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PRELIMINARY MALACOLOGICAL ANALYSIS OF PREHISTORIC SHELL MATERIAL AT THE BURNS SITE 8BR85

by

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Abstract

This paper discusses the importance of shell material recovered during Season Two of the Cape Canaveral Archaeological Mitigation Project (CCAMP) in terms of species identification and the presence of human modification. The abundance of shell, particularly artifacts such as tools, within the midden require detailed documentation and interpretation to postulate the various marine and estuarine resources utilized by the Prehistoric people living at the Burns site. Shells will be organized and classified according to species, weight, and modification by utilizing shell species guides, archaeological reports from past CCAMP seasons, and similar Phase II projects conducted in Florida; crushed and fragmentary shells will be considered temporarily unidentifiable unless distinct features allow for identification. All other partial specimens will be considered unidentifiable until further analysis can be conducted by zoologists at the Florida Museum of Natural History upon project completion; while the lack of identification of such shells does not indicate unimportance, it is beyond both the scope of this research as well as the resources available during this project. Serving as a guide for future research, this continuation of preliminary malacology aims to categorize shell samples from Test Unit E of the Burns Site (8BR85) in Cape Canaveral, FL as thoroughly as possible in hopes of identifying potential trends in species preference for sustenance and tool use.

History of the Burns Site

With the conclusion of Season Three of CCAMP quickly approaching, it is imperative to document and interpret the results of malacological findings from previous field seasons due to the increasing vulnerability of the Burns Site (8BR85). Located just east of the Banana River, archaeological sites present on Patrick Air Force Base remain highly vulnerable due to continuously rising sea levels, an unequivocal consequence of climate change. The first preliminary analysis was conducted during Season One in the Spring of 2017; at present, all shell material recovered from Phase II excavations in this season has been fully investigated to the extent that the resources at the University of Central Florida and the 45th Space Wing Cultural Resources Management Department allow. Therefore, the recovered shell material from Season Two, specifically Test Unit E, will be the origin for all shell material discussed.

Despite three visits to the site between 1869 and 1931, the first true excavation was not conducted until 1933 by Dr. G. Woodbury (Pettinati 2017). In total, four main units (A, B, C, and D) were originally excavated directly on the mound's surface yielding human remains as well as an array of prehistoric artifacts dating to the Malabar I Period. Excavating units to the mound's North will potentially enable the establishment of an occupation boundary or differences in site use in the immediately surrounding areas; Test Unit E was excavated in Season Two of CCAMP followed by the excavation of units F and G to the south and north of Test Unit E during CCAMP Season Three. The goal is to identify any additional features by expanding the original unit excavated in the Spring of 2018, and it is likely that supplemental units will be excavated to the east of Test Unit G or the immediate west of Test Unit E.

Methodology and Materials

All shell samples analyzed in this paper originate from Test Unit E—the first Phase II excavation conducted beyond the clear visual perimeter of the Burns mound itself. The unit is 2m by 2m, and levels are excavated in 10cm increments; at present, the unit is not fully excavated down to two sterile levels, for the last level completed prior to the conclusion of CCAMP Season Two was Level 8 (70 – 80 cmbd).

In the lab, shell material was first separated from faunal remains, historic artifacts such as metal flakes and glass, and prehistoric artifacts; artifacts that are not to be analyzed are placed in appropriately sized bags and returned to the original level artifact bag to improve organization. Shells were then divided into the following two categories before species identification occurred: identifiable and unidentifiable. For each level, weight (in grams) was recorded for both the unidentifiable and identifiable shell groups. A digital scale served as the primary method of determining shell weights to two decimal places for increased accuracy. It must be noted that there exists no available data for Level 2 (10 – 20 cmbd) and Level 7 (60 – 70 cmbd); until these artifact bags can be recovered and analyzed, the malacological data for Test Unit E will remain incomplete.

Using several sources, whole shells, mostly whole shells, and shells with distinct markings and shapes were further divided by species and weighed accordingly. Prior to weighing, shells were gently cleaned with a toothpick to loosen any remaining soil or organic matter within the shell that may skew weight results; this was done with caution so as to maintain the integrity of the shell samples. It was also common for smaller shells to become

lodged within larger shells prior to separating species into individual bags. Upon identifying as many individual shells as possible, data was compiled for each level in a chart for visualization purposes; the weight of each identifiable species, all unidentifiable shells, and the total weight of all recovered material is documented in Table 2. During the process of this research, it was not uncommon for shell weights to fluctuate due to the continuous loss of soil from the shells' surfaces and interiors during handling; any minor weight discrepancies in future analysis may be attributed to this factor.

Species Descriptions

This section provides brief descriptions of the species most commonly found during the excavation of Test Unit E, including details such as habitat, size variations, distinctive characteristics and features, and coloration. The descriptions listed in this section are organized by the cumulative net weight of each species throughout the test unit beginning with the species yielding the highest net weight; this order correlates with Table 1. Language used to describe shell anatomy may be referenced in Figure 11.

Species

Busycon carica subsp. eliceans. A subspecies of *Busycon carica*, the Kierner's Whelk differs in that it is spine heavy with a clear swelling around the lower half of the shell's body that is absent in other whelks. This species is most frequently noted in Northeastern Florida up through North Carolina (Abbott 1968); habitats include shallow shore waters to depths of thirty feet (9.14 m).

Busycon carica. Found along the Atlantic coast of North America from Massachusetts to Florida, Knobbed Whelks are often prominent in shallow water. Shells are thick, pear-shaped, and range in length from four to nine inches (10.16 – 22.86 cm). Broad body whorls are accompanied by protruding spines and nodules circling the shoulder of the shell. Coloration is noted as a yellowish grey while the interior is an orange-red (Morris 1973).

Melongena corona. Florida Crown Conchs have multiple variations including single-spined, multi-spined, dwarf, high-spired, and spineless; in Florida, one species is often recognized as sufficient, but there are some subspecies that are accepted (Abbott 1968). Found in shallow waters along Florida, Alabama, and the Yucatan coastlines, the species ranges from two to five inches (5.08 – 12.7 cm) in length; coloration varies but shells are often dark brown to black with lighter spiral bands. (Morris 1973). Open spines on the shell's shoulder and the presence of multiple spines can also be identified.

Neverita duplicata. Commonly known as the Shark's Eye, this species is found along shallow waters of the Atlantic Coast of North America as well as in the Gulf of Mexico and down into the Caribbean. (Claus 2005). The species often averages three and a half inches in length (8.89 cm), and it is quite round with circular striae. The umbilical callus is dark brown in color while the rest of the shell is a grey or pale brown, and the apex of fresh shells has been documented to be a deep color, resembling an eye; this is the feature responsible for the species' common name.

Mercenaria campechiensis. Commonly found in moderately deep waters from Virginia to Florida, Southern Quahogs range from five to six inches (12.7 – 15.24 cm) when adulthood is reached. These shells are known for their thickness and solidity as well as the fine concentric

lines found on the shell surface. Generally, Southern quahogs exhibit a grey exterior and white interior while some variations may include violet borders. (Morris 1973). This species is often preferred to the less common *M. mercenaria* also found in Florida (Pettinati 2017).

Donax variabilis. Located along the Atlantic coast of Virginia to Florida and as far West as Texas (Morris 1973), Coquina shells (also known as Butterfly or Wedge Shells) reside in shallow waters and are usually about .86 cm in length. Coquina shell colors are highly variable ranging from reds and purples to whites and yellows; some may also exhibit deep red or brown rays, bands, or concentric patterns.

Anadara notabilis. Eared Ark shells are common in shallow waters—particularly those with mossy or grassy floors—from South Carolina to Brazil (Abbott 1968). On the shell's exterior, heavily detailed ribs can be observed ranging in quantity from twenty-five to twenty-seven. When fully developed, the species can reach a length of 7.62 cm and are often white in color.

Crassostrea virginica. Eastern or Common Oysters are a type of edible oyster found along the eastern coast of North America and along the Gulf of Mexico in moderately shallow water (Morris 1973). Ranging in height from six to ten inches (15.24 – 25.4 cm), Common Oysters are greyish in color and vary greatly in shape, but generally they are long, narrow, and exhibit moderate curvature and widening.

Busycon contrarium. Lightening Whelks are common in shallow water in Florida as well as the greater Atlantic Coast of North America up to New Jersey; it is sinistral (left-handed) and ranges in length from seven to ten inches (17.78 – 25.4 cm). The spire is generally flatter than

other *Busycon* specimens, and a pale brown coloration with purple-brown vertical streaks (Morris 1973).

Anadara lienosa floridana. Less formally known as the Cut-Ribbed Ark, this species thrives in shallow water from North Carolina to Texas; it exhibits the characteristic detailed hinge markings of *Anadara* shells and reach approximately 10.16 cm when fully grown. Concentric lines are also present on the shell's exterior (Abbott 1968).

Anadara transversa. Transverse arks are the smallest of the genus *Anadara,* measuring up to one inch (2.54 cm) in length; they can be found in shallow water with sandy and rocky bottoms (Abbott 1968) from Massachusetts to Texas and the West Indies. Coloration is usually white with multiple ribs.

Urosalpinx cinerea. Ranging from Novia Scotia to Florida (Abbott 1968), this common species is frequently found in the presence of oyster beds. Size of the Oyster Drill varies but measures no more than one inch (2.54 cm) in length. Shells can exhibit a variety of colors including white, brown, and yellow, but the unmistakable high spire and longitudinal striae are key indicators for identification (Vilas et al. 1945).

Aequipecten gibbus. Commonly known as the Calico Scallop, this species' shallow water habitat exists along the Atlantic coast of North Carolina to the West Indies. Ranging from one to two inches in length (1.27 – 5.08 cm), the shell often exhibits up to twenty radiating ribs and equal wings on either side. Coloration varies from red, purple, brown yellow, and orange, but the upper valve is known to be the most colorful in comparison to the lower valve (Morris 1973).

Jaspidella jaspidea. Residing in shallow waters along coastlines from North Carolina to the West Indies, Jasper Dwarf Olive shells exhibit an oval shape about 1.27 cm long (Morris

1973). A pointed spire, four or five whorls, and a glossy pale greyish-yellow exterior with narrow brown bands are not uncommon traits of this species.

Prunum apicinum. Common Marginella shells measure approximately 1.27 cm in length, and they are typically located in shallow waters anywhere from North Carolina to the Gulf of Mexico and the West Indies (Morris 1973). A large body whorl, glossy exterior, and orange-brown coloration are common characteristics; pleats can also be observed on the shell's inner lip.

Codakia orbiculata. Dwarf Tiger Lucines are common along the shallow coastline up to about 182 meters into deeper water habitats; these have been observed as far north as North Carolina and as far south as the Caribbean. It is a much smaller version of *Codakia orbicularis* (Tiger Lucine); however, *Codakia orbiculata* does not reach sizes much larger than .76 cm (Abbott 1968).

Species Distribution

Test Unit E

Level 1 (0 – 10 cmbd). Most of the shell recovered is partial; however, two distinct *Neverita duplicata* shells were identified as well as *Busycon* fragments, a *Crassostrea virginica* half, and a partial *Urosalpinx cinerea*. While the single *Crassostrea virginica* accounted for the species with the most net weight, *Neverita duplicata and Busycon* species accounted for the majority of identifiable shell in terms of quantity. See Figure 1.

Level 3 (20 – 30 cmbd). Both whole and identifiable partial shells were present in Level 3, and this level yielded a particularly interesting *Busycon carica* tool (Figure 7). Most of the

shell weight originated from *Busycon* fragments, but other gastropods including snails and bivalves were identified. See Figure 2.

Level 4 (30 – 40 cmbd). Whole and mostly whole shells allowed for the identification of many species with *Busycon carica subpsc. eliceans* making up the bulk of the shell in terms of weight. A few species identified are unique to this level and include *Jaspidella jaspidea*, *Prunum apicinum*, and *Busycon contrarium*. See Figure 3.

Level 5 (40 – 50 cmbd). Whole and mostly whole shell was collected, allowing for the identification of unique species to the level such as *Codakia orbiculata*. See Figure 4.

Level 6 (50 – 60 cmbd). Shells in this level were mostly partial although it was possible to identify *Neverita duplicata* and *Donax variabilis* specimens. See Figure 5.

Level 8 (70 – 80 cmbd). Shells recovered from this level were mostly partials, but enough of the shells remained to determine the presence of *Neverita duplicata* and *Melogena corona*. See Figure 6.

Species Trends

When analyzing the shell material from Test Unit E in its entirety, certain species are clearly more prominent than others. Table 1 represents the overall weight of each species found within the test unit in descending order; this allows one to identify preferred species by prehistoric peoples. However, the environment in terms of climate and habitat must be considered, for the most abundant species may have simply been the most widely available species that suited the needs of individuals utilizing the shells for both sustenance and tools. Furthermore, it is assumed that humans follow an optimal foraging technique in which people

aim to obtain food sources with the highest energy output while expending minimal energy input, so it possible that *Busycon* shells provided the most nutrition and served as an ideal option for tools due to their size and thickness.

According to a preliminary malacological report curated upon the conclusion of CCAMP Season One, positively identified *Busycon* shells and fragments were recovered during surface collection on the mound as well as during Phase I archaeological survey. Therefore, the fact that *Busycon* shells form the bulk of shell material from 8BR85 is consistent with previous season findings and prior excavations in the past (Pettinati 2017).

Modified Shell Analysis

Shells exhibiting human modification included *Busycon carica* and ark shells. Drill holes are evident on two unidentifiable shells; based on similar shape, size, and striae, they appear to be from the same species. However, an accurate speciation could not be completed because both shells are fragmentary (Figure 10).

Evidence of human modification on *Busycon carica* and *Busycon carica subsp. eliceans* was observed most frequently, for Knobbed Whelk and Kierner's Whelk shells seem to not only be a viable source of food, but they are effective once transformed into tools. Particularly evident in Whelks are large circular holes where sticks or ropes would be placed to create weights, pounders, hammers, or picks (Gilliland 1975). Because no rope or petrified wood was discovered in association with the shell artifacts, it cannot be determined exactly what purpose the shell tools served the prehistoric Ais people who inhabited the site (Figures 7and 8). However, the modified *Busycon carica* and *Busycon carica subsp. eliceans* shells are highly

reminiscent of those uncovered in Key Marco, FL, so a general idea regarding similar tool appearance and use in prehistoric populations is documented. Some of the modified shells do not have particularly intentional-looking holes (Figure 9); however, good portions of the shells' shoulders are missing, potentially indicating use as a blunt object rather than a specific tool.

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Figures

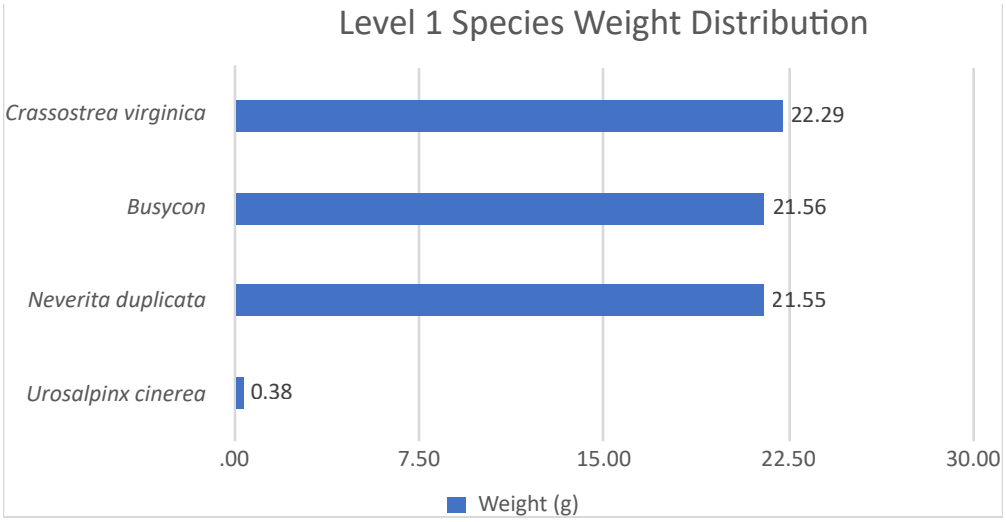

Figure 1. Level 1 Identifiable Species (0 – 10 cmbd).

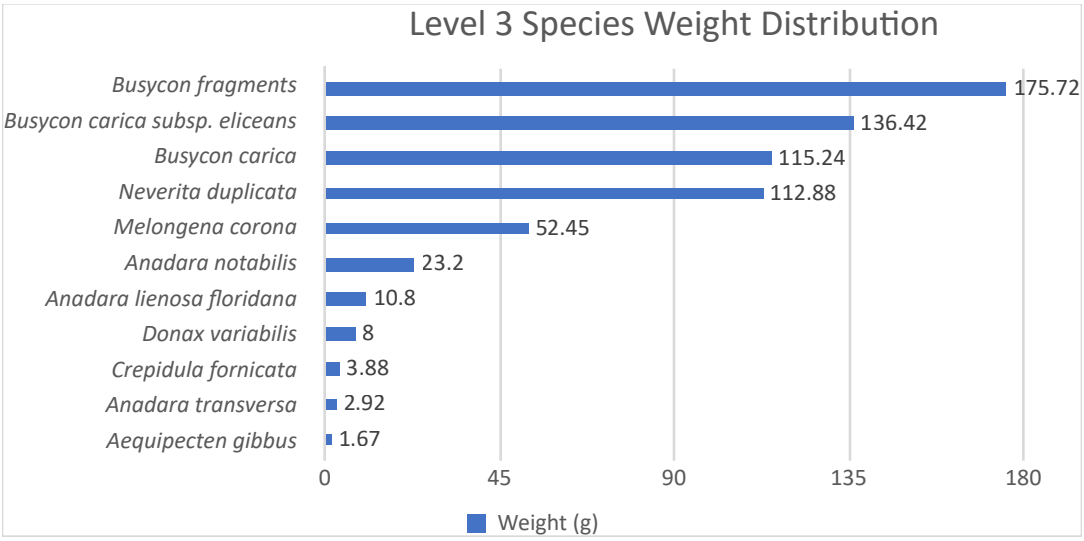

Figure 2. Level 3 Identifiable Species (20 – 30 cmbd); FS#91 and FS#97.

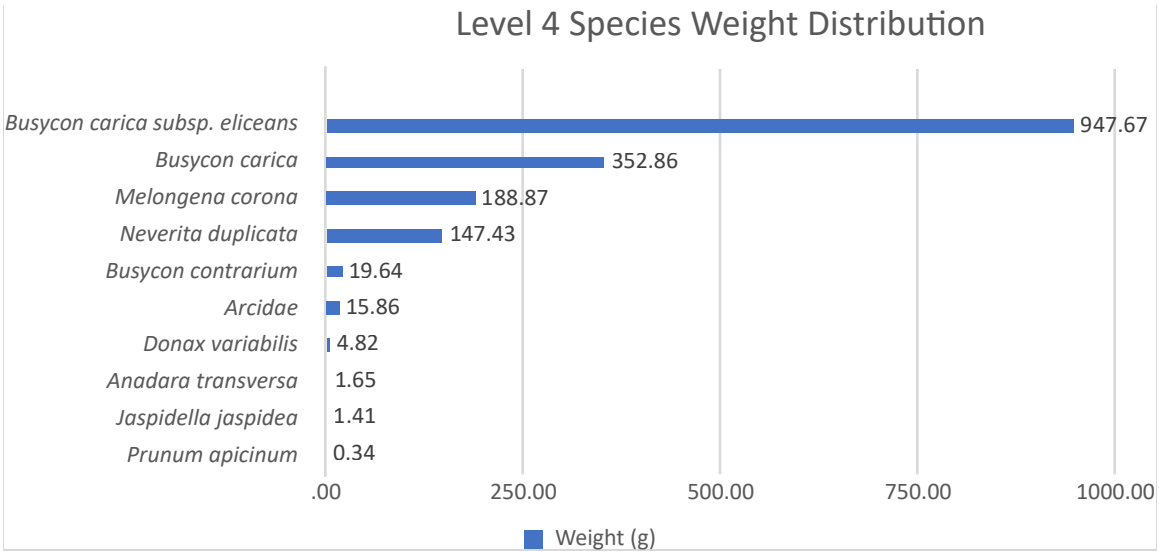

Figure 3. Level 4 Identifiable Species (30 – 40 cmbd); FS#98 and FS#103.

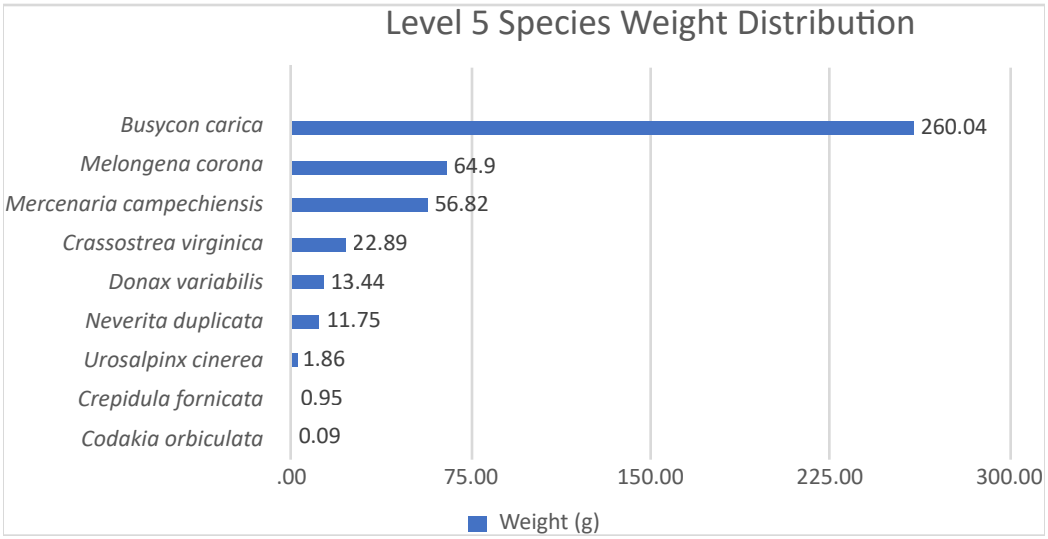

Figure 4. Level 5 Identifiable Species (40 – 50 cmbd); FS#104 and FS#118.

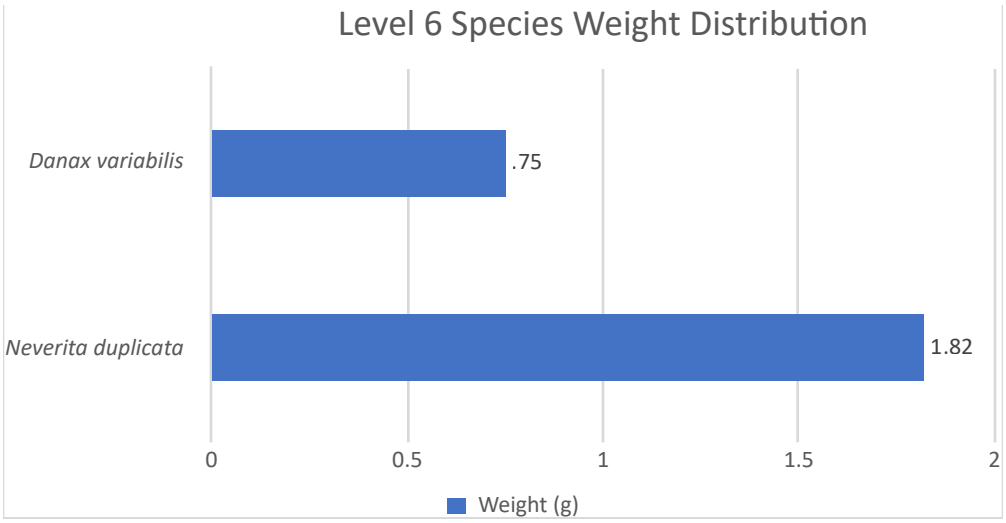

Figure 5. Level 6 Identifiable Species (50 – 60 cmbd).

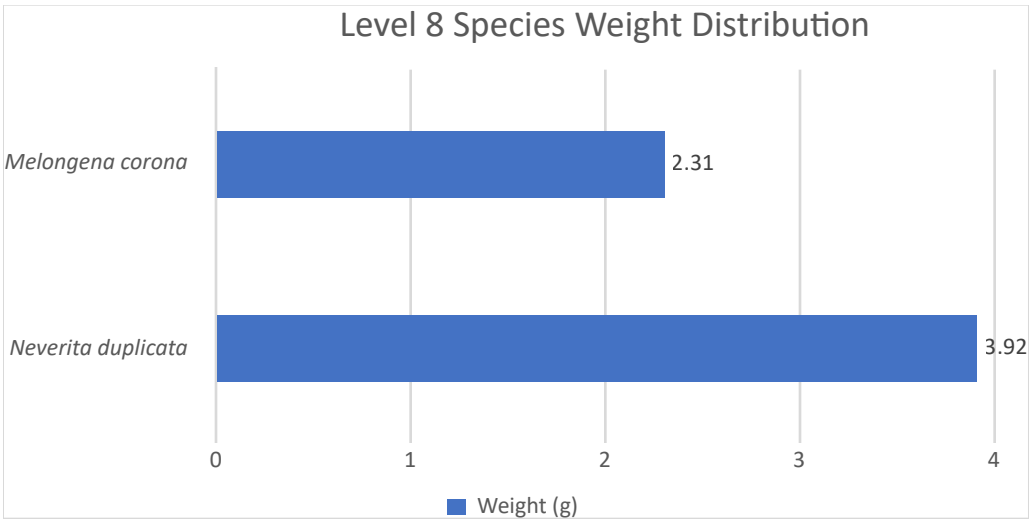

Figure 6. Level 8 Identifiable Species (70 – 80 cmbd).

Figures 7 (left) and 8 (right). *Busycon carica* tool found in Level 3 (20 – 30 cmbd).

Figure 9. *Busycon carica subsp. eliceans* tools.

Figure 10. Modified Unidentifiable Shell Tools.

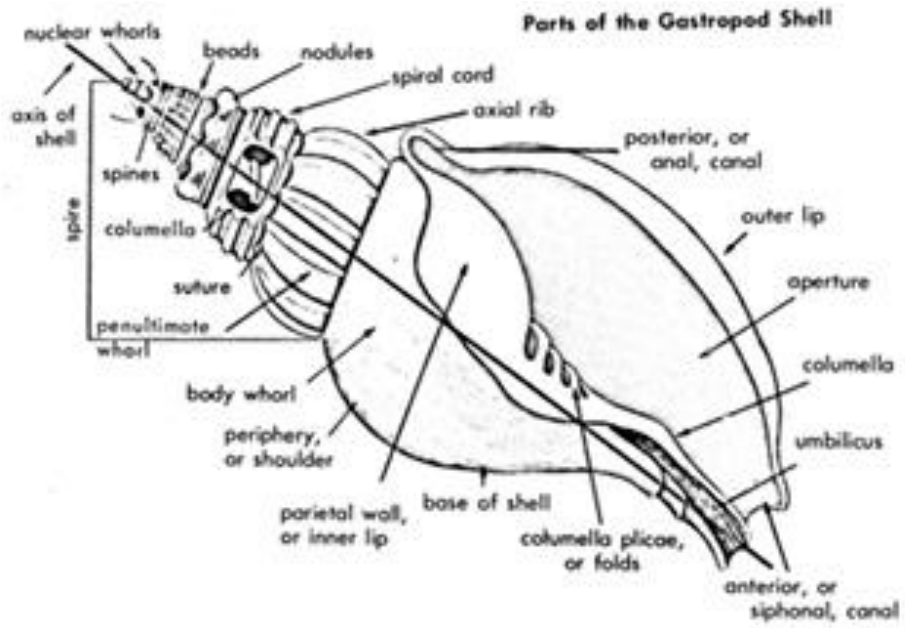

Figure 11. Anatomy of Gastropods (Abbott 1968).

Tables

Cumulative Shell Material		
Scientific Name	Common Name	Weight (g)
Busycon carica subsp. eliceans	Kierner's Whelk	1084.09
Busycon carica	Knobbed Whelk	728.14
Melongena corona	Florida Crown Conch	308.53
Neverita duplicata	Shark's Eye	299.35
Mercenaria campechiensis	Southern Quahog	56.82
Donax variabilis	Coquina	27.01
Anadara notabilis	Eared Ark	23.20
Crassostrea virginica	Eastern Oyster	45.18
Busycon	-	197.28
Busycon contrarium	Lightening Whelk	19.64
Arcidae	Ark Shells	15.86
Anadara flloridana	Cut-Ribbed Ark Clam	10.80
Crepidula fornicata	Common Slipper Shell	4.83
Anadara transversa	Transverse Ark Clam	4.57
Urosalpinx cinerea	Atlantic Oyster Drill	2.24
Aequipecten gibbus	Calico Scallop	1.67
Jaspidella jaspidea	Jasper Dwarf Olive	1.41
Prunum apicinum	Common Marginella	.34
Codakia orbiculata	Dwarf Tiger Lucine	.09
TOTAL		2831.05

Table 1. Cumulative shell weights of Test Unit E by species.

Shell Types in Test Unit E			
Unit Level	Weight		
	Unidentifiable (g)	Identifiable (g)	Total (g)
Level 1 (0 – 10 cmbd)	66.31	65.78	132.09
Level 3 (20 – 30 cmbd)	487.81	643.18	1130.99
Level 4 (30 – 40 cmbd)	391.32	1680.55	2071.87
Level 5 (40 – 50 cmbd)	393.20	432.74	825.94
Level 6 (50 – 60 cmbd)	29.28	2.57	31.85
Level 8 (70 – 80 cmbd)	7.94	6.23	14.17
TOTAL	1375.86	2831.05	4206.91

Table 2. Weights of shell types per level.