- 22 miscellaneous gases and products; and
- 8 were listed as idle.

Based on the findings of the HTRW survey, there is moderate potential of encountering contaminated material during construction of the project. According to TNRCC regional officials, the industrial activity adjacent to the Inner Harbor of the CCSC and the turning basin of La Quinta Channel has caused measurable impacts to the groundwater adjacent to the waterways. The seepage of contaminated groundwater to these waterways has resulted in the potential of impacting channel sediments (refer to Section 3.3 for sediment quality). However, all material from the Inner Harbor will be placed in confined upland areas and the only project activity for the La Quinta Channel is extension beyond the turning basin.

The TNRCC reported a contaminate plume containing hydrocarbons and chromium seeping into the Inner Harbor adjacent to the Elementis Chrome facility. According to analytical results of sediment samples collected from the channel in 1983, 1988, 1991, 1994, 1997, and 2000, chromium was found above detection limits, but well below the ERL, at all sampling stations for each year. Hydrocarbons were not detected in the samples until the 2000 sampling event. The TNRCC reports that the release of hydrocarbon-contaminated groundwater to the waterway has been significantly reduced or eliminated since mid-2000.

The TNRCC also reported a contaminate plume containing carbon tetrachloride and perchloroethane seeping into the La Quinta Channel turning basin adjacent to the DuPont Corpus Christi Plant. Previous analytical testing of water and sediment samples included basic and supplemental parameters but did not include these two constituents of concern.

In addition, with the laws and regulations which govern the handling of hazardous material, there is a decreased risk of future releases of hazardous material causing long-term detrimental impacts to the sediments of the study area. However, any activity regarding releases of hazardous material into the waters of the study area and the resulting remediation should be monitored through the regulatory agencies.

3.8 HISTORIC RESOURCES

The Corpus Christi study area is located in the Southern Coastal Corridor (SCC) Archeological Region of the Central and Southern Planning Region of Texas as delineated by the Texas Historical Commission (Mercado-Allinger and Ricklis, 1996). This Archeological Region encompasses the Coastal Bend from the Colorado River in Matagorda County south to the Rio Grande (Bailey, 1987; Ricklis, 1990). The study area is confined to the Corpus Christi and Nueces bays in San Patricio and Nueces counties.

The SCC Archeological Region contains five subareas, each possessing unique geographic and cultural features. The current study area in Corpus Christi Bay is in the Aransas/Guadalupe subarea with a small portion in Nueces County being included in the Baffin/Oso subarea. In these subareas the primary resource zones are the coastal estuaries and terrestrial flood plains with adjacent prairies.

3.8.1 Cultural History Overview

Archaeological evidence supports the continued presence of indigenous groups in the SCC Archeological Region from at least 10,000 B.C. through the time of European contact and colonization (Mercado-Allinger and Ricklis, 1996). The generally accepted cultural history of the area is divided into four periods, the Paleoindian, Archaic, Late Prehistoric, and Historic. Each of these periods is briefly summarized below.

3.8.1.1 Paleoindian Period

The Paleoindian period in the SCC Archeological Region is the earliest recognized cultural period, dating from at least 10,000 B.C. to circa 6,000 B.C. Little is known about this initial adaptation of the region, but researchers have suggested that this period was marked by a very low population density, small band sizes, and extremely large territorial range (Black, 1989). Material indications of the Paleoindian period include projectile point types such as *Clovis*, *Folsom*, *Scottsbluff*, and *Angostura*. Many of the Paleoindian diagnostic materials are surface finds although some have been from subsurface contexts. In Nueces County the presence of early materials along Oso and Petronila creeks demonstrates that assemblages dating to Paleoindian times occur in this region (Shafer and Bond, 1983). A site in Nueces County with a possible Paleoindian component is 41NU246, the Petronila Creek Site. This site is not located within the Corpus Christi study area.

3.8.1.2 Archaic Period

The Archaic period (approximately 6000 B.C. to A.D. 1200) is identified during the early and middle Holocene by intensive human utilization of a wide variety of ecological niches including the coastal zone. The tripartite division of the Archaic is the Early (6000 B.C. to 2500 B.C.), Middle (2500 to 1000), and Late (1000 B.C. to 1000 A.D.) subperiods. The Early Archaic is the least well understood, but represents a period of transition beyond the Paleoindian period. Some characteristics of the earlier period are still present, such as careful chipping of stone tools and occupation of older sites, yet distinctive artifact styles are found. Large triangular points, corner notched points, stemmed points (*Gower*) and large-barbed points (*Bell*) begin to appear. Population density remains low during this time and large territorial ranges are still utilized (Black, 1989). Sites dating to this subperiod occur in the SCC Archeological Region. Sites with identified Early Archaic deposits in Nueces County include 41NU124, the Means Site (Fox and Hester, 1976) and sites at White's Point on Nueces Bay (Ricklis, 1993).

During the Middle Archaic subperiod exploitation of marine resources appears to have accelerated. This may be evidenced by the thicker shell strata evident in shell middens as well as the more abundant fish remains. The presence of central Texas related groups in the study area during the Middle Archaic and later periods is more conclusively indicated. Clear Fork Phase, *Nolan* and *Travis* type dart points, dated to the beginning of the Middle Archaic period (Prewitt, 1981) occur at three sites, 41KL5, 41KL8, and 41KL9 (Campbell, 1964). Single specimens of later Middle Archaic *Lange* points (Prewitt, 1981) were collected from site 41KL3 (Campbell, 1964).

During the Late Archaic the sea level stabilized at its modern position and remains from this period are abundant and varied. Sites dating to the Late Archaic in the SCC Archeological Region are

shell middens with thick deposits that yield a greater range and quantity of artifacts than do the shell middens dating to the Early Archaic. All of this suggests more frequent and/or intensive occupations than previously, and perhaps a higher regional population density (Ricklis, 1995). Settlement during this time is also characterized by summer occupations in the interior portions of the study area resulting in open lithic scatters. Numerous cemeteries have been identified in the SCC Archeological Region dating to the Late Archaic and Late Archaic/Late Prehistoric associations.

3.8.1.3 Late Prehistoric Period

The Late Prehistoric Period is represented by the Rockport phase in the SCC Archeological Region. With the advent of the bow and arrow and ceramic vessels, the Rockport focus replaces the Aransas focus. The later phase is characterized by the exploitation of larger game and an intensified exploitation of fish (Campbell, 1964). Settlement and subsistence patterns during the Rockport phase involved, to some significant degree, shifting seasonal emphases, with occupation of shoreline fishing camps during the fall through winter-early spring, and later spring through summer residences at hunting camps commonly located along the upland margins of stream valleys (Ricklis, 1995). Both shell middens and lithic sites of this phase tend to be stratified, indicating seasonally inhabited sites. This is probably a result of food resources along the coast and on the barrier islands being more seasonally specific (Thomas and Weed, 1980a).

Artifacts representative of the Rockport phase include, *Perdiz* projectile points as well as *Fresno*, *Young*, *Cliffton*, *Scallorn*, and *Starr* types and *Rockport* ceramic wares (Campbell, 1956). In terms of resource exploitation and cultural assemblages, the pattern for this phase tentatively established a link between the Rockport phase sites and the Karankawas, a historically known coastal group of Coahuiltecan speaking indigenous people (Thomas and Weed, 1980a). The Rockport phase dates from about A.D. 100 until the extinction of the Karankawas in the mid-nineteenth century (Newcomb, 1993). Most of the prehistoric sites thus far investigated in depth in the area are interpreted as reflecting a littoral adaptation with a secondary dependence on inland prairie resources (Prewitt, 1984). Historically, the Karankawa are reported to have camped on shell middens located near sources of fresh water whenever possible. Artifacts associated with Rockport phase sites include shell containers, jewelry, shell working-tools, asphaltum, burned clay nodules, sandstone shaft straighteners, and decorated ceramics including polychrome (Calhoun, 1964), asphaltum-painted black on gray (Fitzpatrick et al., 1964) and scallop-shell scored (Calhoun, 1964).

Late Prehistoric cemeteries and burials are relatively common along the Texas coast and are often found in clay dunes (Headrick, 1993). One coastal cemetery is documented for the Oso Creek/Oso Bay area in Nueces County. According to Hester (1980) the Texas coast encompasses the largest number of prehistoric cemeteries in the region. One of these cemetery sites 41NU2 (Calle del Oso) is one of the largest known. At one time it may have contained as many as 600 burials. Unfortunately, this site has been largely destroyed by development and adequate studies were never conducted at the site. It is believed that site 41NU2 may have also been in use during the Late Archaic period. Another cemetery located in Nueces County is the Berryman Site (41NU173) (Hall, 1987).

3.8.1.4 Historic Period

The post-contact historic period for the Texas coast and south Texas effectively begins with the explorations of the Gulf of Mexico by Spanish explorers seeking to locate new land and economic resources for the Spanish royal crown in Madrid. The first European explorer known to have visited the area of Corpus Christi and Nueces bays was Alonso Alvarez de Piñeda in 1519. Piñeda explored and mapped the Gulf Coast from Apalachicola to the Yucatan and became the first European to sail through Aransas Pass into a shallow body of water he named Corpus Christi Bay. Following Alonzo Piñeda's initial mapping of the Gulf of Mexico and Corpus Christi Bay in 1519, Cabeza de Vaca traversed the area in the 1520s (Webb, 1952).

Two historic Indian groups inhabited the Texas coastal area at that time: the Coahuiltecan and the Karankawas. These nomadic hunters and gatherers were decimated by European diseases and by encroachment of the Spaniards from the south and the Apaches and Comanches from the north, as well as by the Anglo-Americans from the east. By 1850 neither the Coahuiltecans nor the Karankawas occupied the coastal area (Campbell, 1956).

Coahuiltecans

The Coahuiltecans settled primarily on the mainland and only after contact with the Spaniards did they venture out onto some of the islands (Thomas and Weed, 1980a). Some of the Coahuiltecan bands were the Orejon, west of Corpus Christi Bay; the Malaquite, along the coast from Corpus Christi Bay to Baffin Bay; and the Borrado, in the area from Baffin Bay to the Rio Grande (Scurlock, et al., 1974). Each band occupied a territory that included both inland and coastal areas at either end of their yearly-round. Population was estimated to be about 15,000 individuals with about 220 bands identified in 1690; however, by 1870 only remnants of the population remained (Thomas and Weed, 1980a). The influence of the Coahuiltecans on Padre Island was primarily from their trade with the Karankawa. The Coahuiltecan worked extensively with basketry, which they traded with the Karankawa, and worked to a lesser degree with ceramics.

As mentioned above the Coahultecans were not, nor are they today, one group of people, rather they were a conglomerate of different bands probably joined by the Coahuilteco language. Currently there are groups from the coastal plains of northeastern Mexico and adjacent southern Texas that have organized into the Coahuiltecan Nation (Gardner, 2001). Even though they are not an Indian tribe *per se*, on December 2, 1997 the Coahuiltecan Nation submitted a Letter of Intent to Petition for Federal recognition to the Bureau of Indian Affairs. However, as of now, they are not a Federally recognized Indian tribe (Gardner, 2001).

Karankawas

The Karankawa, unlike the Coahuiltecan, occupied the coastline and barrier islands from Trinity to Aransas bays (Thomas and Weed, 1980a). Five major groups were historically documented and included the Capoques and Hans to the north; the Kohanis around the mouth of the Colorado; the Karenkake, Clamcoets, and Carancaquacas on Matagorda Bay and Matagorda Island; and the Kopanos, along Copano Bay and St. Joseph's Island (Scurlock et al., 1974). According to early European accounts,

the Karankawa subsisted primarily on oysters, clams, scallops, other mollusks, turtles, various fish species, porpoises, and several marine plant species (Thomas and Weed, 1980a). Other ethnographic and archaeological evidence supports the contention that historic Karankawas resided during the fall and winter in large shoreline camps of 400-500 people, during the spring and summer they camped along stream courses in bands averaging about 55 individuals (Ricklis, 1992). Karankawa sites were generally located in sheltered bays or on the leeward side of stabilized dunes on the Laguna Madre side of Padre Island (Thomas and Weed, 1980a).

Like the Coahuiltecans, cultural material of the Karankawa was sparse. Huts were constructed of willow branches covered with brush, with hearths in the center of each hut. They did, however, have several varieties of ceramics used for cooking and eating. These were decorated and sometimes coated with asphaltum. The ceramics were globular in shape, reminiscent of Rockport phase types (Thomas and Weed, 1980a).

By the 1700s, the indigenous populations were being affected by Spanish missions and presidios such as the Goliad missions of Espiritu Santo and Rosario, as well as by raiding Lipan Apaches and other central and southwestern groups (Mounger, 1959; Headrick, 1993). Due to the ill treatment the indigenous populations received from the Spanish, especially the Spanish military, prior friendly relations became increasing hostile (Newcomb, 1993). By the early-nineteenth century the increase in Anglo and Mexican ranchers and the establishment of coastal ports and towns left the indigenous populations without access to the coastal resources needed for subsistence. By the early 1840s, most remaining members of the Karankawa tribe had migrated to Mexico. After this time the Karankawa either dispersed or assimilated into other groups. Currently the Karankawa are not a Federally recognized tribe nor is there an extant Karankawa tribe (Gardner, 2001).

European Settlement

Little exploration or settlement took place in the Corpus Christi Bay region during the first two centuries following Piñeda's discovery of the bay in 1519. The Spanish government only regained interest in colonizing this region after the French explorer Réne Robert Cavelier, Sieur de La Salle claimed land in the Northern Gulf of Mexico for France in 1685. La Salle mistakenly entered Matagorda Bay while searching for the entrance to the Mississippi River. His expedition established the settlement of Fort St. Louis there on Garcitas Creek, some 50 miles north of Aransas Bay (Weddle, 1991). This colonization attempt failed, and most of the colonists perished, but the significance of its attempt spurred the Spanish to action. Wanting to protect their interests in Texas and their silver mines in Northern Mexico, Spain sent Alonso de León to reconnoiter the French fort and report back his findings. De León made several attempts and in 1688, he reported to the Spanish government that the threat from La Salle was over and that the fort had been destroyed (Weddle, 1991).

Hostilities between the French and Spanish over what was to become Texas continued into the eighteenth century. In 1720, France sent Jean Béranger to explore and map the Gulf Coast. He visited Aransas Bay and described the local inhabitants and their environment in detail. This expedition and that of La Salle, forced Spain to realize a more aggressive approach had to be taken in regards to Texas. In response to this conclusion, by 1726, Spanish missions or presidios had been established from

East Texas near the French post of Natchitoches on the Red River to Matagorda Bay and the Guadalupe River. This arrangement of presidios and missions provided Spain with a continuous system of communication across Texas and helped curb the immigration of Anglo-American settlers.

Spain's ability to control Texas began to deteriorate when Mexico waged war for independence. Over the next 10 years (1811-1821), resources were pulled away from the Texas frontier and an influx of Anglo-American immigrants came to Texas. This immigration was illegal until 1823, when the newly formed Mexican government passed the Imperial Colonization Law. The law invited individuals of Roman Catholic faith to settle in Mexico including Texas (Freeman, 1990). In addition, Mexico granted large tracts of land to immigration agents, called empresarios, who were given the authority to parcel out the land to settling families. Stephen F. Austin became the first empresario in Texas and was granted permission to search for land to colonize. Austin traveled the entire coastline of Texas, including the region of Corpus Christi Bay before he settled on the land between the Lavaca and Brazos rivers. Further development came in 1824 when the Mexican Congress incorporated all of Texas into a new state, Coahuila y Tejas, with its capital at Saltillo. At that time, states within the Mexican interior were given the power to set up land grants for colonization. As a result, Coahuila y Tejas granted more than 2 dozen empresario contracts.

As the numbers of Anglo-American's increased due to immigration, the tension between the Mexican government and the new settlers increased. Prior to 1821, the majority of American settlers in Texas were not actively seeking independence. Most settlers sought more influence over local affairs and greater control over their economy. Mexico, hoping to halt further American incursions into the region, enacted a law on April 6, 1830, supporting further military occupation of Texas, and increased colonization by Mexicans and Europeans. Mexico also insisted on increased trade between Texas and Mexico. The American settlers resented this action and in response, organized the Conventions of 1832 and 1833 to voice their complaints about the Mexican Government and to draft a constitution for Texas. As a result of the growing unrest by the American settlers, the Mexican Government sent General Juan N. Almonte to Texas on a tour of inspection in 1834. Almonte's recommendations were delivered to the Government but were never carried out (Guthrie, 1988). At this same time, the Mexican government placed the schooner *Santa Pia* in Copano Bay, hoping to help control spreading Anglo influence in Texas. None of these actions improved conditions and in 1835 armed rebellion broke out. As the war concluded with an independent Texas, settlement and economic growth of the area resumed.

Henry Kinney and his partner William P. Aubrey established Corpus Christi as a trading post in 1839. With more settlers coming to the region, overland trade developed between their post and Mexico and other inland posts (Pearson and James, 1997). As a maritime port however, Corpus Christi was slow to develop. With the shallowness of the bay and the numerous obstacles hampering navigation, only shallow draft vessels could service the town. Even with the development of overland trade, it was not until General Zachary Taylor stationed 4,000 troops at the post in 1845 during the Mexican American War that Corpus Christi began to flourish (Guthrie, 1988). With the conclusion of the war, the town was deserted almost overnight when Taylor's troops left. This soon changed as the California Gold Rush brought gold-seekers to Corpus Christi to purchase supplies and transportation west (Pearson and Simmons, 1995).

During the Civil War the area became an important center for Confederate commerce. According to Tyler (1996) not less than forty-five small vessels carried trade between Corpus Christi and Indianola. Small boats sailing inside the barrier islands transported goods from the Brazos River to the Rio Grande, while inland cotton was moved along the Cotton Road through Banquete to Matamoros and on to the mills in England. In an effort to halt the trade, Union forces seized control of Mustang Island in the fall of 1863, and twice Federal gunboats bombarded Corpus Christi and disrupted water transportation. The overland trade, however, continued without interruption until the end of the war.

After the Civil War, ranching developments characterized the area's economy. The expanding cattle industry came to dominate maritime commerce in the bays. With the growth of the packing industry, stockyards and packeries sprang up around Corpus Christi and other small settlements along the coast. These developments stimulated the growth of the area and increased the need for shipping to transport cattle out of the region and supplies back to the local populations. The use of Aransas Pass increased significantly, corresponding to the growth in these stockyards and packeries.

In the years 1871-1875, 171 ships made a total of 1452 crossings through Aransas Pass (Kuehne, 1973). During this period, the Morgan Line steamer *Mary* made 120 appearances, more than any other ship (Hoyt, 1990). By the late 1870s, when the cattle industry again started transporting their herds overland, cotton began to replace the tonnage lost from the cattle industry. By 1882, 364 bales were transported and it was predicted that in the near future, thousands of bales would be shipped yearly (USACE, 1882).

CATTLE EXPORTS FROM CORPUS CHRISTI BAY

Year	No. of Head Exported
1873	23,000
1874	26,000
1875	21,600
1876	18,300
1877	15,700
1878	One load
1879	None

Source: Hoyt, 1990.

History of Waterway Improvements in Corpus Christi Bay

Aransas Pass has remained the main entrance into Corpus Christi Bay since early historic times. Its dynamic nature, harsh environment and lack of deepwater channels has been a hindrance to traffic in and out of the bay throughout its development. The first navigation improvement in the bay system was a lighthouse that was erected on Harbor Island in Aransas Pass in 1856. This improvement quickly became immaterial as the unstable and shifting nature of the pass soon placed the lighthouse too

far north to be effective. It was because of this migration that one of the primary local navigation goals became stabilizing Aransas Pass (Pearson and Simmons, 1995).

Realizing the need to have a secure entrance into Corpus Christi Bay, a 600-foot-long wooden dike on St. Joseph's Island in 1868 was constructed. This project was an attempt to halt the migration and shoaling of the pass. The dike reportedly opened a 12-foot channel for several months. It was destroyed soon after, possibly by wood boring worms (mainly *Teredo navalis* [shipworm]) and wave action, and the pass shoaled back to 7.5 feet (Hoyt, 1990).

The shoaling of Aransas Pass became a serious problem for Corpus Christi Bay commerce by the late 1870s. Steamships could no longer enter the bay and after 1878, the majority of commercial products were sent via lighter to Indianola for long distance shipment (USACE, 1880 reported in Hoyt, 1990). It was obvious that the citizens around Corpus Christi Bay and their economic survival depended on a means to have a permanent entrance into the bay, and Aransas Pass was the only option.

In 1874, the Corpus Christi Navigation Company and Messrs. Morris and Cummings dredged the first deep-water channel into Corpus Christi Bay. This channel, known as the Morris and Cummings Cut, ran along the inshore side of Harbor Island and connected with Aransas Pass through the Lydia Ann Channel that lay between Harbor Island and St. Joseph's Island. The channel was approximately 8 feet deep, 100 feet wide and 6 miles long (Alperin, 1977; James and Pearson, 1991). It was later abandoned with the development of the Corpus Christi Channel (USACE, 1910:552).

While Galveston was initially chosen as the best location along the Texas coast for a deepwater port, several towns in the Corpus Christi Bay area were vying for government approval to be designated the main U.S. port in south Texas. The local inhabitants realized that without a continuous, direct deep-water route to its port facilities, in addition to a stable entrance into the bay, Corpus Christi Bay would not be able to compete. In response to this need, the Turtle Cove Channel Project was adopted in 1907 with the intention of dredging a channel 10 feet deep and 100 feet wide into Corpus Christi Bay. By 1910, the cut had been expanded to a depth of 12 feet. The channel, also known as the Corpus Christi Channel, extended 21 miles to Corpus Christi in 1926, of which only 12 miles between Port Aransas and McGloins Bluff required dredging.

With the completion of this channel, Corpus Christi had fulfilled its need for a deep-water route to its harbor, and thus could lead the economic development of the area. The Port of Corpus Christi was officially opened September 14, 1926, and chosen as the principle port in south Texas. At that time, a 25- by 200-foot channel extended across Corpus Christi Bay to Corpus Christi. The Corpus Christi Ship Channel was again closed for improvement in 1932 with the realization that an increase in vessel sizes led to an increase in vessel groundings. With the coming of larger ships with deeper drafts, the depth of the channel had to be increased to accommodate their size. A proposal to enlarge the channel to 37 feet deep and 400 feet wide was soon adopted (James and Pearson, 1991; Schmidt and Hoyt, 1995).

Another attempt at improving the navigation into Corpus Christi Bay is historically under documented. Packery Channel extended northward from its Gulf outlet, along the west edge of Mustang Island, passing to the east of the Crane Islands before entering the Bay. Historic documentation is made

more difficult because Packery Channel, currently one of three passes in the area, was originally referenced and documented on early maps as Corpus Christi Pass (Board of Engineers 1846; U.S. Coast Survey 1869).

During the nineteenth century, there was no channel outlet into the Laguna Madre, and much of the area between north Mustang Island and Flour Bluff is depicted on 1887 Coast Chart No. 210 as "...flats with less than 6 inches of water." Early maps and navigation charts list a maximum depth at both the Gulf and Corpus Christi Bay outlets of Packery Channel as no more than 2 to 3 feet. C.W. Howell, in an 1879 USACE annual report on a survey of the pass noted that "A man of ordinary stature can wade it now at several points" (1879:930). A notation on one of the USACE maps by Assistant Engineer H.C. Collins (Collins et al. 1878) states that water at the Gulf entrance did not exceed 2 feet in depth and was breaking across the bar. Collins' description of the survey states that their schooner could not enter the pass, and that a "yawl-boat" drawing only 1.5 feet was necessary to sail as close to shore as possible to take soundings.

At the time of Howell's survey and report Packery Channel was apparently little used, and he proposed constructing a dam to further restrict its flow (1879:930). The proposed dam was to be of stone construction approximately 1,900 feet in length, with the crest of the dam being no higher than the plane of mean low tide. Howell proposed that the dam would enable the pass to continue to act as a safety valve for major storm surges while at the same time increasing the tidal flows at the more important Aransas Pass. Howell also thought that the dam would improve the channel connecting Corpus Christi Bay and Laguna Madre to the south, noting that the latter bay was important because the beef packers along that portion of the coast required its salt production.

Although the USACE had concluded that the maintenance of Packery Channel was not a viable option, promoter and land developer Colonel E.H. Ropes was not dissuaded. In 1890 Ropes commissioned the steam powered "dipper dredge" *Josephine* to establish a cut through Padre Island at Packery Channel. While Ropes succeeded in cutting through the island the cut quickly filled. His dredge was unable to extricate itself and had to be abandoned (Alexander et al. 1950).

The role of Packery Channel in navigation to Corpus Christi Bay was seriously reduced by its tendency to shoal and by the economic interests in the last half of the nineteenth century, which favored the development of Aransas Pass for a shipping outlet. There are several reports of beef products being shipped outbound from Packery Channel to overseas destinations (Alexander et al. 1950:168) although some references suggest that the shallow pass required the use of lighter vessels to make the seaward connection. In one instance shallow-draft vessels were reported to be carrying packery products north through Corpus Christi Bay rather than seaward through Packery Channel.

Other improvements in the bay area included a channel through Harbor Island 25 feet deep and 250 feet wide to connect the town of Aransas to Aransas Pass in 1922 (USACE, 1922). Later, in the mid-1900s, the USACE was requested to dredge a channel through Ingleside Cove along the western side of McGloin's Bluff. This channel, known as the La Quinta Channel, was necessary for the development of the Reynolds Metal Company located northeast of McGloins Bluff. Bauxite ore would be brought from Jamaica to be processed at the plant. The Reynolds Metal Company requested that the

USACE dredge a 32-foot channel to its aluminum plant wharf at La Quinta in order for vessels to load and unload cargoes. Work began in 1954 on the 6-mile-long, 150-foot-wide La Quinta Channel. It was completed at 36 feet deep and 200 feet wide in 1958 (Alperin, 1977).

Potential Shipwrecks in the Project Vicinity

There have been a number of ships wrecked in Corpus Christi Bay and Aransas Pass during the historic period. Vessel losses, documented in numerous historic sources, have been summarized in several archaeological reports, among them Hoyt (1990), James and Pearson (1991), Schmidt and Hoyt (1995), Pearson and Wells (1995), Pearson and Simmons (1995), and Pearson and James (1997). Seventy-six shipwrecks are listed in those combined publications. Most of those wrecks are listed in the THC's shipwreck database. The THC gleaned information about those wrecks from a number of sources. James and Pearson (1991) added wrecks to the THC's list from government sources, including the U.S. Life-Saving Service, the U.S. Army Corps of Engineers and the U.S. Coast Guard. Other wrecks, especially more recent ones, are known from sources such as the Automated Wreck and Obstruction Information System (AWOIS) maintained by the National Atmospheric and Oceanic Administration. The AWOIS database contains information about wrecks and obstructions that appear on modern navigation charts. A combined list of shipwrecks from Pearson and Simmons (1995) and Pearson and James (1997) is reproduced below as Table 3.8-1.

The majority of wrecks are known to have occurred in the vicinity of Aransas Pass (the bay entrance, not the town), owing to the concentration of vessel traffic there combined with the hazards of shifting sandbars prior to construction of the jetties. At least 48 vessels wrecked in this vicinity. Another 28 wrecks are known from within Corpus Christi Bay, including Nueces Bay and adjacent portions of Laguna Madre. Vessel names are known for only 46 of the total 76 shipwrecks. These shipwrecks range in age from 1830 to 1981. At least 39 wrecks occurred prior to 1952. Vessels wrecked earlier than 1952 are at least 50 years old, thus meet the suggested age criterion for NRHP eligibility. Some vessels which wrecked within the past 50 years are, no doubt, older than 50 years, thus vessels should not be automatically disregarded based upon the year in which they were wrecked.

The number of shipwrecks that have been archaeologically documented in the vicinity of impact areas is significantly smaller than the total number of wrecks listed in the historic record. Only four shipwrecks have been confirmed in the vicinity of project impacts. This number includes the S.S. *Mary* (41NU252) (Hoyt, 1990; Pearson and Simmons, 1995) located on the southern channel margin between the jetties at Aransas Pass, an unidentified wreck (41NU264) located just south of the channel near the seaward end of the southern jetty (formerly identified as the *Utina* in both Pearson and Simmons, 1995 and Schmidt and Hoyt, 1995), a wreck believed to be the *Utina* (designated as Anomaly M39 until a trinomial site number is assigned) which lies against the submerged seaward end of the south jetty, and an unidentified wreck (designated as Anomaly M39 until a trinomial site number is assigned) located slightly south of the Corpus Christi Ship Channel opposite McGloin's Bluff. The latter wreck, discovered by PBS&J during the summer of 2001, may be the remains of the steamboat *Dayton* whose boiler exploded within a quarter mile of McGloin's Bluff in 1845 (Enright, et al., in preparation). Three other vessels, which may have a higher than average chance of occurring near project impact areas, include the small Confederate boats *Elma, A. Bee* and *Hanna.* These vessels reportedly were scuttled in Corpus

TABLE 3.8-1

LIST OF VESSELS REPORTED LOST
IN THE PROJECT STUDY AREA

Name of Vessel	THC Number	Vessel Type	Year Lost	Location
Vessels Lost in the Vicinity of Aransas Pass				
Unknown	113	Unknown	1830	Aransas Pass Vicinity
Cardena	115	Sail	1834	Aransas Pass Vicinity
Unknown	1678	Schooner	1834	Aransas Pass Vicinity
Wildcat	114	Unknown	1834	Aransas Pass Vicinity
Colonel Yell	192	Sidewheeler	1847	Aransas Pass Vicinity
Umpire	512	Sailing/ Steam	1852	Aransas Pass Vicinity
Unknown	1056	Unknown	1853	Aransas Pass Vicinity
Mary Agnes	655	Schooner	1862	Aransas Pass Vicinity
William Bagley	1045	Sidewheeler	1863	Aransas Pass Vicinity
Louisa	659	Schooner	1865	Aransas Pass Vicinity
L'éclair	1272	Schooner	1866	Aransas Pass Vicinity
Philadelphia	423	Sailing/ Steam	1868	Aransas Pass Vicinity
Mattie	653	Sailing	1873	Aransas Pass Vicinity
Mary	51	Sidewheeler	1876	Aransas Pass Vicinity
St. Mary	1004	Sailing/ Steam	1876	Aransas Pass Vicinity
Ramyrez	1049	Sail	1882	Aransas Pass Vicinity
Tex Mex	1412	Schooner	1882	Aransas Pass Vicinity
Two Marys	1411	Schooner	1882	Aransas Pass Vicinity
O. Jennings Gill	1386	Schooner	1887	Aransas Pass Vicinity
Henrietta	5	Schooner	1888	Aransas Pass Vicinity
Mystery	623	Sail	1899	Aransas Pass Vicinity
Mary Lorena	None	Schooner	1900	Aransas Pass Vicinity
Ellen	None	Schooner	1902	Aransas Pass Vicinity
Mary E. Lynch	None	Schooner	1902	Aransas Pass Vicinity
Silas	None	Schooner	1902	Aransas Pass Vicinity
Lake Austin	None	Schooner	1904	Aransas Pass Vicinity
Pilot Boy	None	Steamer	1916	Aransas Pass Vicinity
Utina	513	Steamer	1920	Aransas Pass Vicinity
Baddacock	None	Steam Tug	1920	Aransas Pass Vicinity
Unknown	1047	Unknown	1935	Aransas Pass Vicinity
Unknown	1048	Unknown	1935	Aransas Pass Vicinity
Coral Sands	197	Oil Steamer	1955	Aransas Pass Vicinity
Jiffie	None	Unknown	1955	Aransas Pass Vicinity
Princess Pat	None	Unknown	1958	Aransas Pass Vicinity
Cabezon	None	Unknown	1959	Aransas Pass Vicinity
Chuck A Dee II	175	Unknown	1963	Aransas Pass Vicinity
Liberia C	None	Unknown	1964	Aransas Pass Vicinity
Desco	214	Unknown	1966	Aransas Pass Vicinity
Unknown	1534	Unknown	1970	Aransas Pass Vicinity
Unknown	1535	Unknown	1970	Aransas Pass Vicinity
Unknown	1536	Unknown	1970	Aransas Pass Vicinity
Unknown	1537	Unknown	1970	Aransas Pass Vicinity
Jimbo	1031	Cabin Cruiser	1971	Aransas Pass Vicinity
De Rail	None	Cabin Cruiser	1972	Aransas Pass Vicinity
Unknown	1028	Unknown	1974	Aransas Pass Vicinity
Unknown	1019	Unknown	Unknown	Aransas Pass Vicinity
Jane and Julie	None	Fishing Vessel	1981	Aransas Pass Vicinity
Eagles Cliff	None	Cargo Ship	1981	Aransas Pass Vicinity

TABLE 3.8-1 (Concluded)

Name of Vessel	THC Number	Vessel Type	Year Lost	Location
Vessels Lost in the Corpus Christi Bay				
Dayton	208	Sidewheel Steamer	1845	McGloin's Bluff
Swallow	155	Unknown	1845	Nueces Bay
A. Bee	1797	Unknown	1862	Corpus Christi
Unknown	1787	Schooner	1862	Corpus Christi
Elma	1802	Schooner	1862	Corpus Christi
Hanna	637	Schooner	1862	Corpus Christi
Catha Minerva	1388	Schooner	1874	Corpus Christi
Captiva II	165	Lugger	1949	Nueces Bay
40 Fathom No. 12	256	Unknown	1955	Corpus Christi
Captain Steve	163	Unknown	1968	Laguna Madre
Unknown	1288	Unknown	1970	Corpus Christi
Unknown	1289	Unknown	1970	Corpus Christi
Unknown	1529	Unknown	1970	Corpus Christi
Unknown	1533	Unknown	1970	Laguna Madre
Unknown	1538	Unknown	1976	Corpus Christi
Unknown	1539	Unknown	1976	Corpus Christi
Unknown	1130	Unknown	1976	Laguna Madre
Unknown	1086	Unknown	1977	Corpus Christi
Unknown	1087	Unknown	1977	Corpus Christi
Unknown	1088	Unknown	1977	Corpus Christi
Unknown	1089	Unknown	1977	Corpus Christi
Unknown	1090	Unknown	1977	Laguna Madre
Unknown	1091	Unknown	1977	Corpus Christi
Unknown	1092	Unknown	1977	Corpus Christi
Unknown	1180	Unknown	1977	Corpus Christi
Unknown	1181	Unknown	1977	Corpus Christi
Unknown	1234	Unknown	1977	Corpus Christi
Unknown	1085	Unknown	1977	Laguna Madre

Source: Pearson and Simmons, 1995; Pearson and James, 1997.

Christi Bay to prevent their capture by Union forces. Their location is reported by Pearson and James (1997: 18) as either near the town of Corpus Christi or near the mouth of the Nueces River.

3.8.2 Previous Investigations

Some of the earliest archaeological investigations in this region were conducted in the 1920s. Syntheses of this work have been prepared by Suhm et al. (1954), Campbell (1958) and Briggs (1971). E.B. Sayles and two avocational archaeologists, George C. Martin and Wendell H. Potter, carried out some of this early work. They conducted an archaeological survey of much of the coastal zone north of Corpus Christi between 1927 and 1929 (Martin and Potter, n.d.; Sayles, 1953). In some instances, limited excavation was performed, but most of the materials were recovered from beaches and eroded bluffs. During the 1930s and 1940s, major archaeological excavations were conducted using Works Progress Administration assistance at the Johnson, Kent-Crane, and Live Oak Point sites on Live Oak Peninsula. These three shell midden sites were the first controlled excavations in the area. The Johnson and Kent-Crane sites were primarily associated with the Late Archaic subperiod.

Since the acquisition of the land by the National Park Service, two major archaeological investigations have been conducted within Padre Island National Seashore, as well as a number of more limited surveys related to proposed oil exploration and extraction activities. The first professional investigations on Padre Island were conducted by T.N. Campbell in 1963. Dr. Campbell relied on a number of avocational archaeologists during his reconnaissance survey of the then-proposed Padre Island National Seashore (Campbell, 1964). His survey areas were located between Corpus Christi Bay and a point about 15 miles north of Mansfield Pass. A total of 15 prehistoric and proto-historic sites were recorded, 12 of which were found within the proposed National Seashore boundaries. Three distinct clusters of sites were documented but were confined to the northern end of the island. The significance of this distribution, however, is uncertain because of erratic ground surface visibility and other problems in site identification.

From 1957 to 1963, Corbin (1963) conducted a number of surface surveys on the northern shore of Corpus Christi Bay that further defined the range of variability in Rockport ceramics. All of the sites recorded by Corbin (1963) were shell middens, except for one, the McGloin Bluff Site (41SP11). The McGloin Bluff Site is described in the site form as a large, open habitation site which yielded ceramics, lithic debitage and tools, and shell artifacts. The shell midden sites were all located along a narrow strip of land adjacent to the shoreline and were described as small, thin, and diffuse components probably due to short term occupation by small groups (Ricklis, 1999).

In 1968, Story excavated a midden at Ingleside Cove, north of Corpus Christi Bay in San Patricio County, that had been exposed by Hurricane Carla. This site exhibited several stratified Archaic and Late Prehistoric occupations with a subsistence base oriented heavily toward marine procurement. The Ingleside Cove Site provided an enormous amount of information regarding coastal adaptation and marine exploitation.

Limited archaeological investigations completed in the SCC Archeological Region include two cultural resource surveys located near the mouth of Baffin Bay. Both surveys were conducted by New

World Research (NWR) in 1980 (Thomas and Weed, 1980a, 1980b). Those surveys, combined, covered 5.5 miles of proposed pipeline easement. The survey corridor was examined at 66-foot intervals. The ground surface was generally visible, but grass was removed in an attempt to improve the visibility in heavily vegetated areas (Thomas and Weed, 1980a). In both surveys, systematic and intuitively placed auger holes were also excavated in an attempt to locate buried cultural materials. No evidence of either prehistoric or historic occupations was observed. In the following year, NWR also completed two surveys of proposed seismic lines opposite Port Mansfield (NWR, 1981a, 1981b).

The Center for Archeological Research (CAR) conducted surveys at three proposed well pad drilling sites (Gibson and Hester, 1982; Valdez 1982; Warren, 1985). Two of the drilling sites are within the Padre Island National Seashore near Yarborough Pass (Valdez, 1982; Warren, 1985) and the third is located in the vicinity of South Bird Island (Gibson and Hester, 1982). Investigations at all three of the drilling sites consisted of a surface examination only. No subsurface excavations were conducted. No cultural resources were observed at any of the well pad locations. Two alternative well pad locations within the National Seashore also were surveyed in 1984 by Prewitt & Associates, Inc. (Fields, 1984). The surface examination encountered areas of both poor and good visibility but found no evidence of either prehistoric or historic occupations. Two shallow trowel tests were dug at each pad location in order to document subsurface sediments.

Several major archaeological investigations have been conducted in the project vicinity. In 1977, the CAR conducted a survey of the Tule Lake Tract (Highley et al., 1977) for the USACE. Only one site, 41NU157, was located. That site was a large, heavily disturbed rangia midden with Rockport ceramics. In 1980, the Texas Department of Water Resources conducted a survey of the proposed Allison Wastewater Treatment Plant. Two large prehistoric sites, 41NU185 and 41NU186, were identified. Site 41NU185, a multi-component prehistoric midden, was subsequently tested by Texas A&M University (Carlson et al., 1982). In 1984, the USACE conducted a survey of two large proposed dredge disposal areas (Good, 1984). The survey resulted in the identification of one archaeological site, 41NU211, a large prehistoric occupation site.

In 1985 and 1986, Ricklis conducted excavations at the McKinzie Site (41NU221), a small multi-component occupation site in the Baffin/Oso subarea (Ricklis, 1986). Site 41NU221 is located on the edge of the uplands overlooking the floodplain of the Nueces River (Mercado-Allinger and Ricklis, 1996). The archaeological work conducted at the site identified two discrete prehistoric components, one Archaic and the other Late Prehistoric. Based on lithics and diagnostic ceramics the Late Prehistoric component has been assigned to the Rockport complex (Ricklis, 1988). The work at site 41NU221 yielded data that was incorporated into studies of seasonality and subsistence strategies.

Texas Parks and Wildlife has also completed an archaeological survey and history of Mustang Island in eastern Nueces County (Howard et al., 1997). The survey recorded two previously unknown sites, 41NU284 and 41NU285 and relocated previously recorded site 41NU224. All three sites contain prehistoric components, and two of the sites, 41NU224 and 41NU284, also contain late-nineteenth-century and early-twentieth-century components.

Cultural resource management surveys and testing programs have proliferated in the Baffin/Oso Subarea since the 1970s (Mercado-Allinger and Ricklis, 1996). This work has provided models of Late Prehistoric settlement and subsistence patterns, as well as native responses to Spanish colonization (Patterson and Ford, 1974; Carlson, 1983; Warren, 1987). Additionally, these investigations have also contributed to the enhancement of the Archaic chronology of the region (Ricklis and Cox, 1991; Ricklis, 1993, 1995). Three previous archaeological studies have been conducted in the vicinity of a new upland beneficial use area, BU Site E, proposed for use under the preferred alternative. Those studies include Corbin's (1963) investigations, a survey by McDonald and Dibble (1973) of a 2,300-acre tract for the Port of Corpus Christi Authority, and a recent survey and excavation conducted by Ricklis (1999). Ricklis' survey is particularly applicable to BU Site E. Ricklis' pedestrian survey of the La Quinta Terminal expansion area investigated 10 sites (41SP32-35, 41SP105-108, 41SP198 and 41SP199) all of which were recommended as ineligible for the NRHP. The THC concurred with that assessment. The Ricklis survey covered the entire area of BU Site E.

Several underwater archaeological investigations have been conducted in the Aransas Pass and Corpus Christi Bay areas, beginning in the late 1980s. Those studies incorporated historical research, remote-sensing surveys, diver evaluations, and data recovery. In 1989, Espey, Huston and Associates, Inc. (EH&A), now PBS&J, conducted a remote-sensing survey over an area within the Aransas Pass Channel to locate the remains of a sidewheel steamer *SS Mary* that sank in 1876 (Hoyt, 1990). Subsequent diving was conducted on the wreck to assess its condition and its possible eligibility for the National Register of Historic Places (NRHP). That work was performed as part of the Section 106 compliance process for the USACE, Galveston District (Hoyt, 1990). EH&A determined that the *Mary* was in poor condition. Nevertheless, the vessel was recommended as eligible for the NRHP based upon several factors, including its association with the Morgan Line, its long service as a typical coastal steamer of the period, and its construction by the innovative H&H Corporation (Hoyt, 1999). The THC concurred with their recommendation. The *Mary* is also eligible for designation as a SAL under the criteria specified in The Antiquities Code of Texas, Section 191.091.

In 1991 Coastal Environments Inc. (CEI) surveyed Aransas Pass and located seven magnetic anomalies (James and Pearson, 1991). Then in 1993, CEI conducted diver evaluations of those seven targets (Pearson and Simmons, 1995). The latter study included additional assessment of the *SS Mary*. During their survey and subsequent diver evaluations, CEI located the fragmentary remains of a vessel that was tentatively identified as the *Utina*, a ship built for the U.S. Emergency Fleet in World War I and wrecked on the south jetty at Port Aransas in 1920.

EH&A undertook further investigation of the same wreck in 1994 (Schmidt and Hoyt, 1995). Their investigations consisted of diving on the site in order to map and delineate the wreck's extent and prominent structures. That study suggested that the site was not archaeologically significant nor eligible for the NRHP because of its fragmentary condition and due to the fact that better preserved examples of the *Utina* vessel type exist elsewhere. Schmidt and Hoyt agreed with CEI's tentative identification of the site as the *Utina*, although they noted some inconsistency between the site and the physical description of the *Utina.* For example, there was no evidence of the heavy iron hull strapping known from historic documents to have been an integral part of the *Utina's* heavy construction.

A more likely candidate for the *Utina* was discovered inadvertently by PBS&J during the summer of 2000. A second wreck was discovered at the end of the south jetty while conducting a close-order magnetometer survey of the wreck CEI and EH&A had tentatively identified as the *Utina*. PBS&J designated that site, investigated by divers during the 1990s, as Anomaly M2. The latter wreck, first located by archaeologists in 2000, has been designated Anomaly M39. Dimensions of the side-scan sonar target associated with M39 closely match the size of the *Utina*. Furthermore, the *Utina* is known from historic documents, including photography, to have stranded on the Gulf end of the south jetty (Schmidt and Hoyt, 1995), precisely where M39 is located. Anomaly M2, on the other hand, is located in deep water between the jetties on the southern margin of the ship channel.

A strong case can now be made that the vessel at Anomaly M2, investigated by CEI and EH&A during the 1990s, is not the *Utina*. Schmidt and Hoyt (1995) had concluded that the M2 wreck was not archaeologically significant based largely on the fact that several better preserved Emergency Fleet vessels, constructed similarly to the *Utina,* exist in the Sabine River. Given this new information, however, the M2 wreck must once again be considered potentially eligible for the NRHP until such time as its identity can be firmly established.

CEI also conducted a remote-sensing survey of a 45-mile-long segment of the GIWW extending from the Ship Channel at the northern end of Corpus Christi Bay to Point Penascal, Texas (Pearson and Wells, 1995). A total of twenty features were recorded during this study. One of the targets exhibited characteristics similar to historic shipwrecks. A diver assessment of that target was conducted, given that the wreck of the *Dayton*, a sidewheel steamer that sank in 1845, had been reported in the vicinity. In 1996, CEI returned to conduct diving operations on the site to further investigate the remains. The examination revealed the target to be modern debris rather than the remains of an historic vessel (Pearson and James, 1997).

Under the direction of PBS&J, additional marine remote-sensing surveys were completed in June and December of 2000 and in June 2001 to determine whether any unrecorded shipwrecks possibly lie within the study area (Enright et al., in prep.). Those surveys were conducted specifically to investigate proposed impact areas under study in this FEIS. The surveys covered all impact areas that had not already been addressed either by previous studies or through consultation with the State Historic Preservation Office (SHPO). Areas adjacent the CCSC, surveyed in June 2000, included the proposed Outer Bar Channel Extension (an area measuring 800 feet x 1.9 miles and centered on the proposed channel), the existing Outer Bar Channel (a 200-foot-wide x 2.8-mile-long area on each side of the channel beginning 50 feet inside the existing top of cut), the Inner Basin (just inside Aransas Pass jetties) to La Quinta Junction (200 feet x 10.8 miles on each side of channel), La Quinta Junction to Light Beacon 82 (400 feet x 9.7 miles on each side of channel), and Light Beacon 82 to Inner Harbor (200 feet x 1 mile on each side of channel). Areas adjacent the La Quinta Channel, surveyed in June 2000, include areas measuring 200 feet wide on each side of the existing channel (5.3 miles long) and a block to encompass the proposed La Quinta Channel Extension and Turning Basin (5,000 x 7,400 feet). Proposed BU sites surveyed in June 2001 include sites CQ (4,975 x 5,175 feet, 591 acres), I (4,825 x 6,875 feet, 762 acres), P (650 x 2,550 feet, 28 acres), R (4,500 x 6,000 feet, 620 acres), and S (4,900 x 5,375 feet, 605 acres). Marine impact areas which were not surveyed include landlocked portions of the CCSC Inner Harbor Reach, offshore BU sites MN and ZZ, BU Pelican, BU Site L, the western 20 percent of BU Site

GH, and all existing open-water PAs (both bay and offshore). Anticipated impacts to all areas were discussed with the SHPO. Low probability areas and previously disturbed areas, the latter including all existing PAs, BU Pelican and BU Site L, were excluded from survey. The inner harbor reach, the offshore BU's and the western 20 percent of BU Site GH were considered low probability areas. In the case of the Inner Harbor Reach this was because of it's recent construction date (from 1934 to 1958).

Thirty-seven magnetic anomalies were recommended for avoidance or further investigation based upon PBS&J's initial survey completed in June 2000 (see interim letter report, Remote-Sensing Survey of Corpus Christi and La Quinta Channels, DACW64-97-D-0004, Delivery Order No. 0013, PBS&J Project No. 440507.00, Texas Antiquities Permit No. 2407). Those anomalies shared characteristics with anomalies recorded over documented shipwrecks. Anomalies M01-M37 include twenty-three along the Corpus Christi Ship Channel, thirteen along the existing La Quinta Channel and turning basin, and one in the proposed extension of the La Quinta Channel turning basin and placement area.

A close-order remote-sensing survey was conducted in December 2000 over the 37 anomalies identified by the initial survey. The purpose of the close-order survey was to increase the resolution of the data over the recommended anomalies in an effort to better discriminate between significant and insignificant anomalies. As a result of the close-order survey, 28 of the original 37 anomalies were removed from further consideration. Ten anomalies (M1, M2, M3, M7, M9, M14, M17, M21, M25 and M38), including one newly discovered during the close-order survey (M38), were recommended for either avoidance of diver assessment. Two additional anomalies, M12 and M13, were recommended for further investigation provisional upon the findings at M38. If M38 was determined to be potentially associated with the wreck of the *Dayton*, then M12 and M13 were thought likely to contain scattered elements from the explosion of the *Dayton's* boilers (see interim letter report, Close-Order Remote-Sensing Survey of 37 Anomalies along Corpus Christi and La Quinta Ship Channels, DACW64-97-D-0004, Delivery Order No. 0013, Modification 01, PBS&J Project No. 440507.00, Texas Antiquities Permit No. 2407).

Consultation with the SHPO reduced the number of anomalies requiring further investigation to nine. Anomaly M2, the wreck formerly identified as the *Utina*, was excluded from further investigation due to the previous diver investigations of the site. Diver assessment of the nine remaining anomalies took place during June and July of 2001. A remote-sensing survey of 5 BU sites (CQ, P, I, R and S) took place simultaneously. As a result of the BU survey, diver assessment of two additional anomalies (I1 and I3) was appended to the diving on the other nine anomalies. Based on the diver assessments, ten of the eleven anomalies investigated were determined to be unassociated with historic shipwrecks. Anomaly M38, on the other hand, was determined to be associated with a shipwreck. Furthermore, the location, construction style and width of the wreck were all consistent with what is known of the *Dayton* (see interim letter report, Remote-Sensing Survey of Beneficial Use Areas and Diver Assessment of Eleven Anomalies, Corpus Christi and La Quinta Ship Channels, DACW64-97-D-0004, Delivery Order No. 0018 and Modification 01 to the same, PBS&J Project No. 440879.00, Texas Antiquities Permit No. 2407).

Additional consultation with the SHPO following discovery of the shipwreck at M38 resulted in concurrence with PBS&J's recommendation for further investigation of anomalies M12 and M13, both located adjacent M38. Diver assessment of M12 and M13 was conducted in October 2001. None of the objects causing those two anomalies appear to be associated with a shipwreck (see interim letter report, Diver Assessment of Two Anomalies for Historic Properties Investigations, Corpus Christi Ship Channel Improvements and La Quinta Channel Improvements and Extension, DACW64-97-D-0004, Delivery Order No. 0020, PBS&J Project No. 440966.00, Texas Antiquities Permit No. 2407). Anomaly M38 is considered potentially eligible for the NRHP and should be avoided by all future bottom disturbing activities.

3.8.3 Records Review

Records were reviewed at the Texas Archeological Research Laboratory (TARL) and at the THC to identify known cultural resource sites and to determine the location and type of sites previously identified in the study area vicinity. The listings on the National Register of Historic Places (NRHP) were reviewed for sites listed on, or determined eligible for, inclusion on the NRHP. The list of State Archeological Landmarks (SAL) prepared by the Department of Antiquities Protection at the THC was consulted for sites determined significant by the State. The Historical Marker Program of the THC was also consulted.

Based on the site maps at TARL, the review revealed 143 previously recorded terrestrial sites within 500 feet of the coastline, in the Corpus Christi Study Area. The THC records identified two of those 143 sites as having been determined eligible for listing to the NRHP. Those two sites, 41NU185 and 41NU219 are both prehistoric occupations. Ten SAL designated terrestrial sites (41NU7, 41NU15, 41NU40, 41NU41, 41NU86, 41NU87, 41NU88, 41NU89, 41NU185, and 41NU286) were also identified during the THC file review. The SAL sites are all prehistoric shell middens or campsites.

None of the NRHP eligible properties or SALs are located within the project impact areas. Site 41NU185 is located approximately 2.5 miles west of PA 7 (Site Tule Lake) and 41NU219 is located about 15 miles to the southeast of the impact locations. Site 41NU7 is at the northern end of Padre Island approximately 1.5 miles northeast of the eastern end of the causeway across the Laguna Madre. The South Guth Park Site, 41NU15, is located on the Oso Creek NE quadrangle map on the eastern bank of Oso Bay. This location is approximately 12 miles from the impact locations. The six King Ranch Prehistoric Sites (41NU40, 41NU41, 41NU86, 41NU87, 41NU88, 41NU89) that are designated SALs are located on the south bank of Oso Creek about 10 miles southeast of the impact locations. Site 41NU286 is located on the Estes topographic 7.5-minute quadrangle. The site is on Hog Island north of the Port Aransas Causeway.

Records for 81 historical markers were found for Nueces County and records for twenty-seven markers were found for San Patricio County. Some of these markers are 1936 Centennial Markers and some of the sites marked are Registered Texas Historical Landmarks.

PBS&J researched the THC shipwreck files recent AWOIS listings, and previous archaeological publications to determine whether any known shipwrecks are located within the current

study area. Three shipwrecks have been confirmed in the immediate vicinity of project impacts. This includes the wreck of the S.S. *Mary* (41NU252) (Hoyt, 1990; Pearson and Simmons, 1995) located on the southern channel margin between the jetties at Aransas Pass, an unidentified wreck (41NU264) located just south of the channel near the seaward end of the southern jetty (formerly identified as the *Utina* in Pearson and Simmons, 1995, and Schmidt and Hoyt, 1995), and an unidentified wreck (site number unassigned at present) located slightly south of the Corpus Christi Ship Channel opposite McGloin's Bluff. The latter wreck, discovered by PBS&J during the summer of 2001, may be the remains of the *Dayton* whose boiler exploded within a quarter mile of McGloin's Bluff in 1845 (Enright, et al., in preparation). The S.S. *Mary* has been determined eligible for the NRHP. Site 41NU264 and the vessel discovered recently near McGloin's Bluff are believed to be potentially eligible for the NRHP, although a formal determination has not been made for either site.

3.9 AIR QUALITY

The Clean Air Act, which was last amended in 1990, requires the EPA to set National Ambient Air Quality Standards (NAAQS) for pollutants considered harmful to public health and the environment. The Clean Air Act established two types of national air quality standards:

- Primary standards set limits to protect public health, including the health of "sensitive" populations such as asthmatics, children, and the elderly.
- Secondary standards set limits to protect public welfare, including protection against decreased visibility, damage to animals, crops, vegetation, and buildings.

The EPA Office of Air Quality Planning and Standards has set NAAQSs for six principal pollutants that are called "criteria" pollutants. They are carbon monoxide (CO), nitrogen dioxide (NO_2), ozone (O_3), lead (Pb), particulate matter with particle diameters of 10 micrometers or less (PM_{10}), particulate matter with particle diameters of 2.5 micrometers or less ($PM_{2.5}$), and sulfur dioxide (SO_2). In its General Air Quality Rules, the State of Texas provides for enforcement of the Federal NAAQSs. In addition, the TNRCC has set standards for net ground-level concentrations for particulate matter and sulfur compounds. Resulting air concentrations from sources on a property that emit these air contaminants should not exceed the applicable property-line standards. Air quality is generally considered acceptable if pollutant levels are less than or equal to established standards on a continuous basis. These pollutants are summarized in Table 3.9-1.

The Clean Air Act also requires EPA to assign a designation of each area of the U.S. regarding compliance with the NAAQS. EPA categorizes the level of compliance or noncompliance as follows:

1. Attainment – area currently meets the NAAQS
2. Maintenance – area currently meets the NAAQS, but has previously been out of compliance
3. Nonattainment – area currently does not meet the NAAQS

Nueces County is considered to be "near nonattainment" for ozone under Federal air quality standards and, therefore, is monitored closely by State and Federal environmental agencies. Once

TABLE 3.9-1

NATIONAL AMBIENT AIR QUALITY STANDARDS
AND TNRCC PROPERTY-LINE NET
GROUND-LEVEL CONCENTRATION STANDARDS

Air Constituent	Averaging Time	NAAQS Primary	NAAQS Secondary	TNRCC Regulation Standard
Sulfur Dioxide (SO_2)	30-min.	---	---	0.4 ppm (1,021 $\mu g/m^3$) 0.28 ppm (for Galveston or Harris County) 0.32 ppm (for Jefferson or Orange County)
	3-hr.	---	0.50 ppm	
	24-hr.	0.14 ppm		
	Annual Arithmetic Mean	0.03 ppm		
Particulate Matter (PM)	1-hr.	---	---	400 $\mu g/m^3$
	3-hr.	---	---	200 $\mu g/m^3$
Inhalable Particulate Matter (PM_{10})	24-hr.	150 $\mu g/m^3$	150 $\mu g/m^3$	---
	Annual Arithmetic Mean	50 $\mu g/m^3$	50 $\mu g/m^3$	---
Fine Particulate Matter ($PM_{2.5}$)	24-hr.	65 $\mu g/m^3$	65 $\mu g/m^3$	---
	Annual Arithmetic Mean	15 $\mu g/m^3$	15 $\mu g/m^3$	---
Nitrogen Dioxide (NO_2)	Annual Arithmetic Mean	0.053 ppm	0.053 ppm	---
Carbon Monoxide (CO)	1-hr.	35 ppm	---	
	8-hr.	9 ppm	---	---
Lead (Elemental) (Pb)	3-mo. (Calendar Quarter)	1.5 $\mu g/m^3$	1.5 $\mu g/m^3$	---
Ozone (O_3)	1-hr.	0.12 ppm	0.12 ppm	---
	8-hr.	0.08 ppm	0.08 ppm	

Source: EPA, 2002a.

µg/m3 – micrograms per cubic meter.

ppm – parts per million.

a metropolitan area has violated ozone levels over a 3-year period, the EPA can require stringent measures to bring that area back into compliance with the NAAQS.

The TNRCC is responsible for monitoring air and water quality within the State and for reporting that information to the public. The staff examines and interprets the causes, nature, and behavior of air pollution in Texas. The TNRCC operates several monitors located in the Corpus Christi area. TNRCC'S Corpus Christi Regional Office maintains these monitors. Four of the eight active monitoring stations measure the concentrations of the criteria pollutants in the air. All are used to measure meteorological parameters such as air temperature, wind velocity, and other meteorological parameters. The ozone monitors operate continuously 24 hours a day, 7 days a week, and are checked by technicians who perform equipment maintenance and conduct quality assurance checks.

Monitored values for the criteria pollutants in Nueces County are shown in Table 3.9-2. No data are available for CO, NO_2 or Pb. The monitoring data show that in 1995, the area exceeded the ozone and sulfur dioxide NAAQS standards (0.12 parts per million (ppm) and 0.14 ppm, respectively) for the 1-hour value. Since then, monitored values have been below the NAAQS.

When measured by the EPA's newer 8-hour standard, instituted in 1997, Corpus Christi has shown exceedances of the standard. Although challenged in federal court, the U.S. Supreme Court recently upheld the standard. Therefore, this 8-hour standard will apply to the Corpus Christi area in lieu of the 1-hour standard.

The air quality issues associated with port activities include non-road mobile air emission sources associated with waterborne traffic, including ships, barges, tugs, dredges, and various other types of marine and commercial vessels. Other activities include the loading and unloading of bulk cargo vessels and tankers. In addition, the port is supported by inland railway and highway transportation systems with associated emissions from combustion of fuel in railcars and vehicular traffic. Although the surrounding area is typically rural, air quality is hampered with dust from agricultural plowing, other automobile emissions, and manufacturing and industrial activities. (TNRCC, 1998).

In 1996, Nueces and San Patricio counties, acting through the Corpus Christi Air Quality Committee, finalized a 5-year plan for identifying actions that have been implemented by residents and businesses on a voluntary basis to control and reduce air pollution including ambient ozone. The plan was formalized in a Flexible Attainment Region memorandum of agreement approved by the EPA and TNRCC. Since then, residents and businesses of Nueces and San Patricio counties have carried out the provisions of the plan embodied in that agreement, successfully reducing and controlling ambient ozone. According to the TNRCC (2001b), key controls include:

- Controls of dockside emissions by industry
- Use of cleaner gasoline
- Training aimed at small and large businesses

As part of the TNRCC State Implementation Plan, regional strategies aimed at the eastern portion of the State, including Corpus Christi, will require the use of cleaner diesel fuel in vehicles such as tractors and bulldozers, and cleaner low-sulfur gasoline. As a result, Nueces and San Patricio

TABLE 3.9-2

MONITORED VALUES COMPARED WITH PRIMARY NAAQS
CORPUS CHRISTI, NUECES COUNTY

	Monitoring Year							
Value/Constituent	1995	1996	1997	1998	1999	2000	2001	NAAQS
2nd 24-hour value for PM_{10} ($\mu g/m^3$)	56	45	74	67	88	71	48	150
Annual mean value for PM_{10} ($\mu g/m^3$)	31.1	25.1	30.5	34.9	35.2	35.7	27.6	50
2nd max. 1-hour value for O_3 (ppm)	0.128	0.103	0.094	0.102	0.103	0.099	0.090	0.12
4^{th} highest 8-hour value for O_3 (ppm)	no data	no data	0.077	0.082	0.085	0.083	0.077	0.08
2nd max. 24-hour value for SO_2 (ppm)	0.144	0.015	0.020	0.029	0.019	0.017	0.017	0.14
Annual mean value for SO_2 (ppm)	0.002	0.002	0.003	0.003	0.002	0.003	0.002	0.03
2nd max. 1-hour value for CO (ppm)	no data	no data	no data	no data	no data	no data	no data	35
2nd max. 8-hour value for CO (ppm)	no data	no data	no data	no data	no data	no data	no data	9
Annual mean value for NO_2 (ppm)	no data	no data	no data	no data	no data	no data	no data	0.053
Quarterly mean value for Pb ($\mu g/m^3$)	no data	no data	no data	no data	no data	no data	no data	1.5

Source: EPA, 2002a.

µg/m3 – micrograms per cubic meter.

ppm – parts per million.

counties, which compose the Corpus Christi urban air shed, are currently in attainment of the NAAQS for ozone adopted by the EPA pursuant to the Clean Air Act.

3.10 NOISE

As directed by Congress in The Noise Control Act of 1972 as amended by the Quiet Communities Act of 1978, the EPA has developed appropriate noise-level guidelines. The EPA generally recognizes rural areas to have an average day-night noise level (L_{dn}) of less than 50 decibels A-weighting (dBA) (EPA, 1978) and urban areas between 55 and 60 dBA. Average outdoor noise levels in excess of 70 dBA or more for 24 hours per day over a 40-year period can result in hearing loss (EPA, 1974). Several factors affect response to noise levels including background level, noise character, level fluctuation, time of year, time of day, history of exposure, community attitudes and individual emotional factors. Typically, people are more tolerant of a given noise level if the background level is closer to the level of the noise source. People are more tolerant of noises during daytime than at night. Residents are more tolerant of a facility or activity if it is considered to benefit the economic or social well being of the community or them individually. Noise levels also affect outdoor activities greater than indoor activities. The immediate activities within the study area affecting noise levels could include waterborne transportation (i.e., barges, commercial fishing vessels, sport and recreational boats, etc.) and dredging. Other noise sources on land include nearby airports and transportation corridors. The noise levels within the study area would increase in proximity to urban communities due to vehicular traffic and major construction activities.

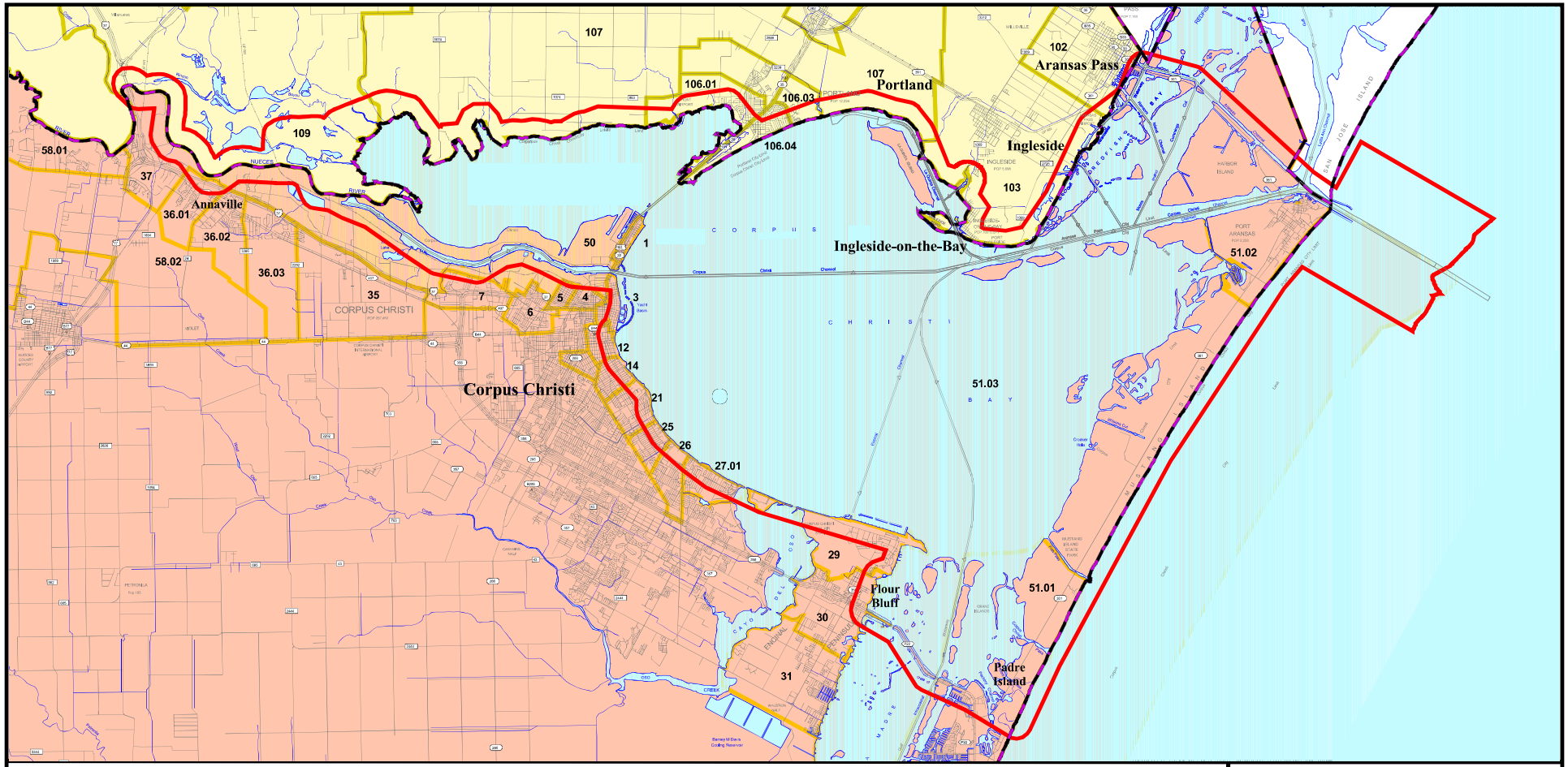
3.11 SOCIOECONOMIC RESOURCES

This section presents a summary of economic and demographic characteristics of the study area and surrounding areas within Nueces and San Patricio counties. The scope of this review includes both county level research and census tract level research (see Figure 3-3). Population, employment, the area economy, a historical perspective of economic development, land use, and Environmental Justice (EJ) are key areas of discussion. Also, a visual survey of the vicinity surrounding the study area was conducted on August 16 and 17, 2001, as a source of information for the land use section.

3.11.1 Population

The proposed project involves improvements to the existing CCSC and extension of the La Quinta Channel. The study area includes Nueces County on the south and San Patricio County on the north, as well as a number of port towns. Vessels enter the CCSC east of Port Aransas, immediately passing north of the City of Port Aransas and then traversing the east end of Corpus Christi Bay toward Ingleside and Aransas Pass. The channel extends west into the Inner Harbor where it parallels the Corpus Christi shoreline. The La Quinta Channel extends to the north bordering Ingleside-On-The-Bay toward Portland.

The proposed project is located in Nueces and San Patricio counties. The 2000 population of Nueces County was 313,645 persons. The City of Corpus Christi, population 277,454, is located within Nueces County on the south side of Corpus Christi Bay. Nueces County maintained steady growth, increasing by 8.5 percent between 1980 and 1990 and by 7.7 percent between 1990 and 2000



1990 Census Tracts

San Patricio County

Nueces County

County Boundary

Study Area

N

W E

S

5000 0 5000 10000 Meters

3 0 3 6 Miles

PBSJ
206 Wild Basin Rd., Ste. 300
Austin, Texas 78746-3343
Phone: (512) 329-8342 Fax: (512) 327-2453

Figure 3-3
Corpus Christi Ship Channel
Census Tracts

Prepared for: USACE	
Job No.: 440524	Scale: 1" = 3 Miles
Prepared by: G. Rackley	Date: Feb 2002
File: N:\440524\av\census.apr (census_B_size layout)	

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(Table 3.11-1). Aransas Pass (pop. 8,138), Port Aransas (pop. 3,370), Ingleside (pop. 9,388), Ingleside-On-The-Bay (pop. 659), and Portland (pop. 14,827) border the northern part of the study area within San Patricio County. The 2000 census places San Patricio County's population at 67,138 persons, an increase of 14.3 percent since 1990. The county maintained a steady population between 1980 and 1990 increasing by only 1.3 percent (from 58,013 to 58,749) over that decade. Neither county grew as fast as the State during the 1980s or the 1990s.

As shown in Table 3.11-2, population projections provided by the Texas State Data Center (TSDC) indicate that growth in both counties is expected to continue; however, neither county is expected to surpass state growth rates through 2030. Nueces County is projected to grow at 0.5 percent per year, while San Patricio County is projected to grow at 1.2 percent per year. Growth rates in both counties are expected to remain positive but decline steadily after 2000. Year 2000 projections have proven to be substantially higher than current 2000 counts for Nueces County and lower than 2000 counts for San Patricio County. The resulting 2010 to 2030 projections may prove to be similarly skewed.

Generally speaking, the populations of Nueces and San Patricio counties are more ethnically diverse than that of the State of Texas (Table 3.11-3). Largely, this is attributable to a higher percentage of Hispanic people living in the two counties. In 2000, both Nueces and San Patricio counties had percentages of White persons (37.7 and 45.8 percent, respectively) that are substantially less than that of the State of Texas (at 52.4 percent). The percentage of African-Americans for both Nueces and San Patricio counties (4.1 and 2.6 percent, respectively) was substantially less than that of the State (at 11.3 percent). The percentage of Hispanics for these two counties (55.8 percent and 49.4 percent, respectively) was substantially higher than for the State (at 32 percent). The percentage of persons of all other races for the two counties (2.4 and 2.1 percent, respectively) was slightly less than for the State (at 4.2 percent).

3.11.1.1 Population and Community Cohesion

This section provides an assessment of various population demographics. Provided below is USBOC information collected for the following categories: family households, household tenure, length of residency, average per capita income, average median household incomes, and poverty levels.

The USBOC classification of "family households" (homes that are occupied by a family) is the dominant form of household composition in both Nueces and San Patricio County census tracts (USBOC, 1990) (Table 3.11-4). Within the Nueces County census tracts located in the study area, households are categorized as follows: family households represent 86.4 percent of all households; non-family households were 11.8 percent of all households, and group quarter households represent 1.8 percent of all households. Within the San Patricio County census tracts located in the study area, the breakdown of household types are as follows: family households represent 92.3 percent of all households; non-family households were 7.2 percent of all households, and group quarter households were 0.5 percent of all households. Unusually high percentages of non-family and/or group quarters households were found in the following census tracts: Nueces County study area census tracts 3, 4, 12, 14, 21, 25, 26, 29, 30, 50, 51.01, 51.02, and 51.03, and San Patricio County study area census tracts 102, and 106.01.

TABLE 3.11-1

POPULATION TRENDS 1980-2000

Place	Population			Percent Change		
	1980	1990	2000	1980-90	1990-2000	Average Annual 1980-2000
San Patricio County	58,013	58,749	67,138	1.3%	14.3%	0.7%
Nueces County	268,215	291,145	313,645	8.5%	7.7%	0.8%
State of Texas *(in 1,000s)*	14,229	16,987	20,852	19.4%	22.8%	1.9%

Source: USBOC, 1980, 1990; TSDC, 2000.

TABLE 3.11-2

POPULATION PROJECTIONS 2000-2030

Place	Population					Percent Change				
	1990	2000	2010	2020	2030	1900-2000	2000-10	2010-20	2020-30	Average Annual 1990-2030
San Patricio County	58,749	68,958	78,443	87,716	95,581	17.4%	13.8%	11.8%	9.0%	1.2%
Nueces County	291,145	318,690	339,100	351,885	355,000	9.5%	6.4%	3.8%	0.9%	0.5%
State of Texas *(in 1,000s)*	16,987	20,345	24,129	28,685	33,912	19.8%	18.6%	18.9%	18.2%	1.7%

Source: USBOC, 1990; TSDC, 2000.

TABLE 3.11-3

DETAILED 1990 POPULATION CHARACTERISTICS BY STATE AND COUNTY

	Population	Number White	Percent White	Number African American	Percent African American	Hispanic Origin	Percent Hispanic	Number Other	Percent Other	Number Below Poverty	Percent Below Poverty
Texas	16,986,510	10,291,680	60.6%	1,976,360	11.6%	4,339,905	25.5%	378,565	2.2%	3,074,558	18.10%
Nueces County	58,749	28,005	47.7%	745	1.3%	29,586	50.4%	413	0.7%	14,686	25.0%
San Patricio County	291,145	124,643	42.8%	12,206	4.2%	151,000	51.9%	3,296	1.1%	59,528	20.4%

Source: USBOC, 1990.

TABLE 3.11-4

HOUSEHOLD COMPOSITION BY STUDY AREA CENSUS TRACTS, 1990

Nueces County Census Tracts	Number of Households	Family Households	% Family Households	Non-Family Households	% Non-Family Households	Living in Group Quarters	% in Group Quarters
3	1,618	419	25.9%	424	26.2%	775	47.9%
4	2,503	2,094	83.7%	337	13.5%	72	2.9%
5	2,433	2,186	89.8%	247	10.2%	0	0.0%
6	8,012	7,286	90.9%	641	8.0%	85	1.1%
7	3,902	3,421	87.7%	428	11.0%	53	1.4%
12	4,342	3,223	74.2%	838	19.3%	281	6.5%
14	4,726	3,636	76.9%	1,030	21.8%	60	1.3%
21	7,180	5,709	79.5%	1,396	19.4%	75	1.0%
25	4,374	3,743	85.6%	590	13.5%	41	0.9%
26	7,520	6,207	82.5%	1,313	17.5%	0	0.0%
27.01	4,994	4,430	88.7%	564	11.3%	0	0.0%
29	1,827	1,426	78.1%	0	0.0%	401	21.9%
30	8,121	6,967	85.8%	1,154	14.2%	0	0.0%
31	8,688	8,056	92.7%	632	7.3%	0	0.0%
35	2,371	2,123	89.5%	248	10.5%	0	0.0%
36.01	5,779	5,389	93.3%	390	6.7%	0	0.0%
36.02	6,359	5,908	92.9%	451	7.1%	0	0.0%
36.03	2,356	2,231	94.7%	125	5.3%	0	0.0%
37	3,136	2,983	95.1%	153	4.9%	0	0.0%
50	1,344	1,174	87.4%	170	12.6%	0	0.0%
51.01	2,741	2,371	86.5%	370	13.5%	0	0.0%
51.02	2,191	1,730	79.0%	461	21.0%	0	0.0%
51.03	84	68	81.0%	16	19.0%	0	0.0%
58.01	3,939	3,739	94.9%	200	5.1%	0	0.0%
58.02	4,251	3,994	94.0%	221	5.2%	36	0.8%
Total/Average	104,791	90,513	86.4%	12,399	11.8%	1,879	1.8%

San Patricio County Census Tracts	Number of Households	Family Households	% Family Households	Non-Family Households	% Non-Family Households	Living in Group Quarters	% in Group Quarters
102	7187	6300	87.7%	740	10.3%	147	2.0%
103	6656	6195	93.1%	461	6.9%	0	0.0%
106.01	5382	4932	91.6%	450	8.4%	0	0.0%
106.03	1045	1036	99.1%	9	0.9%	0	0.0%
106.04	3107	2883	92.8%	224	7.2%	0	0.0%
107	1894	1794	94.7%	100	5.3%	0	0.0%
109	4430	4264	96.3%	166	3.7%	0	0.0%
Total/Average	29,701	27,404	92.3%	2,150	7.2%	147	0.5%
Total/Average Both Counties	134,492	117,917	87.7%	14,549	10.8%	2,026	1.5%

Source: USBOC, 1990.

"Household tenure" is a category that distinguishes between owner-occupied housing units and renter-occupied housing units. The 1990 census data within the study area shows that owner-occupied housing units are more abundant than renter occupied housing units in both Nueces and San Patricio counties (Table 3.11-5). Within the Nueces County census tracts, occupied housing units can be categorized as follows: owner-occupied units represent 61 percent, and renter-occupied units represent 39 percent. Within the San Patricio County census tracts, occupied housing units can be categorized as follows: owner-occupied units represent 66.6 percent, and renter-occupied units represent 33.4 percent. Unusually high percentages of renter-occupied housing units were found in the following census tracts: Nueces County study area census tracts 3, 4, 5, 12, 21, 26, 29, 30, 36.01, 51.01, 51.02, and 51.03, and San Patricio County study area census tracts 102, 103, and 106.01.

The "Length of Residency" category shows the average number of years that housing units are occupied. The 1990 census data within the study area shows that a majority of residents moved into their homes between 1980 and 1990 (Table 3.11-6). Within the Nueces County census tracts, the percentage of homes occupied was 28.4 percent between 1989 and 1990, 26.1 percent between 1985 and 1988, 13.1 percent between 1980 and 1984, 15.7 percent between 1970 and 1979, 9 percent between 1960 and 1969, and 7.7 percent of the homes have been occupied since 1959 or earlier. Within the San Patricio County census tracts, the percentage of homes occupied was: 23.9 percent between 1989 and 1990, 24.6 percent between 1985 and 1988, 15 percent between 1980 and 1984, 20.8 percent between 1970 and 1979, 9.2 percent between 1960 and 1969, and 6.5 percent of the homes have been occupied since 1959 or earlier.

Table 3.11-7 shows the age characteristics for the study area census tracts, and provides a comparison with the overall age characteristics in Nueces and San Patricio counties and the State. Relative to the State, the study area population had higher proportions of the population within the following age cohorts: 5 to 9 (8.6 percent), 10 to 14 (8.3 percent), 15 to 19 (7.8 percent), 35 to 44 (15.6 percent), 45 to 54 (10.1 percent), 55 to 59 (4.3 percent), 60 to 64 (4.1 percent), 65 to 74 (6.5 percent), and 75 to 84 (3.5 percent). The study area population had lower proportions than the State for the following age cohorts: 0 to 5 (7.9 percent), 20 to 24 (6.2 percent), 25 to 34 (16.3 percent), and 85 and over (0.9 percent).

An examination of per capita incomes for census tracts within the study area in Nueces County shows that the average per capita income in 1989 was $14,536. There were significant variations among the census tracts in the study area (Table 3.11-8). Unusually low per capita incomes were recorded for the following Nueces County study area census tracts: 4, 5, 6, 7, 12, 29, 30, 35, and 36.03. For study area census tracts in San Patricio County, the average per capita income in 1989 was $13,138. There were also significant variations among these census tracts. Unusually low per capita incomes were recorded for the following San Patricio County study area census tracts: 102, 103, and 109.

Average median household incomes (average of all median household income values reported by the USBOC for all study area census tracts) were also examined in the study area. For study area census tracts in Nueces County, the average median household income in 1989 was $28,013 although there were significant variations among the census tracts (see Table 3.11-8). Comparatively low median household incomes were recorded for the following Nueces County study area census tracts: 3, 4, 5, 6, 7, 12, 30, 35, and 51.02. For study area census tracts in San Patricio County, the average median

TABLE 3.11-5

STUDY AREA TENURE BY STUDY AREA CENSUS TRACTS, 1990

Nueces County Census Tracts	# Occupied Household Units	Owner Occupied Units	% Owner Occupied Units	Renter Occupied Units	% Renter Occupied Units
3	546	31	5.7%	515	94.3%
4	830	127	15.3%	703	84.7%
5	842	389	46.2%	453	53.8%
6	2,501	1,673	66.9%	828	33.1%
7	3,902	3,421	87.7%	428	11.0%
12	1,598	414	25.9%	1,184	74.1%
14	2,039	1,258	61.7%	781	38.3%
21	3,144	1,587	50.5%	1,557	49.5%
25	1,818	1,270	69.9%	548	30.1%
26	3,142	1,784	56.8%	1,358	43.2%
27.01	1,981	1,430	72.2%	551	27.8%
29	385	22	5.7%	363	94.3%
30	3,018	1,336	44.3%	1,682	55.7%
31	2,895	2,021	69.8%	874	30.2%
35	710	505	71.1%	205	28.9%
36.01	1,827	1,104	60.4%	723	39.6%
36.02	2,179	1,368	62.8%	811	37.2%
36.03	825	644	78.1%	181	21.9%
37	986	682	69.2%	304	30.8%
50	488	313	64.1%	175	35.9%
51.01	1,245	643	51.6%	602	48.4%
51.02	963	571	59.3%	392	40.7%
51.03	45	22	48.9%	23	51.1%
58.01	1,320	964	73.0%	356	27.0%
58.02	1,255	1,074	85.6%	181	14.4%
Total/Average	40,484	24,653	61.0%	15,778	39.0%

San Patricio County Census Tracts	# Occupied Household Units	Owner Occupied Units	% Owner Occupied Units	Renter Occupied Units	% Renter Occupied Units
102	2,504	1,483	59.2%	1,021	40.8%
103	2,239	1,415	63.2%	824	36.8%
106.01	1,880	1,022	54.4%	858	45.6%
106.03	293	254	86.7%	39	13.3%
106.04	1,101	897	81.5%	204	18.5%
107	580	442	76.2%	138	23.8%
109	1,300	1,081	83.2%	219	16.8%
Total/Average	9,897	6,594	66.6%	3,303	33.4%
Total/Average Both Counties	50,381	31,247	62.0%	19,081	38.0%

Source: USBOC, 1990.

TABLE 3.11-6
STUDY AREA LENGTH OF RESIDENCY, 1990
Year Householder Moved Into Residence

Nueces County Census Tracts	# Occupied Housing Units	1989 to 1990	%	1985 to 1988	%	1980 to 1984	%	1970 to 1979	%	1960 to 1969	%	1959 or Earlier	%
3	546	228	41.8%	209	38.3%	43	7.9%	39	7.1%	19	3.5%	8	1.5%
4	830	248	29.9%	222	26.7%	137	16.5%	76	9.2%	70	8.4%	77	9.3%
5	842	244	29.0%	186	22.1%	71	8.4%	134	15.9%	125	14.8%	82	9.7%
6	2,501	596	23.8%	353	14.1%	240	9.6%	440	17.6%	438	17.5%	434	17.4%
7	1,338	365	27.3%	272	20.3%	122	9.1%	286	21.4%	109	8.1%	184	13.8%
12	1,598	608	38.0%	331	20.7%	171	10.7%	303	19.0%	82	5.1%	103	6.4%
14	2,039	534	26.2%	528	25.9%	192	9.4%	228	11.2%	230	11.3%	327	16.0%
21	3,144	778	24.7%	640	20.4%	451	14.3%	574	18.3%	251	8.0%	450	14.3%
25	1,818	350	19.3%	388	21.3%	198	10.9%	339	18.6%	282	15.5%	261	14.4%
26	3,142	842	26.8%	713	22.7%	342	10.9%	573	18.2%	460	14.6%	212	6.7%
27.01	1,981	427	21.6%	431	21.8%	242	12.2%	473	23.9%	264	13.3%	144	7.3%
29	385	218	56.6%	167	43.4%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
30	3,018	1,196	39.6%	1,025	34.0%	444	14.7%	220	7.3%	92	3.0%	41	1.4%
31	2,895	667	23.0%	1,000	34.5%	531	18.3%	497	17.2%	132	4.6%	68	2.3%
35	710	222	31.3%	88	12.4%	112	15.8%	126	17.7%	98	13.8%	64	9.0%
36.01	1,827	572	31.3%	734	40.2%	318	17.4%	104	5.7%	53	2.9%	46	2.5%
36.02	2,179	658	30.2%	548	25.1%	300	13.8%	405	18.6%	200	9.2%	68	3.1%
36.03	825	117	14.2%	180	21.8%	79	9.6%	199	24.1%	161	19.5%	89	10.8%
37	986	182	18.5%	249	25.3%	158	16.0%	227	23.0%	105	10.6%	65	6.6%
50	488	149	30.5%	171	35.0%	110	22.5%	31	6.4%	14	2.9%	13	2.7%
51.01	1,245	733	58.9%	349	28.0%	100	8.0%	52	4.2%	11	0.9%	0	0.0%
51.02	963	299	31.0%	292	30.3%	129	13.4%	177	18.4%	39	4.0%	27	2.8%
51.03	45	12	26.7%	19	42.2%	14	31.1%	0	0.0%	0	0.0%	0	0.0%
58.01	1,320	401	30.4%	444	33.6%	186	14.1%	230	17.4%	50	3.8%	9	0.7%
58.02	1,255	112	8.9%	372	29.6%	260	20.7%	235	18.7%	125	10.0%	151	12.0%
Total/Average	37,920	10,758	28.4%	9,911	26.1%	4,950	13.1%	5,968	15.7%	3,410	9.0%	2,923	7.7%

San Patricio County Census Tracts	# Occupied Housing Units	1989 to 1990	%	1985 to 1988	%	1980 to 1984	%	1970 to 1979	%	1960 to 1969	%	1959 or Earlier	%
102	2,504	676	27.0%	686	27.4%	332	13.3%	540	21.6%	153	6.1%	117	4.7%
103	2,239	530	23.7%	527	23.5%	324	14.5%	469	20.9%	234	10.5%	155	6.9%
106.01	1,880	623	33.1%	435	23.1%	193	10.3%	333	17.7%	230	12.2%	66	3.5%
106.03	293	54	18.4%	104	35.5%	87	29.7%	48	16.4%	0	0.0%	0	0.0%
106.04	1,101	262	23.8%	208	18.9%	65	5.9%	323	29.3%	136	12.4%	107	9.7%
107	580	86	14.8%	166	28.6%	130	22.4%	117	20.2%	35	6.0%	46	7.9%
109	1,300	132	10.2%	311	23.9%	355	27.3%	224	17.2%	127	9.8%	151	11.6%
Total/Average	9,897	2,363	23.9%	2,437	24.6%	1,486	15.0%	2,054	20.8%	915	9.2%	642	6.5%
Total/Average Both Counties	47,817	13,121	27.4%	12,348	25.8%	6,436	13.5%	8,022	16.8%	4,325	9.0%	3,565	7.5%

Source: USBOC 1990.

Table 3.11-7
Age Characteristics of Study Area Census Tracts, 1990

Place	Years of Age																								Total
	under 5		5 to 9		10 to 14		15 to 19		20 to 24		25 to 34		35 to 44		45 to 54		55 to 59		60 to 64		65 to 74		75 to 84		85 and over		
Nueces County Census Tracts	#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%	Persons
3	37	2.3%	32	2.0%	25	1.5%	110	6.8%	177	10.9%	402	24.8%	246	15.2%	119	7.3%	39	2.4%	43	2.7%	118	7.3%	166	10.2%	107	6.6%	1,621
4	354	14.4%	329	13.4%	249	10.1%	210	8.5%	183	7.4%	318	12.9%	218	8.8%	170	6.9%	72	2.9%	69	2.8%	164	6.7%	101	4.1%	27	1.1%	2,464
5	182	7.5%	219	9.0%	200	8.2%	222	9.1%	160	6.6%	351	14.4%	318	13.1%	196	8.1%	107	4.4%	135	5.5%	216	8.9%	100	4.1%	27	1.1%	2,433
6	602	7.5%	750	9.4%	801	10.0%	758	9.5%	514	6.4%	1,125	14.0%	1112	13.9%	745	9.3%	291	3.6%	343	4.3%	561	7.0%	343	4.3%	67	0.8%	8,012
7	381	9.8%	351	9.0%	303	7.8%	277	7.1%	278	7.1%	655	16.8%	527	13.5%	334	8.6%	170	4.4%	160	4.1%	297	7.6%	129	3.3%	42	1.1%	3,904
12	421	9.7%	317	7.3%	283	6.5%	283	6.5%	352	8.1%	780	18.0%	533	12.3%	296	6.8%	151	3.5%	178	4.1%	320	7.4%	266	6.1%	147	3.4%	4,327
14	366	7.7%	295	6.2%	246	5.2%	247	5.2%	264	5.6%	897	19.0%	831	17.6%	402	8.5%	204	4.3%	180	3.8%	362	7.7%	339	7.2%	93	2.0%	4,726
21	538	7.5%	529	7.4%	476	6.6%	450	6.3%	385	5.4%	1186	16.5%	1078	15.0%	608	8.5%	261	3.6%	297	4.1%	672	9.4%	554	7.7%	146	2.0%	7,180
25	275	6.3%	291	6.7%	279	6.4%	229	5.2%	221	5.1%	599	13.7%	698	16.0%	466	10.7%	209	4.8%	257	5.9%	507	11.6%	286	6.5%	57	1.3%	4,374
26	450	6.0%	491	6.5%	477	6.3%	478	6.4%	454	6.0%	1211	16.1%	1093	14.5%	760	10.1%	392	5.2%	491	6.5%	779	10.4%	363	4.8%	81	1.1%	7,520
27.01	308	6.1%	356	7.0%	336	6.6%	315	6.2%	251	4.9%	694	13.6%	802	15.8%	581	11.4%	278	5.5%	353	6.9%	591	11.6%	183	3.6%	39	0.8%	5,087
29	330	17.7%	183	9.8%	108	5.8%	87	4.7%	337	18.1%	586	31.4%	185	9.9%	38	2.0%	7	0.4%	1	0.1%	2	0.1%	0	0.0%	1	0.1%	1,865
30	705	8.7%	751	9.3%	729	9.0%	649	8.0%	602	7.4%	1524	18.9%	1317	16.3%	748	9.3%	280	3.5%	244	3.0%	362	4.5%	147	1.8%	25	0.3%	8,083
31	642	7.4%	794	9.1%	855	9.8%	792	9.1%	384	4.4%	1338	15.4%	1567	18.0%	1081	12.4%	392	4.5%	313	3.6%	394	4.5%	120	1.4%	16	0.2%	8,688
35	179	7.6%	207	8.8%	248	10.6%	255	10.9%	130	5.6%	357	15.3%	422	18.0%	220	9.4%	79	3.4%	78	3.3%	106	4.5%	53	2.3%	6	0.3%	2,340
36.01	611	10.6%	701	12.1%	597	10.3%	448	7.8%	331	5.7%	1252	21.7%	1021	17.7%	405	7.0%	134	2.3%	83	1.4%	128	2.2%	59	1.0%	9	0.2%	5,779
36.02	488	7.7%	585	9.2%	588	9.2%	564	8.9%	403	6.3%	1080	17.0%	1083	17.0%	697	11.0%	260	4.1%	209	3.3%	252	4.0%	122	1.9%	28	0.4%	6,359
36.03	145	6.1%	184	7.7%	239	10.0%	194	8.1%	137	5.7%	316	13.2%	319	13.4%	258	10.8%	136	5.7%	146	6.1%	206	8.6%	89	3.7%	19	0.8%	2,388
37	303	9.6%	270	8.6%	292	9.3%	285	9.1%	222	7.1%	510	16.2%	504	16.0%	322	10.2%	138	4.4%	95	3.0%	130	4.1%	58	1.8%	14	0.4%	3,143
50	99	7.9%	133	10.6%	132	10.5%	113	9.0%	73	5.8%	181	14.5%	200	16.0%	125	10.0%	56	4.5%	41	3.3%	62	5.0%	34	2.7%	3	0.2%	1,252
51.01	140	4.9%	124	4.4%	128	4.5%	157	5.5%	201	7.1%	509	18.0%	548	19.3%	399	14.1%	195	6.9%	166	5.9%	212	7.5%	44	1.6%	12	0.4%	2,835
51.02	114	5.2%	156	7.1%	131	5.9%	129	5.8%	99	4.5%	308	13.9%	422	19.1%	289	13.1%	145	6.6%	116	5.2%	200	9.0%	86	3.9%	17	0.8%	2,212
51.03	4	3.8%	7	6.6%	2	1.9%	4	3.8%	4	3.8%	10	9.4%	16	15.1%	19	17.9%	8	7.5%	5	4.7%	20	18.9%	4	3.8%	3	2.8%	106
58.01	280	7.0%	369	9.2%	383	9.5%	365	9.1%	145	3.6%	611	15.2%	797	19.8%	529	13.2%	185	4.6%	133	3.3%	153	3.8%	52	1.3%	14	0.3%	4,016
58.02	296	7.1%	450	10.8%	434	10.5%	360	8.7%	207	5.0%	650	15.7%	587	14.1%	431	10.4%	224	5.4%	166	4.0%	217	5.2%	107	2.6%	22	0.5%	4,151
Total/Average	8,250	7.9%	8,874	8.5%	8,541	8.1%	7,981	7.6%	6,514	6.2%	17,450	16.6%	16,444	15.7%	10,238	9.8%	4,413	4.2%	4,302	4.1%	7,031	6.7%	3,805	3.6%	1,022	1.0%	104,865
San Patricio County Census Tracts																											
102	591	8.2%	689	9.5%	621	8.6%	545	7.5%	438	6.1%	1,019	14.1%	975	13.5%	676	9.3%	338	4.7%	343	4.7%	555	7.7%	347	4.8%	97	1.3%	7,234
103	550	8.2%	625	9.3%	577	8.6%	583	8.7%	406	6.1%	1,035	15.5%	992	14.8%	797	11.9%	272	4.1%	261	3.9%	361	5.4%	198	3.0%	34	0.5%	6,691
106.01	501	9.3%	495	9.2%	459	8.5%	434	8.0%	377	7.0%	1,008	18.6%	859	15.9%	548	10.1%	218	4.0%	178	3.3%	212	3.9%	99	1.8%	17	0.3%	5,405
106.03	66	6.2%	123	11.6%	96	9.1%	112	10.6%	38	3.6%	114	10.8%	240	22.6%	176	16.6%	38	3.6%	27	2.5%	27	2.5%	2	0.2%	1	0.1%	1,060
106.04	176	5.7%	229	7.4%	261	8.4%	273	8.8%	165	5.3%	348	11.3%	505	16.3%	467	15.1%	219	7.1%	171	5.5%	185	6.0%	80	2.6%	13	0.4%	3,092
107	142	8.1%	159	9.1%	166	9.5%	165	9.4%	87	5.0%	281	16.1%	253	14.5%	189	10.8%	70	4.0%	73	4.2%	116	6.6%	42	2.4%	7	0.4%	1,750
109	299	7.0%	418	9.8%	414	9.7%	386	9.1%	262	6.2%	578	13.6%	644	15.1%	457	10.7%	202	4.7%	214	5.0%	251	5.9%	100	2.4%	28	0.7%	4,253
Total/Average	2,325	7.9%	2,738	9.3%	2,594	8.8%	2,498	8.5%	1,773	6.0%	4,383	14.9%	4,468	15.2%	3,310	11.2%	1,357	4.6%	1,267	4.3%	1,707	5.8%	868	2.9%	197	0.7%	29,485
Study Area Average Both Counties	10,575	7.9%	11,612	8.6%	11,135	8.3%	10,479	7.8%	8,287	6.2%	21,833	16.3%	20,912	15.6%	13,548	10.1%	5,770	4.3%	5,569	4.1%	8,738	6.5%	4,673	3.5%	1,219	0.9%	134,350
Nueces County	24,043	8.3%	25,838	8.9%	24,759	8.5%	23,331	8.0%	19,960	6.9%	50,538	17.4%	43,049	14.8%	27,025	9.3%	11,696	4.0%	11,484	3.9%	17,879	6.1%	9,079	3.1%	2,464	0.8%	291,145
San Patricio County	4,827	8.2%	5,639	9.6%	5,382	9.2%	5,097	8.7%	3,790	6.5%	8,614	14.7%	8,332	14.2%	5,924	10.1%	2,568	4.4%	2,479	4.2%	3,615	6.2%	1,946	3.3%	536	0.9%	58,749
Texas (in 1,000s)	1,390	8.2%	1,396	8.2%	1,294	7.6%	1,312	7.7%	1,334	7.9%	3,086	18.2%	2,539	14.9%	1,629	9.6%	662	3.9%	628	3.7%	998	5.9%	552	3.2%	167	1.0%	16,987

Source: USBOC, 1990.

TABLE 3.11-8
INCOME BY STUDY AREA CENSUS TRACTS, 1990

Nueces County Census Tracts	Number of Persons	Per Capita Income	Median Household Income	# Below Poverty	% Below Poverty
3	1,618	$20,276	$12,576	313	19.3%
4	2,503	$4,351	$4,999	1,710	68.3%
5	2,433	$5,727	$11,734	1,041	42.8%
6	8,012	$7,634	$17,791	2,552	31.9%
7	3,902	$8,276	$21,907	906	23.2%
12	4,342	$7,889	$13,341	1,714	39.5%
14	4,726	$20,973	$28,382	564	11.9%
21	7,180	$16,739	$26,293	1,046	14.6%
25	4,374	$23,736	$37,246	406	9.3%
26	7,520	$15,216	$26,182	1,316	17.5%
27.01	5,087	$28,576	$37,136	493	9.7%
29	1,827	$9,005	$26,010	88	4.8%
30	8,121	$9,799	$22,125	1,561	19.2%
31	8,688	$12,388	$32,351	1,110	12.8%
35	2,371	$8,655	$23,169	400	16.9%
36.01	5,779	$13,084	$37,804	503	8.7%
36.02	6,359	$12,051	$32,423	559	8.8%
36.03	2,356	$10,444	$30,000	414	17.6%
37	3,136	$11,408	$32,151	405	12.9%
50	1,344	$11,902	$27,316	343	25.5%
51.01	2,750	$24,196	$47,348	149	5.4%
51.02	2,207	$14,688	$23,224	349	15.8%
51.03	84	$38,300	$51,869	6	7.1%
58.01	3,954	$16,671	$45,966	210	5.3%
58.02	4,251	$11,425	$30,970	602	14.2%
Total/Average	104,924	$14,536	$28,013	18,760	17.9%

San Patricio County Census Tracts	Number of Persons	Per Capita Income	Median Household Income	# Below Poverty	% Below Poverty
102	7,187	$8,938	$16,318	2,596	36.1%
103	6,656	$10,096	$24,634	1,009	15.2%
106.01	5,382	$11,216	$27,094	669	12.4%
106.03	1,045	$23,232	$63,907	11	1.1%
106.04	3,107	$16,509	$40,625	73	2.3%
107	1,894	$12,100	$37,115	380	20.1%
109	4,430	$9,872	$26,119	785	17.7%
Total/Average	29,701	$13,138	$33,687	5,523	18.6%
Total/Average Both Counties	134,625	$14,230	$29,254	24,283	18.0%

Source: USBOC, 1990.

household income in 1989 was $33,687. There were fairly moderate variations among these census tracts. Comparatively low median household incomes were recorded for the following San Patricio County study area census tracts: 102, 103, 106.01, and 109.

Poverty levels were examined in the study area. For study area census tracts in Nueces County, the average percentage of the population living below the poverty line ($15,000) in 1989 was 17.9 percent. There were significant variations among the census tracts (see Table 3.11-8). Relatively high percentages of persons living below the poverty line were recorded for the following Nueces County study area census tracts: 4, 5, 6, 12, and 37. For study area census tracts in San Patricio County, the average percentage of the population living below the poverty line in 1989 was 18.6 percent, and there were fairly moderate variations among these census tracts. A high percentage of persons living below the poverty line was recorded for San Patricio County study area census tract 102.

3.11.2 Employment

According to the Texas Workforce Commission, most of the jobs in Nueces County fall within the Service sector (32 percent) and Trade sector (26 percent). In San Patricio County, manufacturing is the dominant economic sector employing 3,472 persons, or 24 percent of the labor force; the trade and service sectors employ 19 and 16 percent of the workforce, respectively. In Nueces County, the total civilian labor force increased 8.6 percent between 1990 and 2000 from 136,056 to 147,857. The unemployment rate remained constant at approximately 6.6 percent during this period. In San Patricio County, the civilian labor force increased by 21 percent from 24,981 in 1990 to 30,208 in September of 1998. During the same period, the unemployment rate remained relatively constant, decreasing from 6.9 percent in 1990 to 6.7 percent in September 2000 (Texas Workforce Commission, 2001).

Table 3.11-9 provides a list of the top 20 major employers within the Corpus Christi area. The top employers are concentrated in the government (including public school and military employees), healthcare, telecommunications, petroleum refining, and petrochemical manufacturing industries, and other oil industry/port-related enterprises. The employers listed in Table 3.11-9 that are associated with the operations of the Port of Corpus Christi appear with an asterisk following the company name. Within the top 20 employers, seven have operations directly related to the Port of Corpus Christi, providing just over 10,900 jobs within the Corpus Christi area. The Corpus Christi Chamber of Commerce estimates that port-related companies employed approximately 50,000 people in the Corpus Christi area in 2001 (Corpus Christi Chamber of Commerce, 2001).

3.11.3 Economics

3.11.3.1 Historical Perspective

Corpus Christi began as a small supply post for the Mexican war in the early 1800s. Throughout its history, it has been dependent upon a channel to accommodate its burgeoning ship trade. After the Civil War, the Corpus Christi Bay became a shipping point for moving notable Texas crops (e.g., cattle and cotton) to eastern markets. By 1874, an 8-foot channel, known as the Corpus Christi Channel, was dredged through the bay that allowed steamships to dock at Corpus Christi markets (Heines and Williams, 2001; San Patricio County, 2001).

TABLE 3.11-9

STUDY AREA MAJOR EMPLOYERS, 2002

Top 20 Study Area Employers	Number of Employees
Naval Air Station Corpus Christi	8,800
Corpus Christi ISD	5,355
Christus Spohn Health System	4,500
Naval Station Ingleside*	3,400
Corpus Christi Army Depot	3,000
City of Corpus Christi	3,000
Columbia Healthcare Corp.	2,882
Bay, Inc.*	2,200
HEB Grocery Co.	2,200
Koch Refining Company*	1,253
First Data Corp	1,200
Walmart, Inc.	1,200
APAC Teleservices	1,200
Driscoll Children's Hospital	1,100
Celanese*	1,050
Sherwin Alumina*	1,000
Gulf Marine Fabricators*	1,000
Kiewit Offshore Service, Ltd.*	1,000
Whataburger, Inc.	967
Sam Kane Beef Processors	840

Sources: Corpus Christi Chamber of Commerce, 2002; Portland Chamber of Commerce, 2002; Ingleside Chamber of Commerce, 2002; Corpus Christi Regional Economic Development Corporation, 2002.

* Employer associated with the operations of the Port of Corpus Christi.

In 1911, the first causeway was built across Nueces Bay linking Corpus Christi with the North Bay area. The following year, a major natural gas field was discovered in San Patricio County on the north side of Nueces Bay. Eventually, Corpus Christi became a major center for oil refining and petrochemical industries (San Patricio County, 2001).

In 1907, the channel (under the auspices of the Turtle Cove Channel Project) was deepened to 10 feet and widened to 100 feet. By 1910, the channel was deepened again to a depth of 12 feet. The channel was extended 21 miles to Corpus Christi in 1926 of which only 12 miles between Port Aransas and McGloins Bluff required dredging. On September 14, 1926, the Port of Corpus Christi's 25- by 200-foot channel was opened as the principal port in south Texas (Heines and Williams, 2001).

The channel was dredged to 37 feet wide by 400 feet deep in 1932 (James and Pearson, 1991; Schmidt and Hoyt, 1995). The deep-water port supported the simultaneously occurring oil boom. Between 1935 and 1937, Nueces County increased its number of oil fields from two to 894 (Heines and Williams, 2001).

Throughout the second half of the twentieth century, the bay area's infrastructure and channel related commerce thrived. In 1938, the U.S. Navy opened a training base in the city, and in 1945 the Intracoastal Canal opened a 12-foot-deep canal from Galveston to Corpus Christi, allowing free trade to move quickly between the two cities. In 1947, the University of Corpus Christi (Now Texas A&M University–Corpus Christi) opened at the former U.S. Navy facility on the city's southern end (Heines and Williams, 2001). In 1950, the 4-mile-long Padre Island Causeway (later renamed the John F. Kennedy Causeway) connected the city with Padre and Mustang Islands, and in 1959 the Harbor Bridge over the CCSC was completed (Heines and Williams, 2001). Also in the late 1950s, at the request of Reynolds Metal Company, the USACE dredged a channel through Ingleside Cove along the western side of McGloin's Bluff known as the La Quinta Channel. The 36-foot-deep and 200-foot-wide channel facilitated the development of Reynolds Metal Company (Alperin, 1977). In 1960, the Corpus Christi International Airport was built. In 1962, President Kennedy authorized the purchase of 80.5 miles of Padre Island for a national seashore, with the construction of Interstate Highway 37 (IH 37) connecting Corpus Christi to San Antonio beginning soon after (Heines and Williams, 2001). In 1972, Mustang Island State Park was purchased and added into the park system. By the mid-1980s, the Port of Corpus Christi was ranked the sixth largest port in the nation in terms of tonnage (Heines and Williams, 2001).

Tourism has become a major industry in the area. In 1997, tourism in Corpus Christi and the surrounding area generated over $700 million in local spending, an increase of $204 million compared with 1996 spending estimates. Oil and gas are still important within both Nueces and San Patricio County economies, but its role is declining. The services industry has been the fastest growing job industry in the area in the 1990s. Five out of six jobs in the area are in the service sector. Between 1970 and 1997, the local economy created 35,450 new service jobs, and the mining industry and oil and gas lost 1,500 jobs (San Patricio County, 2001).

The Coastal Bend's petrochemical industry pumps more than $1 billion into the area's economy and provides an estimated 30,000 jobs. Four major operations are located along the north shore of Corpus Christi Bay: DuPont, Occidental Chemical Corporation, Reynolds Metals Company, and Aker-Gulf Marine which is the second largest off-shore platform builder in the country (San Patricio County, 2001).

3.11.3.2 Current Regional Economics

The economy of the Corpus Christi Bay area is broadly based in manufacturing, agriculture and fishing. The port of Corpus Christi handles large volumes of commodities including crude petroleum and petroleum products, aluminum ores, and agricultural products (USACE, 2000). The port ranks fifth in the nation in total cargo tonnage and fourth in foreign trade volume (Port of Corpus Christi, 1999). Industrial development in the area consists of plants devoted to processing agricultural products, petrochemicals, and chemical derivatives; manufacturing fishing and offshore service vessels, drilling rigs, offshore producing platforms, and offshore service equipment; and reducing ores to produce aluminum, zinc, and chrome products.

The CCSC was the first waterway in Texas to be completed to a 45-foot depth. The channel ranks fifth in the nation in tonnage shipped on deep-draft vessels. This amount of deep-draft

tonnage transport through the channel has been increasing steadily since 1965. In Texas, only the Houston Ship Channel handles more traffic (Figure 3-4).

Government also contributes greatly to the area economy. The military is the single largest employer in the Corpus Christi area with the Army Depot and Naval Air Station located on the south side of Corpus Christi Bay, employing 11,800 persons. This 4,400-acre facility has eight runways and provides a $226 million civilian and $107 million military economic contribution to the area. Also within the study area, Naval Station Ingleside is located on the north side of Corpus Christi Bay. Selected as Gulf homeport in 1985, Naval Station Ingleside is currently home to twenty-five minesweepers and three reserve frigates (U.S. Navy, 2000; Corpus Christi Regional Economic Development Corporation, 2002).

3.11.3.3 Tourism and Recreation

Tourism is a major contributor to the Corpus Christi area economy. According to the Corpus Christi Chamber of Commerce, tourism revenues were estimated at $603 million (in constant dollars) in 1994 and increased by 11 percent to $670 million in 2000. Corpus Christi is the second most frequented visitor destination in Texas, with approximately 4 million visitors annually (Corpus Christi Chamber of Commerce, 2000). A majority of the tourism (approximately 70 percent) is drawn from the intrastate travel market, primarily from the largest metropolitan areas of Texas (Hammer, Siler, George Associates, 1997). Much of the tourism in the Corpus Christi area occurs due to the extensive opportunities for outdoor recreation, and the natural beauty of the Corpus Christi Bay, Mustang Island, North Padre Island, and the Gulf of Mexico. Also, the Corpus Christi area is a popular destination for conventions. Man-made tourism destinations within the area include the Texas State Aquarium, the Greyhound Racetrack, and the USS *Lexington* Museum by the Bay (Corpus Christi Chamber of Commerce, 2000).

The natural resources of the Corpus Christi Bay and the Gulf of Mexico provide extensive recreational opportunities in the Corpus Christi area. Outdoor recreation in the area includes fishing, bird-watching, waterfowl hunting, windsurfing, camping, boating, jet skiing, swimming, horseback riding, shelling and beach combing (among others). There are several marinas located within the Corpus Christi Bay area, Port Aransas, and Aransas Pass that support recreational as well as commercial fishing. The Padre Island National Seashore is a popular destination, providing approximately 60 miles of protected beaches along North Padre Island just south of the Corpus Christi city limits. Mustang Island State Park contains 3,703 acres and is located within the southern portion of Mustang Island. This park provides RV spaces, rest rooms and campsites and provides another popular point for beach access. Also, located within the vicinity of the study area is the Corpus Christi Bay Loop of the Great Texas Coastal Birding Trail, that is managed by the TPWD. Fourteen separate trails used for bird-watching make up the Corpus Christi Bay Loop (TPWD, 1999).

3.11.3.4 Commercial Fisheries

Commercial fishing within the Corpus Christi Bay system is a relatively moderate contributor to the Corpus Christi area economy compared to other industry sectors. Table 3.11-10

Figure 3-4
Corpus Christi Ship Channel Transport

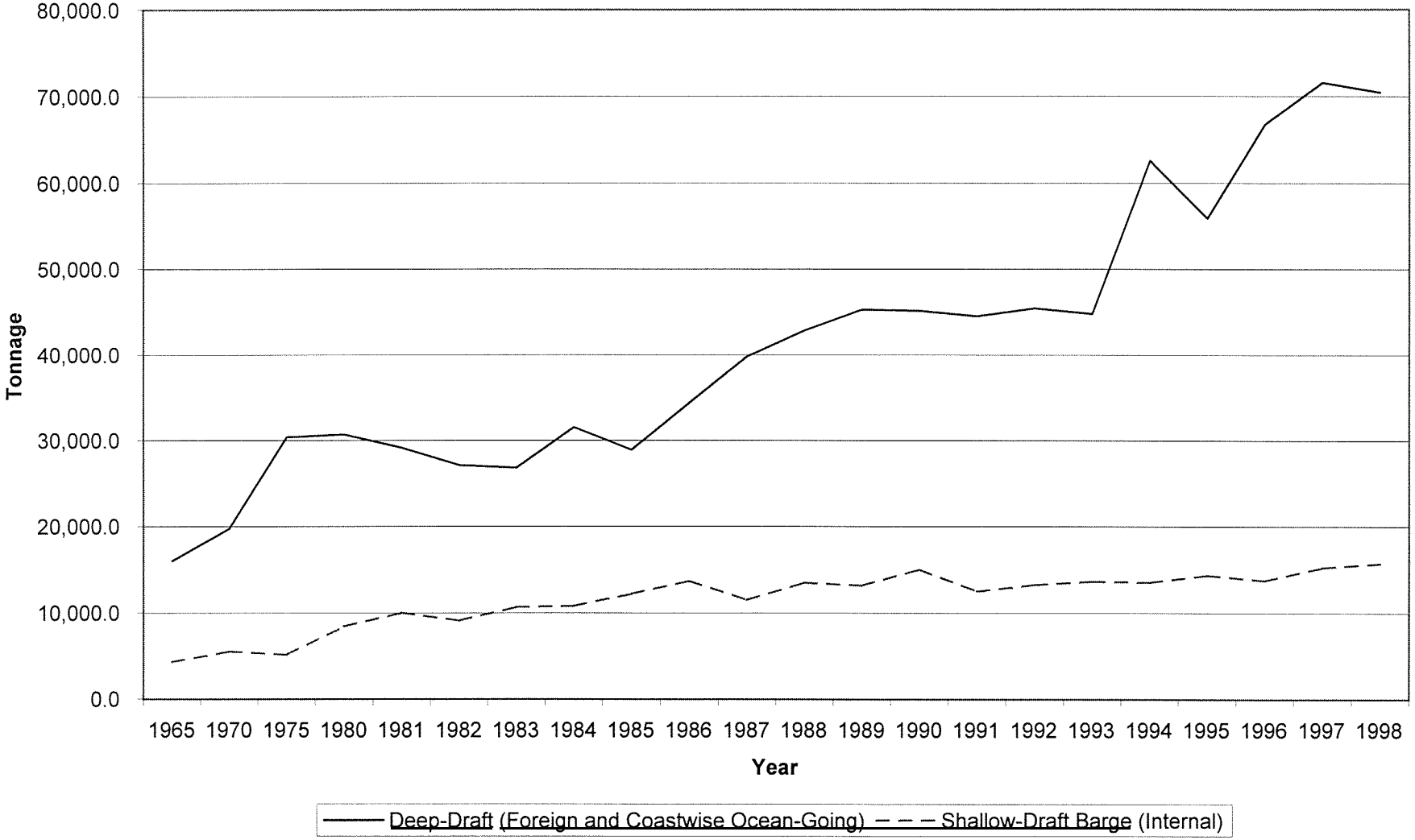

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Table 3.11-10
Trends in Commercial Fishery Landings
Corpus Christi Bay Compared With All Texas Bay Systems, 1999

	Corpus Christi Bay System						All Texas Bay Systems	
	weight (lbs) of fish landed	% of total weight of all Corpus Christi Bay finfish and shellfish	% of total weight from all Texas bay system landings	wholesale value of fish landed	% of total wholesale value from all Corpus Christi Bay finfish and shellfish	% of total wholesale value from all Texas bay system landings	weight (lb x 1,000) from all Texas bay system landings	wholesale value ($ x 1,000) from all Texas bay system landings
Black drum	134,920	18.8%	4.8%	$136,549	14.8%	5.1%	2,798.5	$2,689.8
Flounder	1,841	0.3%	0.6%	$4,039	0.4%	0.7%	284.2	$597.1
Sheeps-head	2,893	0.4%	2.5%	$1,546	0.2%	3.2%	117.4	$47.7
Mullet	1,488	0.2%	2.5%	$3,112	0.3%	4.6%	60.2	$68.0
other finfish	18,719	2.6%	10.8%	$88,569	9.6%	16.1%	173.7	$551.7
Total finfish	159,861	22.2%	4.7%	$233,815	25.3%	5.9%	3,434.0	$3,954.2
Brown and Pink shrimp	512,867	71.4%	9.1%	$568,355	61.5%	11.7%	5,637.7	$4,857.8
White shrimp	33,755	4.7%	0.7%	$113,347	12.3%	1.4%	4,837.0	$8,095.6
Other shrimp	137	0.0%	0.2%	$137	0.0%	0.7%	59.8	$18.8
Total shrimp	546,759	76.1%	5.2%	$681,839	73.7%	5.3%	10,534.6	$12,972.2
Blue crab	8,039	1.1%	0.1%	$3,707	0.4%	0.1%	6,471.9	$4,294.7
Eastern oyster	0	0.0%	0.0%	$0	0.0%	0.0%	5,183.3	$11,216.4
other shellfish	3,994	0.6%	4.6%	$5,190	0.6%	3.4%	86.5	$151.3
Total shellfish	558,792	77.8%	2.5%	$690,737	74.7%	2.4%	22,276.4	$28,634.5
Total finfish and shellfish	**718,653**	**100.0%**	**2.8%**	**$924,552**	**100.0%**	**2.8%**	**25,710.4**	**$32,588.8**

Source: TPWD, 2001.

compares the commercial fishery landings of the Corpus Christi Bay with all Texas bay systems in 1999. The total wholesale value for all finfish and shellfish landings in the Corpus Christi Bay system in 1999 was $924,552, or 2.8 percent of the wholesale value of all such landings for all Texas bay systems in that same year (at $32.6 million). For the Corpus Christi Bay system, shrimp had the greatest wholesale value, by far, worth $681,839 in 1999, or 73.7 percent of wholesale value for all finfish and shellfish. Black drum and "other finfish" also represented substantial shares of the overall wholesale value of finfish and shellfish from landings in the Corpus Christi Bay system, at $136,549 (or 14.8 percent) and $88,569 (9.6 percent) in 1999. The total weight of all finfish and shellfish landings in the Corpus Christi Bay system in 1999 was 718,653 pounds, or 2.8 percent of the weight of all such landings for all Texas bay systems in 1999 (at 25.7 million pounds). Shrimp and black drum landings represented the greatest share of the weight of all finfish and shellfish landings in 1999, at 546,759 pounds (or 76.1 percent) and 134,920 pounds (18.8 percent), respectively. It is noteworthy, however, that 1999 was not a particularly good year for commercial fishing in the Corpus Christi Bay system. During the 1990s, 1992 had the greatest total value for all finfish and shellfish landings, at $6.0 million, or 549 percent greater than the 1999 value (TPWD, 2001).

3.11.3.5 Tax Base

In Texas, the state sales tax is 6.25 percent, with local sales/use tax not to exceed 8.25 percent. Within the general vicinity of the study area, local sales/use taxes are as follows (Texas Comptroller of Public Accounts, 2001a):

- The City of Corpus Christi sales/use tax is 8.125 percent and includes 1.25 percent Corpus Christi City Tax, 0.125 percent Corpus Christi Crime Control District, and 0.5 percent Corpus Christi MTA Tax.
- The City of Port Aransas sales/use tax is 8.25 percent and includes 1.5 percent Port Aransas City Tax and 0.5 percent Corpus Christi MTA Tax.
- The City of Ingleside sales/use tax is 8.25 percent and includes 2 percent Ingleside City Tax.
- The City of Portland sales/use tax is 7.75 percent and includes 1.5 percent Portland City Tax.
- The City of Aransas Pass sales/use tax is 7.75 percent and includes 1 percent Aransas Pass City Tax, and 0.5 percent Aransas Pass Municipal Development District Tax.

In Texas, property is appraised and property tax is collected by local (county) tax offices or appraisal districts, and these funds are used to fund many local needs including public schools, city streets, county roads, and police and fire protection (Texas Comptroller of Public Accounts, 2001b). Property taxes within Nueces County are collected by the Nueces County Tax Office; in San Patricio County, they are collected by the San Patricio County Appraisal District. Table 3.11-11 provides a summary of property tax jurisdictions and tax rates for jurisdictions that affect large portions of the population living in the vicinity of the study area.

TABLE 3.11-11

PROPERTY TAX JURISDICTIONS, NUECES
AND SAN PATRICIO COUNTIES – 2000

Tax Jurisdictions	Tax Rate per $100 of Appraised Valuation
Nueces County	
Nueces County	0.352742
Port of Corpus Christi	0.023718
City of Port Arthur	0.470000
Corpus Christi Independent School District	1.570000
Port Aransas Independent School District	1.449057
Hospital	0.228028
Farm-to-Market Road	0.002738
San Patricio County	
San Patricio County/Drainage District	0.628500
San Patricio County Navigation District	0.036800
City of Ingleside	0.810000
Ingleside Independent School District	1.389180
City of Aransas Pass	0.831850
Aransas Pass Independent School District	1.487000
City of Ingleside-by-the-Bay	0.184620
City of Portland	0.570000
Gregory-Portland Independent School District	1.639100
Ingleside Industrial	0.810000

Sources: Nueces County Tax Office, 2001;
San Patricio County Appraisal District, 2001.

3.11.4 Land Use

Nueces and San Patricio counties lie in the Coastal Bend region of Texas. Land use within the two-county area consists of agricultural land, range-pasture land, industrial land, urban-residential and urban-commercial land, recreational land and facilities, military installations, and marshlands. Water use includes mineral production, commercial and sport fishing, recreation, and transportation.

In San Patricio County, agriculture has historically been, and continues to be, an important part of the economy despite the highly variable rainfall. Approximately 83 percent of the land is used for agriculture, of which about 36 percent is used for range and pastureland, and the remaining 64 percent is cultivated. Only about 9 percent is considered urban. In Nueces County, about 61 percent of the land is used for agriculture, 79 percent of which is under cultivation. Similarly, about 10 percent is considered urban (NRCS, 1992).

The study area for the proposed project encompasses Corpus Christi Bay, including the southern section of Redfish Bay and the northern section of the Laguna Madre, Nueces Bay, the lower Nueces River (12 miles), Tule Lake Channel, Viola Channel, La Quinta Channel and the watershed surrounding these water bodies up to roughly one-half mile inland from all shorelines (see Figure 1-1). The coastline of this area extends across Nueces and San Patricio counties and is adjacent to the cities of Corpus Christi, Portland, Ingleside-On-The-Bay, and Port Aransas.

Along the southern shore of Corpus Christi Bay, is the City of Corpus Christi. With a population of over a quarter million persons, Corpus Christi is the seventh largest city in Texas. Corpus Christi is also South Texas's regional center for banking, retailing, healthcare, and business. The Corpus Christi central business district (CBD) is located southeast of the ship channel entrance to the Inner Harbor (or the Port of Corpus Christi). The Corpus Christi CBD is the most densely urbanized of any area within the vicinity of the study area. Included in this area are skyscrapers, hotels, office buildings, apartment buildings, parks, civic buildings, and other businesses. Also, included in this area is the Convention and Visitors Bureau, the Art Center of Corpus Christi, the Memorial Medical Center, and the Corpus Christi Municipal Marina. Along the shoreline of the Corpus Christi Bay is Shoreline Boulevard and the Seawall, which serves as a gathering place for visitors, joggers, strollers, bikers, and others (Heines and Williams, 2001).

To the southeast of the Corpus Christi CBD along Ocean Drive (which parallels the Corpus Christi Bay Shoreline), land uses consist primarily of large single-family homes, apartments, condos, and a few businesses. Further to the east along Ocean Drive is the campus of Texas A&M University–Corpus Christi, which is built on a thin isthmus between Corpus Christi Bay and Cayo del Oso Bay. Located at the eastern end of Ocean Drive is the Corpus Christi Naval Air Station, a 4,400-acre facility.

The community of Flour Bluff extends south of the Corpus Christi Naval Air Station. This area is dominated by single-family homes with some schools, businesses, and vacant land. Boat docks, small private marinas, and gulf marshes border the western shore of the Laguna Madre within Flour Bluff.

The JFK Causeway crosses the Laguna Madre and connects Flour Bluff and Corpus Christi with North Padre Island. This causeway crosses a few small islands where a variety of restaurants, boat ramps, bait shops, and other fishing related businesses are located.

North Padre Island is located on the east side of JFK Causeway. The portion of this barrier island that is located within the vicinity of the study area contains a variety of land uses, including single-family homes, condominiums, apartments, hotels, restaurants, and other businesses. Businesses in this area cater to beachgoers, and fishermen who frequent this area. The Padre Isles residential community includes waterways and canals adjacent to large single-family homes. Packery Channel is a waterway that cuts through this portion of North Padre Island, but does not connect with the Gulf of Mexico. Nueces County manages the beaches along the Gulf of Mexico shoreline of North Padre Island.

Mustang Island is located north of North Padre Island and along State Highway 361 (SH 361). The southern end of Mustang Island is very sparsely developed, with only a few condos and single-family residences. Also located along the southern portion of Mustang Island is Mustang Island State Park. This state park includes beach access, campgrounds, and RV hookups. Traveling further north along Mustang Island toward the City of Port Aransas, the island becomes progressively more developed. Land uses consist of single-family homes, condos, apartments, hotels, and businesses that are located along SH 361. Also located in this area are the Island Moorings Marina and the Port Aransas Airport, a small landing strip. At the northern end of Mustang Island is the City of Port Aransas, a small coastal community that attracts surfers, beachcombers, anglers, artists, and tourists. Land uses in this area include single-family homes, condos, hotels, restaurants, civic buildings, and shops. The University of Texas – Marine Science Institute is located on the northeastern side of Port Aransas adjacent to the CCSC. The Port Aransas Municipal Marina, which provides docks for fishing and recreational boats, is also adjacent to the CCSC. The channel entrance to the CCSC is located on the north side of Port Aransas where ferries shuttle cars across the channel to Harbor Island to the north allowing cars to access Aransas Pass.

Harbor Island has a variety of land uses including petroleum tanks, industrial uses, fishing docks, bait shops, and a terminal site for the Texas Treasures Casino Cruises. SH 361 connects Harbor Island with the City of Aransas Pass. Aransas Pass is a small coastal community developed with single-family homes, condos, businesses, civic buildings, waterways and canals, and the Conn Brown Harbor.

Along the western shore of the Redfish Bay, south of Aransas Pass, land uses are mostly industrial, including the Gulf Coast Fabricators, a builder of offshore oil drilling platforms. Also within this area are two small private harbors with associated apartments, RV parks, and a wastewater treatment plant.

The City of Ingleside consists of residential, commercial, civic, industrial, and parkland uses. The Naval Station at Ingleside is located on the south side of town and is the headquarters for the Navy's mine warfare fleet and equipment. On the west side of Ingleside's CBD along the Corpus Christi Bay shoreline are a few major manufacturing plants, such as Reynolds Aluminum, DuPont, and OxyChem. Southeast of Ingleside are the south yards of the Gulf Marine Fabricators. South of Ingleside

is the small community of Ingleside-On-The-Bay. Land use in Ingleside-On-The-Bay is mostly residential, concentrated near the Bahia Mar Marina. The CCSC passes just to the south of Ingleside-On-The-Bay.

The City of Portland is located west of Ingleside and north of Corpus Christi Bay and the Nueces Bay Causeway. Land uses in this area include residential, commercial, civic, and park land uses that are centered mostly along SH 35. The Hunt Airport is located on the southwest side of Portland. West of Portland, on the north side of Nueces Bay, land uses are mostly agricultural or vacant with some single-family homes and ranchettes.

Along the Nueces River, to the west of its confluence with the Nueces Bay, land uses are mostly residential and vacant. The area is characterized by a moderate degree of urban encroachment upon the 100-year floodplain (riparian zone). The Nueces River State Park provides an area for picnics and field sports along the river on the west side of IH 37.

The Port of Corpus Christi manages port commerce along the Inner Harbor of the CCSC which is south of Nueces Bay and northwest of the City of Corpus Christi CBD. The Port includes dock-side storage areas, open storage and fabrication sites, cargo terminals, refrigerated warehouse space, direct transportation support from three major rail carriers, and several State and Federal highways. The Port of Corpus Christi has renovated its Cargo Docks 1 and 2 into a multi-purpose cruise terminal/meeting and banquet facility (Port of Corpus Christi, 2001). Also located along the Inner Harbor are numerous heavy industry land uses. Along this industrial corridor, there are several refinery plants including the Koch Services, Citgo, and Valero plants. Included in this industrial zone is the Equistar Pipeline Operations, Valley Solvents and Chemicals, the Interstate Grain Port Terminal, ADM Growmark (grain elevators), and the Centex Cement Company. Also, in and around the Inner Harbor there are numerous small and large companies associated with equipment and supplies for vessels, shipping and receiving of dry bulk materials, construction materials and other goods, pipeline manufacturing, and a wide variety of other goods and services related to waterborne commerce (USACE, 2002).

North of the Inner Harbor along the Nueces Bay Causeway is a narrow strip of land known as Corpus Christi Beach that divides Corpus Christi Bay from Nueces Bay. In this area, there are a variety of land uses, including apartments, condos, restaurants, souvenir shops, and industrial uses. The USS *Lexington* (aircraft carrier) is permanently docked here and houses a historical naval museum.

3.11.4.1 Transportation

Surface transportation in the vicinity of Corpus Christi Bay is provided by a network of primary, secondary, and local roads.

IH 37 connects Corpus Christi and San Antonio by a distance of 140 miles. In Corpus Christi, IH 37 connects the Annaville, Calallen, Five Points, and Tuloso-Midway neighborhoods on the city's northwest side with the rest of the city. U.S. Highway 77 (US 77) connects Kingsville and Corpus Christi and is the most direct route to and from the Rio Grande Valley on the Mexican border. US 181 runs north from IH 37 near the Corpus Christi bayfront. It crosses the Harbor Bridge, Corpus Christi Beach and the Nueces Bay Causeway towards Portland. After passing through Portland, it veers northwest through several small towns of San Patricio County. SH 35 runs from US 181 north of Portland

to Aransas Pass and Rockport. SH 361 runs east from SH 35 to Ingleside, Aransas Pass, Harbor Island, and the north ferry landing to Port Aransas. It then heads south down Mustang Island to Park Road 22 at the southern edge of Corpus Christi. Park Road 22 begins at the southeastern end of SH 358, known locally as South Padre Island Drive, and continues to the entrance of Padre Island National Seashore. SH 358 runs from west of the Crosstown Expressway (SH 286) to the Corpus Christi Naval Air Station on the city's southeast side. The Crosstown Expressway (SH 286) connects IH 37 with South Padre Island Drive (SH 358). Shoreline Boulevard/Ocean Drive runs along the Corpus Christi bayfront from north of IH 37 to the Corpus Christi Naval Air Station (Heines and Williams, 2001).

The Corpus Christi International Airport supports five airlines and a mix of jets and turbo-prop commercial planes providing air service to other major Texas city airports. The airport is located south of SH 44 on the west side of town. Construction has already begun on a 40- to 50-year master plan to upgrade the airport's facilities, an eventual cost of $70 to $80 million. The upgrade will eventually mean an additional 30 gates, more cargo planes, a new 10,000-foot runway, and 1,400 acres added to the airport (Heines and Williams, 2001).

Rail transportation is integral to the operations of the Port of Corpus Christi, and numerous industrial sites that are located within the Inner Harbor and surrounding the Corpus Christi Bay. The Port of Corpus Christi owns and manages 26 miles of rail lines within the Inner Harbor area known as the Corpus Christi Terminal Railroad, Inc. (CCTR). All of the Port of Corpus Christi docks that are located within the Inner Harbor are served by the CCTR. The Union Pacific Railroad (UPRR) provides direct rail access to all of the industrial sites located south of the CCSC in the Inner Harbor area. Two other railroads, the Burlington Northern Santa Fe Railway (BNSF) and the Texas-Mexican Railway, also provide service to the Inner Harbor area. In addition, the UPRR provides rail access to industrial sites located along the northern shoreline of the Corpus Christi Bay (Babin, 2002; Port of Corpus Christi, 2002).

3.11.4.2 Community Services

Fire protection within the vicinity of the study area is handled by a combination of municipal and volunteer fire departments (VFD). Fire departments serving the project study area include the City of Corpus Christi Fire Department, the City of Port Aransas VFD, the Ingleside VFD, and the Ingleside-On-The-Bay VFD.

Fire protection within the city limits of Corpus Christi is handled by the Corpus Christi Fire Department, which serves approximately 300,000 residents. This fire department has 15 stations and has a service area that covers approximately 139 square miles of land, 169 square miles of water, and 12 linear miles of beach along the Gulf of Mexico. The fire stations are located throughout the City and along North Padre Island to Calallen (City of Corpus Christi, 2001a).

The City of Port Aransas VFD provides fire protection and other emergency services to 10,000 people within a 10-square-mile area surrounding the city limits of Port Aransas. This VFD includes 22 volunteer fire fighters and has one fire station and seven fire trucks (Hatzenbuehler, 2002).

The Ingleside VFD provides service to 9,388 people within an 11-square-mile area surrounding the city limits of Ingleside. This VFD includes 49 volunteer fire fighters and has one fire station and nine fire trucks (Marroquin, 2002).

The Ingleside-On-The-Bay VFD provides service to 1,500 people within a 25-square-mile service area (Texas Emergency Services, 2001). This VFD includes approximately five volunteer fire fighters and has one fire station and one fire truck (Hosea, 2002).

The Insurance Services Office, Inc. (ISO) is the entity that evaluates the performance of fire departments throughout the U.S. The ISO rankings are determined through the examination of four primary factors: the city's alerting system (e.g., 911 service and fire alarm systems), the fire department, and the existing water system. In Texas, the *Fire Suppression Rating Schedule* has been modified to include the following fire prevention activities: fire prevention code information, fire investigation, public fire safety education, construction code enforcement, attendance at Texas A&M's Fireman Training School, the number of certified volunteer firefighters available, and membership in the State Fire Marshall's Association or Texas Commission on Fire Protection. On the *Fire Suppression Rating Schedule* scale of 1 to 10, (1 being best) the ISO gives the City of Corpus Christi Fire Department a rating of 4, the Port Aransas Fire Department a rating of 6, the Ingleside Volunteer Fire Department a rating of 5, and the Ingleside-on-the-Bay Volunteer Fire Department a rating of 5 (Bradley, 2002).

Law enforcement within the vicinity of the study area is served by both state and local services. The Texas Highway Patrol, a service of the Texas Department of Public Safety's Traffic Law Enforcement Division, maintains a district office in Corpus Christi. The Nueces County Sheriff's office and the Texas Highway Patrol serve the highways in unincorporated areas of Nueces County. In San Patricio County, the Texas Highway Patrol and the San Patricio County Sheriff's office serve highways in unincorporated areas of that county. Within the incorporated areas of the two counties, the cities of Corpus Christi, Port Aransas, Ingleside, Aransas Pass, and Portland all provide police protection.

In Nueces County, the 911 EMS Service is provided by Metrocom, which is located at the Corpus Christi Police Department. Metrocom dispatches EMS service through the Nueces County Sheriff's Department in unincorporated areas of the county and through the Corpus Christi Police Department for areas within the Corpus Christi city limits (Villarreal, 2001). In San Patricio County, 911 EMS service is covered by the Tri-County EMS for both incorporated and unincorporated areas of the county. The 911 service is dispatched through city police departments and the San Patricio County Sheriff's Department. Tri-County EMS has three stations that are located in Ingleside, Odem, and Portland. The City of Corpus Christi is covered for 911 Emergency Service for emergency medical, police and fire protection (Michaels, 2001).

Within Nueces and San Patricio counties, a variety of entities provide electric utility, natural gas, water, wastewater, and solid waste disposal services. These services are summarized in Table 3.11-12.

TABLE 3.11-12

PUBLIC SERVICES AND UTILITIES FOR VICINITY OF STUDY AREA, 2002

	Electric Utility Service	Natural Gas Service	Water	Waste Water	Solid Waste Disposal Service
City of Corpus Christi	Central Power and Light Co	City of Corpus Christi	City of Corpus Christi	City of Corpus Christi	City of Corpus Christi
City of Port Aransas	Central Power and Light Co	Reliant Energy (Entex, Inc.)	City of Aransas Pass	City of Aransas Pass	City of Aransas Pass
Unincorporated Nueces County	Nueces Electric Co-op	City of Corpus Christi	City of Corpus Christi	City of Corpus Christi	Nueces County (C.C. Disposal)
City of Aransas Pass	Central Power and Light Co	Reliant Energy (Entex, Inc.)	City of Aransas Pass	City of Aransas Pass	City of Aransas Pass
City of Ingleside	Central Power and Light Co.	Reliant Energy (Entex, Inc.)	City of Ingleside	City of Ingleside	BFI
City of Ingleside-by-the-Bay	Central Power and Light Co.	Reliant Energy (Entex, Inc.)	City of Ingleside	Septic System	BFI
City of Portland	Central Power and Light Co.	Reliant Energy (Entex, Inc.)	City of Portland	City of Portland	City of Portland
Unincorporated San Patricio County	Central Power and Light Co., and REA	Reliant Energy (Entex, Inc.)	Municipal Utility Districts, and private wells.	Municipal Utility Districts, and septic systems	Various private contractors.

3.11.4.3 Aesthetics

The term aesthetics deals with the subjective perception of natural beauty in a landscape by attempting to define and measure an area's scenic qualities. Consideration of the visual environment includes a determination of aesthetic values (where the major potential effect of a project on the resource is considered visual) and recreational values (where the location of a proposed project could potentially affect the scenic enjoyment of the area). Aesthetic values considered in this study, which combine to give an area its aesthetic identity, include:

- topographical variation (hills, valleys, etc.)
- prominence of water in the landscape (rivers, lakes, etc.)
- vegetation variety (woodlands, meadows, etc.)
- diversity of scenic elements
- degree of human development or alteration
- overall uniqueness of the scenic environment compared to the larger region

The study area consists of a variety of terrain characterized by varying levels of aesthetic quality. The topography of the area is mostly flat to gently rolling, with very few outstanding elevational changes. However, the study area consists mostly of open-water areas, including Corpus Christi Bay, Nueces Bay, the southern section of Redfish Bay, the northern section of the Laguna Madre, and the Lower Nueces River. Landscapes with water as a major element are generally considered visually pleasing, and this is the case for recreational land adjacent to these water features. However, the study area has also seen widespread urban development which can detract or add, depending on the type and scale, to the overall aesthetic quality. The study area includes a variety of land uses, including downtown business areas, shoreline residential development (single-family homes, condominiums, apartments), commercial development, public and private marinas, parkland, relatively undisturbed natural areas, fishing and tourism related businesses, hotels, military installations, civic uses, transportation systems (highways and railways), port facilities, and heavy industry areas. Generally, these areas are considered to be visually pleasing, with the exception of industrial and port facilities located along the Inner Harbor (CCSC) and other industrial facilities located along the north shore of Corpus Christi Bay and the western shore of Redfish Bay. However, generally speaking, the area is distinguished in aesthetic quality from other adjacent areas within the region that lack the vast water bodies of the study area and many of the outdoor recreational amenities. The landscape exhibits a generally moderate to high level of impact from human activities. No designated scenic views or scenic roadways were identified from the literature review or from field reconnaissance of the study area. However, areas along North Padre Island and Mustang Island have been identified by both TPWD and TxDOT as the Great Texas Coastal Birding Trail (TPWD, 2001).

3.11.4.4 Future Development and Development Restrictions

Urban development within the City of Corpus Christi is expected to continue to grow at a moderate pace in the near future, with most growth occurring within the south, southwestern, and northwestern portions of the city (Payne, 2001). The City of Corpus Christi has an ongoing Comprehensive Planning program that provides the public and private sectors with guidelines for future

development within the city limits and the extra-territorial jurisdiction (ETJ). The Comprehensive Planning program includes the adoption of policy statements, Area Development Plans (ADP), the Capital Improvement Program (CIP), Master Service Plans, and Specific Area Plans (City of Corpus Christi, 2001b).

The following is a list of land use guidelines/restrictions and proposed land development projects potentially affecting development within the vicinity of the study area:

- Dune Protection and Beach Access Plan and Dune Protection and Beach Access Regulations – Mustang Island
- JFK Causeway Recreation Area Master Plan Study – includes the causeway and other publicly owned land, such as portions of SH 53 and SH 361, Packery Channel, and the Gulf Beach
- The Village Master Plan – partnership between the GLO and the City of Corpus Christi for design standards and guidelines for State owned lands on the island side of the JFK Causeway
- Corpus Christi International Airport Master Plan – additional 10,000-foot runway proposed
- Packery Channel Project – includes a public marina, a public park and promenade, an RV park, and related commercial (tourism and boating related) development

The City of Port Aransas is currently in the process of updating its comprehensive plan. Future development is likely to occur in southern Port Aransas along SH 361. In the long-term, more tourism-related development is likely to occur along the south side of the city, especially if the Packery Channel development occurs (Hallbrook, 2001).

The City of Portland adopted a Comprehensive Plan in 1998, which will serve as a guide for future development. Future residential growth is expected to occur to the east of downtown Portland, and along the Corpus Christi Bay shoreline. Future industrial development is expected to occur on the north side of Portland, along SH 181 (Boren, 2001).

The Port of Corpus Christi owns numerous large tracts of land along the Inner Harbor, along the northern shoreline of Corpus Christi Bay, on Harbor Island, and along the western shoreline of Redfish Bay. These parcels of land are available for industrial development. Also, the Port of Corpus Christi is proposing a container terminal to be located along the northern shoreline of Corpus Christi Bay, adjacent to La Quinta Channel, on a 1,100-acre tract known as the La Quinta Tract (La Rue, 2001).

3.11.5 Environmental Justice

In compliance with Executive Order (EO) 12898 – Federal Action to Address Environmental Justice (EJ) in Minority Populations and Low-Income Populations, an analysis has been performed to determine whether the proposed project would have a disproportionate adverse impact on minority or low-income population groups within the study area. The EO requires that minority and low-income populations do not receive disproportionately high adverse human health or environmental impacts and requires that representatives of minority or low-income populations, who could be affected by the project, be involved in the community participation and public involvement process.

The data used in this study to determine the potential for disproportionate impacts to low-income and/or minority populations within the project study area and within the region and the State are presented in tables 3.11-3 and 3.11-13. The information is based on 1990 U.S. Bureau of the Census (USBOC) state, county, and census tract level data for ethnicity and income.

In terms of ethnicity, the population living within the project study area census tracts is characterized by some differences, on average, from that of the State, Nueces County, and San Patricio County. The percentage of African-Americans within the study area (3.8 percent), on average, is higher than Nueces County (1.3 percent), lower than San Patricio County (4.2 percent), and substantially lower than the State (11.6 percent). The percentage of Hispanics within the study area (31.9 percent), on average, is substantially lower than San Patricio County (51.9 percent) and Nueces County (50.4 percent), but higher than the State (25.5 percent). Also, the percentage of other races within the study area (1.4 percent), on average, is slightly higher than both San Patricio County (1.1 percent) and Nueces County (0.7 percent), and lower than the State (2.2 percent). However, there are several individual census tracts within the study area where percentages of ethnic minorities are substantially higher than Nueces County, San Patricio County, or the State. These include the following census tracts in Nueces County: 3, 4, 5, 6, 12, and 29. These also include census tract 109 in San Patricio County.

On average, the percentage of people living below the poverty line within the study area census tracts (17.1 percent) is lower than that of San Patricio County (20.4 percent), Nueces County (25 percent), and the State (18.1 percent). However, there are several individual census tracts within the study area where percentages of people living below the poverty line are substantially higher than Nueces County, San Patricio County, or the State. These include the following census tracts in Nueces County: 4, 5, 6, and 12. These also include census tract 102 in San Patricio County.

TABLE 3.11-13

DETAILED 1990 POPULATION CHARACTERISTICS BY PROJECT AREA CENSUS TRACTS

Census Tract	Population	Number White	% White	Number African American	% African American	Hispanic Origin	% Hispanic	Number Other	% Other	Number Below Poverty	% Below Poverty
Nueces County											
3	1,618	751	46.4%	233	14.4%	623	38.5%	11	0.7%	313	19.3%
4	2,503	72	2.9%	1,260	50.3%	1,171	46.8%	0	0.0%	1,710	68.3%
5	2,433	118	4.8%	1,237	50.8%	1,070	44.0%	8	0.3%	1,041	42.8%
6	8,012	1,626	20.3%	691	8.6%	5,503	68.7%	192	2.4%	2,552	31.9%
7	3,902	1,800	46.1%	31	0.8%	2,029	52.0%	42	1.1%	906	23.2%
12	4,342	1,168	26.9%	217	5.0%	2,835	65.3%	122	2.8%	1,714	39.5%
14	4,726	3,197	67.6%	8	0.2%	1,463	31.0%	58	1.2%	564	11.9%
21	7,180	4,391	61.2%	113	1.6%	2,624	36.5%	52	0.7%	1,046	14.6%
25	4,374	3,499	80.0%	32	0.7%	804	18.4%	39	0.9%	406	9.3%
26	7,520	4,987	66.3%	114	1.5%	2,316	30.8%	103	1.4%	1,316	17.5%
27.01	5,087	3,974	78.1%	90	1.8%	953	18.7%	70	1.4%	493	9.7%
29	1,827	1,232	67.4%	230	12.6%	276	15.1%	89	4.9%	88	4.8%
30	8,121	5,802	71.4%	260	3.2%	1,804	22.2%	255	3.1%	1,561	19.2%
31	8,688	6,786	78.1%	191	2.2%	1,428	16.4%	283	3.3%	1,110	12.8%
35	2,371	1,148	48.4%	0	0.0%	1,223	51.6%	0	0.0%	400	16.9%
36.01	5,779	128	2.2%	128	2.2%	1,455	25.2%	30	0.5%	503	8.7%
36.02	6,359	4,583	72.1%	0	0.0%	1,751	27.5%	25	0.4%	559	8.8%
36.03	2,356	1,555	66.0%	15	0.6%	772	32.8%	14	0.6%	414	17.6%
37	3,136	1,928	61.5%	0	0.0%	1,196	38.1%	12	0.4%	405	12.9%
50	1,344	633	47.1%	17	1.3%	678	50.4%	16	1.2%	343	25.5%
51.01	2,750	2,505	91.1%	32	1.2%	166	6.0%	47	1.7%	149	5.4%
51.02	2,207	2,090	94.7%	0	0.0%	84	3.8%	33	1.5%	349	15.8%

TABLE 3.11-13 (Concluded)

Census Tract	Population	Number White	% White	Number African American	% African American	Hispanic Origin	% Hispanic	Number Other	% Other	Number Below Poverty	% Below Poverty
51.03	84	84	100.0%	0	0.0%	0	0.0%	0	0.0%	6	7.1%
58.01	3,954	3,239	81.9%	48	1.2%	616	15.6%	51	1.3%	210	5.3%
58.02	4,251	2,080	48.9%	7	0.2%	2,153	50.6%	11	0.3%	602	14.2%
Total/Avg.	104,924	59,376	56.6%	4,954	4.7%	34,993	33.4%	1,563	1.5%	18,760	17.9%
San Patricio County											
102	7,187	4,371	60.8%	252	3.5%	2,538	35.3%	26	0.4%	2,596	36.1%
103	6,656	4,822	72.4%	43	0.6%	1,758	26.4%	33	0.5%	1,009	15.2%
106.01	5,382	3,536	65.7%	0	0.0%	1,747	32.5%	99	1.8%	669	12.4%
106.03	1,045	925	88.5%	0	0.0%	116	11.1%	4	0.4%	11	1.1%
106.04	3,107	2,605	83.8%	26	0.8%	458	14.7%	18	0.6%	73	2.3%
107	1,894	1,357	71.6%	0	0.0%	537	28.4%	0	0.0%	380	20.1%
109	4,430	1,937	43.7%	0	0.0%	2,486	56.1%	7	0.2%	785	17.7%
Total/Avg.	186,025	111,490	59.9%	5,973	3.2%	57,959	31.2%	2,527	1.4%	30,894	16.6%
Total/Avg Both Counties	290,949	170,866	58.7%	10,927	3.8%	92,952	31.9%	4,090	1.4%	49,654	17.1%

Source: USBOC, 1990.