

Visiting the Estuarium

For the Teacher of Grades 6 – 8

Before your visit:

1. First-timers:

Teachers may want to preview the Estuarium before bringing students. Contact Denise Keaton at (251) 861-7511 or dkeaton@disl.org for a free teacher's pass.

2. Student Activity: Mobile Bay Map (attached)

- Have students complete the included Mobile Bay Map activity.
- Ask students what differences they would expect to see in habitats, flora, & fauna at the different locations they've labeled.

3. Student Vocabulary:

estuary salinity delta brackish water barrier island
gulf invertebrate vertebrate

4. Handouts:

Make copies of the attached activity for your students to complete while visiting the Estuarium. Bring pencils and crayons (for rubbings).

During your visit:

Complete handout.

After your visit:

- Draw or list organisms seen in the Estuarium in the appropriate areas on the map of Mobile Bay, labeled prior to your visit. Discuss why these organisms live where they do (salinity tolerances).
- Identify the observed animals as invertebrates or vertebrates, and identify their taxonomic groupings (amphibian, reptile, etc.).
- Have students research the animal they chose from the Invertebrate Trail and write an essay about it.



Grades 6-8 AL Course of Study Science Objectives addressed at the Estuarium

Grade

- 6 2.) Describe factors that cause changes to Earth's surface over time.
Examples: weathering, erosion, deposition, water flow, hurricanes, farming and conservation, deforestation and reforestation, waste disposal, global climate changes, greenhouse gases
- Comparing constructive and destructive natural processes and their effects on land formations
- Examples:
- destructive - erosion by wind, water, and ice
 - Distinguishing strata by geologic composition
- Examples: predicting relative age of strata by fossil depth, predicting occurrence of natural events by rock composition in a particular strata
- 5.) Describe layers of the oceanic hydrosphere, including the pelagic zone, benthic zone, abyssal zone, and intertidal zone.
- 6.) Describe regions of the oceanic lithosphere, including the continental shelf, continental slope, and abyssal plain.
- 7 1.) Describe characteristics common to living things, including growth and development, reproduction, cellular organization, use of energy, exchange of gases, and response to the environment.
- Predicting how an organism's behavior impacts the environment
 - Identifying unicellular organisms
- 4.) Describe organisms in the six-kingdom classification system by their characteristics.
- Recognizing genus and species as components of a scientific name
- 7.) Describe biotic and abiotic factors in the environment.
- Examples:
- biotic - plants, animals
 - abiotic - climate, water, soil
 - Classifying organisms as autotrophs or heterotrophs
 - Arranging the sequence of energy flow in an ecosystem through food webs, food chains, and energy pyramids
- 8 1.) Identify steps within the scientific process.
- Applying process skills to interpret data from graphs, tables, and charts
 - Identifying controls and variables in a scientific investigation
 - Measuring Système International (SI) units
 - Identifying examples of hypotheses
 - Identifying appropriate laboratory glassware, balances, time measuring equipment, and optical instruments used to conduct an investigation

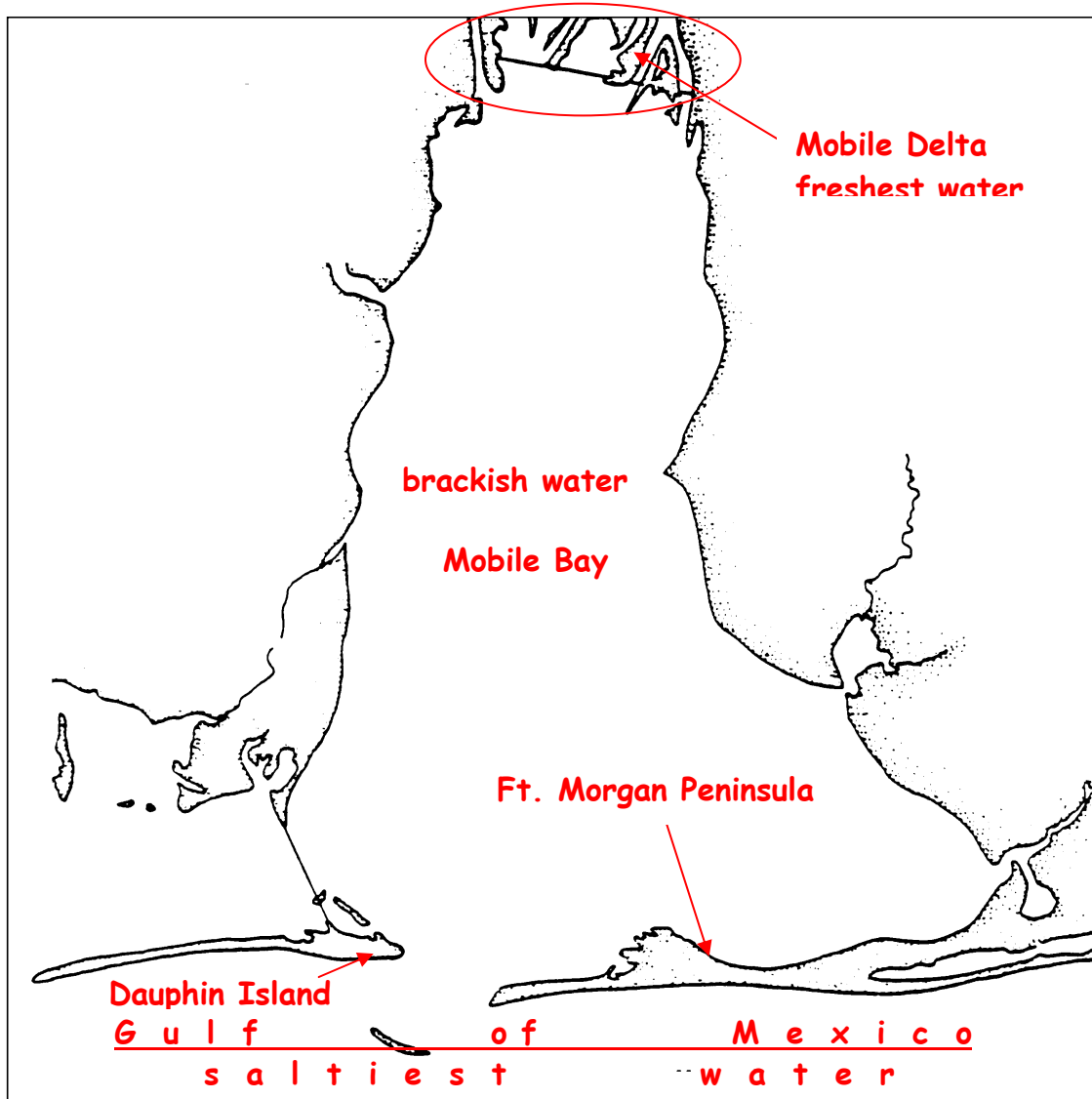
MAP OF MOBILE BAY

To be completed *BEFORE* your visit.

Label North, South, East, and West.

Label these locations around coastal Alabama: Dauphin Island, Gulf of Mexico, Mobile Bay, Ft. Morgan Peninsula, Mobile Delta

Label where you would find these salinities: freshest water, saltiest water, brackish water.



At the Estuarium

The titles of panels where answers are found are in italics.

Answers are in bold.

6th – 8th Grade Activity

Name: _____

Entrance

1. Mobile Bay is the **fourth** largest estuary system in the United States.

Opening Panel

Mobile Delta Gallery

1. **Before the Delta:** List several things mosasaurs are supposed to have eaten. *Mosasaur* **almost anything in their paths, including fish, birds, invertebrates, ammonites, other mosasaurs, turtles**
2. At the largest tank in the Delta Gallery, you will observe a swamp scene. Swamps are dominated by trees. Name one common tree in the swamp. *Cypress Swamp (D3)*
Cypress tree
3. Name three benefits of the wetland filtration system. *A Living Filter (D4)*
Wetland vegetation absorbs and contains rain water, sparing downstream properties from flooding. As flood waters slow, sediment and pollutants drop to the bottom among the wetland plants. Bacteria in the soil help purify the water. Plant roots and stems help hold the sediment, stabilizing the shorelines and absorbing nutrients.
4. Why are sturgeons, gars, and bowfins considered "living fossils?" *River Relics (D10)*
They have changed little from their ancestors of millions of years ago - their scales and skeletons are like fossils of species that have become extinct.
5. What are invasive species? *Alien Species (D12)* **Invasive species are those kinds of (non-native) organisms that out-compete other species for space or nourishment.** Name two invasive species that have been introduced into the Southeastern U.S. **water hyacinth, nutria, zebra mussel, fire ant, Mediterranean gecko, Cuban treefrog, red-bellied pacu, Rio Grande cichlid, sword fern, alligator weed** What is the approximate dollar value of the damage done by invasive species? **\$138 billion per year**

Mobile Bay Gallery

1. Why is Mobile Bay so "dirty?" *A Drowned River Valley (B2)* **Heavy spring rains bring silt and sediment to the bay, and currents and wind stir silt up from the bottom of the bay.** What effect does this have on the health of the bay? **It is natural and beneficial and aerates the bay.**
2. Name a vertebrate and an invertebrate you found interesting on the Touch Table. What did you find interesting about each of these animals? **Answers will vary.**
Vertebrate: _____

Invertebrate: _____

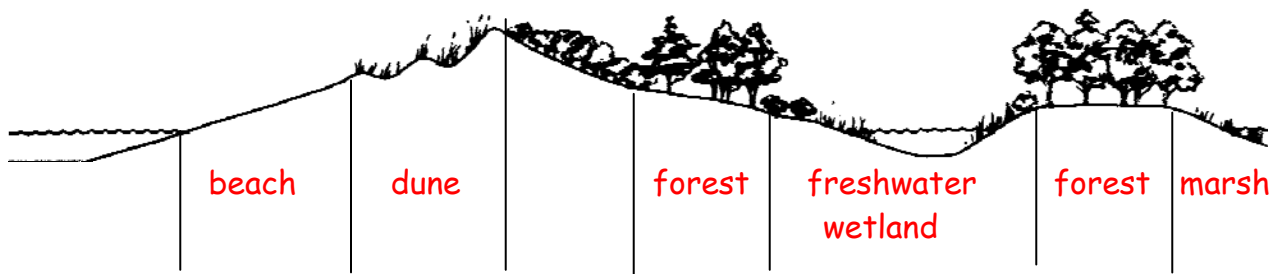
3. Find the largest tank of the Mobile Bay Gallery. The poles in this tank represent what structure? *Middle Bay Lighthouse (B3)* **Middle Bay Lighthouse** When was it lit for the first time? *Guardian Through the Ages (B6)* **December 1, 1885** It was manned until what year? **1916**
4. What happens during a jubilee? *Jubilee (B20)* **Low-oxygen bottom water moves to shore as an easterly wind blows surface water away from shore, allowing the oxygen-poor water to creep closer to the beach. Animals, starving for oxygen, are trapped between the beach and the advancing oxygen-poor water. Under extreme conditions, they are forced onto shore - a Jubilee.**
5. Why are sea grass meadows shrinking? *Underwater Meadows (B13)* **There is less of the sunlight they need to survive because erosion and pollution seep into the delta, clouding the water. Extra nutrients cause phytoplankton blooms, which can shade out the seagrasses** What impact does this loss have on humans? **Sport and commercial fish lose their nursery, leading to a decline in their numbers.** What can humans do to help halt this loss? **We can insist on good coastal management and building practices.**

Barrier Island Gallery

1. Below is a cross section of a barrier island. Label the following habitats:
beach freshwater wetland dune maritime forest salt marsh
Label one plant or one animal that can be found in each of the above habitats.

An Army of Grains (BI9), Island Forest (BI8), The Other Shoreline (BI7) **Plants and animals will vary. Answers may include**

Beach: plankton, seaweeds, shorebirds - sand pipers & willets, coquinas, sand fleas. **Dune:** ghost crabs, skinks, monarch butterflies, terns, skimmers, oyster catchers, sea oats, morning glories, seaside rosemary, beach heather, seaside goldenrod, live oak, slash pine. **Maritime forest:** slash pine, alligators, squirrels, skinks, snakes, migratory birds - black-necked stilts, summer tanagers & prothonotary warblers, garden spiders, cardinals, American kestrels. **Swamp:** cypress. **Salt marsh:** grasses - cordgrass & needle rush, crabs, shrimp, periwinkle snails, ribbed mussels



2. Name three man-made structures intended to protect property from coastal erosion. *Protecting Sand Castles (BI3), Erosion (concrete post)* **sea walls, breakwaters, jetties, groins** What problem(s) do they create? **They interfere with the sand-water-plant system, which holds the dunes in place; they lead to accelerated erosion. They negatively stabilize inlets which normally migrate as part of an island's survival strategy.** What is another (non-structural) remedy people have tried? **beach nourishment or planting native vegetation** How effective is it? **Beach nourishment without other measures will not remain onshore for longer than about a decade (sometimes much less). Planting native vegetation works better than structural remedies for restoring balance to a natural system.**

Gulf of Mexico Gallery

1. What is the name of the heaviest *bony* fish? *Mola mola floor panel* **Mola mola, or ocean sunfish**
What is unusual about its body? **Its tailfin is almost nonexistent.**
2. Observe the octopus. The large, bulbous *mantle* above the octopus' eyes contains what? *Soft Intelligence (G7)* **internal organs: hearts, gills, and the digestive system**
3. What is sargassum? *Gulf Weed (G11)* **brown, floating seaweed** How does it serve as a "mobile home?" **It floats on ocean currents using small air bladders, and there is an entire community of small, specialized organisms that live on and among it.**
4. Look above you. What three things are carried by the pipes running throughout the Estuarium? **freshwater, saltwater, and air** Where do the pipes deliver what they are carrying? **to the tanks in the Estuarium**
5. *Underwater Exploration:* What does SCUBA stand for? **self-contained underwater breathing apparatus** What year was scuba developed? **1943** And by whom? **Jacques Cousteau and Emil Gagnon**

1. *The Weather Station:*

Record these current weather conditions: **Answers will vary.**

Air Temperature _____	Water Temperature _____
Dissolved Oxygen mg/L _____	Salinity _____
* Don't forget to include units of measure.	

Would you expect the salinity to be higher on the north side of Dauphin Island, or on the south side? **south side** Why? **Because there is fresh water flowing into the water on the north side, and the island slows the freshwater's passage south of it.**

1. **Oil Spill:** Which habitat, beach or salt marsh, is more vulnerable to an oil spill? **Salt marsh** List two reasons why. **Marshes are more ecologically valuable, and beaches are easier to clean.**

The Living Marsh Boardwalk

The living marsh boardwalk is located outside the Estuarium. This area was once the site of a sewage-septic tank used by the Air Force. In 1993 the Dauphin Island Sea Lab removed the septic tank and rebuilt the marsh. Use the panels and audio kiosks on the boardwalk and your own observations to answer the following questions.

1. What are the two dominant plants in the salt marsh? *Life in a Salt Marsh or Audiokiosk* **smooth cordgrass and black needlerush**
2. What animal makes a daily migration up and down these marsh plants? **the marsh periwinkle snail** Where would you find it at high tide? **high on the grasses** Why? **to avoid predators that come into the marsh on high tides**
3. What are two functions that barrier islands perform? *Barrier Islands* **1. Protect mainland areas from erosion by absorbing much of a storm's energy. 2. Trap a mix of fresh and salty Gulf water, contributing to the formation of estuaries. Coastal seafood species are dependent upon the abundant food and brackish water habitats the estuarine environment provides.**
4. As you look *east* across Mobile Bay, what large man-made structure do you see? *Energy from the Sands of Time* **a platform, or rig** What type of natural resource is this structure extracting deep beneath the bay's surface? **natural gas, or methane**
5. What is marine debris? *Marine Debris, A Silent Killer* **Marine debris is trash, or any object not normally found, on our coasts or in our oceans.**
How does eating plastic kill an animal? **With plastic filling their stomachs, animals have a false sense of being full (they are unable to digest plastic), and may die of starvation**

Invertebrate Trail

In the space below, make a rubbing of your favorite invertebrate from the Invertebrate Trail.