

# A PRACTICAL GUIDE TO ESTUARY-FRIENDLY LIVING



KARL HAVENS

GARY LYTTON

WILLIAM SEAMAN





*For many, the scenic beauty of the coastal marsh in winter is a source of renewal and inspiration.*

# *A* PRACTICAL GUIDE TO ESTUARY-FRIENDLY LIVING

KARL HAVENS <sup>1</sup>

GARY LYTTON <sup>2</sup>

WILLIAM SEAMAN <sup>3</sup>



<sup>1</sup> Florida Sea Grant College Program and University of Florida / IFAS, P.O. Box 110400, Gainesville, FL 32611-0400, E-mail: khavens@ufl.edu

<sup>2</sup> Rookery Bay National Estuarine Research Reserve, Florida Department of Environmental Protection, 300 Tower Road, Naples, FL 34113, E-mail: gary.lytton@dep.state.fl.us

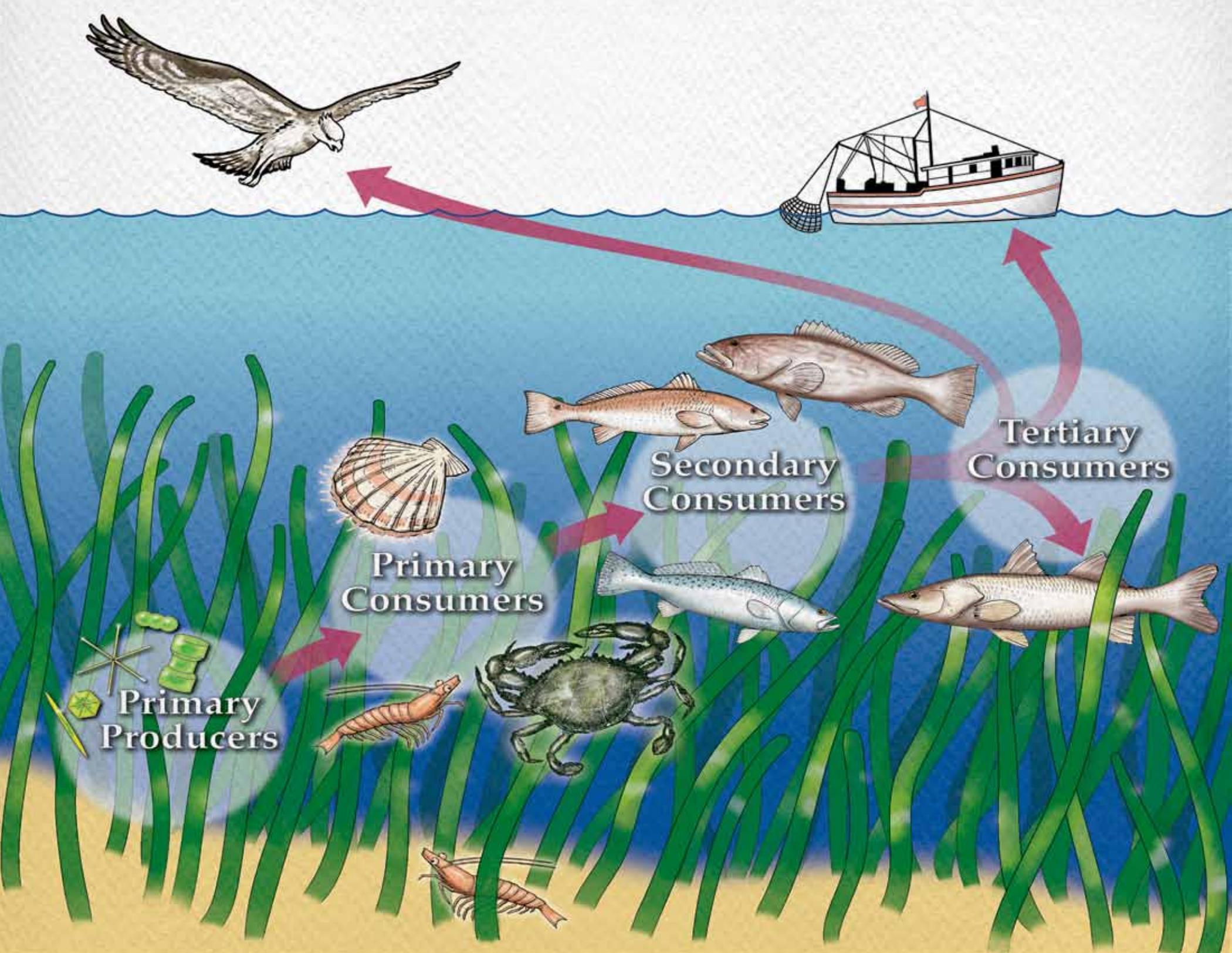
<sup>3</sup> Program for Fisheries and Aquatic Sciences, University of Florida / IFAS, Gainesville, FL 32653

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# ESTUARY-FRIENDLY LIVING

**P**rime real estate for fish. Prime real estate for people. Estuaries are valuable and essential for nature and humans alike. And, wherever you are in Florida, you are close enough to an estuary to either impact or protect it, depending on your actions.

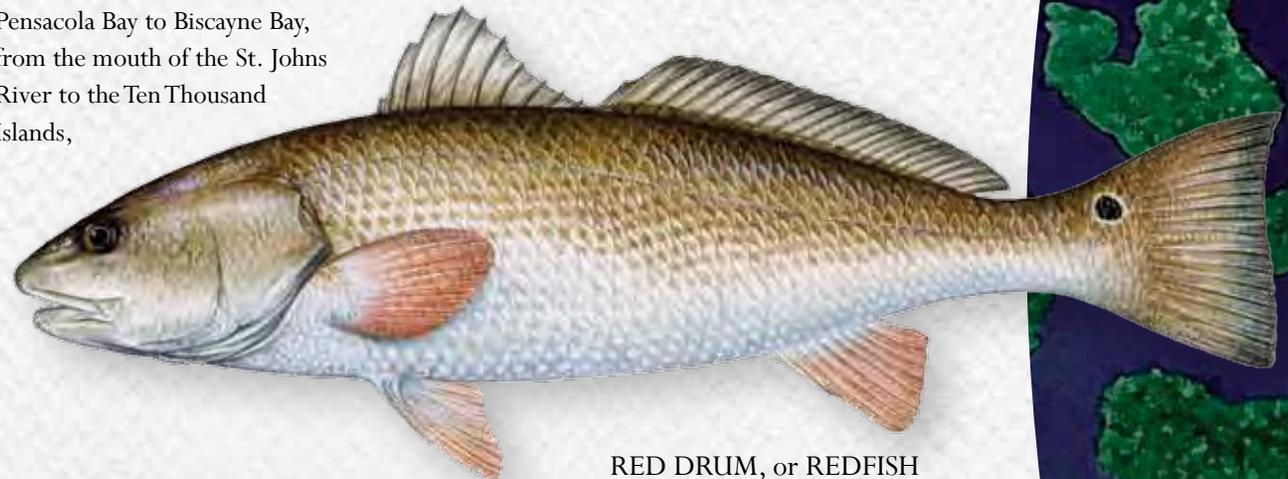
The vast network of coastal waters and wetlands that forms Florida's estuaries provides major economic and environmental benefits to residents and visitors in the Sunshine State. Estuaries support some of our largest commercial and recreational fisheries. They also are the setting for many popular outdoor activities. Estuaries are outstanding places to canoe, kayak or just watch nature. They also play an important role in protecting our coasts from storms. They dissipate wave energy and thereby reduce the damage to our shores and properties. In short, estuaries are coastal treasures.

*LEFT: Florida estuaries can contain hundreds of plant and animal species, and even many more microbes, and patterns of feeding can be very complex. Here is an example of a simple estuary food web.*

Despite all the good they do, Florida's estuaries are being damaged or even destroyed by activities associated with population growth. Construction projects, new highways, dredging, altered freshwater drainage, water pollution, increased boating and anchoring, over-fishing and other activities have combined to create major stress on estuaries. Scientists are learning more about how each of these activities impacts estuary health, and there is an emerging consensus that estuaries require protection.

This booklet can provide you with a starting point for taking a more active role in safeguarding the health of Florida's estuaries. From Pensacola Bay to Biscayne Bay, from the mouth of the St. Johns River to the Ten Thousand Islands,

readers will be able to better understand, appreciate, protect, and perhaps even restore their local estuary. We suggest an action-oriented approach and provide you with numerous suggestions for things you can do to help. Suggestions for community-wide activities also are included. While this booklet does not provide all the answers, it is a good starting point for readers who want to change their personal habits and get involved in active stewardship of Florida's estuaries.



**RED DRUM, or REDFISH**  
*Drawing by Diane Peebles*

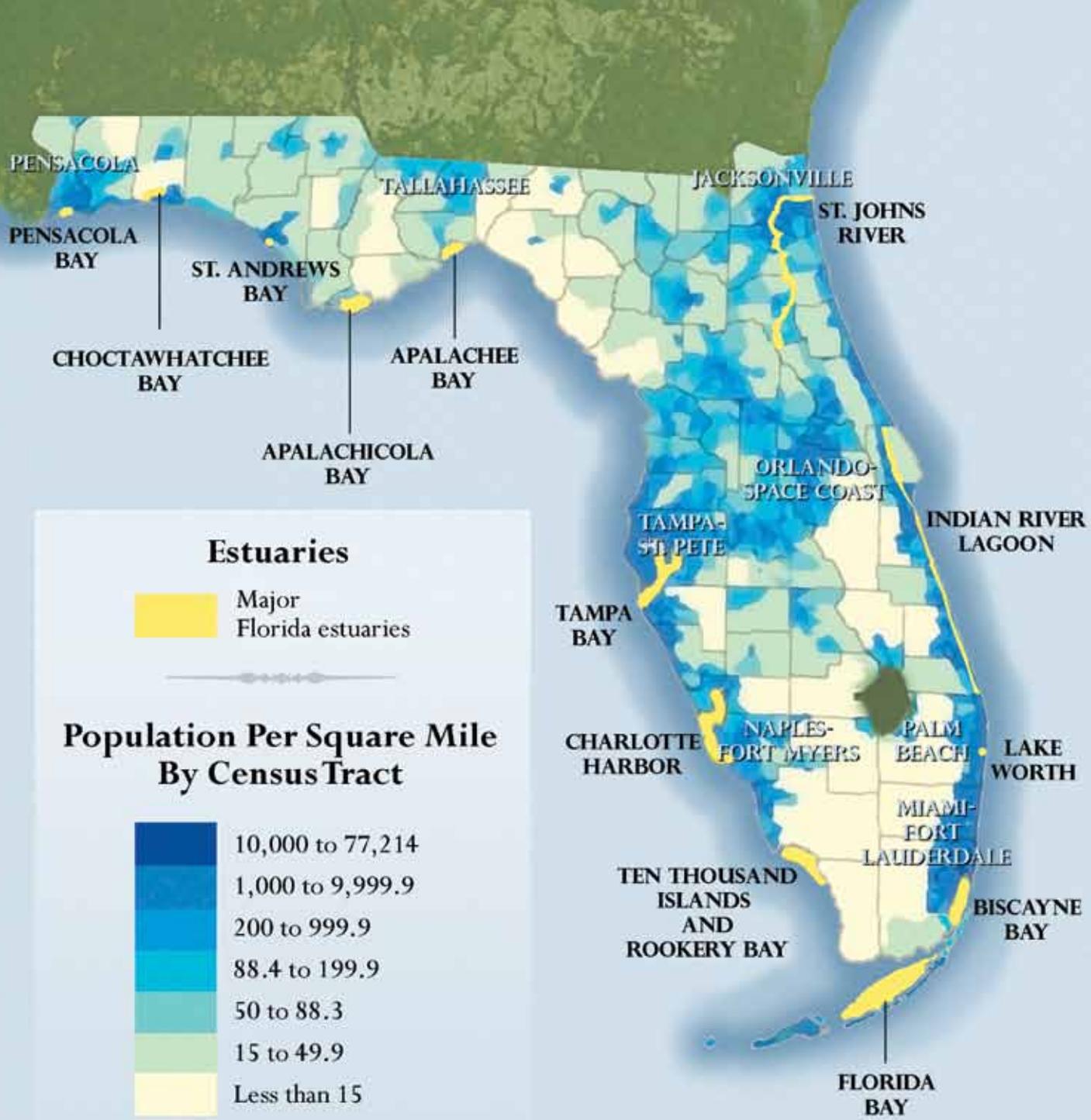


# WHAT IS AN ESTUARY?

Estuaries are places where fresh water from land meets salt water from the sea. Some estuaries, like Tampa Bay, are huge; others are tiny. Some are almost entirely enclosed by land, while others occur as long stretches of marshes facing the open sea. The number of freshwater sources can range from just one major source (as in the St. Johns River) to hundreds of tiny creeks (as in Florida Bay).

Estuaries are among the most productive ecosystems on Earth — rivaling tropical rainforests. Estuaries are 25 times more efficient at converting sunlight and nutrients to plant biomass than open-ocean environments, and 2.5 to 8 times more efficient than terrestrial agriculture. Estuaries also support tremendous biodiversity, the total number of species in an ecosystem. As an example, the 156-mile-long Indian River Lagoon is recognized nationally for having over 3,000 species, including nearly 400 fish.

*The major estuarine systems of Florida in approximate location to major metropolitan areas.*



Adapted from U.S. Census Bureau, 2010 U.S. Census

# WHAT'S IN AN ESTUARY?

Although Florida's estuaries come in many shapes and sizes, all of them share some environmental features. For instance, as you cross a bridge along the coast, look down and you'll probably see several of the following:

- ✧ Rivers that bring fresh water from inland areas
- ✧ Barrier islands that protect estuary mouths
- ✧ Open water
- ✧ Oyster bars
- ✧ Inlets
- ✧ Salt marshes and/or mangrove forests
- ✧ Submerged seagrass beds
- ✧ Mud flats
- ✧ High biological diversity — lots of plants and animals

*Within a typical estuary, there is a wide variety of connectivity among the major physical, chemical and biological processes.*



# FLORIDA'S ESTUARIES AND YOU

**F**loridians, and the many visitors who are attracted to the natural resources of the state, have a big stake in maintaining the ecosystem services provided — for free — by estuaries. Estuaries are important because of:

- ✧ Seafood production — About 80–90% of Florida's commercially valuable fish and shellfish species — including shrimp, blue crab, oysters, and certain groupers and snappers — depend on estuaries.
- ✧ Recreation — Prized sport fish including snook, redfish, and spotted sea trout depend on estuaries. Most of the recreational boating in Florida happens in estuaries.
- ✧ Habitat — Estuaries provide young fish and shellfish with a home ("nursery") where they can find food while avoiding predators that would eat them. Marsh grasses and mangrove trees surrounding many estuaries provide homes for millions of birds.
- ✧ Storm protection — Estuaries protect our coasts by absorbing the force of storms from the sea and by providing an outlet for floodwaters from the land.
- ✧ Commerce and housing for people — Many Floridians depend on estuaries for waterfront homes and businesses. Much of the state's commerce and shipping occurs through estuaries.

- ✧ Waste and runoff treatment — Materials contained in stormwater runoff and drainage from agricultural and urban landscapes are at least partly filtered out of the water by estuaries and ultimately buried in their sediments. Yet as we describe below, this filtering capacity can be overcome by too much waste and runoff, which ultimately damages the plants, fish and other animals living in these ecosystems.

It is important to recognize that estuaries provide these functions to the culture and economy of Florida. Robert Christian, a distinguished professor at East Carolina University, has written that the "protection and management of estuaries depends upon the recognition we place on the value of these services." Later in this booklet the importance of sustainably using and managing estuaries, and their ecosystem services, is discussed.



FLORIDA OYSTERS

# ESTUARY HABITATS AND CRITTERS

## Mangroves

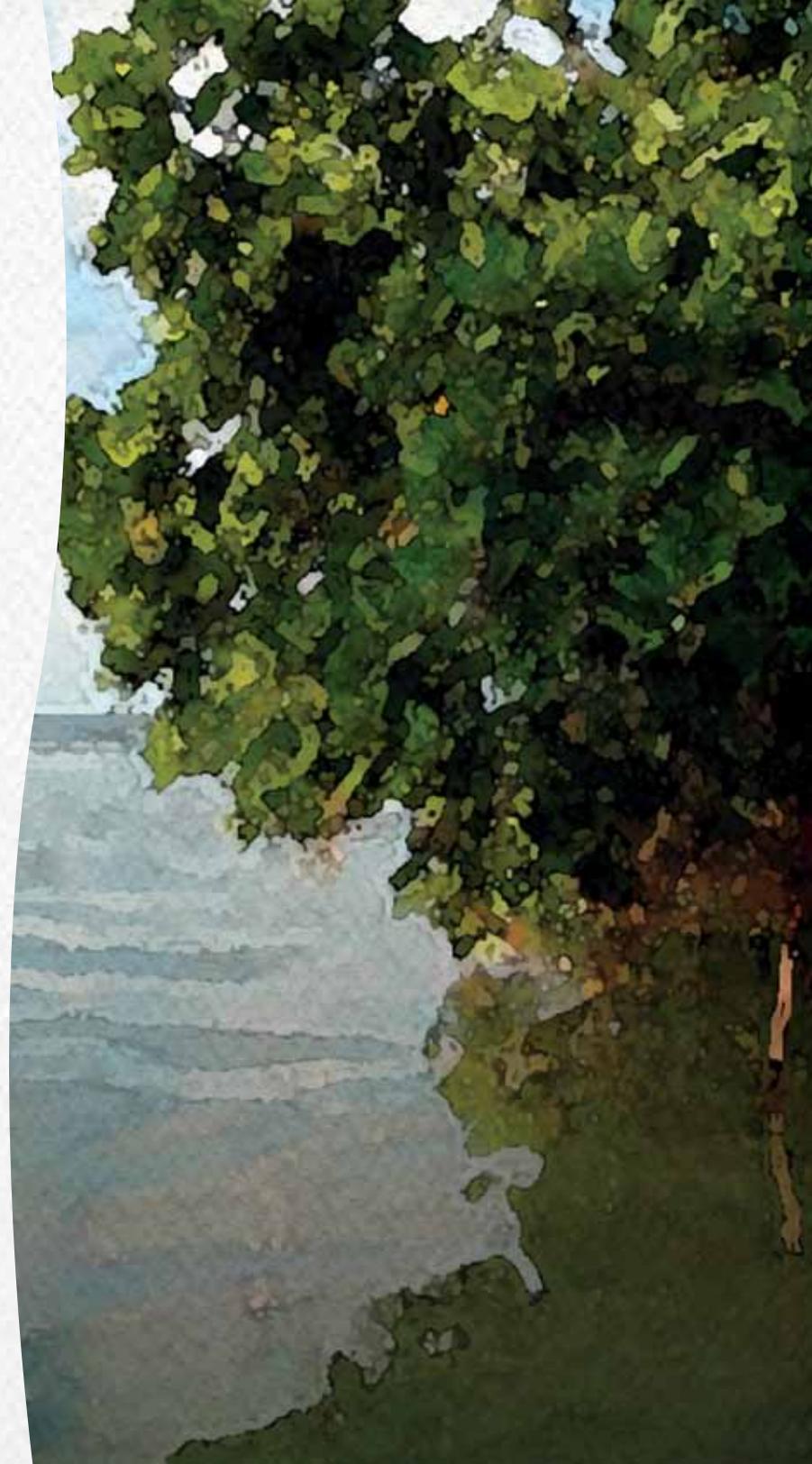
From Daytona Beach southward on the Atlantic Coast and from the Tampa Bay area southward on the Gulf Coast, mangrove forests are the backbone and protector of estuaries. These are special trees that can thrive in or near salt water, and they once formed an unbroken wall of green around south Florida. Urban development and other human activities resulted in a loss of a large part of this habitat. For example, Tampa Bay has lost 40% of its mangroves, a number that is typical for much of the region.



Here are some facts about Florida's mangroves:

- ✧ Mangroves help purify water by filtering nutrient-laden runoff that flows into the estuaries from upland regions.
- ✧ Mangrove roots and dense vegetation help prevent shoreline erosion.
- ✧ Mangroves provide breeding, nesting, and feeding areas for birds and other animals.
- ✧ Many of Florida's important fish species use the submerged root systems of mangroves as nurseries for their young.
- ✧ An estimated 65,000 acres of mangroves have been destroyed in Florida by dredging and filling operations.
- ✧ There now are laws to protect mangroves — even the mangroves on your private property.

*A variety of habitat types is found in our estuaries. The red mangrove tree, for instance, is distinguished by its extensive set of prop roots, which provide an underwater shelter for invertebrates and fishes.*





## *Seagrass Beds*

Seagrass beds, made up of a variety of different species, cover more than 500,000 acres of the bottom in shallow water along our coasts and in our estuaries. They are especially abundant from Tarpon Springs northward to Apalachee Bay on the Gulf coast, and as far north as Volusia County on the Atlantic coast.

Seagrass is important because:

- ✦ It helps maintain water clarity by trapping fine sediments and particles with its leaves.
- ✦ It provides food and shelter for more than 500 species of fish and other marine life.
- ✦ Its roots help hold the sea bottom in place.
- ✦ It provides feeding grounds for protected marine animals including manatees and sea turtles.

As is the case for mangroves and salt marshes, seagrass beds also have been destroyed by human activities. These include scarring from boat propellers and smothering by sand that migrates from areas where beaches are artificially renourished.

*Extensive seagrass beds are sometimes called underwater meadows due to their lush vegetation, and their blades harbor numerous invertebrates and fishes.*



## Salt Marshes

Salt marshes are common along the northern Atlantic and Gulf coasts and are comprised of grasses and tidal creeks. In northern Florida, salt marsh estuaries occupy hundreds of thousands of acres of the coastal zone.

Here are some facts about salt marshes:

- ✧ They provide habitat for shrimp and young fish until they are large enough to move out into open waters.
- ✧ They help filter impurities and nutrients from the water.
- ✧ They provide protection of the shoreline from waves and thereby help reduce shoreline erosion.
- ✧ A significant loss of salt marsh habitat has occurred statewide as a result of coastal development. These habitats also are threatened by sea-level rise, and in many areas are being replaced by open water.



BLUE  
DASHER

*The salt marsh is a vast nursery ground for juvenile animals, which follow the tides as the marsh is flooded and then drained in a cycle that promotes a constant supply of food.*

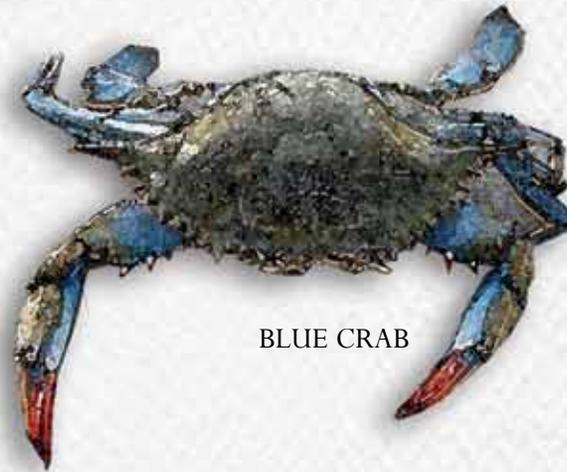




# Aquatic Animals

Estuaries provide essential habitat for many species of fish, invertebrates, and birds. Some of these animals spend their entire lives among the mangroves surrounding the estuary or in the seagrass beds in the warm, shallow waters.

Others are born or hatched within the estuary and then move on to upland areas or deeper waters offshore. Still others are born offshore and then move into estuaries to complete the juvenile stage of the life cycle.



BLUE CRAB

*Hundreds and sometimes thousands of species of invertebrate animals and fishes live in various Florida estuaries, making them hotspots of biodiversity.*



The key thing to know is that many animals depend on the estuary for survival. Without that habitat, many would become extinct. Here are some facts about the inhabitants of Florida's estuaries:

- ✦ The manatee, green sea turtle, and American crocodile are all found in estuaries. Each of these species has been classified as threatened or endangered, which means that these animals are in danger of becoming extinct unless action is taken to save them.
- ✦ Popular and important food and game fishes found in estuaries include snook, tarpon, snapper, redfish, and spotted sea trout.
- ✦ Crabs, shrimp, clams, and oysters all depend on estuaries for survival.
- ✦ Many small organisms, such as baitfish and various invertebrates, live in estuaries, where they provide essential food for predatory fish.



GREEN  
SEA TURTLE  
HATCHLING



## Birds

More than 500 bird species have been documented in Florida, and estuaries support breeding, resting and feeding sites for many of them. Some birds overwinter; some are just stopping over; others are year-round residents, but they all contribute to the greatest bird diversity east of the Mississippi River.

In estuaries, you will commonly see sea gulls and pelicans. Due to the productive mix of plants, fish and animal life you will also see many birds of prey, like hawks and osprey, and numerous long-legged birds like herons, spoonbills, ibis, and egrets feeding in the marshes. There are also plentiful songbirds living in backyard trees and forests.

Birds are beautiful to watch, but they also serve important roles in the health of estuarine systems, by controlling insects and rodents, spreading seeds, and pollinating flowering plants.

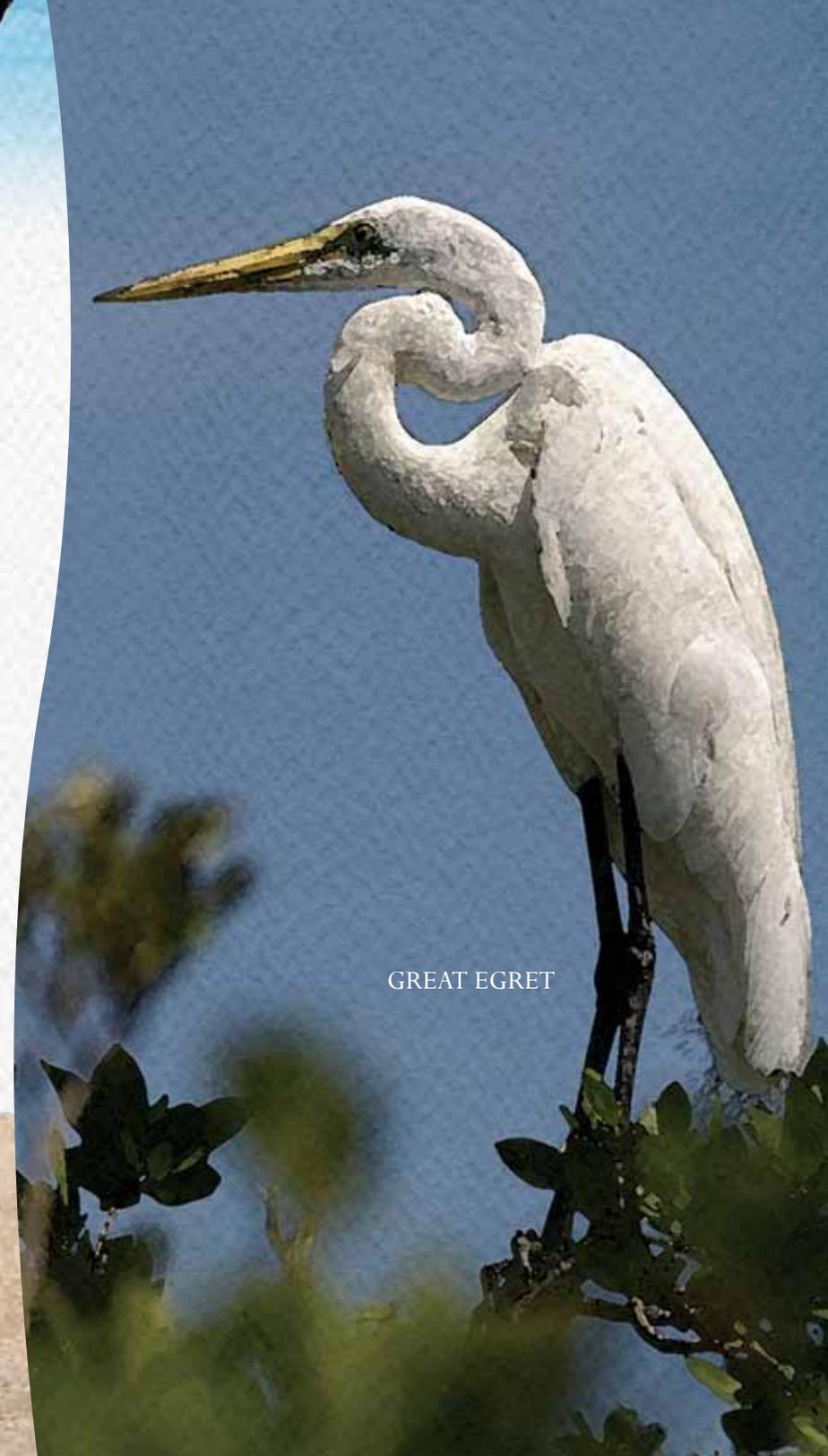
### WHITE IBISES



### WHITE PELICANS and ROSEATE SPOONBILL

To enjoy and protect birds of the estuary:

- ✧ Consult the Great Florida Birding Trail guide ([floridabirdingtrail.com](http://floridabirdingtrail.com)) for a comprehensive list of nearly 500 sites selected for their excellent bird-watching opportunities.
- ✧ Avoid approaching nests, especially from a motorboat, canoe or kayak, and avoid driving on beaches and disturbing shorebird nesting areas. When birds are frightened from their nests, their eggs and young are exposed to predators and weather.
- ✧ Dispose of or recycle fishing line and plastics responsibly, to avoid entangling and strangling birds.
- ✧ Provide backyard feeders, water, and nesting sites to make life easier for our feathered friends. Ask a local specialty shop to suggest suitable feeders and food. Plant native trees and shrubs to provide shelter. Leave dead trees if possible for nesting cavities.



### GREAT EGRET



## HUMAN IMPACTS

**A**lthough the benefits of estuaries continue to be vitally important to the economic and ecological health of the Sunshine State, the past 60 years have not been kind to these remarkable areas. Unfortunately, much of the damage has resulted from ignorance of the impacts our activities have on estuaries. As a result, Florida's estuaries are being severely damaged by:

- ✦ **Habitat loss.** Much of the original habitat found in estuaries has been destroyed to make room for cities, highways, harbors and marina facilities, coastal communities and all the other features of modern life.
- ✦ **Changes in freshwater drainage.** Fresh water can be a pollutant in the estuary if drainage control structures deliver too much water at the wrong time of year. Similarly, more and more estuaries are being starved for fresh water as municipal needs increase. Such drastic changes in flows have serious impacts on the life cycles of fishes, crabs, and shrimp. One major impact that humans have on estuaries occurs when they increase the extent of "impermeable surfaces," which are things like roads, driveways and buildings that do not allow water to percolate into the

soil. Instead, they carry water quickly off into drainage systems. The result is that when it rains, estuaries in locations with considerable development receive a rapid slug of water, instead of water being delivered more gradually and over a longer period of time.

- ✦ **Pollution.** Chemicals, oil, gasoline, and sewage are some of the pollutants that have been dumped into estuaries. There is now even concern for the not-fully understood effects of chemicals released from prescription drugs disposed down people's drains. The U.S. Environmental Protection Agency reports that the number of pharmaceuticals and personal care products, or PPCPS, as pollutants is growing. In addition to antibiotics and steroids, over 100 individual PPCPs have been identified (as of 2007) in environmental samples and drinking water.
- ✦ **Nutrient over-enrichment.** Fertilizers, grass clippings, and leaves that wash off yards, lawns and farmlands, and nutrients in sewage discharges or septic tank fields can stimulate excess algae growth that depletes oxygen. This in turn suffocates animals living in the estuary.

- 
- ✧ **Runoff.** Pesticides, fertilizers, oils, paints and other materials resulting from human activities are carried with storm water from the uplands into the estuary. This can result in loss of water quality and clarity. The increased amount of impermeable surfaces, described above, also means that when pollutants are released, they may quickly be transported to the estuary during the next rain.
  - ✧ **Siltation.** Construction work, paving of large areas, and the digging of canals have changed drainage patterns. As a result, many estuaries are being filled with soil that washes into them.
  - ✧ **Trash.** Humans generate huge amounts of trash and some of it ends up in estuaries. Not only is this trash ugly, it harms water quality and, in many cases, it kills wildlife and fish.
  - ✧ **Exotic Species.** Unwanted fish and other creatures from peoples' aquariums sometimes are dumped in streams and rivers and make their way into estuaries. In some cases they can impact native species by altering their habitat, competing for their food, or eating them.

- ✧ **Sea-level rise.** Florida's estuaries are at risk from the changing climate; sea-level rise is already resulting in changes in coastal wetlands. The plants in some estuaries, like some mangroves in South Florida, are keeping pace with sea-level rise by trapping new sediment and essentially increasing their surface elevation, but this is a rarity. More often the estuary plants are losing ground. A major impact of sea-level rise is to increase the content of sulfate, a component of sea water, in the soils of estuarine wetlands. This has the result of degrading the fiber of the soil, so that the habitat literally breaks apart, and areas are converted to open water. Some plants can migrate upstream as sea level rises; however, structures like roads, seawalls and buildings often create barriers to this process. On a state and national scale, sea-level rise is becoming one of the greatest threats to survival of estuarine habitats.

*Our estuaries are degraded by development, pollution, nutrients, changing climate, and other human impacts.*





# A RECIPE FOR ESTUARY-FRIENDLY LIVING

Up to this point we have identified that estuaries are a national treasure that provide critical economic and ecological value. We documented that estuaries are under threat from pollution, development, sea-level rise and other factors. In the face of these challenges, what can citizens and visitors to the Sunshine State do to protect estuaries?

The first step is to simply be aware that regardless of where you live in Florida, your actions can affect the health of estuaries. Once you know this, there are many things you can do to live in an “estuary-friendly” manner, and by example, show your friends and neighbors how to do this too. In the next few pages we provide some suggested actions that you might consider taking.

## 1. ACTIVELY HELP TO PROTECT AN ESTUARY

There are many things you can do to help protect your local estuary, from simple actions like picking up litter along the shoreline to joining or organizing volunteer restoration projects. Here are just a few examples. For more ideas, go to [www.estuaries.gov](http://www.estuaries.gov), a website of the National Estuarine Research Reserve System.

✧ Clean the coast during the International Coastal Cleanup: Each year on the third Saturday in September, more than 10,000 Floridians volunteer for a one-day cleanup of the Sunshine State’s coastline. The cleanup effort results in the removal of hundreds of tons of trash annually. For information

on how you can participate in the world’s largest volunteer cleanup effort, visit [www.oceanconservancy.org](http://www.oceanconservancy.org).

- ✧ Leave no trace of your estuary visit: Learn how to use “Leave No Trace” camping and hiking techniques when you visit the estuary by visiting [www.LNT.org](http://www.LNT.org). The goal should be to take only photos and leave only footprints behind.
- ✧ Volunteer: Visit the Keep Florida Beautiful website at [gogreenfl.org](http://gogreenfl.org) to get information about ongoing projects in your local community, or check out other opportunities on the website of the Florida Department of Environmental Protection: [www.dep.state.fl.us/cmp/links/#volunteer](http://www.dep.state.fl.us/cmp/links/#volunteer).
- ✧ Write a letter: One of the most effective tools for getting attention and support for protecting an estuary is a personal letter to your local, state or national elected representative. Learn who these people are, learn how to write an effective letter, and use this approach to draw attention to estuarine issues.
- ✧ Learn more about estuaries by visiting a Florida Aquatic Preserve. Many of Florida’s most valuable and undisturbed estuaries are part of the State’s Florida Aquatic Preserve system. Learn more about your local estuary by visiting [www.dep.state.fl.us/coastal/programs/aquatic](http://www.dep.state.fl.us/coastal/programs/aquatic).

- ✧ Respect wildlife from a distance. Never follow or harass manatees, dolphins, turtles or other aquatic animals.
- ✧ Conserve fresh water. It is quickly becoming one of our most limiting natural resources. Remember, estuaries must have balanced inflows of fresh and salt water to survive and flourish.
- ✧ Be a responsible pet owner for the duration of your pet's life. It is against the law to release non-native animals into the wild, even by accident.

## 2. THINK BEFORE POURING

There are many ways we can damage an estuary, but some of the most serious damage is done by the things we pour down the drains in our homes. Whether the drain empties into a sewer system, storm drain, or septic tank, the liquids we pour down the drain could end up in the estuary. The consequences can include outright toxicity to plants and animals. That's why we should:

- ✧ Read the label. Products containing lye, phenols, petroleum distillates, or trichlorobenzenes are extremely harmful to estuaries. Look for alternative products to purchase and never pour toxic products down the drain.
- ✧ More generally, never pour oven cleaners, ammonia, bleach, furniture polish, or floor wax into a drain.

*Common household products can be highly toxic to plants and animals that live in our estuaries.*





- ✦ Dispose of paint, paint thinners, and brush cleaners properly, at a toxic waste collection center in your county. Before disposing of paint cans, be sure that the paint is completely dry before putting the cans in the garbage. Used turpentine or brush cleaners can be filtered through a rag and reused.
- ✦ Old household products, especially those with missing labels, should never be poured down a drain. Save them until they can be safely disposed of during the next toxic waste cleanup day in your community. Call your county's solid waste office for more information.
- ✦ Find out how to dispose of old prescription drugs in a manner that is both safe and environmentally friendly. Some excellent guidelines can be found at [www.smarxtdisposal.net](http://www.smarxtdisposal.net). This site is endorsed by the U.S. Food and Drug Administration.



✧ Remember that regardless of where you live in Florida, whether it be directly on an estuary or tens of miles from the coast, water draining off your land can make its way to rivers and ultimately the estuaries and ocean. The guidelines above apply to us all.

### 3. PRACTICE ESTUARY-SAFE YARD CARE

Floridians are some of America's most devoted home gardeners. In the past, residents were taught that the more fertilizer and pesticide they use, the better their lawn and garden will look. We now know that this is not the case, and that through best management practices, you can have a beautiful yard with a more careful use of chemicals that can harm the environment.

#### Here are some easy tips:

✧ Practice and encourage sensible yard maintenance. The Florida-Friendly Landscaping Program™ is specifically designed to reduce the runoff of fertilizer and pesticides into lakes, rivers, and estuaries. Great tips on how to do this can be found at [fyn.ifas.ufl.edu](http://fyn.ifas.ufl.edu). The following bullets are some of their specific recommendations.

✧ Choose the right plants for your location in Florida. They need minimum amounts of fertilizer and watering because they are adapted to the local soil and weather conditions.



✧ Use mulch around plants—it is attractive, it reduces runoff from your lawn, it reduces evaporation, and it helps hold moisture in the soil. If you use natural leaf litter from your yard, or natural pine needles as mulch, you can cut down on material going to landfills at the same time.

✧ If you use fertilizers or pesticides, follow directions carefully and use only the recommended amounts. Excessive use of fertilizers can attract more insects and grow more weeds, not to mention drain your wallet and potentially damage aquatic habitats when it washes away with the next rain.

✧ Use slow-release (solid) fertilizers, not the liquid fertilizers that are quickly flushed from the soil when it rains. Slow release fertilizers will provide longer-lasting benefits for your plants, save you money, and protect the environment. If you have a commercial company fertilize your grass, ask them to use slow-release fertilizer. If they cannot do it, switch to another company that will.

✧ Find environmentally safe alternatives to pesticides. Contact your local county extension office for suggestions ([solutionsforyourlife.ifas.ufl.edu/map/](http://solutionsforyourlife.ifas.ufl.edu/map/)).

*Apply fertilizer according to guidelines of the Florida-Friendly Landscaping Program™.*





- ✧ Whenever possible, use bricks, gravel or other porous materials when building sidewalks or patios. These materials allow rainwater to seep into the ground and replenish underground supplies. Paved surfaces speed the flow of runoff from your yard into the storm drains and on to the estuary.
- ✧ If you use automatic sprinklers, install a soil moisture sensor and water your lawn only as often as needed. Follow recommendations of your local water management district or county extension office for timing and amount.
- ✧ Adjust sprinklers to reduce runoff from the yard. Don't allow sprinklers to put water on driveways or sidewalks.
- ✧ Protect mangroves. If you are fortunate enough to have mangroves on your property, take extra care to protect them. Check with your county environmental resource management office or the Florida Department of Environmental Protection for the regulations about pruning them.
- ✧ Be careful when disposing of chemicals from your swimming pool. They can be deadly in an estuary. Always take excess chemicals and even the empty containers to hazardous waste collection centers for disposal. Do not put them into your plastic recycling bins.
- ✧ Drain your swimming pool only when absolutely necessary. Don't add chemicals for several days before draining, to give the chlorine time to dissipate before the water is drained.

- ✧ Don't drain pools into the street or a stream! Instead, let the chlorine dissipate and then drain the pool onto an area of soil or mulch so it can be slowly absorbed.
- ✧ Be careful with pet wastes. If washed into the estuary by rain, dog droppings can add unwanted nutrients, as well as bacteria and viruses, to the water. Put pet wastes in the trash or bury them 6–8 inches deep and away from surface waters.

#### 4. COMBINE CAR AND PROPERTY CARE WITH ESTUARY CARE

When it comes to protecting the estuary, perhaps each of us should consider our cars to be miniature oil tankers. After all, each car holds a variety of oils, greases, and fuel that can be deadly to estuarine environments. In fact, every car has enough oil in its motor to create an eight-acre oil slick in the estuary. Despite this danger, Floridians put about 7 million gallons of oil into the environment each year by pouring it down storm drains, tossing it in the garbage, or simply dumping it on the ground. Chemicals used around the home to deal with insect pests or to coat driveways also can be toxic to organisms that live in estuaries, and care should be taken in selecting which ones to use. Needless to say, we all need to do more to stop this pollution.

#### Here are some ways to help.

- ✧ Be aware of the environmental dangers posed by cars. Motor oil, gasoline, antifreeze, transmission fluids, degreasers, battery acid, waxes and cleaners, radiator flushes, and rust preventatives can damage the estuarine environment.
- ✧ Collect used oil and antifreeze and take them to a collection center, garage or recycling center. Clean up antifreeze spills quickly. Antifreeze is a powerful pollutant and it can kill fish and wildlife, as well as dogs and cats. Have fluid leaks repaired promptly. Use kitty litter to absorb oil from newly discovered leaks. Dispose of properly.
- ✧ Use only non-phosphate detergents to wash your car. If it is possible, without damaging your sprinkler system, park your car on the grass when washing it so that soap is not washed down the driveway and into the storm system.



- ✧ Use biodegradable pesticides and where possible, use pesticides made of natural plant products that do not harm the environment.
- ✧ Reduce the impacts of your impermeable surfaces. If your house has rain gutters, install spreaders that distribute the water onto your grass or landscape, rather than directing it onto your driveway. Consider installing rain barrels to collect water for reuse. If you are building a new home, ask the builder about options for driveways constructed of semi-permeable materials that will allow water to pass through to the underlying soil, rather than quickly running off. If your existing driveway needs to be sealed, look for a company that can do it with a material that has the lowest possible toxicity to marine life. Some driveway sealants release high amounts of toxic hydrocarbons (oil products) and should be avoided. Consult this publication on sealcoating your driveway: [seagrant.unh.edu/sealcoat.pdf](http://seagrant.unh.edu/sealcoat.pdf).

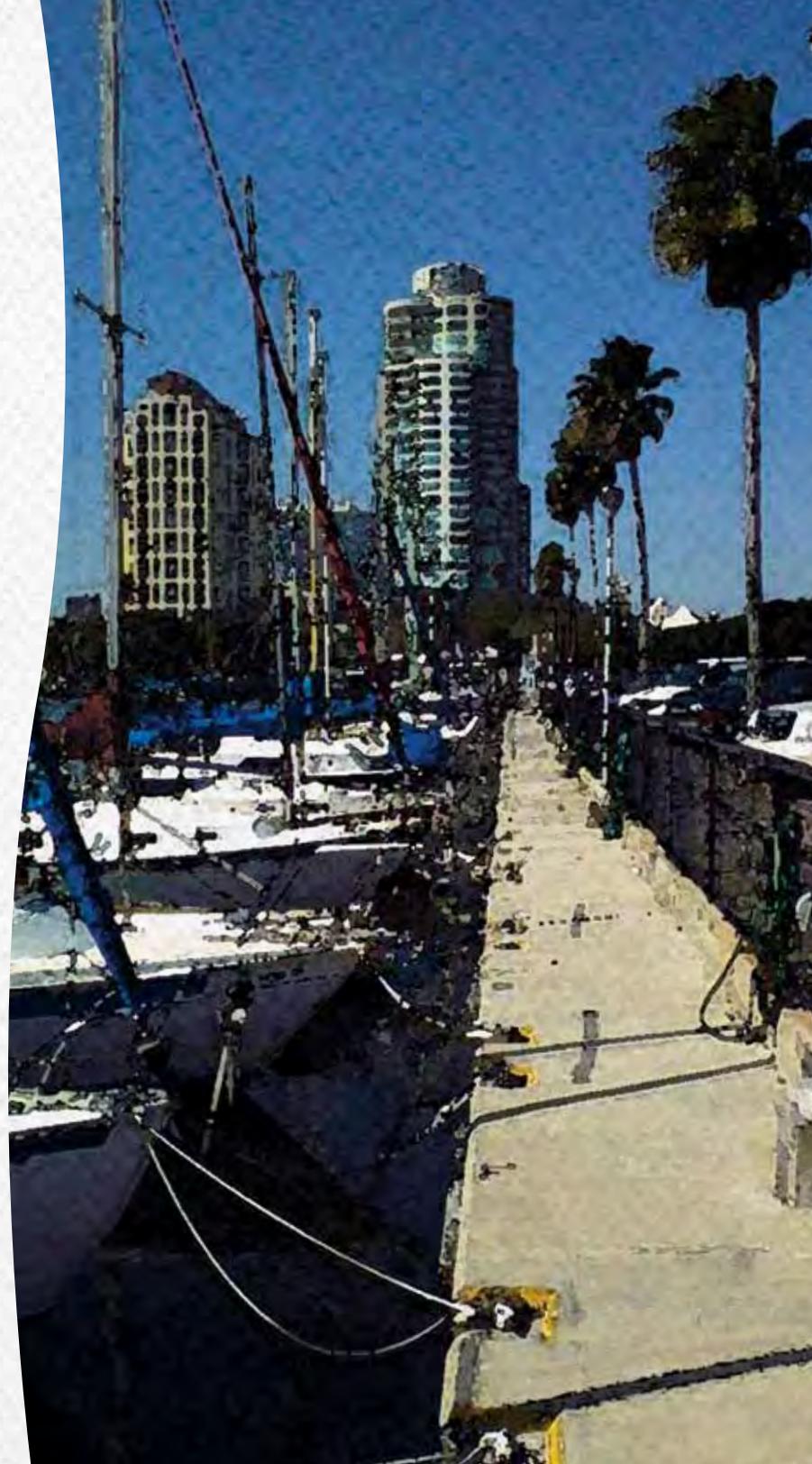
## 5. PRACTICE ESTUARY-FRIENDLY BOATING

There are more than a million registered boats in Florida and the number is rising as more and more people want to enjoy the many experiences associated with boating. While boats provide Floridians with an opportunity to enjoy the beauty of the state's estuaries, as well as a way to fish and for some, earn a living from the sea, they also can damage these fragile environments. In most cases, this damage is caused accidentally — especially when it comes to fuel spills. By using common sense and observing a few rules, boat owners can greatly reduce their impact on Florida's estuaries.

For instance:

- ✧ Avoid shallow water where the boat's propeller can churn up the habitat of animals living in the mud on the estuary's bottom. This also will protect your propeller, engine and your wallet!
- ✧ Stay out of seagrass beds. These vital habitats can be damaged when boats run aground in or run through seagrass. If you get stuck in a seagrass bed, shut down and raise the engine and push the boat to deeper water. Prop damage to sea grasses in any of Florida's Aquatic Preserves is punishable by fine.
- ✧ Observe speed limits and No Wake zones. Excessive wakes can damage fragile shorelines. Speed limits are designed to protect boaters and swimmers, as well as manatees.
- ✧ Keep your boat in top running condition. Repair all fuel and oil leaks promptly. One quart of oil leaked into the water can create a two-acre oil slick.
- ✧ Use extreme caution when fueling. Accidental overfilling of fuel tanks is one of the most frequent causes of fuel leaks into estuaries. Check with your local marine supply store for devices that can be used to prevent fuel spills.
- ✧ Never dump sewage overboard. Use pump out stations.

*Florida is the nation's top boating destination, so boaters should take care in sensitive estuarine environments.*





- ✧ Before discharging bilge water overboard, use a bilge sock or other fuel-absorbing product in your bilge to soak up oil and fuel floating on top of the bilge water.
- ✧ Scrub your boat frequently with water and a brush to remove stains before they become so embedded that cleaners are required to get them off. If necessary, use vinegar and baking soda as cleaners. Never use detergents, as they can harm aquatic life.
- ✧ Remember to stow litter onboard for proper disposal when you return to the dock.
- ✧ Be careful with hull paint. If you need to scrape or sand the hull, catch the scrapings on a drop cloth and dispose of properly. Never have your boat hull scrubbed or scraped while it is in the water.

## 6. BE A CONCERNED ESTUARY VISITOR

Fishing, kayaking, sunset-watching, picnicking, and many other fun-filled activities await visitors to Florida estuaries. In fact, estuaries not only provide us with opportunities for fun, they also are sources of inspiration and education. In return, we owe it to our estuaries to do what we can to protect them.

*What it all comes down to is the commitment that Floridians will make to the concept and practice of "sustainability." This refers to the effort we make to conserving healthy estuaries for future generations.*

Here are some ways we can all help to ensure that our estuaries remain a vital part of the Sunshine State's environment:

- ✧ Pick up and dispose of any trash you see along the shore. If you don't, who will? Plastic garbage can remain in the estuarine environment for hundreds of years. In fact, if the original Spanish settlers at St. Augustine had tossed plastic bottles on the shore in the 1500s, the litter could still be found today.
- ✧ Plastic six-pack rings are death traps for wildlife. Always dispose of them properly and, if possible, cut the rings apart.
- ✧ Clean up your fishing line. Remember, the monofilament fishing line you toss out today can entangle and kill seabirds and wildlife for the next 600 years. Always make sure the line is disposed of properly. Many fishing piers and bait and tackle shops now collect fishing line for recycling. Locations of recycling bins in your area can be found on this website hosted by the Florida Fish and Wildlife Conservation Commission: [www.fishinglinerecycling.org/index.asp](http://www.fishinglinerecycling.org/index.asp).
- ✧ You can make a small container to store used fishing line out of an old tennis ball can until you can empty it at a recycling location.

- ✧ If you see a manatee, pelican, or other animal entangled in monofilament line, contact the FWC immediately at 1-888-404-FWCC (3922).
- ✧ Be aware of windy conditions that could blow picnic supplies into the estuary. Plastic bags and Styrofoam are eaten by sea turtles and other marine creatures that mistake this debris for jellyfish or other food. The results are usually fatal.
- ✧ Conserve estuarine plants and animals. You'll find lots of colorful and attractive plants growing along estuaries. Don't pick them. They are essential for wildlife habitat and for holding coastal beaches together.
- ✧ Estuarine wildlife can be fascinating, but don't disturb or feed dolphins, manatees, pelicans and other creatures. Feeding wild animals encourages them to approach people, boats, and highways — often with fatal results for the wildlife. It also is illegal in the state of Florida to feed certain animals, including dolphins, manatees, and alligators.



BOTTLENOSE  
DOLPHIN

# REFERENCES

## FOR MORE INFORMATION ABOUT ESTUARIES AND COASTS

BAY  
SCALLOP



### Online Publications

Robert R. Christian. 2009. "The Value of Healthy Estuaries." American Institute of Biological Sciences. [www.actionbioscience.org/environment/christian.html?print](http://www.actionbioscience.org/environment/christian.html?print). Describes estuarine ecology, defines ecosystems services that they provide, and offers useful references for teachers and the interested public.

Thomas Frazer et al. 2001. "Nutrients and Florida's Coastal Waters." SGEB 055. Florida Sea Grant College Program. Available at [nsgl.gso.uri.edu/flsgp/flsgpg01010.pdf](http://nsgl.gso.uri.edu/flsgp/flsgpg01010.pdf). Describes the role of nutrients in Florida estuaries, and the consequences of over-enrichment. Provides basics of ecology in estuaries, especially for seagrass and the food chains they support, and offers tips for maintaining and restoring coastal waters.

### Key Organizations and Their Websites

Estuaries.gov — [www.estuaries.gov](http://www.estuaries.gov). This is the official website of the National Estuarine Research Reserve System, a national network of protected areas established for long-term research, education, and stewardship.

National Estuary Program — [www.epa.gov/nep/](http://www.epa.gov/nep/) — is a website of the US Environmental Protection Agency. It contains information about estuaries, the EPA's National Estuary Program, and ongoing projects to protect and restore estuarine habitat.

Florida Department of Environmental Protection website — [www.dep.state.fl.us/coastal/habitats/](http://www.dep.state.fl.us/coastal/habitats/) — has information about major habitats of estuaries, such as seagrass and wetlands.

Florida-Friendly Landscaping — [fyn.ifas.ufl.edu/](http://fyn.ifas.ufl.edu/) — helps homeowner and commercial landscapers use environmentally sustainable practices.

Florida Sea Grant — [www.flseagrant.org](http://www.flseagrant.org) provides information on the marine extension service and science-based solutions for Florida's coastal problems, as well as access to scholarship opportunities for college-bound students seeking careers in marine science.

Florida Fish and Wildlife Conservation Commission — [myfwc.com](http://myfwc.com) — has information about fishing and wildlife regulations, as well as information about coastal ecology and various species.

NOAA Ocean Service Education — [oceanservice.noaa.gov/education/kits/estuaries](http://oceanservice.noaa.gov/education/kits/estuaries) — has an online tutorial about estuaries that is selected by the National Science Teachers Association.

Florida Oceans and Coastal Council — [www.floridaoceanscouncil.org/reports/](http://www.floridaoceanscouncil.org/reports/) — has a report on the expected effects of climate change on Florida's coastal and ocean resources.

EPA Carbon Emissions Calculator — [www.epa.gov/climatechange/emissions/individual.html](http://www.epa.gov/climatechange/emissions/individual.html). This simple tool allows you to calculate your "carbon footprint," which reflects the degree to which your day-to-day activities in and out of the house may be contributing to climate change.

EPA "What You Can Do" — [www.epa.gov/climatechange/wycd/index.html](http://www.epa.gov/climatechange/wycd/index.html). This website provides you with some tips on things you can easily do in and out of your home to reduce your carbon footprint, and therefore reduce your contribution to global climate change.



