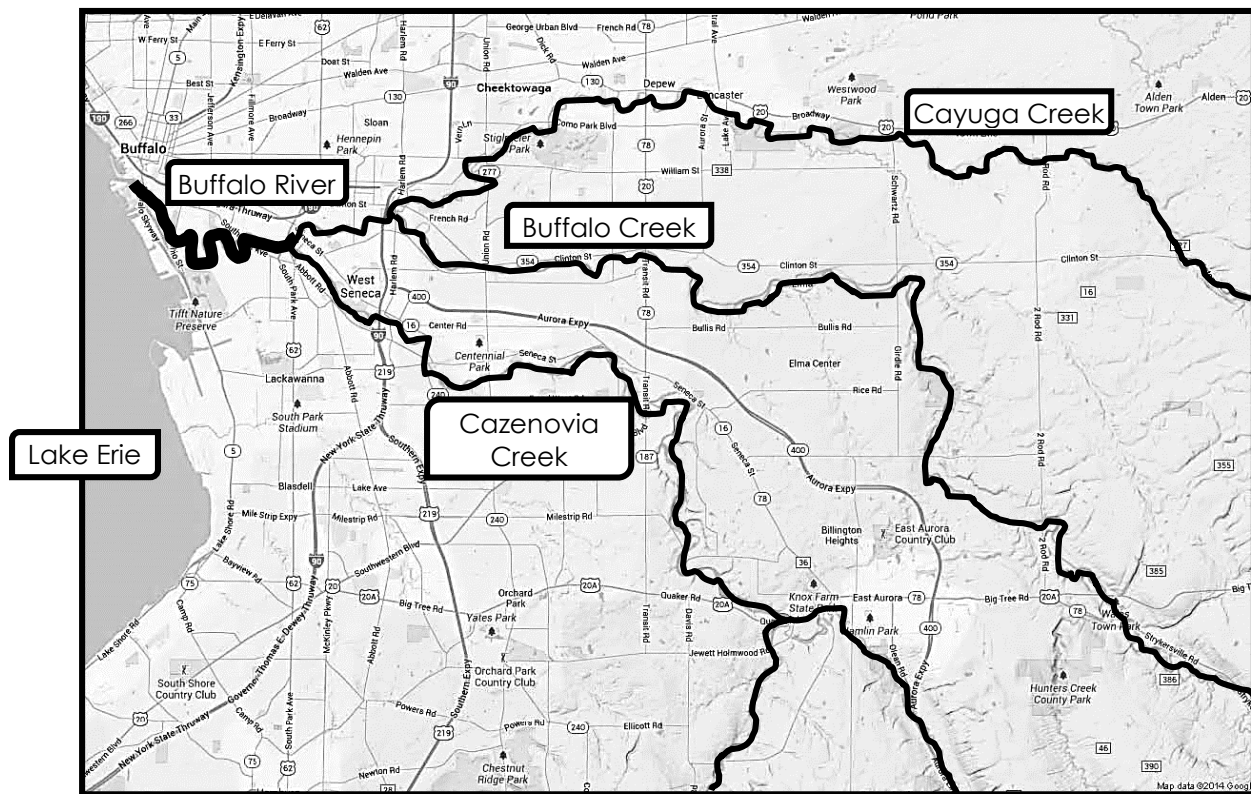


Student Activity Packet

A DAY IN THE LIFE OF THE

BUFFALO RIVER



Welcome to the Buffalo River!

As a scientist, your goal for today is to explore, discover, and observe everything you can about your sample site.

Taking data is like taking a snapshot of the Buffalo River: temperature, weather, plants, animals and chemistry are all part of that picture. Carefully collect your data and record your findings. Investigate environmental clues that might help you to understand or explain your data. Good luck!

Name: _____

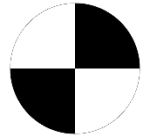
Sample Site: _____

Circle your waterway: Buffalo River Buffalo Creek Cayuga Creek Cazenovia Creek



**Department of
Environmental
Conservation**

Activity 1: Turbidity



Time Limit: 15 minutes

Equipment: turbidity tube, measuring cup, waders, life jacket, Activity 1 Instructions

Time	Reading 1	Reading 2	Average
	in.	in.	in.
	cm.	cm.	cm.

Conversions

Centimeters = inches x 2.54
Inches = cm x 0.394

Field Observations

How turbid is the water? Mark your observation on the line.

Clear

Mostly clear

Half & Half

Cloudy

Extremely cloudy



Field Observations: Circle all that apply.

OBSERVATION	LIKELY CAUSE
Light brown water (muddy or cloudy)	Mud, silt or sand on the river bottom may result from runoff from construction sites or bank erosion
Green water: dark green or blue-green	Organic pollution is being released into the water, feeding algae and causing them to grow.
Multi-color film over water surface	Oil or gasoline spill
Foam floating on water surface	If white in color and over 3 inches high, indicates fertilizer/detergent pollution
Bubbles rising to surface	Anaerobic respiration: bacteria digest leaves etc. which creates gas bubbles.

Activity 2: Weather and Wind

Time Limit: 15 minutes

Equipment: air thermometer, compass, flagging tape, anemometer, sand timer, Activity 2 Instructions

1. Weather

Time	Air Temperature ° F	Air Temperature ° C

Temperature Conversions

$$^{\circ}\text{C} = 0.556 \times (^{\circ}\text{F} - 32)$$

$$^{\circ}\text{F} = (1.8 \times ^{\circ}\text{C}) + 32$$

Cloud cover: (check one)

- Clear (0-25%) Partly cloudy (26-50%)
 Mostly cloudy (51-75%) Overcast (76-100%)

Precipitation: (check all that apply)

- None
 Rain
 Snow
 Rain and snow
 Other: _____

2. Wind

Wind direction: _____

Wind Speed: _____ rotations per minute

Describe the river water: (check one)

- Virtually flat
 Calm, slightly wavy
 Rippled
 Choppy/High waves

Field Observations: Cause and Effect

Describe the weather conditions for the last three days. Were there any heavy rains, extreme temperatures, or high winds? How could these conditions affect the water quality?

Activity 3: Environment at the Sample Site

Time Limit: 15 minutes

Equipment: measuring tape, meter stick, field guides, Activity 3 Instructions

1. Using the list below, describe the land around your site. Estimate to the nearest 5%.

_____% houses (urban/residential)
 _____% forest
 _____% beach
 _____% marsh/swamp
 _____% industrial/commercial
 _____% recreational (playgrounds, sports)
 _____% roads or parking lots
 _____% other: _____
 = 100%

Field Observations

Draw/identify a plant found at your site.

2. Shoreline appearance (*check all that apply*):

- Beach area
 Marsh
 Covered with plants
 Muddy
 Pier
 Debris
 Pipe entering river
 Bulkheading (wooden timbers or metal plates holding shore in place)
 Riprap (large rocks piled up along the shore)
 Other: _____

3. What is the water depth at the sample site? _____in. /_____cm.

4. River *bottom* is mostly: (*check one*)

- Sandy Muddy Unable to determine
 Rocky Weedy

5. What percent of the river *bottom* is covered with plants? (*check one*)

- 0-25% 26-50% Unable to determine
 51-75% 76-100%

6. What percent of the river *surface* is covered with plants? (*check one*)

- 0-25% 26-50%
 51-75% 76-100%

Field Observations

Walk along the shoreline and list the items you find (both man-made and natural):

Field Observations

Describe **three ways** in which the environment at your sample site can impact water quality either positively or negatively.

Activity 4: Nitrate and Phosphate Levels

Time Limit: 15 minutes

Equipment: water chemistry kit, waders, sand timer, container for waste chemicals, Activity 4 instructions

1. Nitrate

Time	Nitrate Level (ppm)

2. Phosphate

Time	Phosphate Level (ppm)

Field Observations: Cause and Effect

Do the nitrate levels show pollution (above 4ppm?) *(circle one)*

Yes

No

Are the phosphate levels within the healthy range (below 0.1 ppm, water remained clear)? *(circle one)*

Yes

No

List two possible causes of increased nitrate or phosphate levels in the river:

Activity 5: Water Temperature

Time Limit: 15 minutes

Equipment: water thermometer, meter stick, waders, Activity 5 Instructions



	Time	Depth	Temperature
Reading 1			
Reading 2			
	Average Temperature		

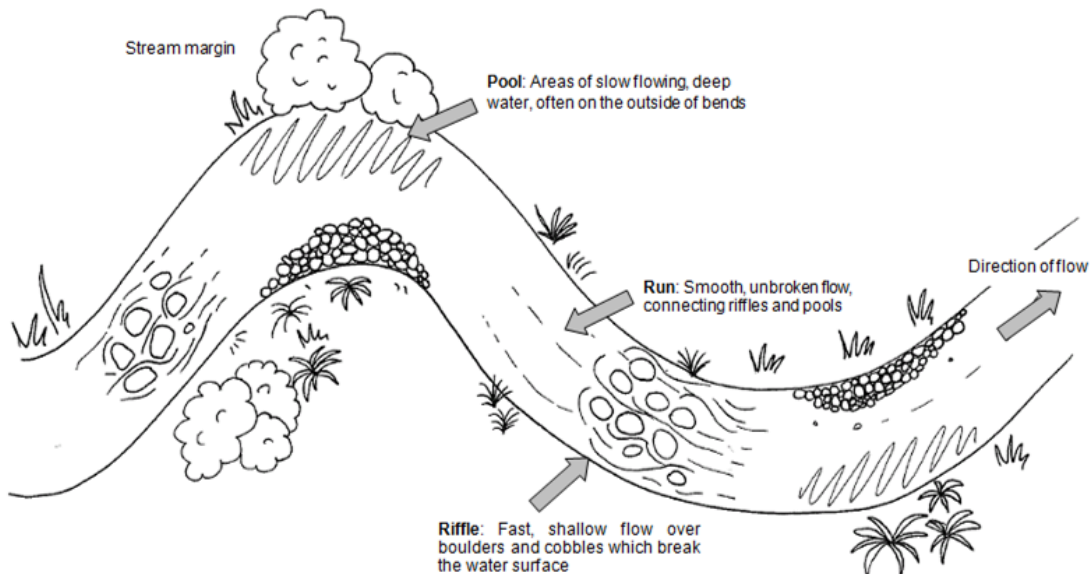
Field Observations

Check off all of the potential sources of thermal pollution at your site.

- | | | |
|---|---|---------------------------------------|
| <input type="checkbox"/> Industry/power plant | <input type="checkbox"/> Parking lot/sidewalk | <input type="checkbox"/> Buildings |
| <input type="checkbox"/> Road | <input type="checkbox"/> Pipe entering water | <input type="checkbox"/> Other: _____ |

If you are near flowing water, identify as many of the water features as you can using the picture below. What feature would you predict has the highest temperature?

- Pool
- Riffle
- Run



Activity 6: Bioassessment

Time Limit: 15 minutes

Equipment: waders, life jackets, scoop nets, viewers, shallow tubs, macroinvertebrate ID sheets, field guides, seine net (optional), Activity 6 Instructions

Macroinvertebrate Species List

Species	Estimated #
1. _____	_____
2. _____	_____
3. _____	_____
4. _____	_____
5. _____	_____
6. _____	_____
7. _____	_____
8. _____	_____
9. _____	_____
10. _____	_____

Field Observations

Sketch an animal you saw!

Field Observations

List any other species you saw (birds, fish, frogs, etc.)

Pollution Tolerance Index

Group 1 Macroinvertebrates: Very Intolerant	Group 2 Macroinvertebrates: Intolerant	Group 3 Macroinvertebrates: Tolerant	Group 4 Macroinvertebrates: Very Tolerant
____ Stonefly ____ Mayfly ____ Caddisfly ____ Dobsonfly	____ Dragonfly ____ Damselfly ____ Scud	____ Water Strider ____ Water Mite ____ Crayfish	____ Pouch Snail ____ Aquatic Worm ____ Water Boatman
# of checks _____ x 4 Group Score = _____	# of checks _____ x 3 Group Score = _____	# of checks _____ x 2 Group Score = _____	# of checks _____ x 1 Group Score = _____
Total Score = _____ Definitions: Intolerant = animal <u>can't</u> live in polluted water. Tolerant = animal <u>can</u> live in polluted water.		Water Quality Assessment (circle one): 23 + = Potentially Excellent Water Quality 17-22 = Potentially Good Water Quality 11-16 = Potentially Fair Water Quality < 10 = Potentially Poor Water Quality	

Activity 7: Chemical Analysis

Time Limit: 15 minutes

Equipment: water chemistry kit, waders, water thermometer, container for waste chemicals, sand timer, Activity 7 Instructions

1. DISSOLVED OXYGEN

Time	Water Temperature	DO (ppm)	% Saturation (extra activity)
	° F		
	° C		

Field Observations: Cause and Effect

Is the DO within the healthy range (5-11 ppm)? (circle one) Yes No

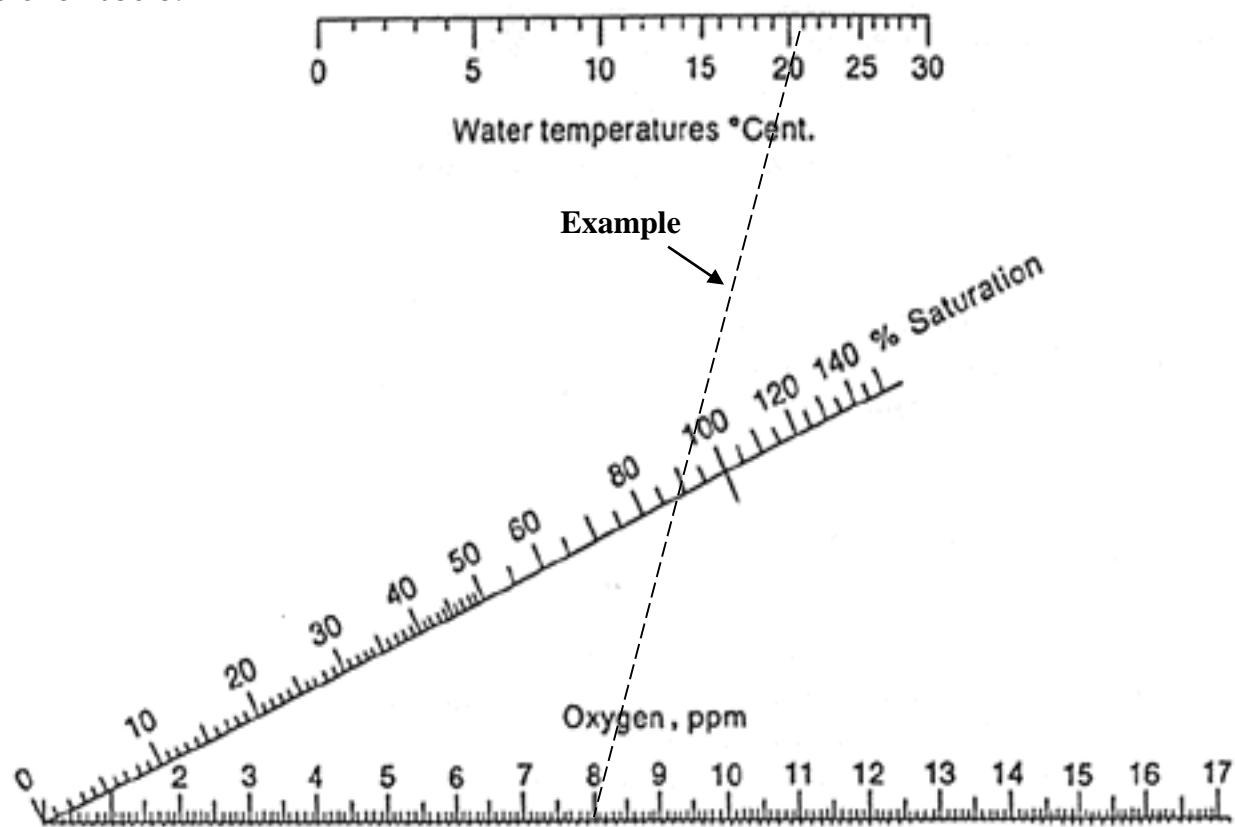
What could cause DO to change? (Hint: look at turbidity, water temperature, and wind speed data.)

What effect would a decrease in DO have on this ecosystem?

Extra Activity: Based on the % saturation value, is your water healthy (90% or above)? Yes No

EXTRA ACTIVITY: Dissolved Oxygen - Percent Saturation

Pair up the measured ppm of DO with the water temperature (° C). Draw a straight line between the two values. The percent saturation is the value where your drawn line intercepts the angled saturation scale.



2. pH

Test Type	Time	pH
Tablet		
pH Strip		
pH Strip		
pH Strip		
pH Strip		
pH Strip		

Field Observations: Cause and Effect

Is the tablet-test pH within the healthy range (6.5 - 8.2)? (circle one)

Yes

No

What could cause the pH of the river to change?

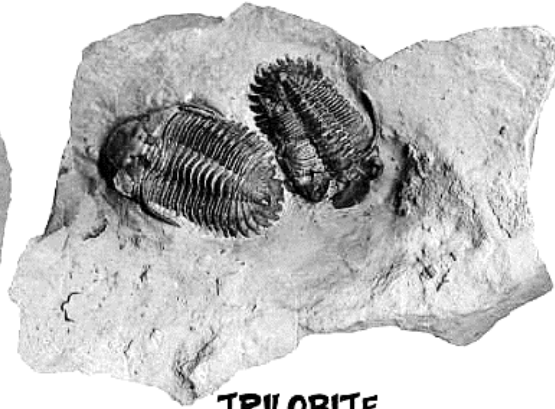
Can you find any evidence of ancient life at your sample site?

COMMON FOSSILS FROM THE DEVONIAN OF WESTERN NEW YORK

PENN DIXIE CENTER - LAKE ERIE SHORES - CREEKS



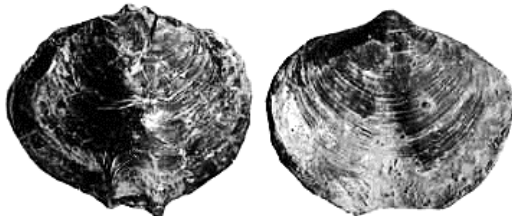
TRIOLOBITE
ELDRIDGEOPS RANA (PHACOPS RANA)
PRONE AND ENROLLED EXAMPLES



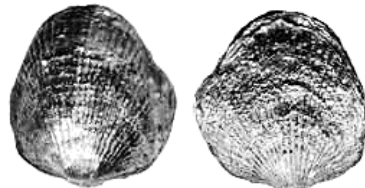
TRIOLOBITE
GREENOPS BARBERI
GREENOPS GRABAU LOOKS SIMILAR,
BUT HAS SHORTER PYGIDIUM SPINES



TRIOLOBITE (1/2 SIZE)
TRIMERUS DEKAYI
(DIPLEURA DEKAYI)
CEPHALON



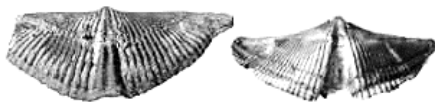
BRACHIOPOD
ATHYRIS SPIRIFEROIDES



BRACHIOPOD
PSEUDOATRYPA DEVONIANA



BRACHIOPOD
SPINATRYPA SPINOSA



BRACHIOPOD
MUCROSPIRIFER MUCRONATUS



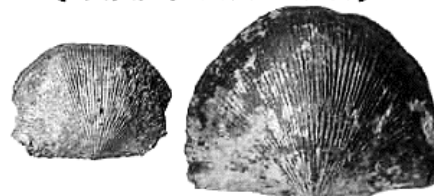
BRACHIOPOD
MEDIOSPIRIFER AUDACULUS
(SPIRIFER AUDALCULUS)



BRACHIOPOD
SPINOCYRTIA GRANULOSA
(SPIRIFER GRANULOSUS)



BRACHIOPOD
RHIPIDOMELLA PENELOPE



BRACHIOPOD
STROPHEODONTA DEMISSA



CEPHALOPOD
SPYROCERAS SP.
(STRAIGHT-SHELLED NAUUTOID)



CORAL
PLEURODICTYUM
AMERICANUM



HORN CORAL
STEREOLASMA RECTUM



CRINOID STEM FRAGMENTS

FOR MORE EXTENSIVE FOSSIL IDENTIFICATION GO TO:



WWW.FOSSILGUY.COM/SITES/18MILE/