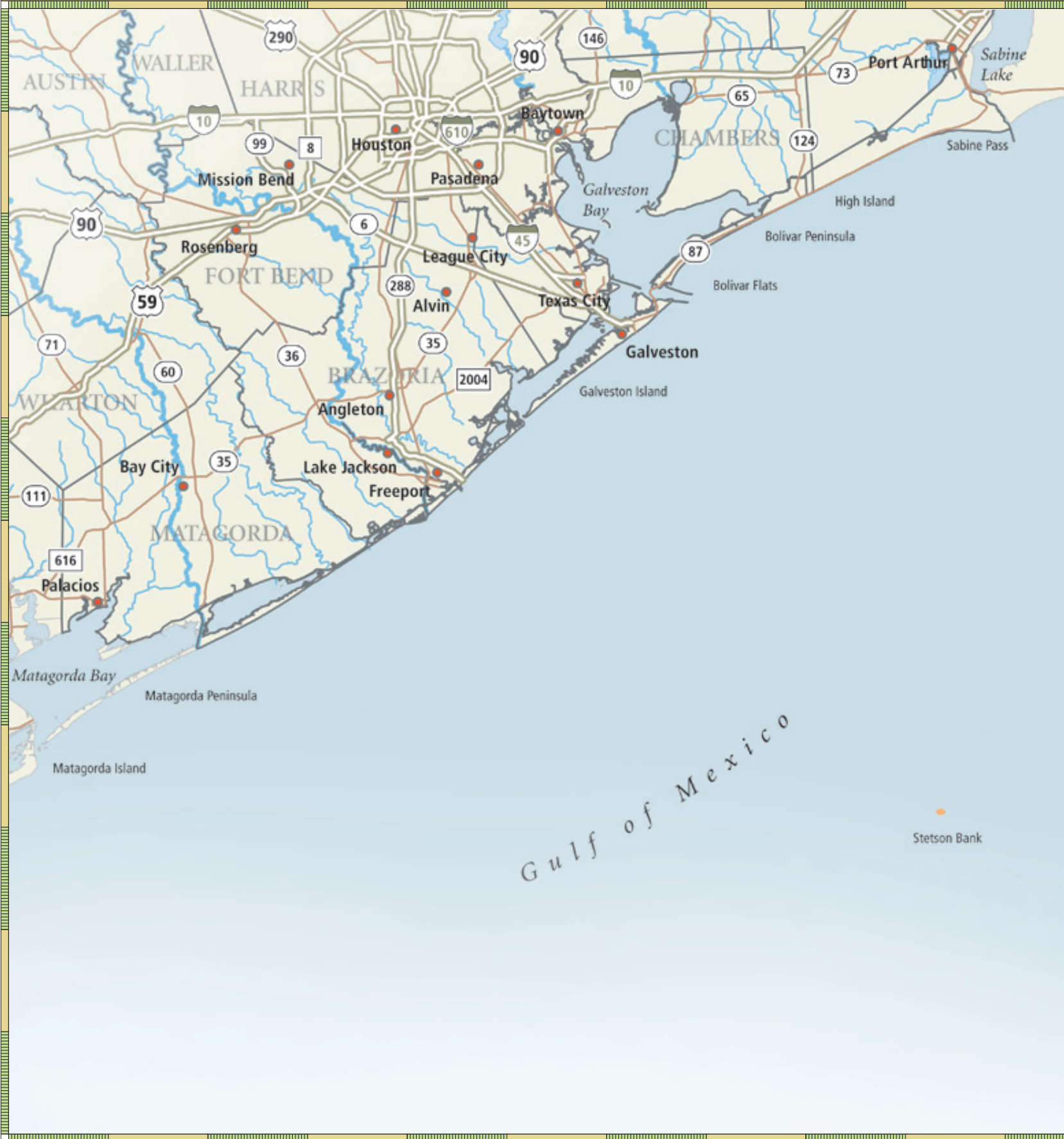
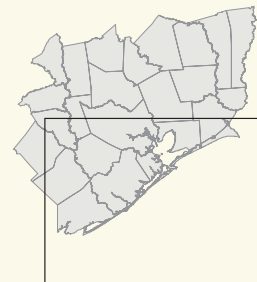


Gulf of Mexico





THE HOUSTON WILDERNESS AREA is bordered on the southeast by the vast ecosystem of the Gulf of Mexico. Most of us come in contact with this ecosystem when we visit our barrier islands and beaches—sandy lands that are formed by the interaction of the Gulf currents, river runoff and the mainland.

The beaches of the upper Texas coast are a mixture of sand and silt, flanked by sand dunes and associated wetlands on the landward side and water on the other side. These beaches are popular swimming, surfing and loafing areas for coastal residents during much of the year. Among our more popular beaches are the Bolivar Peninsula, Galveston Island, Surfside on Follet's Island in Brazoria County, and Matagorda at the mouth of the Colorado River.





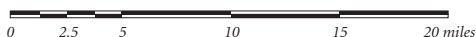
A newly hatched Kemp's Ridley sea turtle makes its way toward the gulf waters.

When we come to the beach to play, few of us realize that we are entering an ecosystem that connects the Texas coast to Florida and Mexico, the Caribbean Sea and the Atlantic Ocean. Except at the edges, humans are not part of this system unless they have an artificial support system such as a boat or an offshore oil rig. This is an ecosystem of marine mammals and deepwater fishes, of whales and dolphins and sharks and red snapper and the millions of smaller fish upon which they feed.

THE FLOWER GARDEN

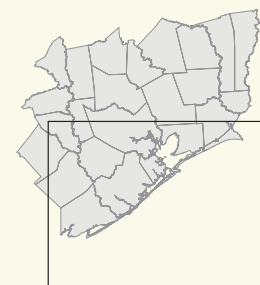


	Gulf of Mexico
	State Parks, WMA's and National Wildlife Refuges





<i>Species of the beaches and gulf waters from top left to right: Common nighthawk,</i>	<i>macrocarpa, grows on beach dunes, helping to stabilize and enlarge the dune. Larger dunes help protect the land and homes behind the dune from storm surge and slow down the effects of erosion.</i>
<i>Chordeiles minor; Bottlenose dolphin, Tursiops truncatus;</i>	
<i>Great egret, Ardea alba.</i>	
<i>Evening primrose, Oenothera</i>	



The waves roll in across the Gulf, pushed by the predominant southeast winds, in toward the beach. Each wave spends itself against gravity as it pushes up the inclining beach slope, leaving fluffy white foam at the uppermost edge. Here the shorebirds feed, dashing down with the retreating wave, running back as the next comes in, plucking tiny morsels from the sand and foam.

As you walk into the surf, the water gets deeper, covering your ankles and then your knees. If you look carefully, you may see small fish and possibly a crab in the shallow trough. If you reach down and pull up a handful of sand, you may find any number of small shells that are home to organisms living in the benthic zone—the bottom beneath the water. Often the beach is filled with larger shells that are washed in after a storm, usually after the organism living inside has died.

As you walk further into the surf, you encounter a shallower zone, a sand bar that is marked by breaking waves. As you walk off the other side of the sand bar, the water quickly becomes much deeper, coming up to your waist or even higher. You are startled by a jumping mullet, a common smaller fish that is the food of many larger fish species, a reminder that you are within a living system.

Ahead, the white foam from the larger breakers on the next sand bar are clearly visible, a place of high energy and turbulent water. It is here that you can body-surf by thrusting your body in a prone position before an oncoming wave, letting the force of the breaking wave carry you forward on a thrilling ride.

Like the beach itself, the sand bars are shaped by the physical forces of water meeting land. Five thousand years ago the Gulf of Mexico was several hundred feet lower in elevation, meaning that water met land more than one hundred miles farther out than today. As sea level rose with the retreat of the glaciers, sediment flowing from the rivers and

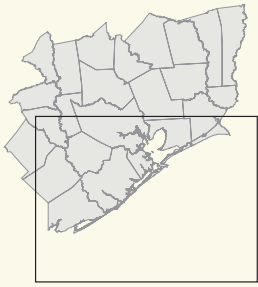
sand deposits resuspended by the rising water were deposited where water and land met. In this manner, the barrier islands and sand bars were formed.

Another factor involved in the formation of the beach and bars is the longshore drift. If you play in the waves for a while, you may notice that you have moved southward over time, particularly if you are on a raft or some type of float. This movement to the south is due to the longshore drift, a current that always moves from the upper Texas coast southward toward Padre Island, where it meets a current coming from the opposite direction. This is simply a physical fact of the Gulf on the upper Texas coast.

The longshore drift has helped form one of the best birdwatching places in the world on our upper Texas coast—the Bolivar Flats. When the Houston Ship Channel was deepened to allow large ships to come into Galveston Bay, rock barriers called jetties were built on either side of the deep channel cutting into the Gulf of Mexico to prevent the channel from being filled with silt. The north jetty—the one on the Bolivar Peninsula—traps tremendous amounts of silt that is moving from north to south with the longshore current. In this manner, a large area has been transformed to fabulous habitat for all types of wading and fish-eating birds.

On a typical outing to the Bolivar Flats one can see thousands, if not hundreds of thousands, of birds. There may be avocets—medium-sized wading birds with an upturned bill, a black and white body, and a light-brown head—or the black and white stilt with its long pink legs. A raft of white pelicans may be floating or fishing together. Reddish egrets can be seen fishing with their wings spread, dancing across the flats next to hundreds of small waders—dowitchers and sanderlings and plovers—huddled together on the exposed sand.

Birdwatchers come from across the world to see the Bolivar Flats, an area that has been preserved by the Houston Audubon Society. This is one of



Species of the Flower Garden Banks include from left to right: Queen parrotfish, Scarus vetula; Jackknife fish, Equetus lanceolatus; Atlantic Deer cowrie, Cypraea cervus; branching fire coral, Millepora alcicornis, with orange elephant ear sponge, Agelas clathrodes and brown chromis, Chromis multilineata.

the most accessible areas to see a great variety of shorebirds and waders, as well as various ducks. The flats are just a short ferry ride from the city of Galveston and can easily be visited in an afternoon from most of the Houston Wilderness area.

The barrier islands and beaches that form the landward side of the Gulf are unique sand systems. These are active geological areas that can be changed quickly by tropical storms and hurricanes coming in from the Gulf. And make no mistake about it—the Gulf is a weather maker as well as an ecosystem. In the summer, all residents of the upper Texas coast keep their eyes on the weather maps, hoping that the next tropical storm or hurricane will not come ashore here.

Over the years, these sandy barrier islands have been hit hard by storms, with the proof being any number of deep channels cut into the landward side of these barrier islands. These channels are now fringed with marshes and provide excellent habitat on the bay side of the islands, places full of juvenile shrimp and fish-eating birds. However, they were formed—literally blown open—by the force of the storms coming in from the Gulf.

On a barrier island there is a normal progression of landforms, from the sandy beach to the wispy, vegetation-covered sand dunes, to freshwater wetlands lacing the prairies behind the dunes, and brackish and salt marsh lining the bay side of the island. Some of the best birdwatching on the coast can be found on Stewart Road, a back road leading from the city of Galveston to the west end of the island and San Luis Pass, the natural connection between West Bay and Christmas Bay and the Gulf of Mexico.

The Gulf is an important natural system that is connected to our bays and is also connected to the Caribbean Sea and the Atlantic Ocean. The Gulf is the ninth-largest water body in the world with some 3,400 miles of shoreline and covering

approximately 940,000 square miles (1.5 million square kilometers). The continental slope provides a shallow shelf off the upper Texas coast, requiring a trip of more than sixty miles offshore to find water more than a hundred feet deep. Farther out, the deepest waters of the Gulf extend deeper than 9,000 feet.

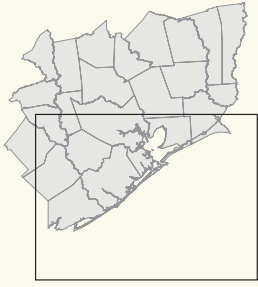
The fisheries are fantastic, with over 1.7 billion pounds of fish and shellfish brought ashore in the five states bordering the Gulf. Biologists have counted more than three hundred species of fish off the Texas shore. There are deep-sea marine mammals such as the pantropical spotted dolphin, sperm whales, the dwarf or pygmy sperm whale, Risso's dolphin, bottlenose dolphin and rough-toothed dolphin. Of these, only the bottlenose dolphin can be commonly seen close to land.

The Gulf is a water ecosystem full of living organisms. In the nearshore area are smaller fish and game fish such as speckled trout and red drum and croaker, a fact revealed by the groups of fishermen wading in the surf and standing on the wooden Gulf fishing piers. When clear water moves in from offshore, pelagic fish species like Spanish and king mackerel move in toward the beach. Schools of tarpon range within sight of the beach during the summer, as do a wide variety of sharks that basically are uninterested in humans.

Both brown and white shrimp use the estuaries as nurseries and migrate to the Gulf when they mature. In the Gulf, these shrimp breed, lay their eggs, and then die, usually at an age of only fifteen months or so. Often during the summer and fall, shrimp boats can be seen pulling their nets near the beach, trying to catch the shrimp that are moving further out in the Gulf to breed. Shrimping is highly regulated and controversial, yet it is part of our coastal heritage.

One of the most important fishery management issues in the Gulf of Mexico involves management





*Bottom right: Endangered Least terns, *Sterna antillarum*, use the Gulf beaches as breeding grounds and spend 2-3 weeks in a noisy courtship that usually includes a “fish flight” - an aerial display involving aerobatics and pursuit, ending in a fish transfer on the ground between two displaying birds.*

of the red snapper. Red snapper live in the deeper water on the continental shelf and are valued for their tasty white meat. They live in large schools and can be overfished with modern commercial as well as recreational fishing techniques and technology. Young red snapper can also be caught in shrimp nets and killed as “bycatch” of the shrimping process, as can sea turtles.

As a result of these potential impacts, fisheries in the Gulf are managed extensively. The red snapper catch—both commercial and recreational—is controlled by the Gulf of Mexico Fishery Management Council, whereas the potential impacts to turtles are controlled under the U.S. Endangered Species Act. Today, shrimp nets have turtle-excluder devices and bycatch reduction devices—holes in the net—to reduce the impact of shrimping. By the same token, tight regulations govern both commercial and recreational take of red snapper.

Although the fisheries of the Gulf are bountiful, they are not without limits. It is extremely difficult to analyze and understand fish populations and how much fish can be harvested without harming the overall population. Obviously, if too many are taken, the population can be jeopardized.

To date, we have been fortunate along the Gulf of Mexico in that we have not seen the severe impacts to our fisheries that have occurred, for example, with cod in the northeastern United States. Many of us enjoy eating shrimp or red snapper at local seafood restaurants and often take for granted that these fish and shellfish resources will be here for us to enjoy. The next time you order red snapper, you might thank the Gulf of Mexico Fishery Management Council for making sure that we continue to have a breeding population that will keep red snapper in the Gulf.

One of the biggest surprises offshore of Freeport in the southern portion of the Houston Wilderness area is the presence of coral reefs that compare with

those of the Caribbean Sea. This area is known as the Flower Garden and was designated a marine sanctuary in 1992. The Flower Garden consists of the East Flower Garden Bank, the West Flower Garden Bank and the Stetson Bank, and they represent a unique ecological resource.

These coral reefs grow atop salt domes—geological formations that push up the soil and sediment above them. These domes rise to within sixty to seventy feet of the water surface and were named by sailors who could see the beautiful coral formations down through the clear Gulf water—like a flower garden underwater.

The reefs are true Caribbean coral, probably brought in by the prevailing currents. There are twenty-one species of coral in the sanctuary. There are more than eighty species of algae, two hundred and fifty species of macroinvertebrates, and more than two hundred species of fish, including many of the colorful reef species, as well as three kinds of marine turtles.

The Stetson Bank is the closest of the reserves to shore, being about seventy miles south of Galveston. Both the East and West Flower Gardens are an additional thirty or so miles out. Together, these reserves represent about four hundred acres of reef crest and about forty-three square miles of reserve that are enjoyed by scuba divers traveling out of Freeport and Galveston.

Back on the beach, a flock of brown pelicans flies over the breakers, rising with the crest of the wave, and lowering again to skim close over the water. Every so often, a pelican rises and then plunges beak-first into the water, catching its dinner.

Brown pelicans were once prevalent on the upper Texas coast, and then they disappeared, victims of pesticides that caused their eggs to weaken and break. Today, the brown pelican is back again, a testament to our ability to reverse ecological harm with our science and a will to protect living things.

