

*Florida Sea Grant Publication:*

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**FLORIDA'S ESTUARIES:**  
**A Citizen's Guide to Coastal Living**  
**and Conservation**

# **FLORIDA'S ESTUARIES:** **A Citizen's Guide to Coastal Living and Conservation**

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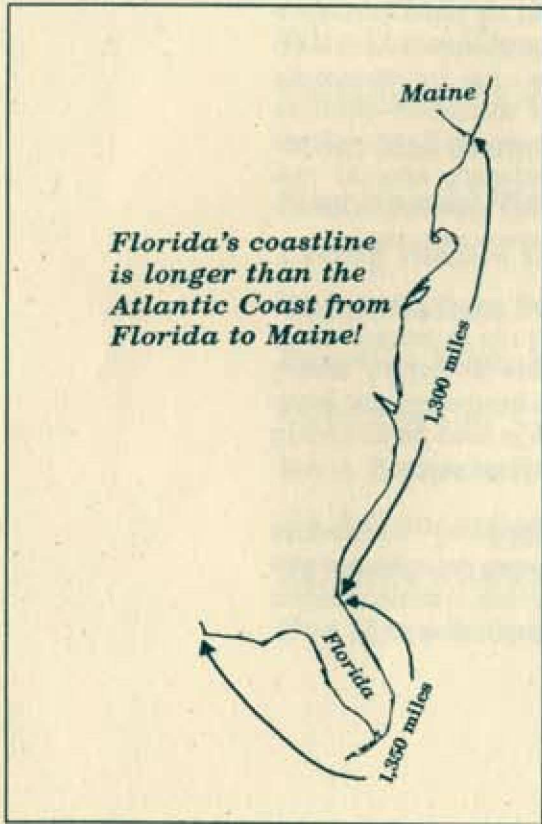
## FOREWORD

The vast network of coastal waters and wetlands that form Florida's estuaries provides major economic benefits to residents of the state. Not only do estuaries support commercial and recreational fisheries, they are also the setting for some of Florida's most popular tourist attractions. In addition, estuaries help reduce the damage caused by coastal storms.

Despite all the good they do, Florida's estuaries are being damaged by the Sunshine State's rapid pace of urbanization. Construction projects, new highways, dredging, and many other activities have combined to cause serious concerns, as well as disagreements, about the future health of our estuaries. Although there may be a lack of agreement on the consequences of our behavior toward estuaries, everyone agrees that estuaries are deserving of our concern and protection.

As Floridians approach the 21st Century, they are seeking ways to balance conservation with the continued demand for urban expansion. It is our hope that this booklet will provide concerned citizens with a starting point for taking a more active role in safeguarding the health of our estuaries. The approach advocated by this booklet is action oriented--numerous suggestions for "things you can do to help" are presented. Suggestions for community-wide activities are also included. It should be noted, however, that this booklet does not provide all the answers needed to protect Florida's estuaries. The intent is to provide a starting point for readers to begin to learn more about estuaries. It is our hope that gaining a better appreciation of estuaries will inspire readers to not only improve their personal habits toward estuaries, but will also motivate them to get involved in the larger effort of responsibly managing these important waters--and ultimately deciding on levels of growth in the upland areas that drain to the coast.

We would like to thank the Florida Department of Community Affairs for their funding of this booklet, as well as for providing technical expertise in reviewing its content. Other reviewers whose technical comments helped improve this booklet include: David Brown, Indian River Lagoon National Estuary Program (NEP); James Cato and Marion Clarke, Florida Sea Grant; Ginger Hinchcliff, Rookery Bay National Estuarine Research Reserve (NERR); Rosalyn Holzer, Department of Community Affairs; Georgia Jeppesen, Florida Department of Education; Erik Lovestrand, Apalachicola Bay NERR; Heidi Smith, Tampa Bay NEP; and Eileen Tramontana, Suwannee River Water Management District.



## WHAT IS AN ESTUARY?

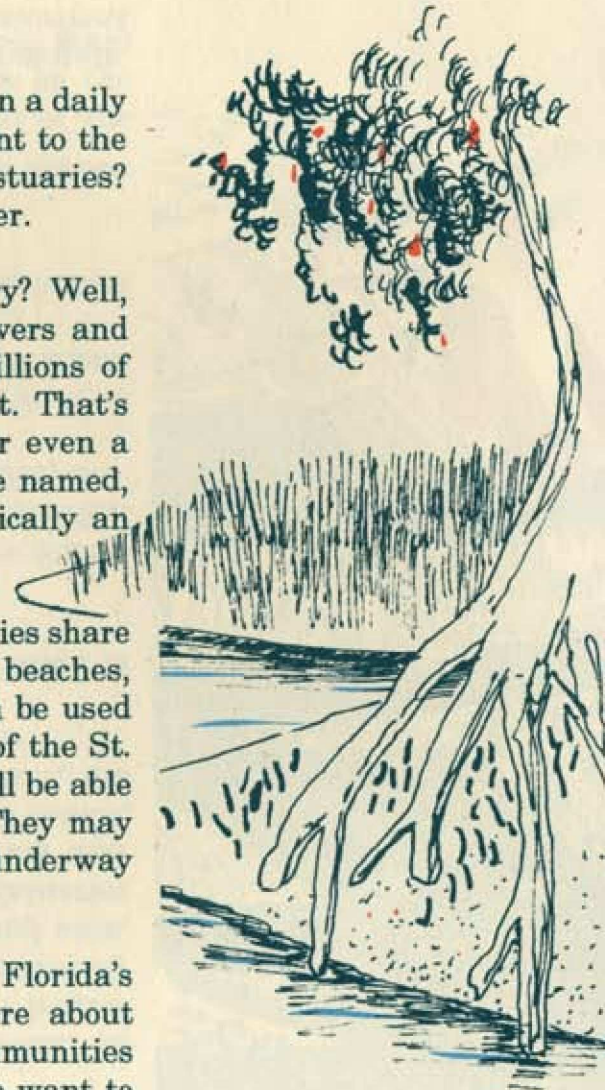


Estuary. That's a word millions of Floridians and their guests hear on a daily basis. But what exactly is an estuary? Why are estuaries important to the Sunshine State? And what can Florida residents do to help protect estuaries? These are just some of the questions we hope this booklet will answer.

In fact, let's answer that first question right away. What is an estuary? Well, basically an estuary is a body of water where freshwater from rivers and streams meets the saltwater of the sea. Most Floridians and millions of tourists see estuaries almost on a daily basis, but few of them realize it. That's because the estuary they see is probably called a bay, a sound, or even a lagoon. It's important to remember that no matter what it may be named, every body of water where saltwater and freshwater mix is technically an estuary.

Despite the diversity of Florida's coastal areas, all of the state's estuaries share many common features, such as being partially enclosed by islands, beaches, and the mainland. As a result, the information in this booklet can be used statewide. From Pensacola Bay to Biscayne Bay, from the mouth of the St. John's River to the Ten Thousand Islands, readers of this booklet will be able to better understand, appreciate, and protect their local estuary. They may even feel inspired to join in the many estuary restoration efforts now underway in Florida.

This booklet is only an introduction to the fascinating world of Florida's estuaries. We hope it will encourage readers to learn even more about estuaries and to get involved in efforts both in their homes and communities to better conserve these vital bodies of water. And for readers who want to learn even more, a list of agencies and organizations that can provide more detailed information about local estuaries is provided at the end of this booklet.



## FLORIDA'S ESTUARIES AND YOU

Estuaries exist where sea water mixes with freshwater from the land. In Florida, estuaries come in many shapes and sizes. Some of the largest estuaries, such as Tampa Bay and Pensacola Bay, are nearly enclosed by surrounding land and barrier islands. Others, such as the Big Bend area, consist of long, narrow stretches of marsh land facing the open sea. Estuaries may get their freshwater from three or four large rivers, or an estuary may receive inflow from literally hundreds of small rivers, creeks, streams, canals, and even springs. In some cases, such as the lower St. Johns River, the estuary may be formed almost entirely by the flow of one large river.

No matter how big it is or how it is formed, every estuary in Florida is important because:

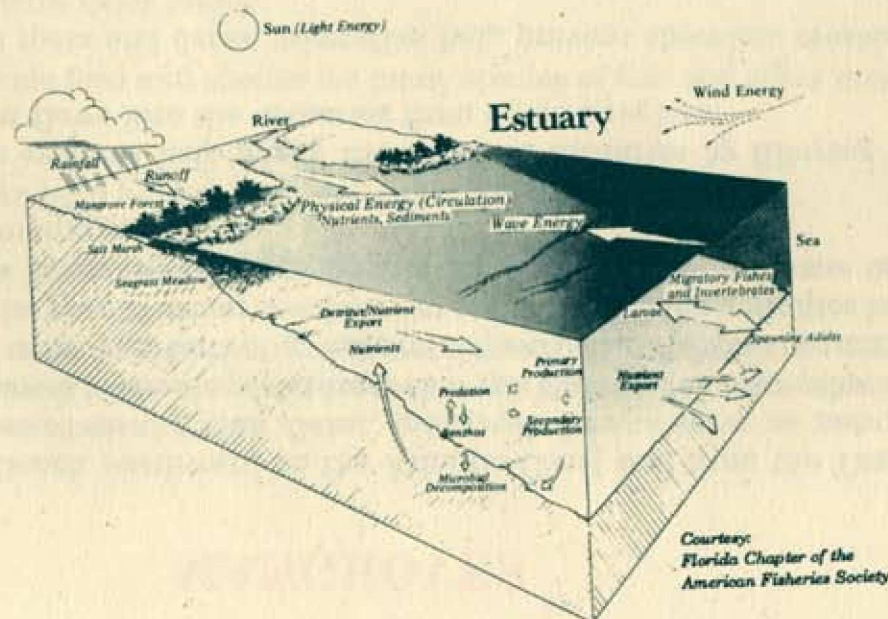
- Estuaries are some of the most biologically productive systems on Earth. About 80-90% of Florida's commercially valuable fish and shellfish species depend on estuaries during at least one part of their lifecycle.
- Estuaries provide young fish and shellfish with a home ("nursery") where they can find food while avoiding predators that would eat them.
- The marshes and mangroves surrounding many estuaries provide homes for millions of birds.
- Estuaries protect Florida by absorbing the force of storms from the sea and by providing an outlet for flood waters from the land.
- The areas surrounding estuaries provide important human habitats. Many Floridians depend on estuaries for recreation and waterfront homes and offices. Much of the state's commerce and shipping also depend on estuaries.



## 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 on the Intracoastal Waterway, look down and you'll probably see several of the following:

- Rivers that bring freshwater 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

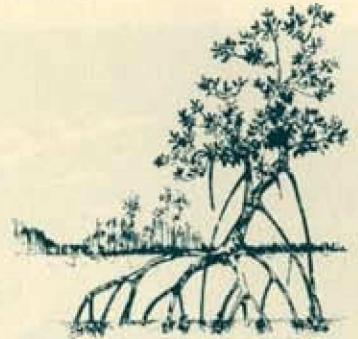




## MANGROVES

From Daytona Beach southward on the Atlantic Coast and from the Tampa Bay area southward on the Gulf Coast, mangrove forests serve as nature's protector of estuaries. These special trees that can thrive in or near saltwater once formed an unbroken wall of green around southern Florida's estuaries. Unfortunately, the pace of urban development and other human activities have caused problems for many of these fascinating trees. Here are some facts about Florida's mangroves:

- Mangrove systems help purify the water in estuaries by filtering the 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 many marine animals and birds.
- Many of Florida's important fish species use the waters beneath mangroves as nurseries for their young.
- More than 23,000 acres of mangroves have been destroyed in Florida by dredging and filling operations.
- Laws help protect mangroves--even mangroves on private property.
- Florida has three types of mangroves--red, black and white.



## SALT MARSHES AND SEAGRASS BEDS

In addition to mangroves, salt marshes and seagrass beds are important parts of a healthy estuary. In Florida, especially in northern areas, coastal marshes filled with brackish waters occupy hundreds of thousands of acres surrounding estuaries. In these fertile areas, young fishes seek shelter until they are large enough to move out into open waters. Salt marshes also help filter impurities and nutrients from the water and hold shorelines in place.

Seagrass, like the grass on your lawn, is a green plant that produces oxygen. But seagrass beds differ from lawns in one very important way--seagrass grows underwater. In Florida, there are seven different types of seagrass. Together, these seagrasses cover more than 500,000 acres--many of which are located within estuaries. Seagrasses are important because:

- They help maintain water clarity by trapping fine sediments and particles with their leaves.
- They provide food and shelter for many species of fish and other marine life.
- Their roots help hold the sea bottom in place.
- They help protect the health of estuaries.
- There is more natural plant and animal activity in estuaries than is found in many areas specifically designed by humans to create biological activity, such as a planted crop.

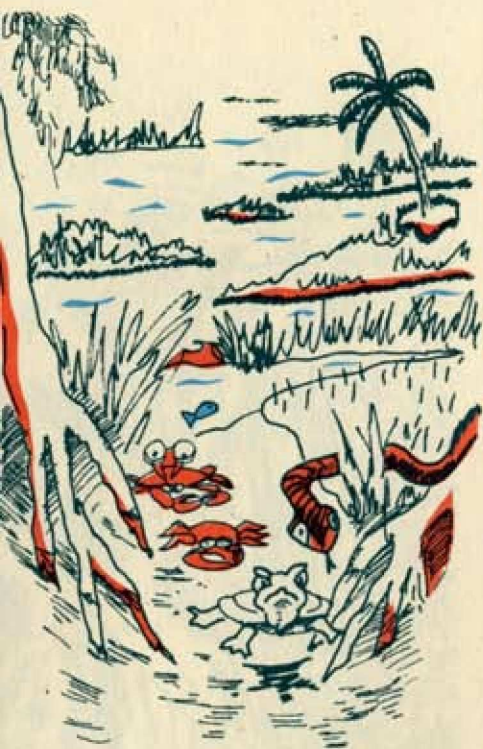


## WHO LIVES THERE?

Estuaries provide homes for many species of fish, invertebrates, and birds. Some of these animals spend their entire lives among the mangrove thickets surrounding the estuary or among 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.

The important thing to remember, however, is that many creatures depend on the estuary for survival. Without the habitat provided by the estuary, they would become extinct. Here are some facts about the inhabitants of Florida's estuaries:

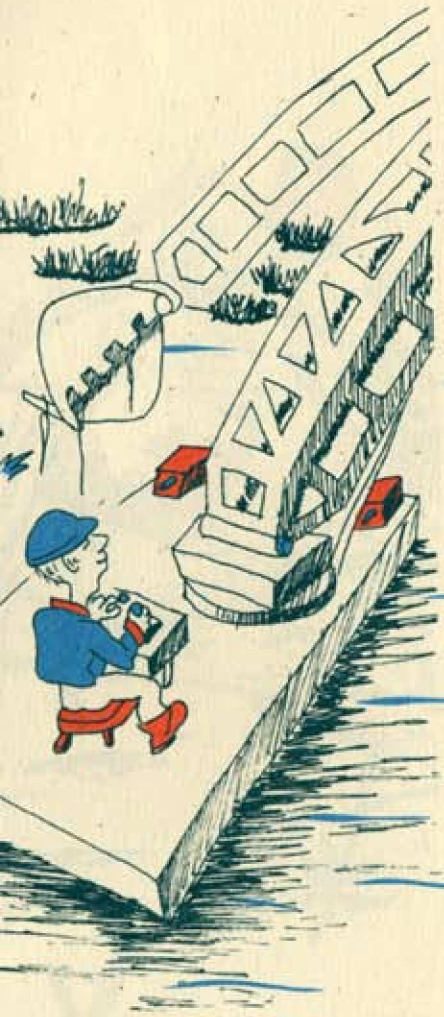
- The manatee, Atlantic green turtle, and American crocodile are all found in estuaries. Each of these species has been classified as "endangered" which means that they are in danger of becoming extinct unless action is taken to save them.
- Popular and important food and game fishes found in estuaries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



## ENDANGERED ESTUARIES

Although the benefits of estuaries continue to be vitally important to the welfare of the Sunshine State, the past 50 years have not been kind to these remarkable areas. Unfortunately, much of the damage has resulted from human ignorance of the impacts their activities have on estuaries. As a result, our 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.
- **Pollution.** Chemicals, oil, gasoline, and sewage are some of the pollutants that have been dumped into estuaries.
- **Runoff.** Pesticides, fertilizers, oils, and paints and other harmful materials resulting from human activities are carried from the uplands into the estuary.
- **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 much of it ends up in estuaries. For example, during the 1991 Coastal Cleanup Day more than 18,000 volunteers removed 180 tons of trash from 1200 miles of Florida beaches. Not only is this trash ugly, it harms water quality and, in many cases, it kills wildlife and fish.



## WHAT HAS BEEN LOST?

To most Floridians and tourists, estuaries look pretty much the same year after year. They may see dredging operations, bridge building, or even more and more debris. But few of us stop to consider what this might mean to the health of the estuary. In recent years, scientists, environmentalists, fishermen, and many other individuals have begun to sense that something is wrong in our estuaries. Fewer fish, diseased fish, murky waters, less wildlife...these are just a few of the clues that have prompted studies of Florida's estuaries. In many cases, these studies have confirmed that all is not well in the Sunshine State's estuaries. For instance:

- Since the early 1900's, more than 80% of the seagrass in Tampa Bay has disappeared. As a result, fewer fish are being caught.
- In a survey of 10 selected estuaries in Florida, scientists determined that loss of habitat between the 1940's and 1980's included up to 50% of the salt marshes; nearly 60% of the seagrasses; and up to 85% of the mangroves.
- None of the seagrass beds that flourished in Ponce de Leon Inlet in the 1940's exist today.
- Since 1945, more than half of the salt marshes in Charlotte Harbor have been destroyed.
- Only 12 percent of the seagrass beds that were growing in Boca Ciega Bay in the 1940's are alive today.
- 38% of the seagrass in a seven-mile section of the Sebastian Inlet estuary has disappeared since 1951.



## WHY SHOULD WE CARE?

These losses, combined with hundreds of other losses throughout the state, mean that the fish, shellfish, and other creatures living in our estuaries are having a difficult time. In fact, there is growing evidence that there are fewer and fewer of some important species each year. Not only does this mean there are fewer fish for recreational and commercial anglers to catch, it is also an important clue that our estuaries are in trouble. And by far the single biggest cause of damage to our estuaries is PEOPLE! People like you and me and Uncle George and Aunt Bess, and our friends who visit each summer from out of state--13 million Floridians and the 30-40 million visitors we host each year have a lot to do with the quality of the environment, especially when it comes to estuaries. Here are some ways we are hurting the estuaries:

- We sometimes destroy estuarine habitats to make room for new houses, highways, hotels, shopping centers, bridges, marinas and many other facilities people need.
- We pollute the estuaries with oil and other petroleum products.
- We use too much fertilizer and too many pesticides on our lawns and gardens. These poisons then get washed into the estuaries where they kill fish, shellfish, and other wildlife. The fertilizers also help algae to grow -- algae that can harm essential seagrass.
- We upset the balance of freshwater and saltwater in our estuaries by changing runoff and circulation patterns. These changes harm fish and plant species living in the estuary.

And what can we do to stop hurting our estuaries? That's what the remainder of this booklet is all about.

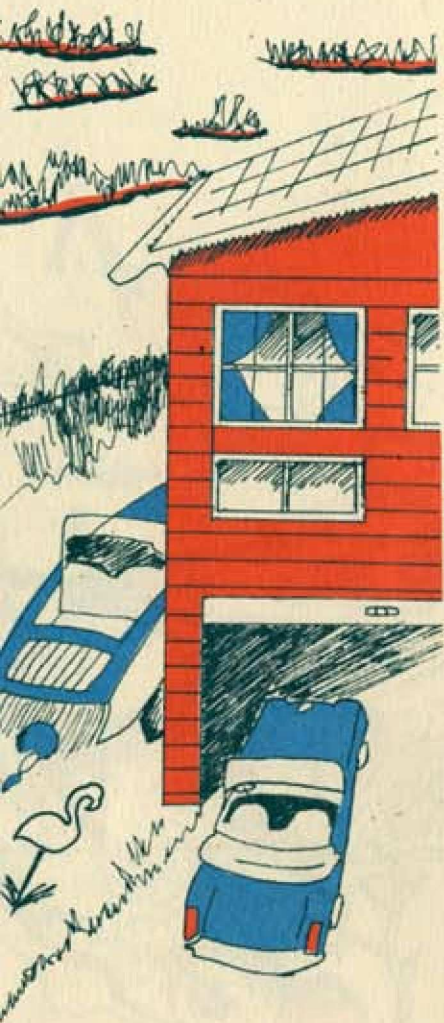


# LIVING BESIDE THE ESTUARY

## How to be a good neighbor

Each week, nearly 3,000 more people move into Florida's coastal counties. For most, Florida is an entirely new environment in which to live. There's lots of warm sunshine year 'round, there's the Gulf of Mexico or Atlantic Ocean in the distance, and there are lots of strange flowers, plants, animals and bugs in their yards. While most of Florida's new coastal residents are excited about their new surroundings, few consider the impact their presence has on the quality of the environment. Unfortunately, many of the 10 million Floridians who are already living in coastal areas provide these new residents with poor examples of how to protect Florida's unique and fragile environment. As a result, it's easy for both new and long-time residents to develop some bad habits when it comes to protecting estuaries.

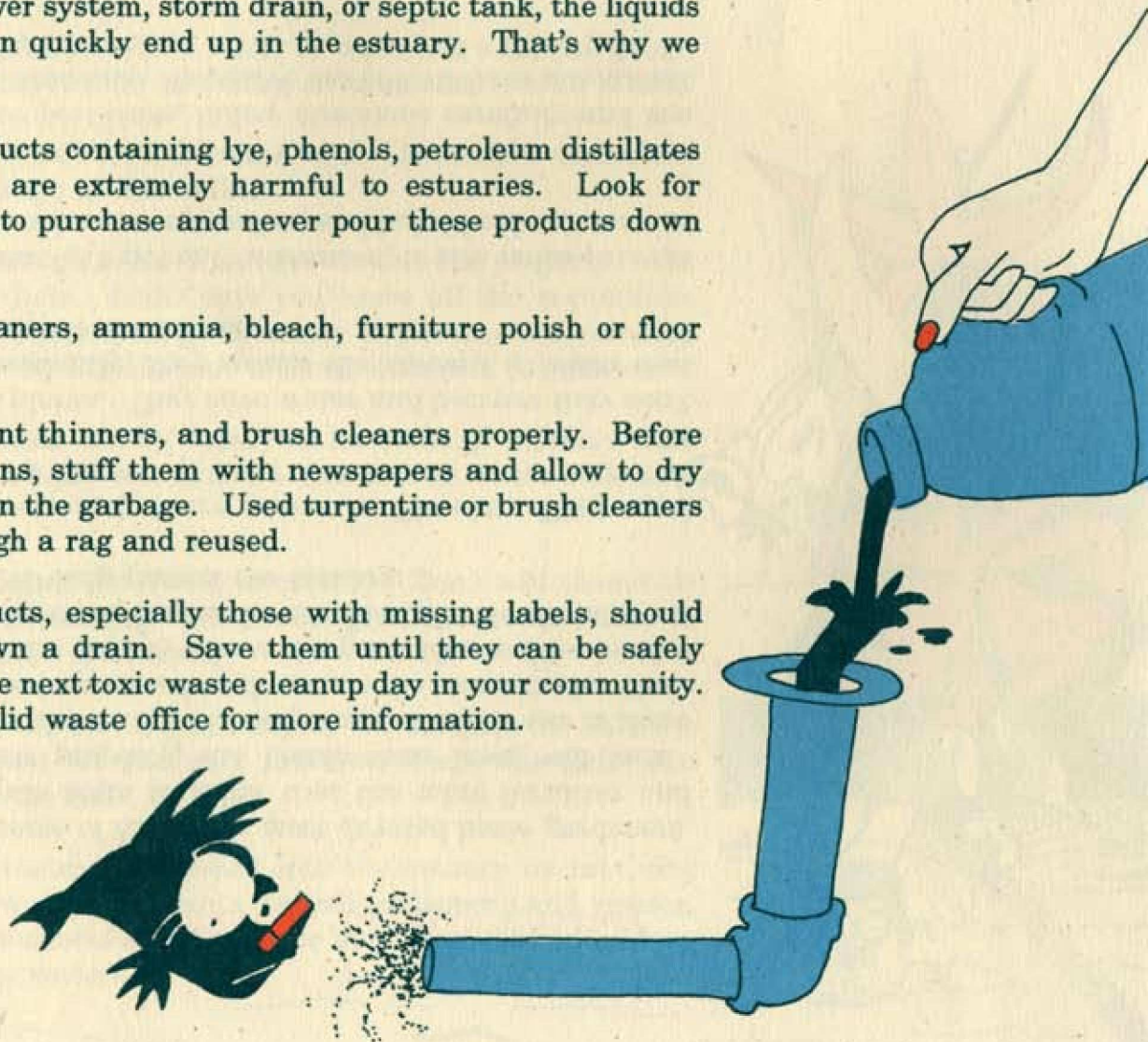
Fortunately, it's not hard to be a good neighbor to an estuary. And the best place to start protecting the estuary is in your own home. The next few pages explain how to do it:



## 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 can quickly end up in the estuary. 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 these products down the drain.
- Never pour oven cleaners, ammonia, bleach, furniture polish or floor wax into a drain.
- Dispose of paint, paint thinners, and brush cleaners properly. Before disposing of paint cans, stuff them with newspapers and allow to dry before putting them 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.







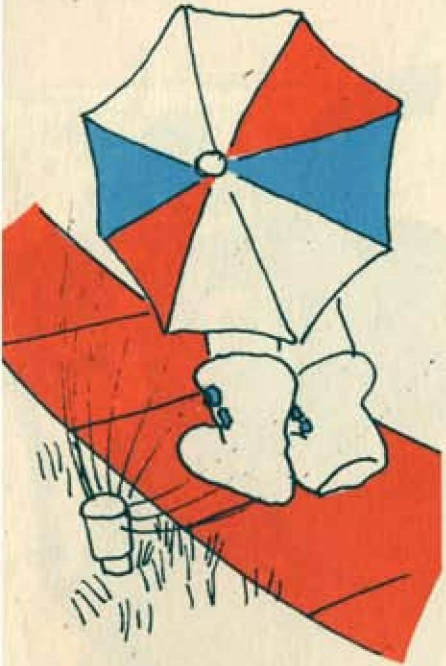
## PRACTICE ESTUARY-SAFE LAWN CARE

Floridians are undoubtedly some of America's most devoted home gardeners. Unfortunately, many residents seem to think that the more fertilizer and pesticide they spray on their property, the better their lawn will look. Nothing could be further from the truth. Not only does excessive use of these chemicals harm your yard, every rain washes them into the storm drain. Once there, it's just a short trip to the estuary where the pesticides and herbicides can combine to create a deadly environment for marine life. Here's how you can have a beautiful yard AND help protect the estuary:

- Choose plants and grasses that are native to Florida. They need minimum amounts of fertilizer.
- Use drought-resistant plants. They save water and because they don't need to be watered frequently, they reduce the amount of water that flows off your lawn and into the estuary.
- Use mulch around plants--it's not only attractive, it also helps prevent runoff from your lawn, reduces evaporation, and helps hold moisture in the soil.
- 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.
- Look for environmentally-safe alternatives to pesticides (contact your local County Extension office for suggestions).



**Don't Be A Back Yard  
Toxic Warrior!**



- Whenever possible, use bricks, gravel or other porous materials when building sidewalks, driveways, 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, save water by installing a rainfall gauge that prevents them from coming on during or immediately after a rain.
- Adjust sprinklers to reduce runoff from the yard. Don't allow sprinklers to put water on driveways or sidewalks.
- If you are fortunate enough to have mangroves on your property, take extra care to protect them. Make sure you know all the regulations about pruning them. Check with your county environmental resource management office or the Department of Environmental Regulation.
- Swimming pool chemicals can be deadly in an estuary. Always take excess chemicals and empty containers to hazardous waste collection centers for disposal.
- Drain your pool only when absolutely necessary. Don't add chemicals for several days before draining--that should 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 over the lawn where the water can safely be absorbed by the soil.
- 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.



## COMBINE CAR 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 crankcase 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. Needless to say, we all need to do more to stop this pollution. Here are some ways to help:

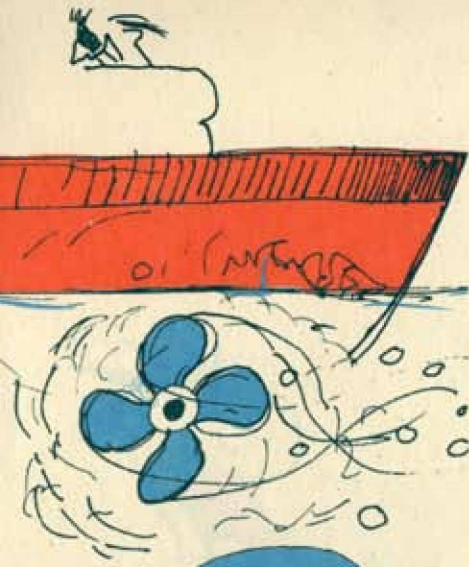
- Be aware of the environmental dangers posed by cars. Motor oil, gasoline, antifreeze, transmission fluids, degreasers, battery acid, waxes and cleaners, radiator flushes, and rust preventatives are just a few of the automotive products that can damage the estuarine environment.
- Collect used oil and antifreeze and take them to a collection center, garage or recycling center. Clean up antifreeze spills quickly. Antifreeze not only is a powerful pollutant, 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. When washing your car, park it on the grass so that harmful chemicals aren't washed down the driveway and into the storm system.



## BE A RESPONSIBLE BOATER

There are more than 715,000 boats registered in Florida. While these boats provide millions of Floridians with an opportunity to enjoy the beauty of the state's estuaries, as well as a way to earn a living from the sea, they also are responsible for damaging these fragile environments. In most cases, this damage is caused accidentally--especially when it comes to fuel spills. But by using a little 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 homes of creatures living in the mud on the estuary's bottom.
- Stay out of seagrass beds. These vital habitats are frequently damaged by boats that run aground in or run through seagrass. If you get stuck in a seagrass bed, shut down the engine and push or pole the boat to deeper water. (Of course, if your boat has an outboard engine you should raise the engine first.)
- 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.



- Please don't dump sewage overboard. Use pump out stations.
- Before discharging bilge water overboard, use paper towels, rags, or other absorbent materials 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 imbedded that detergents are required to get them off. If detergents are necessary, use phosphate-free brands. Some dishwashing detergents work well for simple tasks.
- Remember to stow litter onboard for proper disposal when you return to the dock.
- If you need to scrape or sand the hull, catch the scrapings on a drop cloth and dispose of properly. Never allow paint chips to fall into the water.
- Show you really care about estuaries by taking the Florida Boaters and Angler's Pledge. By taking the pledge, you commit yourself to keeping the Sunshine State's waters free of trash and debris. (You'll also get special recognition for your efforts.) For more details, call: (904) 392-1837.



## BE A CONCERNED ESTUARY VISITOR

Beachcombing, sunset-watching, fishing, clam digging, picnicking, and many other fun-filled activities await visitors to estuaries. In fact, estuaries not only provide human visitors with opportunities for fun, they often serve as sources of inspiration and education. In return, we owe it to our estuaries to do what we can to protect them. Here are some ways we can all help to insure 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 late 1500's, 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.
- 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.
- Be aware of windy conditions that could blow picnic supplies into the estuary. Plastic bags and styrofoam are often eaten by sea turtles and other marine creatures who mistake this debris for jellyfish or other food. The results are usually fatal.



- You'll find lots of colorful and attractive plants growing along estuaries. Please don't pick them. They are essential for wildlife habitat and for holding coastal beaches together.
- Estuarine wildlife can be fascinating, but please don't disturb or feed dolphins, pelicans, birds and other creatures. Feeding wild animals only encourages them to approach people, boats, and highways -- often with fatal results for the wildlife.



## ACTION ALPHABET For Estuary Protection

**A**dopt-A-Shore: Take an active role in protecting a specific area of an estuary's shoreline. Businesses, civic groups--even concerned individuals or families--can adopt part of a shoreline and take responsibility for keeping it clean and protected. For more information, call "Keep Florida Beautiful" at 1-800-828-9338.

**B**uy Boat Oil in Bulk: Always buy oil for your boat in bulk quantities and store it in reusable containers. Not only does this practice save money, it eliminates the use of dozens, if not, hundreds of small, plastic oil containers--containers that often end up as shoreline litter.

**C**lean the Coast on Cleanup Day: Each year, 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 each year. For information on how you can participate in the world's largest volunteer cleanup effort, contact the Center for Marine Conservation at 1-800-262-3567.

**D**on't Bag It! Begun in Pinellas County, the "Don't Bag It!" program provides Floridians with alternatives to bagging and dumping yard debris in the state's overcrowded landfills. This program includes information on reducing the use of chemical fertilizers that can damage estuaries. "Don't Bag It!"--call the Pinellas County Extension Service at (813) 588-8100.

**E**ncourage Sensible Yard Maintenance: The Florida Yard & Neighborhoods Program is specifically designed to reduce the flow of herbicides and pesticides into estuaries. The program shows homeowners the dangers of overuse of chemicals in their yards and provides environmentally-safe alternatives. For details on putting the Florida Yard & Neighborhoods Program to work in your neighborhood, call the Sarasota Bay National Estuary Program at (813) 361-6133 or the Tampa Bay National Estuary Program at (813) 893-2765.





**F**ish for the Future: By releasing the fish you catch today, you can help insure there will always be exciting fishing opportunities in our estuaries tomorrow. For more information on proper catch-and-release techniques, contact the Florida Conservation Foundation at (904) 224-3474.

**G**o Diving for Garbage: Although the garbage along the shoreline is the most noticeable, some of the most damaging debris is hidden beneath the surface of our estuaries. A dive club in Jacksonville, the Scubonauts, has developed an effective program for removing underwater garbage. To find out more, call the Sea Grant Extension agent for northeast Florida at (904) 471-0092.

**H**elp Protect Florida's Manatees: The manatee is one of the most beloved, but endangered creatures found in Florida's estuaries. Please be careful when boating in manatee habitat--go slowly, wear polarized sunglasses so you can see manatees easily, and don't feed them--that only encourages them to approach boats and their lethal propellers. If you see an injured or sick manatee, or see someone harassing manatees, call the Manatee Hotline at 1-800-342-1821.

**I**nspect Your Yard and Garden: Twice each week, inspect your yard and garden for insect damage. If you find a problem, don't try to solve it by spraying pesticides. Take a sample of the damaged plant or one of the insect culprits to your county Extension Service office. Trained personnel will give you expert (and free) advice on how to effectively solve the problem without damaging the environment.

**J**oin a Group: Help local estuarine protection groups achieve their goals by becoming a member. The names of these groups and announcements of their meeting times and places are frequently published in the newspaper. Don't be shy. Get involved!

**K**eep Motor Oil Out of the Estuary: If you change your car's oil yourself, make sure you dispose of it at an oil recycling center. Handle boat oil properly too. For the location of an oil recycling center near you, call the Department of Environmental Regulation at: 1-800-741-4337.

**L**eave No Trace of Your Estuary Visit: Learn how to use "No Trace" camping and hiking techniques when you visit the estuary. The goal should be to take only photos and leave only footprints behind.

**M**eat the Marine Gang: Sally Shrimp, Daisy Dolphin, and Captain Noah are just a few of the members of the Marine Gang who explain life in the estuary to elementary school children. The Marine Gang was developed by the Marine Information Network and provides a colorful and educational look at estuaries presented by costumed characters. The Marine Gang resides at the Museum of Science and Industry in Tampa. For more information, call (813) 985-4700 or 1-800-444-MOSI.

**N**otify Authorities!: There are numerous laws in place to help protect our estuaries. Unfortunately, there aren't enough law enforcement personnel to keep up with the violations. You can help by reporting violations of boating or fishing regulations to the Florida Marine Patrol at 1-800-DIAL-FMP. The Game and Fresh Water Fish Commission can arrest persons who pollute the estuary or conduct illegal dredging operations. Report violations by calling 1-800-342-8105.

**O**rganize a Kids' Fishing Tournament: A fishing tournament for kids is an ideal way to introduce young people to the wonders of the estuarine environment. For information on how to organize a tournament, including sponsorships, contact the Sea Grant Extension Agent in Largo at (813) 588-8100.

**P**ledge Your Support: Taking the Florida Boaters and Angler's Pledge is a great way to show your support for keeping marine debris out of the estuary. In addition, by taking the pledge, you'll be kept informed on important issues regarding your estuary. For more information, contact the Florida Sea Grant Extension Program at (904) 392-1837.

**Q**uestion Decisions: Nearly every week, public policy decisions are made that have an impact on the quality of the estuary. Attend public hearings, make sure you have all the facts, and make your opinion known. If you don't understand the rationale for a decision, ask questions. In many cases, your questions can help public officials clarify their thinking on key environmental issues.

**R**ead the Label: Many of the household products we use every day can be extremely harmful to the estuary. Become familiar with the names of toxic substances and carefully read the contents label before deciding whether or not to purchase or use a product. For more information, contact your county's solid waste management office.



**S**tencil Stormdrains: Volunteers from neighborhood associations and schools recently stenciled messages next to storm drains to remind Manatee and Sarasota County residents that "Dumping Here Pollutes the Bay." To get a "starter kit" for putting this effective program to work in your community, call the Center for Marine Conservation's Virginia Office at (804) 851-6734 and ask about "A Million Points of Blight."

**T**ake A Walk: Schedule a weekly walk along a specific section of the estuary's shoreline. Take note of problems or potential problems and report them to the appropriate authorities. Become an expert on your part of the estuary.

**U**nderstand the Estuary: Many museums, National Estuary Programs, and Water Management Districts have special exhibits and seminars focusing on estuaries. One of the best exhibits is at the National Estuarine Research Reserve in Apalachicola. For information, call (904) 653-8063. The Rookery Bay National Estuarine Research Reserve in Naples also has useful information available, including the Citizen's guide, "Keep It Clean." Call them at (813) 775-8845.

**V**olunteer!: Many of the National Estuary Programs, Water Management Districts, and

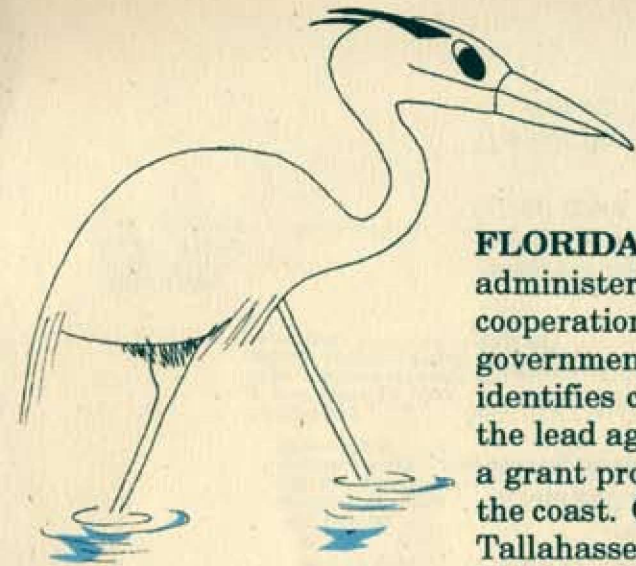
conservation organizations have active volunteer programs devoted to estuary care. Become a volunteer and help improve your local estuary.

**W**rite A Letter: One of the most effective tools for getting attention and support for protecting an estuary is a personal letter to responsible government officials. Learn the techniques for effective letter writing and use them to draw attention to estuarine problems.

**X**eriscape Your Lawn: By using xeriscaping techniques, homeowners can have attractive lawns that require less water, fertilizer, and pesticides than traditional landscaping. All of Florida's Water Management Districts have programs to help residents xeriscape.

**Y**ield Not To Temptation: Protecting the estuary requires a constant commitment. When it comes to proper garbage disposal, you may be tempted to "forget" just once in awhile--but the results can leave a lasting mark on the estuary.

**Z**ero In on a Problem: Identify a specific estuarine problem that you feel you can help solve and then devote your efforts to finding a solution. Gather the facts, organize support, recruit volunteers, write letters, circulate petitions...do whatever it takes to improve the estuary.

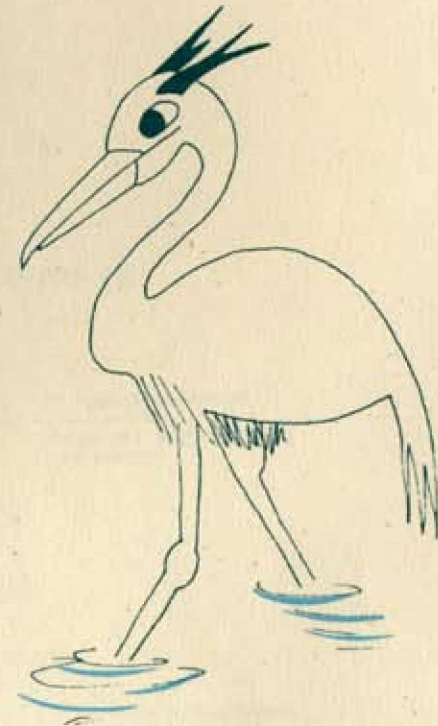


## FOR MORE INFORMATION:

**FLORIDA DEPARTMENT OF COMMUNITY AFFAIRS:** Responsible for administering the state's Coastal Management Program. Working in cooperation with a Citizen Advisory Committee, as well as with local governments and nonprofit organizations, the Coastal Management Program identifies critical coastal issues and seeks efficient ways to resolve them. As the lead agency for this effort, the Department of Community Affairs oversees a grant program that allocates federal funds to recipients working to improve the coast. Contact: Department of Community Affairs, 2740 Centerview Drive, Tallahassee, FL 32399-2100. Phone: (904) 922-5438.

**NATIONAL ESTUARY PROGRAMS AND ESTUARINE RESEARCH RESERVES:** Sponsored by the federal government, National Estuary Programs bring together federal, state, and local government environmental agencies to solve specific problems related to individual estuaries. They develop management plans, as well as publications and other educational materials, to insure the future health of estuaries. The National Estuarine Research Reserves use research, monitoring, and education to help protect the natural resources of specific estuaries. They also have publications available. To contact these programs, see the listing on the last page.

**FLORIDA SEA GRANT:** Sea Grant is the State University System's program for coastal research, education, and extension activities. Florida Sea Grant Extension Agents take the results of scientific research directly to people who can use the information to solve local coastal problems. Sea Grant has a wide variety of educational materials available to the public. Contact your local Sea Grant agent (see list on last page) or write to: Florida Sea Grant, University of Florida, Box 110409, Gainesville, FL 32611.



**WATER MANAGEMENT DISTRICTS:** All Florida residents and visitors are affected by the various activities of these five districts. Each has an environmental education program, produces publications, and works to maintain water quality and quantity in both freshwater and estuaries. Contacts are listed on the next page.

**FLORIDA MARINE PATROL:** Serves as Florida's primary agency for enforcement of regulations designed to protect life in the estuaries. Can provide information on resource and safety regulations. Contact your local district office listed on the next page.

### **ADDITIONAL READING:**

Many of the agencies and organizations listed in this booklet provide publications, videos, and other types of educational materials. In addition, the following publications are excellent sources of information about Florida's estuaries.

"A Fragile Balance: A Look at America's Most Diverse Estuary System," brochure available from the Indian River Lagoon National Estuary Program, 1900 S. Harbor City Boulevard, Suite 109, Melbourne, FL 32901.

"Bay Repair Kit," by Ruth Folit, Sarasota Bay National Estuary Program, 1550 Ken Thompson Parkway, Sarasota, FL 34236.

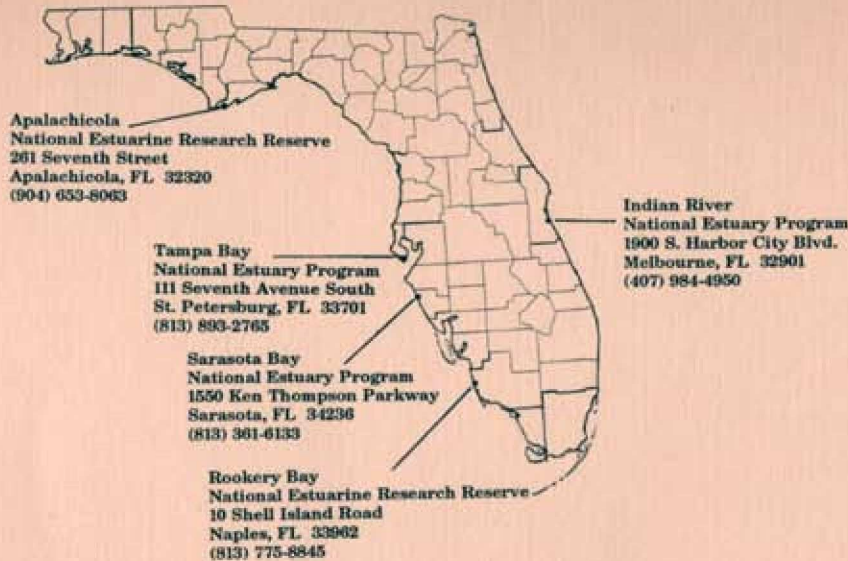
"Estuaries," a brochure available from the Florida Department of Natural Resources, Florida Marine Research Institute, 100 Eighth Avenue S.E., St. Petersburg, FL 33701-5095.

"Florida Aquatic Habitat and Fishery Resources," edited by William Seaman, Jr., Florida Chapter of the American Fisheries Society, P.O. Box 1903, Eustis, FL 32727-1903, 546 pages, \$15.00.

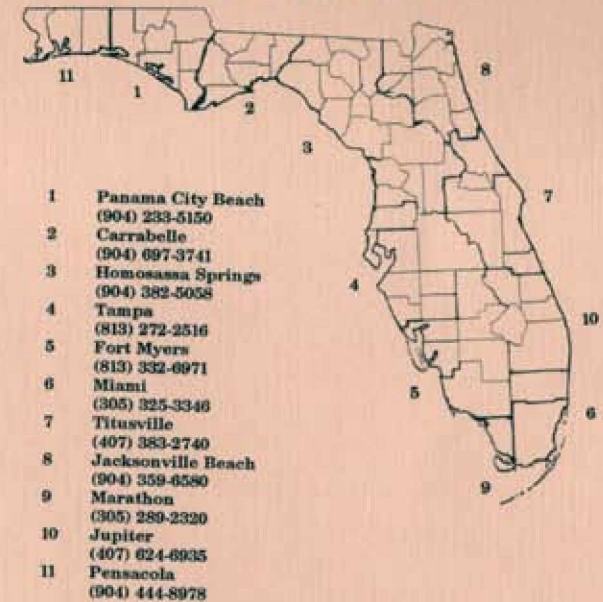
"Keep It Clean: A Citizen's Guide to Protecting Our Estuary," by Carla Kappmeyer, Rookery Bay National Estuarine Research Reserve, Florida Department of Natural Resources, 10 Shell Island Road, Naples, FL 33962.

"Tampa Bay Repair Kit," Tampa Bay National Estuary Program, 111 7th Avenue South, St. Petersburg, FL 33701.

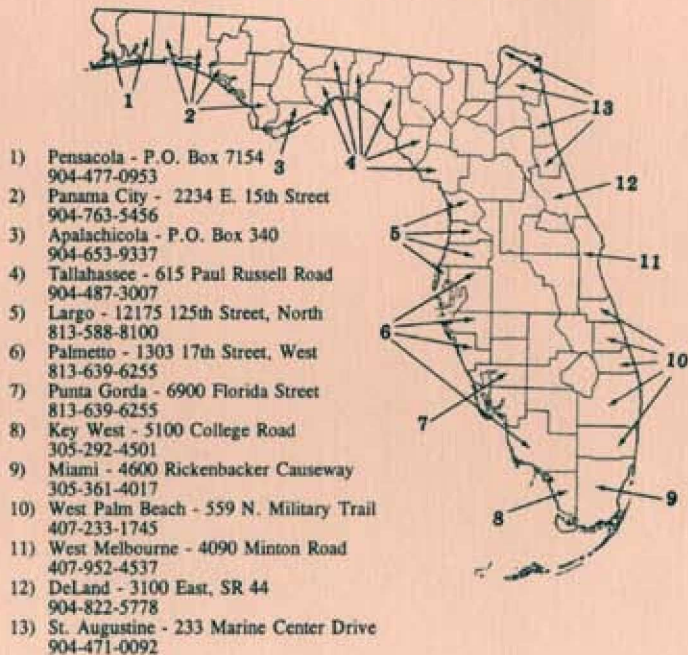
**FLORIDA'S NATIONAL ESTUARY PROGRAMS  
AND NATIONAL ESTUARINE RESEARCH RESERVES**



**FLORIDA MARINE PATROL  
DISTRICT OFFICES**



**FLORIDA SEA GRANT  
MARINE EXTENSION AGENTS**



**FLORIDA'S WATER MANAGEMENT DISTRICTS**



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