



Students2Science
Outdoor Learning
Experience
Volunteer Information

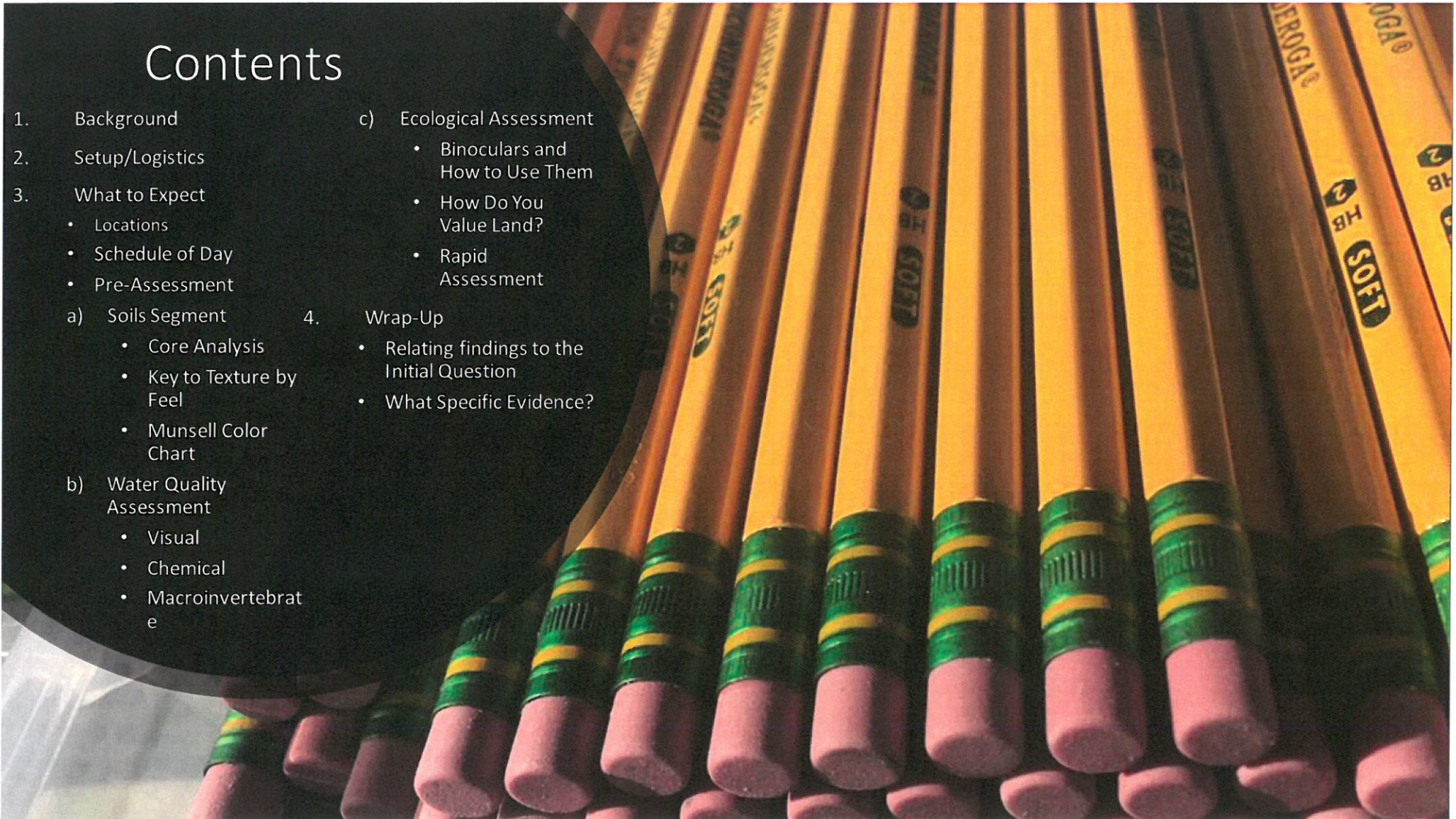


**Great Swamp
Watershed
Association**



Contents

1. Background
2. Setup/Logistics
3. What to Expect
 - Locations
 - Schedule of Day
 - Pre-Assessment
- a) Soils Segment
 - Core Analysis
 - Key to Texture by Feel
 - Munsell Color Chart
- b) Water Quality Assessment
 - Visual
 - Chemical
 - Macroinvertebrate
- c) Ecological Assessment
 - Binoculars and How to Use Them
 - How Do You Value Land?
 - Rapid Assessment
4. Wrap-Up
 - Relating findings to the Initial Question
 - What Specific Evidence?



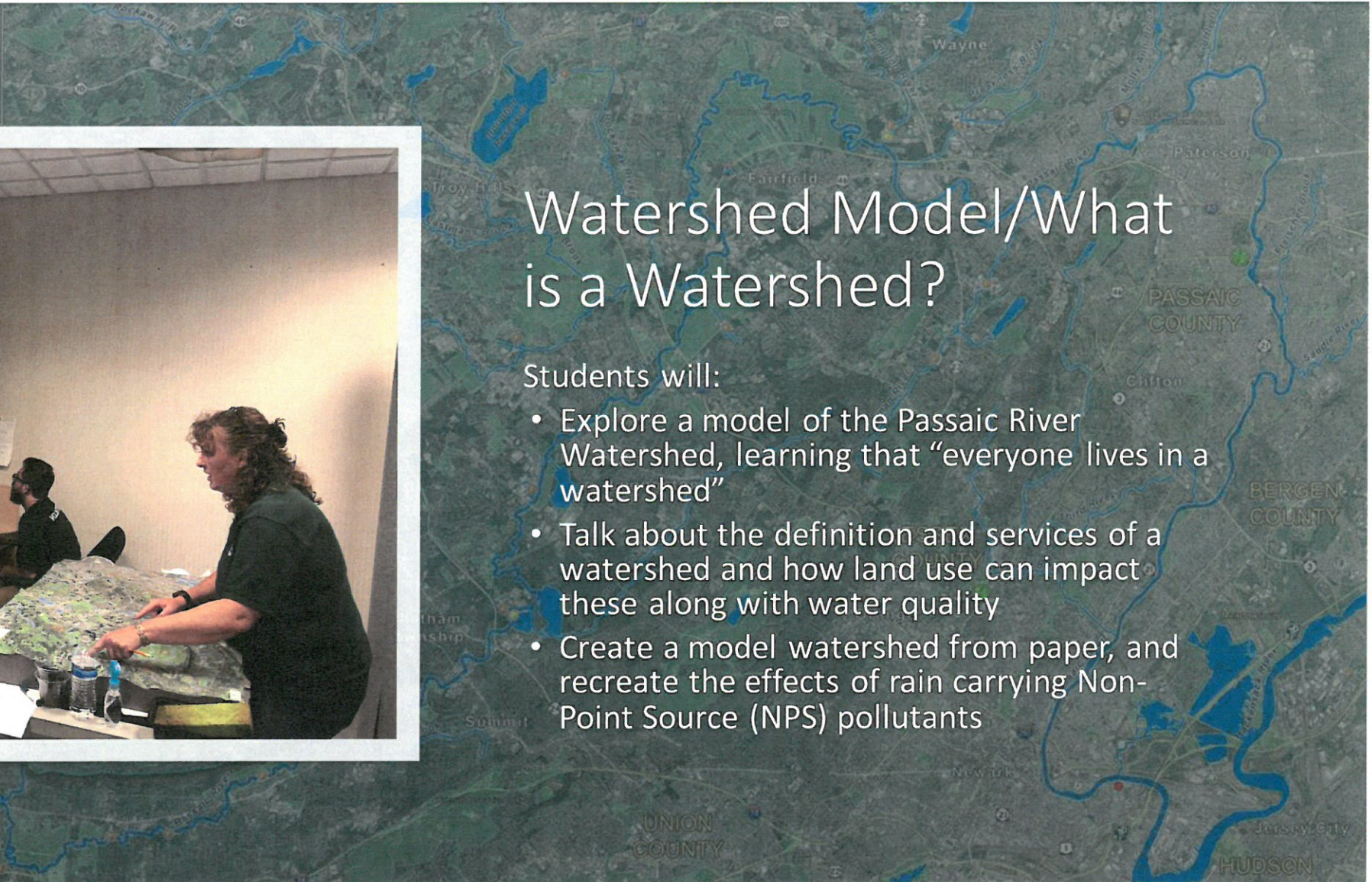
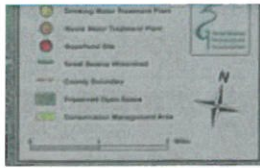
Background

- How did we get here?
 - Students coming for the field experience have already completed a virtual lab session (V-Lab) with GSWA staff in which we discussed and explored three topics:
 1. What is a watershed and why are they important and what factors can influence water quality?
 2. How are soils formed and two field tests we can conduct on site to determine composition.
 3. Water quality parameters and two field tests we can conduct on site to assess stream health.

Students from Somerville High School on the V-Lab screen



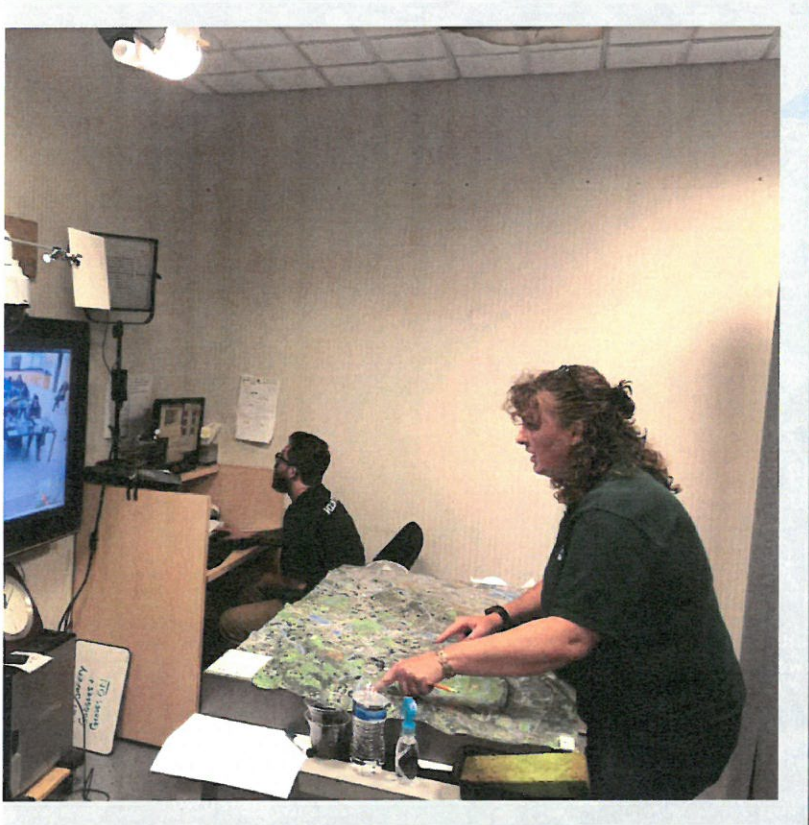
A model watershed made of paper and magic marker



Watershed Model/What is a Watershed?

Students will:

- Explore a model of the Passaic River Watershed, learning that “everyone lives in a watershed”
- Talk about the definition and services of a watershed and how land use can impact these along with water quality
- Create a model watershed from paper, and recreate the effects of rain carrying Non-Point Source (NPS) pollutants



Soils Background

- Students will:
 - Observe a sample “soil core” and learn about horizons and formations and how they impact water quality and hydrology
 - Using a “Key to Texture by Feel” chart, analyze sample soils and practice methods they will use on-site
 - Determine if soils samples are hydric or non-hydric using a Munsell color chart



Water Quality Parameters

Students will:

- Discuss the three types of water quality assessments GSWA typically conducts and how they play a role in stream health assessment
 - Visual
 - Biological
 - Chemical
- Conduct water turbidity assessment using a secchi disk
- Test the pH of three samples and compare their results

Acidic

Neutral

Alkaline

3 4 5 6 7 8 9 10 11 12



The Premise

Students over the course of the day will be exploring the following hypothetical problem:

Unfortunately, GSWA has recently received word that the beginnings of a large construction project consisting of the development of a 65,000 square foot office complex with parking lots for 500 employees has begun directly upstream from the location you are currently standing in. We need to determine if this development is impacting these protected lands and waters, and whether the development may encroach on valuable delineated wetlands or impair habitats, so we can determine our response to Giganticorps.



Setup



Volunteers assist by helping prepare materials for the day which includes:

- Clipboards and worksheets
- Boots, nets, and other equipment
- Water stations and clean-up supplies
- Distribution of pencils and pre-assessment sheets

Logistics

Programs will proceed rain or shine*



Logistics



Please plan to arrive by 8:45-9am



Bring water and lunch, there are no sources of drinkable water on-site



Wear appropriate outdoor clothing and footwear (Long sleeves, long pants, boots/hikers that can get muddy or possibly wet)



Please reach out to either Hazel England 908-477-4578 or Adam Palmer 908-399-5610 if you have any questions regarding weather, location or anything else

Logistics

- Out of an abundance of safety for both students and volunteers, volunteers should never be alone with a student. Please make sure either a GSWA staff, school chaperone or other students are present during any interactions
- All GSWA staff are trained and CPR/First Aid Certified, please alert a staff member to a medical emergencies of any severity so that proper course of action can be taken (even if as simple as requiring a bandage)



A close-up photograph of a person's hand holding a small, dark-colored lizard. The lizard is positioned horizontally across the palm. The text "What to Expect" is overlaid in white, sans-serif font in the center of the image. A thin white vertical line is positioned to the left of the text.

What to Expect

Locations

There are two possible locations where the field experience will happen, depending on site accessibility/conditions. **PLEASE double check your confirmation email the day before to ensure you know which location to be at.** If you have any questions, please reach out to either

- Hazel England 908-477-4578 or
 - Adam Palmer 908-399-5610
1. **Conservation Management Area (CMA)** -
93 Tiger Lily Lane, Morristown NJ
 2. **Great Swamp National Wildlife Refuge** -
32 Pleasant Plains Rd, Harding, NJ



Schedule of Day

*Timing may vary slightly by each school group

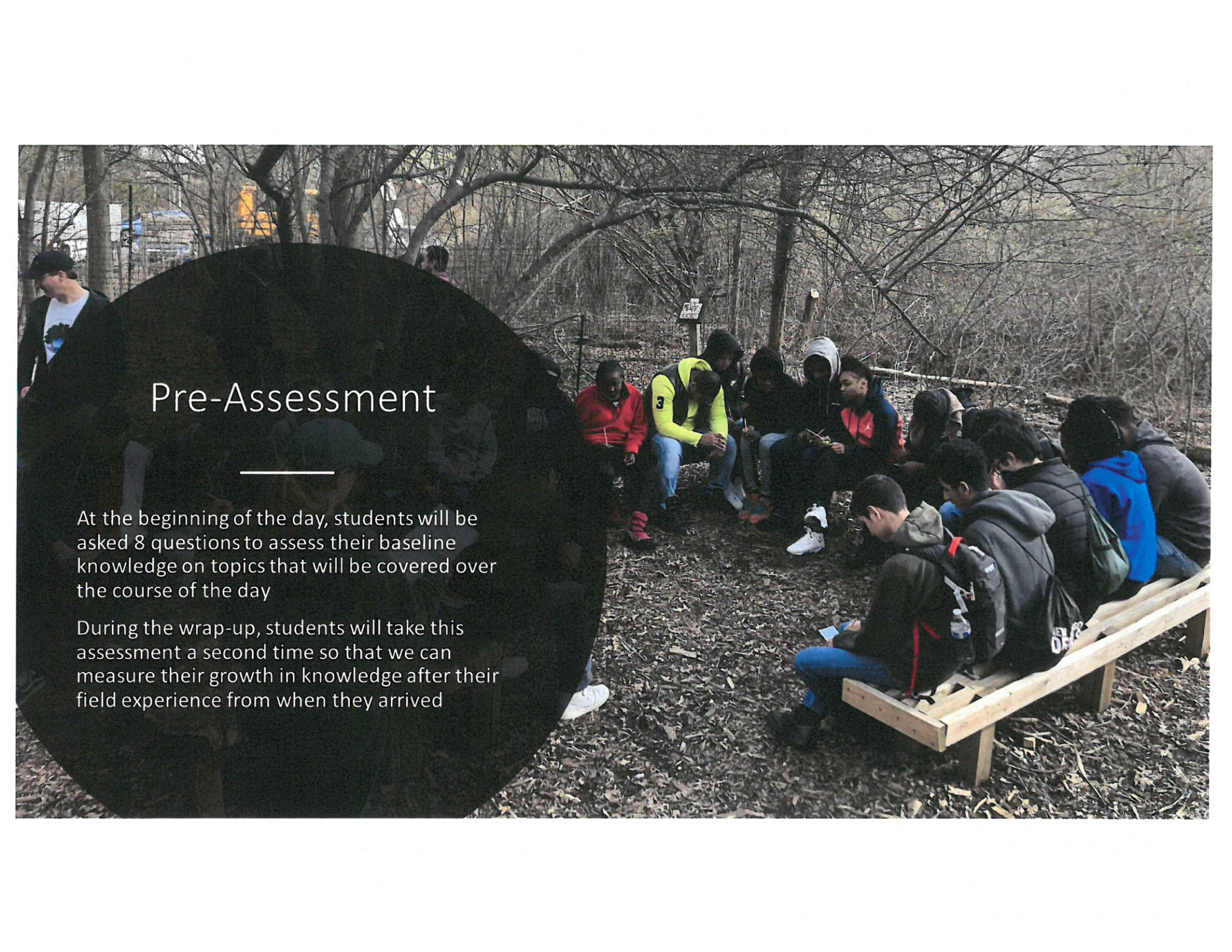
- Students typically depart from school at 9am
- Student arrival/pre-assessment: 9:30-10am
- Activity #1- 10am-11:30am
- Lunch 11:30-12pm
- Activity #2- 12-1:30pm
- Wrap-up- 1:30-1:50pm
- Student Departure- 1:50/2:00pm

10:45 - 11:30

12 - 12

1:45

→ BUS BY 2

A group of approximately 15 students are sitting in a circle on a wooden bench in a wooded area. They are dressed in winter clothing, including jackets and hoodies. The ground is covered with dry leaves and twigs. The background shows bare trees and a fence. A large black circle is overlaid on the left side of the image, containing the text.

Pre-Assessment

At the beginning of the day, students will be asked 8 questions to assess their baseline knowledge on topics that will be covered over the course of the day

During the wrap-up, students will take this assessment a second time so that we can measure their growth in knowledge after their field experience from when they arrived



Soil Assessment





Soil Assessment

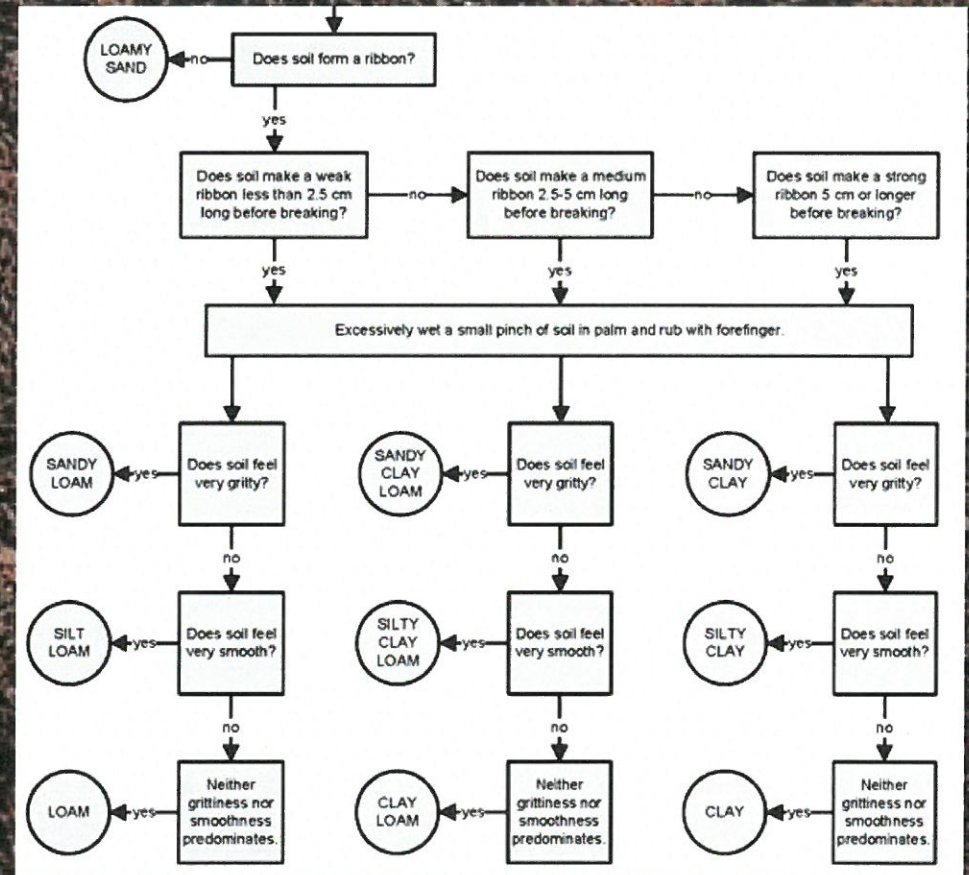
In this part of the program, students will be assessing soils as part of a “quick and dirty” wetlands delineation

- First, we will discuss the layers of soil and talk about how each one is important and interacts with each other. Students will take their own soil cores and look for evidence of organic buildup. Using their observations they will determine if decomposition is happening and at what rate, an indication of water’s presence on site for much of the year.

Soil Assessment

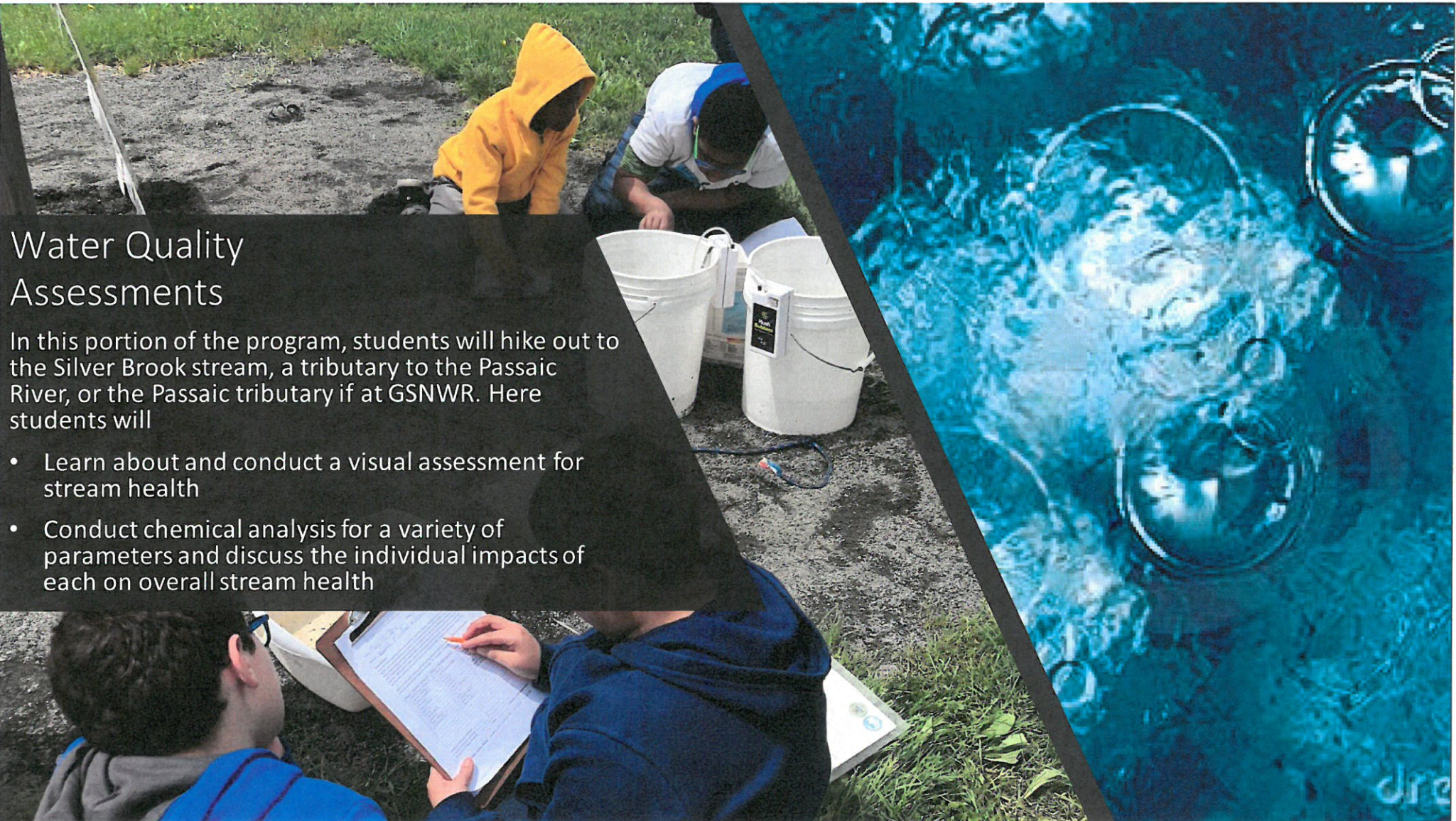
- Next, students will use the “Key to Texture by Feel” chart to determine soil composition and type, learning about the importance of clay to wetland soil systems and how it functions in regard to hydrology and water quality
- Finally, students will use a Munsell color chart to determine if their soil samples are hydric or non-hydric, having formed or existed in wet/dry conditions

Through these observational tasks, students will be asked to determine if they think the habitat they are in is in fact a wetland, and how upstream development might impact it





Water
Quality
Assessment



Water Quality Assessments

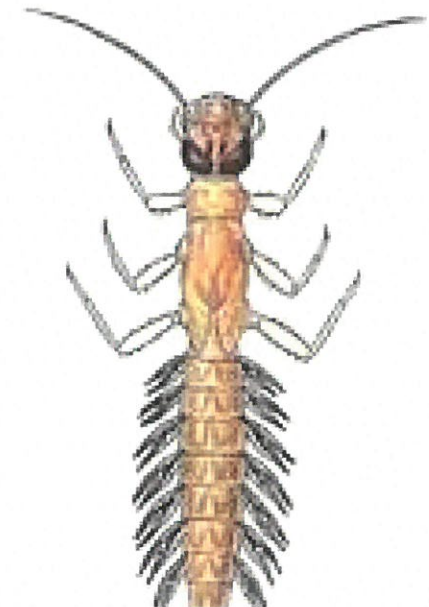
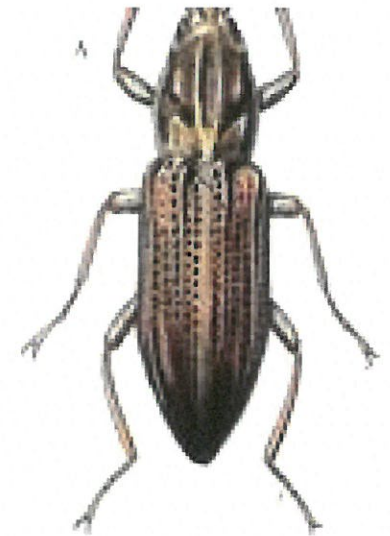
In this portion of the program, students will hike out to the Silver Brook stream, a tributary to the Passaic River, or the Passaic tributary if at GSNWR. Here students will

- Learn about and conduct a visual assessment for stream health
- Conduct chemical analysis for a variety of parameters and discuss the individual impacts of each on overall stream health

Macroinvertebrate/Biological Assessment

If conditions allow, in lieu of a chemical assessment we will conduct a macroinvertebrate survey, here students will

- Learn how to use a dichotomous key to identify species of macroinvertebrates
- Catalog their observations categorically by pollution sensitivity and discuss how this helps us understand more about the overall stream health



Chemical Parameters

- We explore and test a range of chemical parameters with students including:
 - Temperature
 - Turbidity
 - PH
 - Nitrates
 - Dissolved Oxygen
 - Phosphate
 - Total Dissolved Solids
- Volunteers can help students conduct the chemical tests, interpret results and most importantly by asking questions to help them better understand how it ties in to the larger premise

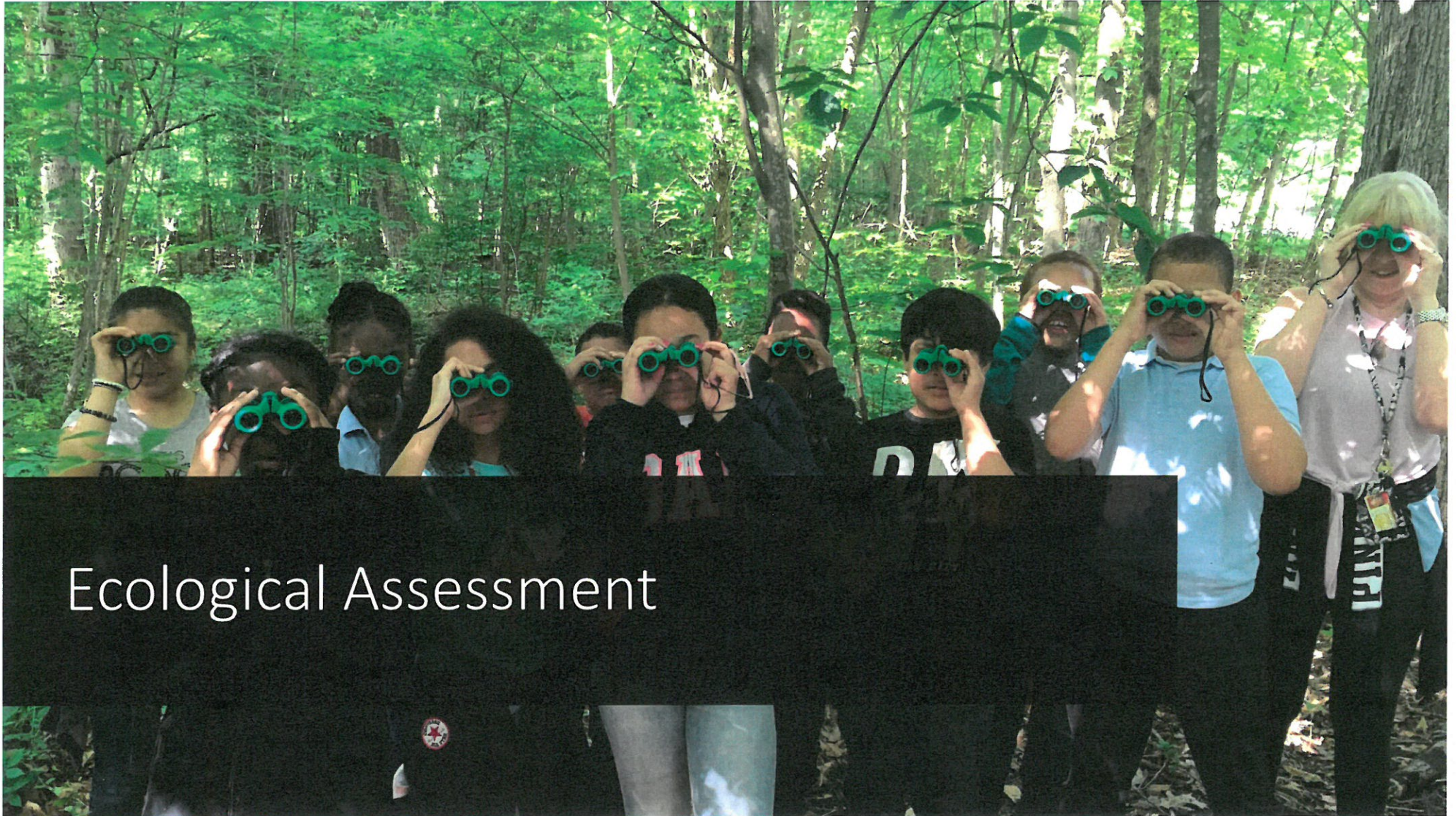
Introduction:

Stream health can be looked at in many ways. Today you will use several chemical tests to determine the water quality including measuring the water temperature, turbidity (water clarity), dissolved oxygen, pH, total dissolved solids, E. coli bacteria, nitrate, and phosphate. You will also complete a visual assessment of the stream and surrounding area to give a broader picture of the health of the stream and factors that might be affecting it.

Instructions for Chemical Tests:

1. Before performing each test, rinse the collection tube in the stream 3 times to make sure the sample doesn't get contaminated by a past test.
2. When collecting samples avoid disturbing the stream. Disturbance (like walking in the stream) can stir up sediment from the bottom and make your results inaccurate.
3. Follow the directions included with each test kit – use the correct amount of water for each test and the correct tablets.
4. If you're not sure about a result, compare your result to other groups. If you're still not sure, re-do the test.
5. Record your results on this data sheet.
6. When you're done with a test, empty the colored water on the ground away from the stream. The tablets are safe for the water but might contaminate other groups' tests.

Stream Name:	
Describe the specific area you are monitoring:	
Weather Today (rain, clouds, etc.):	
Days Since Last Rain:	Air Temp (*F):
Water Temp (*C):	Dissolved Oxygen (ppm):
Turbidity (cm):	DO % Saturation:
pH:	Total Dissolved Solids (ppm):
Nitrate (ppm):	Phosphate (ppm):



Ecological Assessment

Ecological Assessment

The Ecological Assessment is a roughly 1 mile hike on our Horizon trail/ Refuge Trail during which students will


- Learn how to use binoculars
- Discuss how exactly we can “value” land- What is the importance of a forest?
- Conduct a “rapid assessment” of ecological value along the Horizon trail
 - Identifying the layers of a forest
 - The importance of biodiversity and native flora vs. invasive species
 - Explore and discuss micro-habitats, looking under logs to identify the food-chain of each habitat and how they are connected



Rapid Ecological Assessment

During the ~1 mile hike on either the Horizon trail or Refuge trail, Volunteers can assist by asking students thought provoking questions and helping them fill in their worksheets.

Volunteers can also help by locating wildlife and assisting with the use of binoculars.

Great Swamp Watershed Association Ecological Assessment			
As you survey the site, review the questions below, scoring +1 or -1, in each box. At the end of the survey, you will tally the score of this site- which will be a rough assessment of its value and complexity, and its ecosystem value.			
1. Are the 4 different layers of an eastern deciduous forest present over most of the area you surveyed?			
Canopy <input type="checkbox"/> (Tallest trees)	<u>Understory</u> <input type="checkbox"/> (15-20' tall)	Shrub layer <input type="checkbox"/> (4-15' tall)	Herbaceous/ground layer <input type="checkbox"/> (plants to your knee height)
Invasive Species (-1) <input type="checkbox"/> (Species from other countries)	Forest is Heterogeneous <input type="checkbox"/> (Different kinds of trees together)	Homogeneous forest (-1) <input type="checkbox"/> (Mostly the same species of trees)	
2. What kinds of different Microhabitats did you observe- (e.g. meadow, stream, pond, forest, vernal pond)? +1 each			
Habitats observed: _____			Total = <input type="checkbox"/>
3. Are a variety of complex food chains supported by this ecosystem? Yes +1 <input type="checkbox"/> No -1 <input type="checkbox"/>			
Give examples of a multilevel food chain present at the site: can you come up with another different food chain?			
	[Producer] →	[Primary Consumer] →	[Secondary Consumer] → [Tertiary Consumer]
_____	_____	_____	_____

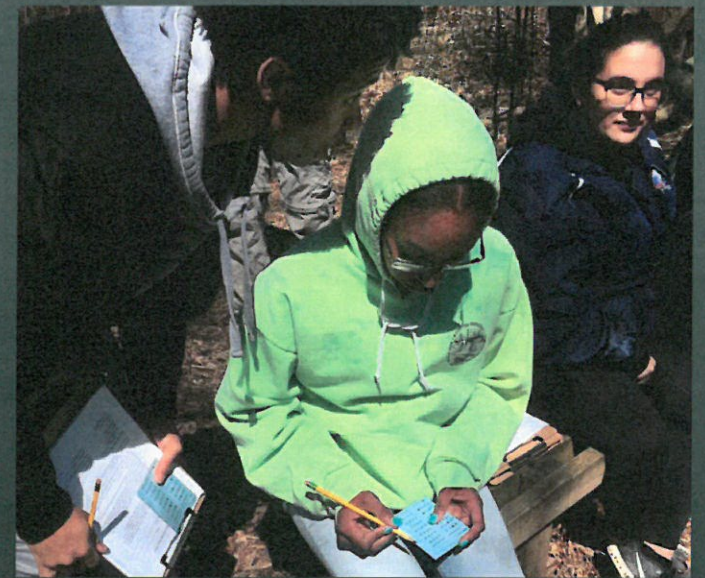
Binoculars


- 1. Make sure the marker on the eye piece of your binoculars is on the 0 indicator
- 2. Look through your binoculars, and adjust the center focus wheel until your target is in focus.
- Remember! Do not walk while looking through your binoculars.
- Volunteers can assist students with the proper usage of their binoculars, and help look for things to practice the skill on!



Wrap-Up

- Here students will re-take the assessment they took at the beginning of our day, applying any new knowledge they might have learned over the course of the day.
- Finally, we try relating our findings of the day to the specific question asked in the premise. We ask students to come up with evidence they gathered/observed during all three segments to support their argument



The background image shows a shed with corrugated metal walls. A yellow wheelbarrow is visible on the right side, partially obscured by a white vertical post. The ground is covered with brown mulch. A large black circular overlay is positioned on the left side of the image, containing the title and a list of bullet points.

Clean-Up

- After students have departed, volunteers can assist GSWA staff in putting away and storing education materials, tools, and kits into the education shed behind the main tool shed on site
- Once the site is cleared, volunteers are free to go- **Thanks for your help!**

Please remember to do a thorough tick check when you get home!

Checking for ticks is a good habit to get into anytime you are spending time outdoors, any ticks can easily be accounted for and removed with a frequent inspection routine.

GSWA will also have poison ivy soap available to wash arms and hands. The soap helps to break down the oils which cause rash, and we recommend using caution even when handling your field clothes later as the oils can persist until washed.





Students2Science
Outdoor Learning
Experience
Volunteer Information



**Great Swamp
Watershed
Association**

