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What are estuaries?

Estuaries are semi-enclosed areas, such as bays and lagoons, where fresh water meets and mixes with salty ocean waters. Estuaries are dynamic systems with constantly changing tides and temperatures where salinity varies temporally and spatially.

Survival of plants and animals in estuaries requires special adaptations. The ebb and flow of tides may leave some plants and animals, such as marsh grasses and oysters, temporarily high and dry. Temperatures in shallow estuarine waters can range from freezing to more than 100°F during the course of a year and expose marine organisms to intense sunlight and drying.

Estuarine organisms are naturally adapted to withstand these ranges in salinity (concentration of salt in the water), tides, sunlight, and temperatures. They must, however, have a balanced flow of fresh and salt water. This balance can be upset if too much fresh water enters the estuary, which can happen when causeways are constructed, impeding the free flow of tides; or if too little fresh water is available, as occurs during a drought and when a river is diverted or dammed. Estuarine-dependent marine life may die if the balance of fresh and salt water is not maintained.

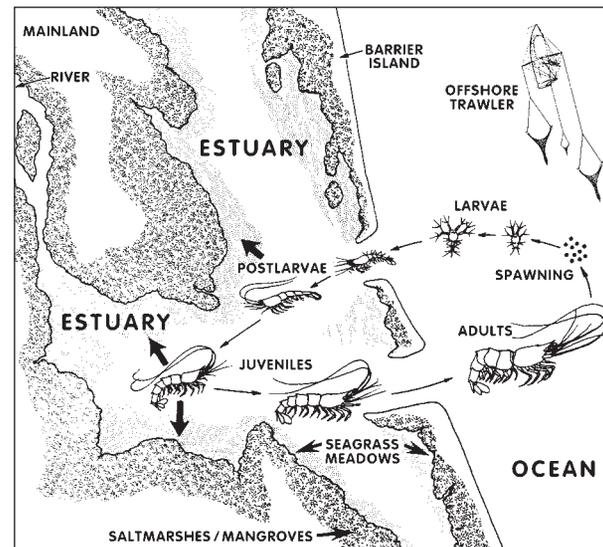
Why are estuaries special?

“The cradle of the ocean” is an appropriate description of estuaries. More than 95% of Florida’s recreationally and commercially important fishes, crustaceans, and shellfish spend periods of their lives in estuaries, usu-

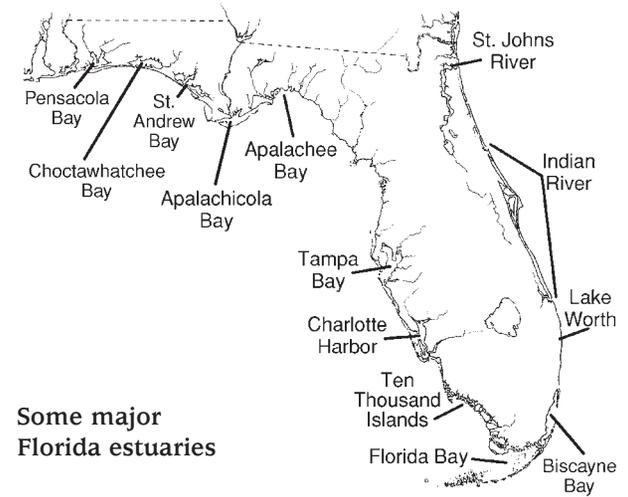
ally when they are young. Many fish and crustaceans migrate offshore to spawn or breed. The eggs develop into larvae (immature forms) that are transported into estuaries by tides and currents. The shallow waters, salt marshes, seagrasses, and mangroves provide excellent places to hide from larger predators. Some species grow in estuaries for a short time, but others may remain there all their lives.

Shrimp, for example, spawn offshore. The larvae then move toward inshore waters, changing form by molting as they progress through various stages of development. As young shrimp, they burrow into the sea floor at the mouth of the estuary as the tide falls, then ride into the estuary on the incoming tide. If successful in reaching the estuary after this hazardous journey, the young shrimp find seagrasses and algae to conceal them from predators. Because many larger animals cannot survive in the lower salinity of the estuary, the young have the added protection of a “salt barrier.” When the shrimp approach maturity, they return to the sea to spawn, and the cycle starts over.

Estuaries are among the most productive landscapes in nature. Rivers and streams drain into estuaries, bringing nutrients from uplands. Plants use these nutrients along with the sun’s energy, carbon dioxide, and water to manufacture food. Among the important plant forms that contribute to estuaries are microscopic floating algae called phytoplankton and



The life cycle of shrimp



Some major Florida estuaries

larger macroalgae that are attached to the bottom. Rooted plants include marsh grasses, mangroves, and seagrasses. When these larger plants die, they are colonized by microbes (bacteria, fungi, and other organisms) that break them down into detritus. During decomposition, detritus becomes smaller and smaller until the nutrients and particles can become food for billions of small animals. Larger animals feed directly on these tiny particles and on smaller animals that fed on the detritus, and energy is transferred through the food web to progressively larger organisms. As long as nutrient-rich, pollutant-free, fresh water continues to mix with marine waters in our estuaries, they will remain productive fisheries.

Without estuaries, many important fisheries would disappear. Snook, trout, mullet, grouper, redfish, sheepshead, spiny lobster, shrimp, crabs, oysters, and clams are examples of the diverse marine animals dependent upon healthy estuaries. Estuaries also provide roosting and nesting areas, or rookeries, for many birds, including several endangered and protected species, such as brown pelicans.

Florida’s estuaries

Loss of estuarine habitat is a serious problem along Florida’s coasts. Florida is undergoing tremendous growth, and 78% of Florida’s estimated 14 million residents live in coastal areas. Coastal development is damaging marine-fisheries habitats that are important in maintaining viable commercial and recreational fisheries. Dredge-and-fill operations for waterfront

homes and seawall construction destroy mangrove shoreline and underwater seagrasses. Although these activities may temporarily enhance real-estate values, they ultimately decrease long-term value as natural amenities disappear, the water becomes foul, and wildlife departs.

Scientists at the Florida Fish and Wildlife Conservation Commission's Fish and Wildlife Research Institute (FWRI) use information from LANDSAT and other satellites to map and monitor Florida's coast. By looking at aerial photographs from different years, scientists can locate and measure the acreage of existing estuarine habitat components such as salt marshes, mangroves, and seagrasses and can observe trends in habitat change. Results of habitat trend analyses have shown substantial loss of fisheries habitats throughout Florida. One study area on the Atlantic coast included the Indian River from Sebastian Inlet south to the St. Lucie Inlet. In that area, the mangrove habitat available to fisheries declined 86 % over a 40-year period, and 30 % of the seagrass acreage was lost. Over a 100-year period, Tampa Bay, in southwest Florida, lost 81 % of its seagrasses and 40 % of its mangrove and salt marsh acreage.

How you can help protect them

There are many ways that people can help protect Florida's estuaries. Here are some ideas.

Trash—Paper, garbage, and other forms of trash wash up on our shorelines at an alarming rate. This debris has a disastrous effect upon marine life, and every year thousands of animals are killed as a result. You can do your part to prevent this unfortunate occurrence by properly disposing of all trash and debris whether you are on a boat, at the beach, at home, or anywhere else.

Oil—More than 35 % of households change the oil in their vehicles themselves, and they frequently dispose of this oil improperly in garbage cans, sewers, or backyards. These actions can contaminate the soil and the water. Florida, like many states within the U.S., has collection and recycling programs for used oil. Ask your service station whether they participate.

Car Wash—When you wash your car at home, the water and dirt from the car run off into the street gutter, which then drains to the storm water sewage system. This storm water then runs into lakes, streams, and larger bodies of water. A more environmentally friendly method of washing your car is to take it to either a professional or a do-it-yourself car wash. The

water used at these locations drains to a sanitary water system, where the water is treated and recycled.

Fertilizers and Pesticides—Many homeowners use more fertilizers and pesticides than are needed. When too much is added, the excess often washes away before it is taken up. This runoff contributes to pollution in local streams and lakes and may influence estuarine plant communities. Homeowners should test their soil to determine what nutrients are present before they decide to add more. Many nutrients such as nitrogen and phosphorus are already there.



Prothonotary warbler, *Protonotaria citrea*

ON THE COVER

Background—Weedon Island Preserve, west Tampa Bay.

Insets—Florida manatees, *Trichechus manatus latirostris*; roseate spoonbill, *Ajaja ajaja*; stone crab, *Menippe mercenaria*.

All color photos (except manatees) courtesy of Gerold Morrison and Holly Greening

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The Cradle of the Ocean ESTUARIES

