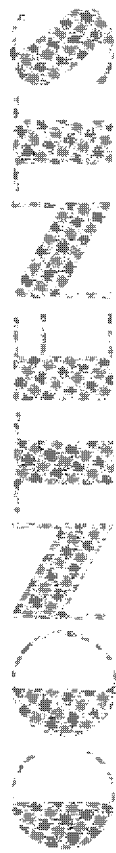


# The Estuarine Zone

.. uses and concerns





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# The Estuarine Zone

## •• uses and concerns

Johnnie H. Crance\*



*Commercial shrimp trawlers unload in Texas ports and make over 61,000 trips annually into estuaries and the Gulf.*

An estuary is that part of the coastal area known as a bay, tideflat, bayou, lagoon or marshland. It might be known locally by still another name. It is an area which usually is surrounded partially by marsh grasses and mud flats and at first glance may appear useless. However, estuaries are one of our most valuable natural resources. They are more productive than our richest cornfields and are used by almost everyone.

A commonly used definition of an estuary is "a . . . coastal body of water . . . within which the seawater is diluted measurably with freshwater." The boundary of an estuary is nebulous because it may change constantly under the influences of tides, runoff, winds and other natural processes. An estuary and its shoreline, bottom, mud flats, salt marshes, edge of the sea, river mouth, plant and animal life, minerals and the air above it comprise the estuarine zone — an appropriate term for these mixing pots of saltwater and freshwater.

Some of the most productive estuarine zones in the United States are located in the Gulf of Mexico from Southwest Florida to the Texas-Mexico border near Brownsville. There are more than 450 miles of coastline and 1,000 miles of estuarine zone shoreline in Texas.

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## Biological Characteristics

An estuarine zone is a living, dynamic complex of interacting phenomena. Tides, wind, rainfall, temperature, currents, animals, plants and nutrients interact and influence the physical, biological and chemical processes which occur there.

The abundant mineral and organic nutrients that are brought in from the sea and runoff are mixed, circulated and distributed to form the basic building blocks for the plants and animals that abound in the estuarine zone. Bacteria, fungi and photosynthetic algae thrive in the nutrient-rich ecosystem and comprise the initial links in the food chains of estuarine animals. These organisms are fed upon by forms of zooplankton, larval forms of shrimp, crabs, fish, mollusks and an array of other immature and mature animals.

Scientists do not understand fully all of the steps and cycles of energy transfer that occur in estuarine zones. But they do know that bacteria, algae, marsh grasses and other higher plants play an important role as energy converters and nutrient sources. Estuarine plants also provide breeding, hatching, resting and protective areas for many forms of aquatic and terrestrial animals. Together, if the system is not overtaxed, the plants and animals that inhabit the estuarine zone convert nutrients into products which are useful to man.

*The Texas shrimping fleet and most of the State's fisheries industry depend upon the availability and harvest of marine animals that utilize estuaries.*



## Uses of Estuarine Zones

Man has looked to the sea for food, travel, adventure and recreation for ages. Our ancestors harvested oysters, shrimp, crabs, lobsters, sea trout, flounder and other succulent seafoods from estuarine waters. These cornucopias of the sea have provided a seemingly inexhaustible supply of food. Our affluent society, with a desire to live near these conveniences, pleasures and products of estuarine zones, and spurred on by an expanding human population and technology, has flocked to the coast to harvest food and find new uses of estuarine zones.

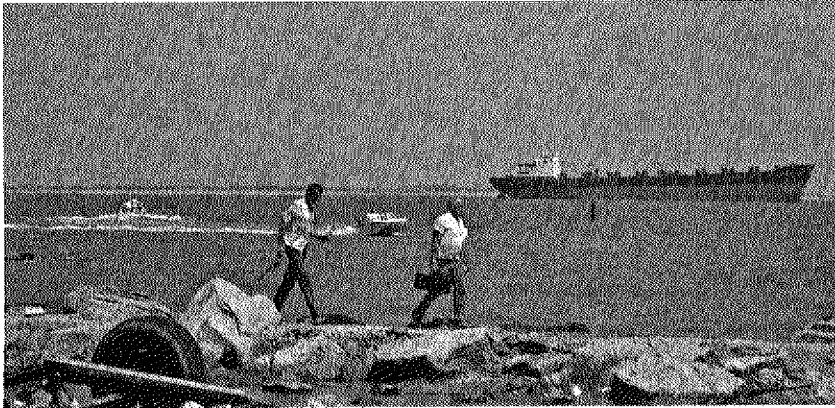
**Marine animals.** Our commercially important species of shrimp and some other marine animals hatch offshore and while in juvenile stages enter estuaries along the Gulf of Mexico to use them as nursery areas. While in estuaries, shrimp grow to "table size" and then return to the Gulf waters. An estimated 95 percent of all fish and shellfish landed by sport and commercial fishermen along the Gulf Coast depend upon the estuarine zone during some period of their life cycle. Some seafood animals such as oysters use estuaries throughout their life cycle.

Seafood animals landed at Texas ports have an annual value of about \$53 million at dockside.

**Waterfowl.** Estuarine zones are nesting, resting and feeding sites for many species of waterfowl. Thousands of hunter days are spent by Texans hunting for ducks, geese and other waterfowl. Gulls, pelicans, roseate spoonbill and other migratory and resident species of birds use estuaries and are enjoyed by bird lovers. The endangered whooping crane winters in a Texas estuarine zone; the muskrat, mink, swamp rabbit, white-tail deer and other game and fur-bearing animals use it also.

**Other creatures and plants.** Crabs, barnacles, jellyfish, sand dollars, seaweeds, sea oats and many other creatures and plants are part of this complex ecosystem. All of the plants and animals in this natural environment add interest, beauty and aesthetic appeal and attract millions of people to the Texas coast each year.

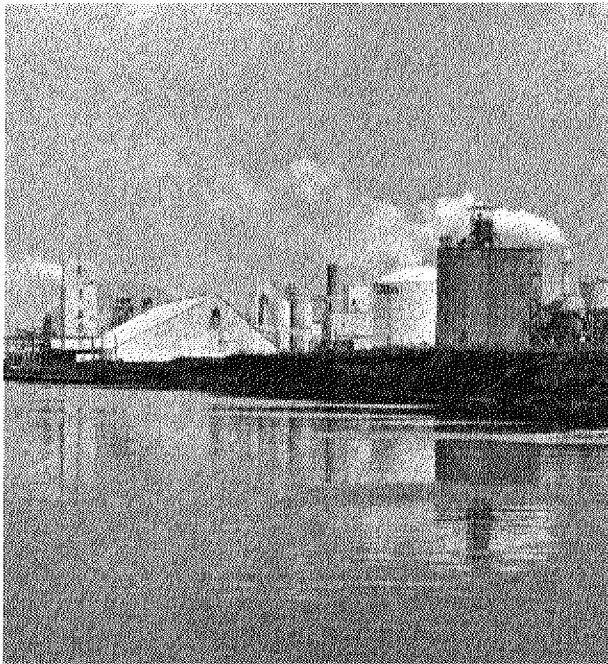
**Recreation.** Many people use this great sports arena for recreation or outdoor activity. Fishermen, hunters, boaters, swimmers, water skiers, surfers, bird watchers, beachcombers, sunbathers and nature lovers flock to the coast. While traveling to their favorite outdoor spot they enjoy motoring along the coastal highways that parallel the shoreline and span the bays and channels. Upon arrival, they have accommodations at motels,



*Top: Some users of estuaries have a minimum impact on other users. Boaters, sport-fishermen and a seagoing vessel are seen in a Texas estuary. Bottom: Estuaries are nursery grounds for shrimp—Texas' most valuable seafood.*



*Beaches and estuary shoreline are favorite outdoor recreation sites for many people. Utility line poles and some other items of commerce reduce the aesthetic appeal of some estuaries.*



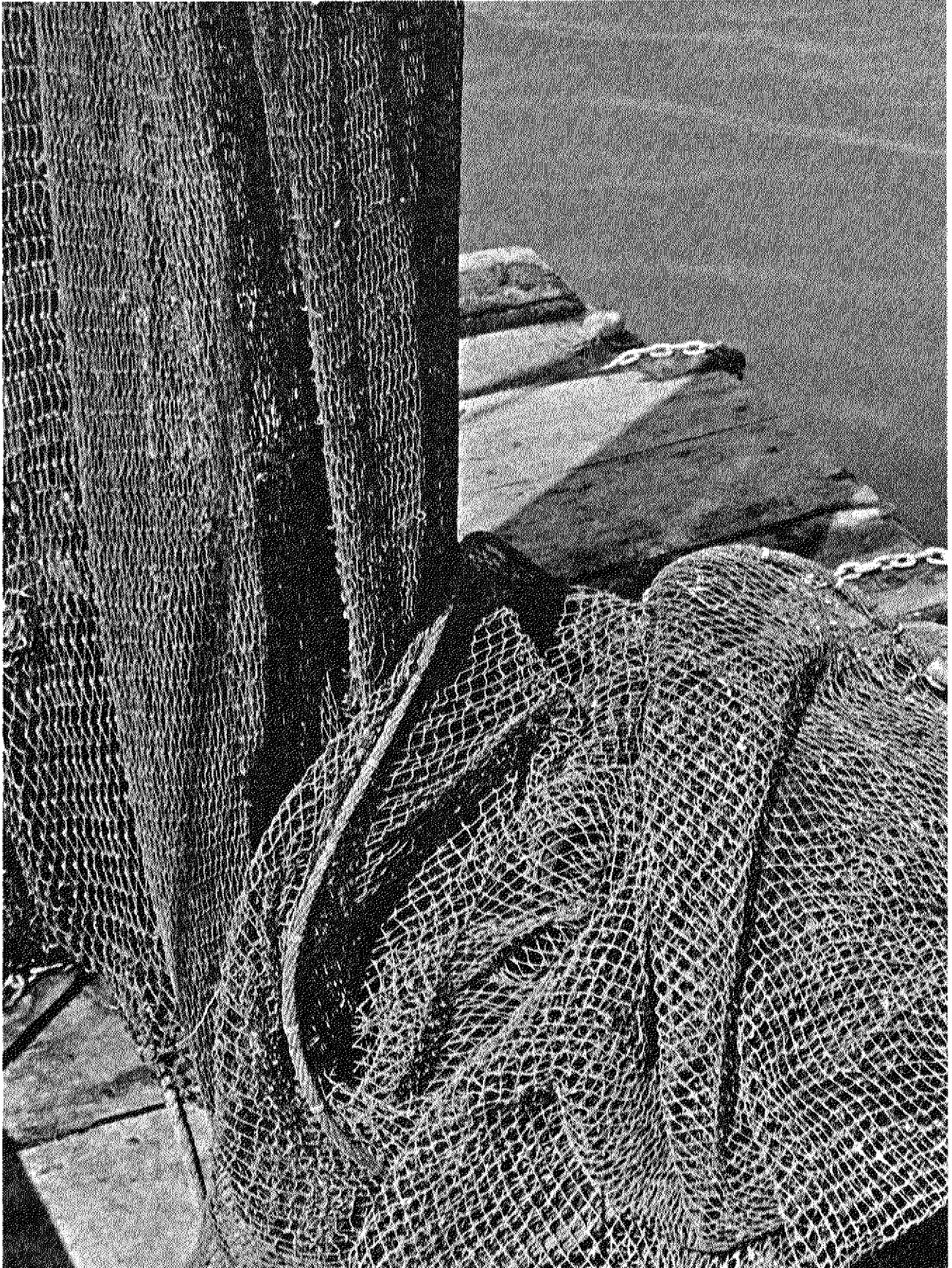
*Many industries have found the land low-priced and access to water and land transportation convenient along estuaries.*

restaurants, service stations, bait shops, marinas and other businesses that cater to visitors along the coast. Thousands of families live in beach cottages or Venetian housing developments that are built on land fills in the estuarine zone. They do not have to travel to their favorite outdoor arena; they live in it.

**Navigation.** This is one of man's oldest uses of estuaries. Channels, harbors, docks and other facilities associated with water transportation and shipping are located in estuarine zones. Navigation is important to our national defense, security and economy. Houston and other great seaports are located in an estuarine zone. Ocean-going ships, barges and pleasure crafts of all sizes travel through Texas estuaries. The loading, unloading, storage and inland transportation facilities required by the shipping industry, and marinas, access sites and other businesses associated with pleasure boats utilize a large amount of estuarine area, involving many people in their operation. Large areas of estuarine zones sometimes are utilized to dump spoil from navigation channels and to construct water transportation facilities.

**Industry.** Estuaries are favorite sites for many industries such as paper mills and chemical plants which locate where abundant water is available for





*An empty net for a day's work. This could be the result if estuaries become unproductive.*



manufacturing processes and disposal of wastes. Fossil fuel and nuclear-operated power plants and desalinization plants locate in estuarine zones and utilize vast amounts of water and estuarine area.

Oil, gas, sand, shell, gravel and other minerals are extracted from bays and estuarine zones. Platforms for drilling, pumping and mining these minerals require space and the bottom of the estuarine zone is used for access and pipeline channels, and for discarding spoil from mining operations and channel building.

**Waste disposal.** Cities, industries and water-

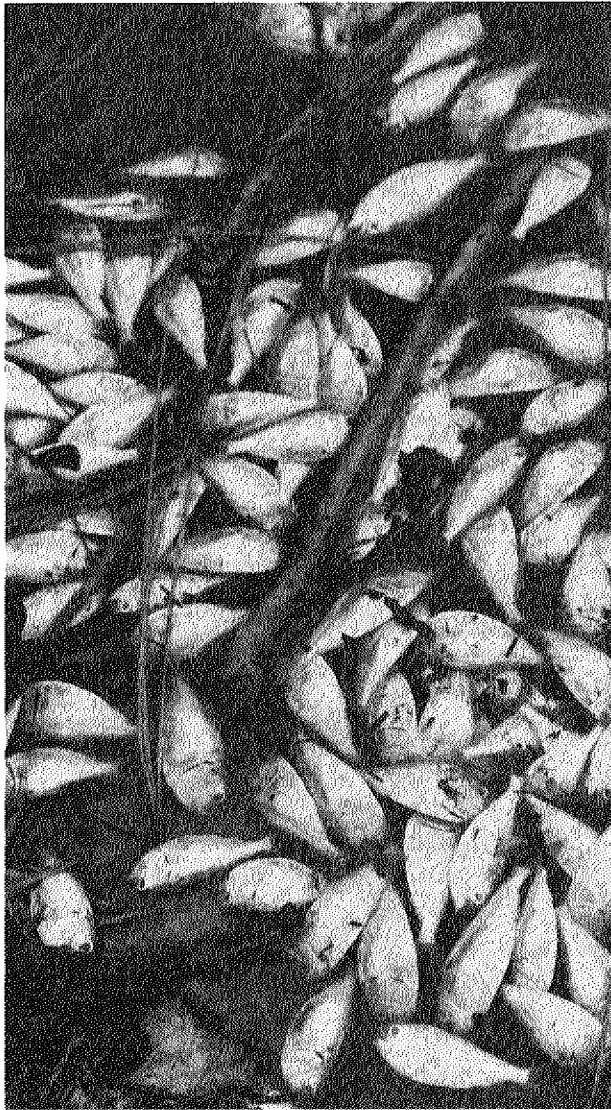
craft find estuarine zones convenient and economical sites to dispose of treated and untreated sewage and wastes. Garbage and solid waste materials are dumped into some estuarine areas to create land fills.

### Problems in Estuarine Zones

Why be concerned about estuarine zones? Scientists, as well as the public, are vitally concerned about them. This concern has resulted from demands for more resources, a need to increase the food supply and the increasing awareness of Americans of a degraded environment. Some uses of the estuarine zone are seemingly incompatible.



*The most irreparable and damaging activity in estuaries by man is the obliteration of estuarine areas by filling.*



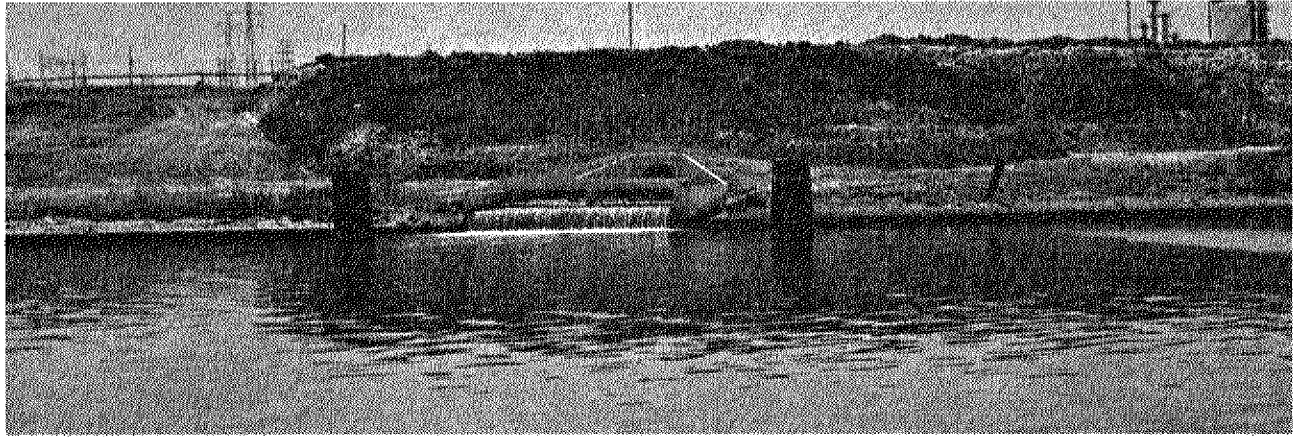
Various Federal, State and private agencies have made numerous studies to determine the present status of estuaries and the need for priorities that should be given to future management and conservation of these areas. One study, completed by the U.S. Department of Interior in 1970, revealed that all of the nation's estuaries (except for a few in Alaska) have been modified by man. Twenty-three percent have been severely modified.

#### Dredging and Filling

The most damaging impact by man has been the obliteration of estuarine areas by filling. From 1950 to 1969, a total of 426,700 acres (5.1 percent of total) of estuarine habitat important to shrimp, fish and other wildlife in the Gulf of Mexico were lost through dredging and filling. During the same period, 68,100 acres (8.2 percent) of Texas' estuarine habitat were lost.

Channels dredged in estuaries or dams constructed on contributory streams may change the salinity, temperature or currents in bays to the extent that valuable estuarine animals cannot flourish or survive. Spoil banks may cause the same results, damage oyster beds and productive bottoms or block the migration of some marine animals.

*Enormous fish kills have occurred in estuaries as a result of pollution.*



*Many waste materials emptied into estuaries are not compatible with healthy populations of fish, shellfish and wildlife.*

## Pollution

Enormous fish kills have occurred in estuaries as a result of excessive pollution. Some bays are overloaded with oxygen-demanding organic wastes and high amounts of heavy metals, pesticides and other materials toxic to marine organisms. Plants and animals in estuaries can assimilate a large portion of man's wastes. But if excessive amounts of nutrients or toxic wastes are added to an estuary or if it is filled, nature cannot handle the problem. The estuary then becomes incapable of converting man's wastes and nutrients into useful products.

Some bays remain closed permanently and others are closed periodically to the harvest of oysters because the water is polluted and the oysters are considered unsafe for human consumption. Some pollutants cause estuarine water to have an offensive odor and unsightly appearance, or render it unsafe for water contact sports. The effects of many pollutants on marine life are unknown. Some compounds accumulate slowly in the water, mud or marine animals and their effects on organisms may go unnoticed for a long time.

The dangers of oil spills from storage tanks,

oil wells and tankers and spills of other chemicals in estuaries are of great concern to scientists and engineers. Safeguards against such dangers are needed.

Power plants in estuarine zones require large areas for plant sites and cooling basins. The discharge of heated water into estuaries may be damaging. Additional studies are needed on the effects of heated effluents upon estuarine organisms and possible uses of thermal discharges to grow fish, shrimp, oysters and other marine animals.

## Our National Heritage

Each use of estuarine zones satisfies a need or desire of someone. Uses and alterations of estuaries that jeopardize the production of fish and wildlife should be carefully controlled to insure future generations the benefits of these renewable resources. Estuarine zones are invaluable and warrant all the attention, concern, study and human ingenuity our affluent society can muster to assure that this natural heritage is utilized and managed in the best interest of Texas and our nation.



*The natural beauty of estuaries is infinite.*

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