



THE SEARCH FOR TAMPA BAY'S EARLIEST PEOPLE



Phase 1 Report and Predictive Model for Submerged Archaeological Sites in Tampa Bay, Florida

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By

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The Search for Tampa Bay’s Earliest People

Phase 1 Report and Predictive Model for Submerged Archaeological Sites in Tampa Bay, Florida

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Introduction

This report presents the results of the initial phase of a multi-phase project to identify submerged archaeological sites of terminal Pleistocene and early Holocene age in Tampa Bay, Florida. This phase of research was funded in large part by a grant from the Felburn Foundation. The report synthesizes existing data and scientific understanding regarding the evidence for submerged archaeological sites in Tampa Bay and presents a preliminary predictive model for identifying intact archaeological sites in the Bay based on a synthesis of modern and historical (i.e., pre-dredge-and-fill) bathymetric geomorphology, the distribution of surface sediments, sub-surface stratigraphy in sediment cores, acoustic sub-bottom mapping, and the locations of early artifact finds.

Tampa Bay (Figure 1) on the west coast of Florida is well known as a locus of early human occupation. Diagnostic artifacts collected from along the bay shoreline and from spoil and oyster shell dredged from the bay in the 1960s range in age from the Paleoindian period (ca. 12,000 years ago) through the Late Archaic period (ca. 4500 yrs BP) (Goodyear and Warren 1972; Goodyear et al. 1983, 2021; Warren 1964, 1972). It is not hard to understand why. The bay is a large estuary system that occupies multiple filled-in karst features (sinkholes) (Hine et al. 2009). Flooding by marine encroachment began at the end of the Pleistocene (~11,000-10,000 years ago) and was approaching modern levels by about 7500 BP (Cronin et al. 2007; Van Soelen et al. 2010). Prior to flooding, a large spring-fed, freshwater lake known as Paleolake Edgar existed in Middle Tampa Bay and the ancestral Hillsborough River flowed south towards the Gulf of Mexico. Both of these hydrologic features, as well as their encompassing wetland habitats, were undoubtedly attractions for Paleoindian and Early Archaic people as well as the animals they hunted

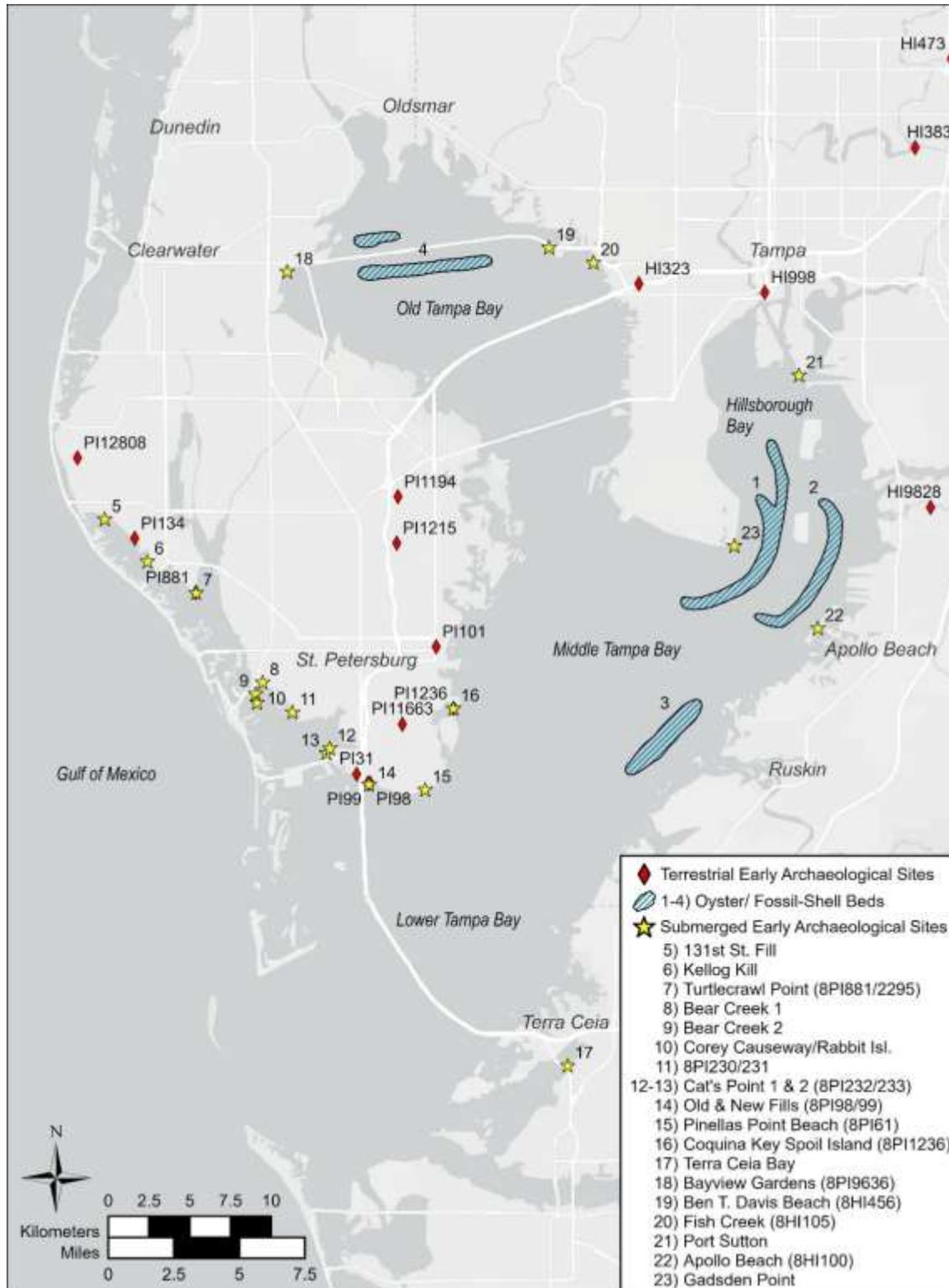


Figure 1. Map of known submerged archaeological sites and terrestrial Paleoindian sites in Tampa Bay, including large shell beds associated with artifacts plotted by Warren.

(Purdy and Hine 2020:269). Raw material for tool production (i.e., chert stone) is abundant in outcrops within Tampa Bay and throughout its terrestrial watershed (Austin et al. 2018; Goodyear et al. 1983; Upchurch et al. 1982; Upchurch et al., forthcoming). With mean sea level as much as 100 meters lower than today, and the Gulf of Mexico shoreline up to 200 km west of its present position, the apparent abundance of freshwater features, wetland plants, animals, and raw materials in what is now Tampa Bay would have served an oasis for the first humans inhabiting Florida during the late Pleistocene at a time when the landscape encompassing the Bay depression was dominated by wind-swept dry-savanna, scrub, and sand hill environments (Purdy and Hine 2020).

Despite archaeological and geological evidence supporting occupation of a now-inundated paleo-landscape, no systematic investigations have been conducted to identify specific locations within the bay that have potential for containing intact archaeological deposits of late Pleistocene and early Holocene age. The potential for success is demonstrated by ongoing research in Florida's Big Bend region where offshore remote sensing and archaeological dive teams have identified drowned river channels, chert outcrops and quarries, and submerged middens (Faught 2004; Cook Hale et al. 2019; Smith and Joy 2020). The archaeological and fossil materials described below provide convincing evidence that early sites also exist beneath the waters of Tampa Bay. Using existing geological and hydrographic data, we have begun to develop a pre-submergence landscape-reconstruction of Tampa Bay that may be used to identify potential archaeological site locations that can be investigated through future remote sensing, coring, and excavation by dive-teams.

Archaeological Evidence for Submerged Sites

A review of the archaeological literature and the Florida Master Site Files, as well as a comprehensive database of Paleoindian and Early Archaic points maintained by archaeologist Al Goodyear for his Southeastern Paleoindian Survey has identified 23 locations in and around Tampa Bay where artifacts have been recovered from spoil dredged from beneath Tampa Bay. Many of these locations were first documented by Lyman Warren in the 1960s and 1970s. Warren had been collecting artifacts and fossils from shell deposits used for road construction and noticed that many of the artifacts were from the Paleoindian and Archaic periods of Florida prehistory. Warren notified Ripley Bullen of the Florida State Museum (now the Florida Museum of Natural History), who also recognized the importance of these finds and encouraged Warren to continue documenting his finds. Warren not only continued his documentation process, but he also contacted the dredge companies who were mining shell from Tampa Bay, obtained maps showing where the shell was being mined in the Bay, and interviewed dredge operators to

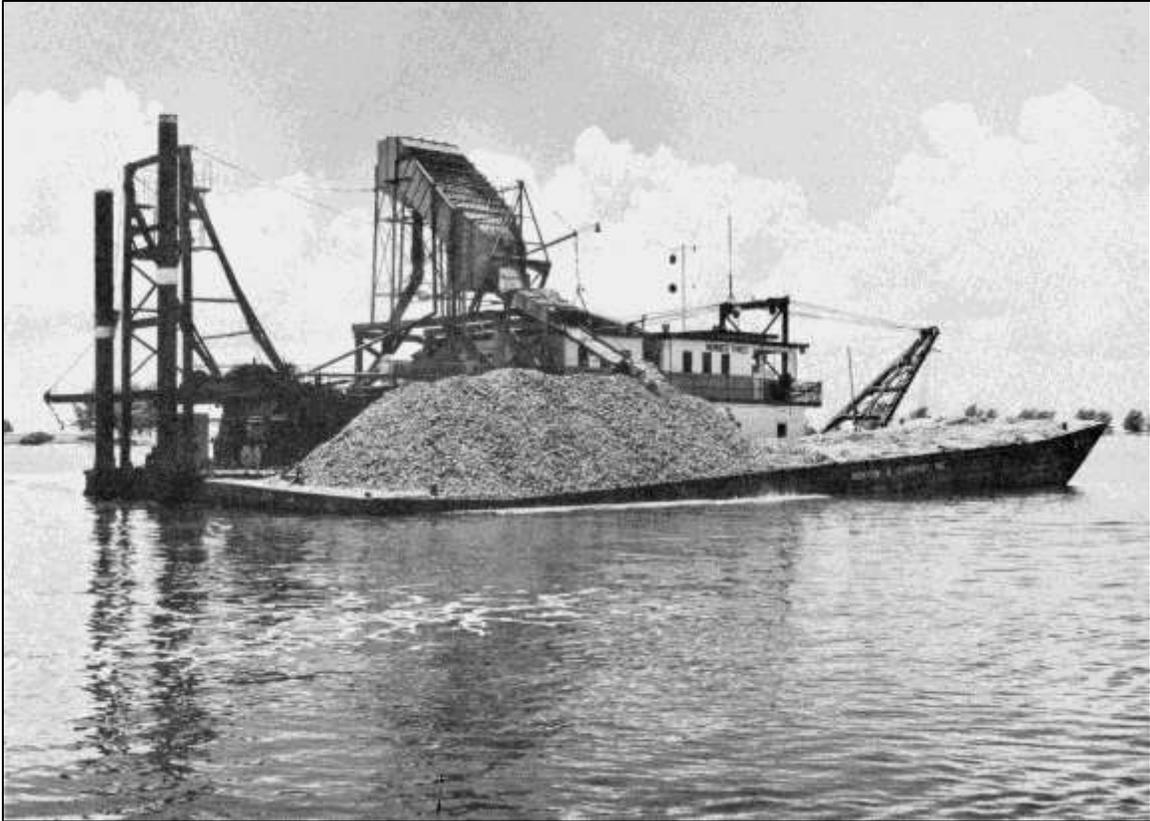


Figure 2. Dredge depositing shell on a barge in Tampa Bay, 1960s. Reproduced from Goodyear and Warren 1972.

obtain information on the depths of shell beds, their thickness, and any artifacts or fossils that they had seen or collected (Figure 2).

With this knowledge, Warren was able to hypothesize locations within the Bay where artifact-bearing shell deposits may be located. Warren published papers describing the dredged shell deposits and artifacts associated with them in *The Florida Anthropologist* (Warren 1964, 1972; Goodyear and Warren 1972). Conversations with principals associated with the Benton Corporation, the dredging company primarily responsible for shell mining operations in the bay at the time, revealed that dredging for shell had been going on for 40 years and that the tops of the shell deposits could be found about 10 feet below the mean high tide with bases at 20 to 50 feet giving a total thickness of 10 to 40 feet. The deposits abut old natural channels associated with the ancestral Hillsborough River and its tributaries. According to the dredge operators, artifacts were found in shallower shell deposits and Pleistocene fossils were found in deeper deposits.

The shell dredged from the bay consisted mostly of oyster, most of which occurred as single, unbroken valves, but “conch” (*Busycon carica* [sic]), *Mercenaria* clam, pen shell, olive shell, and Florida (fighting) conch (*Strombus alatus*) also occurred. While some

oysters were mineralized and appear polished as if tumbled, the non-oyster shells represent typical species often found at Native American shell middens.

Goodyear and Warren (1972:58-60) reported that the artifacts recovered from the submerged oyster shell deposits included Paleoindian-, Archaic-, and Early Woodland-period artifacts indicating persistent occupation from the terminal Pleistocene to the late Holocene (ca. 12,000 to 2500 years BP). The presence of artifacts within unconsolidated deposits of whole and fragmentary mollusk shells is consistent with cultural shell midden soils. The observation that none of these artifacts had mollusk shell adhered to them, indicates that mollusk spat did not colonize the hard surfaces of the artifacts, and suggests that the shelly sediments and artifacts were deposited on dry land. These observations, in combination with the thickness of the shell deposits and observations of dredge workers regarding the stratigraphic occurrence of artifacts near the tops of the shell deposits, motivated Goodyear and Warren (1972:55) to conclude that the oyster shell was not a “a homogeneous mix, either in physical aspects or age.” In other words, it represented a coherent stratigraphic arrangement, with non-cultural shell deposits of unknown age underlying ancient Native American shell midden deposits.

At the same time Warren was investigating potentially early sites dredged from Tampa Bay, land ‘development’ activities in Pinellas and Hillsborough counties were in high gear, particularly in coastal areas. Dredge-and-fill operations throughout the estuary system involved digging deep channels, navigational basins, and haphazard pits, and then utilizing the sediment spoil to create artificial islands, causeways, and seemingly innumerable “fingers” of land extending into the estuary to provide waterfront access to new homeowners. These newly created landforms, containing artifacts dredged up from beneath the Bay, soon became a focus for artifact and fossil collectors. Warren and other dedicated avocational archaeologists (Walter Askew, Loren Blakeley, Frank Bushnell, Brian Evensen, Rick McDonnel, among others) collected materials from the dredged spoil, and Warren wrote up the finds for publication in *The Florida Anthropologist*. These publications, and those documenting the oyster shell deposits, were the first in Florida to demonstrate that early Native American sites existed in submerged contexts along Florida’s Gulf of Mexico coast. Goodyear’s database contains locational information, line drawings, measurement and raw material data for over 270 Paleoindian and Early Archaic artifacts found in the Tampa Bay area; the vast majority of these rare artifacts reside in private collections and many are from currently inundated contexts in Tampa Bay (n=92). Because finds from inundated sites were made in secondary (redeposited) contexts, they lack precise provenience; however, the careful recording of artifact types, lithic materials, and associated faunal remains comprises a significant contribution to Florida prehistory.

Below we provide more detailed descriptions of the known submerged archaeological finds and culturally ambiguous paleontological sites within Tampa Bay. We note that nearly all of this critically important information was produced through self-sponsored salvage work conducted by advocational archaeologists and collectors during major mid-20th century dredge-and-fill operations that preceded environmental and/or cultural resources protection regulations.

Known Archaeological Sites

The following section presents brief descriptions of 22 key locations around Tampa Bay where Paleoindian and Archaic artifacts have been recovered from dredged spoil. These locations are plotted in Figure 1 along with the general locations of previously recorded terrestrial Paleoindian-period archaeological sites. Table 1 provides condensed information for each location, including diagnostic artifacts and associated archaeological period(s). Artifact data were obtained from published articles and reports, collections curated at the Alliance for Weedon Island Archaeological Research and Education, Inc. (AWIARE), Goodyear’s database, and the Florida Master Site File (FMSF). Images of particularly important early artifacts accompany the site descriptions.

Table 1. Archaeological periods and diagnostic artifacts represented at known submerged sites in Tampa Bay.

| Site Name | Fig. 1 Key | Archaeological Periods | | | | |
|--------------------------------|------------|--|----------------------------|---------------------------------------|----------------|-------------------------------|
| | | Paleoindian | Early Archaic | Middle-Archaic | Late Archaic | Early Woodland |
| Tampa Bay Oyster Deposits | 1, 2, 3, 4 | Clovis Preform; Simpson/Suwannee; Suwannee (5) | Greenbriar? (2); Bolen (5) | 9 Putnam & Newnan | | St. Johns Incised |
| 131st St. Fill | 5 | Fluted Suwannee; Suwannee; Suwannee? | Bolen | Newnan; Marion; Newnan/Mation; Putnam | | |
| Kellog fill | 6 | Simpson | Bolen, Greenbriar | 29 stemmed points (e.g., Putnam) | Orange Incised | St. Johns Incised |
| Turtlecrawl Point, 8PI881/2295 | 7 | | Bolen (12) | | | |
| Bear Creek 1 | 8 | | Wacissa? | Putnam | | |
| Bear Creek 2 | 9 | Suwannee Preform? | | Putnam; Hillsborough (5) | | |
| Corey Causeway/Rabbit Island | 10 | | Bolen (4) | "stemmed points" | | Deptford Linear Check Stamped |
| 8PI230/231 | 11 | | | unspecified Archaic points | | |

| Site Name | Fig. 1 Key | Archaeological Periods | | | | |
|-----------------------------------|------------|--|---|---|---|---------------------------------|
| | | Paleoindian | Early Archaic | Middle-Archaic | Late Archaic | Early Woodland |
| Cat's Point 1 & 2, 8PI232/233 | 12,13 | | | Marion, Putnam | Citrus | Citrus |
| Old & New Fills, 8PI98/99 | 14 | Clovis; Suwannee | Bolen (6) | Alachua; Marion; Newnan; Marion/Newnan; Putnam (2); Hillsborough | Citrus | Citrus; Hernando; Adena?; Duval |
| Pinellas Point Beach, 8PI61 | 15 | Fluted Suwannee; Suwannee/Simpson/Santa Fe | Bolen (4) | Hardee Beveled; Marion (2); Newnan (2); Marion/Newnan (2) | Savannah River? | Hernando (2) |
| Coquina Key Spoil Island, 8PI1236 | 16 | Haw River?; Suwannee; UID Lanceolate | | Marion/Newnan; Marion (4); Putnam (4); Hillsborough | | Hernando |
| Terra Ceia Bay | 17 | Beaver Lake? | Greenbriar (4); Bolen; Kirk | | | |
| Bayview Gardens, 8PI9636 | 18 | Clovis Preform (2) | Bolen (7) | Newnan; Marion/Newnan (2); Hillsborough | | |
| Ben T. Davis Beach, 8HI456 | 19 | Clovis; Simpson/Suwannee; Suwannee | Greenbriar (2), Bolen (14), Edgefield Scraper (1) | Putnam; Hillsborough | | |
| Fish Creek, 8HI105 | 20 | Clovis Preform (5); Suwannee | Bolen | Newnan (3); Marion (2); Levy; Putnam (2); Levy; Putnam/Levy (2); Hillsborough (2) | Culbreath | Citrus; Hernando (2); |
| Port Sutton | 21 | | | Marion | | |
| Apollo Beach, 8HI100 | 22 | | Kirk | | Culbreath, Lafayette, Orange Plain, Deptford Linear Check Stamped | Citrus |
| Gadsden Point | 23 | | Bolen | Newnan, Marion, Putnam | | |

Tampa Bay Oyster Shell Deposits (Sites 1 - 4)

There are four submerged oyster shell deposits in Tampa Bay reported by Lyman Warren in the influential series of papers in the 1960s and 1970s discussed above. Two

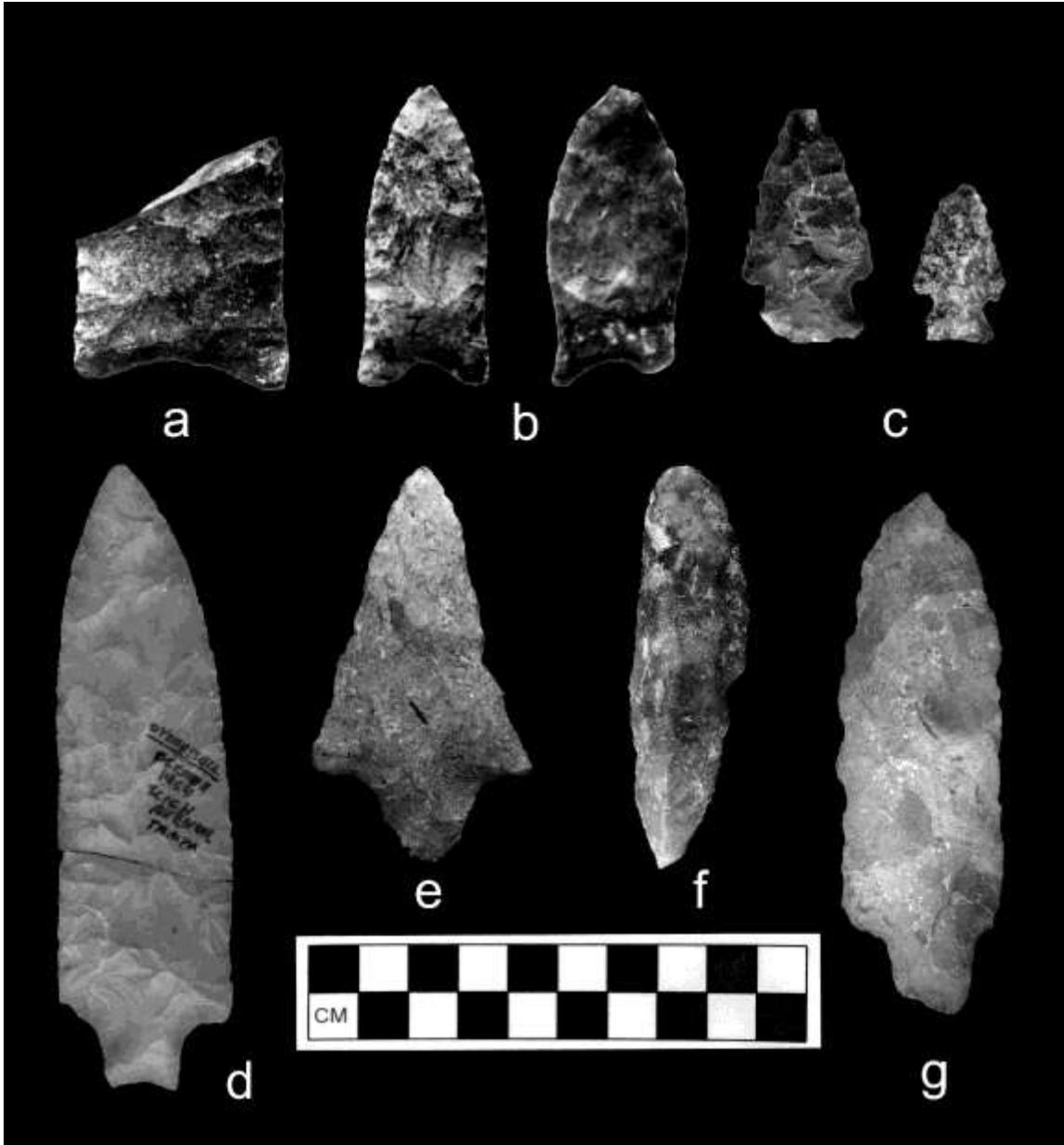


Figure 3. Paleoindian and Archaic artifacts from dredged shell deposits in Tampa Bay: a) Suwannee; b) Simpson points; c) Bolen points; d-e, g) Archaic Stemmed points; f) side scraper on a blade.

locations are in Hillsborough Bay: Gadsden Point and an area off the mouths of the Alafia and Little Manatee Rivers. A third location is near the mouth of the Little Manatee River in Middle Tampa Bay. The fourth location is just south of Courtney Campbell Causeway (SR 60) in Upper Tampa Bay. Mollusk shell mined from these deposits during early-to-mid-20th century was used for roadbed fill throughout Hillsborough and Pinellas counties.

Paleoindian and Archaic-period artifacts were collected by Warren and others from shell road construction projects and from a shell yard (Benton's Shell Yard) where material

was stored (Figure 3). Chert tool blanks (i.e., “preforms”) for the manufacture of Clovis points, as well as finished Suwannee and Simpson points, Greenbriar points (2), Bolen (5), and several Middle Archaic points (Putnam and Newnan) were documented during investigation of the Benton Corporation’s stored and deployed shell fill material (Goodyear and Warren 1972; Goodyear et al. 1983; Goodyear database). Two St. Johns Incised ceramic sherds recovered from the shell fill indicate that Terminal Late Archaic or Early Woodland deposits also lie submerged in the Bay.

Boca Ciega Bay (Sites 5-13)

- **131st Street Fill, Seminole** (5 on Figure 1). Three Suwannee points and several Middle Archaic projectile points (Newnan, Marion, Newnan or Marion, and Putnam) were collected by Goodyear and Brooks from fill dredged from nearby Boca Ciega Bay (Goodyear database; Goodyear and Brooks collections). An example of one of the Suwannee points is shown in Figure 4a.
- **Kellog Fill** (6 on Figure 1). Located on the east shore of Boca Ciega Bay in the town of Seminole, the Kellog Fill consisted of dredged materials pumped-up from the bay bottom during the 1960s. Collections by Warren and others produced a wide assortment of lithic artifacts, some pottery, and fossil bones (Warren n.d., 1970). Artifacts recovered from the dredged spoil include a Suwannee or Simpson, two unidentified lanceolate bifaces, three Bolens, a variety of Middle Archaic stemmed forms (Newnan, Marion, Putnam, Levy, Alachua), 20 plano-convex scrapers, as well as broken bifaces, preforms, and retouched flakes. Examples are shown in figure 4b-d. Pottery was not common, but Orange Incised and St. Johns Incised were both collected by Warren. Together these artifacts indicate that the dredging operation penetrated a site or sites containing the material remains of Paleoindian through Late Archaic occupations. Pleistocene fossil material also was common and included *Bison antiquus*, Florida Glyptodon, giant armadillo, mastodon, tapir, and giant land tortoise.
- **Turtlecrawl Point, 8PI881 and 8PI2295** (7 on Figure 1). Site 8PI881 is located on a spoil island just south of Turtlecrawl Point, a peninsula that separates Boca Ciega Bay from Long Bayou. Site 8PI2295 is a second location at the end of Turtlecrawl Point that also consists of spoil dredged from the Bay. The spoil at both locations was dredged from the adjacent Intracoastal Waterway. Collections made in the 1970s and early 1980s by Al Goodyear, Mark Brooks, and Loren Blakeley found stone tools and waste flakes, natural and worked chert nodules, shell tools, and thousands of broken clam shells (Goodyear et al. 1980, 1993). Among the stone tools are 12 Bolen points, 1 Hardee Beveled, 2 Newnan, 3 Putnam points, 2



Figure 4. Artifacts from 131st Street Fill (a) and Kellog Fill (b-d), Boca Ciega Bay: a-b) Suwannee; c) Bolen points; d) Archaic Stemmed (Marion) points.

unifacial tools that resemble Clear Fork Gouges, 9 unifacial end scrapers, a bifacially flaked adze, and 6 retouched flakes (see Figure 5 for examples). A fragment of a bone awl also was recovered as were two lightning whelk columellae with intentionally beveled ends (aka Columella cutting-edged tools) and a St. Johns Incised ceramic sherd. The diagnostic projectile points indicate an Early Archaic through Middle to Late Archaic presence. The

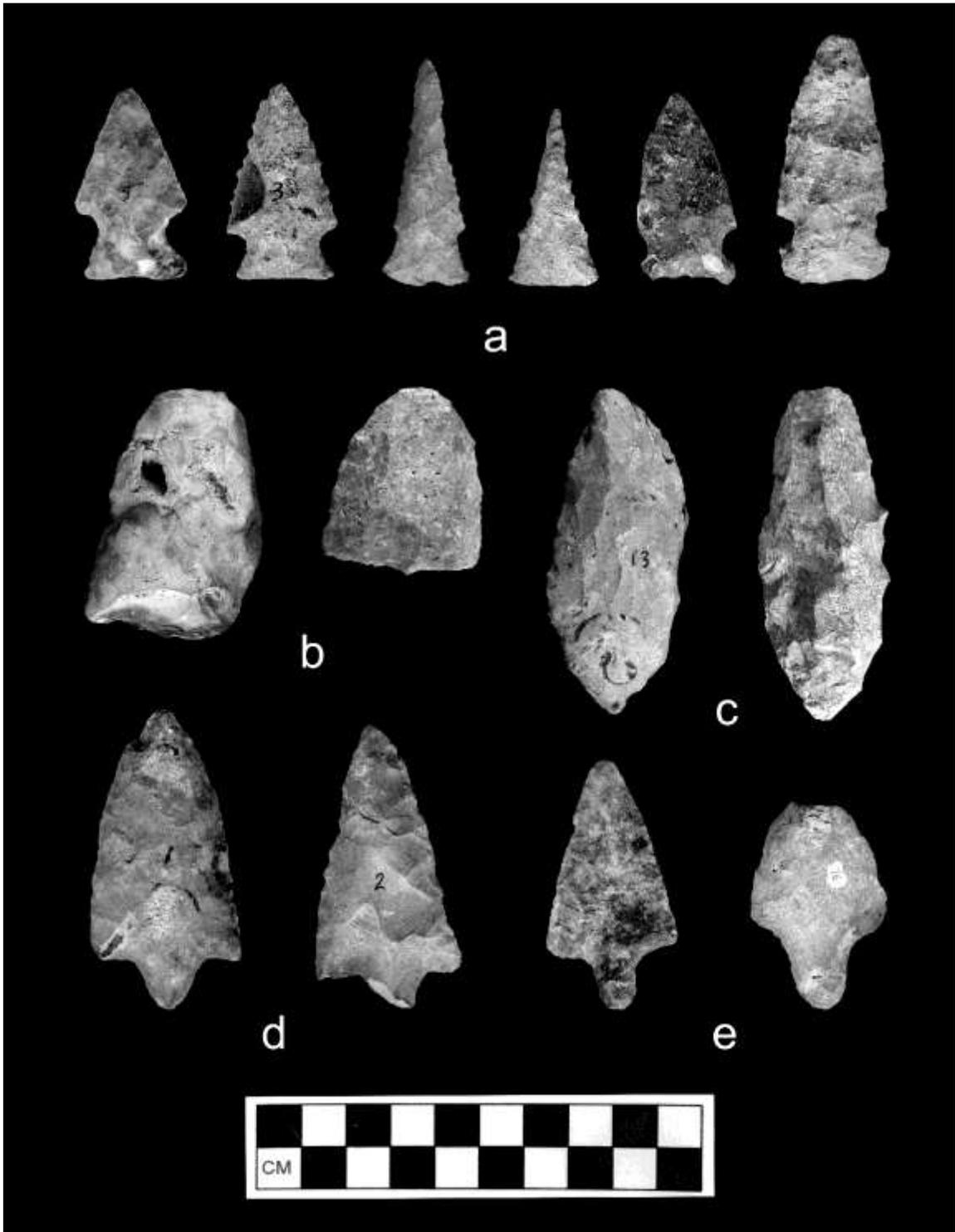


Figure 5. Early and Middle Archaic artifacts from Turtlecrawl Point: a) Bolen points; b) Clear Fork Gouges; c) unifacial side scrapers on blades; d) Newnan points; e) Putnam points.

numerous clam shells, and other marine shells are thought to have come from a Late Archaic through Middle Woodland shell midden (Goodyear et al. 1993:6).

Seven radiocarbon dates were obtained: one each from the two cutting-edge tools, and five from clam shells. The tools were dated to 4675 ± 120 and 4460 ± 130 radiocarbon years before present (rcy BP) or calibrated 5305-4635 BP and 5062-4316 BP (2 sigma range)¹. These dates are both firmly within the Late archaic period. Three clam shells were dated slightly later at 3425 ± 120 , 3080 ± 95 , and 2850 ± 95 rcy BP or cal 3695-3028, 3217-2708, and 2919-2371 BP (2 sigma range). These dates are within the Terminal Late Archaic and Early Woodland periods. The final two clam shells produced dates of 2140 ± 95 and 1500 ± 120 rcy BP. Their calibrated dates are 2060-1526 and 1350-811 BP (2 sigma range), which places them in the Middle Woodland period.

- **Bear Creek 1 and 2** (8 and 9 on Figure 1). Two sites dredged from Boca Ciega Bay near the mouth of Bear Creek produced Middle Archaic projectile points, including Hillsborough and Putnam (Figure 6d, f), as well as core tools, a hammerstone, scrapers (Figure 6c, e), choppers, and flake debris (Warren 1967). A broken lanceolate biface came from Bear Creek 2 and may be a Suwannee preform (Warren 1967:172-173).
- **Corey Causeway/Rabbit Island** (10 on Figure 1). South of Corey Causeway linking the town of Pasadena with St. Petersburg Beach is an island pumped out of the Boca Ciega Bay seabed (Warren 1962, 1963). Warren (1967:172) refers to this as Rabbit Island. Artifacts collected from the spoil include 2 Greenbriar, 2 Bolen (Figure 6a-b), 4 Newnan, 2 Hillsborough, 3 Putnam, a hafted spokeshave, large core tools, and a variety of broken bifaces and utilized flakes Warren 1967. Only two ceramic sherds are reported, one Deptford Check Stamped and one sand-tempered plain. Shell artifacts include lightning whelk and horse conch columellae. The artifact finds indicate an Early Archaic through Early Woodland time frame.
- **8PI230 and 231** (11 on Figure 1). Located in Pasadena, just west of the city of Gulfport, these two locations contain Archaic-period artifacts dredged out of Boca Ciega Bay in the 1960s to create “fingers” of land separated by boat canals. Williams (1975) provides brief descriptions of both based on informant data.
- **Cat’s Point 1 and Cat’s Point 2, 8PI232 and 233** (12 and 13 on Figure 1). Located on Clam Bayou near the mouth of Boca Ciega Bay, these sites received spoil from

¹ Calibrations were performed using Calib 8.10 and the Marine20.14 calibration dataset.

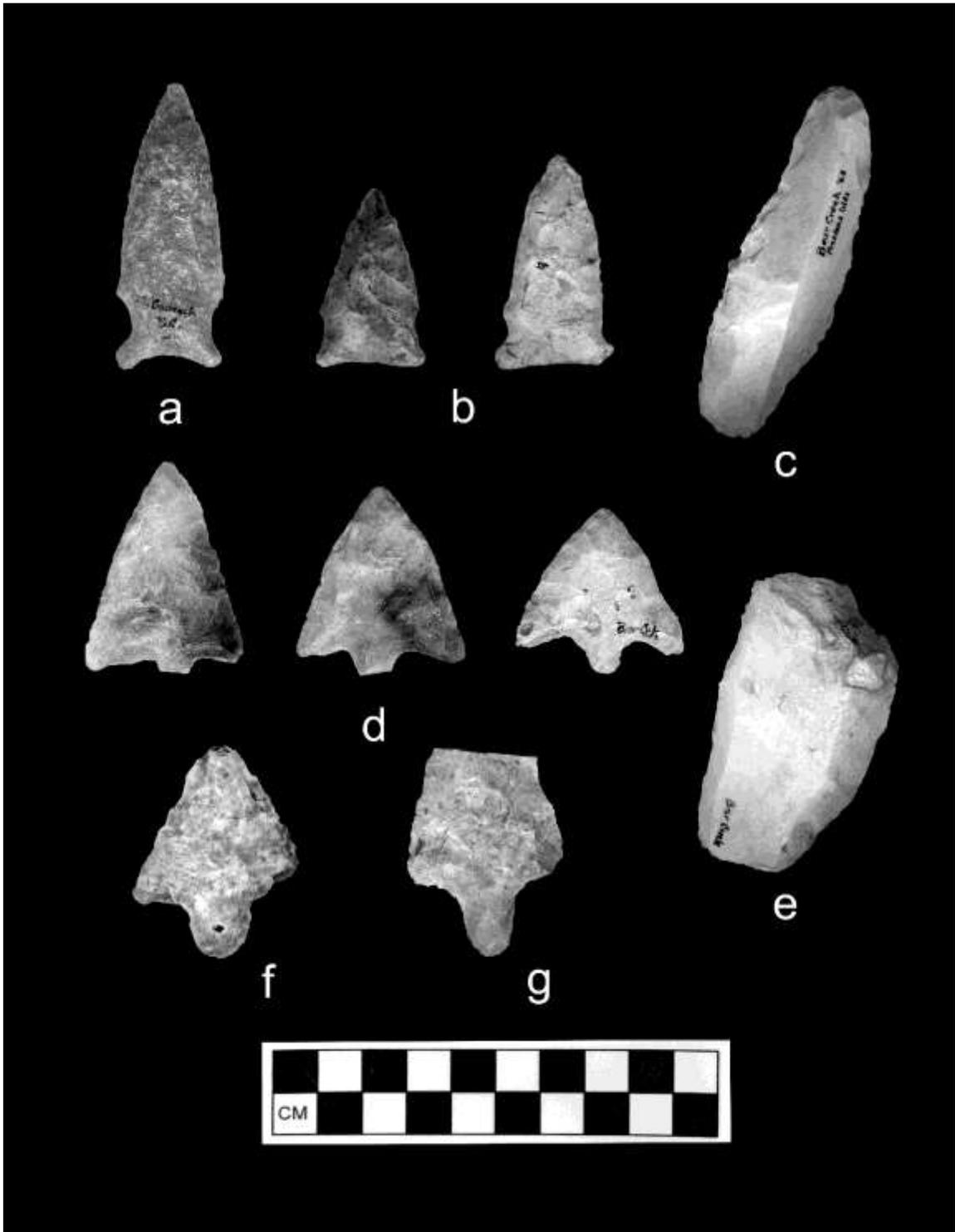


Figure 6. Early Archaic and Middle Archaic artifacts from Boca Ciega Bay: a) Bolen; b) Greenbriar; c) retouched blade; d) Hillsborough; e) retouched flake; f-g) Putnam.

the dredging of a navigation channel. Collections from both sites include Florida Archaic Stemmed (Figure 6g) and Citrus points indicating a Middle to Late Archaic- and possible Early Woodland-period occupation.

Lower Tampa Bay (Sites 14 - 17)

- **Old and New Fills (30th Street South Fills), 8PI98 and 99** (14 on Figure 1). Located on the shoreline of Tampa Bay, these sites consisted of fill dredged from the Bay in the 1960s. As teenagers, archaeologists Al Goodyear and Mark Brooks, along with Lyman Warren, collected artifacts from the spoil-fills in the 1960s and 1970s (Figure 7). Warren (1962:72) briefly mentions the site, which he refers to as 31st Street South, as containing projectile points “with a most distinctive minute stem” (perhaps Hernando points), and both fiber-tempered plain and St. Johns Plain pottery. The Goodyear and Brooks collections include a Suwannee point and a Waisted Clovis. A nearby fill deposit, located at the end of 28th Street South, has produced an Early Archaic Bolen point (Figure 8b). Artifacts from these fills span the Paleoindian through Early Woodland periods.
- **Pinellas Point, 8PI61** (15 on Figure 1). Goodyear (1968) and Goodyear et al. (1983) documented a mix of dredged deposits and eroding shell midden along the Tampa Bay shoreline at the tip of Pinellas Point. Paleoindian and Early Archaic projectile point types include Suwannee, Bolen (3), and a possible Greenbriar (Figure 8a, c). Later artifacts include Newnan, Marion, Levy, Putnam, Culbreath, and Hernando points from Middle Archaic through Late Archaic-Early Woodland contexts.
- **Coquina Key, 8PI228 and 1236** (16 on Figure 1). Dredged spoil deposited at the north end of Coquina and a nearby spoil island has produced lanceolate projectile points and Archaic stemmed points. These include a possible Haw River point (Figure 8d) identified by Goodyear along with several Suwannee points (Figure 8e). In addition, numerous Middle to Late Archaic points and an early Woodland Hernando point have been found (Goodyear database, Goodyear and Brooks collections). The possible Haw River point is a potentially significant find since it is believed to date to pre-Clovis times, ca. 12,000+ rcy BP (Goodyear 2005).
- **Terra Ceia Bay** (17 on Figure 1). On the south side of Tampa Bay in Manatee County, lies Terra Ceia Bay. Warren and Bullen (1965) reported artifacts eroding out of a clay beach on both sides of US 19 south of Rubonia. These included 5 Greenbriar points (one appears to be a Bolen), 2 Nuckels, a Bolen or Big Sandy, Beaver Lake (reclassified as a Suwannee), Kirk Serrated, and a hafted scraper (Figure 9). Also recovered were stemmed projectile points, “turtleback” scrapers, a hammerstone, waste flakes, and fossils, including turtle, mastodon, shark teeth, and manatee

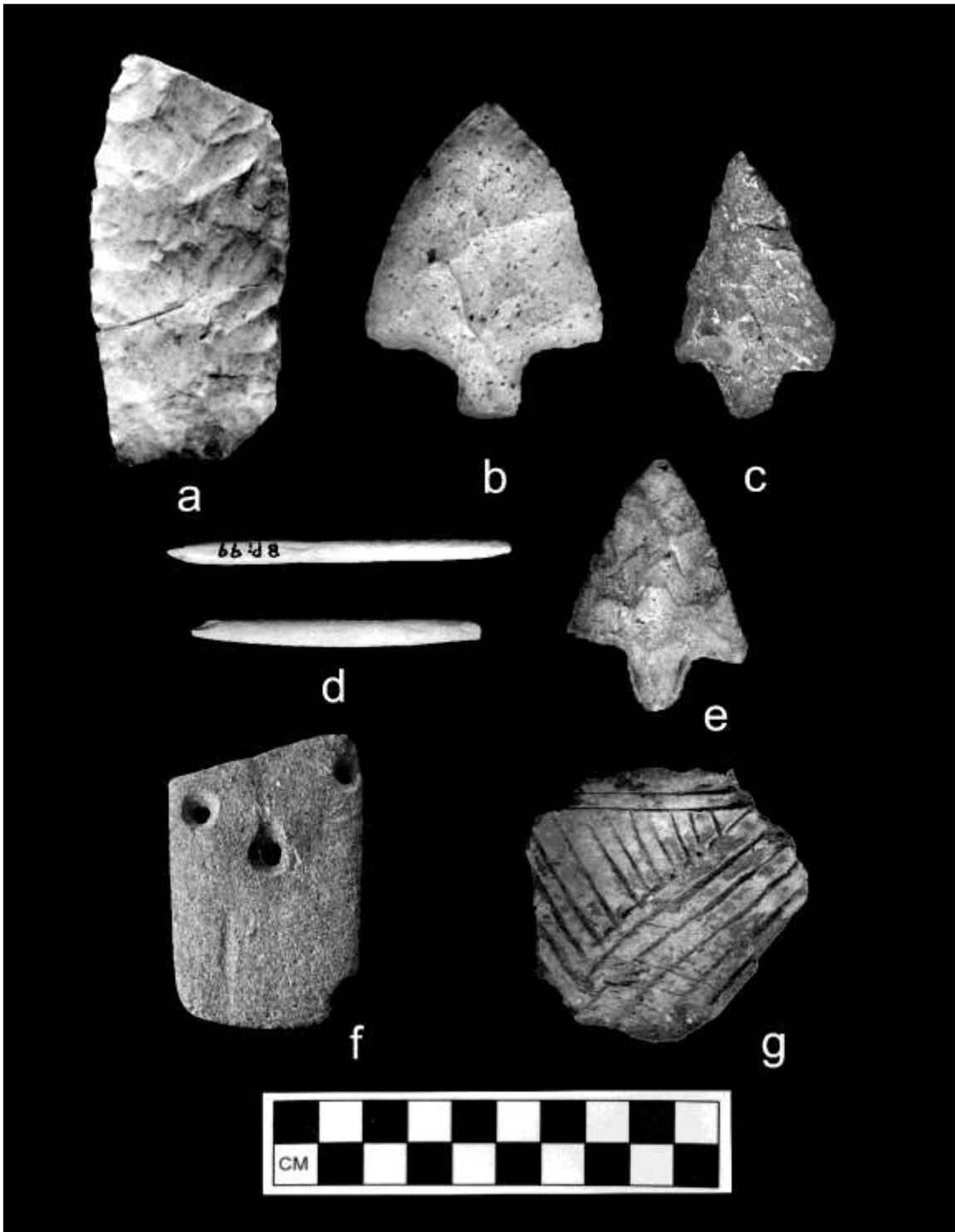


Figure 7. Paleoindian through Late Archaic artifacts from the Old and New Fills: a) Suwannee; b) Alachua; c) Putnam; d) bone pins; e) Marion; f) drilled steatite; g) Orange Incised sherd.

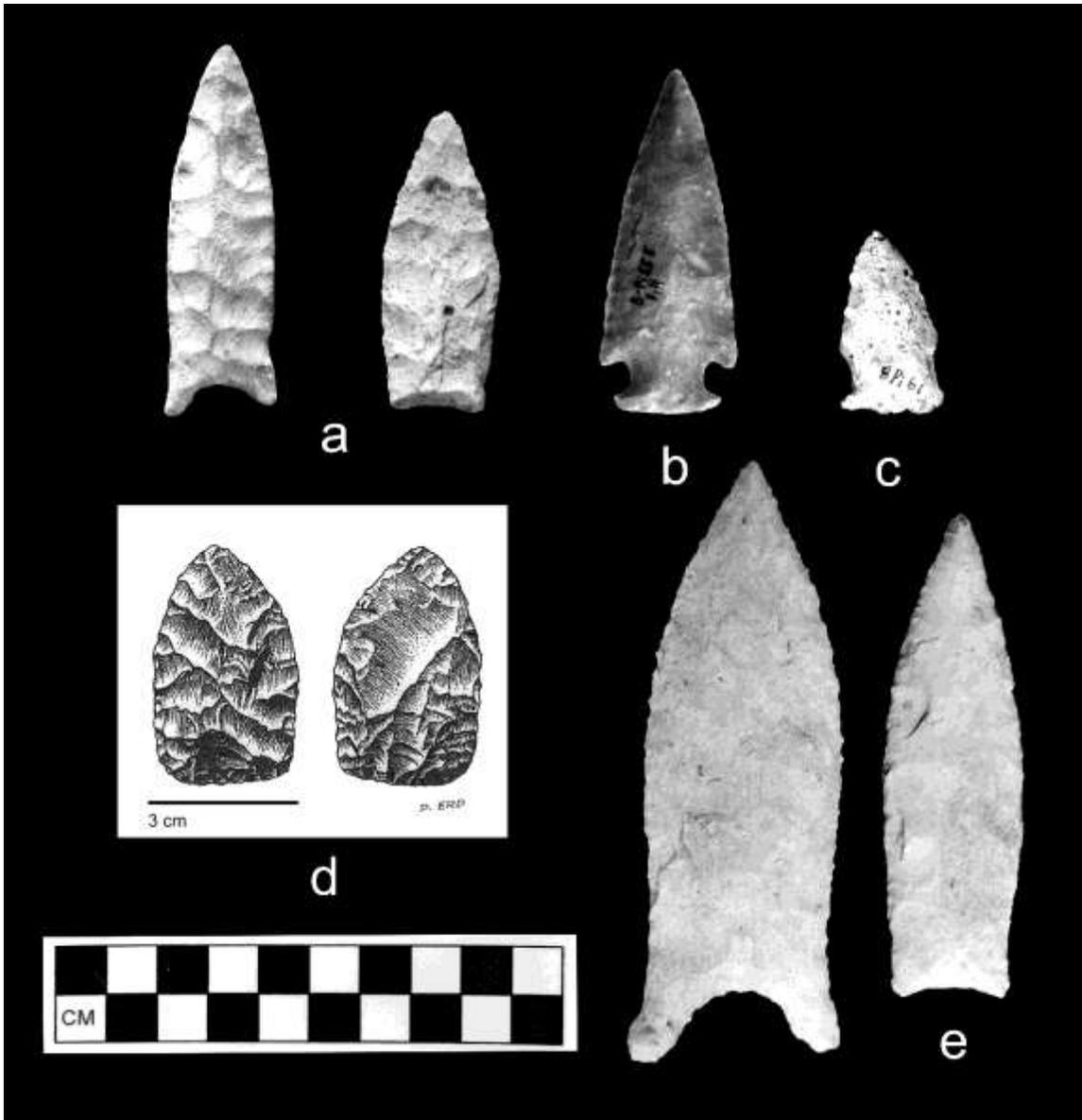


Figure 8. Paleoindian and Early Archaic artifacts from Pinellas Point and Coquina Key: a, e) Suwannee; b) Bolen; c) Greenbriar; d) possible Haw River.

(dugong?). A Late Paleoindian/Early Archaic through Middle Archaic time frame is indicated.

Upper Tampa Bay (Sites 18 – 20)

- **Bayview Gardens, 8PI9636, Japanese Gardens, 8PI13708** (18 on Figure 1). Located on the Pinellas County side of the Courtney Campbell Causeway, these locations received fill along the shoreline from nearby Upper Tampa Bay in the 1970s and produced two lanceolate bifaces that Goodyear has identified in his database as possible Clovis Preforms. Other lanceolate forms include Suwannee

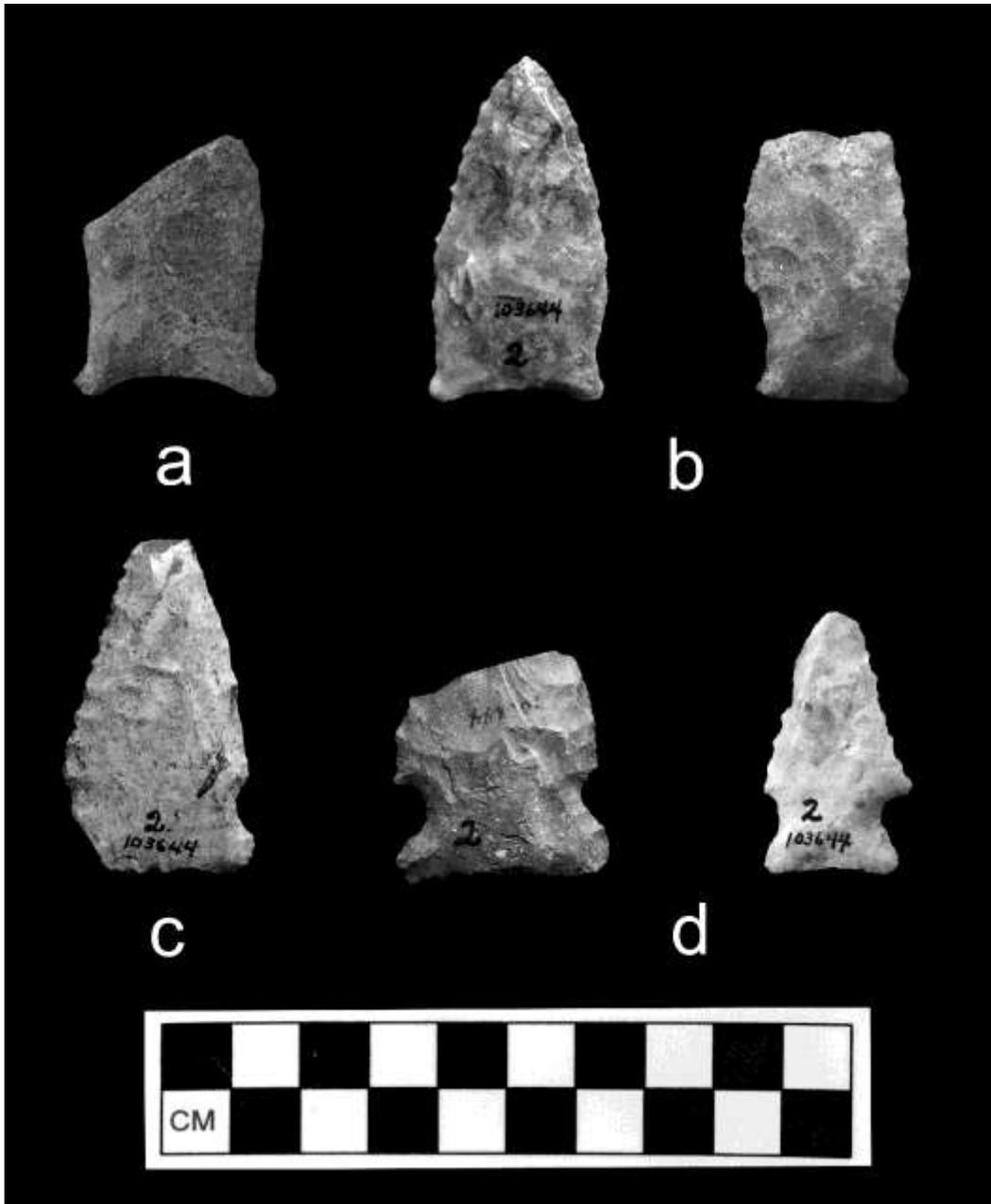


Figure 9. Paleoindian and Early Archaic artifacts from Terra Ceia: a) Suwannee; b-c) Greenbriar; d) Bolen.

variants (Brooks et al. 2020). Other artifacts from the fill deposits include Bolen, Marion, Newnan, Hillsborough, and Levy points all dating to the Middle Archaic period. Examples are shown in Figure 10.

- **Ben T. Davis Beach, 8HI456** (19 on Figure 1). This public (City of Tampa) beach is a well-known spot for artifact collecting. Stone tools and waste debris as well as pottery sherds are common, especially after storms, which wash up artifacts from adjacent dredge cuts and winnow the spoil sediments that make up the causeway.

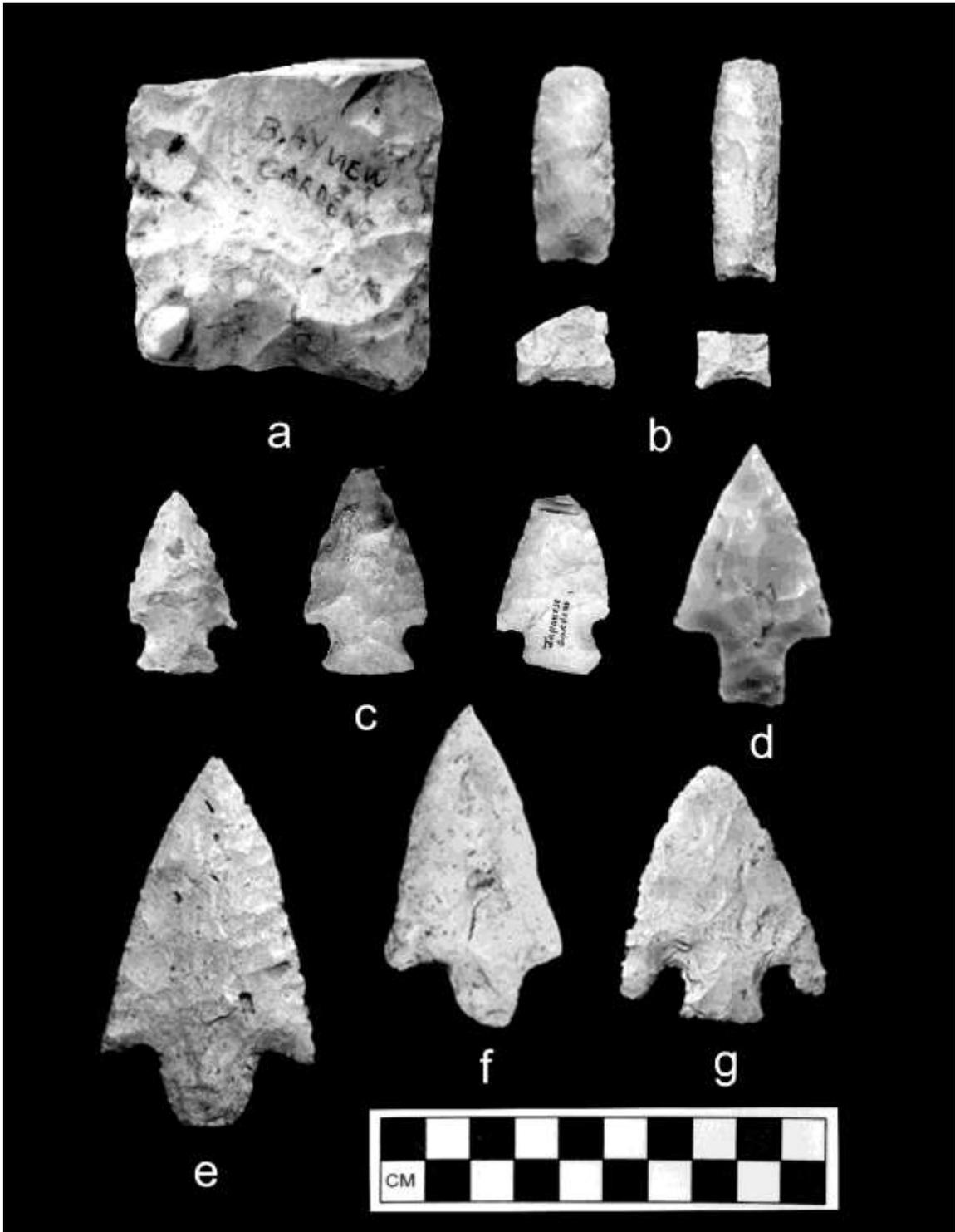


Figure 10. Artifacts from Bayview Gardens (a) and Japanese Gardens (b-g), Upper Tampa Bay: a) possible Clovis preform; b) Suwannee variants; c) Bolens; d) Alachua; e) Newnan; f) Marion; g) Culbreath.

In addition, a dredged channel connecting Sweetwater Creek to Old Tampa Bay intercepted an early chert quarry and campsite. The Goodyear database indicates that a Clovis point, a Suwannee point, and a Simpson or resharpened Suwannee have been found here. Goodyear et al. (1983) published a photograph depicting one of the Suwannee points recovered from the site (Figure 11a). Other reported artifacts include Greenbriar, Bolen, and numerous Archaic-period types, as well as an Early Archaic Edgefield Scraper. At this location, large fragments of chert within a clay matrix were exposed during low tides, attesting to the presence of chert outcrops and suggesting ancient quarrying.

- **Fish Creek, 8HI105** (20 on Figure 1). Spoil from a dredged canal connecting Fish Creek to Old Tampa Bay deposited a large number of stone tools and waste flakes on the mainland (Karklins 1970; Goodyear personal communication, 2024). Karklins reported Suwannee points (2), FAS (Putnam), Newnan (2), Morrow Mountain, Culbreath (2), Citrus, Hernando, and Bradford points collected from the fill. Lyman Warren and Al Goodyear collected a large amount of material from the site in the 1970s, including Suwannee points (Figure 11), unifacial scrapers, large cores and waste debris, and St. Johns Incised pottery. Together these collections indicate that the spoil intercepted a possible quarry with evidence of Paleoindian through Early Woodland components in currently submerged contexts.

Hillsborough Bay (Sites 21-23)

- **Port Sutton** (21 on Figure 1). In 2007 archaeological monitoring of dredging for the expansion of Port Sutton, at the south end of Hooker's Point, was conducted by Pan American Consultants (Faught and Ambrosino 2007). Sub-bottom acoustic profiling conducted prior to dredging had indicated undisturbed marine beds covered by "made-land" sediments. Monitoring was recommended because these marine sediments might overlie previous terrestrial landscapes associated with the relic channel of the Paleo-Hillsborough River. The archaeological monitors recovered Marion projectile points (Figure 13a), non-diagnostic bifaces, large flakes, and faunal remains with cut marks in channel deposits, strengthening the case for the presence of submerged Paleo landscapes and human sites. Large chunks of chert also were recovered suggesting the presence of a natural chert deposit.
- **Apollo Beach, 8HI100** (22 on Figure 1). This redeposited site is on the eastern shore of Hillsborough Bay near Ruskin. Lyman Warren (1968) conducted archaeological investigations there in the 1960s as the spoil was being freshly deposited. The dredging occurred about 200 yards off the shoreline and the spoil was used to make

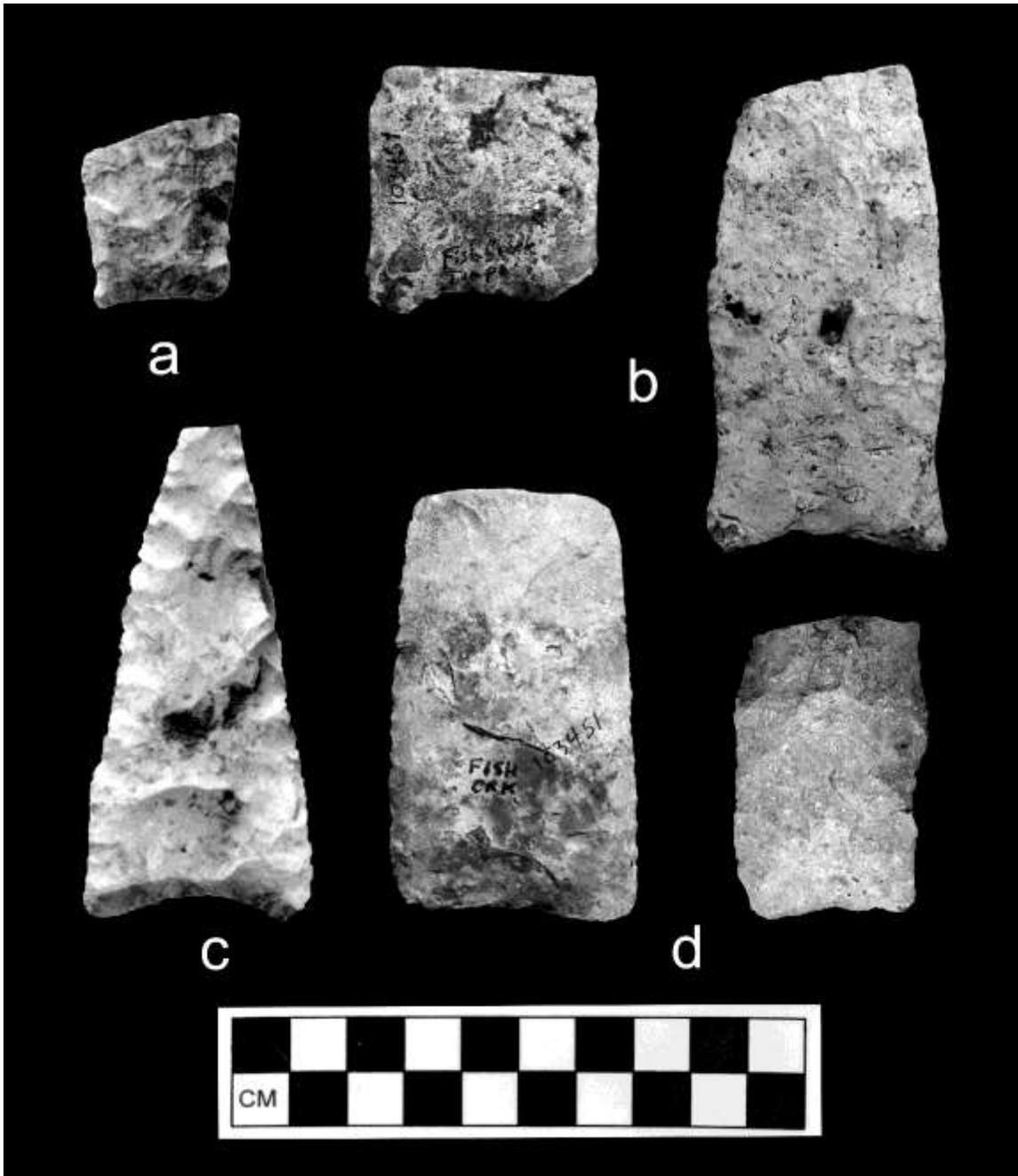


Figure 11. Paleoindian artifacts from Ben T. Davis Beach (a) and Fish Creek: a- b) Suwannee; c) Suwannee-like; d) lanceolates.

an artificial island and fingers of land for residential homes. No shell midden material was observed in the spoil, but a large number of stone tools, flaking debris, and a few pottery sherds were collected. The lithics included projectile point types assignable to the Middle Archaic (Putnam, Alachua), Late Archaic Culbreath, Lafayette) and Early Woodland (Citrus). A large number of stemmed scrapers of Middle to Late Archaic age, thin and thick scrapers, ovate knives or preforms, large

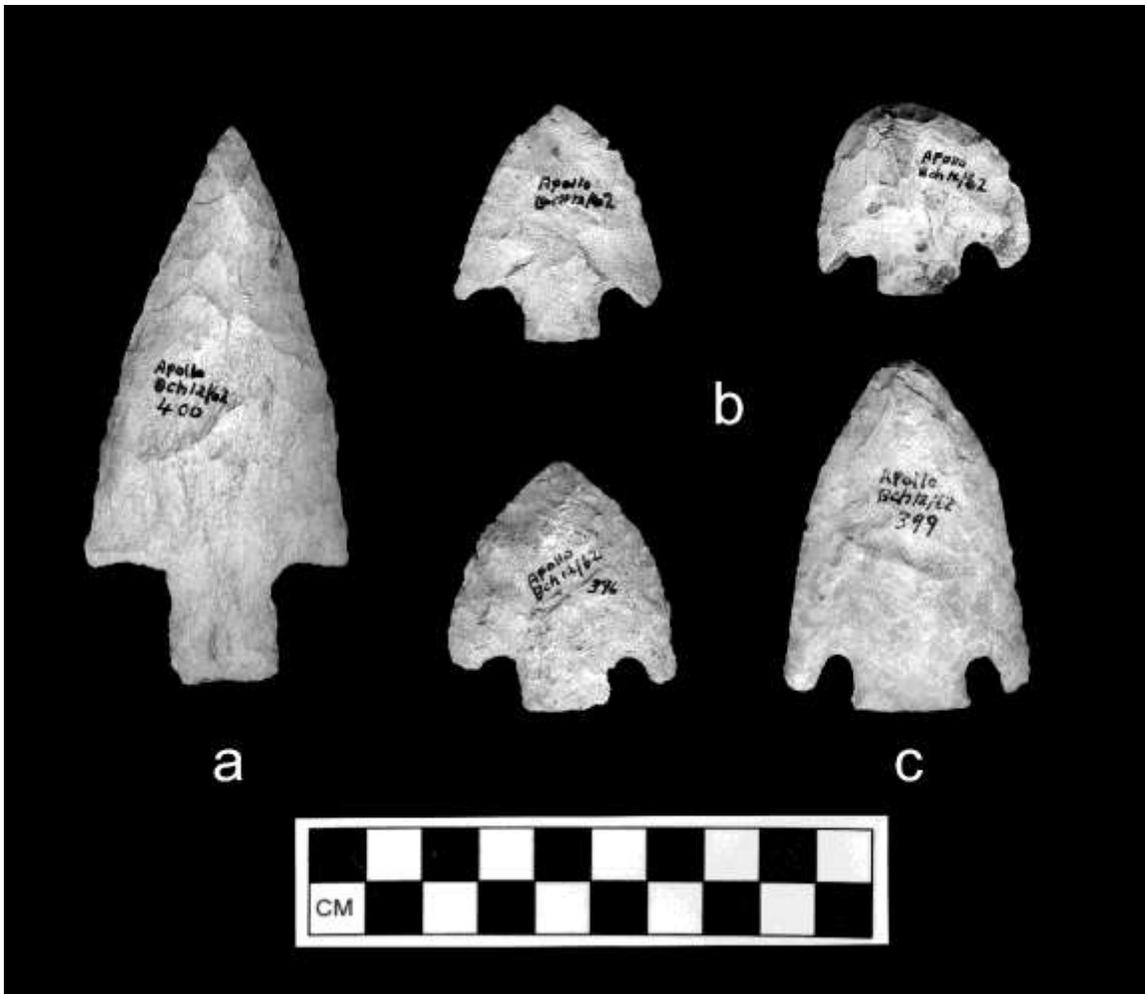


Figure 12. Middle and Late Archaic artifacts from Apollo Beach: a) Alachua; b) Culbreath; c) Citrus.

cores, and flake tools also were collected. Examples of lithic artifacts from the site are shown in Figure 12. Ceramics included Orange Plain, sand-and-fiber-tapered plain, Deptford Linear Check Stamped, Deptford Linear Check Stamped or Simple Stamped, and a few later types. Most of the ceramics date to the Late Archaic Early Woodland periods.

- Gadsden Point (23 on Figure 1).** Lithic artifacts and chert fragments dredged from Hillsborough Bay wash up regularly on the beach at the southern end of Gadsden Point. Private collections contain early artifacts including Bolen points and thick unifacial scrapers as well as Middle Archaic Newnan, Marion, and Putnam projectile points (Figure 13b-e). A nearby spoil island contains abundant chert fragments and spalls indicating a submerged chert source and probable quarry.

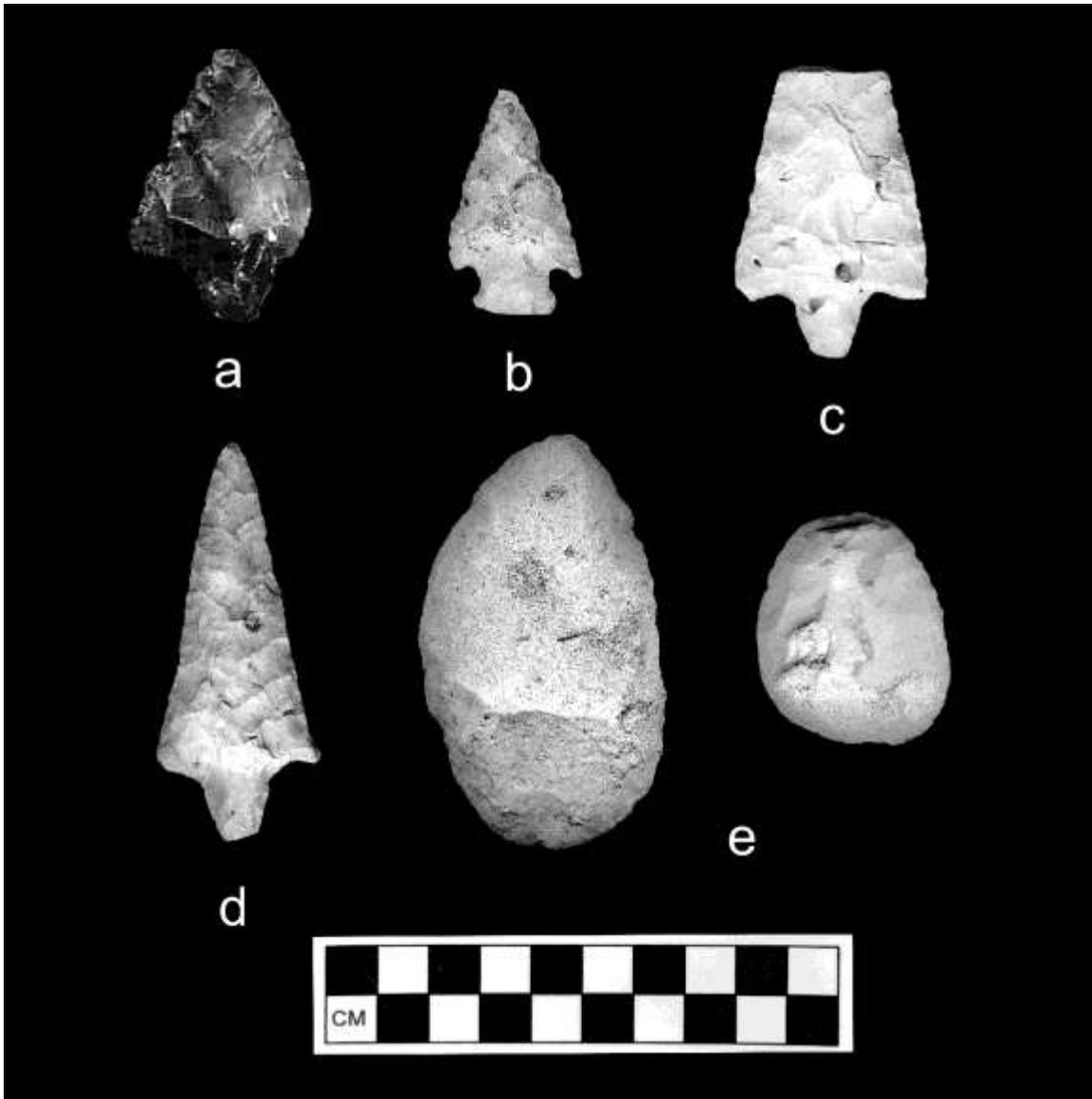


Figure 13. Artifacts from Port Sutton (a) and Gadsden Point: a) Archaic Stemmed (possible Marion); b) Bolen; c) Newnan; d) Marion; e) unifacial scrapers.

Chronological Synthesis of Known Archaeological Sites

Table 1 provides condensed information for the sites discussed above, including associated archaeological periods inferred from their artifact content. In this section, we review the extant material evidence for human occupation of now-submerged contexts in Tampa Bay using regionally accepted archaeological chronological periods to give a sense of the long duration of cultural history that is preserved beneath the estuary seabed.

Pre-Clovis (ca. 13,000+ BP). A possible Haw River point was found at Coquina Key. If the typological assignment is correct, this find would indicate the occupation of Tampa Bay during the earliest documented period of human habitation in Florida.

Paleoindian (ca. 13,000–10,000 BP). Diagnostic Clovis, Suwannee, and Simpson projectile points have been recovered from dredged deposits at the 131st Street Fills, Kellog Fill, Old and New Fills, Pinellas Point, Coquina Key, Ben T. Davis Beach, and Fish Creek as well as from the oyster shell deposits in Tampa Bay reported by Warren. These locations also typically contain fossilized Pleistocene faunal remains.

Transitional Late Paleoindian-Early Archaic (ca. 10,000-9000 B.P.). Beaver Lake, Santa Fe, Greenbriar, and Nuckals occur rarely and have been assigned to the Transitional Late Paleoindian and Early Archaic period (sometimes referred to as Dalton). They have been recovered from the Tampa Bay oyster shell deposits, Corey Causeway, Pinellas Point, Terra Ceia Bay, and Ben T. Davis Beach. Except for Greenbriars, which date to ca. 10,000 B.P., the temporal position of the other types has been inferred from research outside of Florida.

Early Archaic (10,000–8,000 BP). Bolen points are second only in occurrence to Middle Archaic projectile point types. In addition to the Tampa Bay oyster shell deposits, they have been found at Kellog Fill, Turtlecrawl Point, Corey Causeway, Old and New Fills, Pinellas Point, Terra Ceia Bay, and Ben T. Davis Beach. Other Early Archaic types include Edgefield Scrapers and Kirk.

Middle Archaic (8,000–5,000 BP). The Middle Archaic period is well represented. Diagnostic types, particularly Newnan, Marion, Putnam and, to a lesser extent, Alachua and Hillsborough points, are present at 20 of 22 locations discussed above. It was during the Middle Archaic that sea levels began to seriously encroach on modern Tampa Bay (i.e., around 7500 years ago), yet both Newnan and Putnam points were found in the oyster shell deposits from Tampa Bay, which represent submerged contexts that are not in close proximity to a modern shoreline (see Figure 1).

Late Archaic (5,000–3,000 BP). Use of some of the Middle Archaic types described above may have extended into the Late Archaic, to be joined by Culbreath and Lafayette points. It is during this period that the first use of ceramics appears in the form of fiber-tempered (Orange) and sand-and-fiber tempered pottery. St. Johns Incised also begins to appear in archaeological sites at this time. These Late Archaic artifacts have been recovered from Kellog Fill, Turtlecrawl Point, Pinellas Point, and Apollo Beach.

Transitional & Early Woodland (ca. 3,000–1,500 B.P.). St. Johns Incised and Deptford Series sherds, along with Hernando and Citrus points indicate that as late as 3000 B.P. sites now submerged were present on dry land offshore of the current mainland. Sites containing these diagnostic artifacts include Turtlecrawl Point, Corey Causeway, Cat's Point 1 and 2, Old and New Fills, Pinellas Point, and Apollo Beach.

Interpretations of Known Archaeological Sites

The assemblages of artifacts recovered from dredge spoil and/or during monitoring of dredge operations in Tampa Bay attest to the early and persistent occupation of the terrestrial paleo-landscapes that are now submerged and buried beneath the modern estuary seabed. In other words, there is unequivocal archaeological evidence that Native Americans have inhabited the Tampa Bay basin since at least the terminal Pleistocene, millennia before incipient marine flooding and the formation of the estuary system during the early Holocene. Indigenous peoples also occupied the shifting paralic landscapes of the proto-Bay across the last ca. 8000 years as the estuary developed and expanded landward. The archaeological finds described above indicate the submergence, burial, and general preservation of sites from time periods spanning the entire history of marine transgression, estuary formation, and cultural evolution—including ‘early’ human sites from the Pleistocene-Holocene transition (i.e., Paleoindian-period), as well as middle Holocene (i.e., Archaic period) and late Holocene (i.e., Woodland-period) sites that were flooded by more recent sea-level rise.

The spatial distribution of submerged archaeological sites indicates that ancient human occupation in paleo-Tampa Bay was widespread, leaving behind archaeological remnants in each of the estuary system’s major basins, including Hillsborough Bay, Old Tampa Bay, Middle and Lower Tampa Bay, as well as Terra Ceia and Boca Ciega Bays. The recovery of discrete and relatively dense concentrations of artifacts, including materials of varying size, shape, and density, indicates that many of the documented submerged sites were very likely intact (i.e. “in situ”) before they were excavated by dredging. If these finds represented heavily reworked or disturbed contexts, we would expect finds to be weathered (e.g., abraded, rounded, etc.) and sorted by size and density. The observation that artifacts from ancient shell-beds lack evidence for spat cementation likewise supports the case for in situ archaeological deposits preserved beneath the estuary seabed.

The pioneering work of Lyman Warren and later researchers has revealed an extensive archaeological record in Tampa Bay dredge and fill contexts. Despite compromised provenience, the assemblages document continuous human presence from the Paleoindian through Early Woodland periods. The evidence highlights the critical importance of submerged landscapes in Florida prehistory and the need for targeted underwater archaeological survey to resolve outstanding questions about site formation, chronology, and cultural lifeways of Florida’s earliest people.

A Probability Model for the Identification of Preserved Paleolandscapes and Archaeological Sites Beneath the Tampa Bay Seabed

Drawing on the archaeological data reviewed above, as well as extant geological, paleoenvironmental, and historical datasets, we developed a preliminary probability model for locating well-preserved paleo-landscape features and archaeological sites beneath the modern Tampa Bay seabed. The sections below describe the contributing sets of information from previous and ongoing research, as well as their bearing on the demarcation of target areas for archaeological prospection within the model.

Geological and Paleoenvironmental Setting

The Tampa estuary system is situated near the center of the Florida carbonate platform (Scott 2011), which forms a vast and low-gradient continental shelf extending westward beneath the Gulf of Mexico. Much of this shelf was sub-aerially exposed during the last glacial maximum (LGM; ca. 21,000 cal yr BP) and was subsequently inundated by deglacial and Holocene sea-level rise (Joy 2019). Tampa Bay's enigmatic morphology was formed by the marine flooding of antecedent karst depressions—producing numerous sub-basins separated by areas of more durable limestone (Brooks 2011; Hine et al. 2009). Thus, the Tampa Bay depression may be best conceptualized as a complex arrangement of nested and interconnected sinkholes. The depth-to-Arcadia Formation (basement limestones) map produced by Hine and colleagues (2009)—reproduced here as Figure 14—illuminates the deep karst sub-basins underlying the modern seabed in Middle and Lower Tampa Bay.

Before incipient marine flooding ca. 7,500 cal yr BP, this complex karst landscape supported a network of persistent freshwater wetlands, feeding a paleolake system (“Paleolake Edgar”) that once occupied the Middle Tampa Bay basin (cores TB-04-VC77 and MD02-2579; Cronin et al. 2007; Willard et al. 2007). A widespread transition to estuarine conditions in Tampa Bay during the mid-Holocene, ca. 6,500 cal yr BP, corresponded with a major climatic optimum that drove pine-forest expansion and the establishment of vast estuarine marshes (Jackson et al. 2023; Van Soelen et al. 2012). Continued sea-level rise across the late Holocene—particularly after ca. 2000 BP—exposed inshore marshlands to wave-forcing and converted them to open sand flats and seagrass meadows, which currently dominate shallow inshore areas of the Bay (Jackson et al. 2023).

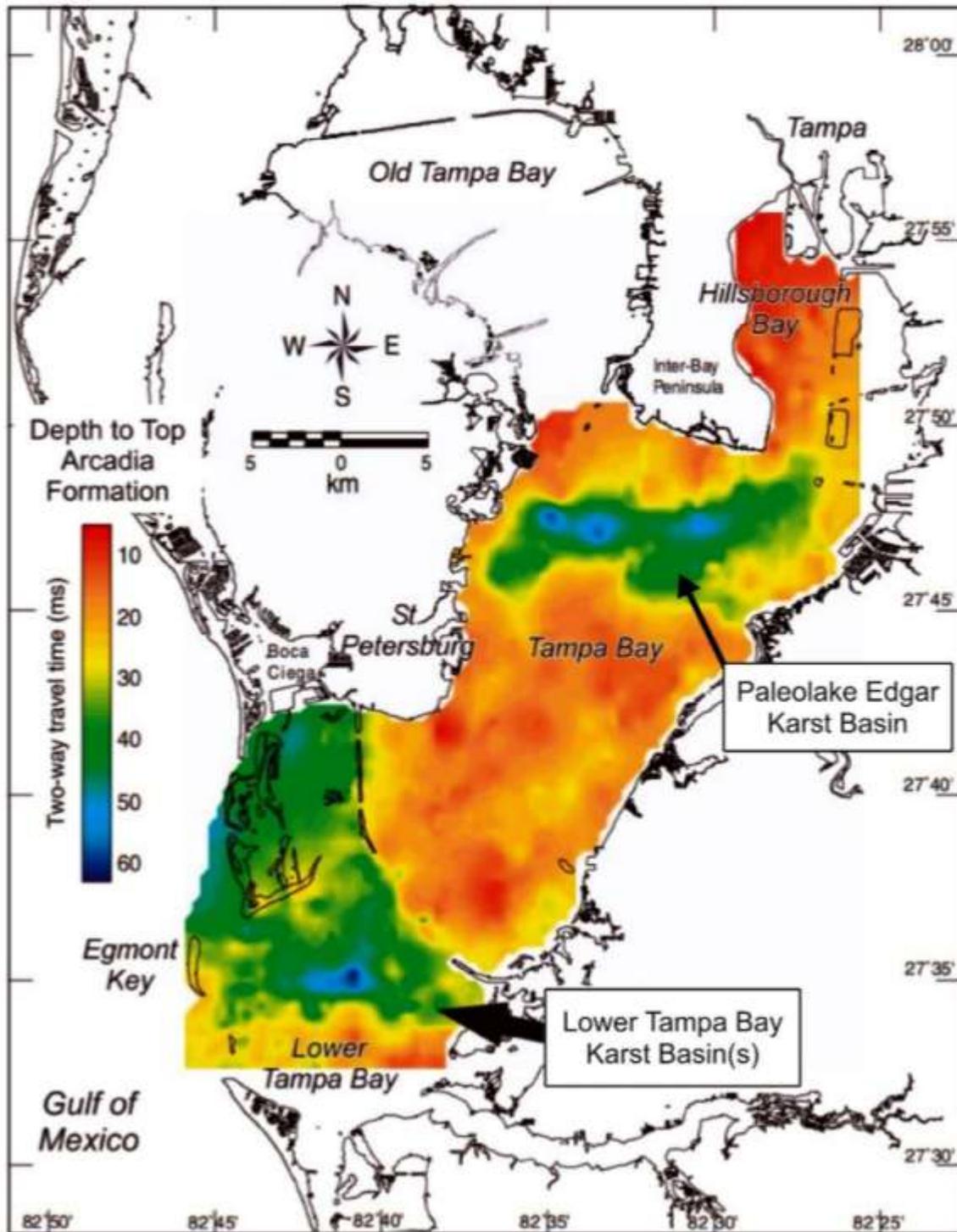


Figure 14. Seismic sub-bottom map of Tampa Bay showing depth to the top of the Arcadia Formation limestone, and the dramatic karst deformation of the surface. Note the major depression features in Middle Tampa Bay—the location of Paleolake Edgar—and throughout Lower Tampa Bay. Adapted from Hine et al. 2009.

Analyses of Historical and Modern Bathymetric Geomorphology

Detailed maps of the estuary seabed (i.e., bathymetric charts) are perhaps the most useful tools for the prospection of now submerged and/or buried paleolandscapes and associated human sites. However, it can be difficult to interpret pre-industrial geomorphology using only modern bathymetry. The modern bathymetry of Tampa Bay (2020)—displayed in Figure 15—is marked by conspicuous industrial-period (i.e., 20th century) alterations, such as the major dredge cuts, turning basins, and spoil piles associated with the main shipping channel system, as well as numerous smaller dredge cuts and spoil piles associated with causeways, bridges, ports, energy facilities, and minor navigation channels.

In the wake of the U.S. military's war against the Seminoles (1817 – 1858) and the American Civil War in Florida (1860 – 1865), the U.S. Coast and Geodetic Survey (CGS) carried out several intensive hydrographic mapping programs in Tampa Bay between 1855 and 1900. These conspicuously thorough mapping efforts produced the first geographically sound topographic charts (T-Sheets) of the Tampa Bay shoreline in the mid-1870s. Subsequent CGS work focused on hydrography and culminated in the first comprehensive and well-resolved bathymetric charts for Tampa Bay in 1879 (Chart No. 77).

We georeferenced and spatially interpolated the 1879 CGS Chart No. 77 in ArcGIS Pro to develop a pre-dredge bathymetric model of Tampa Bay, shown in Figure 16. The pre-alteration bathymetry is essential to our project and has been useful in several ways. First, it enables us to identify persistent relic landforms that may have been attractive for ancient human occupation, such as sandy headlands extending seaward from modern peninsulas at Pinellas Point, Terra Ceia, Interbay, E.G. Simmons, Cooper's Point, Rocky Point, and Mobbly. There are also several well defined shoal complexes that are likely anchored by persistent paleolandforms along the ancient shorelines of Paleolake Edgar and the early-to-mid-Holocene proto-Bay estuary system. Second, the historical bathymetric model helps us parse out areas that are prone to sedimentary deposition and archaeological preservation from those that are disproportionately erosional and destructive to archaeological deposits. Third, the comparison of modern and historical bathymetric models enables us to map the 20th century dredge-and-fill alterations so that we can exclude previously disturbed areas from ongoing and future field surveys.

Figure 17 presents a model of depth change, calculated by direct comparison between the modern and 1879 charts. Importantly, we can utilize this relatively high resolution model to locate the historical dredge scars associated with known submerged sites, as well as adjacent areas where intact archaeological deposits that escaped the dredge may remain beneath the seabed.



Figure 15. Modern digital bathymetric model of Tampa Bay produced by the U.S. Geological Survey and symbolized to highlight natural geomorphology and artificial modifications.

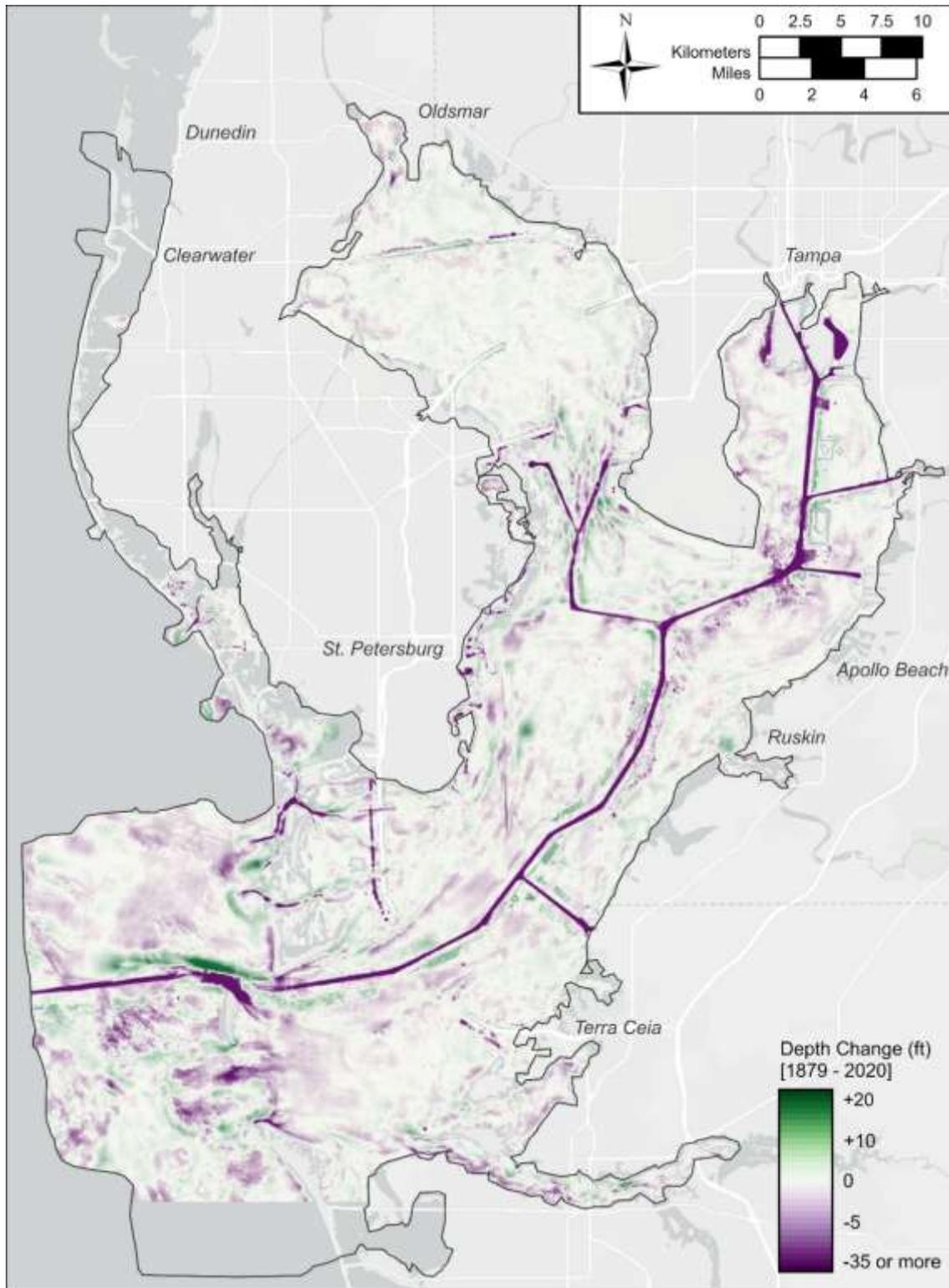


Figure 17. Digital model of changes in bathymetry (depth) between ca. AD 1879 and 2020. Note the sharp demarcation of channels and basins dredged during the 20th century, as well as adjacent areas of spoil deposition in the open bay.

Review of Surface Sediment Distributions and Sediment Core Records

Figure 18 presents a simplified map of surface sediment distributions within Tampa Bay estuary that synthesizes decades of sampling and analyses by Brooks (2011). Surface sediment distributions are controlled by underlying geology and modern energetic conditions.

Considering underlying geology, Figure 18 lays bare Tampa Bay's position along a prominent geological dividing line on Florida's peninsular Gulf Coast, where the Late Pleistocene quartz sand ridges and dune fields of the upper peninsula meet the vast Plio-Pleistocene fossil shell beds of southwest Florida. The infilling of Tampa Bay's northern karst basins (i.e., Old Tampa Bay and Hillsborough Bay) was dominated by fine quartz sand transported down the peninsula by ancient longshore currents during high sea-level stands (most recently ca. 125 kya) and the migration of inland dune fields during low sea-level stands (most recently ca. 30 – 7 kya). In contrast, the southern portion of Tampa Bay (i.e., Middle and Lower Tampa Bay) has infilled with coarse marine mollusk shell and antecedent phosphate-bearing lime gravels (Brooks 2011; Jackson et al. 2023).

Considering modern energy regimes, the coarse shelly sediments at the mouth of Old Tampa Bay typify strong current velocities associated with the natural channel system and constituent shelly lag deposits. The shelly sediments of the lower estuary also face higher energy conditions relative to Old Tampa Bay and Hillsborough Bay and indicate greater probability for the disturbance of early human sites by waves and currents. Organic sandy mud sediments characterize low-energy inshore karst sub-basins where reduced wave-energy and tidal circulation have created depositional centers for microalgal mud and other fine particles. These inshore sub-basins have not yet been exposed to energetic open-water conditions, suggesting generally high preservation potential.

Sediment cores collected by USGS, Eckerd College, and USF/ AWIARE verify the general infilling pattern indicated by surface sediment distributions but also tell us about local landscape features and their transformations from the Late Pleistocene to the present. Figure 19 displays our database of previous sediment core locations. In the deep Middle Tampa Bay basin, USGS/ Eckerd College sediment core MD02-2579 intersected the characteristic pale mud deposits of Paleolake Edgar, which accumulated from the LGM until the incipient estuarine flooding of the basin ca. 8000 cal yr BP (Cronin et al. 2007; Willard et al. 2007). The associated radiocarbon dating and microfossil analyses revealed that the Paleolake Edgar system fluctuated in hydrology attending climatic shifts of the deglacial period but retained productive wetlands even during the most severe arid intervals (i.e., the Older and Younger Dryas)—providing an oasis for human communities within an otherwise xeric and windswept interior peninsular landscape (Figure 20).

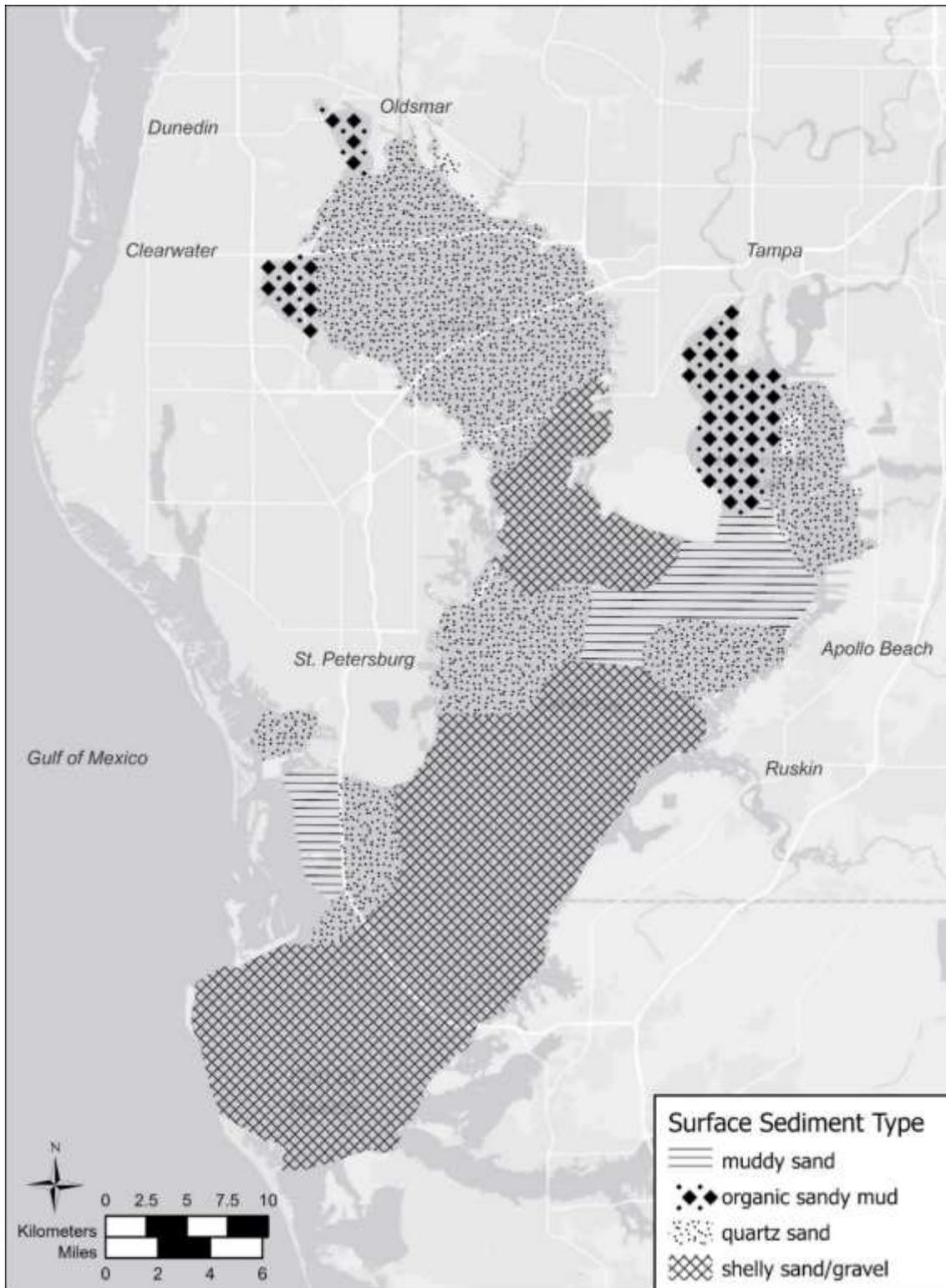


Figure 18. Map of surface sediment distributions in Tampa Bay, adapted from Brooks (2011).

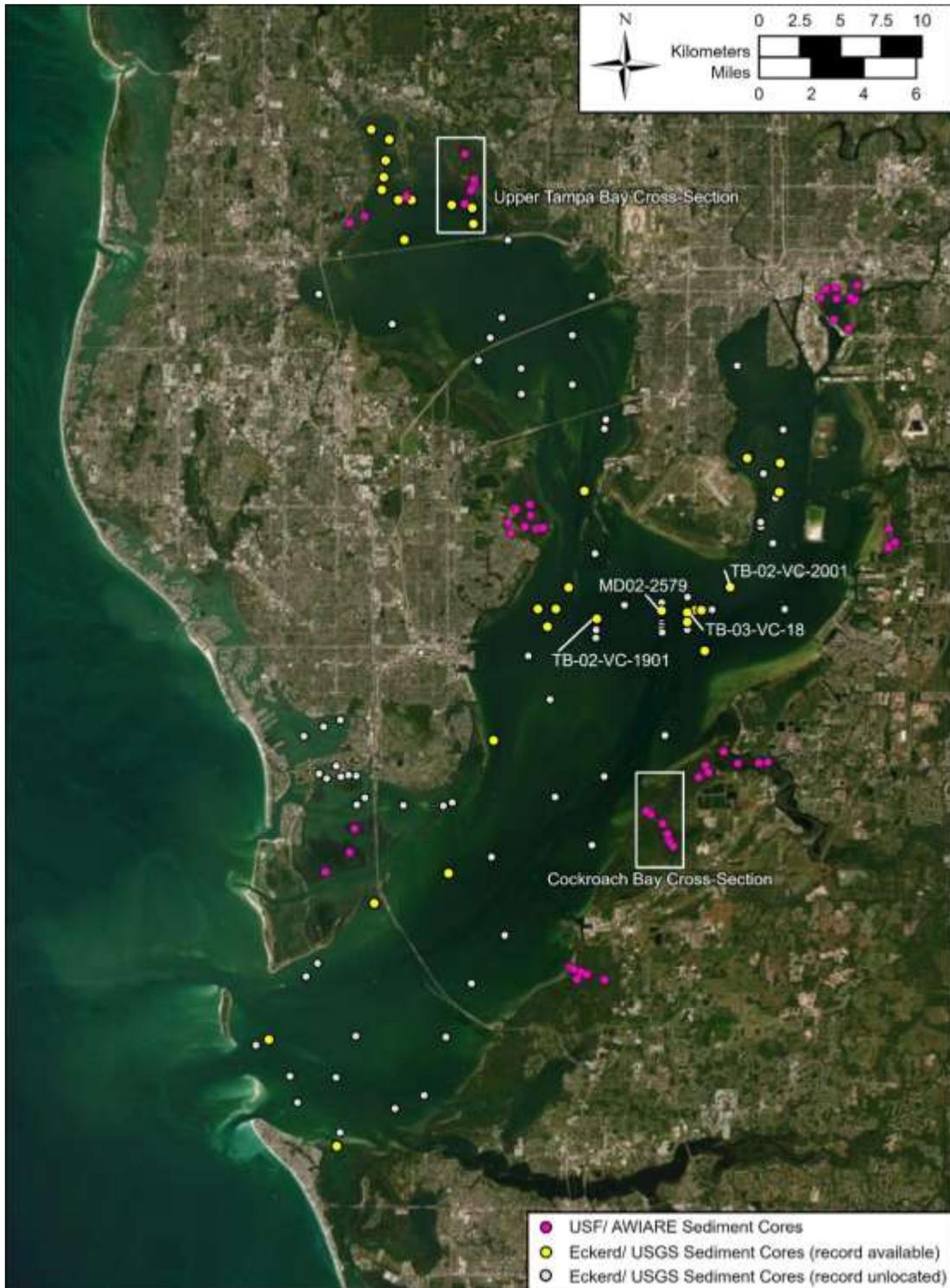


Figure 19. Map of previously collected Tampa Bay paleoenvironmental sediment cores. Core samples by USF/ AWIARE (pink) and archived cores from Eckerd College (yellow) have been reviewed and incorporated into our paleo-landscape model.

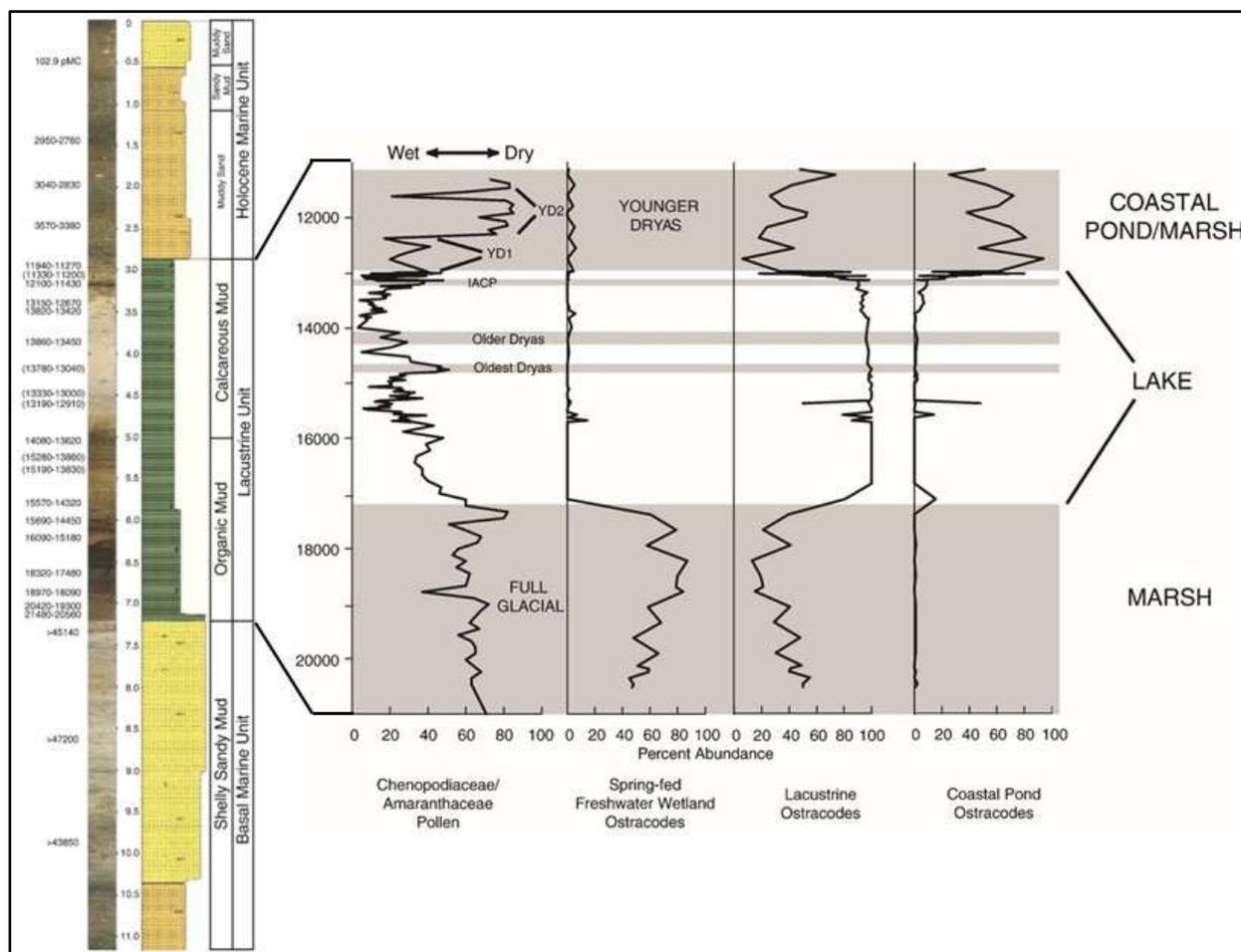


Figure 20. Descriptive log, chronology, photographs, and palynological data from sediment core MD02-2579. Paleolake Edgar (lacustrine unit) deposits are the organic and calcareous muds logged in green. The microfossil data panel (right) displays evidence for ecosystem conversions attending hydrological shifts driven by climate, and attests to the persistence of wetland environments across dry intervals when Paleoindian-period peoples would have most benefitted from the inland oasis. Adapted from Willard et al. (2007).

Subsequent coring operations by Brooks targeted possible shoreline features of the paleolake system. Despite the successful intersection of ancient shoreline environments in several locations, the stratigraphic records from this work have not been published. However, Brooks has kindly provided our team with the corresponding core logs, photographs, and datasets, as well as access to the curated core samples. In several of these cores Brooks encountered fine-textured, black, organic-rich deposits suggestive of paralic wetland soil and/or buried terrestrial topsoil. Conspicuously, some of these organic strata contain dense layers of mollusk shell that may represent early middens or, at least, productive wetland habitats that may have attracted and sustained early human

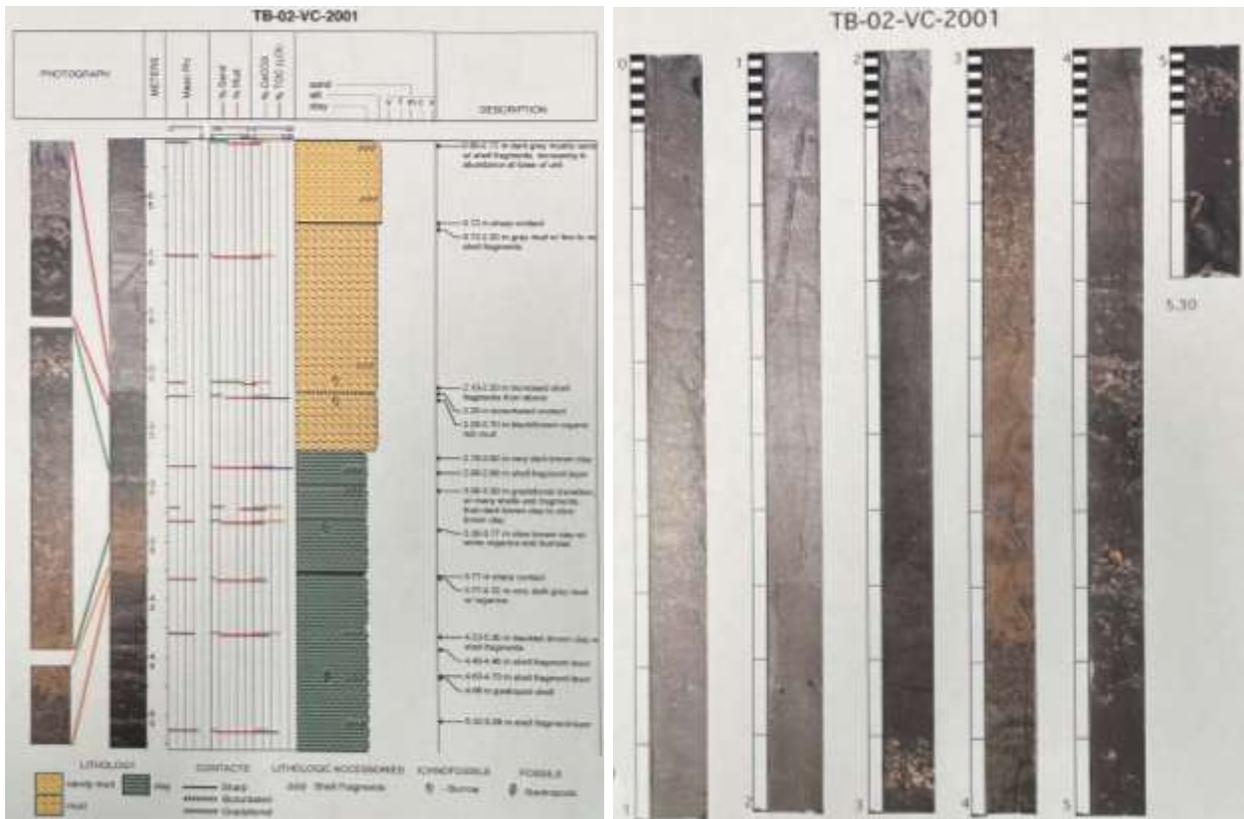


Figure 21. Descriptive logs and photographs of sediment core TB-02-VC2001, collected from the Paleolake Edgar basin. Note the thick layers of fine black organic sediment with mollusk shell that occur below c. 2.1 m depth and interfinger with lacustrine muds—indicating cycles of inundation and exposure along the lake margins

groups. Representative examples of such layers are apparent in core TB-02-VC-2001 (Figure 21) and core TB-03-VC-18 (Figure 22), among others (e.g., TB-02-VC-1901). None of the core samples from Brooks’ paleoshoreline survey have been subjected to radiometric dating; and the black mollusk-shell bearing soil layers have not been sieved or systematically analyzed for natural or cultural inclusions. However, several of these sediment cores have been curated and are available to our team for continued analyses.

More recent sediment coring by Jackson (USF/ AWIARE) focused on inshore areas of Tampa Bay in an effort to reconstruct mid-to-late Holocene histories of estuary evolution and human modification of paralic environments (Jackson et al. 2023). Serendipitously, this inshore sub-surface research found that deep karst sub-basins with LGM-age freshwater wetland sediments are also preserved beneath the seagrass flats along the margins of the modern estuary system at Upper Tampa Bay, Weedon Island, and Cockroach Bay. Figure 23 displays a stratigraphic cross-section from Upper Tampa Bay where Late Pleistocene freshwater wetland sediments were located beneath deglacial-to-early Holocene stream deposits and mid-to-late Holocene estuary sediments. Figure 24

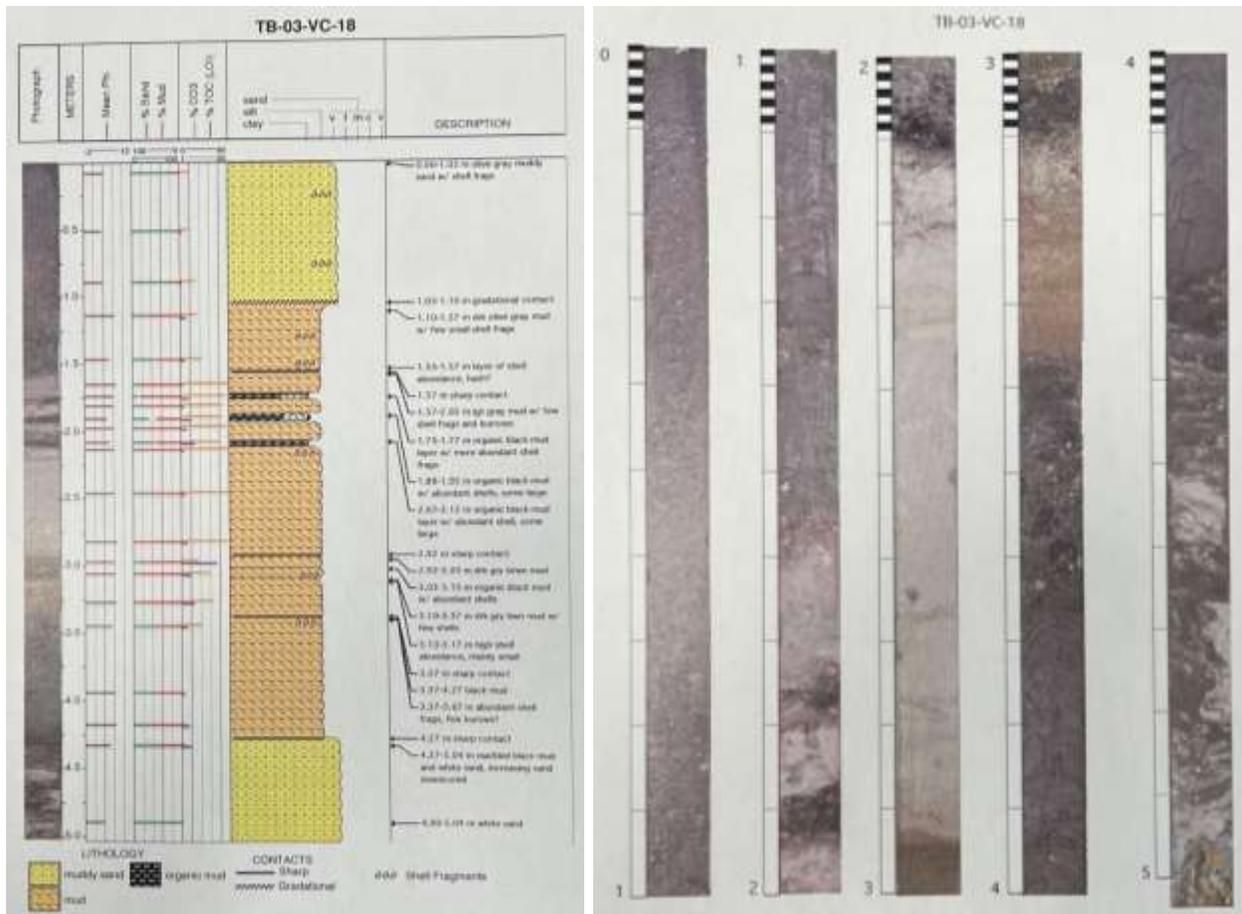


Figure 22. Descriptive logs and photographs of sediment core TB-03-VC18, collected from the margin of the Paleolake Edgar basin. Note the discrete layers of fine black organic sediment with mollusk shell that occur below c. 1.7 m depth—indicating cycles of inundation and exposure along the lake margins.

displays a cross-section from Cockroach Bay that implies a similar landscape history despite different underlying geology. These findings indicate that the Paleolake Edgar system was connected to karst wetlands distributed throughout the Tampa Bay depression, which is consistent with the disturbance of Paleoindian and early Archaic-period archaeological sites during inshore dredging projects.

Deglacial-to-early Holocene environments of these marginal areas were dominated by clear-water oligotrophic stream systems; at Upper Tampa Bay and Weedon Island these streams transported large volumes of fine aeolian quartz sand, providing a mechanism for the relatively rapid burial of human sites. At Cockroach Bay, these stream systems cut through fossil shell beds and phosphate-bearing limestones—producing more complex conditions for the burial and preservation of archaeological sites. However, these early fluvial contexts at Cockroach Bay did yield a dense layer of banded mystery snail shells

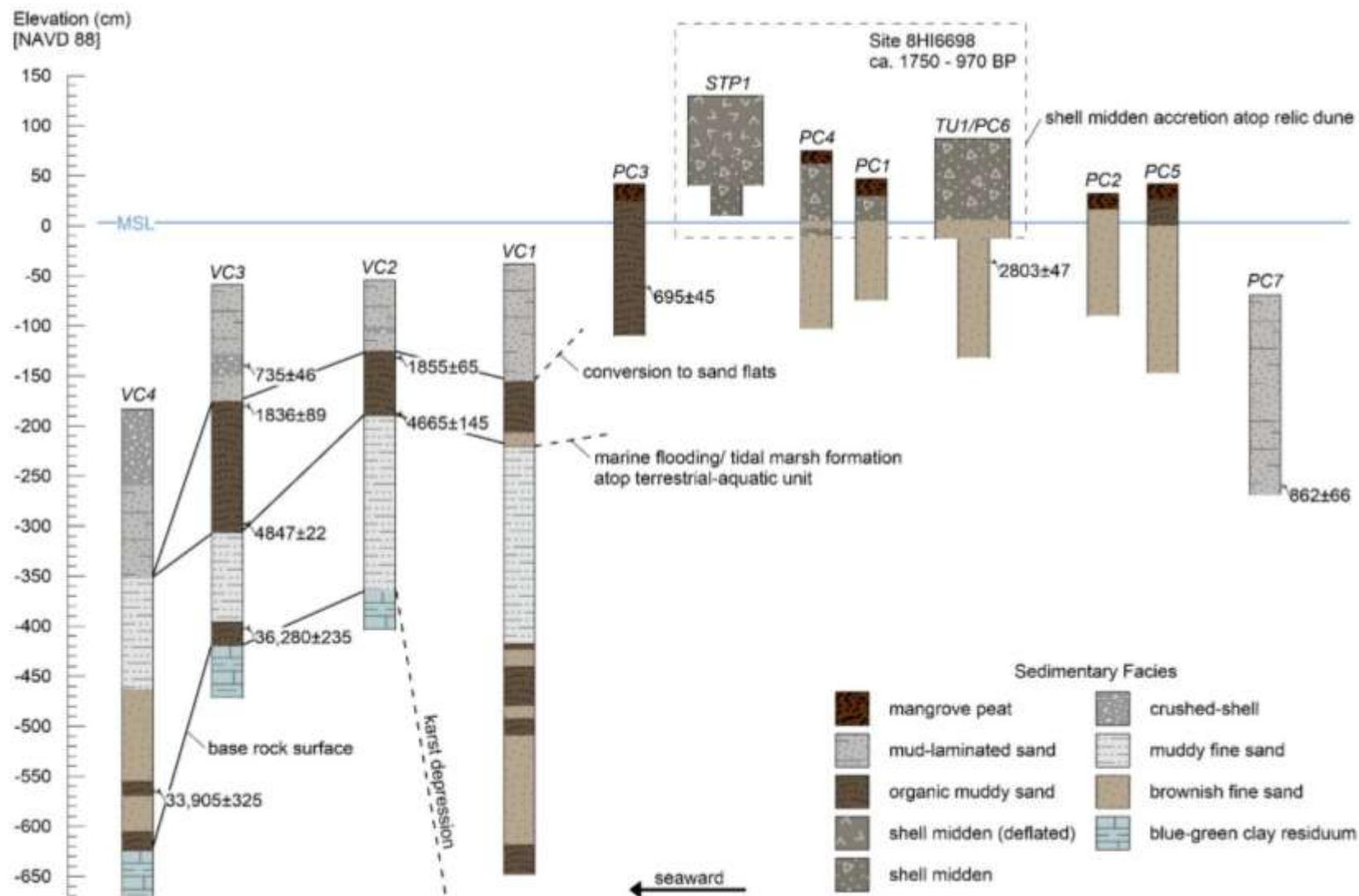


Figure 23. Stratigraphic cross-section from Upper Tampa Bay by Jackson et al. (2023). Note the superposition of deeply buried wetland deposits (~30 kya), deglacial-to-early Holocene stream deposits, and estuarine marsh peats (<5 kya). Radiocarbon ages are reported in calibrated years BP with 2-sigma error ranges.

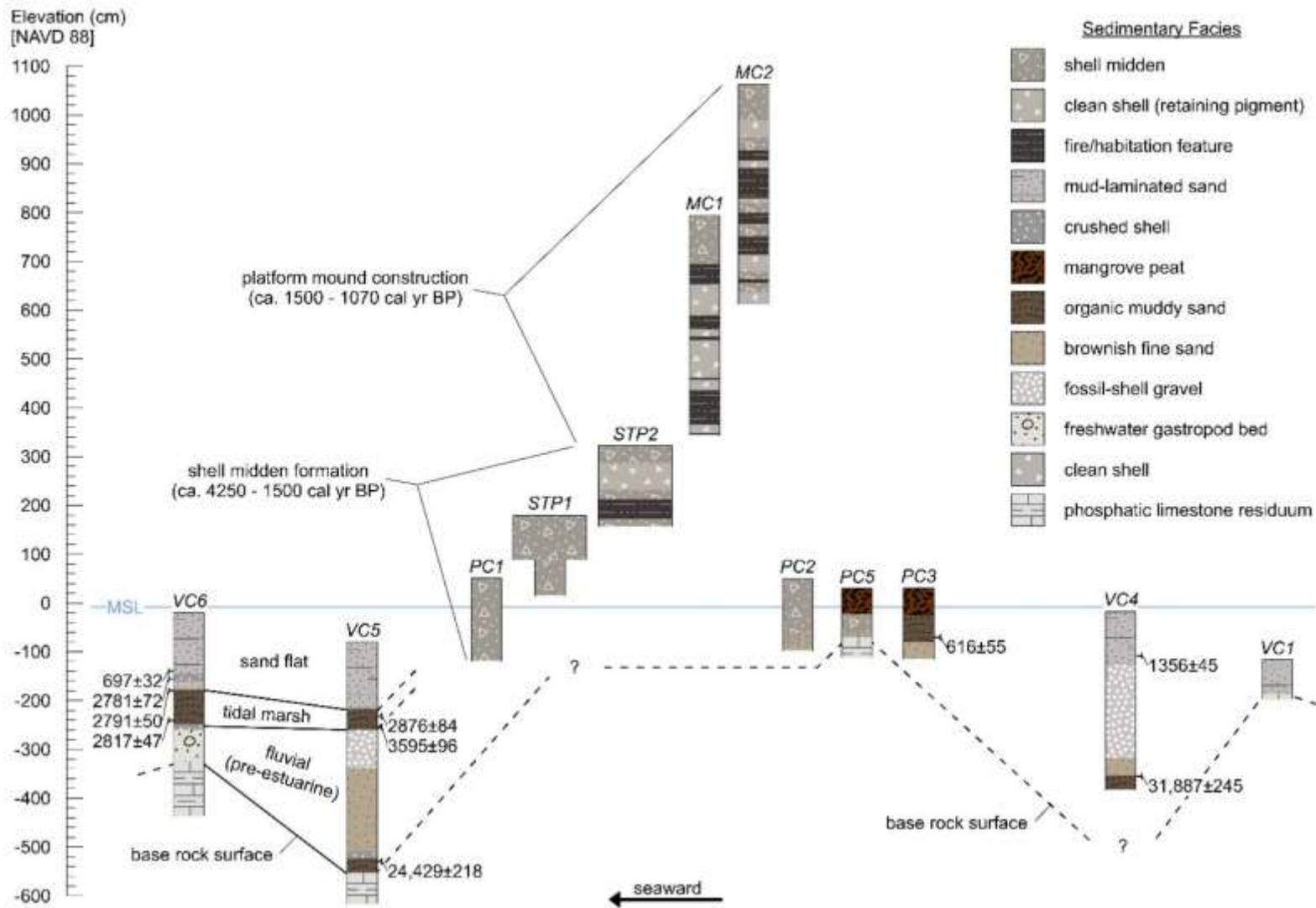


Figure 24. Stratigraphic cross-section from Cockroach Bay by Jackson et al. (2023). Note the superposition of deeply buried wetland deposits (~24 kya), deglacial-to-early Holocene stream deposits, and estuarine marsh peats (<4 kya). Radiocarbon ages are reported in calibrated years BP with 2-sigma error ranges.

(*Callinina georgiana*), indicating the presence and geologic preservation of resource rich wetland habitats (Figure 24, VC6).

The middle Holocene climatic optimum and marine transgression of Tampa Bay drove the formation of vast tidal marshes and creek systems that occupied the areas presently dominated by shallow flats and seagrass meadows (Jackson et al. 2023). Using the marsh systems of Florida's temperate Gulf and Atlantic coasts as a model, we should expect that Archaic-period Indigenous communities occupied fisheries, camps, and other sites on points of high ground along tidal creeks within the paleomarch environment. Although the modest sampling by Jackson et al. (2023) did not encounter such sites, they should be readily detectible via sub-bottom acoustic survey and further sediment coring.

Indigenous archaeological sites occupied during the late-Holocene (after ca. 3000 cal yr BP) are commonly preserved within Tampa Bay's tidal wetlands, where early and middle Woodland period middens and mounds have been encroached by marsh and mangrove peat, as well as storm-overwash sediments (Jackson et al. 2024; Rogers and Jackson 2024). Relatively large portions of these Indigenous sites are buried beneath tidal wetland peat, and some shell midden and mound sites are considerably larger in footprint than they appear from the ground or in remote sensing surveys (aerial imagery, LiDAR, etc.). The relatively recent inundation and burial of late-Holocene sites provide us with basic expectations to aid our search for much earlier sites that went under the tide millennia ago during earlier phases of estuary development. The most ubiquitous pattern available to us as an analog is the accumulation of cultural debris and mollusk shell on sandy shorelines, and the burial of these sites in organic mud or peat, sometimes with lenses of sandy storm overwash.

A Preliminary Probability Model for Preserved Paleo-Landscapes and Human Sites

Figure 25 presents a preliminary probability model for the prospection of intact early archaeological sites within Tampa Bay. The pink polygons denote discrete areas with conspicuous depositional landforms that have not been previously impacted by dredge-and-fill operations—mapped in dark grey. Also plotted are the inferred extent of the Paleolake Edgar basin, the relic shell deposits described by Warren, sediment core locations, and the locations of previously recorded submerged and terrestrial early archaeological sites.

Prime priority may be given to target areas that are adjacent to or otherwise associated with recorded submerged sites that were discovered through disturbance (yellow stars); these are present throughout Boca Ciega Bay, along Pinellas Point, in Old Tampa Bay, off Apollo Beach, and in Terra Ceia Bay. The prioritization of such areas is

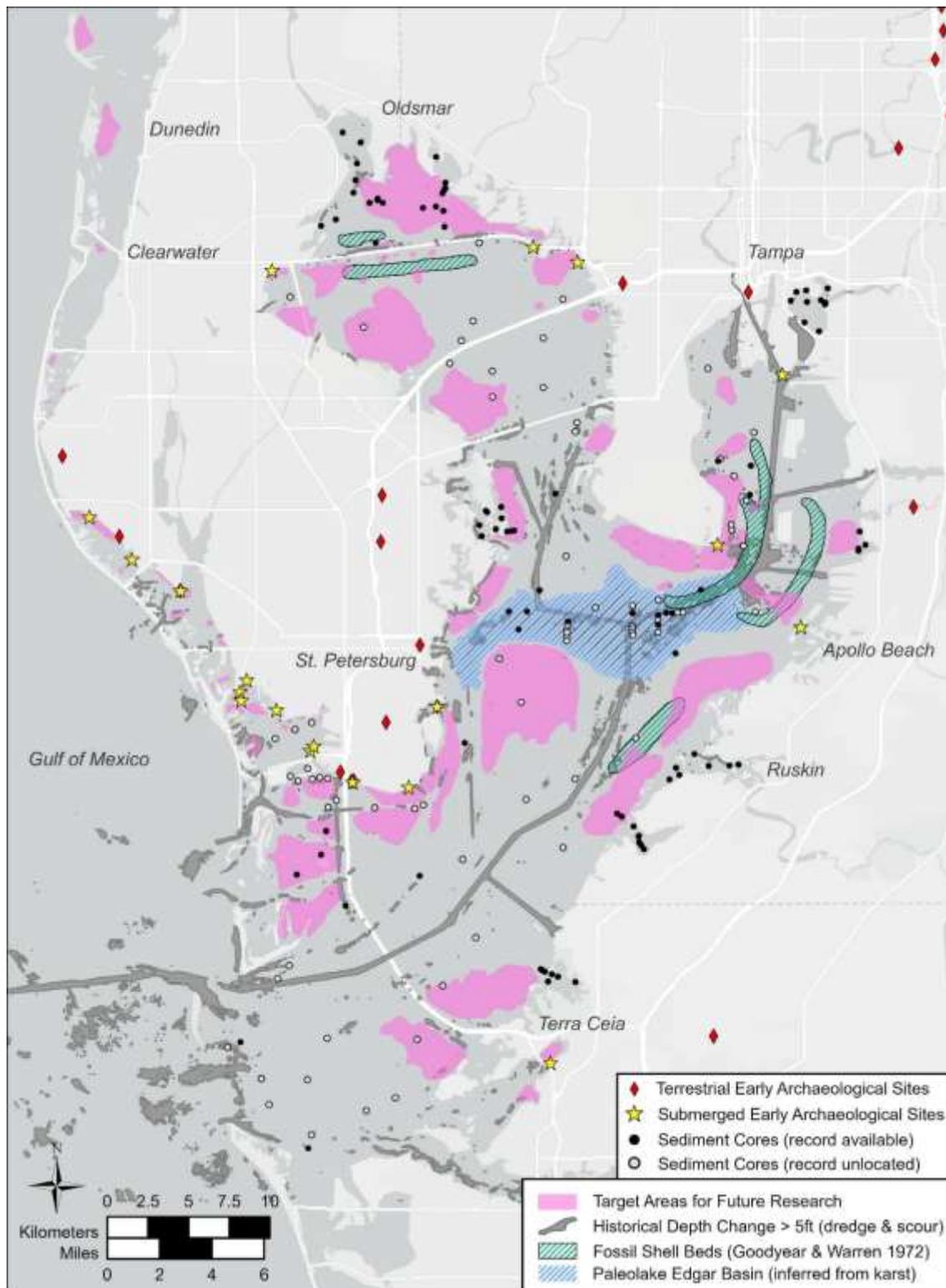


Figure 25. Preliminary probability model for the prospection of paleo-landscapes and early human sites within Tampa Bay.

justified by the straight-forward inference that previously identified submerged archaeological sites may be larger than the dredge impacts that led to their discovery. Future investigations of these areas also present the possibility of connecting legacy salvage collections with modern paleoenvironmental and archaeological findings, which may be important given the relatively miniscule prospects of large-scale professional excavations below the modern seabed.

Secondary priority may be given to the large target areas that have not produced known salvage collections, but that have yielded geological evidence for resource-rich paleolandscapes. These include the large target area encompassing Upper Tampa Bay, as well as the target areas along large shoals offshore of Little Cockroach Bay, Weedon Island, Ballast Point, Terra Ceia, and Maximo Point. In these cases, we have information about the local stratigraphic framework and the deep history of ecological conditions—both of which can inform archaeological prospection and the interpretation of future finds.

Tertiary priority may be reserved for the several large target areas for which we have little-to-no sub-surface information. Importantly, these include areas where sediment cores have been collected but not logged in an archive that we currently have access to. As we continue to mine archives and search through curated sample collections, some of these targets may be upgraded in priority depending on the discovery of relevant paleoenvironmental data. Among the tertiary target areas are large shoals in Lower and Middle Tampa Bay, as well as prominent landforms within Old Tampa Bay and Hillsborough Bay.

Forward! Into the Past: Next Steps in the Search for Tampa Bay's Earliest People

This report distills our team's broader synthesis of extant archaeological and geological data and represents our transition into the second phase of research—focused on geophysical survey and sub-surface sampling of target areas identified in Figure 25. Below we describe the activities planned for our second phase of research, including continued archival work, new analyses of extant sediment cores, opportunistic sub-surface prospection, expert and community consultation, and soliciting funds for a program of geophysical survey and ground-truthing.

Continued Archival Work at Eckerd College, USGS, and USF-CMS

We have identified records related to the collection of numerous sediment cores for which we have not located photographs, stratigraphic logs, or other data. Our search for these records and the corresponding physical core samples will continue. We anticipate that many of these data will be relocated in the coming months, as local institutions regain

their capacity for collaboration with distance from the 2024 hurricane season and the 2025 federal government shutdown. The preliminary probability model presented here will be iteratively revised as we locate and process datasets, especially those associated with known submerged sites in Boca Ciega and Old Tampa Bay.

New Analyses of Extant Sediment Cores

As mentioned above, several particularly intriguing sediment cores collected by Brooks from the Paleolake Edgar basin have not been analyzed or dated despite their substantial paleoenvironmental and archaeological potential. AWIARE currently has facilities, personnel, and funds that may be allocated to the sub-sampling and analysis of these core samples, which are curated at Eckerd College. Follow-up analyses of select sediment cores previously collected by USF/ AWIARE may also produce useful data, especially Cockroach Bay VC6—where we encountered an enigmatic early-Holocene-age freshwater snail deposit. We are particularly interested in identifying intact sediments with the potential for chronometric dating, either through radiocarbon (^{14}C) or optically stimulated luminescence (OSL).

Opportunistic Sub-Surface Prospection

Sediment coring in Tampa Bay is an established component of Jackson's regular teaching and research program at The University of Tampa. Thus, we anticipate the collection of sediment core transects across our target areas during Spring, Summer, and Fall of 2026. As part of this work, our team intends to collaborate with archaeologists Al Goodyear and Chris Moore to search for geochemical markers (namely platinum) that have been tightly associated with the Younger Dryas climatic anomaly (ca. 12 kya) and thus may serve as a reliable chronological marker for the Clovis timeframe in sediment deposits that lack well-preserved biological materials for radiocarbon dating. In any case, the team will integrate data from opportunistic sediment coring to iteratively refine our probability model and to develop case studies for the solicitation of continued research funding.

Consultation with Scientists, Regulators, and Community Stakeholders

The second phase of our research program will require the involvement of an expanded scientific team, including geophysical and remote sensing specialists as well as underwater archaeologists. The corresponding work will also benefit greatly from collaborative relationships with natural scientists working in Tampa Bay, regulatory specialists, and local communities with a stake and/or interest in the ancient Indigenous history of Tampa Bay. As we develop plans for the second phase of research, we will consult with these parties and endeavor to cultivate collaborative relationships that further the rigor of the work and its translation into resources for public education and policy.

Solicitation of Funds for Geophysical Survey and Sub-Surface Sampling

The datasets synthesized for the first phase of our study indicate that the submerged paleolandscapes of Tampa Bay hold immense potential for Paleoindian- and early Archaic-period archaeological research. As we continue to distill these data and engage in follow-up analyses of extant samples, we plan to develop these efforts into proposals to major granting agencies and private foundations seeking funds for sub-bottom acoustic surveys and an associated program of ground-truthing with sediment coring.

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Note on Collections

Artifacts from the Goodyear and Brooks collections are curated at the Alliance for Weedon Island Archaeological Research and Education, Inc. (AWIARE) in St. Petersburg, FL and the Institute of Archaeology and Anthropology, University of South Carolina, Columbia, SC. Artifacts from the Warren Collection are housed at AWIARE and the Florida Museum of Natural History, Gainesville, FL. All figures and images are by the authors unless otherwise indicated.