CHAPTER 3 – STATE OF THE BAY, THIRD EDITION

The Human Role: Past

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At sundown we reached Redfish Bar, composed almost entirely of shells which extend from bank to bank the distance of several miles and appear to be formed by the confluence of the tide and the waters of the San Jacinto and Trinity, which unite a short distance above … This point is undoubtedly the head of navigation for vessels of heavy burden and has occurred to some as a more suitable site for a city than Galveston itself.

—Texas in 1837, edited by Andrew Forest Muir (1958)

Introduction

This chapter examines the history of resource use in Galveston Bay and its adjacent land area. The chapter begins with a look back to the Pleistocene Ice Age and the impact of the earliest humans, continues with the use of resources by Native Americans and changes engendered by the transition to European-American settlement, and then focuses on the alterations that occurred to the bay as the regional focus shifted from agriculture to municipal and industrial development. This chapter describes resource use and human impact from pre-history to 1950. More recent developments and impacts are covered in Chapter 4.

Resource Use: Prehistory to 1800

Galveston Bay is a recent feature of the Earth by geological reckoning. Thousands of years before the bay formed, water was held in continental ice sheets causing the sea level to be considerably lower than it is today. The shoreline was located 50–100 miles farther south into the area now covered by the Gulf of Mexico. The great mammals of the Pleistocene moved southward as the ice sheets spread, pushing many species to lower latitudes. Many of these species inhabited the land where Galveston Bay would later form. This land was crossed by rivers and streams running in deeply entrenched valleys (LeBlanc et al. 1959).

After the last glacial maximum, 18,000 B.P. (years before present), the Earth began to warm and sea level rose. Many of the great Pleistocene mammals became extinct. The shoreline moved north and the rising water drowned the mouths of the Trinity and San Jacinto Rivers. The long shore currents deposited sediments across the new mouths of the rivers and an island was created. Behind the island, an estuary developed, known as Galveston Bay.

Archeological evidence uncovered by erosion and dredging in Galveston Bay tells the story of the great Pleistocene mammals and the men who hunted them. Fossils and artifacts were uncovered by erosion along the high banks of the western shore of the bay and by the dredging of the Texas City Channel.
In 1916, the fossil remains of 3 mammoth skeletons were discovered on the shoreline of San Leon (Saunders et al. 1980; Blume 1992; Saunders 1992). Near the sites of these discoveries local residents found many stone artifacts as they washed out of the bank. Similar artifacts have been dated to the Paleo-Indian Stage, circa 12,000–8,000 B.P. (Meltzer 1986; Ricklis 1994). One of the earliest Paleo-Indian sites recorded in southeast Texas is located on Clear Creek in Galveston County. This site is dated to 11,000 B.P. (Patterson et al. 2001).

From 1895 through the early 1960s, the Texas City Dike was constructed using local dredged material that contained an abundance of fossils. When the clays used to build the first 3 miles of the dike started eroding, the remains of thousands of Pleistocene animals began to emerge. The fossil material came from mammoths, mastodons, bison, camels, horses, armadillos, saber-toothed cats, wolves, sloths, and more. Some of these fossilized bones showed butcher marks or had been worked green into tools and decorative items (Johnston 1975; Few 1991; Wolf 1991).

Other documented sites where Paleo-Indian stone artifacts have been discovered and documented near Galveston Bay are: McFaddin Beach Site, Addicks Reservoir, Smith Point, and the Bolivar Peninsula. Except for the flint points and a few bone artifacts, little is known about these first residents (Hester 1980; Ricklis 1994; Patterson et al. 1999).

The next archeological evidence of human residents comes from the shell middens that were laid down during the period from circa 8,000 B.P. until shortly before European Americans began to settle around Galveston Bay in 1810. The shell middens were mounds or high ridges of Rangia clams and (or) oyster shells deposited near the shore of the bay or on tributaries. For thousands of years the hunter-gatherer tribes camped on the shores of Galveston Bay at these midden sites. They came to eat these mollusks, a staple food that was always accessible. Each year the middens grew, fed by the empty shells and other materials left near the camps. Some of these middens gained religious significance and were used as cemeteries (Figure 3.1) (Campbell 1957; Aten 1983).

Early indigenous people of Galveston Bay moved with the rhythms of nature that controlled their food supply. Primarily fishermen, they traveled along the shores of the bay and gulf, making permanent campsites on the bayous, rivers and creeks, and fishing with nets, traps and flint-armored projectiles. Punched oyster shells used as weights on fishing nets are found at eroding midden sites on East Bay and West Bay mingled with the shells that were discarded from meals.
The Akokisa (also known as the Orcoquisa) and the related Atakapa tribes are the earliest documented inhabitants of Galveston Bay. Akokisa inhabited both sides of the bay, but the Atakapa were found only on the east side and into Louisiana. The name Akokisa is thought to mean ‘river people’, and they can be traced back to the Archaic period 7,000 to 5,000 B.P. Atakapa means ‘man-eater’. These 2 related tribes both spoke the Atakapa language.

In 1719, a French officer, Francois Simars de Bellisle, was stranded in Galveston Bay. He found a group of Akokisa collecting bird eggs and was taken as a servant captive. De Bellisle confirmed that the Akokisa were a migratory tribe. During the spring and summer they broke into small family groups and spent their time on the coast using dugout canoes to travel the bay fishing and gathering shellfish and bird eggs. The women dug a submerged root and pounded it into a starchy paste that was cooked to supplement the seafood. In the winter they moved inland to their more permanent campsites on the riparian corridors of the tributaries that flowed into Galveston Bay. De Bellisle wrote about a member of an enemy tribe of the Akokisa that was killed during a bison hunt and was eaten in a strange manner. All coastal tribes in Texas were known to engage in ceremonial cannibalism and were known to eat various parts of enemies killed to attain their strength and courage. They also believed that if a warrior was killed and eaten by an enemy he couldn’t enter the afterlife (Folmer 1940).
Another lasting change made to the environment by these early inhabitants is the introduction of non-native plants (Figure 3.2). On and near permanent campsites, plants with long histories of use as food, medicine or raw material can be found. Many of the plants are native to east, central and west Texas, not the upper Gulf Coast. The Texas persimmon, *Diospyros texana*, is found in several locations. This tree has an edible fruit that produces a henna-like dye when green, and in Mexico its black juice is still used to dye leather. The wooleybucket bumelia or gum elastic tree, *Sideroxylon lanuginosum* ssp. *lanuginosum*, and the wild olive, a *Forestiera* species, are also found. The lime prickly ash, *Zanthoxylum fagara*, has a long history of medicinal use in Latin American countries. It also produces a yellow dye. The net-leaf sugar hackberry, *Celtis laevigata* var. *reticulata* is a tree with a dry, sweet fruit. This species of hackberry was once the most prevalent woody vegetation on “Van Toon Island.” The Texas nightshade (*hierba mora* in Spanish), *Solanum triquetrum*; the sand post oak, *Quercus margarettae*; and the Western soapberry or Indian soap plant, *Sapindus saponaria* var. *drummondii* can all be found where the land around the midden sites has not been developed (Vines 1960).

During the late 1700s, the Karankawa and the Coco, natives of the mid and lower coastal regions, moved to Galveston Bay. By 1800, these groups had set up permanent camps on old midden sites at Redfish Bar, Red Bluff, and the mouth of the San Jacinto River. These 2 tribes had been traveling to Galveston Island seasonally to fish and hunt for centuries (Dyer 1916; Aten 1983).

The Karankawa, Coco, and Tonkawa tribes also became regulars at Lafitte’s town, bringing hides and other goods to trade (Dyer 1916). Unfortunately, the Native American tribes did not experience the same relationship with Stephen F. Austin’s settlers. By the time Texas won independence from Mexico, the people of these hunter-gatherer tribes not killed by the settlers were pushed off their tribal lands north into the Caddoan territories and south into Mexico.

**Galveston Bay, a Cornucopia of Resources: Early Settlement to 1850**

**The Islands: A Changing Landscape**

**Galveston Island**

Except at the seasonal campsites of Native Americans, Galveston Island, a low, flat barrier island, was uninhabited until 1816. The whole length of the island was protected by sand dunes of varying heights and widths. The interior was tallgrass prairie with several small brackish ponds and one “sweetwater” lake. The bay side of Galveston Island was made up of marsh and bayous. These areas were constantly accreting with sediments and shell deposited by the currents flowing into West Bay. On the bay side of Galveston Island, directly across from Virginia Point, was a group of oaks named Eagle Grove for the bald eagle that nested there yearly. This grove was destroyed when the first railroad bridge was built in the 1850s to connect the island to Virginia Point (Hayes 1879 reprint 1974; WPA 1936).
Pelican Island

Colonel Warren D.C. Hall, a longtime resident of West Galveston Island, was one of the early visitors to Galveston Bay in 1815. Colonel Hall gave the historian Charles Hayes a comparison of the smaller islands in the bay between his earliest viewing and 1850, when the first surveys of the bay were made:

In 1815, Pelican Island was merely a narrow slip of a marsh, on which it was impossible to walk dry-footed, except on a spot that was a hundred feet over, which was all that was dry. The marsh was covered with seaweed growing in the mud, and covered with water at all ordinary tides, and was not visible at any distance off. I saw the island again in 1820, when it had increased to a kind of shell-bank, twenty or thirty yards over, and one hundred and fifty to two hundred yards in length on the east side, and had a few small bushes growing on it. The rest was still a marsh, but had increased in extent greatly since 1815 (Hayes 1879 reprint 1974).

By 1820, Pelican Island (Figure 3.3) was a noted nesting site for the brown pelican, and by 1850 it had accreted to be the largest of the islands located entirely within the bay. The island was described as being 4 miles from the city and island of Galveston, and being 4 miles in length and about one half mile wide (Hayes 1879 reprint 1974; Glass 1986).

Deer Islands

Colonel Hall visited the Deer Islands in 1820. He observed:

... There was not then an acre of dry land on the largest of them, and they were all entirely covered with water at ordinary high tides. They were known as “Egg Islands,” and there was not then a bush or shrub upon them.

The name Deer Islands (Figure 3.4) was given by the early settlers for the large numbers of deer that waded and swam across the channels from the mainland to feed on the rich, luxuriant grasses growing on Galveston Island. James Campbell, one of Lafitte’s lieutenants, and his wife Mary Sabinal were the first inhabitants of the Deer Islands. They were there when the intense hurricane of 1837 (Racer’s Storm) struck Galveston Bay. The hurricane wiped them out, and they moved to Swan Lake where they licensed the first ferry at Campbell’s Bayou in Galveston County. In 1850, these islands
were surveyed and North Deer Island was found to contain 80 acres of good land. South Deer Island had an area of about 200 acres. When Charles Hayes wrote his book, *Galveston in the 1870s*, he noted that the accretion was still occurring (Hayes 1879 reprint 1974; Dyer 1911). North and South Deer islands are historic colonial waterbird nesting and rookery islands.

**Vingt-et-un Islands**

At the beginning of immigration into Texas, Elias R. Wrightman surveyed Galveston Bay for Stephen F. Austin. One of the landmarks he listed to mark navigation between the entrance into the bay at Bolivar and the Trinity River was an island he called “Bird Key.” This island was described as a colonial waterbird nesting island and rookery in 1831, and later referred to by the French name *Vingt-et-Un* (meaning ‘21’) Islands. This French name was later shortened by the English-speaking settlers to “Vantoon Island” (Glass 1986). The historic Vingt-et-un Islands were leased by the National Audubon Society when one of the few nesting colonies of the roseate spoonbill—nearly extinct—was discovered there in the 1920s.

**Redfish Bar**

Wrightman described Galveston Bay from Point Bolivar to the San Jacinto River as being 3 distinct bays: East Bay, Galveston Bay (including West Bay) and Trinity Bay. Trinity Bay was all of the bay system lying north of Redfish Bar. Wrightman had this to say about navigation through the bay.

*The Trinity Bay is about nine feet deep, the entire bay is intercepted by a shoal reaching clear across from Davis Point [Eagle Point] on the west, to Persimmon Point [Smith Point] on the east, a distance of eleven miles, called Redfish Bar, with only a pass near the middle admitting vessels to pass which have draught of about seven feet, when they may ascend to the San Jacinto and Buffalo bayous. But at the harbor of Galveston... vessels drawing sixteen feet may enter by passing around Campeachy and entering the harbor directly south of Point Bolivar.* (Helm 1884 reprint 1987)
Redfish Bar, the great barrier across the bay (highlighted in Figure 3.5) received its name from the Spanish and Mexican fishermen who came regularly to harvest the abundant redfish that fed along the miles of oyster reefs. They called it Barra de las Pescador Encarnador (Glass 1986). From a book published in England in the 1840s we are given a view of Redfish Bar from the high bank of Eagle Point:

... a vast expanse of bay, studded with numberless little islands or banks of nothing but shells, entirely destitute of verdure, but rendered beautiful by fanciful forms their lines composed ... it is called Redfish Bar ...(Hooten 1847)

The shell gravel of the bar was constantly being moved by the currents, causing the topography to change with strong tidal current. The depth of the natural channel through the bar could vary by as much as 2 feet as it filled with loose shell and sand or was scoured by floodwaters. Redfish Reef (an existing oyster reef located mid-bay between Eagle Point and Smith Point) was initially a spoil island created by the dredging of the Houston Ship Channel at the turn of the century.

**Land Use**

Land formations have always influenced how land is developed. The land around Galveston Bay was flat coastal prairie with mima mounds (earthen mounds ranging in height from a few inches to more than 2 meters), prairie potholes, and ribbons of riparian forests snaking across the landscape to end at the bay. Higher-elevation middens, developed at the campsites, were used for thousands of years by early native tribes. Some of the middens that accumulated at sites on the fringes of Galveston Bay became topographic land features, with elevations of over 20 feet above sea level. Many of the early European-American settlers used them as home sites, and the shell from the middens was used as construction material for wagon paths.

The riparian corridors of the rivers, creeks and bayous were the first places around the bay to be settled. The soils there were sandy and drained quickly. Wild game abounded in these greenbelts and there was always fuel for fires. Early settlers depended on the waterways for transportation routes inland from Galveston Bay.

In the 1820s, Nathaniel Lynch established 2 towns, Lynchburg and San Jacinto, directly across from each other on the lower San Jacinto River at the juncture of the river and Buffalo Bayou. Several more towns were platted on the San Jacinto River, Buffalo Bayou, and other tributaries flowing into the bay, including the town of Anahuac platted near the mouth of the Trinity River in 1831 (Foster et al. 1993). The 2 cities that grew to most influence the future of Galveston Bay were Houston, platted in 1836, and Galveston, in 1838.

**Water Use**

For the early settlers, water for household use and drinking came mostly from creeks, rivers and the upper reaches of the bayous. Cisterns were commonly used to catch rainwater. Wells had to be hand dug and at times were shallow and of poor quality. Waterways provided water for household and industrial use. They also aided in the removal of trash and the dilution of sewage waste.
Fisheries

Shrimp were harvested by seine as they migrated out of the bay at the inlets at each end of Galveston Island. A young Irishman named Sheridan documented this fishery in 1839–40. He was familiar with the European prawn fishery and was impressed by the size of the Galveston Bay shrimp, describing the average length of the Texas prawns to be approximately 6 or 7 inches. He described the quantity of 1 seine haul to be 70 pails of shrimp plus many pails of fish. The other seafood he describes as being sold at the Galveston dock included oysters, flounder, mullet, redfish, skate, turtle, crabs, and many fish for which he had only European names (Sheridan 1954).

The Redfish Bar fishing industry was well described by Charles Hooten, an English visitor to Galveston in the early 1840s. In his book San Luis Isle (1847), Hooten tells of his visit to Edwards Point at San Leon to stay at the headquarters of a fishing business owned by a doctor. He first accompanied the fishermen to hunt terrapin (Figure 3.6).

The terrapin—a small kind of sea-tortoise, is used in Texas for the manufacture of soups. They had engaged to supply one of the hotels with, I think, two thousand ... Anxious to see the sport, I set out with them at about noon,—the hottest part of the day being precisely that during which the terrapins come to the surface of the water. A net fifty or sixty yards long was provided for the taking of them,—a smaller one to cover the boat with and prevent their escape when caught, and an axe to kill a dangerous kind of fish called “alligator gar” with, in case any should get into the net. The sky was wholly-cloudless, the sun burning hot, and the water beautifully calm, as we rowed amongst the little shell islands ... the noses of many terrapins were seen sticking out of the water. (Hooten 1847)

By 5:00 that afternoon they had a boat loaded with 300 terrapin, a great quantity of redfish, flounder, and other unnamed fish. As they made their last haul of the net, 2 hawksbill turtles were taken. The author describes them as “being the only pair ever known to have been caught in Galveston Bay.” The largest fishing industry in Galveston Bay was for redfish, also described by Charles Hooten.
In May, went on a small boat with Dr. C.P.W.—the proprietor of the location to which I was bound ... he did not practice his profession except upon himself and the men he employed in the capacity of fishermen—a business which he carried on upon a large scale, supplying the city [Galveston] with fish both fresh and cured.

Hooten describes the process used by the fisherman. Small fish were taken by seines, but fishing for large redfish on Red Fish Bar was done with “hempen” lines and bait. Any time of day or night was considered a good time to fish for large redfish due to their abundance. Seine nets were used to catch mullet; then the bait was dumped on the shell beach to supply the fishermen. They attached a live mullet on the hook knotted to a long hemp line. Another line with a heavy rock or lead weight was tied to the lower part of the fishing line. The fisherman would take the weight and lower line, wade out into the water to his waist and hurl the weight, sending the line as far out as possible. The fisherman would return to shore and, as soon as a fish was hooked, he would throw the line over his shoulder and run as hard as he could to the center of the shell bank to secure the fish. The fish were described as being so large that they could break the line or an arm if the fisherman were careless. The large fish was played on the line until it was tired enough to be dragged ashore. The fishing would stop when the boat was loaded or when the fishermen were exhausted (Hooten 1847).

Shipping

The natural harbor at the eastern end of Galveston Island attracted mercenaries and privateers in the 1800s before settlement began. The men used the island as a base as they conducted a war on Spanish trade ships, in the name of helping the Mexicans gain independence. This short-lived piratical shipping industry lasted from about 1815 to 1821. Jean Lafitte (Figure 3.7) was in charge of the last settlement.

The privateers had plenty of silver, but lacked food supplies and wood for cooking and heating. This need brought a new type of settler to some of the riparian areas around the Galveston Bay, called “leatherstockings.” They hunted wildlife for food and hides, grew a few vegetables, and cut firewood. The goods were loaded onto small boats and transported to Galveston to sell to the privateers (Holley 1836, 1990; Epperson 1995).

Galveston was incorporated as a city in 1839. That same year the steamboat tonnage doubled and Galveston became an active cotton market (Hayes 1879 reprint 1974). In the days of the Republic of Texas, maritime shipping increased greatly. During the first quarter of 1843, the following domestic exports were shipped from Galveston to Great Britain: 3,663 bales of cotton, 1,810 bundles of cattle hides, 46 casks and 149 bags of pecans, 3 bundles of deer skins, 1 box of beeswax, 3 barrels and 1 box of beef tallow, 1 box of dressed deer skins, 1,273 white oak staves, 364 sacks of bones,

Figure 3.7. The natural harbor at the eastern end of Galveston Island attracted mercenaries and privateers in the early 1800s. Jean Lafitte was in charge of the last pirate settlement.
4,000 pounds of bones, 1 barrel of leaf tobacco, 1 buffalo robe, and 258 cedar logs (Hayes 1879 reprint 1974). The plantations on the Brazos River produced cotton, sugar, timber and stock to export, but shipping by water from the Brazos was difficult. Most cargoes were taken to Galveston by small boats and lightered onto deep-water ships.

In this period, the principal function of shipping was to bring new settlers and needed supplies to Texas. On October 17, 1825 Galveston was made a port of entry although no town, customs house, or wharves were built to accommodate shipping. In 1830, a small customs house was erected on the eastern end of the island. A few years later Colonel Juan Davis Bradburn closed all maritime ports of Texas except Galveston and designated Anahuac the only place of entry and collection of customs. Galveston Island remained undeveloped until after the revolution was won in 1836 and the Republic of Texas formed.

To the north, the new city of Houston was chosen as the capital of the Republic of Texas in 1836. In January 1837, the city had few real structures; tents were the main housing. By summer, the quickly growing city of Houston was incorporated. Steamboats plied up and down Buffalo Bayou from Galveston, and by 1841 the Houston City Council had established the Port of Houston with authority over the wharves, landings, slips, and roads on the banks of Buffalo and White Oak bayous within the city limits.

The Trinity River had navigation to Liberty. In 1848, city leaders in Dallas began discussing the possibility of having a navigable Trinity River channel from Dallas to Galveston Bay (Sibley 1968; Johnston 1975; Alperin 1977).

Resources and Industry

Cattle

Cattle have been documented in Texas since 1714 when Louis de St. Denis came to “Tejas” and “found cattle in great abundance.” By 1775, Texas had thousands of unbranded wild cattle and horses (Love 1916; Jackson 1997). The wild cattle and horses descended from stock that escaped from Spanish herds, and would become one of the first major resources to be managed around Galveston Bay. These herds of wild Spanish cattle were the ancestors of the tough, resilient longhorns (Figure 3.8) that would become a symbol of the Texas west.
The saltgrass prairies with their nutritious grasses would become the key element in the open-range cattle industry around the bay. The cattle industry was begun on the eastern side of the bay after 1819 by immigrants who came from Louisiana and were second or third generation saltgrass stockmen. They were masters of the Spanish methods of managing stock from horseback and used the saltgrass marshes to fatten cattle during the winter.

The stockmen came in extended family groups with their slaves to settle near creeks and bayous, and immediately began gathering the wild cattle. By 1831 one of these cattlemen, James Taylor White, who settled on Turtle Bay (Lake Anahuac), had established a herd of over 3,000 head of branded free-ranging cattle (Anonymous 1834). By 1840, his herd had increased to over 8,000 head (Byford 1983). James Taylor White was credited for being the first to bring the range management practice of burning to the coastal prairies of Galveston (Erramouspe 1996).

Lumber
From the early 1800s until the early 1900s, lumber production depended on water transportation (Figure 3.9), causing the riparian corridors to be exploited before other forests. The bottomland forests were not only the easiest to access, they also contained the most prized woods of that era, including cypress, cedar, water woods and tall, straight pines. The trees were felled as near as possible to the body of water. The logs were hauled to the water’s edge by oxen and rolled into the waterway to be rafted down the rivers to the sawmills that were also established near or on the bay. The milled lumber was loaded onto ships anchored in Galveston Harbor and transported to places as near as New Orleans or as far away as Europe (Smith 1934; Johnston 1975; Henson et al. 1988).

Clay
The heavy clay found along the banks of bayous and creeks around the bay was first dug by the Native Americans to manufacture their pottery. The first settlers used this same clay for making bricks. Brick making was a very profitable business during the late 1830s. Bricks imported from Boston were reported by a man of the British diplomatic service to be going for $40 per thousand at Galveston, and skilled brick makers newly emigrated from England were making up to $40 a week (Sheridan 1954).
Several brick factories were established at Cedar Bayou and on other bayous and creeks around the bay. The heavy alluvial clay was mined on the banks of many bayous, which changed their natural shorelines. Galveston Bay bricks were transported on barges pulled by shallow draft schooners to Galveston, Houston, and Harrisburg, to be used in the construction of buildings, homes and roads (Sheridan 1954).

The Years of Change: 1850–1900

In 1850, the U.S. Coast and Geodetic Survey began a detailed mapping of the entire Galveston Bay system and produced the first accurate navigational charts of the bay. Lighthouses were proposed to mark the treacherous channels through the most dangerous obstructions: Clopper’s Bar at Morgan’s Point, Redfish Bar between Eagle Point and Smith Point, Shoal Point at what is now Texas City, and Point Bolivar near Bolivar Roads, the entrance to Galveston Bay and the Houston Ship Channel (Figure 3.10).

Navigational Projects

Intracoastal Waterway

Years after his death, Stephen F. Austin’s 1822 dream of a channel from the Brazos River to Galveston Bay would become a reality. The plantations along the Brazos River needed a safe, dependable way to ship their cotton crop. On February 8, 1850 the Galveston and Brazos Navigation Company was chartered and contracted to build a canal from the Brazos River through West Galveston Bay. This 50-feet-wide channel from Oyster Creek to San Luis Pass and through West Bay to the Galveston Channel was finished in 1855. In 1869, this channel was extended the 7 miles from Oyster Creek to the Brazos River and enlarged to a depth of 5 feet and a width of 100 feet.

Congress authorized a survey for inland cuts and channels along the margin of the Gulf of Mexico in 1873. During the 1880s, hurricanes damaged the existing east-west channels that could contribute to an inter-estuary shipping route. Little would be done to make the interstate channel a reality until 1892, when Congress authorized further dredging. In West Bay, the channel was dredged to a depth of 3½ feet and a width of 100 to 200 feet up to Christmas Bay; the route was also straightened (Sibley 1968; Alperin 1977).
A flood in 1850 washed mud into Buffalo Bayou from the unpaved streets of the city and from erosion of the banks that had been cleared for easier navigation. Steamship traffic to the city of Houston was almost entirely stopped until the city had the mud dredged from the bayou in 1852. That same year the Houston Navigation Company was organized.

Clopper’s Bar and Redfish Bar had been the natural barriers hindering shipping from Galveston to Houston. Schooners attempting to bring settlers through Galveston Bay ran aground and passengers were shipwrecked on these reefs. Only shallow-draft steamboats were able to navigate in the shallow bay waters. In 1857, a contract was let for dredging through Clopper’s Bar and Redfish Bar.

During the Civil War, the Union blockade stopped regular shipping and all channel improvements. Lighthouses in the bay were burned, and only local navigators familiar with the channels were able to maneuver through the shallow, reef-filled bay.

After the war was over, the lighthouses were rebuilt (Figure 3.12) and dredging projects for larger channels were undertaken.
In 1871, a 9-foot-deep channel from Bolivar Roads to Main Street in Houston was finished. Congress appropriated money in 1872 to improve the channel through Redfish Bar. Commodore Charles Morgan signed a contract in 1874 to dredge a 9-foot-deep channel, 120 feet wide, from Galveston Bay to Houston. The U.S. Army Corps of Engineers started dredging a 12-foot-deep channel from Galveston in 1877 (Alperin, 1977; Johnston, 1991; Sibley, 1968). Work began in 1899 on a project that would keep the upper reaches of the ship channel from shoaling. A timber pile and brush dike would be placed along the channel from Morgan’s Point to Redfish Bar (Sibley 1968; Alperin 1977).

**Figure 3.13.** Much of the Houston-Galveston region’s growth has been attributed to the development of the Houston Ship Channel. Periodically, the channel has been enlarged to accommodate increasing size and number of ships. Modified from Alecya Gallaway.

**The Jetties**

In the 20 years following the Civil War, the U.S. Army Corps of Engineers worked on projects to keep a deep-water channel open in Galveston Bay from Galveston Island to Houston. A proposal was made in 1872 to remove the bar between Fort Point and Pelican Spit and to deepen the Galveston Channel over the outer bar to 18 feet. Stone quarries had not been established in Texas, so gabions—6-foot-by-6-foot cages of wire and wicker covered with cement and filled with sand—were used as submerged jetties. These were placed 5 to 6 feet below mean tide to extend the Fort Point breakwater. This gabionade was completed in 1876.

Both Congress and the Texas Legislature supported the construction of jetties and other harbor improvements. The federal Rivers and Harbors Act of 1880 appropriated $175,000 for Galveston Harbor improvement and a new jetty project. In 1883, the Texas Legislature authorized coastal cities to issue bonds for harbor improvements. The foundation layer of the north jetty was completed and the second layer was near completion by 1883. When finally complete, the north jetty extended out 25,907 feet (nearly 5 miles).
Congress appropriated $300,000 in 1886 for work on the south jetty. The north and south jetties would be separated by 7,000 feet at the Gulf and built with rubble stone capped with concrete. The slopes would be covered with huge granite boulders and the outer section built as a solid concrete pier. It would take until 1897 before the south jetty was considered complete at a length of 35,603 feet (more than 6½ miles).

**Texas City Channel**

On March 23, 1893, the U.S. Government granted permission to the Meyer Brothers of Duluth, Minnesota to dredge an 8-foot-deep channel for a deep-water railroad terminal at Texas City. The Texas City Terminal Company dredged a 7-mile-long, 16-foot-deep channel from Galveston Harbor in 1895 (Figure 3.14). In 1899, the army engineers took over the channel project and deepened it to 25 feet (City Commission 1963; Holbrook 1971).

**Land Use**

**Shell**

Settlers in the developing towns around the bay used the shell from the Native American middens as a substitute for gravel. With the coming of the railroads, the midden shell became a major resource, since rocks and gravel for paving materials were absent from the coastal prairies. When railroads proposed to cross the wet prairies on the western shore of Galveston Bay, a ballast material had to be found for the base of the tracks. From the mid 1800s until the late 1890s, shell middens on the western shore of Galveston Bay were heavily mined for this purpose.

One of the largest of the Galveston Bay middens was located at the entrance to Clear Lake. It was a high ridge of *Rangia* shell that was formed by the currents and thousands of years of midden use by Native Americans. Its huge size protected the snaking channel into Clear Lake, keeping the low salinity bay waters from entering into the upper reaches of the Lake except during storm tides. This barrier, which once joined land where the Kemah waterfront is today, was heavily mined before the 1900s. This midden was reported to be nearly 30 feet high in places and contained numerous burial sites according to the daughter of the man who sold the shell to the railroad. This ancient *Rangia* shell midden deposited by Native Americans for thousands of years was sold for 75 cents a railcar load (Benson 1935; Kenyon 1976).
The shell of the middens was insufficient to meet demand for construction material and shell mining expanded to the oyster reefs and islands in the bay. To mine the shell, small schooners and barges were brought in close to a shell island during high tide and anchored off. During low tide the loose shell would be shoveled into the boat’s hold, and at the next high tide the boat would shove off the bar and sail to Galveston or up Buffalo Bayou where the shell was loaded onto mule-drawn wagons (GDN 1940).

**Agriculture**

Along the railroads that ran from Galveston to Houston, farming communities (Figure 3.15) sprang up where the shipping docks were built. The railroad companies promoted this growth by platting towns and bringing excursion trains full of Midwestern farmers to see the rich, productive, rock-free prairies that were plow ready and cheaply priced.

The saltgrass prairies that fringed the edges of Galveston Bay provided rich, nutritious grasses for cattle production. These wet prairies were never productive for growing cotton, but were well suited for rice farming. The low, heavy clay soil of the marshland was ideal for holding water during rice cultivation. All around the bay, near the turn of the century, canals were dug from freshwater sources to flood the new rice fields. The first canals were dug with oxen in 1888 by the Jackson family on Double Bayou in Chambers County. In 1899, the Hankamer-Stowell Canal Company began pumping water out of Turtle Bay for rice irrigation.

**Brick Manufacture**

In the years from early settlement until the Civil War, bricks were made locally by slave and immigrant labor. After the Civil War, a building boom in Houston and Galveston made brick manufacturing a major industry around the bay. Some of the larger factories located near the bay removed tons of clay from the tributaries.

Brick factories were established on both the Harris and Chambers County sides of Cedar Bayou causing it to be one of the waterways most altered by clay extraction. The bayou area contained all the right ingredients for successful brick making: heavy clay for hard bricks, riparian hardwoods for fuel, and water deep enough for barges and shallow-draft schooners to be loaded with bricks and sailed to Galveston (Henson 1986). Other brick factories built before the turn of the century were near League City on Clear Creek, and at Factory Bayou in San Leon (Warco 1982; Gallaway 1999a).
**Lumber**

Lumber continued to be a resource that made many of the first fortunes in Texas, but the prized cypresses and large oaks were gone from the old-growth bottomland forests near Galveston Bay (as mentioned previously, the bottomland forests were the easiest to access and contained the most prized woods of that era). The trees were felled as near as possible to the body of water. Woodcutters had to fell trees farther and farther inland and struggle with oxen to get them out.

**Water Use**

Until railroads were built across the coastal prairies, the immigrants settled along the rivers, bayous, and creeks to ensure a constant supply of good water for themselves and their stock. Then, from the 1850s to the early 1900s, the railroads brought settlers to areas of the prairies located far from sources of flowing water. Subsequently, groundwater use increased. Artesian wells (Figure 3.16) were drilled all around the perimeter of the bay and along the railways. The wells flowed constantly, producing water that was not captured for human use, but spilled onto the prairies and into bayous and creeks and eventually into the bay. This prolific use of groundwater contributed to land subsidence around Galveston Bay (see Chapter 5).

**Fisheries**

The oyster industry was limited to local trade until after the 1870s, when cold-shipping and processing industries were developed. In 1885, the oyster industry was reported to employ approximately 500 men and have 50 boats working the bay. Galveston reportedly shipped about 25,000 oysters daily, most of them to markets within the state. The city of Galveston alone was said to consume 25,000 to 30,000 oysters daily in season (Anonymous 1885).

Natural oyster reefs of Galveston Bay were so heavily harvested after cold shipping was developed that the state intervened. In 1895, the state Oyster and Fish Commission was established. Oystermen were encouraged to lease portions of the bay bottom from the state and were taught how to raise oysters. Private oyster reefs in Galveston Bay covered 3,861 acres of bay bottom by 1912 (Anonymous 1910, 1912; Tucker 1929).

Shrimping was performed by hand until after 1900. Cast nets and haul seines were used in the marshes to harvest small shrimp, which were then sun-dried or pickled in salt for export. At the inlets of Galveston Island, large migrating shrimp were seined for local sales (Iversen et al. 1993).
Terrapins were always a popular item at the Galveston harbor, but were so common in the bay that the only market for them was at the hotel restaurants in Houston and Galveston and the inland fish markets. Sea turtles were not harvested in the bay, but were shipped to Galveston from the sea-turtle canneries located in the coastal-bend area (Doughty 1984).

The fishing industry for the whole state of Texas was small, with only 291 fishermen listed as full time in 1880. Most fishing was done in Galveston Bay out of Houston and Galveston or out of Indianola at Matagorda Bay. Methods most commonly used for fishing included bay and beach seines, and the pole gig method used for flounder fishing at night. The most popular market fish were redfish, sea trout, mullet, croakers, and sheephead (Doughty 1984).

Transportation and Shipping

Maritime shipping before the Civil War was limited to sailing vessels. Domestic exports shipped by sea from Galveston in 1860 were 193,963 bales of cotton, 235 barrels of salted beef, 96,017 cattle hides, 11,245 horned cattle, 9,003 barrels of molasses, 1,792 bags of pecans, 278 bales of pelts, 3,462 hogsheads of sugar, 227 sacks of wheat, and 4,382 bales of wool. After the Civil War, steamships began to replace the sailing ships, and they soon became the major shipping vessels (Hayes 1879 reprint 1974).

There were only 8 railroads in various stages of construction in Texas before the Civil War. One of these was the Galveston, Houston & Henderson Railroad, chartered in 1848. Construction began in 1853 and ran from Houston to Virginia Point by 1859. A bridge to be constructed from Virginia Point to Galveston was authorized in 1857, and the first train crossed from the mainland to Galveston in January of 1860. This railroad connected to the Buffalo Bayou and Brazoria Railroad at Harrisburg.

The railroad to Galveston now connected with the other railroads from Houston, including the Houston & Brazoria, the Houston & Central Texas, and the Houston & New Orleans. Railroad building was halted by the Civil War until 1867, when the great railroad expansion across America began (Hayes 1879 reprint 1974). Before 1900, three railroad bridges and a wagon bridge would join Galveston Island to the mainland at Virginia Point (McComb 1986).
Resources and Industry

Topsoil
Topsoil was a local resource first dug from the mima mounds by the families who settled on the prairies. They called the mima mounds “sand knolls.” The rich sandy loam was loaded onto wagons and transported to their kitchen gardens. Later this became a prairie industry for many hardworking entrepreneurs who made their living selling the topsoil to settlers around the bay. As technology advanced, digging and hauling became more efficient, and the mounds were completely removed from most prairie lands on the western side of the bay (Deats 2000).

Natural Gas
A description of Bolivar Peninsula where the salt dome at High Island is located was written by a cattleman-preacher who went there in 1898. He described the peninsula land as prime farmland where fruit and vegetables were raised for the market. The land not planted in crops was saltgrass prairie where great numbers of cattle ranged. In 1899, the cattleman was given a tour of High Island by the major landowner, Charles Taylor Cade.

While it is called [High] Island, the name is misleading…the island is a very large hill on the peninsula. The high hill covers three or four thousand acres of land, which is very fertile. There are beautiful groves of live oak trees here and there over the “island.”

He was shown “sink holes” filled with quick sand and described them as marshy places from 10 to 100 feet deep where “the tide comes up and floods the area then goes back down.” Local residents told him, “cattle and horses sink out of sight if they step off into them.” Another incredible natural phenomena he described were the mosquitoes which swarmed up out of the marshes in such great numbers that they were impossible to escape (Anderson 1907).

High Island is one of the salt-domes located near Galveston Bay. There were many clues in this period of the abundant fossil-fuel resources of the region that would soon produce fame and fortune. Mr. Smith, who owned the property at High Island that is today the Houston Audubon sanctuary known as Smith Oaks, had a water-well that produced natural gas. The surface of the water at the top of the well boiled with such a force that the sound was described as “like a bunch of geese cackling.” Smith ran a pipe from the well to his house and had gas jets arranged like a stove to cook on. He amazed visitors by cooking eggs on one and bacon on another while at the same time boiling coffee (Anderson 1907). Mineral water with high sulfur content from springs at High Island was bottled and became a thriving local business.

By Lisa A. Gonzalez

Shoreline describes the interface between land and water. Around Galveston Bay, shoreline is more often a zone rather than a definite line because of tidal movements and the presence of habitats such as wetlands. Human development includes hard structures such as piers and bridges, which extend into the water. Human development also sometimes includes the construction of canals that extend water into the land.

The Galveston Bay Plan identifies issues related to shoreline development and public access to bay resources as a priority problem. Galveston Bay and its living resources should be accessed and enjoyed by all who wish to visit or live in its vicinity. However, shoreline development that promotes and enhances public access should be sensitive to the habitats and organisms that exist within and around the edges of the estuary. Very often shoreline development exacerbates environmental problems through disturbance or destruction of habitat, increased loadings of point source and nonpoint source pollutants, increased erosion, and introduction of solid waste and debris. Shoreline development often creates hard structures such as bulkheads and retaining walls that give wetland habitats nowhere to move to as sea levels change. The conversion of public shoreline to private property also reduces opportunities for people living around the bay to access bay resources and appreciate the bay’s unique aesthetic qualities.

The shoreline surrounding Galveston Bay today looks much different from the shoreline that existed prior to European settlement. For example, in the 1850s the shoreline near Kemah and Seabrook at the mouth of Clear Creek was rich with natural habitat and very little human development (Figure 3.18). According to the latest shoreline classification (BEG 1995) discussed in Chapter 4, at least 28 percent of the Galveston Bay shoreline is developed. Commercial, residential, and industrial development along the bay’s edge poses a threat to undeveloped bay habitats such as fringing wetlands, riparian forests, and mudflats. In addition to development, the shoreline of the bay has also been altered by dredge-and-fill operations and isolations of embayments previously connected to the bay system.

Recently, several communities around Galveston Bay, including Seabrook (on the north side of the Clear Lake Channel) and Clear Lake Shores (on the south side of the Clear Lake Channel, west of Kemah) have incorporated shoreline public access, habitat conservation, and wetland restoration in their waterfront development plans (COS 2006; COCLS 2009). These plans can serve as models to other bay communities seeking to promote economic development.

Galveston Bay is a popular recreational destination for residents and visitors alike and most recreational uses such as pleasure boating, kayaking, fishing, and nature reviewing require some type of shoreline access. For those lucky enough to live on the bay access is not an issue. However, for most people some type of shoreline access point such as a public park, boat ramp, fishing pier, or walking path is required. Residents want access to the bay and its associated recreational resources and, in many cases, governments are responding with programs and public-access projects to meet those demands.
Figure 3.18. At the time of this mapping survey in 1850, the bay shoreline near Clear Lake was rich with natural habitat and very little human development. Image source (Wampler 1851).
Industrialization: 1900–1950

Human Alterations of the Bay and Surroundings

Houston Ship Channel
The 1900 storm caused great destruction to the city of Galveston and the towns around the bay. It also gave Houston the advantage in the political struggle over whether a deep-water channel would be dredged to its inland port. In 1901, construction began on an improved channel, 25 feet deep by 100 feet wide, through the length of the bay. At the same time, work began on a 60,000-foot dike of timber pilings and brush that would extend from the dredged cut at Morgan’s Point to the new channel cut through Redfish Bar.

The new channel at Redfish Bar was nearer to the western shore of the bay than the original one. The dike extending along the eastern side of the channel from Morgan’s Point was completed in 1902, and the dredged material from the new channel was deposited on the eastern side of the timber-pile structure. Over the years, more dredged material was deposited on the eastern side of the channel, creating a long spoil island later named Atkinson Island.

In 1910, the name of the channel was officially changed from the Galveston Ship Channel and Buffalo Bayou Project to the Houston Ship Channel. In 1934, work began on a project to enlarge the channel to a depth of 32-feet and a width of 400-feet. It was completed in 1937. World War II interrupted shipping operations at the ports of Galveston and Houston, but after the war shipping increased and intense industrial and municipal development began an era of rapid alteration of Galveston Bay.

Raising the City of Galveston
As residents were reminded by Hurricane Ike in September 2008, any settlement on Galveston Bay is vulnerable to storm surges from hurricanes and tropical storms. This was especially true of Galveston in the late 1800s. The city had removed the natural 12- to 15-foot-high sand dunes from the east beach area in the 1800s to allow easier carriage access and give better visibility of the beachfront. The 1875 hurricane caused severe damage. City officials began looking for a way to erect a barrier to help protect them from future storm tides. Salt cedars were planted on the old dune line in the hopes that they would catch sand and reestablish the removed dunes.

Figure 3.19. Galveston seawall, circa 1909. Image courtesy Galveston County Historical Commission.
The hurricane of 1886 destroyed Indianola on Matagorda Bay and convinced some city leaders that a seawall was the only solution to protect Galveston from inundation by gulf waters. Residents of Galveston protested the issuance of bonds for this project so strongly that it was never put to a vote. The 1900 hurricane battered Galveston Island, destroying most of the city and killing between 6,000 and 8,000 people throughout the Galveston Bay region. The beachfront lost over 300 feet to erosion. Immediately after the storm, businessmen joined in an effort with the city to protect Galveston from future storm waters. In 1902, a plan was accepted, and funds appropriated, for the building of a seawall (Figure 3.19), raising the city grade to 17 feet above mean low tide.

Raising the city of Galveston was a tremendous dredge and fill operation. New technology allowed huge deposits of sand to be removed from the east beach area, Offatts Bayou, and other sites on the West Bay side of Galveston Island. This dredged material was pumped in to fill the area behind the new seawall. As the seawall was extended west, more sand was removed from Offatts Bayou to build up the Fort Crockett site (Figure 3.26). Later, when the seawall was extended to the extreme eastern end of the island, more sand was removed from the “Atlantic Hole” pit that later was named the East Lagoon. Westward extensions continued on the seawall past the 1950s.

**Intracoastal Waterway**

In 1902, the purchase of the Galveston and Brazos Navigational Company by the U.S. Government was completed. The final leg of the Intracoastal Waterway, the channel between Galveston Bay and the Sabine River, was authorized in 1925. Nine years later in 1934, the long planned channel through the inland coastal waters of Texas was opened.

**Texas City Channel**

On July 28, 1900, dredging on the 25-foot-deep by 100-foot-wide channel began, only to be halted by the 1900 hurricane when the dredge washed ashore. The deeper channel opened 5 years later. By 1909, the channel had shoaled again. A 27-foot by 200-foot channel was authorized in 1910 and completed 1 year later. In 1913, Congress approved a 30-foot by 300-foot channel.

When the first clamshell dredge dug the deep-water rail terminal off Shoal Point in Texas City in 1893, the dredged material was deposited on the bottom of the bay north of the channel. The process continued over the years, creating a spit of land that extended from the shore, parallel to the channel. Currents continually washed material into the channel. In 1913, Congress appropriated $1.4 million for a timber-pile dike to be constructed on the north side of the channel to keep the dredged material and river sediment from migrating into the channel. The dike was finished in 1915 using 950,000 linear feet of timber pilings.

In 1916, the channel was enlarged to a depth of 30 feet and a width of 300 feet. The new dredged material was continually added to the existing dike, greatly increasing its width and length. Granite boulders were placed on the edge of the channel in 1931 to reinforce the deteriorating timber piles. That same year, the Texas Legislature patented a strip of land, 1,000 feet wide down the middle of the dike, to the city of Texas City, and the channel was increased to 30 feet by 800 feet. In 1934, the rubble-mound Texas City Dike was finished, and Texas City Harbor enlarged.
**Turtle Bay–Lake Anahuac**

Turtle Bay was a brackish to freshwater estuary fed by storm water runoff from Turtle Bayou and low salinity water from Trinity Bay. Prior to 1900, logging was the major industry for boatmen on Turtle Bay, and the channel through the bay was important to their industry. After a century of logging, the lumber industry had exhausted the old growth riparian forests above Turtle Bay, and rice production was quickly replacing logging as an important industry. An irrigation canal had been dug from the lake in 1902 (Figure 3.20), but salt-water intrusion ruined the crops.

In 1902, Congress declared Turtle Bay non-navigable and authorized a 4-foot-wide by 50-foot-deep channel from the entrance of Turtle Bay to Turtle Bayou. In 1911, Trinity River Irrigation District No.1 was established. Bonds were issued in 1912 to build a bulkhead across the mouth of Turtle Bay. The 1915 hurricane destroyed the bulkhead. Cycles of salt-water intrusion and maintenance dredging continued until 1931, when the Trinity River Irrigation District began construction of a new bulkhead at the entrance to Turtle Bay.

Oil was discovered at Turtle Bayou in 1935, increasing opposition to the barrier. The problem was turned over to the War Department, which resolved the conflict by giving the district 60 days to finish all their work on the barrier, locks, and dam. The time limit was met, and Turtle Bay was isolated from Galveston Bay, and later renamed Lake Anahuac (Alperin 1977; Henson and Ladd 1988; Ward 1993).

**Redfish Bar**

Cattle were driven across Redfish Bar, the prominent land bridge between Eagle Point and Smith Point, until the 1880s. The bar was completely dredged away before 1950. Tons of shell gravel and reef shell were removed by the early clamshell dredges, loaded onto barges, and transported to land where it was used to build roads and railroads. Later the shell would be used as a source of calcium carbonate for the chemical industries that were established around the bay. Still later, hydraulic dredges would remove even deeper shell. As World War II approached, reef shell from the bay supplied Galveston Bay–based industries with about 4.5 million cubic yards per year. After the war the amount of shell being removed from the bay doubled. This shell went into chemical manufacturing and construction (Anonymous 1941; Ward 1993).

Demand for more shell was reason for a 1954–58 geological survey to locate the ancient shell reefs buried under the bottom sediments of the bay. The survey maps gave the shell dredgers access to reef shell laid down as long ago as the Pleistocene. The removal of this shell and the live oysters building on top of it was a
very controversial issue. Jurisdiction over permits for dredging that might affect wildlife was given to the office of the Texas Game, Fish and Oyster Commission in 1911. This same agency regulated the oyster fishery in the bay. The oystermen protested the damage to the live oyster reefs from shell dredging and the destruction of the habitat by the constant release of sediment into the bay waters. The protests continued for years, as more and more of the bay was affected by the turbid water. It was 1969 before mud-shell dredging was banned in Galveston Bay (Ward 1993; GBNEP 1994b).

**Land Use**

Agriculture was a major use of the coastal prairies from the late 1800s. After 1900, a group of Japanese came to farm rice in Harris, Galveston, and Brazoria counties. They brought cultivation methods that would revolutionize farming practices. Japanese methods of budding and grafting plants were soon used to establish large citrus farms in many areas on the western side of the bay. After World War II, men coming home from the war left the farms and went to work for the industries around Galveston Bay.

Construction of buildings and roads used increasing quantities of shell, soil, and sand after 1900. The hydraulic dredge made available sand from the San Jacinto and Trinity rivers. Bank sand from ancient river tributaries was the next soil resource mined from the coastal prairies. These “sand pits” created new pond habitats and wetlands on those prairies.

Cattle ranching was still a major industry (Figure 3.21), and open-range grazing continued until the 1930s, when counties to the north and the west of Galveston Bay voted in the Stock Laws, but ranch land east of Galveston Bay kept open range until the 1950s. Much of the saltgrass coastal prairie was historically protected from development by the ranchers for cattle range and later for rice farms in Chambers and Brazoria counties. Remnants of that habitat have become important U.S. Fish and Wildlife preserves.

Figure 3.21. Cattle going to saltgrass in the 1930s. Counties to the north and the west of Galveston Bay voted in the Stock Laws in the 1930s, but ranch land east of Galveston Bay kept open range until the 1950s. Image courtesy Gallaway Collection.
Water Use

The demand for fuel to operate internal combustion engines brought about a fundamental change in groundwater usage from the aquifers under Galveston Bay. The growth of refinery operations on or near the new Houston Ship Channel and at Texas City was dependent on water resources (Sibley 1968). The refining process uses extremely large quantities of water—up to 1,851 gallons of water to refine 1 barrel of petroleum. During the late 1930s and early 1940s the artesian wells (Figure 3.16) drilled in the late 1800s stopped flowing.

Industry was not the only user of groundwater in the region. Groundwater irrigation was used for rice farming in the Katy area. The City of Galveston and the entire island depended on groundwater from the mainland. The City of Galveston drilled numerous wells at Alta Loma into the same water sand tapped by the early wells of the industries at Texas City.

As water demand rose, surface water sources were developed to meet the demand. During the 1940s, the Houston region began to see some surface water use from Sheldon Lake and the San Jacinto River. In the 1950s, Lake Houston began supplying some of the city’s water. Slowly the use of groundwater was shifted to surface water as fresh water tributaries flowing into Galveston Bay were dammed and reservoirs built to meet the constantly increasing demand. The brackish water of Turtle Bay (Lake Anahuac) was converted to fresh water to meet the demands of the growing rice fields in Chambers County. Today water from the Brazos River is diverted to a reservoir at Texas City to supply industry (Paulsen et al. 1941; Gabrysch et al. 1974).

Fisheries

By 1910, the Galveston Bay oyster industry had grown to such an extent that articles filled the newspapers saying that the public oyster beds could no longer supply the demand. Problems, ranging from slow growth to disease, plagued oyster production in Galveston Bay by 1913. A state biologist decided the cause was overproduction and recommended dredging to thin out the reefs. State law was changed and the dredging of live oysters was
permitted. By 1929, this law had been misused, and dredging was labeled as “the source of all evils” for the loss of oyster production in the bay (Anonymous 1910, 1912; Tucker 1929).

The fishing industry still depended on bay and gulf seines to harvest fish. A marked decline in the fish population of Galveston Bay was noted before 1900. Breeding-season closures were instituted in most of Galveston Bay to protect fish in nursery grounds. In 1907, the total catch of fish from Galveston Bay was 185,119 pounds. The state reported that the catch was not enough to supply local markets. Saltwater fish hatcheries were proposed as a solution to the shortage. Controversy between fishermen and state commissioners over the closures to seining and netting kept restrictive netting laws from being passed until 1929, when all littoral waters were closed permanently to drag seines. Gill nets would replace the fishermen’s drag seines for several decades (Tucker 1929).

After 1920, shrimping became a vital fishing industry in Galveston Bay (Figure 3.24). Gasoline motors were used to power boats and canning factories were built throughout the bay. By 1932, the U.S. Bureau of Commercial Fisheries and the Texas Game, Fish and Oyster Commission began the first shrimp studies. After World War II, shrimping in Galveston Bay waters increased even more, and it quickly became the leading fishery of Galveston Bay and the state of Texas (Gallaway 1999b).

Transportation and Shipping

The discovery of oil in the region and the increase in refining caused a shipping boom in Houston. In 1930, shipping exports from Houston included 2,069,792 bales of cotton and 3,920,100 tons of petroleum products. Grain exports reached a total of 4,947,515 bushels that same year. Barely 30 years into the new century, Houston had taken the lead over Galveston in shipping by sea (Sibley 1968).

Oil, Natural Resources, and Industry

When oil was struck at Spindletop near Beaumont in 1901, the event signaled great change for Galveston Bay, as oil quickly replaced cattle and cotton as the king revenue producers and the bay shore, open range, and ranches became the sites of thousands of oil derricks. Experienced oilmen and inexperienced wildcatters came to the southeast coast of Texas in droves to place their claim to the new “black gold.”

Because of the flat, level topography of the prairies, any rise in elevation was quite apparent. The salt domes just under the crust of the earth were the first to be discovered and drilled. Oil speculators traveled miles
across the wet coastal prairies by horseback and wagon to be the first to locate and buy or lease the “hills” from local landowners. Travel was limited to 30–35 miles per day because there were no automobiles and few roads. The surface salt domes created a “hill” and the level prairie surrounding the base of the hill usually held the runoff from the higher elevation. Oil exploration was a very messy endeavor after the heavy drilling equipment was hauled in by mule or oxen teams and wagons. The black gumbo soil was churned into quagmires (Barton et al. 1936).

Access to early technology was limited to the larger investors who could pay for geologists and geophysicists. Wildcatters without wealthy funding resources used unconventional exploration methods. “Oil witching” became a lucrative business for the people in the “water witching craft.” The witcher’s tool was usually a Y-shaped green twig from a witch hazel, willow, or peach tree. The witcher would hold the top arms of the Y, one in each hand, with the tail of the Y pointing up towards the sky. The best place to drill was identified as the point at which the tail of the Y rotated, pointing to the ground. It was said that the Humble Dome field was discovered through oil witching and that Joseph Cullinan purchased a portion of the field and brought in a well that produced a million barrels of oil in 90 days (Dumble 1928; Vogt 1952).

All early drilling was extremely dangerous. Oil gushed from the wells until they were capped, and wooden derricks were so close together they sometimes touched. Fires were frequent and deadly. Hydrogen sulfide gas escaped from some of the wells, killing and blinding many. The early southeast Texas oil fields “came in with a rush, rose to their culmination and then declined and were finally flooded with saltwater” (Dumble 1928).

Figure 3.25. The Goose Creek oil field in Tabbs Bay near Baytown. Image courtesy National Archives.

After Houston’s industrial growth was initiated by the Spindletop discovery in 1901, rapid discoveries of oil fields between Beaumont and Houston soon followed: Sour Lake in 1901, Saratoga in 1902, Batson in 1904, and Humble in 1905. Barber’s Hill and Goose Creek (Figure 3.25) in 1908 quickly followed. Although oil was brought in at Goose Creek in 1908, prolific production was not established until 1916 when a 3,000-foot well was drilled into sands of Miocene age (23 to 5 million years B.P.). The High Island dome was first drilled in 1901, but its first caprock production occurred in 1922.
Miocene-sand production exceeded caprock production, making Goose Creek the first significant Miocene production on the Texas coast. Drilling technology rapidly improved, and wells were drilled to deeper and deeper depths.

During the early 1920s, micropaleontology was used by Shell Oil Company geologists to locate oil. By 1924, the first seismic crews were working in the Gulf Coast. Wells 5,000 feet deep became common after 1929. By 1935, the coastal salt-dome oil fields of Texas had produced 942,586,244 barrels of oil along with natural gas and distillate, sulfur, rock salt and gypsum. By 1936 the following oil fields, salt-domes and prospective fields had been identified at locations around Galveston Bay: West Bay (Hoskins Mound, Danbury, Halls Bayou, Hitchcock, and Greens Lake), East Bay and Trinity Bay (Lost Lake, Moss Bluff, Anahuac, Jackson Ranch, Salt Cedars, Oyster Bayou, High Island, and Bolivar Peninsula), and Galveston Bay (San Leon, Dickinson, Genoa, Red Bluff, Deer Park, Goose Creek, and Barbers Hill).

Hoskins Mound, located 4 miles from West Bay, yielded sulfur. By 1930, it had produced over 4 million long tons of sulfur (Barton and Sawtelle 1936). Joseph Cullinan founded the Texas Company—renamed Texaco in 1902. In 1905, he moved his headquarters to Houston. After he retired from Texaco in 1913, he continued to stay active in the growth of the new oil town. He served as president of the Houston Chamber of Commerce from 1913 until 1919. He strongly supported the development of the Houston Ship Channel. The discovery of oil around Galveston Bay soon exploded into an oil-refining industry. The first oil refinery was built at Texas City in 1908 by the Texas City Refining Company, now the Sid Richardson Refining Company.

By 1917, World War I produced a demand for petroleum. Lumber barons were investing their fortunes in drilling for oil. Cattlemen who owned large acreage of rangeland began leasing to the oil companies. In 1917, Humble Oil, Paraffin & Reliance, Shultz Oil, Ardmore Oil, and Globe Refining companies merged to form the huge oil conglomerate known as Humble Oil and Refining Company. In 1919, Humble Oil sold 50 percent of its stock for $17 million to Standard Oil Company of New Jersey to secure the funds to build a refinery on the Houston Ship Channel at Buffalo Bayou. Some of the funds were used to buy land and for employee housing. Humble continued this practice as its production expanded and “Humble Camps” were...
established in many communities in the Galveston Bay region. Humble Oil became Exxon and later Exxon-Mobil (Dunbar 1982; Pfennig 1990).

By 1927, eight oil refineries were in operation on the tributaries of Galveston Bay. After 1930, new oil refineries were built on the upper reaches of the Houston Ship Channel and on the southwestern shore of the bay in Texas City. Refinery development in Texas began in 1920 when Vacuum Oil built a crude-oil tank farm, and the Republic Refining Company constructed a refinery on the site in 1933. Standard Oil bought an interest in the Pan American Petroleum and Transport Company in 1925. Four years later, Standard Oil acquired more Pan American stock, bringing its ownership to 81 percent. Through this relationship, Pan American introduced Standard Oil to the American Oil Company. In 1933, Pan American began construction of a 25,000 barrel per day refinery incorporating the Republic Refining Company and the Vacuum Oil tank farm. The Pan American Oil Refinery became American Oil (Amoco). Today, this refinery in Texas City is owned by British Petroleum (Sibley 1968; GBNEP 1994a). In 1928, the Roxana Petroleum Company of Oklahoma became part of the Shell Petroleum Company and built a refinery on the Houston Ship Channel in Deer Park (Wells 1979).

The early industrial development highlighted above was the beginning of a trend that resulted in the highest concentration of refineries and petrochemical plants in the world along with a very high concentration of oil and gas wells in and around Galveston Bay. The Houston Ship Channel and Texas City would become the industrial centers of Galveston Bay. Many of the companies that established themselves in these locations in the 1920s and 1930s would become the large oil refining corporations that we recognize today.

**Summary**

Archaeological evidence shows that humans have been using the resources of Galveston Bay for at least 11,000 years. Early hunter-gatherers modified the bay environment by harvesting shellfish and other wildlife, producing shell middens and introducing plants from other ecoregions. After 1800, settlers exploited the fish, shellfish, prairies, and forests in and around the bay to develop the early fishing, cattle and lumber industries. Commercial fishing for shrimp, oysters, and fish continues today with modern technology, but the composition of the catch has changed.

**Figure 3.27.** The old (top) and new (bottom) Galveston Causeway, 1912. Image courtesy Galveston County Historical Commission.
In addition to its biological resources, the bay’s physical resources were exploited as well. The bay and its tributaries yielded construction materials in the form shell, sand and clay. Ranch land composed of upper prairies and lower saltgrass-marsh areas were used over time for other purposes including farming, oil extraction, and industrial and urban development. Riparian resources became scarce and the lumber industry disappeared from the vicinity of Galveston Bay.

Alterations of the bay for navigation include channels to 3 major ports and many smaller harbors. Dredged material from the Gulf Intracoastal Waterway, the Texas City Channel, the Galveston Channel, and the Houston Ship Channel have been deposited on the open-bay floor or into designated containment areas, creating planned and unplanned islands which alter bay currents. Heavy exploitation of buried shell and groundwater produced detrimental effects. Growth of the petroleum industry led to changes of land use in and around Galveston Bay. Industrial and residential growth increased the use of groundwater, which attributed to subsidence and taxed the limits of aquifers.

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