



## **Title: Sargasso Sailing**

Created by the NC Aquarium at Fort Fisher Education Section

**Objectives:** By the end of this lesson, students will be able to

- Understand that ocean currents are the boundaries of the Sargasso Sea and the Northern Atlantic Subtropical Gyre
- Understand that juvenile loggerhead sea turtles spend much of their time in the Sargasso Sea
- Understand that plastic pollution is often collected in gyres and infer how that will affect sea turtles

## **North Carolina Standard Course of Study:**

### **First Grade:**

#### **Technology:**

- 1.TT.1 Use technology tools and skills to reinforce classroom concepts and activities.
  - 1.TT.1.1. Use a variety of technology tools to gather data and information

#### **Science:**

- 1.L.1 Understand characteristics of various environments and behaviors of humans that enable plants and animals to survive.
  - 1.L.1.3 Summarize ways that humans protect their environment and/or improve conditions for the growth of the plants and animals that live there

### **Second Grade:**

#### **Technology:**

- 2.TT.1 Use technology tools and skills to reinforce classroom concepts and activities.
  - 2.TT.1.1. Use a variety of technology tools to gather data and information

#### **Science:**

- 2.E.1 Understand patterns of weather and factors that affect weather
  - 2.E.1.1 Summarize how energy from the sun serves as a source of light that warms the land, air and water

### **Third Grade:**

#### **Technology:**

- 3.TT.1 Use technology tools and skills to reinforce classroom concepts and activities.
  - 3.TT.1.1. Use a variety of technology tools to gather data and information



## **Fourth Grade:**

### **Technology:**

- 4.TT.1 Use technology tools and skills to reinforce classroom concepts and activities.
  - 4.TT.1.1. Use a variety of technology tools to gather data and information

### **Science:**

- 4.L.1 Understand the effects of environmental changes, adaptations and behaviors that enable animals (including humans) to survive in changing habitats
  - 4.L.1.2 Explain how animals meet their needs by using behaviors in response to information received from the environment

## **Fifth Grade:**

### **Technology:**

- 5.TT.1 Use technology tools and skills to reinforce classroom concepts and activities.
  - 5.TT.1.1. Use a variety of technology tools to gather data and information

### **Science:**

- 5.L.2 Understand the interdependence of plants and animals with their ecosystem
  - 5.L.2.2 Classify the organisms within an ecosystem according to the function they serve: producers, consumers, or decomposers
  - 5.L.2.3 Infer the effects that may result from the interconnected relationship of plants and animals to their ecosystem

## **Time Frame:**

Preparation: 10 minutes

Explanation and Sargassum Brainstorming: 15 minutes

Video Clips and Sampling Activity: 20 minutes

## **Background:**

The Sargasso Sea is a stretch of ocean located within the Northern Atlantic Subtropical Gyre and is the only sea with no land boundaries. Instead, the boundaries are ocean currents. The Gulf Stream makes up the western boundary of the Sargasso Sea while the northern boundary is the North Atlantic Current. To the east of the Sargasso Sea is the Canary Current and the southern border is established by the North Atlantic Equatorial Current.

The Northern Atlantic Subtropical gyre is one of many gyres found throughout the ocean. A gyre is a circular system of ocean currents that are formed by global wind



patterns and the rotation of the Earth. Due to the circular motion of the gyre and the typically stationary water within, plastic pollution can accumulate in these areas.

The Sargasso Sea is named for mats of free-floating seaweed found in the genus *Sargassum*. These are unique seaweeds as they not only free-float while other species of seaweed attach to the bottom of the ocean, they also reproduce vegetatively meaning that offspring are produced from a single parent without seeds or spores.

Sargassum provides habitat for many marine species including young sea turtles. When hatchlings leave our coast and head to the ocean, they swim to the Gulf Stream and ride the fast-moving current to get away from coastal areas which have a lot of predators. During a scientific study where young loggerhead sea turtles were tracked with satellite tags, researchers found that the turtles would leave the Gulf Stream and enter the Sargasso Sea with surprising regularity. Within these floating seaweed mats, turtles find shelter and food while also utilizing the seaweed's thermal enhancing properties to warm up. To learn more about this study, use the following resources:

[http://www.fisheries.noaa.gov/stories/2014/03/3\\_11\\_14seaturtle\\_migrationroute\\_revealed.html](http://www.fisheries.noaa.gov/stories/2014/03/3_11_14seaturtle_migrationroute_revealed.html)

<https://www.ucf.edu/pegasus/sea-turtles-the-lost-years/>

## Materials:

- Maps of North Atlantic Ocean, either enlarged and printed or projected on a wall or smartboard
- Picture of Sargassum seaweed
- Five collection containers with shredded paper and colored plastic pieces (or laminated bits of colored construction paper) inside. These represent samples collected from different locations throughout the North Atlantic. The 30° and 29° samples were collected from the Northern Atlantic Subtropical Gyre. The 42° sample is from the Gulf of Maine. The 32° sample is from the coast of NC. The 39° sample is from the New England fishing grounds. Each collection container should be labeled with location coordinates as follows:
  - 30°N 65°W → 37 purple plastic pieces
  - 29°N 60°W → 30 red plastic pieces
  - 42°N 65°W → 4 green plastic pieces
  - 32°N 78°W → 3 yellow plastic pieces
  - 39°N 68°W → 19 blue plastic pieces
- 5-10 pairs of tweezers

**Preparation:** Create the collection containers using Tupperware bins, shoeboxes, or even paper bags. Either use cut up bits of plastic or laminate small pieces of colored

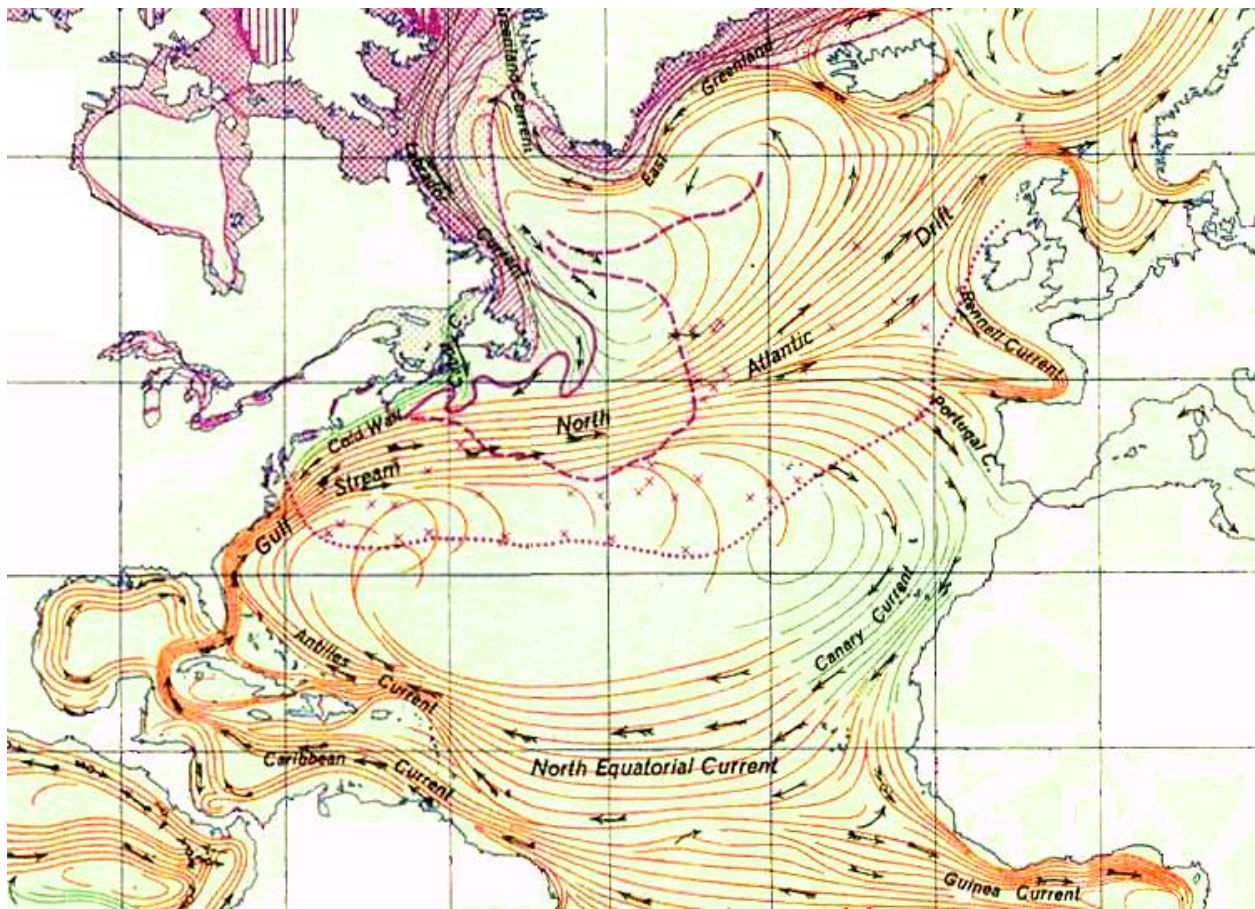


construction paper and mix those pieces with shredded paper inside the collection container.

Print out and enlarge maps of the North Atlantic, or you can project them on a smartboard or wall. Use a digital image of Sargassum seaweed.

## Activity:

Introduce the topic of ocean gyres to the students. Offer a short explanation of how they form and show students a visual representation of the Northern Atlantic Subtropical gyre and the currents that form its boundaries (Fig. 1). Point out the different currents on the figure, particularly the Gulf Stream. Because the Gulf Stream runs along the eastern coast of the United States, students may be more familiar with this current.



**Figure 1.** A representation of the currents that form the Northern Atlantic Subtropical gyre (Wikipedia, n.d.).

Explain that the Sargasso Sea is located entirely within the Northern Atlantic Subtropical gyre. Show students pictures of Sargassum seaweed and ask them to brainstorm what types of marine animals may be found within the floating mats. If students are younger, you can have pictures of animals from which they can choose. If working with older students, have them brainstorm in





small groups and then connect the animals together to create a marine food web.

This floating community offers food, shelter, and protection for various types of invertebrates which in turn support a great diversity of fish and other animals. Many species of juvenile fish have been documented in the Sargassum, including those in the filefish, jack, flyingfish, triggerfish, and dolphin fish (mahi mahi) families. Additionally, adult, commercially-important fish such as dolphin fish, amberjack, and tuna can be found hunting for prey in this community. Marine mammals and juvenile loggerhead sea turtles also spend time in the Sargasso Sea.

We know that young loggerheads spend time in the Sargasso Sea, but that is actually a recent finding. Show students this video clip from Newsy Science about young loggerheads and their journey to the Sargasso Sea: <https://www.youtube.com/watch?v=IJPkQpRCrxU>

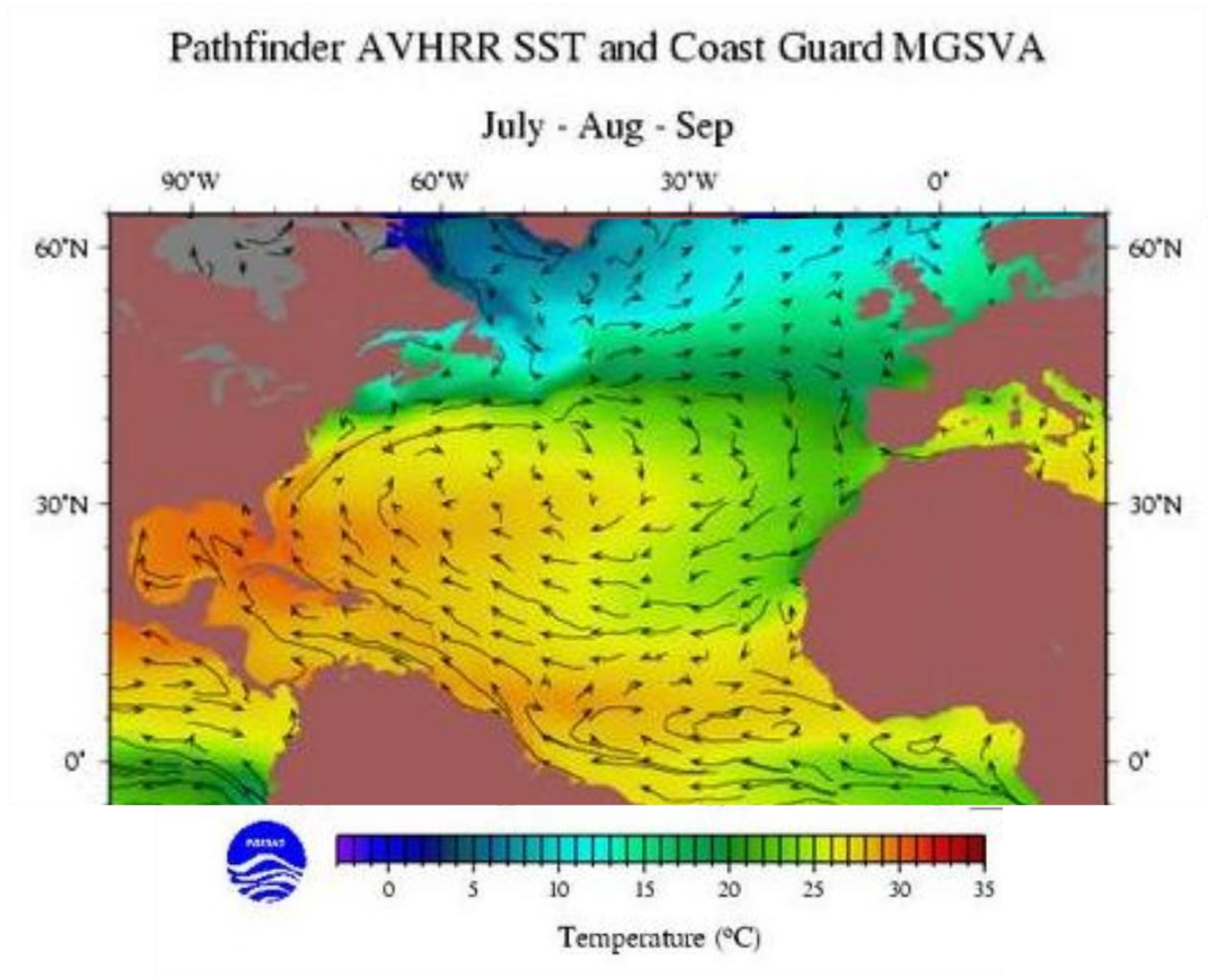
There are certainly a lot of animals that can be found in the Sargasso Sea, but what about plastic pollution? Researchers have also studied plastics in the ocean. Scientists with the Sea Education Association have been collecting samples from the North Atlantic for over 20 years! Watch them work in this short video clip: <https://www.youtube.com/watch?v=kZGJTdbdvO4>

Tell the students they are going to become ocean scientists and look through some samples SEA researchers have collected from specific locations.

Split the students into 5 groups and give each group a collection container and one or two pairs of tweezers. Have the students use the tweezers to separate the plastic pieces from the rest of the sample. Each collection container should be marked with the latitude and longitude where that specific sample was collected and all the plastic pieces in a sample should be the same color. Once the students find all their plastic pieces, invite them up to the front to mark their sample and location on the large map of the Northern Atlantic (Fig. 2). After all groups have marked their samples on the map, discuss observations with the entire class.

### Critical Thinking Questions:

1. Where was the most plastic found according to these samples?
2. Do these findings make sense regarding what we know of ocean currents in the North Atlantic?
3. Do these findings have any implications for young loggerhead sea turtles.
4. We only looked at five samples today. Is this an appropriate number of samples, why or why not?
5. Where does the plastic come from?
6. What can we do about plastic in the ocean?



**Figure 2.** A map of the North Atlantic Ocean showing average sea surface temperatures and surface ocean current direction for July, August, and September 2013. (Rosenstiel School of Atmospheric and Marine Science, 2013).

**Summary:** Loggerhead sea turtle hatchlings ride the Gulf Stream and hop off to spend a significant amount of time in the Sargasso Sea. The Sargasso Sea is home to large floating mats of Sargassum seaweed which provides much needed habitat in the open ocean. Sargassum stays in a circular patch of the North Atlantic due to wind-driven surface ocean currents and the rotation of the planet. Because of these patterns, plastic pollution often collects in these areas of the ocean as well. Humans play a part in the production and distribution of plastic pollution. We can also play a major role in



limiting our use of plastics and making sure trash is disposed of properly. A great way we can help limit plastic pollution is by swapping out reusable items for single-use plastic items. Use reusable bags and water bottles instead of relying on plastic ones. Additionally, you can skip the straw at restaurants. Plastic straws are among the most common plastic pollution found during beach clean-ups.

## **Extensions:**

1. Follow this lesson with “On the Sargasso Sea” to discuss camouflage among Sargassum seaweed.
2. Follow this lesson with “Sea Turtle Food Web” to discuss marine food webs.
3. Learn more about surface ocean currents and create a map depicting these currents through the world ocean. Identify the gyres in each major ocean basin.
4. Give each small group one collection container with all samples in it. The colored pieces would still connect to the latitude and longitude. The students, working in small groups, could mark all of the sample locations on smaller maps and then create a graph presenting their findings.