North Carolina Stream Watch Cohort

Guidebook

2025 Revision

CONTENTS

NC Stream Watch Cohort

Guidebook and Reflection Journal

Written and funded in collaboration with:

NORTH CAROLINA Department of Environmental Quality

EENC Environmental Educators of North Carolina

wrri NC WATER RESOURCES RESEARCH INSTITUTE

Sea Grant NORTH CAROLINA

NORTH CAROLINA project WET WATER EDUCATION TODAY

Welcome to the NC Stream Watch Cohort

Dear Educator,

We are excited to have you join us for the first year of the NC Stream Watch Cohort. We hope you will utilize the materials in this program to enhance how you already teach about water in your community. This cohort was developed as a part of a program to create lesson plans and activities to support water education in grades K-8. Throughout this program we will share information and resources with you and in return we want to hear your feedback. Is the information relevant to your standards? Does it help you engage your students with the natural world? Does it inspire you to ask questions and wonder about how water is managed in your community or watershed?

Each month will feature a guest speaker and an NC Stream Watch tutorial presentation. We encourage you to take time each month to ask questions, explore your own watershed, and observe the changes that occur on your campus, at home, or even in the parking lot of the grocery store.

By the end of our cohort, we hope you will feel confident to teach about new aspects of water resource management such as: water planning, droughts, floods, dischargers, water quality, human impacts on water, and how the federal, state, and local agencies protect water resources. If you have questions at any point, please reach out to Lauren Daniel, NC Stream Watch Coordinator (Lauren.Daniel@deq.nc.gov) or Sediment Educator Rebecca Coppa (Rebecca.Coppa@deq.nc.gov).

Thank you for your time and interest in NC Stream Watch!

Lauren Daniel
Water Education Program Coordinator
NC Department of Environmental Quality, Division of Water Resources

About NC Stream Watch

NC Stream Watch

NC Stream Watch is your go-to source for sharing and exploring basic observations of water throughout North Carolina. The NC Stream Watch tool consists of a survey paired with a GIS map to allow for student-friendly navigation. Since this tool is strictly used for educational purposes, there is no required protocol or training. You are welcome to share observations to NC Stream Watch in the following categories:

- **Habitat Assessment**- How much erosion or vegetative buffer do you see?
- **Chemical Monitoring**- Collect water samples to find pH, Nitrogen, stream flow, and more.
- **Macroinvertebrates**- What kind of critters do you find in the water?
- **Source Conveyances**- How is water getting into the stream? What is draining into your stream?

How can you make a difference with NC Stream Watch?

Water quality and water quantity are two key components to understanding our water resources. The ability for streams to support wildlife and provide habitat is critical to the health and sustainability of our water. Humans rely on water both directly and indirectly each day, so protecting our water resources depends on our ability to monitor a variety of features. Understanding the parameters of a healthy stream is the first step to understanding the complexity of every ecosystem. Recognizing the value of vegetative buffers to stabilize shorelines is just as important as recognizing the detrimental effects of allowing pollutants to flow into our streams. Your participation in NC Stream Watch is critical to protecting our valuable water resources!

Program Overview

NC Stream Watch Cohort Website

This website will serve as your one-stop shop for all the information you need in this cohort. On this website, you'll find maps, links, resources, and tools that we identify along the way.

Scan for NC Stream Watch Website

NCSW Instructional Kit

You will receive this in the mail. It will have everything you need to run the NC Stream Watch activities.

NCSW Monthly Webinar Check-Ins

Topics Covered During Check-ins Include:

- Introduction to NC Stream Watch and stream monitoring
- Exploring watersheds and the movement of water
- Human impacts on watersheds
- Inside, outside and streamside activities
- Identifying problems and designing solutions
- Online resources
- Stewardship, partnerships, and call to action

Program Goals

1. Understand the value of water quality and water quantity

We will offer presentations to learn from subject matter experts in the field of water resource management. We will make connections to monitoring and restoration efforts taking place in our own watershed with state-wide and even national water management issues.

2. Apply NC Stream Watch into your education programs

If you don't know it now, you'll be getting to know the NC Stream Watch Survey and its accompanying map. We will use the survey to collect data and the map to compare/contrast statewide data. By the end of your cohort experience, you'll feel confident and empowered to consistently use NC Stream Watch with your students.

3. Create a collaborative community of watershed stewards across NC

We want this cohort to be more than a one-time class. We hope that through this cohort you will build a lasting network with your cohort members, cohort leaders, and guest speakers. We want you to enjoy this material so much that you share it with others, colleagues and students. By the end of your cohort experience, we hope you'll support others to enhance their own water education in the future.

Reflection Sheet

After watching videos, consider the following...

After you watch the video presentations from the subject matter experts, choose a question from each of the following categories to craft a thorough reflection about what you learned.

1. What do you notice?

How do you interpret this information?
What are the implications of this information?
Will may this information change how you teach about water? How?

2. What do you wonder?

Do you think your students would benefit from hearing this information?
How could you incorporate this information into your teaching?
What other questions do you have?
What is your reaction to what you heard?

3. What does this remind you of?

What aspects of this information “strike a chord” with the issues your community faces?
How might the knowledge of this information inform decision making in your community?
What can be done to educate more people about this information?

NC Stream Watch Cohort

Lesson Plans

K-2 Indoor

Exploring Watersheds

In this initial activity, students will become familiar with the sights, sounds, and features in a watershed. Students will be able to apply an understanding of a watershed to stream features from the mountains to the coast of NC.

NC STREAM WATCH PILOT PACK

VOCABULARY
habitat

DURATION: about an hour

LOCATION: i ndoors/classroom

MATERIALS (for each group)**:**
pencils or drawing utensils
paper
NC rivers/streams images
NC wildlife images
clue cards

Look for the web link symbol to connect to our recommended online resources. See Appendix A for citations of source materials.

Procedure

1. **Opening Question:** How can living things find their basic needs when they live in or near rivers and streams?
2. **What's That Sound :** Make sure each student has a piece of paper and something to write or draw with. Using **this link**, or search for another video of a river running through a forest, play the sounds only (do not project the video) for 3 minutes and have students draw what they hear.
   Ask these questions as they listen, to encourage observations in their drawings:
   - What's making this sound?
   - What might this place look like?
   - Have you ever seen or been to a place like this?
   - What might live in this place that you cannot hear?
3. **Exploring Ideas:** Next give each small/table group a set of NC streams/rivers images to explore and discuss with their group. To encourage exploration, ask the follow questions using a Turn and Talk approach:
   - What do you notice about these streams/rivers?
   - What are you wondering about them?
   - How are they the same or different from your drawing?

   Keep a list of their observations that you hear as you listen to each group discussion.
4. **Full Group Discussion**: Based on their observations and using the NC Stream/River images, ask the following assessment questions:
   - Could a living thing find air in the place? What is your evidence?
   - Could a living thing find space in this place? What is your evidence?
   - Could a living things find shelter in this place? What is your evidence?
   - Could a living thing find food in this place? What is your evidence?
   - Could a living thing find water in this place? What is your evidence?
   - Will all of the living things in each stream or river be the same or different? What makes you think that?

K-2 Indoor (Page 2/2)

5. Now is the time to either introduce or review the word **habitat**. A habitat is an environment where a plant or animal grows and lives, having its basic needs met. Share with the students that while each of these rivers and streams have things in common, their different features make them a home to some special creatures in North Carolina. The next activity will help everyone learn more.

6. **Home Stream Home:** Make sure each group has their set of NC Streams/Rivers images and provide each group with a set of NC Wildlife images. You will read the Clue Cards about each animal's preferred habitat to the whole class. Each animal has three clues. Groups wil need to evaluate their Stream/River images and determine which one is the correct home for the animal, based on the clues that are given. An answer key is provided in the materials. You may want to use a point system as follows, if the students guess the correct habitat:
   - One clue read = 3 points
   - Two clues read = 2 points
   - Three clues read = 1 point

   Once all the habitats have been guessed, students can total their scores if necessary.

   Share the following with the students: We focused on the shelter and space that these animals prefer. What other factors do you think might be involved to explain why they live in these rivers and streams?
   Answers might include:
   - The food they like is also in that space.
   - They like the kind of water in that stream or river, i.e. how fast or slow it moves, how clean it is, the temperature.

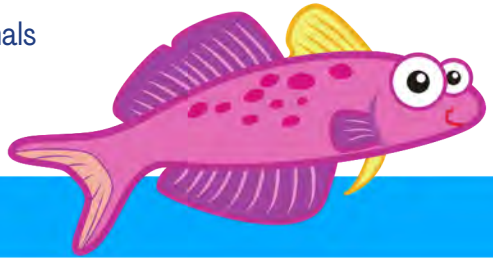
7. **Reflection:** What helped you learn about how living things find their basic needs when they live in or near rivers and streams?

Learning Targets

LS.K.1.1: Engage in argument from evidence to summarize the characteristics of living organisms and nonliving things in terms of their: structure, growth, changes, movement, basic needs.

LS.1.1.1: Obtain, evaluate and communicate information to summarize the needs of different plants and animals.

LS.1.1.2: Analyze and interpret data to compare how the needs of plants and animals can be met in different environments.



Variations

1. **Exploration:** Explore existing images of streams and rivers in the **NC Stream Watch** Observation Map. **Compare and contrast** streams in the mountains versus the coast. Ask students: How do different landforms affect how the streams look? (Example: Mountain streams are usually more narrow and flow faster than coastal streams.)

3-5 Indoor

Exploring Watersheds

In this initial activity, students will become familiar with the sights, sounds, and features in a watershed. Students will be able to apply an understanding of a watershed to stream features in the mountains and the coast of NC.

NC STREAM WATCH PILOT PACK

VOCABULARY
drainage
flow
water
watershed
erosion

DURATION: about an hour

LOCATION: indoors/classroom

MATERIALS:
wax paper
crayola markers
spray bottles
internet/TV/monitor

Look for the web link symbol to connect to our recommended online resources. See Appendix A for citations of source materials.

Procedure

1. **Mindful Opening:** First, start out with a mindfulness activity. Using **this link**, or search for another video of a lakeshore and water sounds, play this video's audio only (do not project the video) and ask students to just listen and think about what they hear.

2. Ask students to turn and talk with other students about where we might find **water** naturally. Bring the class back together and brainstorm a list of where we find water. Possible answers include: lakes, rivers, oceans, groundwater, ponds, clouds/atmosphere, living organisms, plants/trees.

3. **Pre/Post Assessment** (See Next Section)

4. **Ask the students:** How did you use water today? Where do you think that water comes from? Our water ultimately comes from rain or snow that falls on our **watershed** or the land area that collects rain and snowmelt and helps it **drain** or **flow** into a body of water, such as a lake, river, or ocean. Consider watching this 1-minute video from PBS Learning Media NC: **Water Cycle & Watersheds: Ways of Watersheds**

   North Carolina's watersheds are unique because the state has both tall mountains in the west, and flat coastal lands near the ocean in the east. Do you think water **drains** and **flows** differently high up in the mountains when compared to the lower lying coastline?

5. Explore existing images of streams and rivers in North Carolina using **NC Stream Watch**. Compare and contrast streams in the mountains versus the coast. Ask students: Based on your observations, how do different landforms affect how the streams look? (Example: Mountain streams are usually more narrow and flow faster than coastal streams.)

3-5 Indoor (Page 2/3)

6 Next, students will build a simple **watershed** model at their desks using basic items such as wax paper, tin trays, spray bottles, and Crayola markers to color the wax paper. Show students the materials, and ask, "How might we use these materials to build a model landscape with hills, valleys, rivers, and lakes?" Brainstorm for a few minutes, then begin building your models.

Students should shape the wax paper to form their desired landscape. Ask students to color the ridgelines of their landforms with one color and make a hypothesis about where the water will collect using another color. Then, place the wax paper into the tin tray and instruct students to spray the model with water.

Once water is sprayed on the Crayola marker ink on the wax paper, it will become very bold and visible. Ask the students: how do you notice the water **draining** and **flowing** across the **watershed**? Were your predictions right? How did the water move differently in areas of high elevation (mountains) to areas of low elevation (near the coast)?

Next, have students add a pinch of soil or cocoa powder to the ridgelines of their landforms. Ask them to make a hypothesis about what will happen to the soil when they spray their model? Then have them spray the soil with water. Ask the students: do you notice the water **eroding** or moving the soil? What happens to the soil when the water stops moving?

Image from Seattle Public Utilities

7 **CONNECT WITH TECH!** After completing their watershed, and making observations about what happens to water after rain events, consider uploading photos of the students' watershed model to the NC Division of Water Resources' **NC Creative Environment Map**

8 **Post-Assessment** (See Next Section)

3-5 Indoor (Page 3/3)

Pre/Post Assessment

The assessment is a small group, multiple choice activity. Students will select the answer with which they most agree, and as a group explain their answer/reasoning.

1. **ACTIVITY PREP**: Prior to starting the lesson, print and hang the descriptions below in 3 different areas around the room:
   - I think a watershed is a group of buildings and human made structures that water flows over and drains off and then collects in a certain area.
   - I think a watershed is a tower or some type of building that stores water for human use.
   - I think a watershed is an area of land where all of the water that is under it, or drains off of it, goes to the same place.
2. Ask the students: What is a **watershed**? And give some thinking time.
3. Read aloud the possible answers placed in the designated areas around the room.
   Have the students stand near the response they agree with most. Have students work with the others at that response to share why they chose it.
4. **Pre-Assessment:** Record how many students selected each answer. Let the students know the group will revisit their responses to this activity at the end of the lesson. Have students return to their seat.
5. **Post-Assessment**: Record how many students selected each answer. Ask students to describe how their answers may changed from the beginning of the activity.

Learning Targets

ESS.3.2: Understand the Earth's surface using models.

ESS.4.2.3 Use models to explain changes in Earth's surface over time (to include slow changes of erosion and weathering, and fast changes of earthquakes, landslides, and volcanic activity).

LS.5.2.1: Engage in argument from evidence to compare the characteristics of several common ecosystems (including estuaries and salt marshes, oceans, lakes and ponds, rivers and streams, forests, and grasslands) in terms of their ability to support a variety of populations.

Variations

1. **Extended Learning**: The above lesson was adapted from the PBS "**Build a Watershed**" PDF lesson. The original lesson includes a discussion and extension activity about water pollution. Consider exploring the PBS' lesson plan to extend this lesson to include an exploration of how pollution impacts our waterways.
2. Use the EPA's **How's My Waterway** website to explore the health of your local waterways. Ask the students what waterbody is nearest. Click on the "Protect" tab, and toggle on "Watershed Health Scores". What do the shades of blue mean?

K-2 Outdoor

Exploring Water Movement

Students are asked to experience and explore their learning space from the perspective of water drainage. What are areas that are susceptible to standing water? How do these surfaces impact how water flows when it rains? By the end of this activity, students will understand that different surface coverage changes how much water flows to our streams or causes more puddles to form in the watershed.

VOCABULARY
absorb
runoff
water
surface

DURATION: about an hour

LOCATION: outside, playground, or other open space

MATERIALS:
spray bottles

Look for the web link symbol to connect to our recommended online resources. See Appendix A for citations of source materials.

Procedure

1. **Ask students:** Turn to your neighbor and discuss how many different surfaces you can think of around our school/education center/camp? Come back as a group and make a list of these surfaces. Be sure this list includes what is present such as grass, mulch, parking lots, roofs, etc.
2. **Guiding Question:** Ask the group "How might water move in, around, or through these surfaces? What makes you think that?" Record their answers to look back on at the end of the activity.
3. **Campus Exploration:** Give students a spray bottle with water to spray on different surfaces on their campus. Students should identify 3 places where water **absorbs**, or soaks into the ground (Example: grass, gardens, soccer field) and 3 places where water does NOT soak in to the ground and becomes **runoff,** or water that flows over a surface instead of being absorbed into the ground (Example: sidewalk, basketball court, parking lot).
4. **Sort the Surfaces:** Come back together as a group and make two lists: 1. Surfaces that absorb water and 2. Surfaces that don't absorb water.
5. **Understand the Impact:** Facilitate a class discussion to determine if there are any areas on campus that often get muddy or even flood after rain events. Ask students if there's a connection between these areas that **absorb** water and areas that create **runoff**. Where do we see puddles? Are these puddles near surfaces that absorb water well? Or are these puddles near areas that make water run off during rain events? **Students should make the connection that puddles and mud are created when a lot of water runs off and can't absorb quickly enough during rain events.**
6. **Post Assessment** (see next section).

K-2 Outdoor (Page 2/2)

Post Assessment

This assessment will ask students to create a brief (no more than 2 minutes) video of the various surfaces they test around campus.

1. After students have explored their 6 surfaces, ask them to think about how each surface absorbs water. Have students review their responses to the Guiding Question (Step 2). Has any of their initial thinking changed based on their observations during the activity?
2. Ask students to draw two pictures on a sheet of paper: Picture 1: A surface that **absorbs** water when it rains. Picture 2: A surface that DOES NOT absorb water when it rains and creates **runoff**. Label the picture with any details to support their imagery (such as vocabulary: absorb or runoff).
3. **CONNECT WITH TECH!** Students can take photos of their drawings and upload them to NC Division of Water Resources' **NC Creative Environment map**.

Learning Targets

PS.K.1.1: Analyze and interpret data to classify objects by physical properties (size, color, shape, texture, weight and flexibility).

ESS.1.2.1: Obtain, evaluate and communicate information to summarize the physical properties of Earth materials, including rocks, minerals, soils, and water.

Variations

1. Prior to heading outside, consider having students watch this video as an introduction to the vocabulary and concepts introduced during the lesson: **Water and Surfaces** by Buffalo Niagra Waterkeeper.
2. Create vocabulary cards and ask students to find examples on campus of: erosion, soil, run off, storm drain, stream, culvert, impervious/pervious surfaces. Create a map of your campus and include these terms in the legend.
3. Use the US Environmental Protection Agency's **How's My Waterway** website to answer these questions.
   a) Enter the school address. Ask students what water body the school is near? Rain falling at the school flows to that water body.
   b) What does the color of the river or creek on this map mean? (The color is a symbol on the map that shows how healthy it is).
   c) Click on the "Protect" tab, and toggle on "Watershed Health Scores". What do the shades of blue mean? Is the school's watershed more or less healthy than surrounding watersheds? Click on "Tips for Protecting your Watershed" to learn how to help.

3-5 Outdoor

Exploring Water Movement

Students are asked to experience and explore their learning space from the perspective of water drainage. What are areas that are susceptible to standing water? How do pervious/impervious surfaces impact how water flows when it rains? By the end of this activity, students will understand that impervious surface coverage causes more water to flow to our streams or more puddles to form in our environment.

VOCABULARY

drainage
flood
impervious
pervious
water
soil
watershed
erosion
runoff
absorb

DURATION: about an hour

LOCATION: outside, playground, or other open space

MATERIALS (for each group)**:**
notebook/paper
writing utensil
spray bottle
vocabulary cards (in appendix)

Look for the web link symbol to connect to our recommended online resources. See Appendix A for citations of source materials.

Procedure

1. **Pre Assessment** (**see next section**)
2. **Access Prior Knowledge:** Ask students to turn to your neighbor and discuss how many different surfaces they can think of around our school/education center/camp. Come back together as a group and make a list of as many surfaces as you can.
3. **Spray It, Don't Say It:** Give students a spray bottle with water to explore different **pervious**/**impervious** surfaces on their campus. Students should identify 3 **pervious** surfaces or places where water soaks into the ground (Example: grass, gardens, soccer field) and 3 **impervious surfaces** or places where water does NOT soak in to the ground (Example: sidewalk, basketball court, parking lot).
4. **Sort the Surfaces:** Come back together as a group and make two lists: 1. Surfaces that absorb water (**pervious**) and 2. Surfaces that don't absorb water (**impervious**).
   Let's Talk About It: Ask students to think of parts of your campus that have mud or puddles after rain events. What types of surfaces are nearby? Are there surfaces that don't absorb water nearby? Is there a connection? (YES!) Puddles and mud are created when a lot of water runs off and can't absorb quickly enough during rain events.
6. **Label It:** Use vocabulary cards and ask students to find examples on campus of: ***erosion, soil, run off, storm drain, stream, culvert, impervious/pervious surfaces***. You can also draw a map of your campus and include these terms in the map legend. As an alternative, allow students to use devices to take pictures of examples of each type of vocabulary term they can find on campus. (Tip: This is an excellent activity to do after a rain event.)
7. **Post Assessment** (see next section).

3-5 Outdoor (Page 2/2)

Pre/Post Assessment

This assessment will ask students to create a brief (no more than 2 minutes) video of the various surfaces they test around campus.

1. **Pre Assessment**: Prior to beginning the lesson, ask students to draw two pictures on a sheet of paper: Picture 1: A surface that **ABSORBS** water when it rains. Picture 2: A surface that DOES NOT **absorb** water when it rains. Label the picture with any details to support their imagery (such as vocabulary: absorb or runoff). Have students pair and share their thinking with another student.
2. **Post Assessment**: Ask students to reflect on their drawings from the pre-assessment. After completing today's activity, was their initial thinking confirmed or challenged by their observations? Have students share their thoughts in pairs or as a large group.
3. **CONNECT WITH TECH!** After completing their drawings, students may take photos of their drawings and upload them to NC Division of Water Resources' **NC Creative Environment map**.

Learning Targets

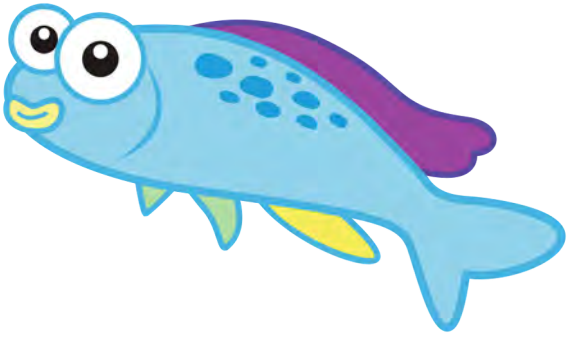
ESS.3.2.2: Use models to compare Earth's land features (including volcanoes, mountains, valleys, canyons, caverns, and islands).

ESS.4.2.3: Use models to explain changes in Earth's surface over time (to include slow changes of erosion and weathering, and fast changes of earthquakes, landslides, and volcanic activity).

ESS.5.1.4: Use models to explain how the sun's energy drives the processes of the water cycle (including evaporation, transpiration, condensation, precipitation).

Variations

1. **Compare and Contrast**: Once you have returned to the classroom, ask students if they think different environments, such as the mountains and the coastal regions in North Carolina, experience water absorption and runoff differently. Print or project images of the **mountains** and **coastal regions**. Have students discuss in pairs or as a whole group how the different land features in the mountains and on the coast may impact water absorption and runoff.



K-2 Streamside

Exploring Water Movement

Students will explore the various aspects and landforms that support streams. They will learn new vocabulary and apply that new information to completing an actual NC Stream Watch Habitat Assessment Survey Submission.

VOCABULARY
ecosystem
living
non-living
environment

DURATION: about an hour

LOCATION: along, or in view of, a stream

MATERIALS:
Internet access for NC Stream Watch Survey and statewide map (use macroinvertebrate section).
Optional: Paper copy of NCSW survey.

Look for the web link symbol to connect to our recommended online resources. See Appendix A for citations of source materials.

Procedure

1. **Observe the Surroundings:** Ask students to turn and talk to each other about how plants and animals utilize the area in and around the stream. How do humans utilize the area in and around the stream? How is the surrounding land used? Share observations as a whole group.
2. **Stream Watching:** Ask the students to complete the student copy page titled: "Stream Watching".
3. **Share Your Stream:** After students have completed their Stream Watching Student Copy Page, share the image of the stream or the student copy page work to **NC Stream Watch**.
4. **Kick Rocks:** If accessible, take time to demonstrate/model how to look under rocks to find macro-invertebrates. Or, share video to demonstrate techniques (Appendix A) . Be sure to talk about how these macroinvertebrates depend on clean water to live and other animals depend on the macroinvertebrates for food.
5. **Group reflection:** What surprised you about the animals you found? How were the animals in the stream using it? How could the ways humans use the land around the stream affect the animals?
6. **Put it all together:** If you're able, show students their stream on the **NC Stream Watch statewide map**. Try to identify what is "upstream" and "downstream" of your location.

K-2 Streamside (Page 2/2)

Post Assessment

Use the questions below to determine student understanding of lesson objectives.

1. Split learning area into two sides: Side A and Side B. Put students in the middle so they can move to Side A and Side B.
2. Ask students to think about the following questions and move to Side A or Side B.

How do streams flow?
Side A: Through grass and trees. **Side B:** From upstream to downstream.

What can we find alongside a stream?
Side A: A variety of living and non-living things. **Side B:** Mostly spiders and other bugs .

What can we look for near a stream to tell if it's healthy?
Side A: We can look for a variety of plants and animals. **Side B:** If the water is blue then it is healthy.

Learning Targets

LS.K.1.1: Engage in argument from evidence to summarize the characteristics of living organisms and nonliving things in terms of their: structure, growth, changes, movement, basic needs.

LS.1.1.1 Obtain, evaluate and communicate information to summarize the needs of different plants and animals.

LS.2.2.1: Obtain, evaluate, and communicate information to summarize ways in which animals closely resemble their parents and ways they are different.

Variations

1. Have students make a list of all the living things they can find in and around the stream.
2. Have students create posters/flyers/cards of their stream. Have students try to include (and label) as many living things in their picture as possible and then share them to the NC Division of Water Resources' **NC Creative Environment map**.
3. Use the US Environmental Protection Agency's **How's My Waterway** website to answer these questions.
   a) Enter the school address. Ask students what water body the school is near? Rain falling at the school flows to that water body.
   b) What does the color of the river or creek on this map mean? (The color is a symbol on the map that shows how healthy it is).
   c) Click on the "Protect" tab, and toggle on "Watershed Health Scores". What do the shades of blue mean? Is the school's watershed more or less healthy than nearby watersheds? Click on "Tips for Protecting your Watershed" to learn how to help.

3-5 Streamside

Exploring Water Movement

Students will explore the various aspects and landforms that support streams. They will learn new vocabulary and apply that new information to completing an actual NC Stream Watch Habitat Assessment Survey Submission.

VOCABULARY
drainage
flow
water
watershed
erosion

DURATION: about an hour

LOCATION: near a stream

MATERIALS (for each group)**:**
Internet access for NC Stream Watch Survey.

Optional: Paper copy of NCSW survey.

Look for the web link symbol to connect to our recommended online resources. See Appendix A for citations of source materials.

Procedure

1. **Observe the Surroundings:** Ask students to turn and talk to each other about how plants and animals utilize the area in and around the stream. How do humans utilize the area in and around the stream? How is the surrounding land used? Share observations as a whole group.

2. **Stream Watching:** Ask the students to complete the student copy page titled: "Stream Watching".

3. **Share Your Stream:** After students have completed their Stream Watching Student Copy Page, share the image of the stream or the student copy page work to **NC Stream Watch**.

4. **Kick Rocks:** If accessible, take time to demonstrate/model how to look under rocks to find macro-invertebrates. Or, share video to demonstrate techniques (Appendix A) . Be sure to talk about how these macroinvertebrates depend on clean water to live and other animals depend on the macroinvertebrates for food.

5. **Group reflection:** What surprised you about the animals you found? How were the animals in the stream using it? How could the ways humans use the land around the stream affect the animals?

6. **Put it all together:** If you're able, show students their stream on the **NC Stream Watch statewide map**. Try to identify what is "upstream" and "downstream" of your location.

3-5 Streamside (Page 2/2)

Post Assessment

Students will complete the habitat assessment portion of the NC Stream Watch Survey.

1. Open the NC Stream Watch Survey (Optional: Complete a paper copy of the NCSW Survey first and then carry over answers to the actual survey).
2. Record habitat health observations that were found during your stream exploration.
3. Ask students how their visual observations can help them determine their stream's health.

Learning Targets

LS.4.1.1: Use models to explain that plants and animals have external structures that function to support survival.

ESS.4.3.1: Ask questions to infer whether changes in an organism's environment are beneficial or harmful.

LS.5.2.1: Engage in argument from evidence to compare the characteristics of several common ecosystems (including estuaries and salt marshes, oceans, lakes and ponds, rivers and streams, forests, and grasslands) in terms of their ability to support a variety of populations.

Variations

1. Students can simply submit their own observations on the NC Stream Watch Survey using their own devices.
2. For smaller groups, you can complete the NC Stream Watch survey as a whole-group. Complete the questions on a mobile device on site, or complete the paper copy and upload observations once you have internet access.
3. You can also print this two-page **NCSW Quick Guide worksheet** with tips to use in the field.

6-8 Indoor

What Happens in a Watershed?

This activity covers the relationships between living organisms and their environment. Students will observe existing images from NC Stream Watch Tool, identify common features, and then research the relationship between those features, land use, and the health of their stream.

NC STREAM WATCH PILOT PACK

VOCABULARY

landforms
watershed
headwaters
tributary
streamflow
runoff
land use

DURATION: about an hour

LOCATION: indoors/classroom

MATERIALS:

Internet Access for NC Stream Watch, PBS Kids Water Cycle & Watersheds and Neuse River Waterdog Salamander

Look for the web link symbol to connect to our recommended online resources. See Appendix A for citations of source materials.

Procedure

1. **Mindful Opening:** First, start out with a mindfulness activity. Using this **link**, or search for another video of Birds Singing on the Lakeshore, play this video's audio and ask students to just listen and think about what they hear.
2. **Pre Assessment** (**See Next Section**)
3. **Activate Prior Knowledge:**
   Ask students to turn and talk with other students to determine where we find water naturally. Bring the class back together and brainstorm a list of where we find water. Possible answers include: lakes, rivers, oceans, groundwater, clouds/atmosphere, living organisms, plants/trees.
4. **Review Vocabulary:** Use an **image of a watershed** to talk about how water gets into streams. Explain that a watershed is all the land that drains to a particular water body. You can show this **PBS Learning Media "Water Cycle & Watersheds: Ways of Watersheds"** animation. Anywhere we stand, we are in a watershed.
5. **Explore existing images:** Using images from **NC Stream Watch**, compare and contrast streams in the mountains versus the coast. Ask students: How do different landforms affect how the streams look? (Example: Mountain streams are usually narrower and flow faster than coastal streams because of their landforms.)
6. **Discussion**: What are the variety of ways humans change land? Possible answers may include: farming, building neighborhoods, building roads, forestry, urban cities. Have students look back at the NC Streamwatch pictures. Ask: How might logging (or cutting down trees for human use) impact streams in the mountains? How might construction of new homes impact streams along the coast?
7. **Video**: Watch the video, "**Neuse River Waterdog Salamander**". While watching the video, have students write down all the ways humans impact waterways.

8. **Small Group Work**: Ask students to create "Top 5 List of Things that Could Help or Hurt a Waterdog." They can reflect back on the video they watched, the NC Stream Watch images, or any personal experiences they have had.
9. **Share Ideas:** Have groups share their Top 5 lists to make one big list. Ask students to turn and talk to generate questions they have about these factors they observe. Ask the students:
   - Are the features on our list human-made or natural?
   - Which stream observations indicate healthy streams and which factors indicate degraded streams?
   - How does a streamside habitat impact the lives of creatures such as the waterdog, as well as the overall water quality.

   Share the compiled list to the NC Division of Water Resources' **NC Creative Environment map**.
10. **Post Assessment** (See Next Section)

Pre/Post Assessment

The assessment is a small group, multiple choice activity. Students will select the answer with which they most agree, and as a group explain their answer/reasoning. (Answers A or B indicate limited understanding of objectives.)

1. Prior to the start of the lesson, print the (3) responses from Step 3 below and post them around the classroom so, students can read them.
2. Ask the students: **What is the relationship between streamside land habitat and the water quality of a stream?** And give some thinking time.
3. Share the possible answers and place each response in one of the designated areas/cones.
   - I think there is **no** relationship between rivers and land.
   - I think there is **some** relationship between streamside land habitat and the stream's water quality.
   - I think there is a **strong** relationship between streamside habitat and a stream's water quality.

   Have the students go to the response they agree with most.
4. **Pre Assessment**: Have the students gathered at each response discuss as a group why they chose it. Then have them share their ideas with the whole group.
   Record the number of students at each response to review during post assessment.
5. **Post Assessment**: As a large group, compare and contrast the number of students at each response to the pre assessment numbers. Ask students to elaborate on whether or not their thinking was changed from the beginning of the lesson.

6-8 Indoor (Page 3/3)

Standards and Learning Targets

ESS.6.3.2: Obtain, evaluate, and communicate information to compare the implications of sustainable and unsustainable land use practices (including agriculture and deforestation) and the importance of stewardship.

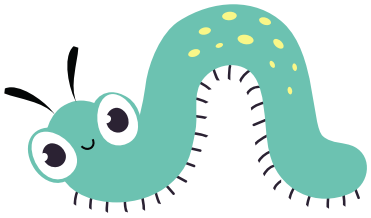
LS.8.2.1: Carry out investigations to explain how changing biotic and abiotic factors such as food, water, shelter, and space affect populations in an ecosystem.

ESS.8.3.2: Engage in argument from evidence to explain that the good health of humans and the environment requires: monitoring of the hydrosphere, water quality standards, methods of water treatment, maintaining safe water quality, and stewardship.

Learning Target: Learners will be able to demonstrate the interconnectedness of the components of their local water resources.

Variations

1. Provide students with access to **River Runner** and let them choose a river or creek nearby or from NC Stream Watch Observations to run through the River Runner Model. You can search with your town or zip code.
2. As students explore their stream's path on River Runner, ask them to slow it down and identify the types of land-use along that stream. What are all the ways land is used along the stream? How may that land use impact the stream?
3. Use the US Environmental Protection Agency's **How's My Waterway** website to answer these questions:
   a) Enter the school address. Ask students what watershed the school is in? Does this watershed flow into another, larger watershed and if so, which one? how does the health of the upstream water body contribute to the health of a downstream body?
   b) What does the color of the river or creek on this map mean? (The color is a symbol on the map that shows how healthy it is).
   c) Click on the "Aquatic Life" tab. Describe the conditions of waterbodies in your watershed.
   d) Click on the Protect" tab, then "Tips for Protecting Your Watershed". What actions have students heard of? What could happen at the school? Students could explore and share about an action they are curious about.
4. **Share Your Ideas Variation:** Have students create a brief 1-2 minute video answering the question: What is a watershed? Post the video to the NC Division of Water Resources' **NC Creative Environment map**.
5. **Share Your Ideas Variation:** Have students make a poster about protecting their own local river or waterway, based on their observations of human impact. Then share them to the NC Division of Water Resources' **NC Creative Environment map**.



6-8 Outdoor

Look Beyond The Surface

Students are asked to experience and explore their learning space from the perspective of water drainage. What are areas that are susceptible to standing water? How do pervious/impervious surfaces impact how water flows when it rains? By the end of this activity, students will understand that impervious surface coverage causes more water to flow to our streams or more puddles to form in our environment. Also, students will have a foundational understanding of how rain events impact our water availability and water quality.

NC STREAM WATCH PILOT PACK

VOCABULARY

absorb
basin
erosion
runoff
pervious
impervious
water

DURATION: About an hour

LOCATION: Outside, playground, or other open space

MATERIALS:
spray bottles
notebooks/pencils (optional)

Look for the web link symbol to connect to our recommended online resources. See Appendix A for citations of source materials.

Procedure

1. **Guiding Question:** In your outdoor learning space, invite students to find a space to sit or stand and make some observations. Ask students to reflect on the following: How might a rain event effect the water quality and water quantity in this area (or on the school ground)?
2. **Ask students:** Turn to your neighbor and discuss how many different surfaces you can think of around our school/education center/camp? Ask students to share what they discussed and make a list. Make sure to include/add: **pavement, grass, roofs, wood chips/mulch.**
3. Put the students into small groups and have them make a list of 6 surfaces they'd like to explore based on which will absorb the most and the least amount of water.
4. Give students a spray bottle with water to explore different surfaces on their campus- they can try spraying and then pouring on surfaces. Students should identify 3 places where water soaks into the ground (Example: soccer field) and 3 places where water does NOT soak in to the ground (Example: sidewalk). Ask them to reflect on how quickly the water is absorbed or flows, and describe how it moves. They can sketch the surface and how water moves, if they have notebooks with them.
5. Come back together as a group and ask students to work in their groups and discuss their results. What surprised them? Did their initial ideas change?
6. **Discussion** (**continued on Page 2**):
   - Define **pervious surfaces**: A pervious surface is a surface that allows for the passage of water. Pervious materials permit water to enter the ground by virtue of their porous nature. Examples: gardens, forested areas, and loosely packed gravel or soil. Water that soaks into the ground is called **groundwater**, and can eventually become surface water, ending up in streams and rivers.

6-8 Outdoor (Page 2/3)

Discussion (continued from Page 1):

- Define **impervious surfaces**: An impervious surface is a surface that does not allow surface water to soak into or pass through it. Examples of impervious surfaces are concrete, asphalt, packed soil, packed gravel, and roofs. When rainwater or any other kind of precipitation hits an impervious surface, it will not soak through the ground. It will become stormwater runoff and spill to the lowest point.
- Have groups label their different surfaces as pervious or impervious.

7. Ask students to turn and talk with each other about how rain could impact streams nearby. Student answers can include: water flows off concrete into storm drains and directly into streams.
8. Ask students where on the campus they see poor drainage or flooding after rain events. Ideally, walk over to the site and observe possible conditions that make it flood or collect water.
9. **Reflection:** Ask students to reflect on the following: How might a rain event effect the water quality and water quantity in this area (or on the school ground)?

Standards & Learning Targets

ESS.7.1.2: Use models to explain how the energy of the Sun and Earth's gravity drive the cycling of water, including changes of state, as it moves through multiple pathways in Earth's systems and relates to weather patterns on Earth.

ESS.8.2.1 Use models to explain the structure of the hydrosphere including: water distribution on earth, local river basins, estuaries, and water availability.

Learning Target: Learners will be able to demonstrate the interconnectedness of the components of their local water system.

Variations

1. Create vocabulary cards and ask students to find examples on campus of: erosion, soil, run off, storm drain, stream, culvert, impervious/pervious surfaces. Create a map of your campus and include these terms in the legend.
2. After students have drawn their plans, ask them to share their work share them to the NC Division of Water Resources' **NC Creative Environment map.**
3. Use the EPA's **How's My Waterway** website to answer these questions:

a) Enter the school address. Ask students what watershed the school is in? Does this watershed flow into another, larger watershed and if so, which one? how does the health of the upstream water body contribute to the health of a downstream body?

b) What does the color of the river or creek on this map mean? (The color is a symbol on the map that shows how healthy it is).

c) Click on the "Aquatic Life" tab. Describe the conditions of waterbodies in your watershed.

d) Click on the Protect" tab, then "Tips for Protecting Your Watershed". What actions have students heard of? What could happen at the school? Students could explore and share about an action they are curious about.

6-8 Streamside

Exploring Watersheds

This lesson invites students to observe their stream and collect information from those observations to draw conclusions about their stream's health. When students are exploring the streamside ecosystem, students will observe interrelated components such as how vegetation may relate to erosion patterns, or exposed roots may relate to water quality impacts. By the end of this lesson, students will share these observations on the NC Stream Watch map for other students to see across the state.

NC STREAM WATCH PILOT PACK

VOCABULARY

vegetative buffer streambank land use drainage watershed erosion habitat pervious impervious

DURATION: about an hour

LOCATION: at a stream

MATERIALS:
NC Streamwatch Survey, either printed with clipboards and pencils, or with teacher and/or students using the app on a phone or tablets

Look for the web link symbol to connect to our recommended online resources. See Appendix A for citations of source materials.

Procedure

1. **Streamside:** Ask students to take a moment and make a list of all the things they see/hear/smell.
2. After a few minutes, ask students to share what they observed with a partner, then the group. Introduce students to the stream: What is the name of the stream and what river basin does it flow into?
3. Based on those shared observations, ask students: How might these features impact water quality? How might these features impact water quantity?
4. Using visual cards with the vocabulary words printed, have the students work with a partner or in small groups to find examples of each word near the streamside (You might print sets of the vocabulary words on different colored paper in order to better identify groups).
5. Next, have a group discussion. Ask students to share why they chose their examples of the streamside vocabulary words with each other.
6. Stream Assessment: Provide students with the NC Stream Watch Survey (**electronic** or **paper**). Ask the students to work in small groups to answer the questions on their papers, or have one student enter information into the app on the small group's behalf. Or the teacher can bring the groups together and enter one set of info into the app based on their responses.

6-8 Streamside (Page 2/2)

7. Direct students to complete the first portion, General Observations, and then complete the Habitat Assessment. (Optional: If you see point-sources, complete "Conveyances" portion as well.) Allow students to transfer their observations from paper copy onto the online survey if possible.
Stream habitat includes the physical and chemical conditions of this ecosystem and plays a large role in the aquatic life you will find. By conducting this survey, you will be able to qualitatively document the condition of instream habitat and the vegetated buffer.
If you use the paper assessment, you can get a habitat score. Season of the year and rainfall can affect stream habitat scores, but in general you can consider these as guidelines: Excellent (69-90); Good (46-68); Fair (23-45); Poor (0-22).

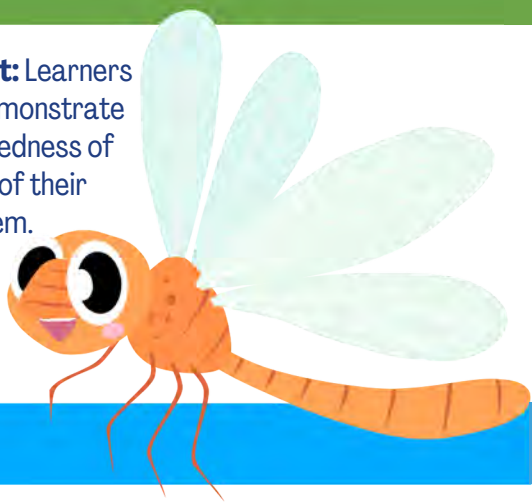
8. **Discussion and Reflection:** Ask students what they think about the abundance and diversity of features they observed for the survey? What surprised you about how the living and non-living components of this ecosystem are connected?

Standards & Learning Targets

ESS.6.3.1: Engage in argument from evidence to explain that the good health of humans and the environment requires: monitoring of the lithosphere, maintaining soil quality and stewardship.

ESS.8.3.2: Engage in argument from evidence to explain that the good health of humans and the environment requires: monitoring of the hydrosphere, water quality standards, methods of water treatment, maintaining safe water quality, and stewardship.

Learning Target: Learners will be able to demonstrate the interconnectedness of the components of their local water system.



Variations

1. While at the stream, have students draw a map of the stream and its surrounding watershed.
Ask students to label the various land uses and human impacts to the stream. Students may present these drawings to the class and share them to NC Division of Water Resources' **Creative Environment map**

2. Use the EPA's **How's My Waterway** website have the students answer these questions:
a) Enter the school address. What watershed the school is in? Does this watershed flow into another?
b) What does the color of the river or creek on this map mean? (The color is a symbol on the map that shows how healthy it is). How does the health of the river upstream water body contribute to the health of a downstream body?
c) Click on the "Aquatic Life" tab. Describe the conditions of waterbodies in your watershed.
d) Click on the "Protect" tab, then "Tips for Protecting Your Watershed". What actions have students heard of? Which are they curious about? What could happen at the school?

3. If you are able to acquire test kit, students can do the chemistry section of **NC Stream Watch**. These parameters can be tested using any water quality test kit that you purchase from your favorite store. You can also use pH strips, a thermometer, secci disk, etc. It's ok if you don't test for each parameter. For detailed information about selecting monitoring sites, safety, and testing materials, review the Tier 1 methods in the **NC Aquatic Data Hub's Methods Manual**.

NC Stream Watch Cohort

Appendices

APPENDIX A

Additional learning resources for teachers

1. PBS Learning Media's Ways of Watersheds lesson includes a 1 minute **animation about watersheds**. The entire lesson is **here** .

2. Watch teachers demonstrate how to conduct the K-2 and 3-5 indoor "build a watershed" activity: **https://www.youtube.com/watch?v=uw_ONS3zn74**.

3. Link to PDF or website about stream monitoring parameters and why they are important: **https://extension.usu.edu/waterquality/learnaboutsurfacewater/propertiesofwater/**.

4. Video from N.C. Youth Outdoor Engagement Commission on How to find macro-invertebrates: **https://youtu.be/z5SyHbid_1o.**

5. Additional lesson plan guiding students to model a watershed: **https://pbskids.org/plumlanding/educators/activities/pdf/build_a_watershed_fam.pdf.**

6. Use these resources from US Geological Service (USGS) to deepen your understanding of the connection between surface runoff, water quality and the water cycle:

Runoff: Surface and Overland Water Runoff
Surface Runoff and the Water Cycle

APPENDIX B

Additional learning resources for teachers

Scan for interactive Water Cycle Lesson

Properties of Water

Water Cycle Interactive Lesson

3 **https://extension.usu.edu/waterquality/learnaboutsurfacewater/propertiesofwater.**

VOCABULARY

absorb river	impervious	runoff
basin	land use	streamflow
ecosystem	landforms	tributary
erosion	pervious	vegetative buffer
headwaters	riverbasin	watershed

QUICK LINKS

NC Stream Watch Survey: https://survey123.arcgis.com/share/2938586844784dffa27e9a3684d3ad13?open=menu
NC Stream Watch Map: https://ncdenr.maps.arcgis.com/apps/dashboards/78ad171a06ef44b896c5955e8c3fcd59
Groundwater: https://www.groundwater.org/get-informed/basics/groundwater.html
NC Creative Environment Map: https://bit.ly/NCcreativeMap
Neuse River Waterdog: https://www.pbs.org/video/neuse-river-waterdog-salamander-0tiblu/

NC Stream Watch Cohort

Printables

Watersheds

Additional learning resources for teachers

Watershed: an area of land that drains all the streams and rainfall into one common outlet. These outlets can be described as the outflow of a reservoir, mouth of a bay, or any point along a stream channel.

How it applies to Streams and Rivers:

Streams, lakes, rivers and other waters are interconnected with the landscape and all its activities through their watersheds.

These watersheds affect the water quality and provide benefits to the communities of people and wildlife.

Additional Resources

Weather and Climate:
https://www.ncowl.org
Water Movement:
https://extension.usu.edu/waterquality
NCStreamWatch Survey:
https://survey123.arcgis.com

Vocabulary

Watershed, Groundwater, Filtration, River, Streams, Rainfall, Movement, Water Quality, Hydrosphere, Landscape, and Development

Permeable/Impermeable Surfaces

Additional learning resources for teachers

Figure 1: Examples of permeable surfaces (left to right): Woodchips, Gravel, Bricks & Grass-concrete

Figure 2: Examples of impermeable surface: (left to right): Concrete, Street/Roads, & Parking Lots.

- **Permeable Surfaces**: Solid surfaces that allow water to penetrate and soak into soil.
- **Impermeable Surfaces**: Solid surfaces that **DO NOT** allow water from going into the soil.

- **How it applies to Streams and Rivers:**
  - Understanding the kinds of surfaces in our area will help us better understand where our water goes.
  - Permeable surfaces allow rainwater to infiltrate into the ground, causing the groundwater to replenish, and relieve sewerage systems.
  - Permeable surfaces also reduce the amount of contamination that comes from the runoff of impermeable surfaces.

Additional Resources

Impervious surfaces: https://stormwater.allianceforthebay.org/glossary-of-terms/impervious
Water-permeable pavements: https://www.urbangreenbluegrids.com/measures/porous
Soak Up the Rain: https://www.epa.gov/soakuptherain
Groundwater: https://www.groundwater.org/get-informed/basics

Vocabulary

Permeable, Impermeable, Surface, Concrete, Asphalt, Sidewalk, Cobblestone, Brick, Shells, Marble, Runoff, Groundwater, Sewage,

Water Chemistry

Additional learning resources for teachers

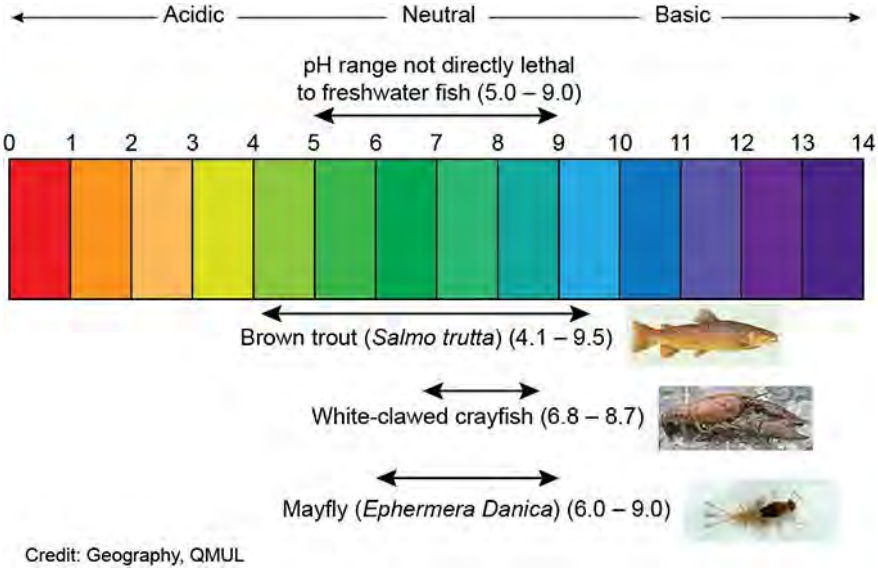


Figure 1: pH scale system

Figure 2,3, 4: river with high levels of turbidity, a pile of dead fish from dissolved levels of oxygen, algae from high levels of phosphorus and nitrogen.

- **Water Chemistry:** Measuring specific chemical parameters in water can determine the health of a stream.
- **How it applies to Streams and Rivers:**
  pH:
  - Acidity in water (below 6.5 pH) can disrupt chemical and biological processes.
  - **Turbidity:** Clarity of the water can be measured in NTUs. The more suspended solids in water, the higher the NTUs.
  - **Dissolved Oxygen:** Often related to turbidity, DO can indicate suspended solids that may deplete available oxygen in the water for organisms to survive.
  - **Phosphorus/Nitrogen:** Considered "plant food"- too much can cause algae to grow faster than ecosystems can handle.

Additional Resources

- **Properties of Water**: https://extension.usu.edu/waterquality/learnaboutsurfacewater/propertiesofwater/
- **Chemistry of Water**: https://www.britannica.com/science/water
- **Changes in river chemistry**: https://earthsky.org/science-wire/changes-in-river-chemistry
- **Treasuring the Choptank:** https://youtu.be/LXzouwBb0OE

Vocabulary

Permeable, Impermeable, Surface, Concrete, Asphalt, Sidewalk, Cobblestone, Brick, Shells, Marble, Runoff, Groundwater, Sewage,

Print for K-2 Indoor Activity

Carolina Gopher Frog

1. Lives mostly underground in the Sandhills and Coastal Plain of North Carolina.

2. Use fishless ponds to lay their eggs.

3. These ponds are near longleaf pine forests.

Cape Fear Shiner

1. Found in shallow areas of main river channels.

2. They prefer rivers with small islands.

3. They also prefer rivers with rocky shores and gravel or boulders along the bottom.

Print for K-2 Indoor Activity

Carolina Heelsplitter

1. Prefers small to large streams and rivers, or even ponds.

2. Found in sand or gravel in the river bed.

3. The most important part of their habitat is a stable and well-shaded stream or river bank.

Neuse River Waterdog

1. Lives only in one river and the smaller waterways that fill it.

2. They prefer quiet, slow waterways.

3. Needs lots of leaf litter or log jams in the stream or river.

Print for K-2 Indoor Activity

Green Salamander

1. Found only in a small mountainous region in the southwestern part of the state.

2. They will climb rocks and sometimes trees to look for food in their habitat.

3. Can be found in moist, shady crevices in cliffs and rocks along the waterway.

Print for K-2 Indoor Activity

Photo from NC Stream Watch Dashboard

Photo from NC Stream Watch Dashboard

Print for K-2 Indoor Activity

Photo from NC Stream Watch Dashboard

Photo from NC Stream Watch Dashboard

Key:

1. Tree-lined image of the Neuse River.
2. A rocky creek in Transylvania County (WNC).
3. A waterway/pond near a Longleaf Pine forest near Fayetteville.
4. Wide, shallow, rocky Cape Fear River. A small creek with sturdy, shade-covered banks in Union County.

Photo from NC Stream Watch Dashboard

NC STREAM WATCH

Print for K-2 Indoor Activity

Neuse River Waterdog

Photo from Jeff Hall, Amphibians and Reptiles of North Carolina

Carolina Gopher Frog

Photo from Kevin Stohlgren, Amphibians and Reptiles of North Carolina

Green Salamander

Photo from Todd Pierson , Amphibians and Reptiles of North Carolina

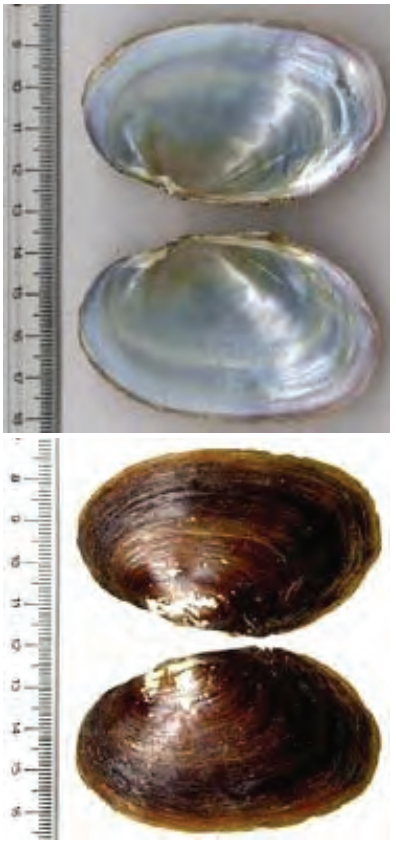
Cape Fear Shiner

Photo from North Carolina Wildlife Resources Commission

Print for K-2 Indoor Activity

Answer Key to Home Stream Home Activity:

1. Neuse River Waterdog, Neuse River
2. Green Salamander, rocky creeks in WNC
3. Carolina Gopher Frog, waterway/pond near a Longleaf Pine forest near Fayetteville
4. Cape Fear Shiner, Cape Fear River
5. Carolina Heelsplitter, waterways with sturdy, shade-covered banks in Union County



Carolina Heelsplitter

Photo from North Carolina Wildlife Resources Commission

NC Stream Watch Cohort

Resources and Links

QR Codes and Quick Reference Resources

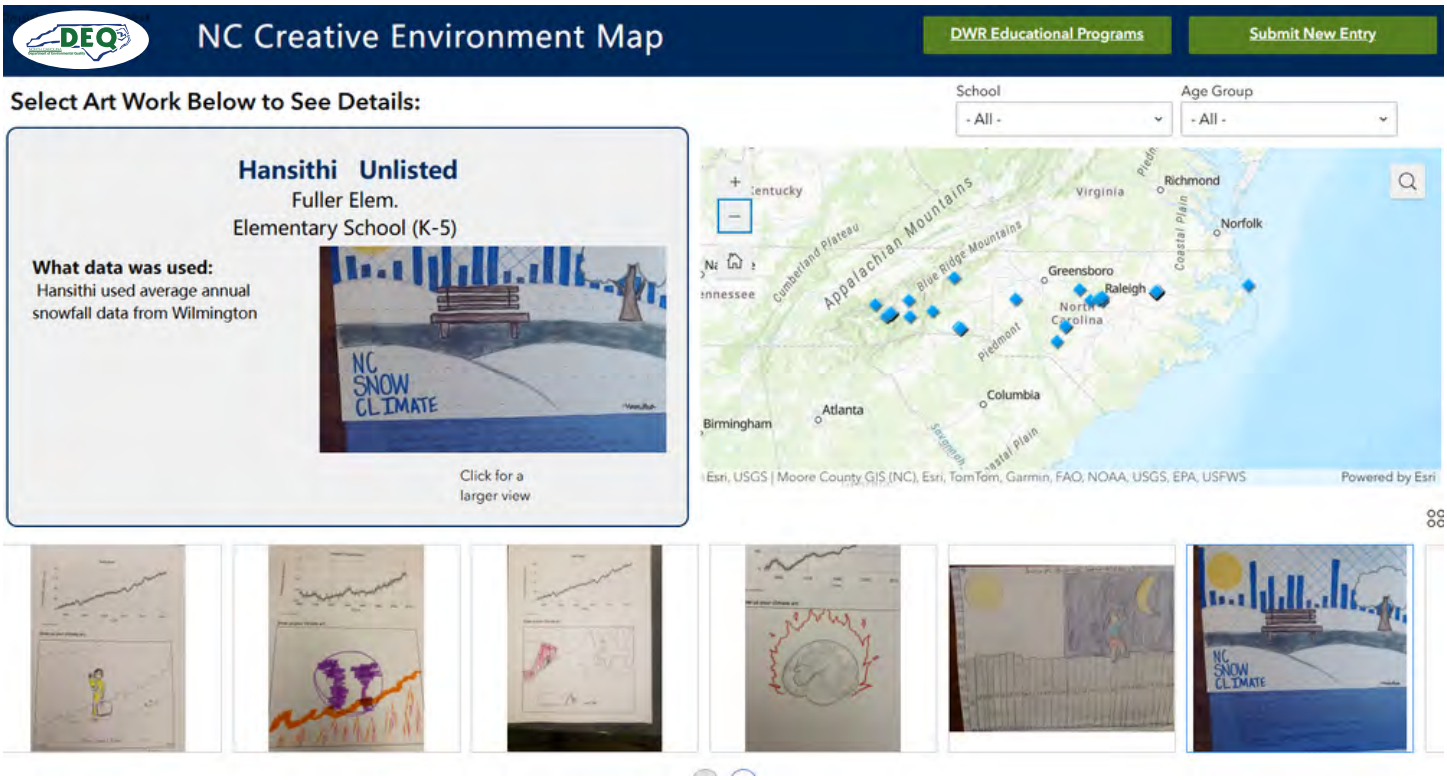
There is a lot of information to learn and to share. Use these QR Codes to quickly access the information you need.

NC Creative Environment Map		River Runner	
NC Stream Watch Survey		How's My Waterway?	
NC Stream Watch Dashboard		DEQ Office of Environmental Education	
NC Stream Watch Website		North Carolina River Basin Map	

QR Codes and Quick Reference Resources

There is a lot of information to learn and to share. Use these QR Codes to quickly access the information you need.

NC Stream Watch Activities Storymap		Current Press Releases from NC DEQ	
NC Stream Watch K-8 Lesson Plans		Leaf Pack Network	
NC DEQ's One Map		My Rain Plan	
NC DEQ Website		Interactive Water Cycle Game from Project WET	



NC Creative Environment Map

Share your work here!