

It is important to keep in mind that preceramic peoples were fishermen and coastal hunter-gatherers not because they had yet to invent agriculture and ceramics, but rather because their small numbers and available resources allowed them to live off the land and the sea without the toil of agriculture.

Formal preceramic typologies have been produced by Kozłowski (1974), Pina et al. (1976), Rouse and Allaire (1978), and others. Although there are significant discrepancies, most researchers would agree that there are three primary typological patterns in the archaeological assemblages of preceramic cultures. Pattern 1 is characterized by ground stone artifacts, including stone balls, mortars and grinders. Pattern 2 is characterized by stone artifacts produced by percussion and pressure flaking, including choppers, scrapers, lanceolate points, flint knives, blades and microblades. Finally, Pattern 3 is characterized by shell artifacts, including conch picks and vessels, shell hammers, scrapers and gouges.

Preceramic peoples survived into the Ceramic Age of Arawak and Carib migrations from South America. Moreover, some preceramic bands survived into the early historic period, at least in Cuba, as reported by Spanish geographers Andrés Morales and Alonso de Santa Cruz (Sauer 1969:48).

Ceramic-producing peoples started migrating from South America into the Caribbean about 2,500 yrs BP or more, moving north along the Lesser Antilles and arriving in Puerto Rico as early as 300 BC (before Christ).

Originating of Arawak stock, these peoples were characterized by the following traits:

- horticulture
- ceramics
- permanent villages
- watercraft without sails until historic times
- originally settled in coastal areas
- often associated with large shell middens
- sophisticated stone sculptures
- increased dependence on agriculture
- absorption of previous, preceramic peoples
- construction of plazas and ball courts
- eventual development of ceremonial centers
- culmination in regional chiefdoms

At the time of the Spanish arrival in the so-called New World, the aboriginal ceramic cultures of Puerto Rico were exploiting all ecozones, including the sea, the coast, mangrove lagoons, rivers, inland valleys and the rugged mountain interior.

Aboriginal ceramic sites in Puerto Rico are generally grouped into three principal, pottery-making traditions. In chronological order, these include the Saladoid, Ostionoid and Chicoid series or traditions. Again, there are

differences of interpretation and stylistic variations within these traditions, but the main traits may be described as follows:

Saladoid: white-on-red wares, often including modeling and incision. Often associated with land-based foods, particularly crabs. Related traits include *zemis* or three-pointed stones, cohoba pipes, etc. Saladoid sites in Puerto Rico range approximately from 300 BC (before Christ) to 600 AD (after Christ). A distinct Huecoid series has been proposed by Chanlatte, which other researchers interpret as a Saladoid sub-series (Rouse 1992).

Ostionoid: use of red paint on entire surfaces of vessels, evolving into a red slip. Emergence of ball courts and ceremonial centers in Puerto Rico, and apparent increase in the production of *zemis*, have been related to the Ostionoid series. Often associated with large shell middens. Ostionoid sites in Puerto Rico range approximately from 600 to 1200 AD.

Chicoid: also called Chican-Ostionoid by some authors. Elaborate pottery with smooth surfaces and modeled-incised designs, but little use of paint. Chicoid ceramics are associated with the Taíno chiefdoms encountered by the first Spanish explorers and settlers (Rouse 1992). Chicoid sites in Puerto Rico range approximately from 1200 AD to the mid-16th century.

The coast of Guánica is highly sensitive to prehistoric, terrestrial archaeological sites. Over twenty-three (23) prehistoric archaeological sites have been reported around Guánica Bay and at nearby Ensenada Las Pardas, Salinas Providencia, and Bahía La Ballena. These numbers are likely to increase with additional field research.

The first report of archaeological sites in Guánica was written by Lothrop (1915), who explored two caves. One of the caves had petroglyphs, which were cut from the rock and sent to the Smithsonian Institute (Rivera Fontán 1995:24).

In the 1920's and early 30's, Guenard explored the large site at the Municipal Cemetery (Britton 1930). The site is located about one km NW of the town of Guánica and about 850m N of the mouth of the Río Loco at Bahía Noroeste. In 1934, Rainey also conducted a preliminary survey of the site (Rainey 1940). Known as Los Indios, Abra, Cemetery and now formally classified as Guánica 9 or G-9, the site was excavated by Rouse in 1937.

The site of Abra (G-2) consisted of five shell middens, ranging in depth from 1 to 1.5m, with Ostiones shards detected in all levels of the test excavations (Rouse 1954:517). This site is significant to our investigation, as it offered the first published evidence of long-term prehistoric occupation along the Loco River. Without question, the people of Abra exploited the marine resources at Guánica Bay, including the use of canoes.

In 1980, a ceramic site was excavated at Playa Santa by the Fundación Arqueológica del Suroeste. As is often the case, the results of the excavation were never published, and the technical report, if ever written, has been lost. A summary of this investigation was produced by Ramos Vélez (1996), based on interviews with some of the excavation members. The excavation detected numerous hearths, as well as Saladoid and Ostionoid ceramics.

Also in 1980, an island-wide archaeological inventory was attempted by J. Gonzalez, who reported six prehistoric sites for Guánica to the Institute of Puerto Rican Culture.

In 1984, J. Walker conducted a systematic archaeological investigation of the Río Loco. This survey detected a new prehistoric site on the SE end of the Abra Hills (G-8), and another about 100m E of the river. Other prehistoric sites in Guánica have been reported by Maíz and Questell (1984), Questell (1987), Ramos y Ramirez de Arellano (1990), Ramos velez (1996), Rodriguez Miranda (1997), and Rivera Fontán (1995).

According to early Spanish sources, the principal cacique Agueybaná lived in Guánica, but his settlement has never been identified. According to Montalvo Guenard, the word Guánica derives from the Taíno Guanin-quen, which means the land of gold (de Hostos 1992:699). According to Alvarez Nazario (1999:101), Guanica derives from Huanicoy, a minor Taíno chief or cacique.

Although prehistoric sites on land do not necessarily imply the presence of submerged prehistoric sites, they nonetheless indicate extensive aboriginal activity in and around the bay. This classifies Guánica Bay as a sensitive area for all prehistoric archaeological sites, including intertidal and submerged middens, prehistoric watercraft and fish weirs.

A submerged, preceramic site was recently detected off Condado Beach, San Juan, by the author and oceanographer Vance Vicente, during the installation of a fiber-optic, trans-oceanic cable (Vega 1999). Vega-Vicente Site is a shell midden about 205 m (671 ft.) from shore, at a depth of 6.7 m (22 ft.), behind a submerged beachrock pavement. This discovery supports the author's model for submerged prehistoric middens (Vega 1990b:13, Fig. 18).

According to mid-to-late Holoene sea level curves for the Caribbean, based on extensive coring and radiocarbon dating of wetlands in Jamaica (Diggerfeldt and Hendry 1987), the depth of the site suggests a tentative dating of 6,250 yrs BP. The site is characterized by large lithic tools, numerous shell points, absence of pottery, *Strombus* conchs with their tips removed, and diverse species of gastropod and bivalve shells.

About the time that Vega-Vicente Site was occupied off Condado Beach, Guánica Bay was a coastal valley. Considering the presence of the Loco River, a paleo-estuarine environment at nearby Ensenada Las Pargas with abundant shelfish and inshore fishing areas, excellent resources for lithic workshops at the nearby Abra Hills, and the presence of coastal caverns, there is a very high probability that the paleo-valley of Guánica Bay was occupied by preceramic peoples.

Due to the erosion of archaeological sites by the Loco River, prehistoric artifacts may also be transported to Guánica Bay, potentially creating the illusion of a submerged prehistoric site. Although redeposited materials may

3.3 Submerged Prehistoric Sites

Puerto Rico's first submerged prehistoric site was discovered by the author and geologist Arturo Camacho, in the late 1970's, off the north coast (Vega 1981). Located 6 km E of San Juan Islet, Isla Verde Site is a submerged midden off Punta el Medio, Carolina. The site is located in shallow water, between an inshore reef and Puerto Rico's north shore.

Following a preliminary survey in 1979, underwater test excavations were conducted in 1980. The site has been subsequently visited for additional observations, up to the present.

Underwater excavations revealed a compact midden, submerged in place. Located at the median point of a compound lunate embayment, Isla Verde was submerged as the embayment expanded. During transgression, the midden was partly protected from surf by the reef and a small islet.

The 1980 excavations yielded Ostionoid and a few Eelenoid pottery shards, petaloid stone celts made of mudstone and volcanic breccia, shell picks and gouges, human bones, turtle and manatee bones, and diverse species of gastropod and bivalve shellfish.

Another possible, submerged prehistoric site has been detected off Joyuda, on the W coast. Numerous other sites are presently at the edge of the sea, including Caño de los Indios in Ceiba, Cayo Cofresí in Jobos, Cayito in Santa Isabel, Magueyes in Lajas, Joyuda in Cabo Rojo, Mar Chiquita in Manatí, Maisabel and Cerro Gordo in Vega Baja. etc. (Vega 1990).

also yield clues to the past, these river-transported artifacts have lost their original context and are not as significant as an actual, submerged archaeological site found in-situ. Evidence of redeposited artifacts, particularly lithics, has been detected by the author in the river's flood plain, as far as 250m E of the river (Vega 1998a).

During a survey at Caleta Salinas, SW of Ensenada, the author detected evidence of a prograding coast, suggesting minor tectonic uplift (Vega 1998b). The integration of tectonic and eustatic factors of sea level change is extremely complex. In the case of Puerto Rico's southeast coast, the tectonic factor appears to be very small, but significant enough to prograde lowland coasts in periods of minimal or zero eustatic rise of mean sea level (MSL). This probably occurred about 4,000 to 2,000 yrs BP, potentially prograding the preceramic coast of Guánica Bay, and resulting in preceramic middens slightly inland of the present shoreline.

3.4 Aboriginal Watercraft

The primary aboriginal method of water transport was the canoe, with possible, secondary use of rafts. The antiquity of canoes is well established. In Florida, prehistoric dugout canoes dating back to 3,000 yrs BP have been excavated in wet sites.

In the Bahamas, Columbus saw canoes "all of one piece hollowed like a tray from the trunk of one tree . . . so large as to contain forty or forty-five men, while others were so small as to hold one person" (McKusick 1970:8).

In Jamaica, Columbus measured on finely decorated canoe at 29 m (96 ft.) and 1.8 m (6 ft.) wide (Sauer 1969:82). This was surpassed by another canoe at the Bay Islands, off Honduras, “as great as a galley, eight feet wide, all of a single trunk” (ibid:128).

Coppier describes a Lesser Antillean canoe that was 27 m (90 ft.) long, which he estimated could carry up to eighty-five persons plus cargo (Cárdenas 1981:143). Columbus reports that the largest canoes traveled with great speed, strictly by paddling. None of the European explorers mention the use of aboriginal sail. According to the Spanish Friar Blasius, rescued by the British at Dominica in 1606, all of his companions were killed by Carib Indians, who spared him for teaching them how to rig sails to their canoes (Mckusick 1970:5).

Aboriginal canoes were built of mahogany (*Swietenia mahogany*), cedar (*Cedrale odorata* Gomier), silk cotton (*Ceiba pentrandia*), and other fine woods. The construction process often included the use of fire. Prehistoric Caribbean navigation is discussed in detail by Robiou (1993). The structural difference between river and seagoing canoes is discussed by Vega (1990, 1995), including the possible aboriginal invention of the pirogue or keeled canoe.

The use of canoes extended well into the historic period, with rigged pirogues used as late as the 19th century. Prehistoric or historic, the discovery of a canoe in Puerto Rico’s waters would be of primary significance, because not one has been systematically excavated. Such a discovery might occur

practically anywhere in Puerto Rico's coastal waters, including beaches, coastal shallows, river mouths, reefs, lagoons, ports and under modern piers.

Considering the presence of woodland areas with fine trees around Guánica Bay in historic times (Ramos 1999:35), plus the numerous archaeological sites, including the historically documented village of Agueybaná, it is highly probable that prehistoric canoes were frequently built in Guánica Bay. The wrecks of some of these canoes, either destroyed by hurricanes or burned by the Spaniards, may be found almost anywhere in the soft sediments of Guánica Bay.

4. Historic Ports

4.1 Maritime History of Puerto Rico

Puerto Rico was “discovered” in 1493, during Christopher Columbus’ second voyage. Proposed landfalls have included Guayanilla Bay, Cabo Rojo, Mayaguez, Añasco, Aguada and Aguadilla. Current research indicates that Columbus almost certainly landed at Añasco Bay (Delgado et al. 1996).

In 1504, Vicente Yanés Pinzón briefly explored the island, introducing goats, pigs and horses. The following year, Yanés Pinzón was granted the title of “Capitán General y Gobernador” of Puerto Rico, but afterwards decided to move his colonial enterprise to Brazil.

During the early 16th century, Puerto Rico was at the core of the Spanish colonial enterprise. The island had excellent harbors, abundant rivers, fertile soil and the promise of gold. Soon, however, the mining decayed, and the island lost much of its initial attraction. By the early 17th century, Puerto Rico and the Caribbean had become peripheral to the main colonial enterprise.

Still, the island retained great strategic importance in relation to the Spanish fleets (Cardona 1989).

At the time of Columbus' discoveries, Spain was hindered by a weak economy. Financial difficulties were largely due to the 1492 conquest of Granada, the last Islamic bastion in Spain. Thus, the conquest of the Americas became an open door for private investors and adventurers. Their contract with the crown was known as a capitulación. This royal license could be sold or exchanged.

In 1508, already a hero of the Indian wars in Hispaniola, Juan Ponce de León signed a capitulación to settle Puerto Rico. The following year, he founded the settlement of Caparra on the north coast, while Cristobal de Sotomayor founded Guánica on the south coast.

Caparra was built about 3km inland from San Juan Bay (measured as the bird flies, with an estimated walking distance of about 4 km). The settlement was named after the Roman city of Caparra or Capera, near Cáceres, Spain, by Nicolás de Ovado, Governor General of the Indies, who was born in Cáceres (Sepúlveda 1989:33-51).

The new Caparra, described as a ciudad or city in some documents, included various stone houses, a plaza, a church, a small hospital, dozens of *bohíos* or thatched houses, warehouses, a brick furnace for gold production, farms, a blacksmith's shop, wells, etc. The town was close to various aboriginal settlements, which provided labor for the mining and agricultural enterprises.

At the south end of San Juan Bay, the settlers of Caparra built a small port, connected to the city by a dirt road. The location of the port, or desembarcadero, is depicted in a map of 1519, by Rodrigo de Figueroa (Archivo General de Indias, Mapas y Planos, Santo Domingo 1). Cartographic analysis of over 50 maps, including more recent historic maps up to the early 20th century, clearly identify the port of Caparra at the site of the present-day Army Terminal, on the south end of San Juan Bay (Vega 2001).

Caparra lasted from 1509 to about 1521, when the settlement was abandoned in favor of San Juan. The significance of Caparra to this study, is that a similar colonization strategy was employed by Spaniards on the south coast, but only limited historical data is available, and the archaeological research has yet to begin.

During the early 16th century, ships en route to Hispaniola (Dominican Republic) and New Spain (Mexico) generally sailed along the south coast of Puerto Rico, making a watering stop at San Germán Antiguo (present-day Añasco Bay). This derrotero or sea route would place the Spanish fleets off Guánica Bay on a regular basis.

In 1556, the regional government of San Germán was moved to Guayanilla. This change would have increased the entry of Spanish vessels with official correspondence from the crown (Cardona 1989:147).

By the 17th century, the route from Spain to Mexico was changed, with the fleet sailing along the north coast of Puerto Rico, stopping at San Juan if

necessary. Upon leaving San Juan en route to Mexico, the ships would sail west past Punta Borinquen, then southwest, between Puerto Rico and Desecheo Island, stopping at the aguadas or watering places of the west coast.

On average, sailing from Spain to Mexico lasted seventy-nine days, or two and a half months, including a five-day feria on the west coast of Puerto Rico. To appreciate the significance of the Spanish fleet system, of which only a segment has been described here, this was the first global communication network in history. However difficult and rudimentary the Spanish fleet system was, it fused the ports and politics of Europe, Africa, the Americas and Asia into one global history.

4.1 Pirates, Smugglers and Fishermen

The maritime history of Puerto Rico is not limited to the Spanish fleets and the great invasions of San Juan in 1595, 1597, 1625 and 1797. Countless minor invasions occurred throughout the island, as well as extensive contraband.

The nearby port of Guayanilla, or Guadianilla, east of Guánica, was attacked by the French in 1565, by Carib Indians in 1567, by the French again in 1576, by pirates in 1702, by the Dutch in 1703, and by the British in 1797 (Sievens 1983:12-17). The Carib attack of 1567 is particularly significant, as it resulted in the loss of a Spanish ship near shore

In addition to these attacks, the anchorages of Guánica, Guayanilla and Ponce Bays were frequently visited by smugglers, particularly British, who

traded with the locals without the restrictions and taxes of the Spanish government. Very little is known about the outlaw history of smuggling, but it was certainly a primary activity in Puerto Rico's economic history.

While San Juan became the center of Spanish colonial bureaucracy, the south coast grew on a more informal basis. This allowed contraband to flourish. In the "Juicios de Residencia" or evaluations of Spanish governors of Puerto Rico, which the author had the opportunity to read in the archives of Seville, contraband in Ponce, the principal city on the south coast, is a recurrent theme.

In 1693, the Governor moved against a large contraband ring in Ponce, which included the town's vicar. A similar operation was conducted in 1701 (López Cantos 1975:265-268).

Contraband imports included coffee, hides, cattle, fruits and fine timber. In turn, the smugglers traded wine, cloth, tools, firearms, gunpowder, etc. Most contraband vessels in Ponce Bay were from the Danish colony of St. Thomas and British colony of Jamaica.

Contraband in Guánica was partly due to its relative isolation, excellent harbor, the large number of foreign settlers in Yauco, and the presence of a local militia in Ponce, instead of royal Spanish troops.

In 1805, in a radical change of policy, the Spanish crown instructed the Governor of Puerto Rico to open the ports of Fajardo, Ponce, Cabo Rojo, Mayaguez and Aguadilla. The goal was to promote trade with other Spanish-

American ports and reduce contraband with non-Spanish vessels (Morales Carrión 1974:121).

Another significant area of maritime activity is fishing. In the case of Guánica Bay, we have a virtually uninterrupted history of sailing and fishing activity since the late 16th century. The potential archaeological record includes port structures and discards, discussed below, and shipwrecks, discussed in section 5 of this report.

Since prehistoric times, the people of Puerto Rico built fish weirs to capture and hold large quantities of fish. The practice was adapted by Spanish settlers and their criollo descendants, with evidence of fish weirs until the early 20th century (Vega 1995:116). Particularly in silt and mud bottoms, the poles of fish weirs may be preserved for centuries, frail but significant features of our maritime past.

4.3 The Archaeology of Ports and Anchorages

Non-maritime researchers often believe that underwater archaeology is limited to shipwrecks. In fact, a historic port is an archaeological site in itself, with or without shipwrecks (Vega 1995:99-108).

A wide variety of archaeological materials may be found in areas of port activity. In addition to abandoned piers and boat yards, a historic port might yield surprising amounts of garbage, including hulks, shell middens, abandoned anchors and chains, ballast piles, bottles and ceramic shards, etc.

Historic anchorages also produce great amounts of archaeological materials, including all sorts of discards, as well as cargo accidentally lost during loading or unloading operations.

In recent years, entire towns and cities have been discovered in coastal waters, including Alexandria in Egypt and numerous other Mediterranean ports.

If we consider the countless ships and boats that have operated out of Guánica Bay since the 16th century, all the storms and hurricanes, invasions, smuggling and fishing operations, it is evident that there is a rich undersea archaeological heritage to be discovered within the bay.

In many instances, port materials may be deposited in stratigraphic context (or chronological layering of sediments). Dredging, piling, sedimentation and fill might destroy or alter the stratigraphic context, but one cannot assume that the cultural resources of an entire bay have been destroyed by dredging operations in specific areas.

The detection of historic port materials might be difficult, particularly in silty and polluted environments. On the other hand, the potential for preservation and data recovery may be very high.

4.4 The Historic Ports of Guánica Bay

The historic ports of Guánica include the incipient settlement founded by Cristobal de Sotomayor in 1510; the port immediately south of the town of

Guánica, operating as early as 1577 and still in use, and the pier of the Central Guánica at Punta Pera, operating from 1901 to 1981.

The exact location of Sotomayor's settlement is unknown, with both Punta Pera and the town of Guánica as possible sites. Prior to the fill of the Central Guánica, Punta Pera was an islet known as Isla de los Puercos or Hog Islet (Ramos 1999:34).

In 1505, Vicente Yanes Pinzón explored Puerto Rico, leaving hogs and goats at various locations. Along the south coast, one of these locations was Hog Islet (ibid).

Although this information has not been verified, Hog Islet is the only islet within Guánica Bay. Considering also the traditional name of the islet, plus the description of Yanes Pinzón of an islet about 200 yards offshore, and the islet's central location within the west side of the bay as the easiest approach for a sailing caravel, it is highly probable that Columbus' partner landed exactly where the Central Guánica's wharf and pier were built nearly four centuries later.

In 1510, while Juan Ponce de León developed his gold mining enterprise on the north coast of Puerto Rico, Cristobal de Sotomayor founded Guánica on the south coast, with the same industry in mind.

In 1511, while traveling with his nephew Diego Sotomayor and three other Spaniards, Cristobal de Sotomayor was ambushed and killed by the aborigines, who then razed the settlement of Guánica. That same year, the village of Santa Maria de Guadianilla was built, somewhere in Guayanilla

Bay. The primary incentives for the settlement of Guayanilla were the mining operations in the Hills of Santa Marta (present-day San Germán), and to maintain control of the salinas or salt works at the nearby coast of Guánica (Cardona 1989:146). In the 16th century, the salt works of Guánica were often called Salinas de Agueybana, and considered among the best of the island.

The settlement of Guánica was also called Sotomayor, Tavora and possibly Guanía and San Germán. As discussed in detail in Section 5 of this report, San Germán meant various ports throughout history, as well as the partido of San Germán, which included the western half of Puerto Rico. Although some writers have indicated that the first settlement of Guánica was abandoned because of mosquitoes, it is more likely that the place was attacked by the aborigines (Tió 1956:45).

In 1535, the Spanish chronicler Oviedo described Guánica as one of the best harbors in the world. Still, the bay remained undeveloped until the late 18th century, used primarily by local fishermen and smugglers. In 1580, the port of Guánica was attacked by aborigines.

In 1743, English pirates entered Guánica Bay in small ships, including one described as a paquebot in Spanish documents (de Hostos 1992:701). Anchoring near Caño de los Negros, they landed and marched into San Germán. The attack was soon repelled by the Spaniards, who managed to destroy the paquebot. Since some of the pirates escaped, it is assumed that they had more than one vessel, or else they stole a local canoe.

The town of Guánica was built in the 1840's. Its original name was the Nuestra Señora del Socorro y San Vicente Ferrer de Guánica.

Until 1875, Guánica was a barrio of San Germán. Afterwards, it became a barrio of Yauco until 1914, when it achieved municipal status, largely due to the presence of the Central Guánica, or Guánica Centrale.

In 1898, war broke between Spain and the United States, followed by the invasion of Cuba, Puerto Rico, and the Philippines. In Puerto Rico, the primary landing site was the port of Guánica. According to the reports received by General Nelson A. Miles, Commander in Chief of the U.S. Army, at the time there were numerous large boats and a few sailing ships in Ponce and Guánica (Rivero 1998:183). This indicates regular maritime activity in Guánica Bay, before construction of the Central Guánica. The port itself, however, was very small and separated from the town by over 300 m of salt marsh (Figure 10).

At 5:20 am, July 25, 1898, the USS *Massachusetts* reached the coast of Guánica with all lights out. At daybreak, the USS *Gloucester*, ex-*Corsair*, entered the bay, reporting a depth of five fathoms. The *Gloucester* anchored at 600 yards off the port, sending a boat with an officer, 28 marines and a Colt machine gun. Raising the U.S. flag at the wooden office of the *cabo de mar*, the marines were fired at a Spanish troop of thirty men hidden in the nearby woodland. As the *Gloucester* opened fire, the Spanish troops retired inland. Without any further opposition, the U.S. fleet entered the bay and General Nelson Miles gave the order to land.

At least eleven ships entered Guánica Bay, with a total of 3,300 men landing at the small port, excluding 115 soldiers who were sick. Although the invasion occurred without any large-scale conflict, the sheer size of the fleet and its invading army suggests a high probability of garbage as well as small items accidentally falling into the water. Given the circulation of currents within the bay, some floatsam and slightly negative items might have drifted into the Study Area.

The primary event in the Study Area's maritime past, is the construction and shipping activity of the Central Guánica, beginning three years after the invasion.

In 1901, Hog Islet was connected with the mainland coast of Ensenada with rock fill, followed by construction of the wharf, pier and other structures of the Central Guánica. As the fill gave the islet the shape of a pear, the area became known as Punta Pera.

The construction and operation of the Central Guánica depended on intensive shipping activity, both to import materials and machinery, and to export its sugar cane and sugar products. At Punta Pera, a Customs Office was built specifically for the sugar mill's intensive shipping activity.

In 1911, the Porto Rico Sugar Company began importing sugar cane from La Romana, in the Dominican Republic, for processing in the Central Guánica. Two of the steam ships used at the time were the *Santiago de Cuba* and *El Romanita* (Ramos 1999:94).

In 1918, the area was hit by a strong earthquake, with the sea invading the lowlands of Guánica Bay and causing damage to the Central Guánica (Ramos 1999:124). This was due to a tsunami or tidal wave, which also destroyed parts of Agiadilla on the west coast (Vega 1990:90).

In the 1930's, a private beach was built at Caleta Salinas for the upper-level managers of the Central Guánica. This beach was segmented with a cyclone fence. A second beach club was built, adjacent to the first one, for members of the Club Puertorriqueño (Ramos 1999:149).

In 1932, the Central Guánica bought the USS *Cape Mohican* from the U.S. Navy, for shipping duty-free sugar from Guánica to the mainland United States.

During World War II, various ships operating out of Central Guánica were lost at sea, including the *San Jacinto*, *Romanita* and *Mariana*, attacked by German submarines (ibid. 192).

In the mid-1950's, various large-scale improvements were made to the Central Guánica, including dredging of the navigational channel (ibid. 209). This was a private dredging project, probably among the largest of its kind in Puerto Rico.

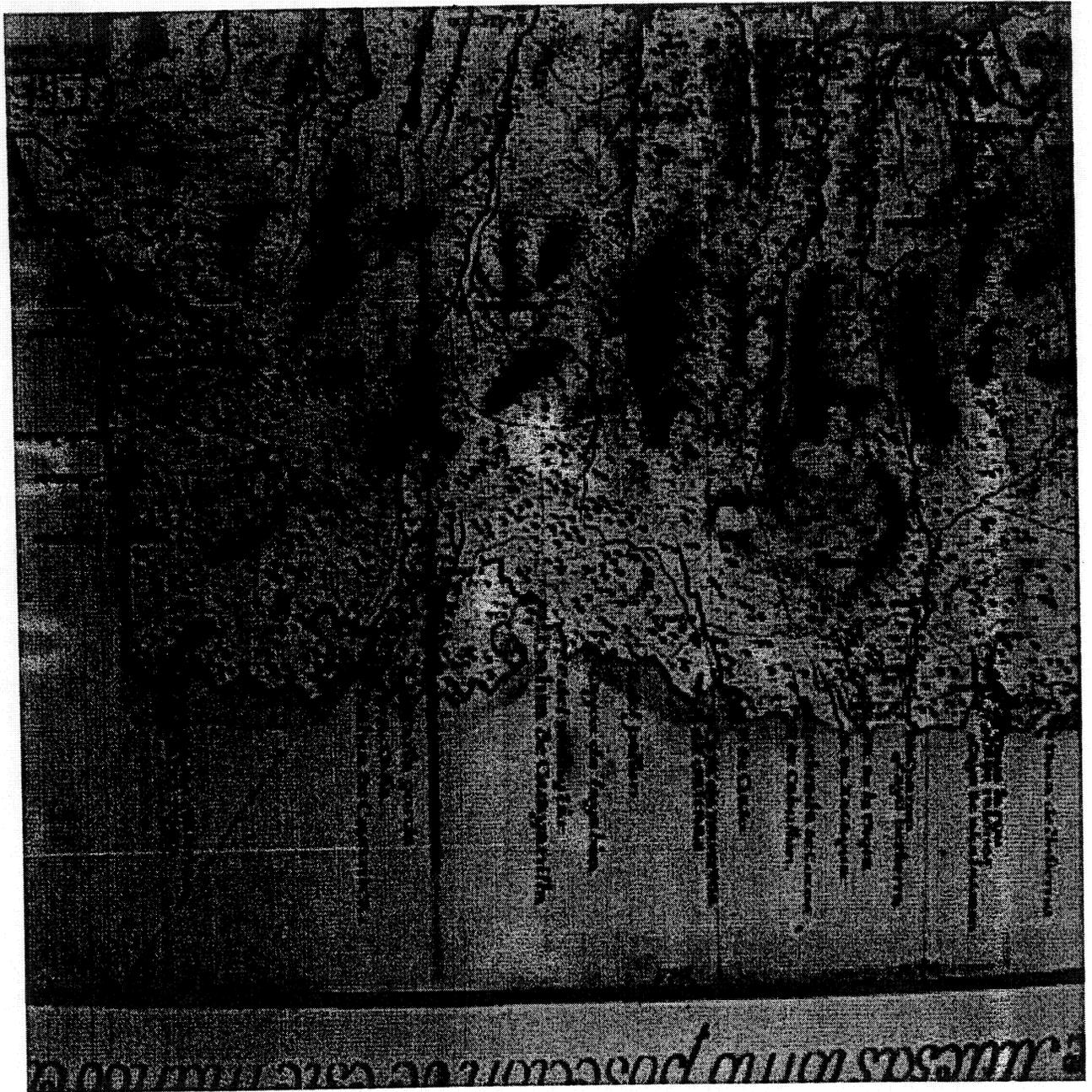


Figure 7. Detail, Historic map of Puerto Rico, by Miguel de Muesas, 1769, Archivo Genral de Indias, Santo Domingo 2396.

Notice the tip of Cabo Rojo, the SW corner of Puerto Rico, on the left side. Moving east (to the right), we find the anchorages of Guánica, Guayanilla and Ponce, marked with small anchors.



Figure 8. Map of 1632, depicting salt works on St. Martin, AGI, Seville.

A similar situation probably occurred on the salinas or salt works at Ensenada Las Pardas, Caleta Salinas and Bahía Montalva. The presence of salt works would have increased the probability of Spanish vessels in Guánica Bay, particularly during storms and hurricanes, as none of these salinas were located in hurricane harbors.

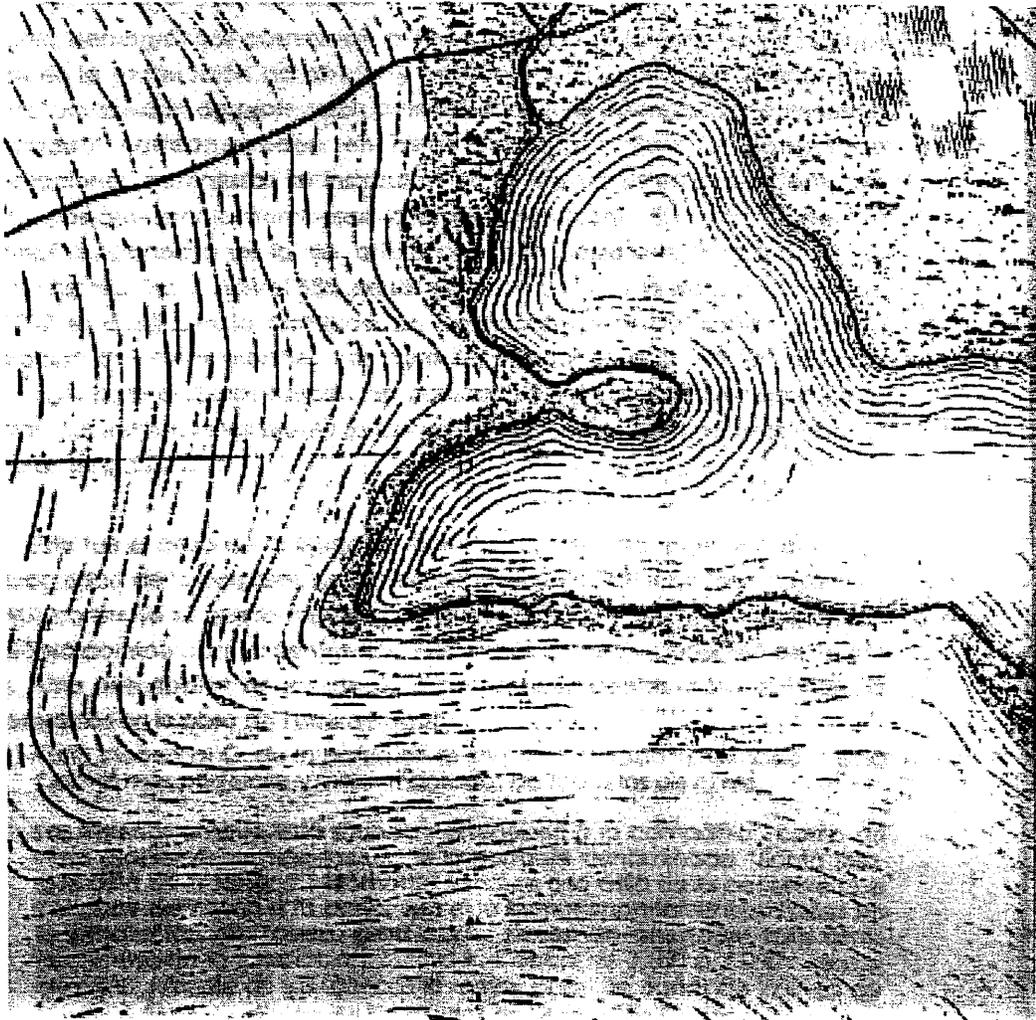


Figure 9. West side of Guánica Bay. Detail from 1866 map of Guánica Bay, by Pedro A. Bisbal (AGPR, Obras Públicas, Muelles y Puertos, Legajo 109).

4. Historic Shipwrecks

4.1 Historic Ships and Boats

Potential shipwrecks at Guánica Bay cover the entire range of Puerto Rican history, from the early 16th century to modern times. Within this 500-year time span, numerous types of ships and boats were developed for diverse uses, including scouting, warfare, commerce, fishing, coast guarding, dredging, pleasure sailing, passenger service, mail service, etc.

Vessels known to have sailed along the south coast of Puerto Rico include caravels, pataches, galleons, naos, felipots, urcas, frigates, navíos, schooners, corvettes, barques, polacres, brigs, tartans, pirogues, lighters, clippers, sloops, steamers, etc.

Ships were built with wooden hulls until the late 19th century. The first Spanish liner built with a steel hull was the steamship *Antonio López*, built in Scotland in 1881 and lost off Dorado, Puerto Rico in 1898 (Vega 1993). This vessel was the first Puerto Rico shipwreck nominated to the National Register of Historic Places, and the first to become a National Landmark in 1998.

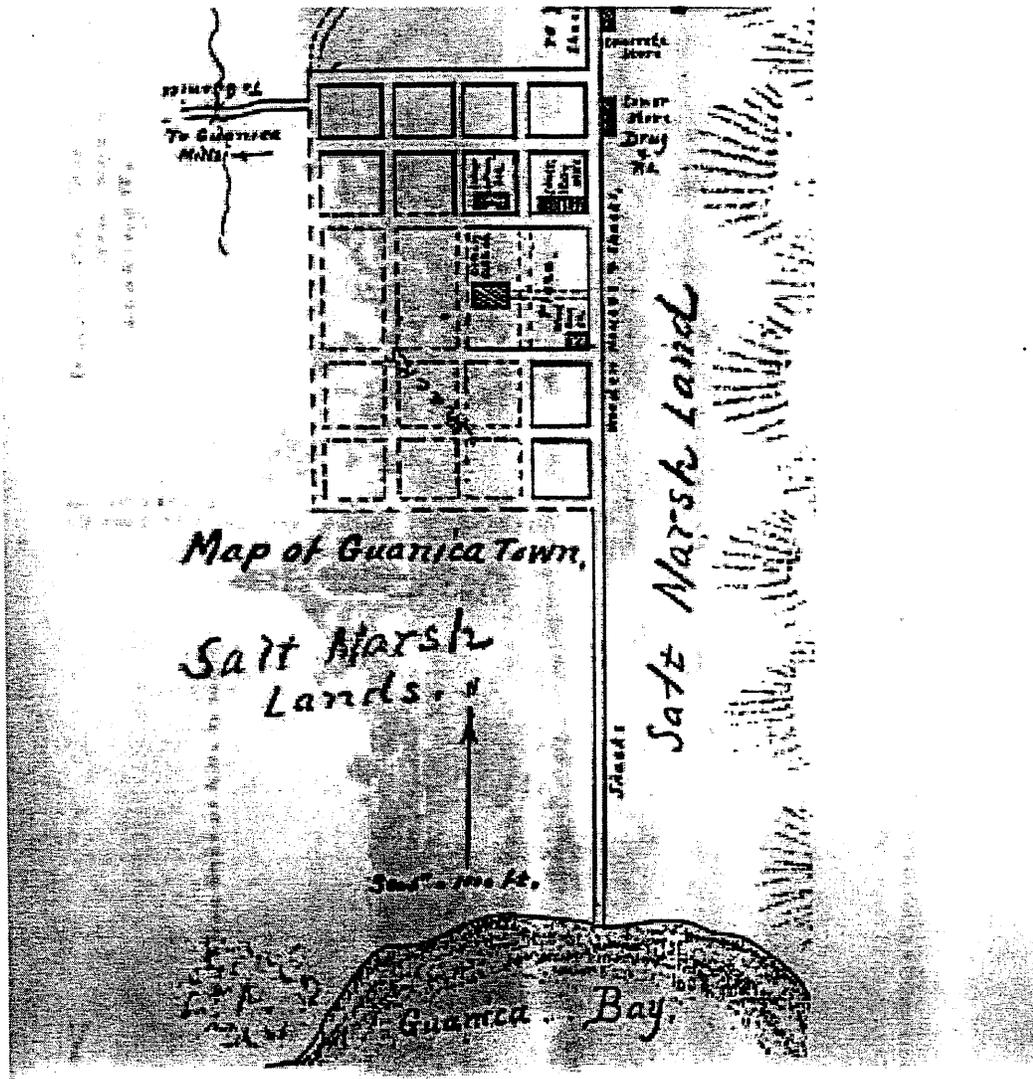


Figure 10. Town of Guánica, NE of the bay (Armstrong 1909-1912).

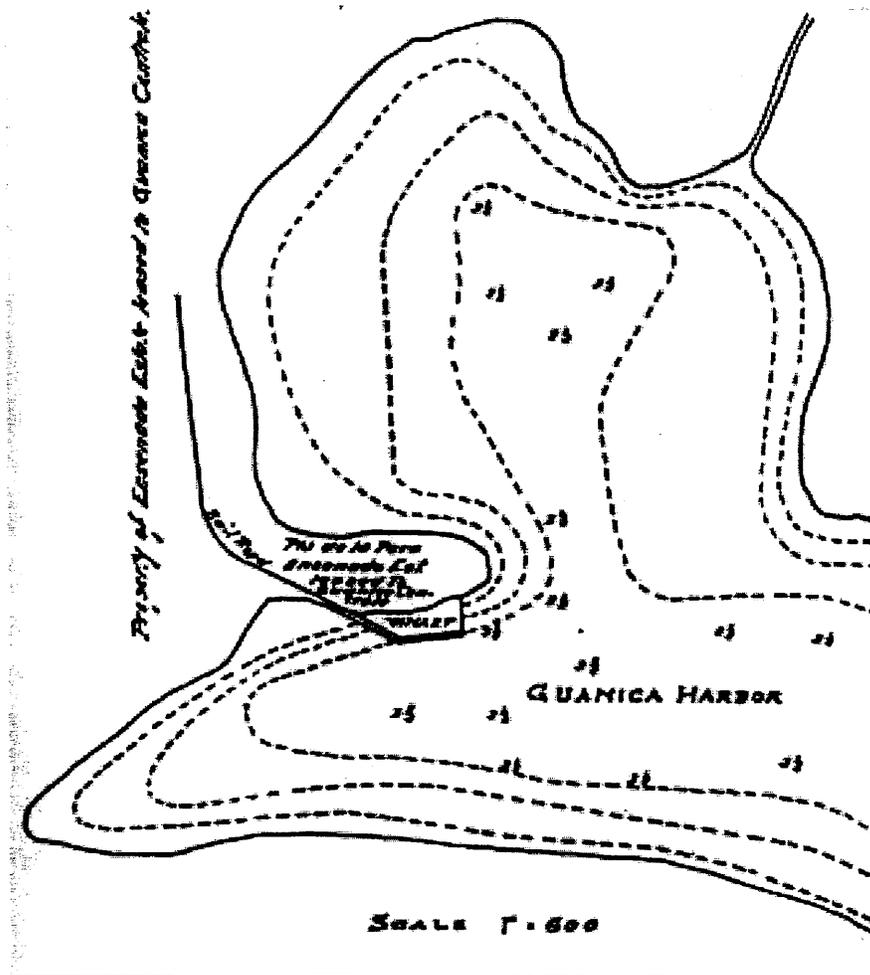


Figure 11. Wharf construction plan, Central Guánica, dated Sept. 6, 1901 (AGPR, Obras Públicas, Muelles y Puertos, Legajo 169).

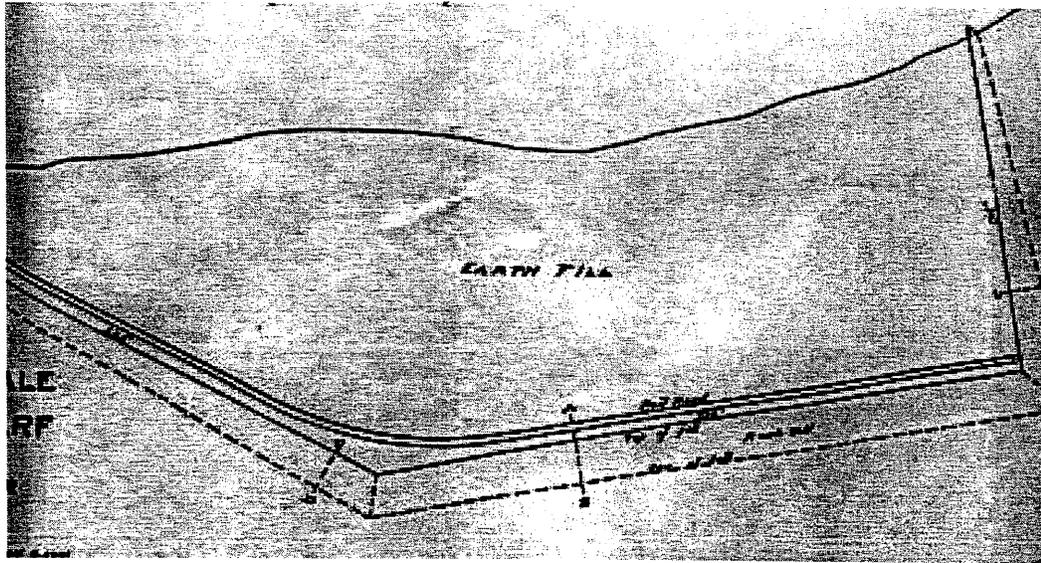


Figure 12. Wharf plan, south side of Punta Pera, Central Guánica, 1901 (AGPR).

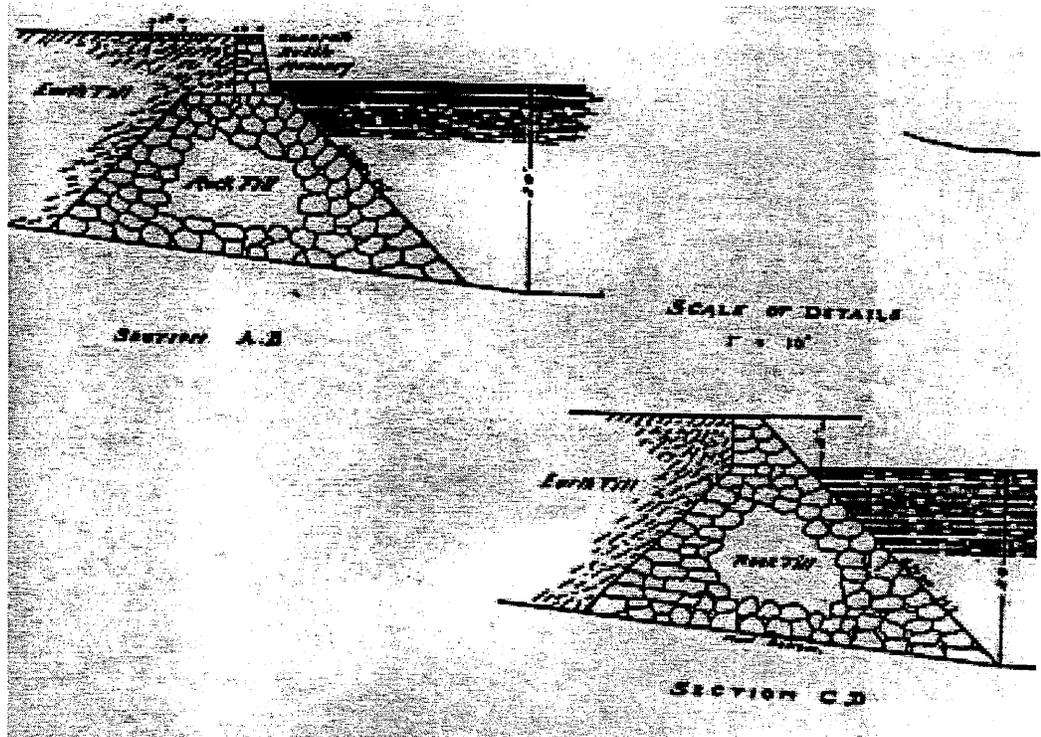


Figure 13. Wharf sections, Punta Pera, Central Guánica, 1901 (AGPR).

In theory, historic shipwrecks at or near Guánica Bay may include wooden-hulled vessels from the early 16th century onwards, and metal-hulled vessels of the late 19th and early 20th centuries. By the late 1890's, dozens of steamers operated out of Puerto Rico's principal ports, including San Juan, Ponce and Mayaguez, with frequent calls at Guánica.

5.2 The Archaeology of Shipwrecks

The importance of shipwreck archaeology has been demonstrated by dozens of studies around the world (Bass 1988; Konstam 1999; Muckelroy 1980, etc.). Shipwrecks may yield unique information on ship construction, exploration, colonization, trade, warfare, piracy, contraband, slavery, fishing, and numerous other areas of past human activity.

While terrestrial archaeology consists mostly of what people discarded as garbage hundreds or thousands of years ago, shipwrecks often involve cargo and personal items abandoned intact in a survival crisis. Although some artifacts may be damaged by long-term immersion in salt water, others are preserved in soft sediments.

In addition to providing unique information on the maritime lifeways of sailors, pirates, whalers, fishermen, etc., shipwreck may also provide fine-dated artifacts, which allow archaeologists to date similar finds on land. Unlike terrestrial sites, which might represent dozens or hundreds of years of occupation, shipwrecks occur at a specific moment in history, the moment of sinking.

To nautical archaeologists, every shipwreck is a time capsule, a frozen moment in time that in many cases can be dated down to the day and the hour. For instance, the study of bronze and iron cannon in a dated shipwreck will provide important information on the history of technology.

In the Mediterranean, shipwrecks as early as 3,500 yrs BP have been excavated, yielding extensive information on trade, ship construction, navigation, and the daily life of sailors and merchants.

In the case of Puerto Rico, some 2,000 ships were lost prior to 1900 (Vega 1995). Each of these shipwrecks represents a moment in time in Puerto Rico's history. Prior to the invention of commercial airplanes, in the late 1920's, ships were the only contact between Puerto Rico and the rest of the world. Additionally, as late as the 1850's, travel between Puerto Rico's coastal cities and towns was often by sea, in order to avoid the narrow roads across the rugged mountain interior.

4.1 Shipwrecks off the South Coast

Shipwreck documents often provide limited location data, which make it necessary to separate potential and actual shipwrecks. In many instances, archival documents might report a ship loss off the south coast, or en route from Ponce to Mayaguez, without providing the specific area of sinking. Historic documents might report ship losses off San Germán, but it might not be clear if the scrivener meant the first port of San Germán within present-day Añasco Bay, the port of the second San Germán at Guayanilla Bay, or the

partido of San Germán, which included all of the west coast, parts of the north coast west of the Camuy River, and parts of the south coast west of the Jacaguas River (Santana y Torrech1988:20). On the south coast, the partido of San Germán included the modern municipalities of Juana Diaz, Ponce, Peñuelas, Guayanilla, Yauco, Guánica, Lajas and Cabo Rojo. Thus, a shipwreck within the partido of San Germán could mean Guánica, but it could also mean Guayanilla, Cabo Rojo, etc. A shipwreck reported after 1556 at the nueva Villa de San Germán, or the New San Germán, would indicate a ship loss within Guayanilla Bay.

Shipwreck location errors are frequent in the literature. For instance, Marx (1975:401) mentions the loss of a French ship in 1673, off the Guadianilla Islets. This was *L'Ecueil*, a pirate ship from Tortuga, under the command of the legendary Bertrand d'Ogeron, which actually sank off Arecibo, on the north coast of Puerto Rico. The author was able to corroborate this loss both in the archives of Spain, and by diving off Barrio Islote, Arecibo.

Off Cabo Rojo, the SW tip of Puerto Rico, the Spanish Frigate *San José*, alias *El Gallardo*, was grounded and lost in 1780.

Off La Parguera, roughly halfway between Guánica Bay and Cabo Rojo, the Spanish steamer *Alicante* was lost at Margarita Reef in 1881. Other known shipwrecks off Lajas include the French schooner *Alerta*, lost in 1846, and an unidentified Spanish shipwreck lost in the mid-17th century.

Off the coast of Guánica, the *Astra*, a three-masted, 119-ft. schooner, was lost near Cayo Turrumote in 1962. Two unidentified shipwrecks, off Punta Jorobado and Baúl Reef, have also been reported by professional divers Jaime Braulio and Pili Pagán (Fritz and Pilkey 1976:18).

Shipwrecks in Guánica Bay

Numerous hurricanes have hit the south coast of Puerto Rico during the last 500 years. The hurricanes of 1827, 1855, 1899 and 1928 were particularly damaging, including the loss of small vessels (Salivia 1972). For instance, in the 1827 hurricane of San Jacinto, five ships were lost in Ponce, three in Guayama, two in Humacao, one in Mayagüez, one in San Juan and four in Naguabo (Salivia 1972:166). Considering that Guánica Bay was considered the best hurricane harbor in Puerto Rico, it likely that many ships and boats in distress would have attempted to reach her protected harbor.

Future research is likely to reveal additional losses of many small boats within Guánica Bay. Many other losses went unreported, and will only be known through archaeological work. Even today, with radio, television, numerous newspapers and magazines, boats are lost with little or no news coverage.

Potential shipwrecks at or near Guánica Bay are listed in Table 1. It is important to keep in mind that many shipwrecks were minimally reported, or not reported at all. Three or four hundred years later, no archival data might exist on the loss of even a large ship. If we consider the potential losses of

pirates and smugglers, who operated outside of the law, and of fishermen in their small boats, it is evident that most historic shipwrecks are not documented in the archives.

Of the shipwrecks in Table 1, the pirate vessel of 1743 is the most significant. This vessel is presumed lost within Guánica Bay. The other wrecks before 1900 are known losses at or near the coast of San Germán, or near the coast of Puerto Rico.

The list includes four (4) modern shipwrecks after 1950. Two of these are reported on the Nautical Chart for Bahía de Guánica (NOAA 25679, 9th Ed., 1990). The metal wreck at Punta Pera was observed by the author during the field inspection (Section 6). The other metal wreck is located on the east side of the bay, south of Playa de Guánica. Older wooden vessels are almost never reported in modern nautical charts.

On July 13, 1964, the SS *Daniel Pierce* began reacting with its cargo of sulfuric acid, and was intentionally beached at Guánica Harbor. In 1971, the grounded ship was described by the Mayor of Guánica as a “floating brothel” frequented by drug users. Soon after, the *Daniel Pierce* was towed away “to be sunk at greater depths” (Fritz and Pilkey 1976:2). At present, it is not clear if the *Daniel Pierce*, which remained abandoned seven years in Guánica Bay, is the wreck reported on the E side of the bay. In addition to the listed wrecks, it is assumed that dozens of fishing boats, contraband vessels and canoes have been lost at or just outside of Guánica Bay in the last 500 years.

TABLE 1
ACTUAL AND POTENTIAL SHIPWRECKS AT GUANICA BAY

Year	Vessel Type	Nation	Place of Loss	Cause of Loss
1528	Caravel	Spain	San Germán	Blazed
1528	Caravel	Spain	San Germán	Blazed
1537	Nao	Spain	Puerto Rico	Grounding
1577	Navío	Portugal	San Germán	Unknown
1720	Ship	Spain	Puerto Rico	Blazed
1720	Ship	Great Britain	Puerto Rico	Blazed
1742	Ship	Spain	Puerto Rico	Unknown
1743	Paquebot	British pirates	Guánica Bay	Combat
1822	Ship	U.S.A.	Puerto Rico	Unknown
1855	Boat	Puerto Rico	South coast	Hurricane
1855	Schooner	Puerto Rico	Punta Ballena	Hurricane
1855	Schooner	Puerto Rico	South coast	Hurricane
1855	Schooner	Puerto Rico	South coast	Hurricane
1899	Many boats	Puerto Rico	South coast	Hurricane
1962	<i>Astra</i>	U.S.A.	C. Turrumote	Grounded
1971	<i>Daniel Pierce</i>	U.S.A.	Guánica Bay	Grounding
20 th century	Metal wreck	U.S.A.	Punta Pera	Unknown
20 th century	Metal wreck	U.S.A.	Playa Guánica	Unknown

Sources: Cardona (1989); Fritz and Pilkey (1976); Marx (1987); Salivia (1972); Potter (1988), Vega (1995), Archivo General de Puerto Rico; NOAA Chart 25679 for Bahía de Guánica, and material from Spanish archives in author's personal library.

6. Field Inspection

6.1 Previous Research

No previous maritime research has been conducted at Guánica Bay. The closest investigation, in terms of maritime research, is a Stage II archaeological evaluation at Caleta Salinas, conducted by the author for the Puerto Rico Aqueduct and Sewer Authority (Vega 1998b). Previously discussed in Section 3, this study detected evidence of a prograding coast.

6.1 Field Inspection

The field inspection was conducted on August 6, 2001. The inspection was conducted by the author and assistant archaeologist Erik Rivera. Access to the site was provided by William Pérez, Director of the Guánica Office, Land Authority of Puerto Rico.

At present, the old sugar mill appears to be a ghost town. Horses roam along the silent roads. Many of the processing and loading facilities are still standing, including the three-story high loading tower at Punta Pera.

The Dominican Pier is the most prominent marine feature at Punta Pera. Most of the pier's superstructure was destroyed by fire about a year ago, presumably by vandalism.

According to our informant, many boats take refuge in Guánica during hurricanes. This is significant, because a similar behavior probably occurred among the fishermen and sailors of history.

A large barge was sunk on the north side of the Dominican Pier and adjacent to the shore. Some of the ribs are visible at the water line. The barge was lost after 1950 and is not considered historic. Still, a brief underwater inspection is recommended as part of the IB marine survey, as the barge is associated with the late years of the Central Guánica.

During Hurricane Georges, a large pleasure boat was anchored between the wharf and the mooring piles. This is probably the most dangerous hurricane anchorage within the harbor. Hurricane waves repeatedly pushed the boat against the concrete wharf, finally sinking the vessel. After the hurricane, the vessel was salvaged and repaired.

Contrary to what our anonymous boat owner thought, the safest place in the bay in a storm is close to the mangrove. Here the roots of the mangrove trees dissipate much of the force of the surf. A boat moored against a solid wharf receives the power of the incoming surf, as well as the rebounding wave.

From the perspective of diving research, the Study Area is far from ideal. The water is murky, polluted and unprotected from the wind. As far as diving

conditions are concerned, the area somewhat resembles the south end of San Juan Bay.

The loading tower provided an excellent station for photographing the bay. However, parts of the wooden floors are rotten, including the interior floor. Researchers and visitors should be extremely careful where they step, as a fall from the high tower could be fatal. The metallic staircase is in much better condition, but the entire structure should be carefully evaluated for safety.

The south coast of Cueva de la Julia has been largely occupied by informal constructions, including the houses and wooden piers of local fishermen, as well as summer houses and houseboats of upper and upper-middle class owners.

During our inspection, we found several beams of the Dominican Pier on the shore of Cueva de la Julia. It is not clear if these beams were transported here in a hurricane, or if they were retrieved by the local fishermen. In any case, the circulation within the bay runs counterclockwise, moving north and west along Bahía Noroeste, continuing south along Punta Pera, and then exiting along the shore of Monte las Pargas.

Much of the coast north and south of Punta Pera is surrounded by mangrove. The shore of Punta Pera is mostly fill, with some mangrove trees presently reclaiming the area. The winds and currents are probably more complex than might seem at first sight, and should be carefully evaluated before the final design of the marina and coastal structures.

As a preliminary observation, the wind and currents favor the movement of floatsam and slightly negative objects into the Study Area. Thus, historic floatsam as far away as Playa de Guánica, might be found on the shore of the Central Guánica.

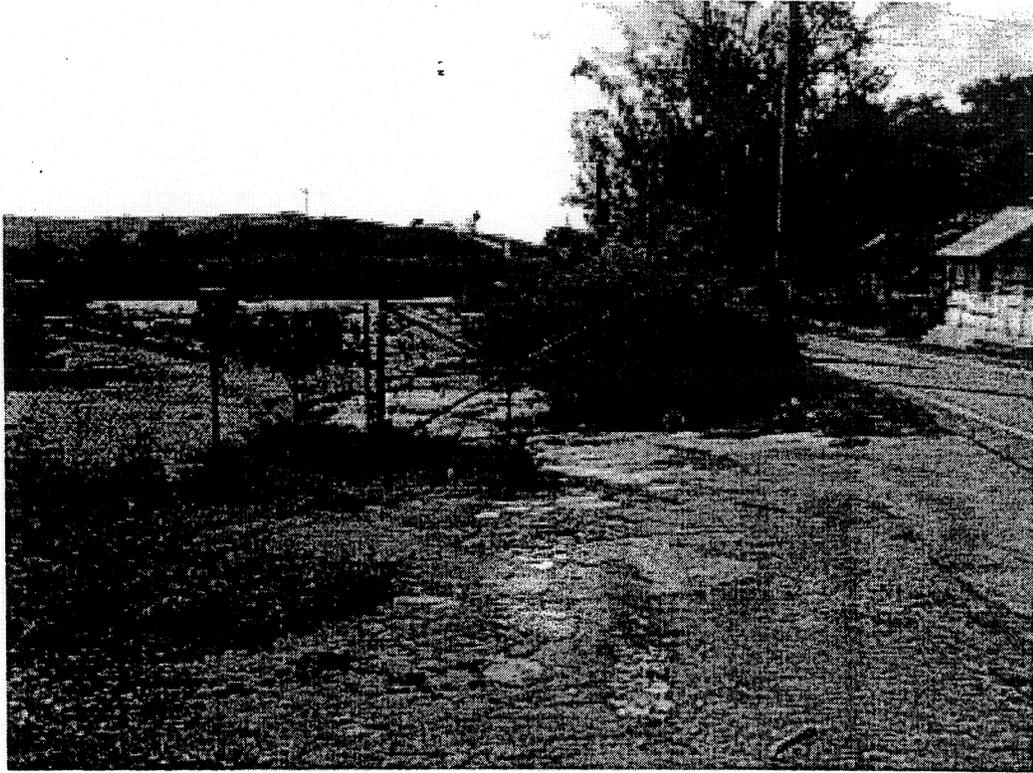


Figure 14. Entrance to Punta Pera, Road PR-325.