes, industrial waste, and sewage
- a river with a low flow rate, and the lack of rapids in the area (such as behind a dam)
- decomposing organic material

Nitrates

1. Fill the test tube with 5 mL of river water.
2. Hold bottle #1 upside down and add 10 drops to the test tube.
3. Cap the test tube and gently turn it over repeatedly to mix it.
4. Shake bottle #2.
5. Hold bottle #2 upside down and add 10 drops to the test tube.
6. Cap the test tube and gently turn it over repeatedly to mix it.
7. Wait three minutes.
8. Read the test results by comparing the color of the solution to the nitrate color card. The closest match indicates the amount of nitrates in the water.
9. Record your results. Put the water in the test tube into the waste water bottle.
10. Turn this sheet over to see what your results mean.

What do your results mean?

If your result is ...	The river is ...
1-3 ppm	healthy
more than 3 ppm	unhealthy

What can affect the level of nitrates in the river?

- surface water runoff carrying fertilizer from lawns and farms
- wastewater treatment plant effluent and untreated sewage
- erosion of natural materials

pH

1. Fill the test tube with 5 mL of river water from the bucket.
2. Hold the small white bottle upside down, and add 3 drops of the liquid to your test tube.
3. Put the cap on the test tube and turn the test tube over repeatedly to mix it.
4. Compare the color of the sample in the test tube to the pH color card. The closest match indicates the pH of the water. Record the pH on a data sheet.
5. Pour your river water into the plastic wastewater bottle.
6. Turn this sheet over to see what your results mean.

What do your results mean?

If your result is...	The river is...
0.0 – 6.4	unhealthy
6.5 – 8.5	healthy
8.6 – 14	unhealthy

What affects the pH of a river?

- the amount of plant life in the river
- acid rain, acidic snowmelt
- erosion
- wastewater treatment plant effluent & untreated sewage

Temperature

1. If you are outdoors, find a shaded area, out of the sunlight.
2. Gently swirl the thermometer in your sample of water for two minutes.
3. Keep the thermometer in the water and read the temperature.
4. Record your results.
5. Turn this sheet over to see what your results mean.

What do your results mean?

Time of year	Healthy range of water temperature Merrimack River in Lowell (degrees Celsius)
May	9 - 21
June	19 - 26
July	23 – 28.4
August	21 – 28.9
September	18 - 23
October	10 - 17

What can affect water temperature?

- time of year: the amount of daylight, and seasonal weather conditions
- the overall depth of the river, and the depth of the water at which you gathered your sample
- the flow rate of the river
- water impounded (trapped) behind a dam
- electric plants use river water to cool their system, and then discharge the warm water into the river

Total Dissolved Solids (TDS)

1. Remove the clear cap and press the power button (the bottom button).
2. Lower the pointed end into the water.
3. Wait until the number on the screen stops changing.
4. With the device still in the water, press the hold the top button.
5. Record the number on your data sheet.
6. Press the power button again to shut off the device.
7. Put the clear cap back on the pointed end.
8. Turn this sheet over to see what your results mean.

What do your results mean?

If your result is ...	The river is ...
50 – 250 ppm	healthy
more than 250 ppm	unhealthy

What can affect the levels of dissolved solids in a river?

- natural erosion of rocks and soil
- cities and towns putting salt on icy roads in winter
- fertilizers for farms and yards (for example, nitrates)
- storm-water runoff and acid rain

Turbidity

1. Make sure the rope attached to the black and white Secchi disk is secured with a carabiner to the side of the boat.
2. Slowly lower the Secchi disk into the water.
3. Stop lowering the disk when it goes out of sight.
4. Raise the disk up slowly until you can just barely see it again.
5. Look at the rope where it meets the water's surface.
6. As you pull the Secchi disk back towards you, have someone hold the rope where it was at the waterline. Put the secchi disk back on the deck of the boat.
7. Start at the disk and measure how much rope was under water. The knots on the rope are half ($\frac{1}{2}$) a meter apart. This is your measure of turbidity.
8. Record your results.
9. Turn this sheet over to see what your results mean.

What do your results mean?

If your result is...	The river is...
Less than 1 meter	unhealthy
1 to 4 meters	healthy - this is the normal range for the Merrimack River

What can affect the turbidity of the river?

- soil erosion
- algae blooms
- plankton and other microscopic organisms