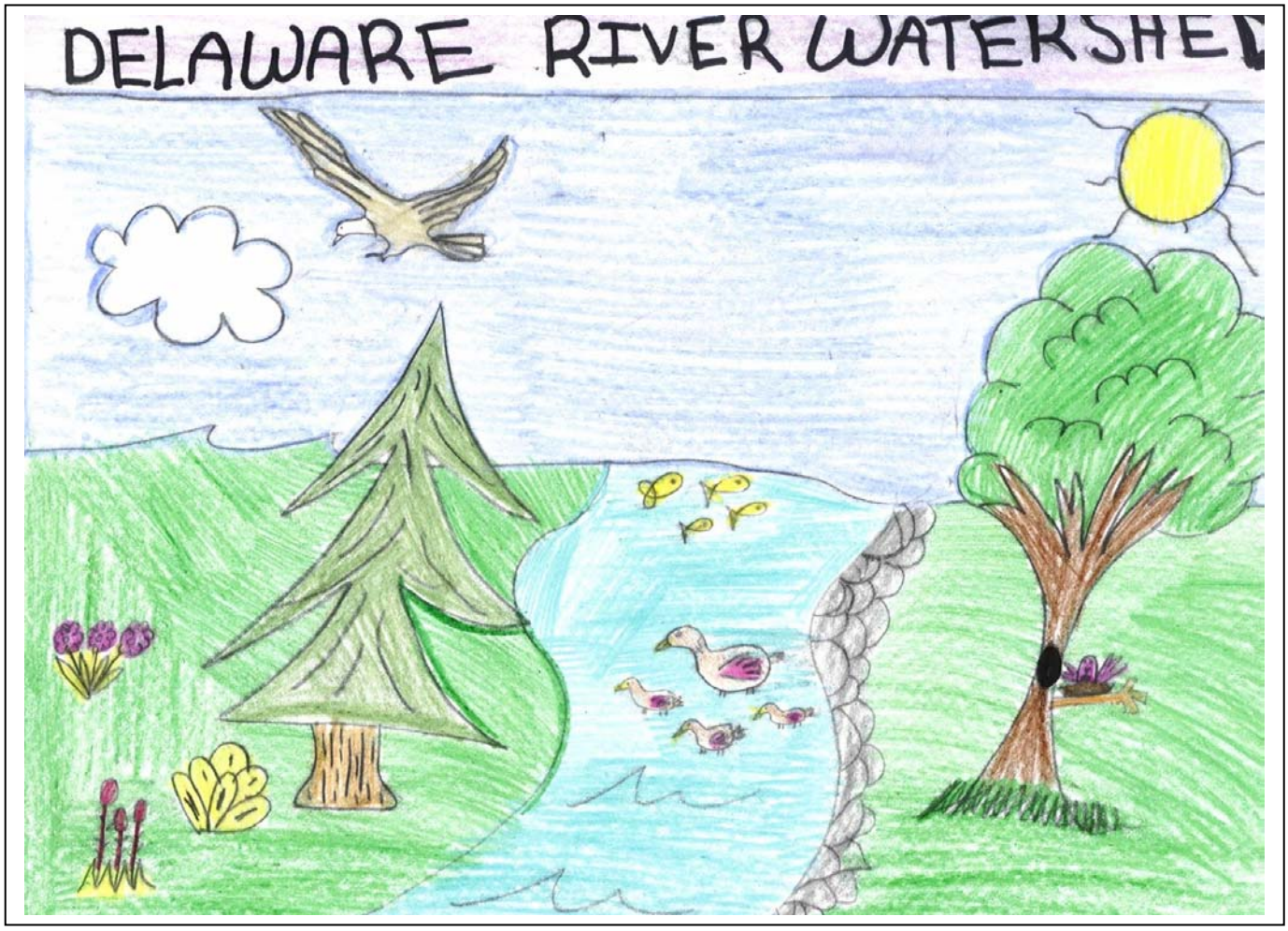
WATER SNAPSHOT 2004

An Upper Delaware Snapshot



Drawing by Kortnie Figura – Preston Area School

Upper Delaware Scenic & Recreational River

Compilation of results collected by students from Wayne-Highlands School District's Damascus Elementary School, Preston Area School and Wayne Highlands Middle School in conjunction with National Park Service Ranger Jamie Myers and Rich Egan.

My forest is special.
You can do anything in my forest.

Forests are amazing.
Owls, falcons and deer are just a few things in my forest.
Riding horses in my forest is fun.
Ever so nice in my forest.
So sweet is the smell of raspberries and fresh air.
The forest is special to me because it's always there.

By John Martin
Wayne-Highlands Middle School

Drawing by Austin LoCicero – Damascus Elementary

Overview

Who: Fifth Grade classes from Wayne-Highlands School District's Damascus Elementary School, Preston Area School and Wayne Highlands Middle 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 people of all ages and experience levels to go to a portion of the Delaware River watershed, whether it is a tributary or the Delaware River itself, and collect water quality information.

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 16 through April 25, 2004

Where: Students in the Upper Delaware River Valley were able to collect water samples from three different aquatic settings. This year three different tributaries of the Upper Delaware were sampled along with the main stem Delaware River. Because each of these areas are unique from each other, a comparison of results between each aquatic setting is encouraged.

Be sure to check out the DRBC Water Snapshot WebPage at:

http://www.state.nj.us/drbc/snapshot.htm

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.

"The Delaware River is a beautiful and lively river. Many animals live here, but if we pollute the lakes and streams we will also pollute the Delaware River."

Noel Slifko ~ Preston Area School

Damascus Elementary School – Damascus, PA

Results of sample testing performed by students of Mr. Smith's and Mrs. Phillip's classes.

WEATHER CONDITIONS

Air Temp: 14°C *Description*: PARTLY CLOUDY/OVERCAST

Was there precipitation within the past 48 hours? YES

SAMPLING LOCATION – Beaverdam Creek & Delaware River

SAMPLING DATE – April 20, 2004

	Water Temp. (°C)	pH	Dissolved Oxygen (ppm)	Water Depth (meters)	Nitrate (ppm)	Phos-phate (ppm)
Justen, Ethan, Kelly, Kyle	14	7	4		<5	<1
Chris, Mark, Megan, Laura	14	8	4	0.33	5	
Kelsey, Nick, Dylan, Jimmy	12	7.5	8		<5	<1
Austin, Mike, Jake, Lisa	<14	8	4		<5	<1
Joey, Zach, Hunter, Philip	14	7	4		<5	<1
Rony, Jake, Isaiah, Silvana	14	8	4		<5	1
Courtney, Alexis, Randi, Cassie	<14	7.5	4	0.08	<5	<1
Vanessa, Dirk, Shephen, Sara	14	8	4		<5	1
Class Averages	**13.75**	**7.6**	**4.5**	**0.21**	**<5**	**<1**

AQUATIC LIFE OBSERVED: algae, rooted plants, invertebrates, fish, and amphibians.

WAS THE WATER CLOUDY? NO

"Please keep the water clean. The fish need to live their life just like you and me."

Lisa Sepesi ~ Damascus Elementary

Wayne Highlands Middle School – Honesdale, PA.

Results of sample testing performed by students of Mrs. Hauenstein's class.

WEATHER CONDITIONS

Air Temp: 17°C *Description*: RAIN

Was there precipitation within the past 48 hours? YES

SAMPLING LOCATION – Lackawaxen River

SAMPLING DATE – April 23, 2004

	Water Temp. (°C)	pH	Dissolved Oxygen (ppm)	Nitrate (ppm)	Phos-phate (ppm)
Brittney, Johnny, Caitlin, Ashley	18		8	<5	<1
Kayla, Ashley, Andrea, Luke, Gina	18	8	8	<5	1
Mo, Joe, Brandon, Stellie, Marlee	16	8		<5	<1
Tommy, Joe, Eric, Josh	18	8	8	5	2
Tim, Kevin, Chris, Scott	18	8	8	<5	<1
Tim, Frank, Jeremy	18	8	8	<5	<1
Class Averages	**17.6**	**8**	**8**	**<5**	**1.2**

Preston Area School – Lakewood, PA

Results of sample testing performed by students of Mr. Myers' and Miss Kilker's classes.

WEATHER CONDITIONS

Air Temp: 23°C *Description:* PARTLYCLOUDY

Was there precipitation within the past 48 hours? YES

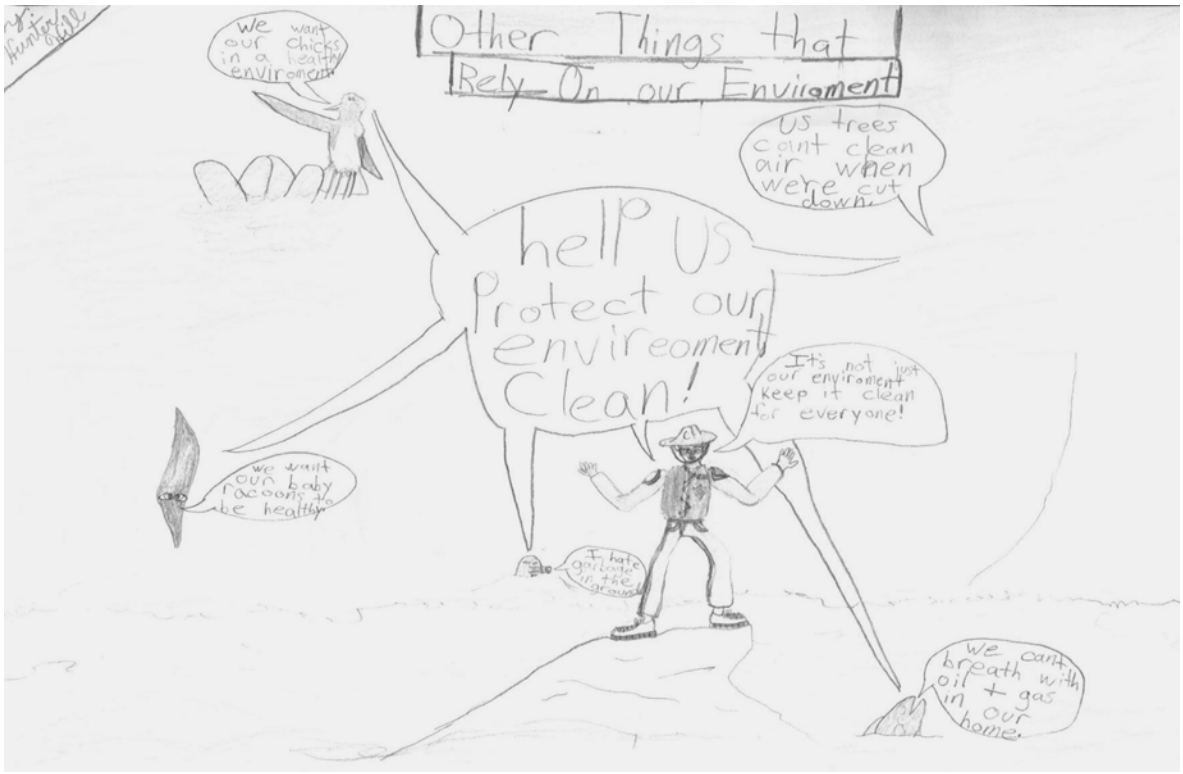
SAMPLING LOCATION – Equinunk Creek

SAMPLING DATE – April 19, 2004

	Water Temp. (°C)	pH	Dissolved Oxygen (ppm)	Nitrate (ppm)	Phos-phate (ppm)
Jon, Eric, Kortnie	16	8	8	<5	1
Mike, Matt, Charlie, Kasey	16	8	8	<5	<1
Greg, Zach, Jordan, Stephanie	16	8	4	<5	4
Shane, Frank, Angellica	16	8	8	<5	<1
Josh, Chelsea, Russell, Chris	16	8	8	<5	1
Rachel, AJ, Bradley, Cody	16	8	8	<5	1
Noel, Zach, Shannon, Brett, Josh R.	16	8	8	<5	<1
Class Averages	**16**	**8**	**7.4**	**<5**	**1.4**

“WATER SNAPSHOTS”

Drawing by Shannon Miller – Preston Area School



Drawing by Hunter Hill – Damascus Elementary