



Estuaries and Your Coastal Watershed

Estuaries are an important component of the complex and dynamic coastal watershed. The economy of many coastal areas relies on the natural beauty and bounty of estuaries. When those natural resources are imperiled, so are the livelihoods of the many people who live and work along the coast. As our population grows, the demands imposed on our natural resources increase and protecting these resources for all their natural, economic, and aesthetic values becomes even more important.

What Is an Estuary and What Does It Do?

An estuary is a partially enclosed body of water formed where freshwater from rivers, streams, and groundwater flows to the ocean, mixing with the salty seawater. Although influenced by the winds and tides, estuaries are protected from the full force of ocean waves, winds, and storms by the reefs, barrier islands, or fingers of land, mud, or sand that define an estuary's seaward boundary.

Estuaries come in all shapes and sizes and go by many different names. They are often known as bays, lagoons, harbors, inlets, or sounds. Whatever the name or type, estuaries provide valuable functions.

- They are critical to the survival of tens of thousands of birds, mammals, fish, and other wildlife. Many different habitat types are found in and around estuaries, including shallow open waters, freshwater and salt marshes, sandy beaches, mud and sand flats, rocky shores, oyster reefs, mangrove forests, river deltas, tidal pools, sea grass beds, and wooded swamps.
- The wetlands bordering many estuaries perform valuable functions including water quality and flood protection and water storage. Many upland areas drain to fresh and salt marshes, which act as filters, removing pollution from runoff. Wetland plants and soils also act as a natural buffer between the land and the ocean, absorbing floodwaters and dissipating storm surges. Salt marsh grasses, mangrove trees, and other estuarine plants also prevent erosion and stabilize the shoreline.
- They are a source of recreation, education, and aesthetic value. Boating, fishing, swimming, windsurfing, and bird-watching are just a few of the many activities people enjoy in estuaries.
- Estuaries have important commercial value. They serve as nursery grounds for two-thirds of the nation's commercial fish and shellfish. Estuaries are also home to ports and marinas that support shipping and other industrial activities.

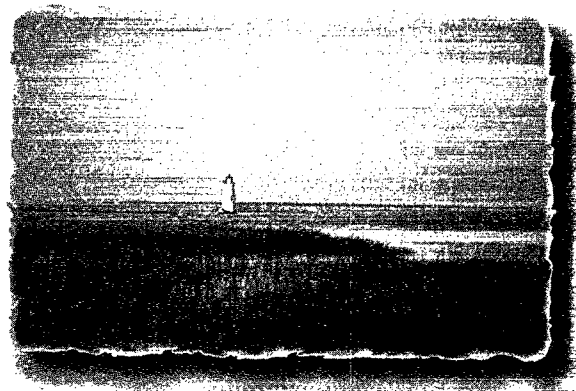
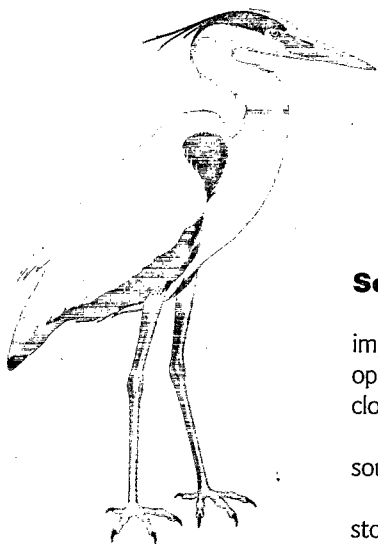
Some Impacts on Estuaries

Pollution of coastal watersheds poses a threat to our nation's estuaries. Some typical impacts on estuarine systems include loss of habitat due to development, loss of recreational opportunities due to poor water quality, and loss of economic resources due to shellfish bed closures and a reduction in fisheries.

People can adversely affect estuaries. Stresses caused by the overuse of estuarine resources have resulted in reduction in fisheries, loss of habitat and wildlife, and fish kills.

Excessive *nutrients* from sources such as failing septic tanks, sewage treatment plants, storm water runoff, atmospheric deposition, industrial organic waste discharge, and contaminated runoff from fertilized farms or yards or from animal operations can adversely affect estuarine systems. Excessive nutrients in estuaries can result in accelerated eutrophica-

A watershed is an area in which water, sediments, and dissolved material drain to a common outlet, such as a river, lake, bay or ocean.



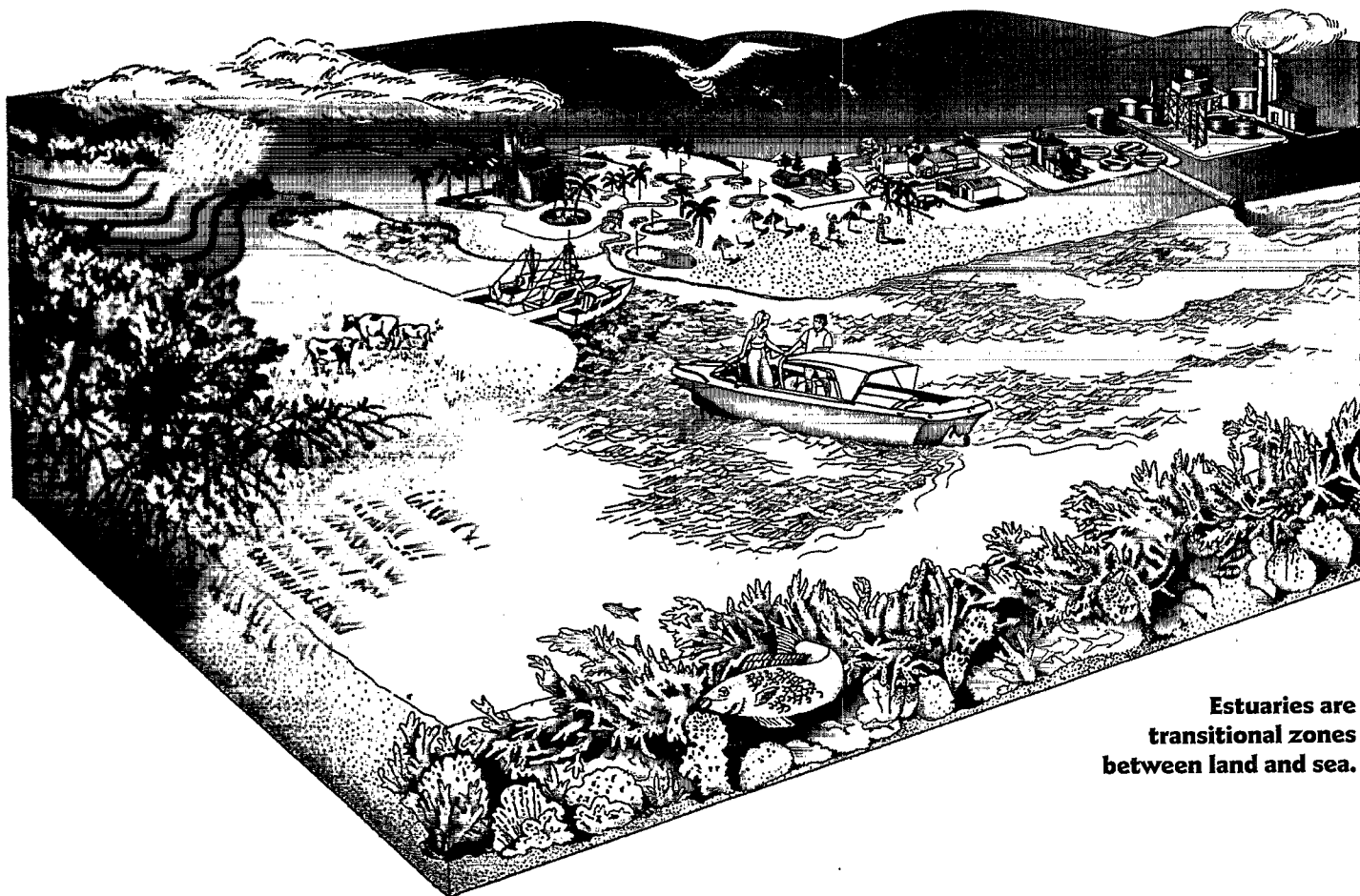
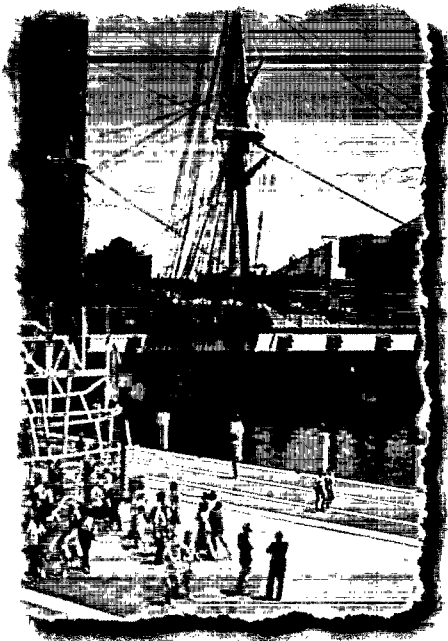
tion and algal blooms. As the algae die, they decay and rob the water of oxygen. The algae also prevent sunlight from penetrating the water. Fish and shellfish are deprived of oxygen, and underwater sea grasses are deprived of light and can die. Animals that depend on sea grasses for food or shelter leave the area or die. In addition, the excessive algae growth can result in brown and red tides and other harmful blooms, such as *Pfiesteria piscicida*, which have been linked to fish kills. Increased algae can also cause foul odors and decrease aesthetic value.

Pathogens are disease-causing microorganisms such as viruses, bacteria, and parasites and can be a result of inadequately treated sewage released into estuaries by faulty or leaky septic systems and sewage treatment plants, runoff from urban areas and animal operations, medical waste, boat and marina waste, combined sewer overflows, and waste from pets and wildlife. They can pose a health threat to swimmers, divers, and seafood consumers. Fish and shellfish concentrate pathogens in their tissues and can cause illness in people consuming them.

Habitat alteration such as the filling of marshes and tidal flats, and reconstruction of shorelines to accommodate the needs of development, transportation, and agriculture, can degrade estuaries. Wetland loss and degradation have limited the amount of habitat available to support healthy populations of wildlife and marine organisms. The clearing of land to obtain timber, the construction of homes and roads, and other development projects completed without properly revegetating the area can lead to excessive *sediments* being washed into the estuarine environment.

These sediments muddy the water, preventing sunlight from reaching aquatic vegetation and making the water unappealing to swimmers. Sediments can also carry excess nutrients, pesticides, and toxic substances, causing additional water quality problems.

Estuaries are vulnerable to the introduction of a wide variety of *toxic substances*. Metals, such as mercury, polycyclic aromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs), and pesticides can concentrate in the water, sediment, and local aquatic animals. These substances enter waterways through storm drains; industrial discharges; runoff from lawns, streets, and farmlands; discharges from sewage treatment plants; and atmospheric deposi-



Estuaries are transitional zones between land and sea.

Approximately half of the U.S. population, or 125 million Americans, live in coastal areas, including the shores of estuaries.

tion. Bottom-dwelling organisms like shellfish are exposed to these chemicals and can pose a risk to human health if consumed. Wildlife and aquatic plants and animals can also be harmed through the consumption of contaminated fish and water.

Intentional or accidental introduction of *invasive species* can often result in unexpected ecological, economic, and social impacts on the estuarine environment. Through predation and competition, introduced species have contributed to the loss of some native populations and the drastic reduction of others. Overpopulation of some introduced herbivorous species has resulted in overgrazing of wetland vegetation and degradation and loss of marsh habitat. Other impacts include increased erosion and interference with sport and commercial fishing and beach use.

Marine debris enters an estuary by washing in from storm sewers and with the tide. Marine debris is one of the more widespread pollution problems threatening estuarine and coastal systems. Debris comes from many sources, including improper disposal of trash on land, storm water runoff and combined sewer overflows to rivers and streams, ships and other vessels, and offshore oil and gas platforms. Once litter gets into the estuarine environment, it seriously affects wildlife, the environment, humans, and our economy. Coastal communities lose considerable income when littered beaches must be closed or cleaned up.



What Is EPA Doing to Protect Estuaries?

National Estuary Program—The National Estuary Program (NEP) was designed to restore and protect America's nationally significant estuaries. Through its approach of inclusive, community-based planning and action on the watershed level, the NEP is an important initiative in conserving our estuarine resources and an effective model for the protection and management of other coastal areas. The program focuses not only on improving water quality in an estuary, but also on maintaining the integrity of the whole system—its chemical, physical, and biological properties,

as well as its economic, recreational, and aesthetic values. The NEP is designed so local communities can work together to manage their own estuaries. Each NEP is advised by committees made up of representatives from federal, state, and local government agencies responsible for managing the estuary's resources, as well as members of the community. These stakeholders work together to identify problems in the estuary, develop specific actions to address those problems, and create a formal management plan to restore and protect the estuary. In addition, EPA has been helping NEPs with the assessment of air pollution affecting water quality.

EPA's Watershed Approach—EPA has joined with others to promote the Watershed Approach nationally as a means to further restore and maintain the physical, chemical, and biological quality of our nation's waters. In particular, EPA has been working with federal, state, and tribal governments to tailor activities and services to their local watersheds. The Watershed Approach has three key components:

- Geographic focus—Watersheds are nature's boundaries, draining to surface water bodies including lakes, rivers, estuaries, wetlands, streams, and the surrounding landscape.
- Continuous improvement based on sound science—Sound scientific data, tools, and techniques are critical to inform the process. Actions taken include characterizing priority watershed problems and solutions, developing action plans, and evaluating the plans' effectiveness within the watershed.
- Partnerships/stakeholder involvement—Since watersheds transcend political, social, and economic boundaries, it is important to involve all the affected interests in designing and implementing goals for the watershed. Watershed teams may include representatives from all levels of government, public interest groups, industry, academic institutions, private landowners, concerned citizens, and others.

Through the Watershed Approach, integrated coastal management tools and watershed concepts can be applied in the development of comprehensive management and conservation plans to assess, protect, and restore our nation's estuaries.

Other EPA Programs—EPA's *Coastal Watershed Protection Strategy* specifically targets technical assistance and support to priority coastal watersheds such as NEPs and other coastal waters identified by states. Through an interagency effort, the *Clean Water Action Plan* was

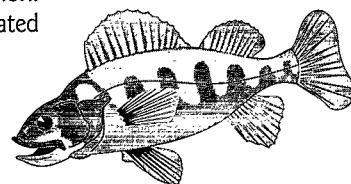


developed to address enhanced protection of public health from threats posed by water pollution, more effective control of polluted runoff, and promotion of water quality protection on a watershed basis. EPA works with coastal states to develop their *Coastal Nonpoint Pollution Control Programs* and with other federal agencies to protect human health and aquatic habitats by reducing marine debris and the discharge of pollutants into estuarine waters.

What Can You Do to Help Protect Estuaries?

Estuaries reflect the overall health of a watershed. Individuals are the most important contributors in the long-term effort to identify and address water quality, pollution, and habitat problems within estuaries. Examine your everyday activities and think about how you might be contributing to the pollution problem. Here are some suggestions on how you can make a difference:

- **Be informed and involved.** Learn about estuarine water quality and habitat issues that affect the community in which you live and work. Become familiar with your local estuarine systems. Visit or contact your nearby National Estuary Program office. Become a citizen volunteer. As a volunteer, you might take ongoing water quality measurements, track the progress of protection and restoration projects, or report on special events such as fish kills and storm damage. You can volunteer to plant trees, to clean up trash, or even to participate in restoration efforts planting sea grasses and shoreline plants.
- **Take responsibility for your own backyard.** Determine whether additional nutrients or pesticides are needed before you apply them, and look for alternatives where fertilizers and pesticides might run off into surface waters and, ultimately, the estuary. Consider selecting plants and grasses with low maintenance requirements. Water your lawn conservatively; the less water you use, the less runoff will eventually find its way into the estuaries. Preserve existing trees and plant new trees and shrubs to help prevent erosion and promote infiltration of water into the soil. Restore bare patches in your lawn to prevent erosion.
- **Practice good housekeeping.** Around the house, keep litter, pet waste, leaves, and grass clippings out of street gutters and storm drains to prevent their entrance into streams that might flow to estuaries. Never dump any household, automotive, or gardening wastes into a storm drain. It might end up in an estuary. Keep your septic system in good working order. Replace any dripping faucets or leaky pipes and install water-saving devices in shower heads and toilets. Always follow label directions for the use and disposal of household chemicals. Take used motor oil, paints, and other hazardous household materials to proper collection sites such as approved service stations or designated landfills.
- **Respect your estuary.** Avoid entering sensitive habitat areas with your boat or other motorized watercraft. Maintain your boat engine to prevent oil and gas leaks. Keep all waste produced during your excursions in a safe place to be disposed of properly when you're back on land. Maintain safe boat speeds to avoid shoreline erosion. Maintain and use your marine sanitation devices properly. Use designated pumpout and dump stations. Maintain your automobile so that oil doesn't leak and the engine is tuned to conserve energy. By reducing your energy consumption, many tons of nitrogen and toxic pollutants can be prevented from entering estuaries through emissions from the exhaust system.



For additional information . . .

Call EPA's Oceans and Coastal Protection Division at (202) 260-1952 or visit EPA's web site at <http://www.epa.gov/OWOW/oceans>.

Visit EPA's "National Estuary Program" web site at <http://www.epa.gov/OWOW/estuaries/nep> for additional information on the National Estuary Program.

