WATER SNAPSHOT 2001
A Local Perspective

Upper Delaware Scenic & Recreational River

Compilation of results collected by students from Sullivan West Central School District's Delaware Valley and Narrowsburg School and Wayne Highlands School District's Damascus Elementary School in conjunction with National Park Service Rangers Rocci Aguirre and Jamie Myers.

Special Thank you to Park Ranger Chris Kenyon for designing the data pages of this booklet.

Overview

Who: Sixth Grade classes from Sullivan West Central School District's Delaware Valley and Narrowsburg campuses in New York, and Wayne-Highlands School District's Damascus Elementary School in Pennsylvania.

What: Water Snapshot is a popular, basin-wide water quality sampling event that takes a "snapshot" of the health of the entire Delaware River Basin, starting from the confluence of its headwaters and ending in the Delaware River Estuary that empties into the Atlantic Ocean.

It is an opportunity for all ages and experience levels to go to a portion of the Delaware River watershed, whether it be a tributary or the Delaware River itself, and collect water quality data.

Why: In order to create an awareness of local watersheds and the valuable role they play in all of our lives. Students will gain an appreciation of the health and high quality of water in their own backyards, or next to their own schools.

When: April 20 through April 29, 2001

Where: Students in the Upper Delaware River Valley were able to collect water samples from three different aquatic settings, including a swampy area, a tributary of the Delaware River, and the main stem Delaware River. Because each of these areas is unique from each other, a comparison of results between each aquatic setting is encouraged.

Each year Water Snapshot is supported by the Delaware River Basin Commission, Delaware Department of Natural Resources and Environmental Control, Delaware Estuary Program, Delaware Riverkeeper Network, National Park Service, New Jersey Department of Environmental Protection, New York Department of Environmental Conservation, Pennsylvania Department of Environmental Protection, Pennsylvania Department of Conservation and Natural Resources, Pennsylvania Environmental Council, Pocono Environmental Education Center, Upper Delaware Council, U.S. Environmental Protection Agency, and the U.S. Geological Survey.

Delaware River Basin Commission

EXPLANATION OF WATER QUALITY TERMINOLOGY USED DURING WATER SNAPSHOT

Nitrate and Phosphate - Nitrate and phosphate are necessary for aquatic plant growth, which supports the rest of the aquatic food chain. Both of these nutrients are derived from a variety of natural and artificial sources, including decomposition of plant and animal materials, man-made fertilizers, and sewage. Rainfall also can be a significant source of nitrates. While excessive nutrients might cause undesirable plant growth with their deleterious impacts on water quality, an appropriate level of nutrients is one of the driving forces of the aquatic ecosystem.

Determining the optimum levels of nitrates and phosphates in water is extremely complex. Their levels often fluctuate considerably because they are constantly being taken up and released by aquatic life, being exchanged with stream bed sediments, and undergoing various other transformations.

Natural nitrate concentrations rarely exceed 10 milligrams per liter (mg/l). Most are less than 1 mg/l, especially during periods of high plant production. Concentrations greater than 20 mg/l may pose a health hazard to small mammals, causing a problem where the blood's hemoglobin cannot transport oxygen.

In natural unpolluted water, phosphate levels are generally very low. Phosphorus, which combines with oxygen to form phosphate, is most often the limiting factor for plant production in streams.

Oxygen - Dissolved - Dissolved oxygen (DO, pronounced dee-oh) is oxygen that is dissolved in water. It gets there by diffusion from the surrounding air; aeration of water that has tumbled over falls and rapids; and as a product of photosynthesis. The amount of dissolved oxygen present is affected by temperature. Cold water generally contains more DO than warm water.

If water is too warm, there may not be enough oxygen in it. When there are too many bacteria or aquatic animals in the area, they may overpopulate, using DO in great amounts.

Oxygen levels also can be reduced through over fertilization of water plants by run-off from farm fields containing phosphates and nitrates (the ingredients in fertilizers). Under these conditions, the numbers and size of water plants increase a great deal. Then, if the weather becomes cloudy for several days, respiring plants will use much of the available DO. When these plants die, they become food for bacteria, which in turn multiply and use large amounts of oxygen.

How much DO an aquatic organism needs depends upon its species, its physical state, water temperature, pollutants present, and other factors. For example, at 5 °C (41 °F), trout use about 50-60 milligrams (mg) of oxygen per hour; at 25 °C (77 °F), they may need five or six times that amount. Fish are cold-blooded animals, so they use more oxygen at higher temperatures when their metabolic rate increases.

Numerous scientific studies suggest that 4-5 parts per million (ppm) of DO is the minimum amount that will support a large, diverse fish population. The DO level in good fishing waters generally averages about 9.0 parts per million (ppm).

pH - pH is a measure of the acid/alkaline relationship in a water body. pH values range on a scale of zero to 14, with 7 being neutral. Since pH is logarithmic, a one-notch change in pH (e.g., from 6 to 7) represents a 10-fold increase.

A pH of about 6 to 9 is generally favored by aquatic life, especially fish. Algae and rooted plants in a stream modify pH levels through the photosynthesis and respiration processes. If plants are active, wide swings in pH levels can be observed over a 24-hour period, with low values experienced at night and high values experienced at midday. In-stream pH levels can also be impacted by acid and alkaline chemicals from industry, mining, acid rain, and other man-made sources, as well as by natural sources such as limestone deposits (bedrock) and tannic acid (produced by certain vegetation).

Turbidity - The American Public Health Association (APHA) defines turbidity as "the optical property of a water sample that causes light to be scattered and absorbed rather than transmitted in straight lines through the sample. In simple terms, turbidity answers the question, "How cloudy is the water?"

Light's ability to pass through water depends on how much suspended material is present. Turbidity may be caused when light is blocked by large amounts of silt, microorganisms, plant fibers, sawdust, wood ashes, chemicals, and coal dust. Any substance that makes water cloudy will cause turbidity. The most frequent causes of turbidity in lakes and rivers are plankton and soil erosion from storm water runoff.

The most accurate way to determine water's turbidity is with an electronic turbidimeter. The turbidimeter has a light source and a photoelectric cell that accurately measures the light scattered by suspended particles in a water sample. The results are reported in units called Nephelometric Turbidity Units or NTU's.

Water Temperature - Water temperature is an important environmental factor for fish and other aquatic life, with many species needing specific temperature ranges to thrive. Temperature affects the concentrations of dissolved oxygen in water, with higher concentrations occurring with colder temperatures.

Damascus School - Damascus, PA

Results of sample testing performed by students of Mrs. Vosburg's and Mrs. Alexander's classes.

WEATHER CONDITIONS

Air Temp: 20°C *Description*: SUNNY

SAMPLING LOCATION - Beaverdam Creek

SAMPLING DATE - April 20, 2001

	Water Temp. (°C)	pH	Dissolved Oxygen (ppm)	Water Depth (meters)	Nitrate (ppm)	Phos-phate (ppm)
Steven, Kristi, and Andrew	6	8	4		0	2
Heather, Mandy, and Breanne	18	6	8		0	0
Shelley, Alycia, and George	18	8	8		0	1
Phil, Nick, and Andrew	18	8	8		0	0
Kelly, Spencer, and Jennifer	14	7	4		5	1
Lauren, Dan, Ryan, and Justin	14	8	4	0.33	5	1
Anonymous	18	8	4		0	0
Scott ,Lauren, Gina, and Amanda	20	7	8	0.33	0	0
Hillary, Caitlin, and Thol	18	8	4	2.5	0	0
Lauren, Dan, and Steven	20	6	4	0.33	0	2
Ray, Matt, Alyssa, and T.J.	6	8	4	0.33	0	0
Carrie, Stephanie, Camila	14	6	8		0	1
Class Averages	**15.333**	**7.333**	**5.667**	**0.764**	**0.833**	**0.667**

Delaware Valley School - Callicoon, NY

Results of sample testing performed by students in the classes of Mrs. Kraack, Mrs. Humleker, and Mr. Sebastiano.

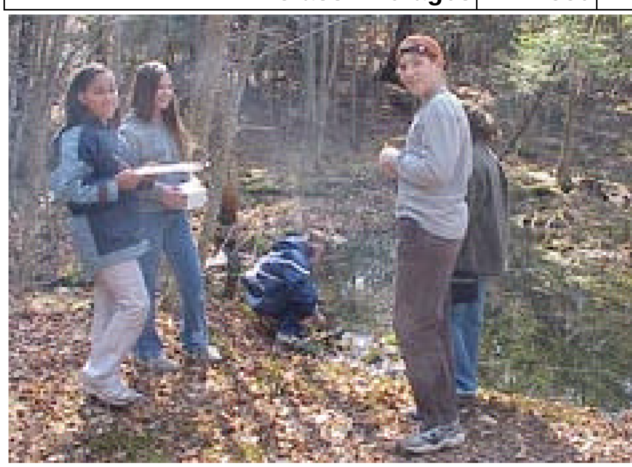
WEATHER CONDITIONS

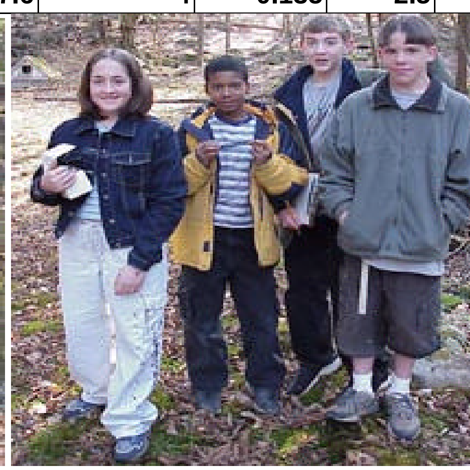
Air Temp: 10°C *Description*: SUNNY

SAMPLING LOCATION - swampy area in woods next to springhouse.

SAMPLING DATE - April 20, 2001

	Water Temp. (°C)	pH	Dissolved Oxygen (ppm)	Water Depth (meters)	Nitrate (ppm)	Phos-phate (ppm)
Maegan, Shannon, Mercedes, and Marcus	12	8	4		5	1
Mandy, Heidi, Patrick, Chris, and David	6	8	4		5	1
Michael, Tony, Deanna, Natasha, and Ashley	10	8	4	0.05	0	0
Joe, Melissa, Amanda, Katelyn, and Nathaniel	6	8	4		0	0
Kelsey, Kristie, Mallory, Matt, and Garret	5	7	4	0.15	0	0
Danielle, Patti, Brett, Andrew, and Stacey	4	8	4	0.01	5	0
Vincent, Danielle, Joe, and Paige	32	7	4		0	1
Ben, Dan, Nick, John, and Erica	18	7	4	0.33	0	0
Donald, Lucas, Kent, and Stevie	14	8	4		5	0
Gary, Matt, Henry, and James		7	4		5	2
Class Averages	**11.889**	**7.6**	**4**	**0.135**	**2.5**	**0.5**





Narrowsburg School - Narrowsburg, NY

Results of sample testing performed by students of Mr. Walsh's class.

WEATHER CONDITIONS

Air Temp: 23°C *Description*: SUNNY

SAMPLING LOCATION - Delaware River at Narrowsburg Access Area

SAMPLING DATE - April 24, 2001

	Water Temp. (°C)	pH	Dissolved Oxygen (ppm)	Water Depth (meters)	Nitrate (ppm)	Phos-0 phate (ppm)
Greg, Heather, Angela, and Ginger	16	7	8	0.33	0	0
Britt, Ashleigh, Kelsey, Alex, and Josh	20	7	4	0.15	0	0
Michael, James, Jesse, and Kaitlin	28	6	8		5	1
Nicole, Chelsie, Jeff, and Addie	15	8	4	0.15	5	1
Katlyn, Chris, Emily, and John	18	7	8	0.25	0	1
Class Average	**19.4**	**7**	**6.4**	**0.22**	**2**	**0.6**