Welcome, Orientation and Ground Rules:
Welcome! We are looking forward to your field trip to the State Botanical Garden of Georgia. The plants and animals at the State Botanical Garden provide a variety of important free services to all the creatures of Earth. These free services are referred to by ecologists as life support functions. They include air purification, climate control, food production, pollination, soil production, pest and disease control, water purification and biodiversity.

Georgia Discovery Quest
This field trip through the Alice H. Richards Children’s Garden invites students to discover and interact with the natural wonders of Georgia. All activities are aligned with the Georgia Standards of Excellence, STEAM and Habits of Mind for K-5. Students will discover the diversity of plants, animals, cities, river systems and natural wonders of Georgia as they walk across a fourteen foot map of Georgia made of Elberton granite. A bog area filled with carnivorous pitcher plants allows students to investigate these unique habitats that are found in Georgia. A replica of Sitton’s Cave is integrated into their discovery of our rich geologic diversity. A fossil filled wall facilitates discussion and analysis of our geologic history. A large Dig and Grow area provides students with examples of sustainable growing practices. A root zone viewing area provides a visual glimpse into the wonders of underground plant ecosystems. This overview of Georgia promises to stimulate students to discover and learn more about our state.

Bus Drop-off/Parking
All busses and cars, both school system and private, should enter the long driveway to the State Botanical Garden. A field trip instructor will greet the bus and direct the driver where to unload. Additional field trip instructors will be at the bus drop off to greet you and direct the bus to a parking area.

If you plan to eat at the garden after the field trip the eating area is located outside. Please plan your food and drinks for the proper temperature. Field trip instructors will take the lunches from the bus and transport it to the eating area for you. There is a dumpster available for any trash. Thank you so much for teaching and modeling best practices by leaving the area as you found it.
Payment
You may give payment for the field trip to the instructor at that time. He or she will have a receipt for you. Check to make sure the amount on the receipt matches that of your check. Often the number of students changes between the time of registration and the actual date of the field trip.

Field Trip Responsibilities and Expectations
Prior to the field trip please review the responsibilities with the students and chaperones for the field trip experience:

- When in the Visitor Center and gardens, do not pick a plant or flower without permission from your guide or teacher. This includes grabbing at leaves as you walk by them. If instructed, touch the plants gently to feel the texture or to smell scents.
- Stay on the pathways, unless otherwise instructed by your guide or teacher. There are many tiny plants that are put on the edges so you can see them, but they can also be easily hurt by a misplaced shoe.
- Listen carefully to your guide's directions and information. There are several beautiful gardens to explore, but if you get lost it will be no fun for you, your teachers, or your classmates.
- Please wear closed toe shoes and weather appropriate clothes for the weather. The entirety of the field trip will be spent outside.
Pre-and Post-Trip Resources, Activities and Background Information

To enhance your learners’ experience during their field study we hope you will be able to read through the background information found in each activity. This will give you the information you need to prepare your students. Vocabulary words and definitions are included. Pre and post trip activities and resources are provided in this packet. Completing these will help learners to absorb the information given in the field trip. The field trips are all aligned to the Georgia Standards of Excellence. Most of all, enjoy your field trip at the State Botanical Garden of Georgia!

Resources

Bog facts for kids
https://kids.kiddle.co/Bog

Useful books for the classroom:
- 101 facts about rivers (101 Facts about Our World) by Barnes, Julia
- 24 hours in the wetlands (Day in an Ecosystem Set 1) by Schomp, Virginia
- All about forests (Little Pebble: Habitats) by Gardeski, Christina Mia
- All about forests by Mack
- All about forests by Santos, Penelope
- All about wetlands (Little Pebble: Habitats) by Gardeski, Christina
- At home in the wetlands (At Home in the Biome) by Spilsbury, Louise
- Pitcher plants eat meat! (World's Weirdest Plants) by Linde, Barbara M

You tube resources for children:
- Water cycle--https://youtu.be/y5gFI3pMvoI
- What is a watershed?--https://youtu.be/QOrVotzBNto
- Water cycle song--https://youtu.be/TWb4K1M2vts
- Soil (dirt)--https://youtu.be/fqOYSf7Tbg (Sid the Science Kid: 26 min)
- Rivers and watershed/basins resources--
  http://georgiainfo.galileo.usg.edu/topics/geography/article/georgia-rivers/oconee-river and
  https://garivers.org/other-georgia-rivers/oconee-river.html
- Oconee river facts--https://garivers.org/
- GA River network, paddle GA, information, family events, conservation
Beachcomber’s Guide to the Georgia coast (Observation of biological organisms)

**Essential Questions:**
- Where is coastal Georgia located in relation to me?
- What organisms or natural items might I find on my beach walk?

**Teaching this activity:**

1. Introduce this geography and biology activity by telling the students they are going on an imaginary trip to the beach.
2. Use a Georgia map and show the students where the Atlantic Ocean is in relation to their location. Maps can be found online, in an atlas and a roadmap from Georgia DOT.
3. A teacher, adult volunteer or older student can read a book about going to the beach. Or, students can prepare a puppet show to talk about going to the beach.
4. Students can take an imaginary trip to the Atlantic coast and describe what they would do.
5. The beachcomber’s guide can be printed in color, then laminated and cut into individual shells. Bury the shells images in tubs filled with sand. Students then take a stroll on the beach and find shells. To aid in team building, communication skills and matching two sets of cards can be made and then have the students with matching cards get together and create a story.
6. This created story can be shared by drawings, maps, puppet show or acting.
7. **Extension lesson:** map reading, geography, planning, time and chronology, describing, matching, analyzing characteristics, learning the animals that lived in these shells. Shore bird identification cards can also be printed from the website and used in the same manner.
8. **Students can make a mural.** Use a roll of butcher paper or art paper on a roll. Print the organism from the website, have the students, cut them out and then glue them to the mural.

**Options:** Students can bring in their shell treasures to share and tell their beachcombing stories.

**Ecology option:** students can bury trash that is common on the beach: balloons, plastic bags, sand play toys, snack bags, fishing line and human food. These items are often deadly to marine organisms. For further activities (geared towards 4<sup>th</sup>–8<sup>th</sup> grades) on marine debris see [https://gacoast.uga.edu/wp-content/uploads/2016/05/MarineDebrisAndMe.pdf](https://gacoast.uga.edu/wp-content/uploads/2016/05/MarineDebrisAndMe.pdf)

<table>
<thead>
<tr>
<th><strong>Georgia Standards of Excellence:</strong></th>
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<td>S2L1, SS2G1, S3L1, S3L2</td>
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<th><strong>Skills:</strong></th>
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<td>Obtain, evaluate, and communicate information:</td>
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<td>- about the life cycles of coastal organisms</td>
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<td>- to describe the organisms found on Georgia’s coastal ecosystems.</td>
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<td>- about the effects of pollution</td>
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<th><strong>Supplies:</strong></th>
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<tr>
<td>- Map of Georgia</td>
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<tr>
<td>- Storybook about the beach</td>
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<tr>
<td>- Beachcomber’s Guide-printed, cut, and laminated into individual organisms</td>
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<tr>
<td>- Bins of sand</td>
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<td>- Information on the organisms</td>
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**Time:** 40-60+ minutes
Walk like a Decapod-ian!

Examine a ghost crab and play a game that introduces how animals are adapted to live in specific habitats. (From UGA Marine Extension)

**Essential Questions**

**Background Information**
Have you ever wondered why you’ve seen that crab sneaking stealthily sideways across the sand? By taking a close look at crab anatomy we can gain some insight into crab movement and behavior. Form follows function in nature. The way an organism is shaped relates to it needs for survival in a particular habitat. Look at a ghost crab and notice how their jointed legs are shaped and hinged. This attachment allows them to easily glide in any plane of movement - not only side to side, but also forwards and backwards. By moving sideways a ghost crab can construct a narrower burrow opening, which leaves less space for a predator to reach inside, and a stronger burrow construction architecturally speaking! Ghost crabs legs are long and sturdy. Always on the move to dodge predators and scavenge for food, these crabs have been clocked traveling at speeds over one meter per second and covering over 300 meters a night. A ghost crab could be considered an animal Olympian of sorts! Compare and contrast crab and human bodies by studying their locomotion.

**Procedure**
- Copy pictures of a ghost crab for the class to examine - If not done as a class activity, cut yarn or string into (9) 15 meter lengths and mark (6) of them at every meter with tape. See procedure step 6.
  1. Examine a picture of a crab with the class and generate a list of things students know about crabs. Students may have a lot of different feelings about crabs, so as the list is generated separate facts from opinions.
  2. Introduce the idea that there is a reason for the way that living things look and behave in their environment. Crabs are creatures that look completely different from us! Each of their features (adaptations) has a unique purpose to help them survive in their habitat.
  3. Crab legs are shaped for movement. How are our legs shaped for our movements? For example, ghost crabs (Ocypode quadrata) could be considered animal Olympians because of their swiftness. Do the students think a human the size of a ghost crab could move faster than a ghost crab? Let’s find out!
  4. Divide students into 6 teams of 4. Each team should make a measuring yarn to record how far the students will travel in meters. These will also serve as racing lanes. Give teams a precut 15 meter yarn piece, and have them measure and fold masking tape over the yarn at every meter. A marker can be used to write units on the tape.
  5. Lay out the six (6) parallel lanes in a teaching area with lots of space (outside is best). An extra unmarked yarn piece can be used to close off the last outer lane edge.

**Georgia Standards of Excellence:**
S3L1, M3M2, M3N4

**Skills:**
- understand that the shape of living things allow them to function and survive in their natural environment
- measure distance in metric units.

**Supplies:**
- ghost crab pictures
- stopwatch or timer (with a second hand)
- pieces of yarn or string (precut to 15 meters)
- masking tape
- permanent marker
- meter stick or tape

**Time:** One class period
6. Now it’s time to test our hypothesis with a race! Ask a student to demonstrate the crab walk, done on all fours with your stomach facing the sky. This race is conducted in four rounds – one team member participates per round, and each round uses a different mode of movement. Assign each team member a different crabwalk for their round – frontward, backward, sideways leading left, or sideways leading right.

7. Line up the frontward crab walkers in the lanes for round one. At the GO signal, students crab walk as far as they can while 10 seconds is timed on a watch. The students freeze at the end of time, and another teammate looks at the yarn to determine how far the crabwalker traveled. Record these distances on group data sheets (attached) or on a class chart.

8. Repeat this process for the backwards, sideways leading left, and sideways leading right crab walkers.

9. Analyze the data. The data recorded indicates speed: the number of meters traveled in 10 seconds. Ghost crabs travel over one meter per second. Have students create a division equation to calculate how many meters they traveled per second.

10. Compare data recorded for different racing styles. Were student speeds faster than those of a ghost crab? Why not? Compare human size to that of a crab. Do we move faster just because we are bigger? If we were the same size as a crab, who would move faster? How do our legs bend compared to a crab? Would we be limited in accomplishing daily tasks if we moved like a crab? In which direction was it easiest to move? How does a crab benefit from moving as it does?

**Extensions**
- Use the data collected to create graphs for visual comparison, or practice math skills by converting meters per second into different units or by computing average speeds for different race methods or racing teams.
Investigating Soil at School

Essential Questions

Procedure:

1. **Soil Collection**
   Whole class outdoor exploration is a good way to take students outside on a sensory hike. You will need metal tablespoons or trowels, bags, containers and markers for recording location, temperature and observations of several samples.
   Indoor option: Ask children to bring in soil (dirt) samples from home in a container. Transfer the samples to baby food or jelly jars. These samples can be looked at as a large group.

2. Pose the following questions to students as they collect samples at various sites on your schoolgrounds:
   - Is the soil hard or easy to dig?
   - If it’s hard, how can you loosen it?
   - Is the soil wet or dry?
   - Does it get wetter or drier as you dig deeper?
   - What is the temperature?
   - What does the soil feel like? Smell like? Look like?
   - Do you see anything besides soil in your sample? Seeds, leaves, bugs?
   - Are there plants growing near your sample?
   - Do people walk on this site? (Is it compacted?)
   - Is it shady or sunny during the morning or afternoon?
   - Does it appear that a plant or seed would have an easy time putting down roots for nutrients?
   In your group time you can compare and contrast the answers to the questions and discuss different factors that would affect the soil.

3. **Soil drawing**: Use the soil samples brought in by students or collected from different locations on the school campus to begin an artistic exploration of soil characteristics. Take a pinch of soil with fingers and rub it on a white sheet of paper without adding water. This process helps children feel the texture of different soils and notice the different color rubbings the varied soil samples make. Allow students to use descriptive words for texture, color, smell, drawing ability and ease of plant root movement. Try creating a picture by just using soil smudges! They can also make a rainbow by sharing different soil samples with their classmates. This activity can be done outside our inside on newspaper for easy clean up.

4. **Analyzing and concluding**: Use an empty glass jar or clear plastic container to make soil layers of various soil samples. Students can then draw their observations and color them different shades to recognize that all soils are not the same. A terrarium can also be made using the soils.

5. **Extension**: Students can use the soil samples to plant identical seeds and keep all variables constant, light exposure, temperature, water, amount of soil to see if the soil may make a difference in germination and growth.

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**Georgia Standards of Excellence:**
SKE2, S1L1, S3E1

**Skills:**
Obtain, evaluate, and communicate information to describe the physical attributes of soil and basic needs of plants.

**Supplies:**
- Metal spoons/trowels
- Collection bags/containers
- Markers to record data on bags
- Thermometer
- Magnifying classes (opt.)
- Paper for soil drawing
- Empty, clear jar
- Seeds for planting in soil samples (opt.)

**Time:** 40-60+ minutes
What is your Ecological Address?

https://www.eenorthcarolina.org/resources/your-ecological-address

Essential Questions
What are the different environmental factors that make up where we live?
Where do the resources we use every day come from?
Are there any impacts on the environment from our use of resources?

Background information
Your river basin is only one part of your ecological address. You know what street you live on; what town or county you live in but do you know your ecological address? Your ecological address can tell you a lot about your place in the natural world. Ecology is the branch of biology that deals with the relations of organisms to one another and to their physical surroundings. It involves the relationship between the abiotic (not living) and the biotic (living).

There are nine parts to your ecological address:

1. River Basin
   - Which river basin do you live in?
   - Can you find out where your water comes from when you turn on the faucet?
   - Where does your wastewater go?

2. Topography
   - Topography describes the terrain of the land. Terrain is a geographic area: a piece of land: it includes the physical features of a tract of land. (examples: hilly, flat, mountains, valley, high, low, etc.) Georgia has 4-5 unique regions (physiographic or ecoregions). Each of these regions has unique soils, geology, topography and plant and animal communities.
   - Do you live in the Blue Ridge, Ridge and Valley and Cumberland Plateau, Piedmont, or Coastal Plain region of Georgia?

3. Wetlands
   - A wetland is an area where the level of the surface water is at, near, or above the ground surface for part of the year. Do you live near a wetland?
   - Wetlands act like giant sponges. They soak up water when it rains which keeps places from flooding.
   - Marshes, swamps, and bogs are examples of wetlands
   - Wetlands help clean pollutants out of water. Pollutants are some that pollutes. Water pollution is an undesirable change in the state of water, contaminated with harmful substances. Any change in the physical, chemical, and biological properties of water that has a harmful effect on living things is called water pollution. It affects all the major water bodies of the world, such as lakes, rivers, oceans, and groundwater. (examples: chemical runoff from lawns and farms, oil

Georgia Standards of Excellence:
S2E3, SS2G1, S3L2, SS3G1 S3L1, S3L2, S4L1

Skills:
- Researching the different ecological factors unique to your school/community’s location in Georgia
- Understanding our connection to and impact on the environment and resources around us.

Supplies:
- Maps of Georgia
- Access to weather, energy, water use data
- Materials to record data on biodiversity walk around school (clipboards, paper, pencils, etc.)

Time: 60+ minutes (can be easily divided into segments)
films from roads and parking lots, animal waste from the land, and industrial waste from manufacturing.)

- They give a home to most of the seafood that people like to eat.

4. **Groundwater**
   - **Groundwater** is the water found in cracks and spaces between sand, gravel, and rocks below the ground surface.
   - **Aquifer**: An aquifer is an underground layer of water-bearing rock. Water-bearing rocks are permeable, meaning that they have openings that liquids and gases can pass through.
   - Many people in Georgia and around the world get their drinking water from groundwater sources.
   - Groundwater can be pumped to the surface through a well and pump system. These wells can be individual for homes, or communities, or towns and cities.
   - Where does your drinking water come from?

5. **Climate**
   - **Climate** refers to the average weather conditions in an area over a long period of time.
   - How much rain or snow do you see in a year? (inches(cm) per year, inches(cm) per season)
   - How hot or cold does it get where you live and for how many days a year?

6. **Soil**
   - **Soil** is the top layer of the earth’s surface.
   - It is made of **weathered** (chemical or physical break down of rock to create soil) rock and decayed **organic** (living or once living) matter.
   - What kind of soil do you see where you live?
   - What color is your soil and what does that indicate (tell you) about that soil and the **nutrients**?
   - A **nutrient** is a substance that provides nourishment essential for growth and the maintenance of life.

7. **Air**
   - **Air** is made up mostly of nitrogen and oxygen gases and it surrounds the earth and makes life possible. (Abiotic – not living)
   - Like water, air can be polluted.
   - What kinds of things might pollute the air around you? (exhaust from lawnmowers, blowers, weed eaters, cars, trucks, factories, four-wheelers, trains, power plants, animal waste, etc.)

8. **Biodiversity**
   - **Biodiversity** is the number of plants and animals in an area. (Bio- means life)
   - People depend on biodiversity for food and medicine.
   - Sometimes when one plant or animal becomes extinct, the whole ecosystem feels the effects.
   - **Action**: Do a biodiversity survey of your school grounds. How many different plants and animals can you find?
   - Which plants and animals are **native** to Georgia and which were introduced from somewhere else?
   - **WHAT IS A NATIVE PLANT?**
• The generally accepted principle is that native plants are those plants which have inhabited a particular region for thousands of years arguably plants that and were present in a particular area prior to European settlement.

• **Georgia’s Native Plants**  [https://gnps.org/georgias-native-plants/](https://gnps.org/georgias-native-plants/)

9. **Energy**
   - **Energy** is the ability to do work. We need energy for everything we do.
   - Our bodies get energy from food.
   - We use energy in the form of **fossil fuels** to light up our homes and travel in cars and buses.
   - A **fossil fuel** is a fuel (such as coal, oil, or natural gas) formed in the earth from plant or animal remains over millions of years.
   - Think about the energy that you use in a day. Where does your electricity come from?
   - How does your food get to your table? How far did it travel to get there? What resources were used to produce it?

**Further Exploration: Ecological Footprint**
- Every one of us leaves behind an ecological footprint. We all need and use natural resources to survive. Driving habits, eating habits, and household activities can affect the size of that footprint.
- How large is your footprint? Find out at [https://www.footprintnetwork.org/resources/footprint-calculator/](https://www.footprintnetwork.org/resources/footprint-calculator/) (requires email address)
Watershed and River Basin vocabulary acquisition

Materials: 3–4 ropes and location cards, GA River Basin and watershed pictures

Procedure: Vocabulary cards have the picture on the front and the definition on the back. Students can move to any location on the map that matches their card.

- **Ask** the same discussion questions.
- **Say**: “As a group can you explain how water moves through its component parts in a watershed.” Provide time for responses.
- **Say**: “You will play the roles of different parts of a watershed working together to move water through the communities in our state. I will hand out role cards and say the name. Please be studying the Georgia map and the picture and move to those locations. **Hand out** cards. If you have more students than cards, then they will be the precipitation (movement) and creeks that run into the main **tributaries**; they contribute as well to the rivers and the overall river basin. Help students move to the locations on the Georgia map.

*Students are encouraged to work cooperatively. Students with river names should stand at the source or headwaters position. (see the illustration in the instructor’s manual)*

- **Ask**: Provide time for each student to explain why they think they are in the correct place. This allows for misconceptions to be heard and gently guided to the correct information cooperatively.
- **Ask**: Please read your vocabulary card front and back. Help students if they do not want to read. If any student is in the wrong place, then they can move during the discussion to the correct location.
- **Start with the source of a river system (may be several)**
- **Hand out** ropes and say: “Students at the headwaters of the tributaries should connect to each other by passing a string from one headwater location to the other thus outlining the watershed.
- **Say**: “Remember water flows from high to low. Your water will flow towards Bainbridge or Valdosta and on through the Florida panhandle to the Gulf of Mexico or to the Atlantic Ocean. Now we are going to have a rain storm and rain falling on the land (Precipitation). **Ask**: “Now, students clap on your thighs to make rain sound. Then have the story progress through each student location starting at the most upslope location and moving toward larger bodies of water. All students except the string holders move through the river system. Evaporate (students wave arms in the air) and then go back to the headwater (wave hands like water falling and runoff) and go through the cycle again.
Altamaha River Basin or Chattahoochee River Basin

Locating communities along our shared waterway

**Materials:** River system diagram (labeled), GA river basins map, Altamaha River Basin map or Chattahoochee River Basin map.

**Procedure:**

- **Ask:** How would you describe a watershed or river basin? Describe where water goes when it rains on your yard or at school.
- **Have** students hold up their hands and us as a model to illustrate the parts of the river system. Review with the students by asking probing questions how the parts all work together. Hold up maps as you review.
- **Say:** “You will play the roles of different parts of a watershed working together to move water through the communities in our state. I will hand out role cards and say the name. Please be studying the Georgia map and the picture and move to those locations. Hand out cards. If you have more students than cards, then they will be the precipitation (movement) and creeks that run into the main tributaries; they contribute as well to the rivers and the overall river basin. Help students move to the locations on the Georgia map.

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**Priority Locations: Altamaha River Basin**
Altamaha River
Altamaha River Basin
Altamaha River
Oconee River (tributary)
Ohooppe River (Tributary)
Lake Oconee (reservoir)
Jackson Lake (reservoir)
Atlantic Ocean
Stone Mountain
State Botanical Garden of Georgia
Athens

**Optional Locations: Chattahoochee River Basin**
Chattahoochee River
Westpoint Lake
Providence Canyon
Atlanta
Gainesville
Helen
Columbus
Discussion/Assessment:

- What is the name of the main channel (stem) of your watershed? (Ocmulgee River, Oconee River, Ohoopee River, and eventually the Altamaha River)
- What is the name of your watershed? (Altamaha River Watershed & River basin)
- How many tributaries (primary) drain into the main channel (stem). (in this GA map- 3- Ocmulgee, Oconee, Ohoopee Rivers)
- Does your watershed map indicate the outlet or mouth of the main channel? (yes, the Atlantic Ocean)
- Name a plant, animal, city, town or community within the boundaries of your watershed. (use the names on the map)
- Locate: Atlanta, Stone Mountain, State Botanical Garden of Georgia, Jackson Lake, Lake Oconee, Lake Sinclair, Atlantic Ocean

Credit: Option 2 adapted from Project WET by GL 2018.