Cumberland Island National Seashore

# Habitats

A *Cumberland Island National Seashore*

Teacher Resource

*Cumberland Island National Seashore*

# Habitats

**Introduction:** The resources in this guide are designed to introduce your students to the habitats found on *Cumberland Island*. There are a variety of activities, some can be completed in the classroom, others are designed to be completed on the island. Feel free to adapt and modify them for use with your students.



**NOTE:** Printed copies of the official *Cumberland Island Map* are available in the *Visitors Center*. The map can also be accessed online at http://www.nps.gov/cuis/index.htm

## Habitat Overview

*Cumberland Island* is Georgia's largest and southernmost barrier island. A **barrier island** has four major habitats: *salt marsh*, *maritime forest*, *beach and dunes*, and *freshwater systems*.

The **salt marsh** is located on the west side of the island because it is the protected side. Salt tolerant plants live here. Daily tidal changes of 6 feet create and sustain the marsh by bringing fresh water, oxygen and food into and out of the marsh. Animals found in the marsh can vary due to the fluctuating tide. A variety of *birds* can be found here, as well as *raccoons* and other animals who come down from the uplands to feed on *crabs* and search for *shellfish*.

The **maritime forest** is the most stable part of the island and is characterized by *live oaks* draped in *Spanish moss*, *palms*, *hollies* and *palmettos*. *Deer*, *armadillos*, *raccoon*, *opossum*, *snakes*, *lizards*, and *birds* are commonly seen.

The **dunes and beach** are ever-changing due to wind and water. Items washed up on the beach trap sand and start to form sand dunes. As organic material decomposes, it feeds any seeds trying to grow. Some of the plants like *sea oats* and *morning glory* stabilize the dunes. These are the first line of defense against any storms and water surges. Beaches have a very gentle slope and due to tidal flux are very wide at low tide. Shelling and birding are usually possible.

The **freshwater systems** vary from springs to ponds to freshwater sloughs. Weather plays a big role in the presence or absence of these systems. As in any freshwater system, animals such as wading birds, mammals, alligators and insects can all be found.

**Teaching Suggestions:**

- Discuss the different habitats on the island. Ask students what kind of animals and plants they would expect to find in each habitat.
- Ask why a certain animal, like a deer, can be found in the forest, as well as in some of the other habitats on the island. (looking for food, shelter, etc)
- View the online video, *Sapelo, An Island in Time* on the *Georgia Department of Natural Resources* website to learn more about barrier island habitats: http://gadnr.edvid.org/ **NOTE:** Scroll down the page to locate the *Island in Time* video.
- Review the **Cumberland Island Habitat Map** with your students. Discuss the locations of the various habitats on the island. Allow students to color the map and map legend.

# The Maritime Forest Habitat

Of all the major ecosystems, the **maritime forest** is the most stable, being surrounded by dunes on one side and marsh on the other.

A forest has three levels: **canopy, understory,** and **ground floor.** Each level contains plants adapted to survive there. Each plant needs a specific amount of sunlight, water, and nutrients from the soil. On a barrier island, the maritime forest also has to deal with the effects of the salt.

The **canopy** gets the most sunlight but also receives the most salty air. This results in **salt pruning**, a characteristic **wedge-shape** arching up from the ocean. This pruning causes the trees to spread sideways, creating a dense canopy. The dense canopy helps hold in moisture that comes from the air and is a by-product of photosynthesis. Live oaks are the predominate plant in the canopy. Its limbs are often covered with Spanish moss and resurrection fern. Animals utilizing the canopy include **migratory** *birds* (like *warblers*), *squirrels*, and various *insects*.

The **canopy** connects to the **understory** by **vines**, such as *grape*, *poison ivy* (a hairy vine), *crossvine* and *Virginia Creeper* (leaflets of five). The **understory** consists of **shade-tolerant** species like *sparkleberry*, *hollies*, and *saw palmetto*. Sunlight filtering through to the understory is reduced because of the dense canopy. *Lizards*, *snakes*, *birds*, *insects* and *deer* are commonly found in the **understory**.

The **ground floor** supports the other two levels of the maritime forest and **recycles** forest nutrients. Limbs and other dead wood are **decomposed** by *insects* and *wood borers. Mold* and *bacteria* break down leaves and dead animals. *Armadillos* keep the soil overturned with their search for insects, allowing decomposers to work more efficiently. The nutrients are then returned to the soil and utilized by the plants, perpetuating the **nutrient cycle**.

## Key Terms

** maritime forest *  canopy * understory  *  ground floor  **

**  salt pruning  * migratory * decomposed * nutrient cycle **

## Do You Know?

1. Name the three levels of a maritime forest.
2. Which level receives the most sunlight?
3. Name some plants which can be found in the understory.
4. Which level is known for decomposing wood and leaves?
5. How do armadillos assist with this decomposition?
6. Describe the nutrient cycle of a maritime forest.

## Want to Know More?

View **illustrations** of *Maritime Forest Plants*
http://oceanica.cofc.edu/an%20educator%27sl%20guide%20to%20folly%20beach/guide/forest.htm

Read an **article**: *Georgia Sea Grant: Maritime Forests*
http://georgiaseagrant.uga.edu/article/maritime_forests/

**Create a set** of *Maritime Forest Scavenger Hunt Cards*
*Georgia Sea Grant: Teacher Tools*
*http://georgiaseagrant.uga.edu/article/teacher_tools/*

# Cumberland Island Forest Survey


**Directions:** After reading through the *Maritime Forest reading passage* and reviewing the *Maritime Forest Plant list* with your students, lead your students on a walk through the maritime forest. The maritime forest can be explored in a number of places on the island, but one of the easiest to access is the *Nightingale Trail*. Please refer to the *Cumberland Island map* for the exact location.

Distribute copies of the **Forest Survey Observation Guide** to each student. Ask them to document the plants and animals they observe on their walk. You can also allow students to take photos of plants and animals seen on the hike. Use the photos to create presentations or photo collages once you return to the classroom.

Explain to the students that their observations and note-taking are similar to those other naturalists made on strolls through the forest. These provide a basis for information on animals, plants and changes in the forest. They can use their observations and notes for the basis of a writing assignment or presentation once they return to the classroom.

**Teaching Suggestions:**

The **canopy** can be explored using binoculars (if available). Hand out the binoculars and explain how to use them - *Adjust binoculars to the width of the eyes. Focus the right eye by closing the left eye and turning the right ocular lens. Open the left eye and focus with the main knob. To use the binoculars, look around for an object of interest. Stare at the object and, without moving the head, place binoculars up to the face. The object should be seen easily. Focus with the main knob to clarify*. – ***Caution students <u>NOT</u>*** *to look at the sun!* Students should also not walk around with the binoculars up to their face. Observation by sight and sound should be emphasized. **Field guides** can help with the identification, but is not necessary. Have students note a particular trait or adaptation. Note observations on the *Forest Survey Worksheet*.

For the **understory**, look for traces of animals in the sand, as well as sightings of the actual animals. Note observations on the worksheet.

For the **ground floor**: Use the observation sheet as your guide and circle the names of the plants & animals you find.

# Forest Survey Observation Guide

**DIRECTIONS:** Circle each item you see as you explore the 3 levels of the maritime forest. Make note of any other interesting discoveries you find.

**CANOPY**

Live Oak  Grape Vine  Spanish Moss  Greenbrier

Cardinal  Squirrel  Insects

Other:

*Notes*:

**UNDERSTORY**

Saw Palmetto  Greenbrier  Sparkleberry  Resurrection Fern  Lichen

Spiders  Birds  Lizard  Deer  Armadillo

Other:

*Notes*:

**GROUND FLOOR**

Moss  Bracken Fern  Mushroom

Centipede  Wren  Snake  Termite  Worms

Other:

*Notes*:



# *The Salt Marsh Habitat*

*Georgia* has many of the salt marshes found along the East coast. *Cumberland Island National Seashore* has **9,341 acres** of salt marsh. A marsh is a **wetland** where the main vegetation is *non-woody* plants.

There are both fresh and salt water marshes. In a salt marsh, water floods the area at high tide. Elevation of the land and height of water in the marsh varies, allowing for a **diversity** of plants and animals. The salt water inundation limits what plants can live there.

The *Cumberland Island salt marshes* are found on the western side of the island, protected from the force of the waves. It is bordered by the **maritime forest**. A small transition zone separates the forest from the marsh. This is referred to as the **marsh border**. During large storms and very high tides the marsh border gets flooded by salt water, so the plants are **salt tolerant**. *Cedars*, *palms*, *palmettos* and *groundsel tree* are commonly seen in this area.

The tide plays a vital role in the salt marsh. It brings in *nutrients*, *oxygen*, and *water*, as well as *animals*. Few animals actually live in the marsh. Most are visitors looking for food or shelter. Many enter the marsh as **plankton** (microscopic drifters) and leave as adults. *Crabs* and *shrimp* are good examples. Other organisms enter to stay, like *periwinkles* and *oysters*. Each has **adaptations** to survive in this changing environment.

The actual marsh has **two major zones** - the high and the low marsh. These two areas are delineated by the vegetation type, which is an indication of the daily water coverage. The **high marsh** is covered with water only at the highest tides, which occur when the moon is new or full and during stormy weather. It has sandy soil and a high diversity of plants. These include *sea oxeye*, *glasswort* or *sea pickle*, *needle rush* and *saltwort*.

The **low marsh** is flooded with salt water for 6-8 hours per day. It is one of the true **monocultures** in the world. There is only one kind of plant that has adapted to survive this - *Spartina alternaflora* (*smooth cordgrass*). Extra salt taken in by the cordgrass is collected by a gland in the leaves and then excreted through special pores. The soil is dark and squishy in the low marsh.

The **tidal creek** is the life blood of the marsh. It meanders through the marsh bringing nutrients, oxygen and water and then carries wastes away, just like the blood vessels of the human body.

Bordering the tidal creeks is a raised area called a **levee**. It is formed from tidal deposits as the waters flow over the bank. Friction causes the water to slow and drop the sediment load which is how the levee is built.

## Key Terms

** wetland * diversity * maritime forest * marsh border * salt tolerant **

** adaptations * high marsh * low marsh * tidal creek * levee **

## Do You Know?

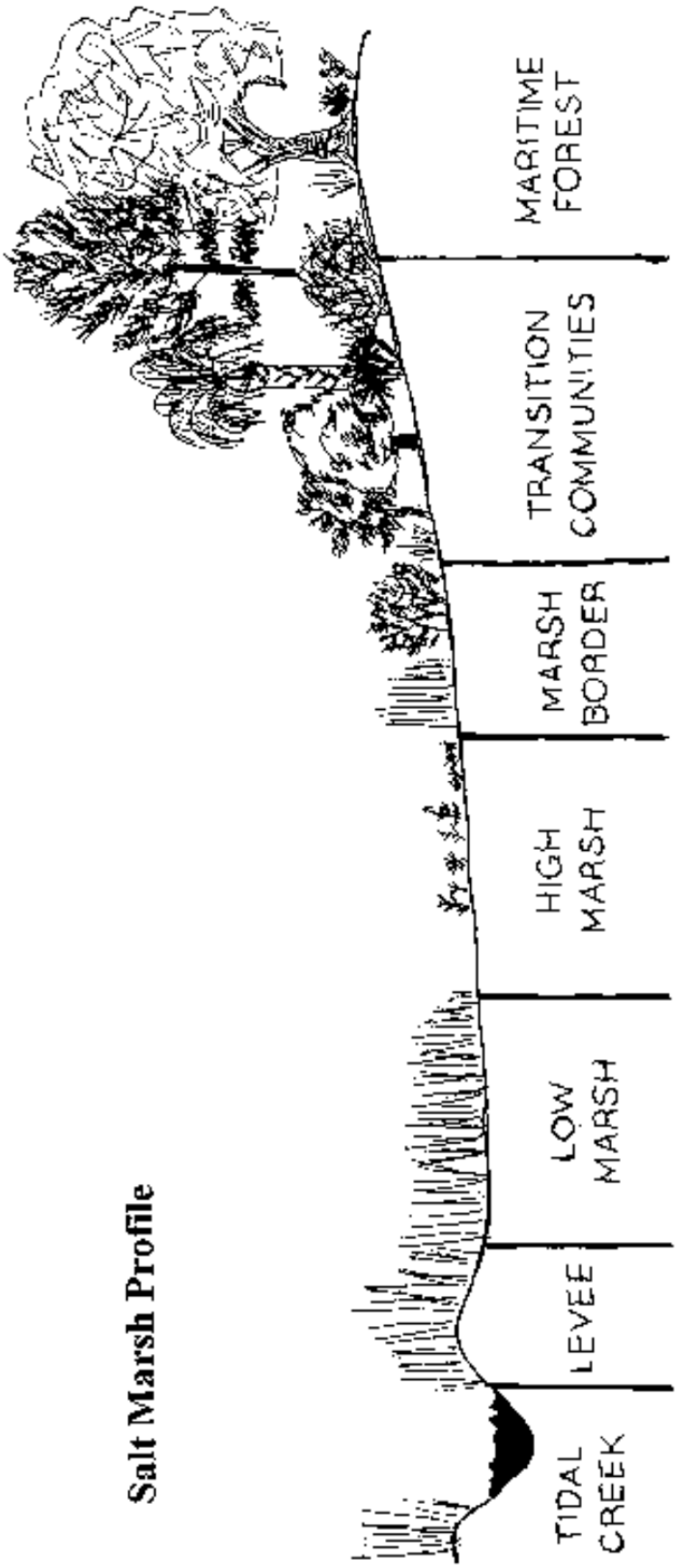
1. Define marsh.
2. What limits the type of plant that can survive in a marsh?
3. What are the two major zones of a marsh? Describe each zone.
4. Why are tidal creeks so important to the health of a marsh?
5. How is a levee formed?

## Want to Know More?

Take a virtual tour of a salt marsh.
*Clemson University Salt Marsh Virtual Field Trip*
http://www.knowitall.org/sclife/

Explore a Salt Marsh High Tide/Low Tide Animation
*NOAA Ocean Service Education*
http://oceanservice.noaa.gov/education/kits/estuaries/media/supp_estuar06a_saltmarsh.html

Watch a Video
*U.S. Fish & Wildlife Service – What is a Salt Marsh?*
*http://www.youtube.com/watch?v=3HXyTMnj7ac*


Salt Marsh Profile
TIDAL CREEK
LEVEE
LOW MARSH
HIGH MARSH
MARSH BORDER
TRANSITION COMMUNITIES
MARITIME FOREST

# Plants of the Salt Marsh

**Levee**

Spartina alternaflora (smooth cordgrass)
glasswort
needle rush
sea oxeye

**Low Marsh**

Spartina alternaflora (smooth cordgrass)

**High Marsh**

glasswort
Saltwort

**Marsh Border**

needle rush
sea oxeye
marsh lavender
marsh aster

**Transition Community**

marsh elder
groundsel tree
salt meadow cordgrass
cabbage palm
red cedar
wax myrtle
yaupon holly
red bay

# Salt Marsh Habitat Word Find

**Directions:** A salt marsh is home to many plants & animals. See how many salt marsh plants and animals can you find in the puzzle below.

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| N | U | I | H | H | E | R | O | N | X | Q | R |
| E | X | N | U | G | W | G | C | R | A | B | S |
| E | O | R | A | C | C | O | O | N | S | R | A |
| D | L | Z | C | O | R | D | G | R | A | S | S |
| L | E | Y | Q | Y | D | K | Q | M | N | D | P |
| E | F | A | G | U | L | L | N | S | R | S | A |
| R | P | M | U | S | K | R | A | T | S | H | R |
| U | M | J | R | E | D | B | A | Y | O | R | R |
| S | G | L | A | S | S | W | O | R | T | I | O |
| H | C | L | A | M | S | Q | V | D | J | M | W |
| H | B | E | G | R | E | T | M | U | N | P | O |
| P | L | I | D | M | S | N | A | K | E | S | N |

**Salt Marsh Habitat Word List**

* clams * cordgrass * crabs * egret * glasswort * gull * heron *
* muskrats * needle rush * raccoons * red bay * shrimp * snakes * sparrow *

**Credit:** Salt Marsh Habitat Word Find created was with *A to Z Teacher Stuff Word Search Maker*

# Cumberland Island Marsh Observation Walk


**Directions:** After reading through the *Salt Marsh reading passage* and reviewing the *Salt Marsh Profile* & *Salt Marsh Plant list* with your students, lead your students on a walk through the *Cumberland Island Marsh*. Distribute copies of the **Salt Marsh Observation Sheet** to each student. You can also encourage students to take photos of plants and animals observed on the walk. Use the photos to create presentations or photo collages once you return to the classroom.

**Note:** Use the **Cumberland Island Inset Map** to locate the **Salt Marsh Boardwalk**.

**Distance:** This is a short walk through the marsh, only about **500 yards**. Take your time and look carefully for plants and animals along the way.

# Salt Marsh Observation Sheet

**DIRECTIONS:** Circle each item you see as you explore the *Saltwater Marsh*. Make note of any other interesting discoveries you find.

**PLANTS**

| | | |
|---|---|---|
| Spartina (smooth cordgrass) | Glasswort | Needle Rush |
| Sea oxeye | Marsh Lavender | Marsh Aster |

*Notes*:

**ANIMALS**

| | | |
|---|---|---|
| Crabs | Shrimp | Periwinkles (snails) |
| Oysters | terrapins (turtles) | Alligators |
| Wading Birds | Raccoon | Marsh Rabbits |

Other:

*Notes*:

**OTHER OBSERVATIONS** (weather, temperature, high tide, low tide, etc.)

*Notes*:



# The Beach & Dunes Habitat

*Cumberland Island* is Georgia's largest and southernmost **barrier island**. Barrier islands act as buffers that reduce the force of waves off the ocean and provide invaluable protection to the mainland. During a storm these buffers are crucial. Barrier islands are **dynamic systems**. They constantly change in size and shape, reacting to **fluctuations** of *ocean level*, *currents* and *weather*. Wind and water move the island and sand. The ocean side of the island is most vulnerable to storms.

Cumberland Island is located within the **Georgia Bight** – the geographically concave area of the Southern U.S. This concave area forces the water to refract and build up as the tide comes in, resulting in the 6 foot tidal range. While the beach is covered with water at high tide, low tide reveals a broad flat area.

Gentle waves and wind move the sand across the beach on most days. Big storms, such as **nor'easters** and **tropical depressions**, increase the wind and waves resulting in beach and dune erosion. This eroded sand is stored in offshore sandbars and slowly migrates back to the beach once the storm is passed.

## Beach Habitat

The beach is a harsh environment in which to make a living. Temperature fluctuations, wave action, tides and weather create ever changing conditions. Marine animals come and go with the tide. Algae colors the sand a golden hue as it surfaces to catch the sun's rays at low tide, before retreating as the tide returns. Many visitors find the remains of animals like *whelks*, *clams*, and *horseshoe crabs*, but the *microscopic organisms* living between the sand grains go unnoticed.

*Birds*, *crabs*, *sea stars*, and *turtles* attract attention on the beaches, while offshore; *dolphins*, *manatee*, *alligators* and the *North Atlantic right whale* may be seen.

## Dune Formation

Once the ocean waves deliver **sand** to the beach, the wind and sun dry it out. When the wind hits some kind of **barrier**, such as *marsh wrack*, *sea shells*, *dune vegetation* or *debris*, the wind energy lessens, and sand being carried by the wind is dropped behind. This is called an **embryo**, or **incipient**, **dune**. If there are no storms to wash out these **small piles** of sand, they continue to build up.

**Seeds** from **dune vegetation** are deposited by *wind*, *water* or *animals*. Since sand has no nutrients, **marsh wrack** decomposing under the sand pile is very important for the seedlings' growth. Once these plants are established, dunes start to become **stabilized**. The first plants found on the dunes are *railroad vine* and *beach croton*. They are low growing plants, spreading **laterally** rather than vertically.

*Sea oats* come in next. Unlike *railroad vine* and *beach croton*, *sea oats* grow **vertically** as well as **laterally**. The **flattened seeds** (which give *sea oats* its name) and **leaves** help block the wind and build up the sand. Because the sand is deposited **around the base** of the *sea oat*, parts of the plant get covered and die. As they **decompose**, *sea oats* constantly supply more nutrients for the growth of new sea oats. By **providing a barrier to the wind**, sea oats build up the dunes and provide their own nutrients. Sea oats are **protected by federal law** because of their importance in **stabilizing the dune ecosystem**. Each layer of dunes provides a **line of defense** against wind and water, protecting the areas behind them.

The dunes are home to a variety of animals. Because sand heats and cools quickly, animals have to adapt either behaviorally or physically. Many are **light colored** to prevent absorbing the heat. *Ghost crabs* are good examples. Others stay hidden in the heat of the day. These animals are identified mainly by their tracks.

## Key Terms

** barrier island *  Georgia Bight * embryo dune **

** marsh wrack  *  dynamic system  *  ecosystem **

## Do You Know?

1. How do barrier islands help protect the mainland during a storm?

2. Name at least three animals that can be found on Cumberland Island beaches.

3. Describe an embryo (incipient) dune.

4. Why are sea oats protected by federal law?

5. What adaptations do dune animals have to make in order to survive in the dune habitat?

## Want to Know More?

View a Slideshow
*Georgia Museum of Natural History (Education – Habitats)*
http://naturalhistory.uga.edu/index.php?page=content/education/habitats/habitats

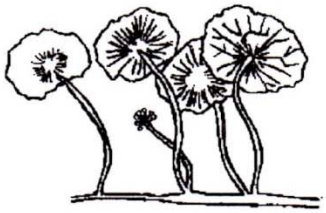
View a Video
*Georgia Department of Natural Resources Video:*
*The Struggle for Survival: Georgia's Giant Sea Turtles*
http://gadnr.edvid.org/

Learn More About Turtles at the *Sea Turtle Conservancy*
http://www.conserveturtles.org/turtletides.php

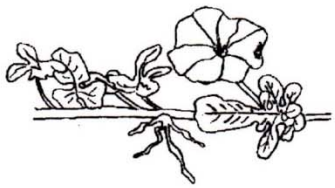
# Dune System Plant Key

greenbrier

Virginia creeper



pennywort

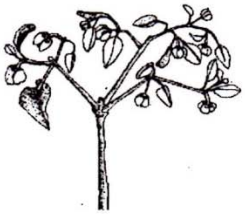


morning glory

grape

saw palmetto

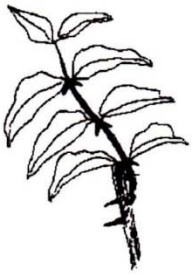
wax myrtle



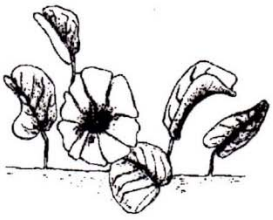
beach croton

sea oats

prickly pear cactus



prickly ash



railroad vine

thistle

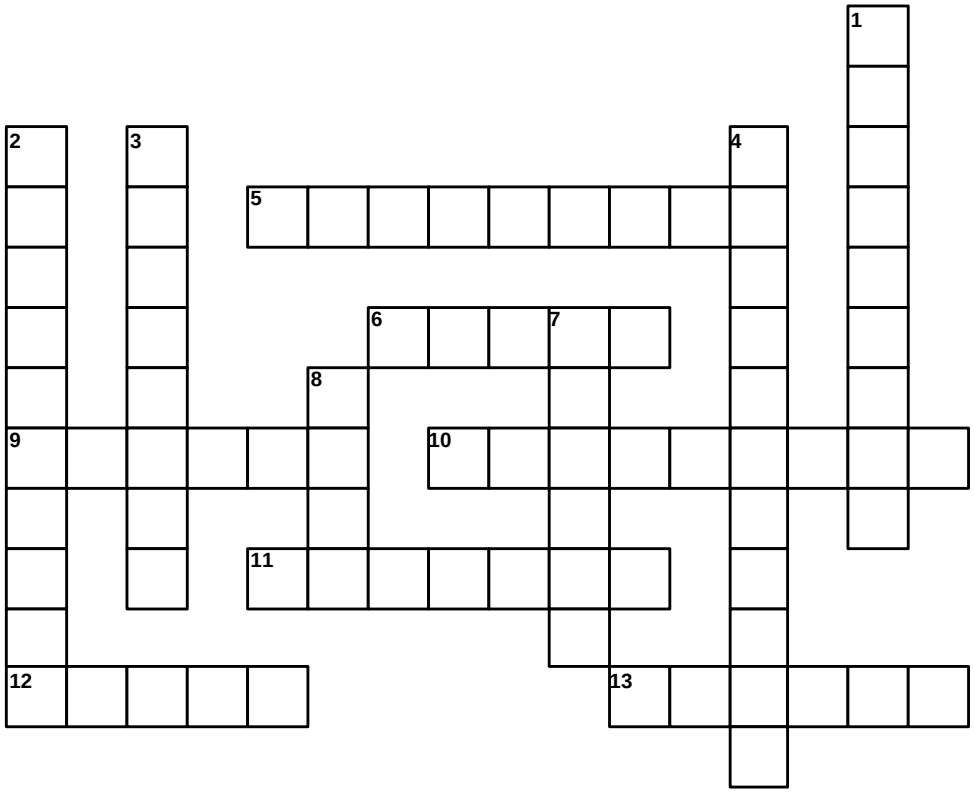
mullein

cattail

rushes

pickerelweed

# Dune Critters




**ACROSS**

**5** The only shelled mammal. The wiry hair in on the underside.
**6** This small furry mammal runs around the dunes looking for seeds.
**9** This group of insects has one pair of wings that act like a shell.
**10** I am a flying predator. Some call me a "mosquito hawk"
**11** This insect hangs out in moist areas and "sings" at night. The faster the chirps, the hotter it is.
**12** Type of lizard with four legs and a tail that can drop off when necessary.
**13** This large bird does not fly much. The males have a "beard".

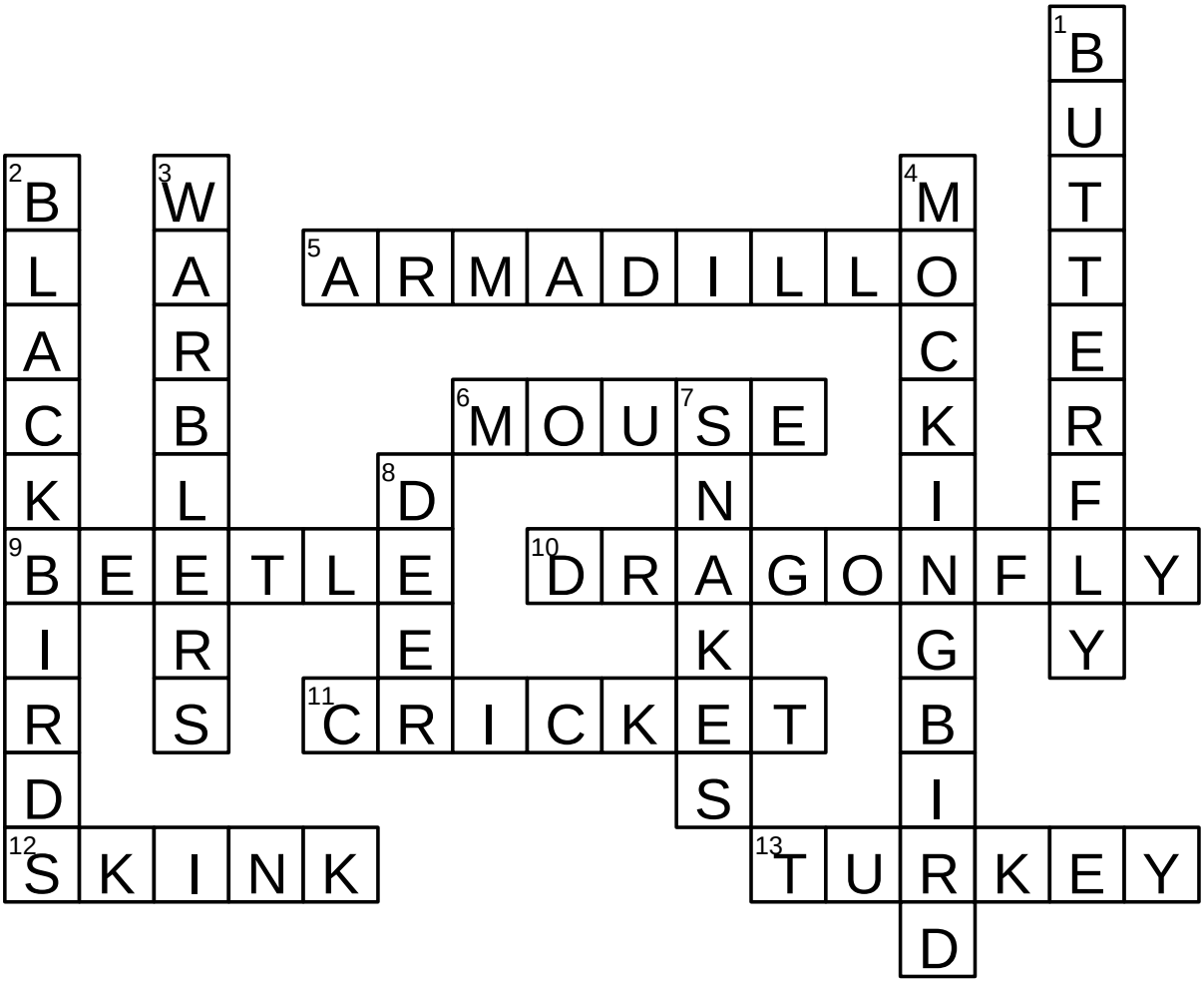
**DOWN**

**1** This brightly colored insect flits around and drinks nectar for food.
**2** This group of birds are very dark. It includes grackles, redwings, and brown-headed cowbirds.
**3** These tiny migratory birds are usually heard more than seen.
**4** This bird copies other's songs and sings them in groups of 3. It is gray with white patches on wings and tail.
**7** Some of these legless reptiles are poisonous, so keep an eye out when crossing the dunes.
**8** A mammal that has a white "flag".

**WORD BANK:** Armadillo, beetle, blackbirds, butterfly, cricket, deer, dragonfly, mockingbird, mouse, skink, snakes, turkey, warblers.

# Dune Critters

Answer Key



# Cumberland Island
# Beach & Dune Discovery Walk


**Directions**: After reading through the *Beach & Dune reading passage* and reviewing the *Dune Plant list* with your students, lead your students on a walk through the *Cumberland Island Beach & Dunes Habitat*.

Use the **dune boardwalk** to explore the dunes without damaging them. It's very important to **stay off the dunes**. Once you have arrived on the beach, look for the **black & white pole** to locate the **pathway** back to **Sea Camp** Please refer to the *Cumberland Island Inset Map* for exact locations.

**Teaching Suggestions:** Distribute copies of the **Beach & Dune Observation Sheet** to each student. Consider making copies of the **Dune System Plant Key** to assist students with plant identification. Ask students to document the plants and animals they observe on their walk. You can also encourage students to take photos of plants and animals they see. Use the photos to create presentations or photo collages once you return to the classroom.

You may want to consider bringing along a **seashell field guide** to assist with seashell identification. You can access an identification guide on the *Georgia Sea Grant* website: http://georgiaseagrant.uga.edu/article/teacher_tools/ (scroll down to *Beachcombing Identification Guide*).

**Note:** While students **should not** collect any plant specimens, they **may collect shells** and **shark teeth** on their walk and keep any they find.

**Total Distance:** The beach boardwalk is approximately **a quarter mile** long. If you walk along the beach until you come to the **black & white pole** marking the path to *Sea Camp*, you will walk **an additional mile and a half**. The path leading **from the beach to Sea Camp** is approximately **a half mile**, for **a total walk** of **2 ¼ miles**.

# Beach & Dune Observation Sheet

**DIRECTIONS:** Circle each item you see as you explore the *Beach & Dune Habitat*. Make note of any other interesting discoveries you find. Be sure to look **out over the ocean** for additional discoveries!

**PLANTS**

| | | |
|---|---|---|
| Sea Oats | Greenbrier | Pennywort |
| Morning Glory | Grape | Prickly Pear Cactus |
| Cattail | Saw Palmetto | Thistle |

*Notes*:

**ANIMALS**

| | | |
|---|---|---|
| Ghost Crab | Horseshoe Crab | Pelicans |
| Shells | Sand dollars | Starfish |
| Dolphins | Fish | Shore birds |

Other:

*Notes*:

**OTHER OBSERVATIONS** (weather, temperature, high tide, low tide, etc.)

*Notes*:

# Resources

The following websites are referenced in the *Cumberland Island Habitat Guide*:

- *Cumberland Island National Seashore*
  http://www.nps.gov/cuis/index.htm

**Overview**

- *Georgia Department of Natural Resources* Video: *Sapelo, An Island in Time*
  http://gadnr.edvid.org/

**Maritime Forest Habitat**

- College of Charleston *Project Oceanica*: Maritime Forest Plant Illustrations
  http://oceanica.cofc.edu/an%20educator%27sl%20guide%20to%20folly%20beach/guide/forest.htm

- *Georgia Sea Grant*: Maritime Forests
  http://georgiaseagrant.uga.edu/article/maritime_forests/

- *Georgia Sea Grant*: Maritime Forest Scavenger Hunt Cards
  http://georgiaseagrant.uga.edu/article/teacher_tools/

**Saltwater Marsh Habitat**

- *Clemson University Salt Marsh Virtual Field Trip*
  http://www.knowitall.org/sclife/

- *NOAA Ocean Service Education*
  http://oceanservice.noaa.gov/education/kits/estuaries/media/supp_estuar06a_saltmarsh.html

- *U.S. Fish & Wildlife Service – What is a Salt Marsh?*
  http://www.youtube.com/watch?v=3HXyTMnj7ac

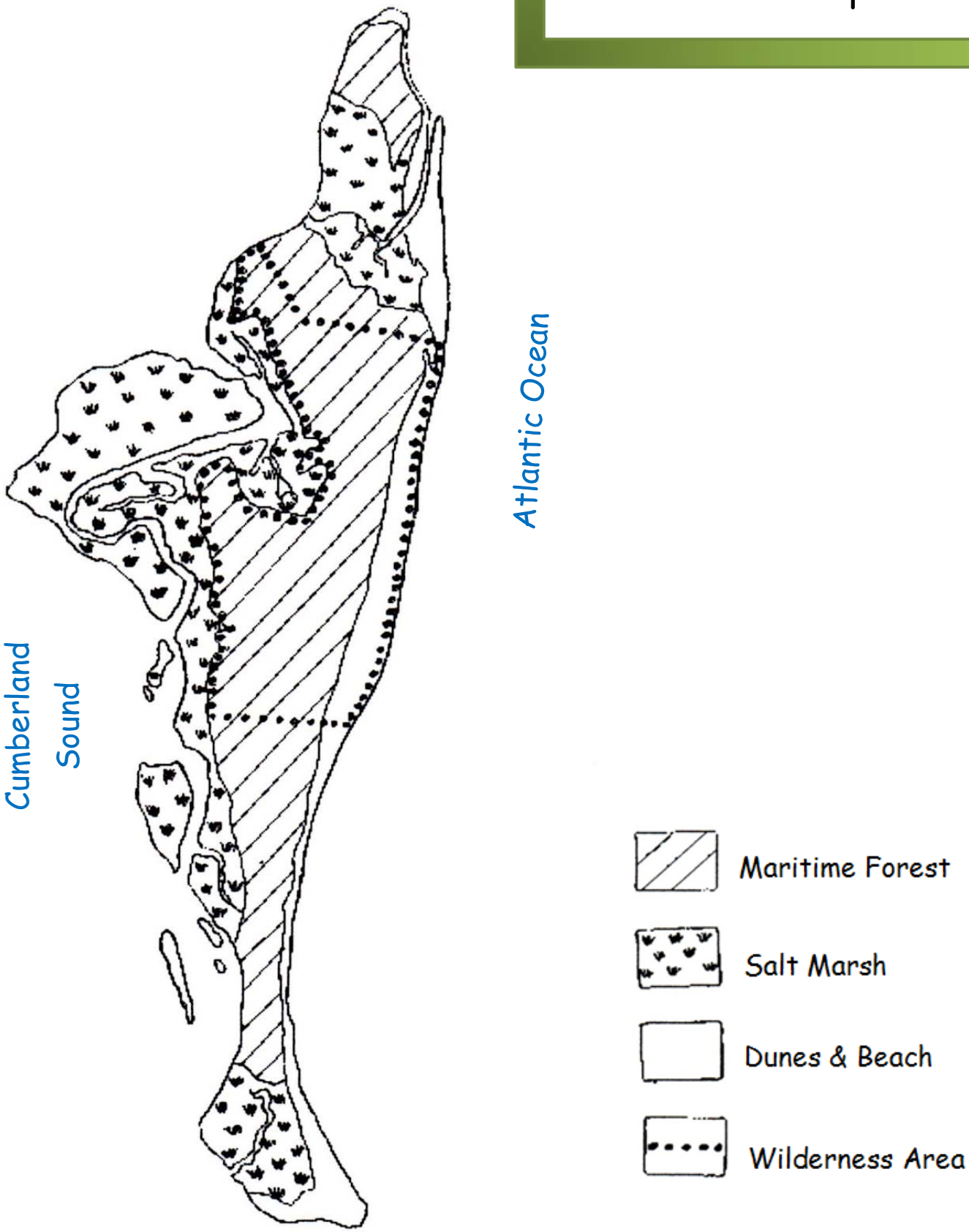
**Beach & Dunes Habitat**

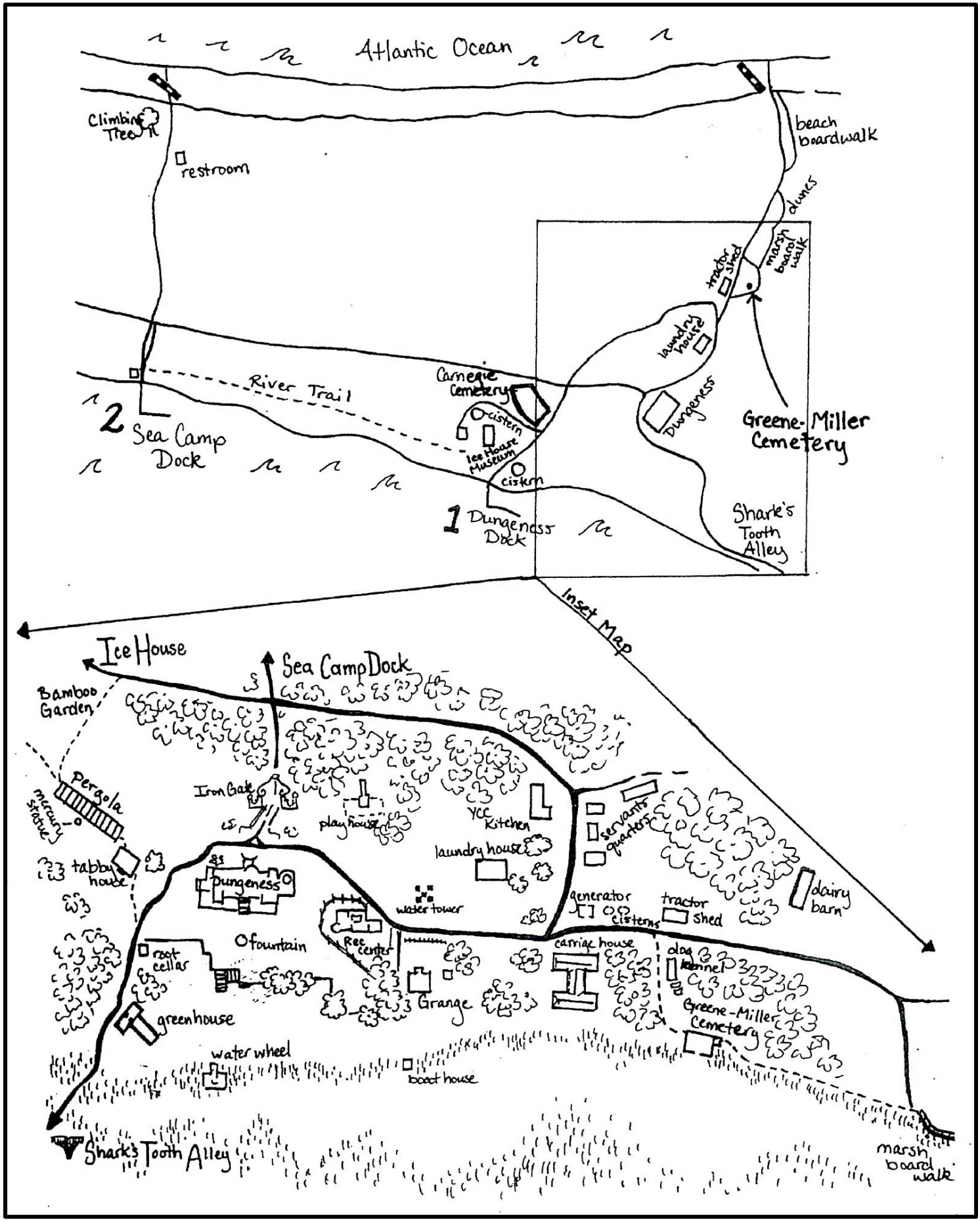
- *Georgia Museum of Natural History (Education – Habitats)*
  http://naturalhistory.uga.edu/index.php?page=content/education/habitats/habitats

- *Georgia DNR Video: The Struggle for Survival: Georgia's Giant Sea Turtles*
  http://gadnr.edvid.org/

- Learn More About Turtles at the *Sea Turtle Conservancy*
  http://www.conserveturtles.org/turtletides.php

# Cumberland Island Habitat Map






Cumberland Island Inset Map Courtesy of *Driftwood Environmental Center*