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Reconstructing Paleoenvironments of the Plio-Pleistocene Tamiami Formation of Florida with Benthic Foraminifera

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Reconstructing Paleoenvironments of the Plio-Pleistocene Tamiami Formation
of Florida with Benthic Foraminifera

by

Heather Bender

A thesis submitted in partial fulfillment
of the requirements for the degree of
Master of Science
School of Geosciences
with a concentration in Paleoecology
College of Arts and Sciences
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ABSTRACT

There is general agreement that a range of paleodepths and environments are represented in the individual shell units of the middle Pliocene to earliest Pleistocene Tamiami Formation of southwest Florida, but maximum depths remain poorly constrained. Here, benthic Foraminifera abundances are used as a paleoenvironmental proxy to compare the upper Tamiami from quarries in Sarasota, Florida to Recent modern coastal, bay, and reef habitats of Florida, the Grand Cayman Islands, and Puerto Rico, ranging in depth from 0 to 55 meters. I used: (1) ordination techniques, including detrended correspondence analysis (DCA) and cluster analysis, to compare upper Tamiami foraminiferal assemblages with potential modern analogs; (2) *Ammonia-Elphidium* (AEI) and FORAM (FI) indices to reconstruct past oxygen levels and environmental stress levels, respectively; and (3) diversity indices and rarefaction to investigate habitat-specific diversity change through time.

Results indicate that the upper Tamiami units represent several distinct environments. APAC quarry, Fruitville Member Unit 4 samples group in DCA and cluster analyses with modern shallow, tropical, mangrove-proximate lagoon samples from Puerto Rico; AEI values of both Unit 4 and these lagoonal samples are consistent with high nutrients. APAC quarry, Fruitville Member Unit 3 and Pinecrest Member units 5 and 7, however, group with tropical shallow, open coast environments up to 12 m in depth and have relatively low FORAM indices suggesting stress and AEI values comparable to modern mesotrophic, shelf habitats. SMR samples group with modern mangrove environments from White Water Bay at depths

approximately 0 to 0.3 m, with FORAM and AEI indices indicating low oxygen and possibly high nutrients. Species richness measured by individual rarefaction in the fossil units is highest in the lowest APAC units sampled and progressively declines in younger APAC units, while SMR beds have the lowest richness of all fossil samples. The lower portion of Unit 7 contains the highest richness of all fossil and modern units, while other fossil units have either lower or comparable richness, diversity, and evenness when compared to modern habitat analogs as identified in cluster and DCA analyses. Thus, there is no clear evidence for wide-scale decline in foraminiferal biodiversity from the Plio-Pleistocene to now. Significantly, the identification of modern habitat analogs for the upper Tamiami units make it possible to compare biodiversity trends in other fauna (e.g., mollusks) thought to have experienced significant extinction.

I. INTRODUCTION

In this study, I use data on benthic foraminiferal abundances and composition to reconstruct paleoenvironments of the upper Tamiami Fm. at APAC quarry, including Fruitville Member Unit 3, Pinecrest Member units 5 and 7a and 7b, as well as three units from SMR quarry Phase 8, to determine if maximum Tamiami Fm. depths can be constrained. Percentages of planktic foraminifera were also noted in the fossil units, because planktic-to-benthic ratios have been used as a proxy for depth or connection to open water (e.g. Berger et al., 1988; Van der Zwaan, 1990; Kopecka, 2012). With this, paleodepth could be examined for each unit. I also investigated paleoenvironmental characteristics of upper Pinecrest and lower Fruitville units by comparison to possible modern analogs using multivariate statistics, including detrended correspondence analysis (DCA) and cluster analysis. The database of potential modern analog habitats were based on new collections, supplemented with data in the published literature. I also examined paleoproductivity using oxygen and stress indices (AEI and FORAM Index) to test hypotheses about paleo-upwelling and freshwater influx. I examined diversity changes across units and between Tamiami Fm. foraminifera and modern analog assemblages by calculating and comparing rarefaction, Shannon diversity, and Shannon evenness to test whether environmental changes since the Pliocene have reduced or added to alpha-level diversity of foraminifera taxa. Diversity was expected to be higher within stratigraphically lower units and lowest in brackish units based on depth variation within the Tamiami Fm., but the effects of purported environmental changes, such as long-term cooling and nutrient decline, could have had offsetting

effects. Finally, I determined if the Tamiami Fm. units had any tropical characteristics by comparing them to modern samples from Puerto Rico, Grand Cayman, and the Florida Keys.

1.1 Background: Pliocene Florida

During the Pliocene, global temperatures were higher than today, volume of sea ice was lower, and sea level was higher (Zachos et al., 2001). The warmest part of the Pliocene, the Mid-Pliocene Warm Period (MPWM) at approximately 3 Ma, had temperatures as much as 3°C warmer than today (Dowsett, 2007). However, the long-term climate trend was one of cooling conditions and increasing fluctuations, from a warm Miocene into the much cooler Pleistocene as more permanent pole ice became established (Zachos et al., 2001). Changes in the volume of ice have been estimated based on oxygen isotope ratios, where higher amounts of $\delta^{16}\text{O}$ represent warmer periods than those with higher $\delta^{18}\text{O}$ (Zachos et al., 2001).

While these sea level fluctuations are widely noted, maximum sea level rise at this time is debated. Global sea ice models estimate a more conservative 12 m higher than today (Pollard, 2009), while some estimates based on possible modern analogs in the upper Tamiami Formation of Florida have suggested over 30 m (Allmon, 1992). The most commonly adopted value is ~25 m (Cronin and Dowsett, 1999; Dowsett, 2007).

Important phenomena regarding sea level estimates must be taken into consideration. For instance, estimates based on modern ecological analog ranges may not accurately depict paleodepth, because extinct taxa ranges are compared to modern morphological “equivalents” that may not have had comparable ecologies due to evolutionary change (Allmon, 1992). Finally, local sea level can change independently of global sea level trends. For example, PRISM, a climate modeling effort, estimated mid-Pliocene sea levels in Antarctica and Greenland at 7 and 14 m above present, respectively (Dowsett, 2007).

1.2 Stratigraphy and Geologic Setting

The Plio-Pleistocene upper Tamiami Formation represents various micro-paleoenvironments spanning over one million years (Allmon, 1992). The upper Tamiami Fm. exposed at APAC quarry represents one of richest known molluscan assemblages in the Cenozoic, with estimates of 500-800 gastropod species (Allmon, 1992). Exposures of the upper Tamiami Fm. were once accessible in two major quarry operations, the APAC and SMR Quality Aggregates, Inc., both in Sarasota, FL. While these pits are located very close to one another, each appears to represent different habitats and depths (Emslie, 1996).

The APAC quarry, now flooded, is located on the west side of Interstate 75 in Sarasota, Florida. Of the ten biostratigraphic units described for the upper Tamiami Formation (Petuch, 1982), the lowermost units Pinecrest Member units 10 - 5 at APAC quarry range from 3.5 - 2.5 Ma representing the warmest peak of the Pliocene to the Plio-Pleistocene boundary, while the Fruitville Member units 4 - 2 at APAC quarry range from 2.5 - 2.0 Ma (Figure 1) and come from a time in the Pleistocene when cooling and glacial patterns became amplified (Jones et al., 1991).

Deposition of these marine fossil assemblages over what is now land would have been possible only at times of interglacial warming and relatively higher sea level. The APAC and SMR near Sarasota, Florida are approximately 6 m above sea level today.

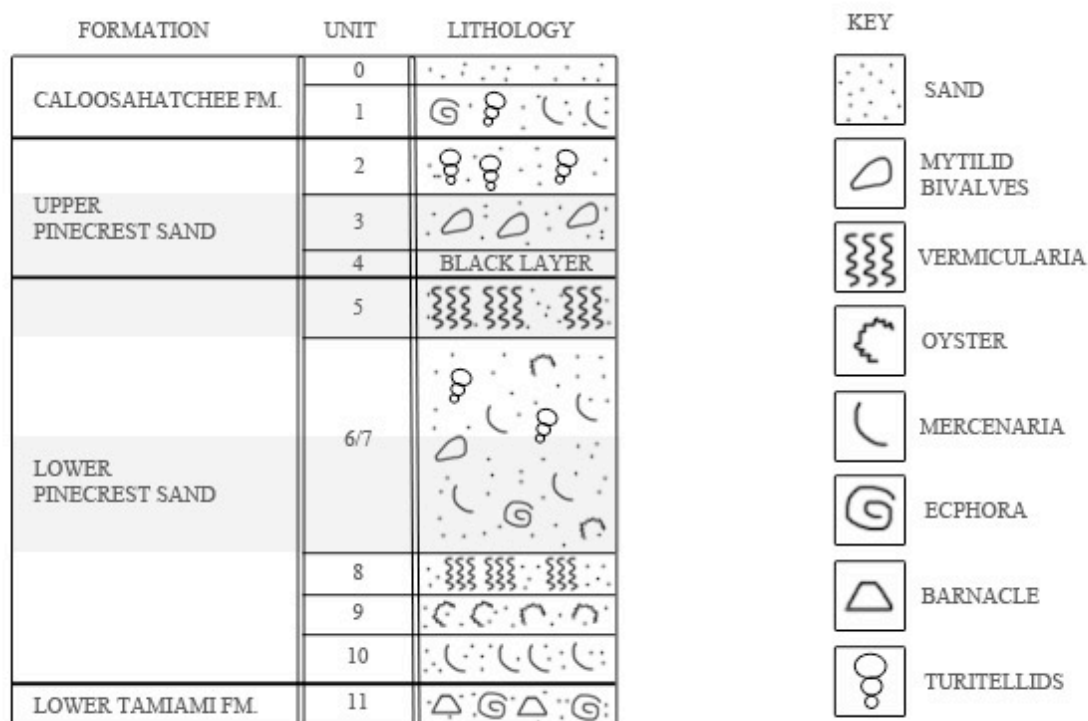


Figure 1: APAC Stratigraphy

Stratigraphic section for Plio-Pleistocene of South Florida with representative fossiliferous strata exposed in pits at the APAC Quarry in Sarasota, FL. Fossil sites in this study are depicted as gray. (Modified from Allmon, 1993. *Palaios* 8:183-201)

The SMR Quality Aggregates, Inc. quarry is situated on the east side of Interstate 75 in Sarasota, Florida and is divided into “phases,” most of which are now water filled. Three notable phases from this quarry are phase 10, reviewed by Portell (2012), containing *in situ* marine remains, Phase 8, a shallow-water environment, and Phase 6 Richardson Road shell pit, which contained exposures of the “bird layer”, an avian death assemblage attributed to red tide events and correlated approximately with Unit 4 of the upper Tamiami Pinecrest units at APAC (Emslie, 1996). These units are not the same as those defined by Petuch (1982). Figure 2 contains a stratigraphic column for SMR Phase 8.

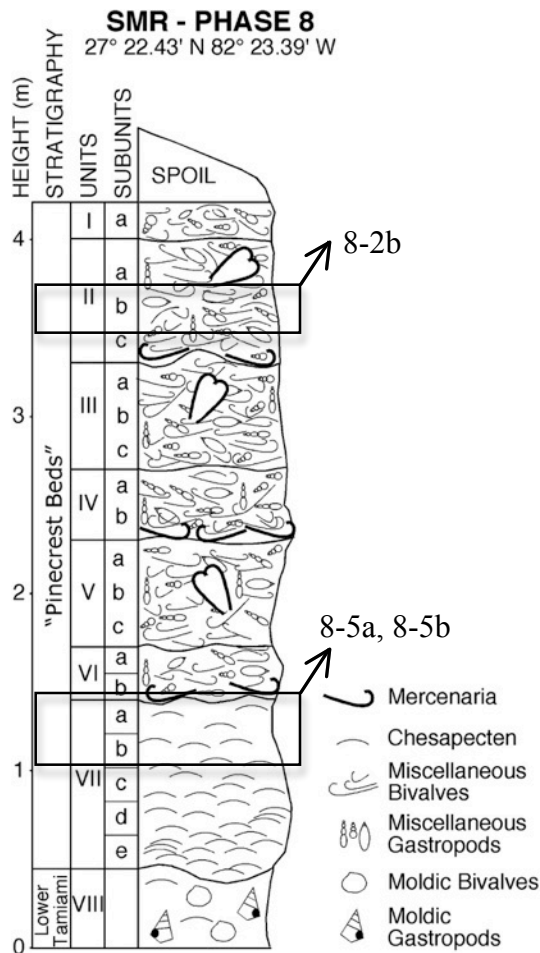


Figure 2: SMR Stratigraphy

Stratigraphic section for Plio-Pleistocene of South Florida with representative fossiliferous strata exposed in pits at the SMR Quarry in Sarasota, FL (Harries, pers. comm., 2015)

The paleotemperature and nutrient conditions of the Tamiami Fm. are also under debate. While some studies suggest a warm, tropical environment based on the presence of Caribbean-associated molluscan fauna (e.g., Stanley, 1986), ostracode paleoecologic studies indicate no tropical signatures for the upper Tamiami or overlying Caloosahatchee Fm. (Cronin & Dowsett, 1996). Final closure of the Central American Isthmus around this time may have redirected warm tropical waters northward towards Florida; however, Florida would have been on the border of this sub-tropical to tropical transition and may have never had a fully tropical assemblage (Cronin & Dowsett, 1996). This has important implications for understanding

diversity change, since the tropics tend to have higher diversity. Closure of the Central American Isthmus of Panama began during the Miocene, but there were at least two full closures noted at 3 Ma and 2 Ma, with final closure by 1.5 Ma (Cronin & Dowsett, 1996). As the Isthmus closed, warm saline waters were redirected northward into the Gulf of Mexico. Studies note “dramatic” fluctuations in western Atlantic marine fauna as the Atlantic and Pacific waters ceased to mix (Allmon et al., 1996). Molluscan diversity plummeted (Petuch, 1995), representing a regional extinction.

Several recent studies have suggested that high nutrients in coastal marine habitats of the Pliocene of Florida were instead generated primarily by freshwater input from a combination of surface flow and submarine groundwater discharge. In particular, $\delta^{18}\text{O}$ stable isotope and trace element analysis of gastropod shell supports freshwater input with a nearby Everglades-like environment (Tao and Grossman, 2010).

All of this leaves questions regarding the maximum depth represented in these units, as well as the nutrients, water conditions, occurrence of upwelling, extent of tropical conditions, and diversity. Whether modern analog environments can be determined is also unknown.

1.3 Foraminifera as Environmental Proxies

Foraminifera are one of the most widely used paleoecological indicators (e.g., Culver, 1990; Ishman, 1997; Hallock, et al., 2003; Carnahan, et al., 2009). They are small protists with shells referred to as “tests.” They can be benthic or planktic and have a wide variety of morphological types. The benthic forms are typically distinguished by test composition (i.e. hyaline, porcellaneous, or agglutinated) or chamber style (i.e. tubular, uniserial, biserial, etc., and aperture positioning). They also display a range of trophic behaviors from those that house algal symbionts to heterotrophic and opportunistic types (Sen Gupta, 2002).

Benthic foraminifera are particularly useful in both modern and paleoenvironmental studies because they have relatively well-understood ecological niches (Murray, 2006; Carnahan et al., 2009), are commonly well-preserved, widely distributed, very diverse, and are small, abundant, and generally easily acquired (Carnahan et al., 2009). In addition, they are small and abundant in surface sediments of coastal habitats and the shelf, which translates into low environmental impact of collection for monitoring studies of modern habitats. Many of these modern studies aim to understand ecological changes as the result of anthropogenic influence, namely nutrient input and associated eutrophication (e.g., Carnahan et al., 2009). In addition to modern environmental assessments, they have been extremely useful for reconstructing paleodepths in Cenozoic and Mesozoic environments (Akimoto, 1994; Kopecka, 2014). Many studies have reconstructed paleonutrient flux using Foraminifera (e.g., Jónsdóttir, 2003; Algret et al., 2008; Reymond, 2014). A study in the Late Jurassic paleonutrients revealed that high nutrients in middle shelf environments correlated with sediment influx and deep infaunal taxa (Reolid, 2008). This study also showed correlations between higher foraminiferal diversity with oligotrophic conditions (Reolid, 2008).

The presence or absence of specific taxa can help constrain environment types based on their various tolerances, such as the hypoxia tolerance of *Ammonia* (Sen Gupta, 1996) or the minimum depth tolerances of certain benthic and planktic foraminifera (Murray, 2006). Likewise, assemblages consisting of relative abundances of various taxa can indicate habitat of origin, such as those found in a study by Rose and Lidz (1989). Various models have been proposed to analyze habitats associated with assemblages, such as the use of ternary diagrams to differentiate calcareous hyaline, calcareous porcellaneous, and agglutinated foraminifera abundances (Murray, 1991; Poag, 2015). Changes in foraminiferal assemblages have been

documented in studies of open versus semi-closed bays (Annin, 2001) and used to infer paleo-storm events (Pilarczyk, 2015). Studies like these show how foraminifera can be used to infer depth and habitats, as well as environmental shifts.

Genus-level analysis can be used to infer ecological patterns, as depicted by Bett (2014) in a study that compared the effects of using species versus genera. In the study, they examined northeast Atlantic deep-sea macro-benthos and showed support for large ecological patterns being successfully inferred with a genus level analysis. Genus level diversity and ecology correlated with species-level diversity and ecology (Bett, 2014). Moreover, species within foraminiferal genera tend to share similar ecological behaviors (Murray, 1991); therefore, most foraminifera studies are commonly performed at the genus level (e.g., Carnahan et al., 2009; Hallock, 2014).

II. METHODS

2.1. Study Area & Data Collection

A data matrix of foraminiferal abundances was assembled from eight upper Tamiami Formation fossil samples and 219 modern sample sites from Florida and the northern Caribbean (Table 1), which together included 110 foraminifera genera (Appendix A). Modern samples included new collections, supplemented with data reported in the literature to increase the range of habitats represented. Modern samples (Appendix D) from the west Florida shelf (Fig. 3) were collected in spring 2008 along an onshore-offshore transect with 12 stations ranging in depth from 4 to 55 m at latitudes ranging from 25 to 27 °N. Sediment samples of 0.25 m² were collected with a Shipek sediment grab to ~4 cm depth. Fossil samples were acquired from bulk sediment samples collected directly from exposures in quarries or from the interior cavities of fossil gastropod shells collected from the Plio-Pleistocene exposures in APAC and SMR Quarries near Sarasota, Florida. These include: APAC Unit 7 (upper 7a and lower 7b), Unit 4, Unit 5, SMR 8-5a, SMR 8-5b, SMR 8-2b. Figures 1 and 2 contains geographic and stratigraphic detail for these localities and appendix F contains a map of the unit locations in APAC and SMR quarries.

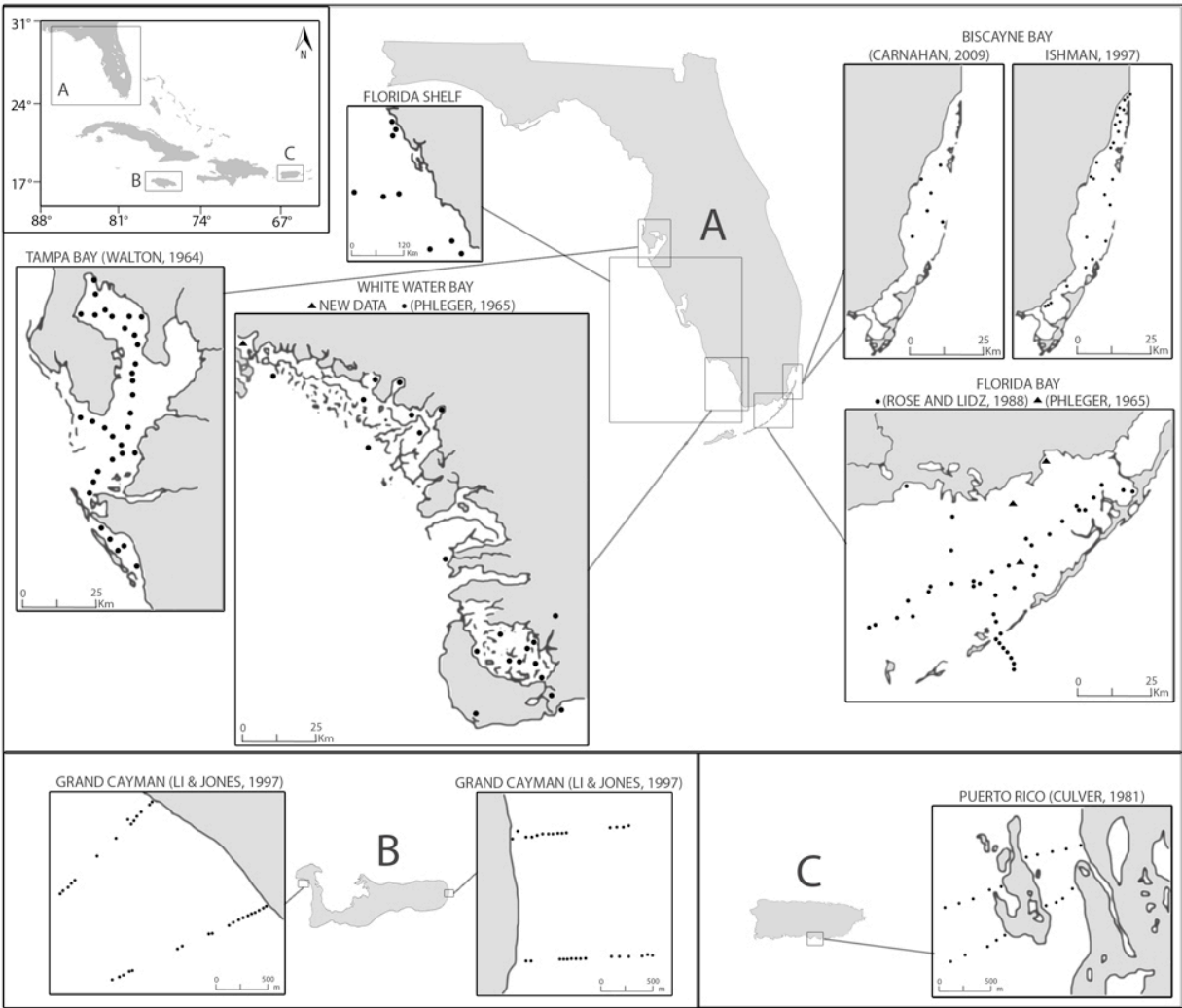


Figure 3: Study areas of modern sample sites

Map depicts total study area for modern sample sites, including region (A) Florida, (B) Grand Cayman Island, and (C) Puerto Rico.

Table 1: Modern Florida and Caribbean biotopes represented by foraminiferal assemblages
 Biotopes and station details for all modern sample sites in this study.

SAMPLING AREA (abbreviations)	BIOTOPES REPRESENTED	SOURCE (NUMBER OF STATIONS)	DEPTH RANGE (m)	NUMBER OF STATIONS
W. Florida Shelf	Shallow to Middle Shelf	this study	4.3 – 55.0	9
Florida Bay (FB)	Bay (carbonate, protected) Reef (Alligator Reef) Sounds	Lidz and Rose (1988)	0.0 – 20.0	41
		Phleger (1965)		3
Biscayne Bay (BB)	Bay	Ishman (1997)	0.0 – 2.6	22
Biscayne Bay (BB)	Bay	Carahan et al. (2009)	0.0 – 2.6	5
White Water Bay (WWB)	Mangrove Marsh	Phleger (1965)	0.0 – 0.3	22
		this study		1
Tampa and Sarasota Bay (TB)	Estuary	Walton (1964)	0.0 – 10.0	33
Grand Cayman (GC)	Reef	Li and Jones (1997)	0.0 – 25.0	63
Puerto Rico (PR)	Shoreward, Shallow Shelf Mangrove, Lagoon	Culver (1990)	0.0 – 12.0	19

2.2. Sample Processing

In the lab, 50 g samples were wet-sieved through 1 mm and 63 μm sieves and dried at 50°C overnight. Three-hundred foraminifera were picked from each sample following standard practice (Hallock et al., 2003) and stored on labeled micro-paleontological slides. Individual foraminifera were identified to genus level following the taxonomy of Loeblich and Tappan (1987). Examples of fossil samples are presented in Appendix C.

Genus-level analysis can be used to infer ecological patterns, as depicted by Bett (2014) in a study that compared the effects of using species versus genera. In the study, they examined northeast Atlantic deep-sea macro-benthos and showed their large ecological patterns can be successfully inferred using genus level analysis. Genus level diversity and ecology correlated

with species-level diversity and ecology (Bett, 2014). Moreover, species within foraminiferal genera tend to share similar ecological behaviors (Murray, 1991); therefore, most foraminifera studies are commonly performed at the genus level (e.g., Carnahan et al., 2009; Hallock, 2012).

2.3 Quantitative Analysis

For quantitative analysis, raw abundances were normalized to relative abundance and arcsine square-root transformed, a method of data treatment consistent with recommendations for percentage data as well as data sets that contain large numbers of zeros or low counts. It has the effect of moderating the influence of dominant taxa (Clarke and Warwick, 2001; McCune and Grace, 2002) so that similarities are based on shared taxa in assemblages and not just few dominant taxa. Additionally, to reduce potential taphonomic bias or influence of chance occurrences of taxa, rare genera, which are defined here as those making up less than 5% of a sample, were removed, consistent with recommended procedures (Clarke and Warwick, 2001; Parker and Arnold, 2000). These data changes minimize the possibility inaccurate representation of the actual living assemblage through the introduction of taxa spatially from adjacent habitats or temporally through time-averaging (Tomasovych and Kidwell, 2009).

2.3.1 Ecological Indices: Diversity Analysis

For each sample site, the following ecological indices were calculated with the Paleontological Statistics Program (PAST v2.17: Hammer et al., 2004): taxonomic richness (individual-based rarefaction), Shannon's H diversity analysis, and evenness (E_H). The Shannon index is formulated after Clark and Warwick (2001) as:

$$\text{Shannon Index (H)} = - \sum_{i=1}^s p_i \ln p_i \quad \text{Eq. 2.1}$$

where $p =$ proportion (n/N) with n equivalent to the number of individuals of a particular species found and N representing the total number of individuals found, and $s =$ number of species.

Evenness is a measure of the equitability of taxon abundances in the assemblage. It yields a value from 0 to 1, where 1 is most equitable. It is calculated from Clark and Warwick (2001) as:

$$E_H = H/H_{\max} = H/\ln S \quad \text{Eq. 2.2}$$

Rarefaction was used to compare taxonomic diversity (richness) in samples of similar habitats. It compares the number of species acquired relative to the number of individuals in a sample and standardizes the analyses at a chosen cutoff value of individuals (Hammer, 2014). Only samples with at least 250 individuals were used in this analysis. Sampling units for each representative habitat were combined. Richness was analyzed for the following modern habitats: (1) shallow Florida Shelf, (2) mid Florida Shelf, (3) inner Puerto Rican Shelf, (5) outer Puerto Rican Shelf, (7) White Water Bay - Marco Island, and all eight fossil samples.

2.3.2 Ecological Indices: *Ammonia Elphidium Index (AEI)*

The *Ammonia-Elphidium* Index (AEI), developed by Sen Gupta et al. (1996), indicates the prevalence of hypoxia in the paleoenvironment based on the fact that *Ammonia* spp. have a greater tolerance for low oxygen than *Elphidium* spp. Hence, a simple ratio can be used to compare relative oxygenation of sediments between collection sites, where higher AEI values indicate high sedimentary organic content, low water transparency, and hypoxic conditions; lower values indicate the opposite. The index works best for waters less than 30 m and has been applied to fossil samples (e.g., Rabalais et al., 2007). The results are interpretable on a scale of 0 to 100, by using the formula, where N_A represents the number of *Ammonia* and N_E represents the number of *Elphidium*:

$$AEI = [N_A/(N_A+N_E)] * 100 \quad \text{Eq. 2.3}$$

2.3.3 Ecological Indices: FORAM Index

The FORAM Index, as defined by Hallock et al. (2003), indicates conditions favoring carbonate production by placing foraminifera genera into one of three functional groups, including symbiont-bearing (s), heterotrophic (h), and opportunistic (o) or “stress tolerant (Yanko et al., 1999) foraminifers. Indices are calculated with the following formula:

$$\mathbf{FI = (10 \times P_s) + (P_o) + (2 \times P_h)} \quad \text{Eq. 2.4}$$

where $P_s = N_s/T$; $P_o = N_o/T$; $P_h = N_h/T$; and T = total number of specimens counted; N_s = number of specimens of symbiont-bearing taxa; N_o = number of specimens of opportunistic taxa; N_h = number of specimens of small, heterotrophic taxa.

While it was originally developed for analyzing reef growth conditions, it can be used in a broader sense to assess water conditions, such as turbidity, nutrient flux, organic carbon supply, and euryhaline conditions, which can be stressful to certain open shelf foraminifera. It should provide an additional test of conclusions based on AEI, which is derived differently. The interpretation of the FORAM index (FI), in accordance with Hallock et al. (2003) and Hallock, (2012), ranges on a scale from 1-10, where:

FI > 4

- indicates environment conducive to reef growth.
- indicates consistently nutrient-poor environments.
- indicates the environment consistently supports calcifying mixotrophs.
- represent assemblages made of 25% or more of symbiont-bearing taxa.

FI between 3 and 5

- indicates environmental change.

2 < FI < 4

- indicates environment marginal for reef growth and unsuitable for recovery.

FI < 2

- indicates stressed conditions unsuitable for reef growth.
- represents assemblages dominated by heterotrophs.
- represents environments stressful for open-marine shallow-shelf taxa.
- suggests high oxygen demand, euryhaline, or other stress conditions.

Statistical analysis was performed in PAST v2.17 (Hammer et al., 2004) and index values were tested for normality using a Shapiro-Wilk W test, where a p(normal) value below 0.05 results in rejection of the null hypothesis that assumes a normal distribution.

Finally, percentages of deep-water and planktic taxa were documented because these can be indicative of habitats at greater depths. For instance, *Cibicides* is primarily found at depths > 30 m (Bandy, 1956) and planktic foraminifera, such as *Globigerina*, are most frequently found > 30 m in the Gulf of Mexico (Bandy, 1956).

2.3.4 Cluster Analysis and Detrended Correspondence Analysis (DCA)

Multivariate analyses were performed on the data matrix using PAST v2.17. Q-mode Cluster Analysis (Euclidian-based distance) was used to group samples after transformation of abundance data as described above. Euclidian distance can sufficiently explain ecological distances, which represent dissimilarities between sample sites, when used on transformed abundance data (Parker and Arnold, 2000). Both Euclidean and Bray-Curtis were examined with no difference in the results.

The DCA is a widely used, multivariate statistical analysis that recognizes potential gradients in taxonomic composition of samples and is used to identify environmental factors affecting taxonomic abundances (Holland, 2001, 2006). Benefits of DCA over CA include the

elimination of an arch effect and preservation of ecological distances. The DCA is sometimes preferred over other approaches, such as NMDS, as it can handle complex data matrices with high diversity (Gauch, 1982) and is more commonly used in studies incorporating fossil foraminifera (e.g., Collins, 1999).

III. RESULTS

3.1 Fossil Sample Ecological Indices and Diversity Analysis

Of the eight fossil sites, all contained *Elphidium*, and all but Unit 7b contained *Ammonia*. *Elphidium* was the dominant taxon for most units. Unit 7a and 7b contained significant proportions of *Quinqueloculina*. APAC units contained relatively large numbers of rare taxa as compared to SMR. A miscellaneous category was used to classify foraminifers that could not be identified to genus level. No more than 10 percent of any assemblage consisted of these miscellaneous types. Table 2 summarizes the results of dominant and rare taxa, FORAM indices, AEI values, diversity analysis, and other notable taxa found in each unit and Table 3 depicts these data for modern units. Index values were not normally distributed.

Relative to all fossil samples, Unit 7b has the second highest FORAM index, the lowest AEI, the highest diversity (H'), the second highest Shannon Evenness ($E^{H/S}$) index and the highest richness estimated by rarefaction. SMR units have the lowest FORAM index values, highest AEI values, lowest diversity (H') and evenness ($E^{H/S}$) and the lowest richness on rarefaction.

FORAM indices fall below 3 (1.01 - 2.32) for all fossils units, with upper APAC units ranging from 2.01 to 2.32, lower APAC units ranging from 1.57 to 1.72, and SMR units ranging from 1.01 to 1.23. AEI values range from 0 – 25 for all APAC units except Unit 4 (AEI = 60). SMR units, by contrast, have much higher AEI values (80 – 89) than any APAC unit.

Diversity (H') ranges from 2.20 to 2.85 for APAC units with the highest diversity in Unit 7b, while diversity ranges from 0.51 to 0.86 for SMR units with the highest diversity in Unit 8-2b. Evenness ($E^{H/S}$) is highest for APAC units 7a and 7b and lowest for SMR units. SMR 8-2b has slightly higher evenness than the other two SMR units. APAC units have higher richness as estimated by rarefaction than SMR units (Fig. 4). APAC Unit 7b has higher richness than the other APAC units, and SMR Unit 8-2b has slightly higher richness than the other SMR 8 units (Fig 4).

Table 2: Fossil Data Analysis

Statistical data for fossil samples, where “S” are symbiont-bearing foraminifers, “O” are opportunistic foraminifers, and “H” are heterotrophic foraminifers. FI = FORAM index. AEI = *Ammonia-Elphidium* Index. $E^{H/S}$ measures evenness and overall diversity is represented by Shannon Diversity (H').

Site	Dominant taxa ($\geq 50\%$)	# Rare taxa ($< 5\%$)	FI S%, O%, H%	AEI	H'	$E^{H/S}$	Notable taxa or % unidentified
Unit 3	<i>Elphidium</i> , <i>Planulina</i> , <i>Ammonia</i>	18	1.71 2%, 47%, 50%	23	2.31	0.48	10% miscellaneous
Unit 4	<i>Ammonia</i> , <i>Elphidium</i>	20	1.57 2%, 61%, 36%	60	2.02	0.47	4% miscellaneous
Unit 5	<i>Planulina</i> , <i>Elphidium</i>	17	2.01 5%, 42%, 53%	25	2.21	0.57	10% miscellaneous
Unit 7-a (upper)	<i>Elphidium</i> , <i>Planulina</i> , <i>Quinqueloculina</i>	11	2.32 8%, 30%, 62%	25	2.30	0.66	2% miscellaneous
Unit 7-b (lower)	<i>Elphidium</i> , <i>Quinqueloculina</i> , <i>Rosalina</i> , <i>Cibicides</i> , <i>Amphistegina</i>	28	2.16 6%, 32%, 62%	0	2.85	0.62	10% <i>Cibicides</i> 2% <i>Globigerina</i> 10% miscellaneous
SMR 8-5a	<i>Ammonia</i>	5	1.01 0%, 99%, 1%	89	0.51	0.42	
8-5b	<i>Ammonia</i>	4	1.01 0%, 99%, 1%	86	0.54	0.43	
8-2b	<i>Ammonia</i>	2	1.23 0%, 97%, 2%	80	0.86	0.47	

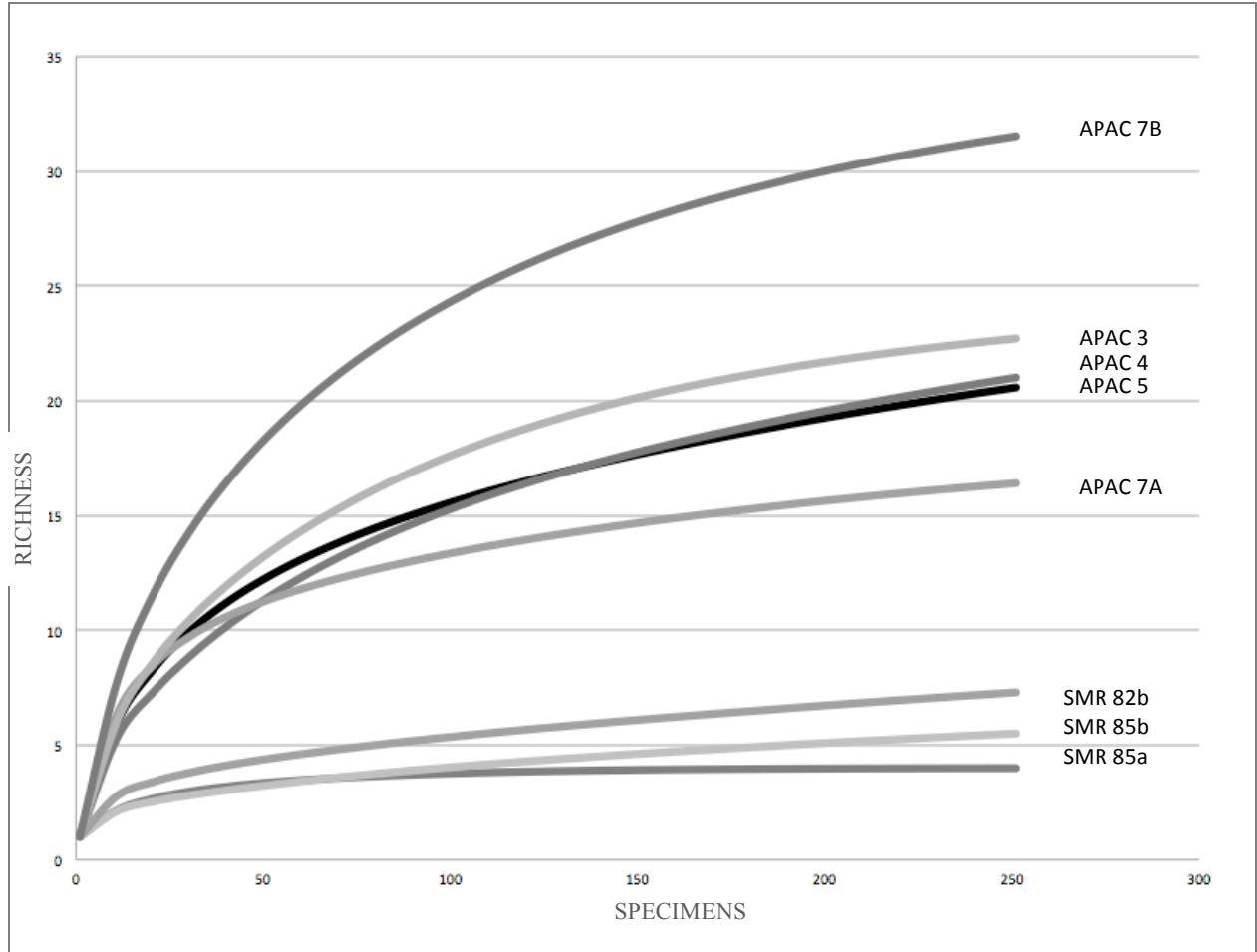


Figure 4: Richness with Rarefaction for Fossil Samples

The highest richness values are for samples in APAC fossil sample 7b. APAC units are relatively higher in richness than SMR units. The standardized cutoff is 250 to match the smallest recent sample.

3.2 Modern Sample Ecological Indices and Diversity Analysis

Table 3 depicts FORAM, AEI, and diversity indices for comparison with fossil units.

Reef and shelf habitats yield the highest FI and lowest AEI, while lagoon and mangrove samples have the lowest FI values and highest AEI values.

Table 3: Modern Data Summary

Statistics (median and range) for modern sample groups: “S” are symbiont-bearing foraminifers, “O” are opportunistic foraminifers, and “H” are heterotrophic foraminifers. FI = FORAM index. AEI = *Ammonia-Elphidium* Index. E H/S measures evenness and overall diversity is represented by Shannon Diversity (H’). Indices are reported as median (max, min) based on non-normally distributed data ($p < .005$).

Modern Site (depth, m)	FI median (min.-max.) S%, O%, H%	AEI median (min.-max.)	H’ median (min.-max.)	E ^{H/S} median (min.-max.)
Mid Shelf 24.32– 54.86	3.37 (3.18 – 4.83) 24%, 12%, 64%	0 (0 - 5)	2.13 (1.76 – 2.69)	0.53 (0.48 - 0.55)
Shallow Shelf 4.27 – 13.42	4.66 (1.66 – 5.18) 25%, 22%, 54%	22 (0 – 40)	1.38 (1.05 – 1.68)	0.56 (0.38 – 0.59)
FL Bay sounds 0-3.2	2.41 (1.42 – 3.97) 12% 45% 47%	82 (83 – 51)	1.69 (1.45 – 1.94)	0.68 (0.61 - 0.77)
N. Biscayne Bay High nutrient bay 0-3.2	1.18 (1.07 – 3.29) 0%, 81%, 19%	70 (55 - 90)	1.32 (0.89 – 2.22)	0.52 (0.39 – 0.70)
S. and Central Biscayne Bay 0-3.2	2.69 (1.34 – 6.28) 13%, 23%, 60%	55 (0 – 100)	1.63 (0.90 – 2.44)	0.51 (0.38 – 0.73)
Florida Bay Carbonate Bay 3-4	2.70 (1.20 - 5.53) 17%, 32%, 50%	42 (0 - 85)	1.76 (1.16 – 1.99)	0.68 (0.46 – 0.92)
Florida Bay Alligator Reef 0-20	6.73 (4.37 – 7.56) 54%, 3%, 42%	0 (0 – 0)	1.85 (1.63 – 2.26)	0.72 (0.57 – 0.80)
Puerto Rico Outer Shallow Shelf off of Mangroves 0-12	1.80 (1.45 – 2.05) 1%, 29%, 70%	25 (4 – 56)	2.60 (2.45 – 2.87)	0.46 (0.36 – 0.53)
Puerto Rico Inner Lagoons/ Mangrove 0-6	1.36 (1.19 – 1.36) 0%, 69%, 31%	60 (49 – 71)	1.99 (1.77 – 2.45)	0.41 (0.29 – 0.51)
White Water Bay Mangroves 0-.3	1.06 (1.00 – 1.37) 0%, 74%, 26%	68 (14 – 98)	1.18 (0.65 – 2.14)	0.61 (0.28 - 0.94)

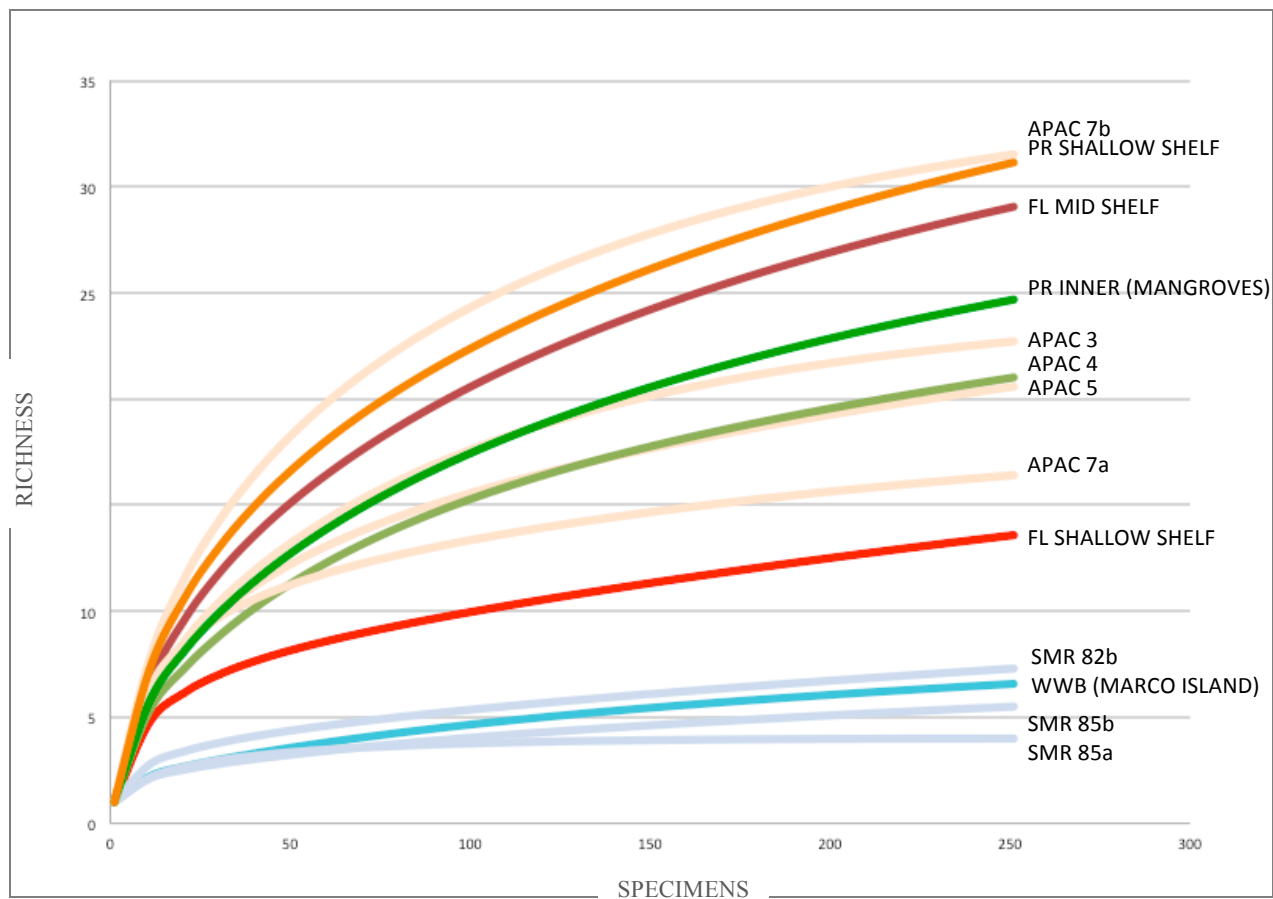


Figure 5: Richness with Rarefaction for Fossil and Modern Samples

This graph compares rarefied richness for all fossil samples and habitat analogs identified in cluster and DCA analyses. Rarefaction curves were cut off at N=250, which was the smallest sample size for the modern analog samples.

3.3 Cluster Analysis

Cluster analysis (Fig. 6) differentiates four major clusters. Individual samples were examined in the cluster diagram to determine that each cluster is distinguishable by habitat type (near shore lagoons and mangroves, estuaries, open shelf or bays, and reefs). Units 3, 5, 7a and 7b samples clustered in an overall group with Puerto Rican shallow shelf samples (0.6 – 12 m depth) and Florida shelf samples (8 – 33 m depth). Unit 4 samples clustered with Puerto Rico mangrove lagoon samples, ranging from depths of 0 – 6 m. SMR 8 samples clustered with White

Water Bay samples, which are also mangrove habitats with depths that range from 0 – 1 m depths.

3.4 Detrended Correspondence Analysis (DCA)

The DCA yields general groupings (Fig. 7) along DCA axis 1 between fossil samples and bay to shelf modern samples, with pronounced dissimilarities between fossil samples and Grand Cayman reef or Tampa Bay estuary samples. There is a strong correlation between axis 1 scores and the FORAM index (FI), but not between axis 1 scores and depth or AEI. Correlations between environmental parameters and axes 2 and 3 were not statistically significant (see Table 4).

Table 4: DCA Axis Correlation Analysis

DCA axis scores were analyzed with ordinary least squares linear regression to explain variances driving the gradients. Axis 1 describes 75% of variance and is significantly correlated with the FORAM index, with an $r^2 = .81$ and $p < .0001$.

DCA Axis	FI	AEI	Depth	Latitude	Eigenvalues
Axis 1	0.81	0.15	0.02	0.53	.75
Axis 2	0.04	0.21	0	0.04	.40
Axis 3	0.02	0.16	0.02	0.13	.32

Appendix E depicts the cluster and DCA results with outlier samples from Tampa Bay and Grand Cayman Island removed.

Figure 6: Cluster Analysis

Q-mode Cluster analysis was used to group sample sites based on Euclidian Distance. Four major cluster units were generated and include (1) Grand Cayman samples, (2) shelf and bay samples, including Florida Bay, Florida shelf, and Puerto Rican shelf samples (3) estuary samples primarily from Tampa Bay area, and (4) shallow brackish mangrove samples, primarily with White Water Bay, Puerto Rican inshore and North Biscayne Bay samples.

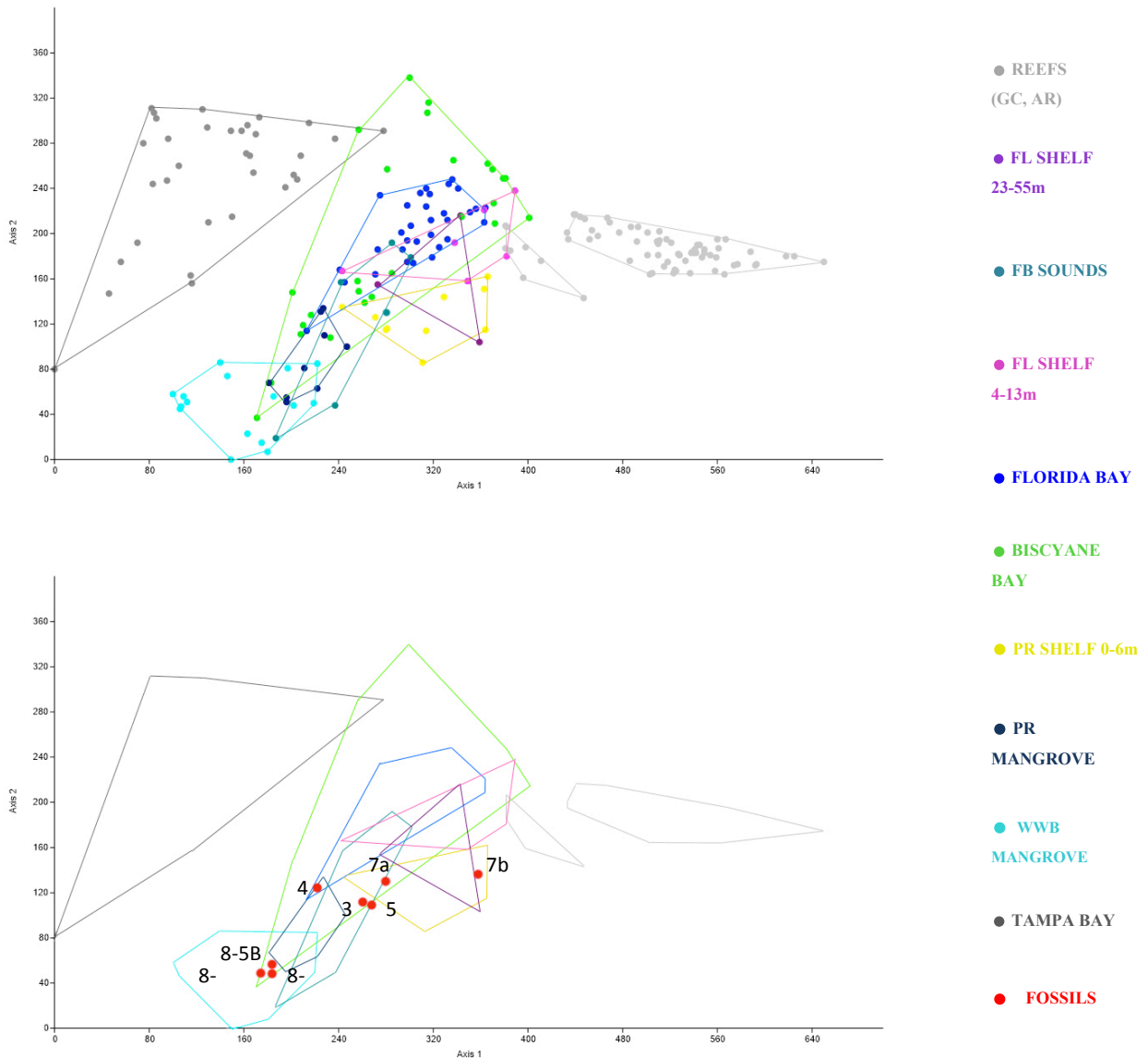


Figure 7: DCA Hulls for Modern and Fossil Samples

(top) DCA points and hulls with all modern data, (bottom) DCA hulls for modern data and fossil data points. Fossil samples fall within convex hulls of shelf, bay, lagoon, or mangrove samples. GC = Grand Cayman, AR = Alligator Reef, FL = Florida, FB = Florida Bay, PR = Puerto Rico, WBB = White Water Bay.

IV. DISCUSSION AND CONCLUSIONS

4.1 Fossil Data Interpretations

4.1.1 Significance of Ecological Indices and Taxa

All fossil FORAM index values are relatively low ($FI < 3$) in fossil samples indicating an environment that is stressful to foraminiferal taxa characteristic of an open-marine, sunlit shallow-shelf assemblage (Hallock, 2012). Potential stresses for shelf taxa could include turbid or euryhaline conditions. It has been shown that some species of *Rosalina*, *Cibicides*, *Planorbulina*, and asterigerinids are tolerant of turbid water conditions (Alegret et al., 2008). Units 3, 5, 7a, and 7b have 9%, 5%, 9%, and 11% *Rosalina* in the total assemblage, respectively. SMR samples have no *Rosalina*. Moreover, there were no significant proportions of *Cibicides*, *Planorbulina*, or asterigerinids in any fossil unit. This suggests that turbidity was not a contributing factor to the low FI in these fossil units. Alternatively, the presence of hypersaline-tolerant miliolid taxa, specifically *Quinqueloculina* (see Murray, 1999), in all APAC units support a normal to high salinity rather than a euryhaline environment. Unit 7b also contains a large variation in the morphological types of miliolids. *Quinqueloculina* and *Triloculina* associations are more indicative of hypersaline environments than those dominated by *Ammonia-Elphidium* associations (Wingard et al., 2004). There were *Quinqueloculina* in units 5 and 7a and 7b, consisting of 16%, 14%, and 11% of total assemblage, respectively, while SMR units contained no *Quinqueloculina*. Hence, normal to high salinity habitats are likely for APAC units while low salinity habitats are likely for SMR units. These results are consistent with those from a study by

Tao and Grossman (2010). In that study, they attributed high $\delta^{18}\text{O}_{\text{sw}}$ estimates for the Plio-Pleistocene of southern Florida to high evaporation rates and concluded that the Plio-Pleistocene samples in their study (APAC units 4 and 7) represent high salinity (around 38 ppt) environments.

Units APAC 4 and SMR 8-5b, 8-5a, and 8-2b indicate conditions with relatively low oxygen, as reflected in AEI values (AEI = 60 to 90). *Ammonia* is also an indicator taxon of relatively low salinities and increased freshwater input, but is also common in eutrophic waters (Wingard et al., 2004). All samples except Unit 7b contained some *Ammonia*, but only Fruitville member Unit 4 at APAC and SMR Phase 8 samples were dominated (50% or more of the total assemblage) by *Ammonia*. *Ammonia* proportions were 82%, 84%, and 72% for SMR Unit 8-5a, SMR Unit 8-5b, and SMR Unit 8-2b, respectively. *Ammonia* proportions were 10%, 34%, 8%, and 7% for APAC units 3, 4, 5, and 7a, respectively. Freshwater input and nutrients were, therefore, interpreted to have been higher and oxygen lower in SMR units than in APAC units. This is consistent with the findings of Tao and Grossman (2010).

4.1.2 Diversity of the Fossil Units

Biodiversity measures H' and rarefied richness via rarefaction are highest for the lowermost APAC Unit 7b, consistent with other faunal (i.e., mollusk) studies that found higher diversities in the lower units of upper Tamiami than upper units (Allmon, 1992). H' diversity is also much higher for APAC units relative to SMR units. Similarly, evenness is highest for APAC Units 5 and 7 and lowest for all SMR units; evenness is comparably low for APAC Units 3 and 4. These results are consistent with general habitat patterns in that normal marine salinity and open ocean environments, like those of middle shelf habitats, display higher diversity than

brackish habitats because brackish and lagoon environments have high variation that leads to fewer taxa which can tolerate those conditions (Reizopouou and Nicolaidou, 2004).

4.2 Potential Modern Analogs – Insights from Cluster Analysis and DCA

4.2.1 Confidence from Multivariate Analysis

Analog environments are defined as those that are compositionally similar to modern environments (Williams and Jackson, 2007). The multivariate analysis suggests that the Tamiami paleoenvironments do have modern analogs based on groups depicted in the cluster diagram and location of fossil samples within hulls on the DCA.

Analysis of Unit 4 corroborated previous findings that this unit represents a shallow mangrove-proximate, potentially high-nutrient bay, characterized by land snails such as *Pyrazisinus scalatus* (Portell, 2012) and shallow-water foraminifera. This consistency indicates that the methodology used in this study reveals likely habitat analogs for the other less-studied units. Multivariate analyses delineated three environments represented by the eight fossil units examined: (1) APAC units 3, 5, and 7a, and Unit 7b, (2) APAC Unit 4, and (3) the SMR 8 units. Reconstructions of these groups are described in more detail below.

4.2.2 APAC Units 3, 5, 7a, 7b

The overall group that contains all APAC samples, except for Unit 4, cluster primarily with the Puerto Rican shelf samples and Florida shelf samples. The Puerto Rican samples are from shallow (0 - 12 m) localities representing two transects from the southeastern Puerto Rican shelf near Punta Salinas, Puerto Rico. There are intermittent reefs in the seaward portion of samples and mangroves proximate to the nearshore samples (Culver, 1990). These samples have a median FI 1.80, a median AEI of 25 (range: 4-56) and are dominated by heterotrophic foraminifera with few symbiont-bearing taxa. The DCA places APAC 3, 5, and 7a closest to well

oxygenated to possibly intermittent hypoxia (AEI = 8-52), shallow (> 1 m to 12 m depth) Puerto Rican samples, PR-O 33 PR-O 34, PR-O 30.

Unit 7b branches off on the cluster diagram, grouping closer to Puerto Rican shelf sample PR - O 38 (6 m depth). In addition to falling within the Puerto Rican shelf hull in the DCA, APAC 7b is close to the Florida Shelf sample Bell 110 (33 m depth) with a medium FI of 3.37 and well oxygenated conditions (AEI = 0).

Due to the composition of Unit 7b, it is difficult to constrain paleodepths and paleoenvironmental conditions, but the overall signal is more suggestive of a deeper paleodepth than any of the other fossil units in this study. Unit 7b contains foraminifera common at depths below 30 m (i.e., 7b contains 2% of planktic *Globigerina* and 10% *Cibicides*), contains higher diversity (i.e., 7b has the highest richness in rarefaction results and Shannon $H' = 2.85$), and is the closest fossil unit to middle shelf habitats in DCA results. Other taxa supporting deeper waters or potential upwelling conditions, such as *Bolivina* and *Nonionella* (Jónsdóttir, 2003), are present in APAC Unit 7b.

Tropical analog results for APAC units are consistent with other studies on Pleistocene foraminifera from southern Florida where tropical taxa were found in Caloosahatchee assemblages (Cole, 1931).

4.2.3 APAC Unit 4

The APAC Unit 4 sample clusters with shallow, Puerto Rican stations (0-12 m depth) and closest to station PR-I 52, a sample off the mainland close to an island colonized by mangroves (Culver, 1990). It is also relevant to note that the larger cluster containing APAC 4 contains two samples that branch off just before APAC 4 and PR-I 52 cluster. These samples are from Florida Bay FBN7429, described as a nearshore (<5 m depth), intermittent hypoxia (AEI = 63), brackish

water sample (Rose and Lidz, 1988) and Biscayne Bay's BB14, from North Biscayne Bay (0.6 m) (Ishman, 1997).

The DCA places the APAC 4 sample closest to Biscayne Bay samples BB11 (1.5 m depth) and BB09 (1.9 m depth), and near Puerto Rican mangrove samples PR-I 44 and PR-I 52, as well as Biscayne Bay sample BB17 and Florida Bay sample FBN7429. The Biscayne Bay and Puerto Rican samples both have low FI's ($FI > 2$) and AEI indicates intermittent hypoxia (AEI's = 57-61). This suggests APAC Unit 4 was a brackish environment possibly influenced by nutrients from some freshwater or groundwater source.

4.2.4 SMR Phase 8

SMR Phase 8 samples group with sub-tropical to tropical, very low oxygen and seemingly, mangrove-proximate habitats, consistent with preliminary results found by the analysis of SMR by Mike Meyer (2012). These include White Water Bay samples WWB103 and WWBMarco and a Biscayne Bay samples BB15. The SMR 8-2b sample differs somewhat from the SMR 8-5. The SMR 8-5b clusters with the WWBMarco modern sample. The North Biscayne Bay sample BB15 is the deepest sample in this cluster (3.2 m depth) with a low FI of 1.07 and high AEI of 70. WWB Marco and WWB103 are very shallow (< 1 m depth), low FI ($FI = 1.01 - 1.13$), poorly oxygenated (AEI = 85-89) samples.

On the DCA figure (Fig. 7), SMR 8 samples are within a hull of White Water Bay samples, closest to WWBMarco and WWB 103, consistent with cluster results. Also, these are similar to Puerto Rican shallow (< 1m depth), intermittent hypoxia (AEI = 52 – 65), mangrove samples of PR-I 42, PR-I 46, PR-I 48, and BB15. SMR 8-2b is also near other shallow, poorly oxygenated (AEI = 70 – 90), low FI ($FI > 2$) samples of a Florida Bay FB7 sample (0.3 m depth), NB05A (0.9 m), and a southern White Water Bay sample WWB108 (0.3 m). These modern

samples are dominated by opportunistic forams with no symbiont-bearing taxa. This suggests that SMR units were brackish habitats highly influence by freshwater or groundwater sources, similar to modern Everglades environments.

4.2.5 Comparison of Diversity with Modern Analog Habitats

The APAC Unit 7b appears to have higher diversity, richness, and evenness than the suggested modern analog from this study. However, fossil samples are subject to the effects of time-averaging which tends to inflate evenness and alpha diversity. Assemblages can also include taxa from adjacent habitats (Tomasovych and Kidwell, 2009). Due to these phenomena, it can be problematic to differentiate actual heightened diversity due to evolutionary or ecological processes from inflated time-averaged diversity (Kowalewski et al., 1998).

4.2.6 DCA Axis Interpretation

Foraminiferal assemblages vary with depth (Cushman 1921, 1922; Norton, 1930; Stubbs, 1939; Bandy, 1956; Rose and Lidz, 1989; Murray, 1991), but temperature (Norton, 1930; Stubbs, 1939; Poag, 2015), circulation and wave energy (Cushman, 1921, 1922; Rose and Lidz, 1989), freshwater influence (Rose and Lidz, 1989), nutrient flux and oxygen availability (Sen Gupta, 1996), evaporation (Rose and Lidz, 1989), and bottom conditions or grass cover (Cushman, 1921, 1922; Stubbs, 1939) are the important factors. Based on the linear regression results from this study, DCA axis 1 had a stronger correlation with FORAM index values ($r^2=.81$) than AEI, depth, or latitude. The FORAM index is a cumulative index representing multiple environmental factors, such as temperature, salinity, nutrient flux and water clarity (Hallock, 2012).

4.4 Taphonomic Considerations

Foraminiferal preservation is driven by microhabitat, sediment biogeochemical conditions, and specific test composition of the foraminifera (Walker, 1999). Low proportions (10 % or less) of unidentifiable foraminifera, as depicted in the miscellaneous category in Table 2, suggest that abundances of foraminifera in this study were not generally biased by a major loss of genera to degradation. While some transport is possible, it does not appear to have damaged the tests in any of the units significantly. Also, Unit 7b has a wide range of sizes of foraminiferal tests, which could mean the selective nature of transport from living habitat was not a major influence for at least this assemblage (see Rose and Lidz, 1988). Agglutinated foraminifera are especially subject to breakage. However, some intact specimens of *Ammobaculites* were found in Units 7b and 4 (< 1 % of total assemblage). Similarly, observed mollusks in these assemblages have intricate fragile components intact, further supporting minimal degradation and transport of fossil fauna in these assemblages.

4.5 Conclusions

Paleoenvironments and modern analogs have been reconstructed for units from the Plio-Pleistocene upper Tamiami Formation of south Florida. To achieve this, foraminiferal assemblage data from APAC units 3, 4, 5, 7a, and 7b, and SMR Phase 8 units 8-5a, 8-5b, and 8-2b were explored using ecological and diversity indices and multivariate statistical analyses.

Results revealed that APAC and SMR units come from distinct paleoenvironments. APAC units 3, 5, and 7 are more well oxygenated, high saline, tropical, open shelf-like, assemblages, while SMR units are poorly oxygenated, low saline, non-tropical, shallow brackish assemblages. APAC Unit 4 has the closest similarities to SMR units, but still some ecological differences. Hence, the APAC units and SMR Phase 8 units in this study must have been

deposited at different times or in different paleoenvironments. This is consistent with research that compared SMR Phase 6 units to Unit 4. SMR Phase 6, the “bird layer,” is markedly different paleoecologically and taphonomically than APAC Unit 4, despite being potentially deposited at similar ages (Emslie, 1996).

Foraminiferal taxonomic composition and FORAM index values support normal marine to hypersaline water conditions for APAC units. This could be partially attributed to an intensified Gulf Stream resulting from closures of the Central American Isthmus (Willard, 1993). High salinity water conditions are consistent with recent isotopic analysis by Tao and Grossman (2010), where these Plio-Pleistocene units reflect highly evaporative and relatively high salinity levels.

Freshwater and groundwater discharge are said to be the cause of high nutrients in some habitats along the southwest Plio-Pleistocene Florida coast (Tao and Grossman, 2010). This could be the cause of poor oxygenation in SMR units that resemble an Everglades-proximate habitat. To a lesser extent, APAC Unit 4 was also likely affected by some runoff or groundwater discharge causing intermittent hypoxia. Remaining APAC units, however, do not appear to have been significantly affected by freshwater flow based on AEI results.

There are tropical taxa present in APAC units, which could have been the result of currents bringing tropical fauna to higher latitudes. Warmer water temperatures (Cronin and Dowsett, 1996), which have been attributed to oceanic heat transport by Willard (1993), and current changes (Vermeij, 2005) may have allowed tropical taxa to exist at higher latitudes than today, supported by prior research (Stanley, 1986, 1991; Cole, 1931; Vermeij, 2005; Cronin and Dowsett). Vermeij (2005) documented a Plio-Pleistocene migration reversal caused by northward current intensification leading to movement of tropical Caribbean mollusks to west

Florida environments. Cronin and Dowsett (1996) also found an increased tropical assemblage of ostracodes; however, they did not extend as north as Sarasota.

In this study, I conclude that diversity for fossil units, with the exception of Unit 7b, was either lower or similar to modern analog habitats. Differences in habitat type between APAC and SMR localities explain these relative diversity patterns, since middle shelf habitats are expected to be higher than brackish habitats and tropical habitats tend to display higher taxonomic richness than non-tropical habitats.

Unit 7b, however, may contain higher diversity than all other fossil units. This would be consistent with other faunal (i.e., molluscan) analyses of this unit that indicate high biodiversity in some of these units (Petuch, 1982).

However, it remains in question whether Unit 7b is more middle Florida Shelf-like or tropical Puerto Rican shelf-like, which has significant implications on diversity change through time. Allmon (1993) has suggested that mollusk diversity has not changed much since the Pliocene, attributed to high origination rates.

Future researchers should be careful in comparing lower APAC Unit 7b to correct modern analogs. Yet, despite post-deposition taphonomic processes, results in this study indicate that Unit 7b can be constrained to a shallow to middle shelf-like environment, potentially tropical, with depths similar to shallow to middle shelf habitats (8 to 33 m). Additional research on taphonomic implications would help confirm Unit 7b's modern analog.

These results have implications for evolutionary and conservation analyses. Future research can now accurately compare APAC units to proper modern analogs of tropical shelf-like habitats and SMR units to proper shallow brackish habitats to conclude evolutionary and

environmental changes through time. Tropical biotic movement documented here may also have implications for studies on invasive species.

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APPENDICES

Appendix A: Genus List

Affinetrina
Acervulina
Ammobaculites
Ammonia
Amphisorus
Amphistegina
Anomalinoides
Androsina
Angulogerina
Archaias
Arenoparella
Articulina
Asterigerina
Astrononion
Bigenerina
Bolivina
Borelis
Brizalina
Broeckina
Bulimina
Buliminella
Cancris
Cassidulina
Cibicides
Clavulina
Cornuloculina
Criboelphidium
Cribrostomoides
Cyclorbiculina
Cornuspira
Cymbaloporella
Discorbis
Elphidium
Oolina
Eponides
Fissurina
Florilus
Fursenkoina
Gaudryina
Glabratella
Globigerina
Globigerinella
Globigerinoides
Globocassidulina
Globorotalia
Glomospira
Guttulina
Gypsina
Hanzawaia
Haplophragmoides
Helenina
Hopkinsina
Hauerina
Haynesina
JSMB
Laevipeneroplis
Lagena
Lenticulina
Miliammina
Miliolinella
Mychostomina
Neoconorbina
Neoeponides
Nodobaculariella
Nodosariidae
Nonion
Nonionella
Nubecularia
Pateoris
Patellina
Peneroplis
Planispirinella
Planorbulina
Planulina
Pseudoclavelina
Pulleniatina
Pyrgo
Quinqueloculina
Rectobolivina
Recurvoides
Reophax
Reussella
Rosalina
Rotalia
Saccamina
Sagrina
Scutularis
Sigmavirgulina
Siphotrochammmina
Siphonaperta
Siphonina
Sorites
Spirillina
Spiroloculina
Spirosigmoilina
Stainforthia
Textularia
Trifarina
Tretomphalus
Triloculina
Triloculinella
Trochammmina
Turrispirillina
Uvigerina
Vulvulina
Valvulineria
Wiesnerella
Int Textulariid
Int Rotaliid

Appendix B: Fossil Data Sources

Fossil Sample Details

<u>Nmae</u>	<u>DETAILS</u>	<u>DATE COLLECT ED</u>	<u>INSTITUTION</u>	<u>Author</u>	<u>Notes</u>
APAC 3	UNIT 3	1987	UF - Florida Museum of Natural History (Invertebrate Paleontology Master Collection)	KIENER, LC 1840 (DON/COLLECTOR: RODGER PORTELL & JONES, DOUGLAS)	MACASPHALT SHELL PIT B (SO017) SARASOTA COUNTY, BEE RIDGE QUAD USGS 7.5 - SEC 12 E1/2
APAC 4	SECTION 3 - UNIT 4	1987	UF - Florida Museum of Natural History (Invertebrate Paleontology Master Collection)	COLL: FLAMNH CREW	MACASPHALT SHELL PIT B (SO017) SARASOTA COUNTY, BEE RIDGE QUAD USGS 7.5 - SEC 12
APAC 5	SECTION 2 - UNIT 5	1988	UF - Florida Museum of Natural History (Invertebrate Paleontology Master Collection)	(DON/COLLECTOR: RODGER PORTELL & JONES, DOUGLAS)	MACASPHALT SHELL PIT B (SO017) SARASOTA COUNTY, BEE RIDGE QUAD USGS 7.5 - SEC 12
APAC 7a	SECTION 12 E 1/2		UF - Florida Museum of Natural History (Invertebrate Paleontology Master Collection)		MACASPHALT SHELL PIT B (SO017) LAT 27, LONG -82 USGS 7.5 QUAD
APAC 7b			UNIVERSITY OF S. FLORIDA		
SMR 8-5a			UF - Florida Museum of Natural History (Invertebrate Paleontology Master Collection)		
SMR 8-5b			UF - Florida Museum of Natural History (Invertebrate Paleontology Master Collection)		
SMR 8-2b			UF - Florida Museum of Natural History (Invertebrate Paleontology Master Collection)		

Appendix C: Examples of Foraminifera in Fossil Units



Pinecrest Unit 5: Elphidium, broken Amphisteginas, miliolid

Pinecrest Unit 4 Foraminifera

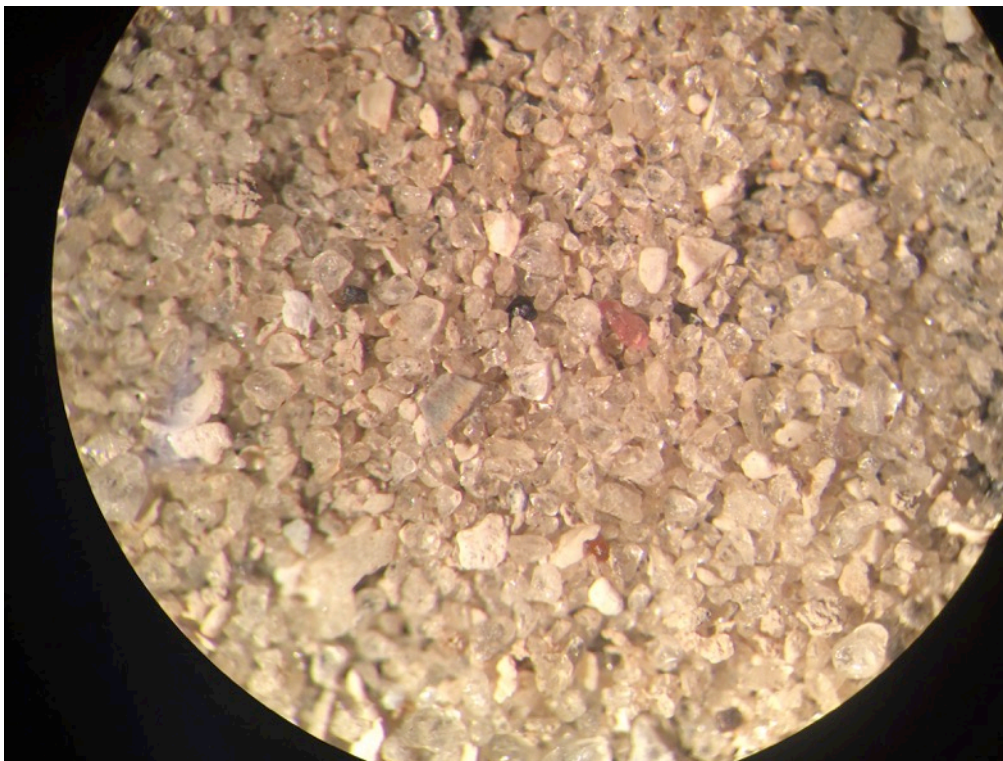


Unit 4: Quinqueloculina



Unit 4: Textularia; Reusella

Pinecrest Unit 7



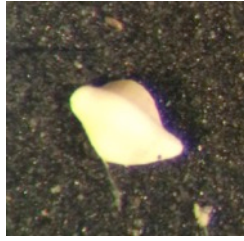
Unit 7: Sediment



Planorbulina



Globigerina



Quinquelocilina

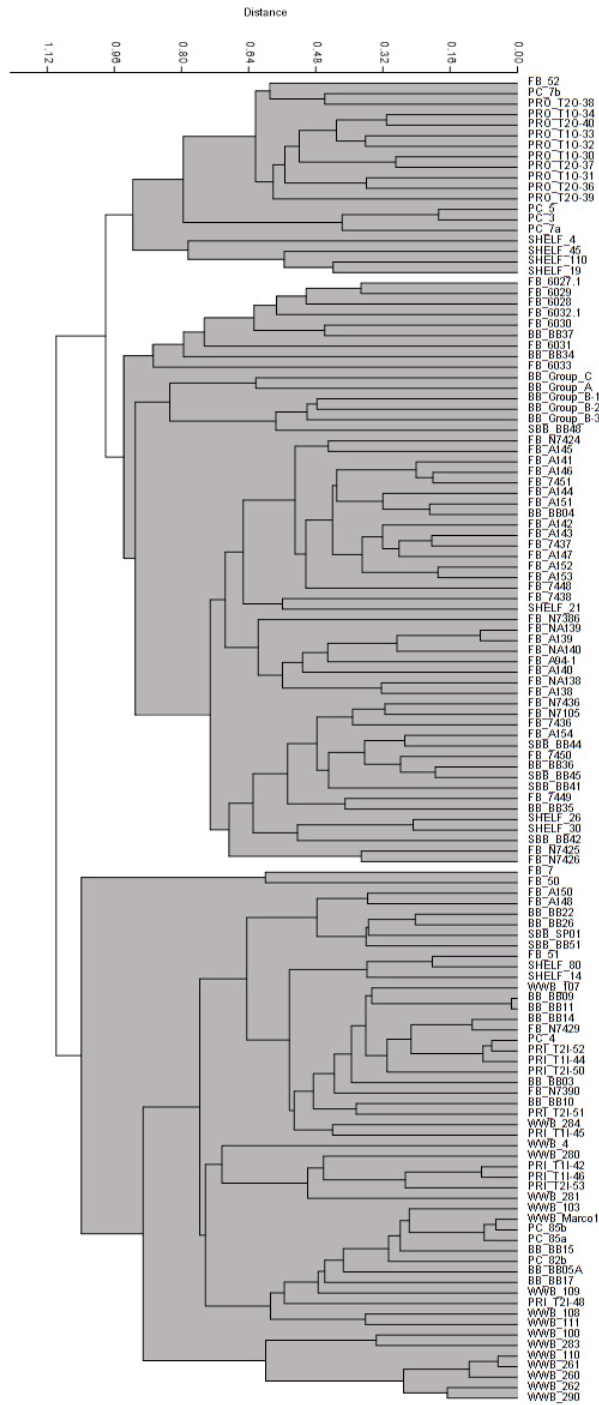
Appendix D: Coordinates of West Florida Shelf Samples

Data source: Bellows Research Cruise, 2008. Depths 0-60m.

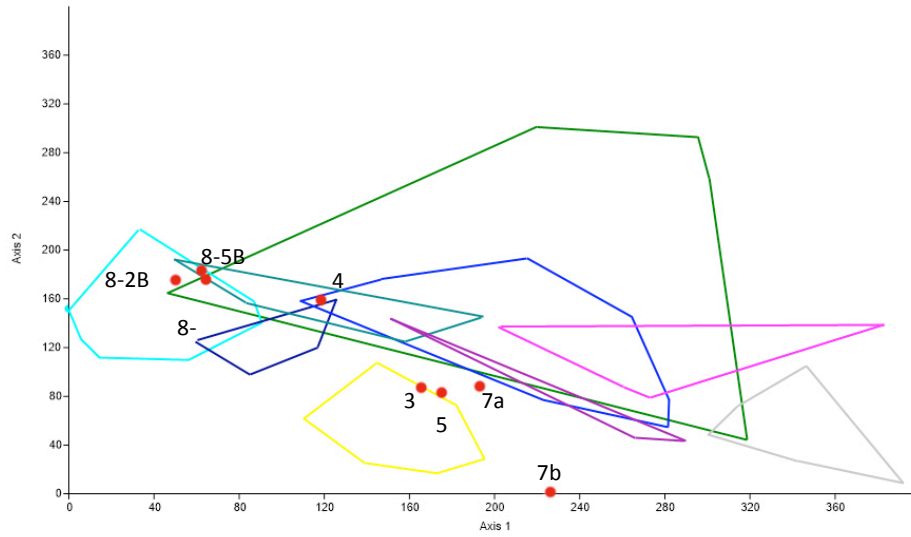
LATITUDE	LONGITUDE	Depth (m)	Transect Station
25.05	-81.32	4.27	IA
25.25	-81.51	7.92	IB
25.10	-81.92	13.72	IC
26.06	-82.52	24.08	IIID
26.03	-82.82	33.53	IIIE
26.10	-83.35	54.86	IIIG
27.18	-82.56	8.23	IVB
27.31	-82.59	8.53	IVC
25.34	-81.72	9.14	IIA

Appendix E: Cluster and DCA without Outliers

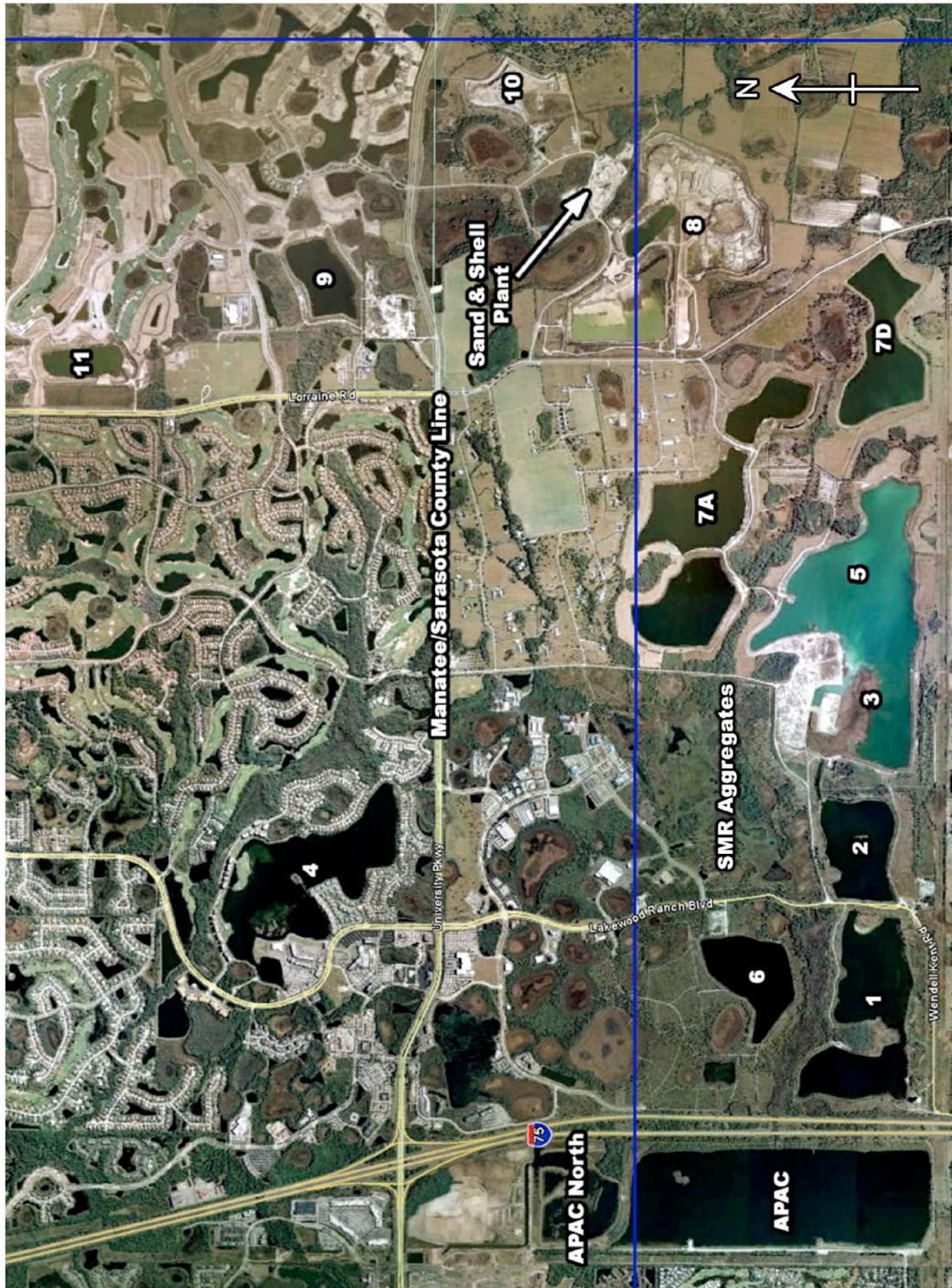
Cluster with Tampa Bay and Grand Cayman samples not included



DCA with Tampa Bay and Grand Cayman samples not included



Appendix F: Map of Fossil Localities



from Portell, R.W. 2012

Appendix G: Foraminiferal Abundance Data

	Affinetrina	Acervulina	Ammobaculites	Ammonia	Amphisorus	Amphistegina	Anomalinoidea	Androsina	Angulogerina	Archaias	Arenoparella
UTB (3837)	0.00	0.00	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UTB (3842)	0.00	0.00	0.24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UTB (3851)	0.00	0.00	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UTB (3916)	0.00	0.00	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UTB (3926)	0.00	0.00	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UTB (3941)	0.00	0.00	0.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UTB (3949)	0.00	0.00	0.41	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SB (3958)	0.00	0.00	0.43	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SB (3961)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SB (3971)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SB (3972)	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SB (3990)	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SB (3991)	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
IndRks (4005)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
GCW (F13)	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.78	0.00
GCW (105)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.64	0.00
GCW (106)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.64	0.00
GCW (107)	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.66	0.00
GCW (108)	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.64	0.00
GCW (103)	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.68	0.00
GCW (104)	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.67	0.00
GCW (100)	0.00	0.00	0.00	0.00	0.02	0.08	0.00	0.00	0.00	0.51	0.00
GCW (112)	0.00	0.00	0.00	0.00	0.02	0.07	0.00	0.00	0.00	0.51	0.00
GCW (111)	0.00	0.00	0.00	0.00	0.05	0.10	0.00	0.00	0.00	0.43	0.00
GCW (116)	0.00	0.00	0.00	0.00	0.01	0.02	0.00	0.00	0.00	0.54	0.00
GCW (117)	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.56	0.00
GCW (101)	0.00	0.00	0.00	0.00	0.05	0.03	0.00	0.00	0.00	0.60	0.00
GCW (114)	0.00	0.00	0.00	0.00	0.04	0.02	0.00	0.00	0.00	0.57	0.00
GCW (102)	0.00	0.00	0.00	0.00	0.05	0.02	0.00	0.00	0.00	0.59	0.00
GCW (115)	0.00	0.00	0.00	0.00	0.04	0.01	0.00	0.00	0.00	0.55	0.00
GCW (113)	0.00	0.00	0.00	0.00	0.02	0.05	0.00	0.00	0.00	0.60	0.00
GCW (F87)	0.00	0.00	0.00	0.00	0.00	0.37	0.00	0.00	0.00	0.11	0.00
GCW (F92)	0.00	0.00	0.00	0.00	0.00	0.30	0.00	0.00	0.00	0.09	0.00
GCW (F90)	0.00	0.00	0.00	0.00	0.01	0.29	0.00	0.00	0.00	0.08	0.00
GCW (37)	0.00	0.00	0.00	0.00	0.05	0.20	0.00	0.00	0.00	0.16	0.00
GCW (38)	0.00	0.00	0.00	0.00	0.02	0.21	0.00	0.00	0.00	0.18	0.00
GCW (110)	0.00	0.00	0.00	0.00	0.02	0.19	0.00	0.00	0.00	0.25	0.00
GCW (36)	0.00	0.00	0.00	0.00	0.07	0.15	0.00	0.00	0.00	0.07	0.00
GCW (156)	0.00	0.00	0.00	0.00	0.00	0.63	0.00	0.00	0.00	0.07	0.00
GCW (164)	0.00	0.00	0.00	0.00	0.00	0.64	0.00	0.00	0.00	0.16	0.00
GCW (158)	0.00	0.00	0.00	0.00	0.00	0.45	0.00	0.00	0.00	0.16	0.00

	Affinetrina	Acervulina	Ammobaculites	Ammonia	Amphisorus	Amphistegina	Anomalinoidea	Androsina	Angulogerina	Archaias	Arenoparella
PRI (T2I-50)	0.00	0.00	0.02	0.37	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PRI (T2I-51)	0.00	0.00	0.03	0.32	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PRI (T2I-52)	0.00	0.00	0.00	0.33	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PRI (T2I-53)	0.00	0.00	0.00	0.28	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PRO (T1O-34)	0.00	0.00	0.00	0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.00
PRO (T1O-33)	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PRO (T1O-32)	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PRO (T1O-31)	0.00	0.00	0.00	0.02	0.00	0.00	0.01	0.00	0.00	0.00	0.00
PRO (T1O-30)	0.00	0.00	0.00	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PRO (T2O-40)	0.00	0.00	0.02	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PRO (T2O-39)	0.00	0.00	0.00	0.05	0.00	0.00	0.01	0.00	0.00	0.00	0.00
PRO (T2O-38)	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00
PRO (T2O-37)	0.00	0.00	0.00	0.06	0.00	0.00	0.01	0.00	0.00	0.00	0.00
PRO (T2O-36)	0.00	0.00	0.00	0.02	0.00	0.00	0.01	0.00	0.00	0.00	0.00

	Articulina	Asterigerina	Astrononion	Bigenerina	Bolivina	Borelis	Brizalina	Broeckina	Bulimina	Buliminella	Cancris
AR (6029)	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
AR (6030)	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
AR (6031)	0.10	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
AR (6032.1)	0.03	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
AR (6033)	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
WWB-TTI (4)	0.00	0.00	0.00	0.00	0.21	0.00	0.00	0.00	0.00	0.04	0.00
WWB-TTI (100)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
WWB-TTI (103)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
WWB-TTI (106)	0.00	0.00	0.00	0.00	0.16	0.00	0.00	0.00	0.01	0.09	0.00
WWB-TTI (107)	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.03	0.00
WWB-TTI (108)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
WWB-TTI (109)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
WWB-TTI (110)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
WWB-TTI (111)	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
WWB-TTI (113)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
WWB-TTI (115)	0.00	0.00	0.00	0.00	0.19	0.00	0.00	0.00	0.02	0.04	0.00
WWB-TTI (116)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
WWB-TTI (260)	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
WWB-TTI (261)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
WWB-TTI (262)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
WWB-TTI (270)	0.00	0.00	0.00	0.00	0.06	0.00	0.00	0.00	0.00	0.04	0.00
WWB-TTI (280)	0.00	0.00	0.00	0.00	0.13	0.00	0.00	0.00	0.01	0.03	0.00
WWB-TTI (281)	0.00	0.00	0.00	0.00	0.24	0.00	0.00	0.00	0.01	0.04	0.00
WWB-TTI (283)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
WWB-TTI (284)	0.00	0.00	0.00	0.00	0.15	0.00	0.00	0.00	0.00	0.03	0.00
WWB-TTI (290)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TTI (Marco Isl)	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FL Shelf (19)	0.00	0.01	0.00	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.01
FL Shelf (4)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FL Shelf (21)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FL Shelf (14)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FL Shelf (26)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FL Shelf (45)	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FL Shelf (30)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FL Shelf (80)	0.00	0.10	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00
FL Shelf (110)	0.00	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NBB (BB03)	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
NBB (BB04)	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NBB (BB05A)	0.00	0.00	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NBB (BB09)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NBB (BB10)	0.02	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00

	Articulina	Asterigerina	Astrononion	Bigenerina	Bolivina	Borelis	Brizalina	Broeckina	Bulimina	Buliminella	Cancris
UTB (3837)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UTB (3842)	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
UTB (3851)	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
UTB (3916)	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00
UTB (3926)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UTB (3941)	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00
UTB (3949)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SB (3958)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SB (3961)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SB (3971)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00
SB (3972)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SB (3990)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00
SB (3991)	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.01	0.00
IndRks (4005)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
GCW (F13)	0.00	0.01	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00
GCW (105)	0.00	0.01	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00
GCW (106)	0.00	0.01	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00
GCW (107)	0.00	0.02	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00
GCW (108)	0.00	0.01	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00
GCW (103)	0.00	0.03	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00
GCW (104)	0.00	0.02	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00
GCW (100)	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00
GCW (112)	0.00	0.06	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00
GCW (111)	0.00	0.06	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00
GCW (116)	0.00	0.05	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00
GCW (117)	0.00	0.04	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00
GCW (101)	0.00	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
GCW (114)	0.00	0.05	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00
GCW (102)	0.00	0.04	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00
GCW (115)	0.00	0.06	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00
GCW (113)	0.00	0.04	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00
GCW (F87)	0.00	0.12	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00
GCW (F92)	0.00	0.15	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00
GCW (F90)	0.00	0.15	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00
GCW (37)	0.00	0.09	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00
GCW (38)	0.00	0.09	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00
GCW (110)	0.00	0.05	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00
GCW (36)	0.00	0.17	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00
GCW (156)	0.00	0.04	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00
GCW (164)	0.00	0.02	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00
GCW (158)	0.00	0.07	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00

	Articulina	Asterigerina	Astrononion	Bigenerina	Bolivina	Borelis	Brizalina	Broeckina	Bulimina	Buliminella	Cancris
GCW (163)	0.00	0.06	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00
GCW (155)	0.00	0.08	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00
GCW (162)	0.00	0.08	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00
GCW (157)	0.00	0.07	0.00	0.00	0.00	0.04	0.00	0.00	0.00	0.00	0.00
GCL (19)	0.00	0.02	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00
GCL (20)	0.00	0.03	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00
GCL (80)	0.00	0.02	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00
GCL (82)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
GCL (4)	0.00	0.16	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00
GCL (5)	0.00	0.15	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00
GCL (6)	0.00	0.20	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00
GCL (7)	0.00	0.07	0.00	0.00	0.00	0.04	0.00	0.00	0.00	0.00	0.00
GCL (8)	0.00	0.13	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00
GCL (9)	0.00	0.12	0.00	0.00	0.00	0.04	0.00	0.00	0.00	0.00	0.00
GCL (17)	0.00	0.12	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00
GCL (18)	0.00	0.07	0.00	0.00	0.00	0.04	0.00	0.00	0.00	0.00	0.00
GCL (23)	0.00	0.10	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00
GCL (24)	0.00	0.10	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00
GCL (25)	0.00	0.09	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00
GCL (26)	0.00	0.12	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00
GCL (88)	0.00	0.14	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00
GCL (89)	0.00	0.11	0.00	0.00	0.00	0.04	0.00	0.00	0.00	0.00	0.00
GCL (90)	0.00	0.08	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00
GCL (92)	0.00	0.16	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00
GCL (96)	0.00	0.10	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00
GCL (97)	0.00	0.05	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00
GCL (75)	0.00	0.09	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00
GCL (76)	0.00	0.10	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00
GCL (77)	0.00	0.08	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00
GCL (78)	0.00	0.08	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00
GCL (79)	0.00	0.17	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00
GCL (83)	0.00	0.12	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00
GCL (84)	0.00	0.11	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00
GCL (85)	0.00	0.07	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00
GCL (86)	0.00	0.14	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00
GCL (87)	0.00	0.12	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00
PRI (T1I-42)	0.00	0.00	0.00	0.00	0.14	0.00	0.00	0.00	0.01	0.01	0.00
PRI (T1I-44)	0.00	0.00	0.00	0.00	0.05	0.00	0.00	0.00	0.02	0.00	0.00
PRI (T1I-45)	0.00	0.00	0.00	0.00	0.08	0.00	0.00	0.00	0.01	0.01	0.00
PRI (T1I-46)	0.00	0.01	0.00	0.00	0.14	0.00	0.00	0.00	0.01	0.00	0.00
PRI (T2I-48)	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.01	0.00	0.00

	Articulina	Asterigerina	Astrononion	Bigenerina	Bolivina	Borelis	Brizalina	Broeckina	Bulimina	Buliminella	Cancris
PRI (T2I-50)	0.00	0.00	0.00	0.00	0.07	0.00	0.00	0.00	0.00	0.00	0.00
PRI (T2I-51)	0.00	0.01	0.00	0.00	0.06	0.00	0.00	0.00	0.01	0.00	0.00
PRI (T2I-52)	0.01	0.00	0.00	0.00	0.05	0.00	0.00	0.00	0.00	0.00	0.00
PRI (T2I-53)	0.00	0.01	0.00	0.00	0.18	0.00	0.00	0.00	0.01	0.01	0.00
PRO (T1O-34)	0.00	0.01	0.00	0.00	0.19	0.00	0.00	0.00	0.02	0.01	0.00
PRO (T1O-33)	0.00	0.00	0.00	0.00	0.11	0.00	0.00	0.00	0.01	0.01	0.00
PRO (T1O-32)	0.00	0.00	0.00	0.00	0.07	0.00	0.00	0.00	0.00	0.00	0.00
PRO (T1O-31)	0.00	0.00	0.00	0.00	0.09	0.00	0.00	0.00	0.01	0.01	0.00
PRO (T1O-30)	0.00	0.00	0.00	0.00	0.06	0.00	0.00	0.00	0.00	0.00	0.00
PRO (T2O-40)	0.00	0.01	0.00	0.00	0.24	0.00	0.00	0.00	0.01	0.01	0.00
PRO (T2O-39)	0.00	0.00	0.00	0.00	0.20	0.00	0.00	0.00	0.00	0.01	0.00
PRO (T2O-38)	0.00	0.00	0.00	0.00	0.05	0.00	0.00	0.00	0.00	0.02	0.00
PRO (T2O-37)	0.00	0.00	0.00	0.00	0.08	0.00	0.00	0.00	0.00	0.01	0.00
PRO (T2O-36)	0.01	0.00	0.00	0.00	0.07	0.00	0.00	0.00	0.00	0.01	0.00

	Cassidulina	Cibicides	Clavulina	Cornuloculina	Criboelphidium	Cribrostomoides	Cyclobiculina	Cornuspira	Cymbaloporetta	Discorbis	Elphidium
FB (N7429)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.30
FB (N7390)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.34
FB (N7386)	0.00	0.00	0.00	0.00	0.00	0.00	0.10	0.00	0.00	0.00	0.07
FB (N7436)	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.08
FB (NA139)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.21
FB (NA138)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.07
FB (NA140)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.23
FB (N7424)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.21
FB (N7105)	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.10
FB (N7425)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.10
FB (7436)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05
FB (A139)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.27
FB (A138)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.04
FB (A140)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.15
FB (A141)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.12
FB (A142)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.12
FB (A143)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.11
FB (A144)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.40
FB (A145)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.27
FB (A146)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.07
FB (A150)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.20
FB (A148)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.10
FB (A147)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.10
FB (A151)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03
FB (A152)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.07
FB (A153)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.06
FB (A154)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.10
FB (7451)	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.03	0.10
FB (7450)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.03
FB (7449)	0.00	0.00	0.00	0.00	0.00	0.00	0.07	0.00	0.00	0.03	0.02
FB (7448)	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.00	0.00	0.02	0.17
FB (A94-1)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.10
FB (7438)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.30
FB (7437)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.17
FB (7)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.07
FB (50)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04
FB (51)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.21
FB (52)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.07
AR (N7426)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.05
AR (6027.1)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05
AR (6028)	0.00	0.00	0.00	0.00	0.00	0.00	0.07	0.00	0.00	0.00	0.04

	Cassidulina	Cibicides	Clavulina	Cornuloculina	Criboelphidium	Crirostomoides	Cyclobiculina	Cornuspira	Cymbaloporetta	Discorbis	Elphidium
PRI (T2I-50)	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.18
PRI (T2I-51)	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.02	0.02	0.00	0.13
PRI (T2I-52)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.22
PRI (T2I-53)	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.29
PRO (T1O-34)	0.01	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.03	0.13
PRO (T1O-33)	0.01	0.04	0.00	0.00	0.00	0.00	0.00	0.04	0.00	0.03	0.10
PRO (T1O-32)	0.01	0.03	0.00	0.00	0.00	0.00	0.00	0.02	0.01	0.06	0.11
PRO (T1O-31)	0.00	0.06	0.00	0.00	0.00	0.00	0.00	0.05	0.01	0.06	0.05
PRO (T1O-30)	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.04	0.00	0.02	0.07
PRO (T2O-40)	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.25
PRO (T2O-39)	0.01	0.12	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.06	0.13
PRO (T2O-38)	0.00	0.06	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.11	0.08
PRO (T2O-37)	0.01	0.05	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.07	0.08
PRO (T2O-36)	0.00	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.08	0.04

	Oolina	Eponides	Fissurina	Fursenkoina	Gaudryina	Glabratella	Globigerina	Globigerinella	Globigerinoides	Globocassidulina	Globorotalia
NBB (BB11)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NBB (BB14)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NBB (BB15)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NBB (BB17)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NBB (Group C)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NBB (Group B-1)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CBB (BB22)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CBB (BB26)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CBB (BB34)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CBB (BB35)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CBB (BB36)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CBB (BB37)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NBB (Group B-2)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
BNP (BB41)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
BNP (BB42)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
BNP (BB44)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
BNP (BB45)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SBB (BB48)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SBB (BB51)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SBB (SP01)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SBB (Group A)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NBB (Group B-3)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
L TB (3750)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
L TB (3756)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
L TB (3761)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
L TB (3775)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
L TB (3782)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
L TB (3861)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
L TB (3870)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
L TB (3881)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
L TB (3890)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
L TB (3898)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
L TB (3908)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
L TB (3915)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
U TB (3785)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
U TB (3794)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UTB (3802)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UTB (3807)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UTB (3817)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UTB (3818)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UTB (3826)	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00

	Oolina	Eponides	Fissurina	Fursenkoina	Gaudryina	Glabratella	Globigerina	Globigerinella	Globigerinoides	Globocassidulina	Globorotalia
GCW (163)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
GCW (155)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
GCW (162)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
GCW (157)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
GCL (19)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
GCL (20)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
GCL (80)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
GCL (82)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
GCL (4)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
GCL (5)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
GCL (6)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
GCL (7)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
GCL (8)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
GCL (9)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
GCL (17)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
GCL (18)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
GCL (23)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
GCL (24)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
GCL (25)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
GCL (26)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
GCL (88)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
GCL (89)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
GCL (90)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
GCL (92)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
GCL (96)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
GCL (97)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
GCL (75)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
GCL (76)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
GCL (77)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
GCL (78)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
GCL (79)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
GCL (83)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
GCL (84)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
GCL (85)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
GCL (86)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
GCL (87)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PRI (T1I-42)	0.00	0.00	0.01	0.02	0.01	0.02	0.00	0.00	0.00	0.00	0.00
PRI (T1I-44)	0.00	0.00	0.03	0.01	0.00	0.03	0.00	0.00	0.00	0.00	0.00
PRI (T1I-45)	0.00	0.00	0.05	0.05	0.00	0.01	0.00	0.00	0.00	0.00	0.00
PRI (T1I-46)	0.00	0.00	0.00	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00
PRI (T2I-48)	0.00	0.00	0.00	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00

	Oolina	Eponides	Fissurina	Fursenkoina	Gaudryina	Glbratella	Globigerina	Globigerinella	Globigerinoides	Globocassidulina	Globorotalia
PRI (T2I-50)	0.00	0.00	0.02	0.03	0.00	0.01	0.00	0.00	0.00	0.00	0.00
PRI (T2I-51)	0.00	0.00	0.02	0.01	0.03	0.01	0.00	0.00	0.00	0.00	0.00
PRI (T2I-52)	0.00	0.00	0.02	0.02	0.00	0.01	0.00	0.00	0.00	0.00	0.00
PRI (T2I-53)	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
PRO (T1O-34)	0.00	0.00	0.00	0.02	0.00	0.02	0.00	0.00	0.00	0.00	0.00
PRO (T1O-33)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PRO (T1O-32)	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00
PRO (T1O-31)	0.00	0.00	0.01	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00
PRO (T1O-30)	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PRO (T2O-40)	0.00	0.00	0.02	0.03	0.01	0.03	0.00	0.00	0.00	0.00	0.00
PRO (T2O-39)	0.00	0.00	0.02	0.02	0.00	0.01	0.00	0.00	0.00	0.00	0.00
PRO (T2O-38)	0.00	0.00	0.01	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00
PRO (T2O-37)	0.00	0.00	0.00	0.02	0.00	0.01	0.00	0.00	0.00	0.00	0.00
PRO (T2O-36)	0.00	0.00	0.00	0.02	0.00	0.02	0.00	0.00	0.00	0.00	0.00

	Glomospira	Guttulina	Gypsina	Hanzawaia	Haplophragmoides	Helenina	Hopkinsina	Hauerina	Haynesina	Jsbm	Laevipeneroplis
GCW (163)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
GCW (155)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
GCW (162)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
GCW (157)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
GCL (19)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
GCL (20)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
GCL (80)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
GCL (82)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
GCL (4)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
GCL (5)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
GCL (6)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
GCL (7)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
GCL (8)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
GCL (9)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
GCL (17)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
GCL (18)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
GCL (23)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
GCL (24)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
GCL (25)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
GCL (26)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
GCL (88)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
GCL (89)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
GCL (90)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
GCL (92)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
GCL (96)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
GCL (97)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
GCL (75)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
GCL (76)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
GCL (77)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
GCL (78)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
GCL (79)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
GCL (83)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
GCL (84)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
GCL (85)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
GCL (86)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
GCL (87)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PRI (T1I-42)	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00
PRI (T1I-44)	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00
PRI (T1I-45)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PRI (T1I-46)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PRI (T2I-48)	0.00	0.00	0.00	0.00	0.00	0.02	0.01	0.00	0.00	0.00	0.00

	Lagena	Lenticulina	Miliammina	Miliolinella	Misc. Miliolids	Miscellaneous	Mychostomina	Neoconorbina	Neoeponides	Nodobaculariella	Nonion
UTB (3837)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UTB (3842)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UTB (3851)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UTB (3916)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UTB (3926)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UTB (3941)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UTB (3949)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SB (3958)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SB (3961)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SB (3971)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SB (3972)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SB (3990)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SB (3991)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
IndRks (4005)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
GCW (F13)	0.00	0.00	0.00	0.00	0.00	0.04	0.00	0.00	0.00	0.00	0.00
GCW (105)	0.00	0.00	0.00	0.00	0.00	0.13	0.00	0.00	0.00	0.00	0.00
GCW (106)	0.00	0.00	0.00	0.00	0.00	0.12	0.00	0.00	0.00	0.00	0.00
GCW (107)	0.00	0.00	0.00	0.01	0.00	0.14	0.00	0.00	0.00	0.00	0.00
GCW (108)	0.00	0.00	0.00	0.01	0.00	0.14	0.00	0.00	0.00	0.00	0.00
GCW (103)	0.00	0.00	0.00	0.01	0.00	0.08	0.00	0.00	0.00	0.00	0.00
GCW (104)	0.00	0.00	0.00	0.01	0.00	0.09	0.00	0.00	0.00	0.00	0.00
GCW (100)	0.00	0.00	0.00	0.03	0.00	0.13	0.00	0.00	0.00	0.00	0.00
GCW (112)	0.00	0.00	0.00	0.01	0.00	0.11	0.00	0.00	0.00	0.00	0.00
GCW (111)	0.00	0.00	0.00	0.01	0.00	0.11	0.00	0.00	0.00	0.00	0.00
GCW (116)	0.00	0.00	0.00	0.01	0.00	0.13	0.00	0.00	0.00	0.00	0.00
GCW (117)	0.00	0.00	0.00	0.01	0.00	0.14	0.00	0.00	0.00	0.00	0.00
GCW (101)	0.00	0.00	0.00	0.01	0.00	0.11	0.00	0.00	0.00	0.00	0.00
GCW (114)	0.00	0.00	0.00	0.02	0.00	0.16	0.00	0.00	0.00	0.00	0.00
GCW (102)	0.00	0.00	0.00	0.01	0.00	0.10	0.00	0.00	0.00	0.00	0.00
GCW (115)	0.00	0.00	0.00	0.01	0.00	0.14	0.00	0.00	0.00	0.00	0.00
GCW (113)	0.00	0.00	0.00	0.01	0.00	0.12	0.00	0.00	0.00	0.00	0.00
GCW (F87)	0.00	0.00	0.00	0.01	0.00	0.18	0.00	0.00	0.00	0.00	0.00
GCW (F92)	0.00	0.00	0.00	0.01	0.00	0.19	0.00	0.00	0.00	0.00	0.00
GCW (F90)	0.00	0.00	0.00	0.01	0.00	0.24	0.00	0.00	0.00	0.00	0.00
GCW (37)	0.00	0.00	0.00	0.04	0.00	0.20	0.00	0.00	0.00	0.00	0.00
GCW (38)	0.00	0.00	0.00	0.02	0.00	0.16	0.00	0.00	0.00	0.00	0.00
GCW (110)	0.00	0.00	0.00	0.02	0.00	0.15	0.00	0.00	0.00	0.00	0.00
GCW (36)	0.00	0.00	0.00	0.02	0.00	0.23	0.00	0.00	0.00	0.00	0.00
GCW (156)	0.00	0.00	0.00	0.01	0.00	0.13	0.00	0.00	0.00	0.00	0.00
GCW (164)	0.00	0.00	0.00	0.00	0.00	0.08	0.00	0.00	0.00	0.00	0.00
GCW (158)	0.00	0.00	0.00	0.00	0.00	0.15	0.00	0.00	0.00	0.00	0.00

	Lagena	Lenticulina	Miliammina	Miliolinella	Misc. Miliolids	Miscellaneous	Mychostomina	Neoconorbina	Neoeponides	Nodobaculariella	Nonion
PRI (T2I-50)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PRI (T2I-51)	0.00	0.00	0.01	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00
PRI (T2I-52)	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00
PRI (T2I-53)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PRO (T1O-34)	0.00	0.00	0.00	0.02	0.10	0.00	0.00	0.00	0.00	0.00	0.00
PRO (T1O-33)	0.00	0.00	0.00	0.00	0.14	0.00	0.00	0.00	0.00	0.02	0.00
PRO (T1O-32)	0.00	0.00	0.00	0.02	0.16	0.00	0.00	0.00	0.00	0.00	0.00
PRO (T1O-31)	0.00	0.00	0.00	0.03	0.18	0.00	0.01	0.00	0.00	0.00	0.00
PRO (T1O-30)	0.00	0.00	0.00	0.03	0.17	0.00	0.00	0.00	0.00	0.00	0.00
PRO (T2O-40)	0.00	0.00	0.02	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
PRO (T2O-39)	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00
PRO (T2O-38)	0.00	0.00	0.00	0.01	0.12	0.00	0.00	0.00	0.00	0.00	0.00
PRO (T2O-37)	0.00	0.00	0.00	0.04	0.02	0.00	0.00	0.00	0.00	0.01	0.00
PRO (T2O-36)	0.00	0.00	0.00	0.03	0.07	0.00	0.00	0.00	0.00	0.01	0.00

	Quinqueloculina	Rectobolivina	Recurvoides	Reophax	Reussella	Rosalina	Rotalia	Saccammina	Sagrina	Scutuloris	Sigmavirgulina	Siphotrochammina
FB (N7429)	0.13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FB (N7390)	0.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FB (N7386)	0.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FB (N7436)	0.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FB (NA139)	0.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FB (NA138)	0.09	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00
FB (NA140)	0.15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FB (N7424)	0.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FB (N7105)	0.25	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00
FB (N7425)	0.20	0.00	0.00	0.00	0.00	0.06	0.00	0.00	0.00	0.00	0.00	0.00
FB (7436)	0.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FB (A139)	0.21	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00
FB (A138)	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FB (A140)	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FB (A141)	0.18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FB (A142)	0.45	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FB (A143)	0.42	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FB (A144)	0.16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FB (A145)	0.28	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FB (A146)	0.28	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FB (A150)	0.14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FB (A148)	0.21	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FB (A147)	0.29	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FB (A151)	0.21	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FB (A152)	0.21	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FB (A153)	0.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FB (A154)	0.29	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FB (7451)	0.28	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00
FB (7450)	0.43	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00
FB (7449)	0.45	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FB (7448)	0.37	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FB (A94-1)	0.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FB (7438)	0.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FB (7437)	0.35	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FB (7)	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FB (50)	0.16	0.00	0.00	0.00	0.00	0.06	0.00	0.00	0.00	0.00	0.00	0.00
FB (51)	0.41	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00
FB (52)	0.35	0.00	0.00	0.00	0.00	0.15	0.00	0.00	0.00	0.00	0.00	0.00
AR (N7426)	0.06	0.00	0.00	0.00	0.00	0.05	0.00	0.00	0.00	0.00	0.00	0.00
AR (6027.1)	0.10	0.00	0.00	0.00	0.00	0.06	0.00	0.00	0.00	0.00	0.00	0.00
AR (6028)	0.07	0.00	0.00	0.00	0.00	0.10	0.00	0.00	0.00	0.00	0.00	0.00

	Quinqueloculina	Rectobolivina	Recurvoides	Reophax	Reussella	Rosalina	Rotalia	Saccammina	Sagrina	Scutuloris	Sigmavirgulina	Siphotrochammina
AR (6029)	0.15	0.00	0.00	0.00	0.00	0.10	0.00	0.00	0.00	0.00	0.00	0.00
AR (6030)	0.30	0.00	0.00	0.00	0.00	0.18	0.00	0.00	0.00	0.00	0.00	0.00
AR (6031)	0.09	0.00	0.00	0.00	0.00	0.08	0.00	0.00	0.00	0.00	0.00	0.00
AR (6032.1)	0.15	0.00	0.00	0.00	0.00	0.15	0.00	0.00	0.00	0.00	0.00	0.00
AR (6033)	0.14	0.00	0.00	0.00	0.00	0.10	0.00	0.00	0.00	0.00	0.00	0.00
WWB-TTI (4)	0.11	0.00	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
WWB-TTI (100)	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
WWB-TTI (103)	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
WWB-TTI (106)	0.00	0.00	0.00	0.07	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00
WWB-TTI (107)	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
WWB-TTI (108)	0.03	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
WWB-TTI (109)	0.00	0.00	0.00	0.00	0.00	0.06	0.00	0.00	0.00	0.00	0.00	0.00
WWB-TTI (110)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
WWB-TTI (111)	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00
WWB-TTI (113)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
WWB-TTI (115)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
WWB-TTI (116)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
WWB-TTI (260)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
WWB-TTI (261)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
WWB-TTI (262)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
WWB-TTI (270)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
WWB-TTI (280)	0.01	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
WWB-TTI (281)	0.00	0.00	0.00	0.03	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
WWB-TTI (283)	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
WWB-TTI (284)	0.23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
WWB-TTI (290)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TTI (Marco Isl)	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
FL Shelf (19)	0.22	0.00	0.00	0.01	0.02	0.01	0.00	0.00	0.00	0.00	0.00	0.00
FL Shelf (4)	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FL Shelf (21)	0.48	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FL Shelf (14)	0.57	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FL Shelf (26)	0.52	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
FL Shelf (45)	0.47	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FL Shelf (30)	0.39	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00
FL Shelf (80)	0.45	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
FL Shelf (110)	0.31	0.00	0.00	0.01	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00
NBB (BB03)	0.13	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00
NBB (BB04)	0.10	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00
NBB (BB05A)	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NBB (BB09)	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NBB (BB10)	0.32	0.00	0.00	0.00	0.00	0.07	0.00	0.00	0.00	0.00	0.00	0.00

	Quinqueloculina	Rectobolivina	Recurvoides	Reophax	Reussella	Rosalina	Rotalia	Saccammina	Sagrina	Scutuloris	Sigmavirgulina	Siphonochammina
NBB (BB11)	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NBB (BB14)	0.09	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
NBB (BB15)	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NBB (BB17)	0.05	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
NBB (Group C)	0.23	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00
NBB (Group B-1)	0.37	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00
CBB (BB22)	0.23	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00
CBB (BB26)	0.28	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00
CBB (BB34)	0.22	0.00	0.00	0.00	0.00	0.21	0.00	0.00	0.00	0.00	0.00	0.00
CBB (BB35)	0.43	0.00	0.00	0.00	0.00	0.08	0.00	0.00	0.00	0.00	0.00	0.00
CBB (BB36)	0.41	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00
CBB (BB37)	0.26	0.00	0.00	0.00	0.00	0.10	0.00	0.00	0.00	0.00	0.00	0.00
NBB (Group B-2)	0.37	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00
BNP (BB41)	0.32	0.00	0.00	0.00	0.00	0.05	0.00	0.00	0.00	0.00	0.00	0.00
BNP (BB42)	0.29	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00
BNP (BB44)	0.30	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00
BNP (BB45)	0.35	0.00	0.00	0.00	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.00
SBB (BB48)	0.48	0.00	0.00	0.00	0.00	0.08	0.00	0.00	0.00	0.00	0.00	0.00
SBB (BB51)	0.43	0.00	0.00	0.00	0.00	0.05	0.00	0.00	0.00	0.00	0.00	0.00
SBB (SP01)	0.21	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00
SBB (Group A)	0.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NBB (Group B-3)	0.35	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00
L TB (3750)	0.02	0.00	0.00	0.00	0.00	0.02	0.14	0.00	0.00	0.00	0.00	0.00
L TB (3756)	0.01	0.00	0.00	0.00	0.00	0.03	0.26	0.00	0.00	0.00	0.00	0.00
L TB (3761)	0.33	0.00	0.00	0.00	0.00	0.00	0.24	0.00	0.00	0.00	0.00	0.00
L TB (3775)	0.23	0.00	0.00	0.00	0.00	0.03	0.50	0.00	0.00	0.00	0.00	0.00
L TB (3782)	0.07	0.00	0.00	0.00	0.00	0.00	0.55	0.00	0.00	0.00	0.00	0.00
L TB (3861)	0.26	0.00	0.00	0.00	0.00	0.03	0.42	0.00	0.00	0.00	0.00	0.00
L TB (3870)	0.11	0.00	0.00	0.00	0.00	0.07	0.47	0.00	0.00	0.00	0.00	0.00
L TB (3881)	0.18	0.00	0.00	0.00	0.00	0.09	0.35	0.00	0.00	0.00	0.00	0.00
L TB (3890)	0.58	0.00	0.00	0.00	0.00	0.04	0.07	0.00	0.00	0.00	0.00	0.00
L TB (3898)	0.60	0.00	0.00	0.00	0.00	0.05	0.22	0.00	0.00	0.00	0.00	0.00
L TB (3908)	0.02	0.00	0.00	0.00	0.00	0.01	0.80	0.00	0.00	0.00	0.00	0.00
L TB (3915)	0.30	0.00	0.00	0.00	0.00	0.00	0.34	0.00	0.00	0.00	0.00	0.00
U TB (3785)	0.05	0.00	0.00	0.00	0.00	0.02	0.59	0.00	0.00	0.00	0.00	0.00
U TB (3794)	0.23	0.00	0.00	0.00	0.00	0.02	0.44	0.00	0.00	0.00	0.00	0.00
UTB (3802)	0.05	0.00	0.00	0.00	0.00	0.00	0.54	0.00	0.00	0.00	0.00	0.00
UTB (3807)	0.00	0.00	0.00	0.00	0.00	0.00	0.67	0.00	0.00	0.00	0.00	0.00
UTB (3817)	0.00	0.00	0.00	0.00	0.00	0.01	0.30	0.00	0.00	0.00	0.00	0.00
UTB (3818)	0.00	0.00	0.00	0.00	0.00	0.00	0.31	0.00	0.00	0.00	0.00	0.00
UTB (3826)	0.00	0.00	0.00	0.00	0.00	0.00	0.08	0.00	0.00	0.00	0.00	0.00

	Quinqueloculina	Rectobolivina	Recurvoides	Reophax	Reussella	Rosalina	Rotalia	Saccamina	Sagrina	Scutuloris	Sigmavirgulina	Siphotrochammina
UTB (3837)	0.00	0.00	0.00	0.00	0.00	0.00	0.72	0.00	0.00	0.00	0.00	0.00
UTB (3842)	0.00	0.00	0.00	0.00	0.00	0.00	0.49	0.00	0.00	0.00	0.00	0.00
UTB (3851)	0.00	0.00	0.00	0.00	0.00	0.00	0.74	0.00	0.00	0.00	0.00	0.00
UTB (3916)	0.00	0.00	0.00	0.00	0.00	0.00	0.35	0.00	0.00	0.00	0.00	0.00
UTB (3926)	0.05	0.00	0.00	0.00	0.00	0.00	0.73	0.00	0.00	0.00	0.00	0.00
UTB (3941)	0.00	0.00	0.00	0.00	0.00	0.00	0.44	0.00	0.00	0.00	0.00	0.00
UTB (3949)	0.00	0.00	0.00	0.00	0.00	0.00	0.13	0.00	0.00	0.00	0.00	0.00
SB (3958)	0.00	0.00	0.00	0.00	0.00	0.00	0.10	0.00	0.00	0.00	0.00	0.00
SB (3961)	0.03	0.00	0.00	0.00	0.00	0.00	0.74	0.00	0.00	0.00	0.00	0.00
SB (3971)	0.01	0.00	0.00	0.00	0.00	0.00	0.88	0.00	0.00	0.00	0.00	0.00
SB (3972)	0.06	0.00	0.00	0.00	0.00	0.00	0.57	0.00	0.00	0.00	0.00	0.00
SB (3990)	0.00	0.00	0.00	0.00	0.00	0.00	0.84	0.00	0.00	0.00	0.00	0.00
SB (3991)	0.18	0.00	0.00	0.00	0.00	0.00	0.41	0.00	0.00	0.00	0.00	0.00
IndRks (4005)	0.13	0.00	0.00	0.00	0.00	0.02	0.27	0.00	0.00	0.00	0.00	0.00
GCW (F13)	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
GCW (105)	0.09	0.00	0.00	0.00	0.00	0.05	0.00	0.00	0.00	0.00	0.00	0.00
GCW (106)	0.09	0.00	0.00	0.00	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.00
GCW (107)	0.05	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00
GCW (108)	0.07	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
GCW (103)	0.11	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00
GCW (104)	0.09	0.00	0.00	0.00	0.00	0.05	0.00	0.00	0.00	0.00	0.00	0.00
GCW (100)	0.05	0.00	0.00	0.00	0.00	0.05	0.00	0.00	0.00	0.00	0.00	0.00
GCW (112)	0.03	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00
GCW (111)	0.05	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
GCW (116)	0.09	0.00	0.00	0.00	0.00	0.07	0.00	0.00	0.00	0.00	0.00	0.00
GCW (117)	0.05	0.00	0.00	0.00	0.00	0.07	0.00	0.00	0.00	0.00	0.00	0.00
GCW (101)	0.04	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00
GCW (114)	0.04	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00
GCW (102)	0.07	0.00	0.00	0.00	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.00
GCW (115)	0.07	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00
GCW (113)	0.04	0.00	0.00	0.00	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.00
GCW (F87)	0.02	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00
GCW (F92)	0.01	0.00	0.00	0.00	0.00	0.05	0.00	0.00	0.00	0.00	0.00	0.00
GCW (F90)	0.03	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00
GCW (37)	0.03	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
GCW (38)	0.03	0.00	0.00	0.00	0.00	0.05	0.00	0.00	0.00	0.00	0.00	0.00
GCW (110)	0.04	0.00	0.00	0.00	0.00	0.06	0.00	0.00	0.00	0.00	0.00	0.00
GCW (36)	0.01	0.00	0.00	0.00	0.00	0.08	0.00	0.00	0.00	0.00	0.00	0.00
GCW (156)	0.03	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
GCW (164)	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
GCW (158)	0.05	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00

	Quinqueloculina	Rectobolivina	Recurvoides	Reophax	Reussella	Rosalina	Rotalia	Saccammina	Sagrina	Scutuloris	Sigmavirgulina	Siphotrochammina
GCW (163)	0.06	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00
GCW (155)	0.04	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00
GCW (162)	0.04	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
GCW (157)	0.03	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
GCL (19)	0.05	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00
GCL (20)	0.04	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00
GCL (80)	0.00	0.00	0.00	0.00	0.00	0.05	0.00	0.00	0.00	0.00	0.00	0.00
GCL (82)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
GCL (4)	0.05	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00
GCL (5)	0.03	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00
GCL (6)	0.04	0.00	0.00	0.00	0.00	0.06	0.00	0.00	0.00	0.00	0.00	0.00
GCL (7)	0.05	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
GCL (8)	0.04	0.00	0.00	0.00	0.00	0.06	0.00	0.00	0.00	0.00	0.00	0.00
GCL (9)	0.03	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
GCL (17)	0.04	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00
GCL (18)	0.05	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
GCL (23)	0.02	0.00	0.00	0.00	0.00	0.08	0.00	0.00	0.00	0.00	0.00	0.00
GCL (24)	0.02	0.00	0.00	0.00	0.00	0.08	0.00	0.00	0.00	0.00	0.00	0.00
GCL (25)	0.01	0.00	0.00	0.00	0.00	0.11	0.00	0.00	0.00	0.00	0.00	0.00
GCL (26)	0.01	0.00	0.00	0.00	0.00	0.12	0.00	0.00	0.00	0.00	0.00	0.00
GCL (88)	0.04	0.00	0.00	0.00	0.00	0.07	0.00	0.00	0.00	0.00	0.00	0.00
GCL (89)	0.04	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00
GCL (90)	0.02	0.00	0.00	0.00	0.00	0.08	0.00	0.00	0.00	0.00	0.00	0.00
GCL (92)	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
GCL (96)	0.02	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00
GCL (97)	0.07	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
GCL (75)	0.03	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00
GCL (76)	0.03	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00
GCL (77)	0.04	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00
GCL (78)	0.04	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00
GCL (79)	0.02	0.00	0.00	0.00	0.00	0.06	0.00	0.00	0.00	0.00	0.00	0.00
GCL (83)	0.02	0.00	0.00	0.00	0.00	0.08	0.00	0.00	0.00	0.00	0.00	0.00
GCL (84)	0.03	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00
GCL (85)	0.02	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00
GCL (86)	0.03	0.00	0.00	0.00	0.00	0.05	0.00	0.00	0.00	0.00	0.00	0.00
GCL (87)	0.03	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00
PRI (T1I-42)	0.00	0.00	0.00	0.01	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00
PRI (T1I-44)	0.19	0.00	0.00	0.01	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00
PRI (T1I-45)	0.12	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00
PRI (T1I-46)	0.00	0.00	0.00	0.00	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.00
PRI (T2I-48)	0.02	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00

	Siphonaperta	Siphonina	Sorites	Spirillina	Spiroloculina	Spirosigmoilina	Stainforthia	Textularia	Trifarina	Tretomphalus	Triloculina	Triloculinella
FB (N7429)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.00
FB (N7390)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.10	0.00
FB (N7386)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.10	0.00
FB (N7436)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.27	0.00
FB (NA139)	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.20	0.00
FB (NA138)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.35	0.00
FB (NA140)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.25	0.00
FB (N7424)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.03	0.00
FB (N7105)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.15	0.00
FB (N7425)	0.00	0.00	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.10	0.00
FB (7436)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.31	0.00
FB (A139)	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.18	0.00
FB (A138)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.45	0.00
FB (A140)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.40	0.00
FB (A141)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.11	0.00
FB (A142)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.00
FB (A143)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.07	0.00
FB (A144)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.00
FB (A145)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.08	0.00
FB (A146)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.07	0.00
FB (A150)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.08	0.00
FB (A148)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.00	0.00	0.21	0.00
FB (A147)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.11	0.00
FB (A151)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.00	0.00	0.19	0.00
FB (A152)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.21	0.00
FB (A153)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.00	0.00	0.08	0.00
FB (A154)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.07	0.00
FB (7451)	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.12	0.00
FB (7450)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.08	0.00
FB (7449)	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.19	0.00
FB (7448)	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.19	0.00
FB (A94-1)	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.15	0.00
FB (7438)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.15	0.00
FB (7437)	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.15	0.00
FB (7)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.64
FB (50)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.32
FB (51)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FB (52)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.12
AR (N7426)	0.00	0.00	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.14	0.00
AR (6027.1)	0.00	0.00	0.09	0.00	0.00	0.00	0.00	0.05	0.00	0.00	0.07	0.00
AR (6028)	0.00	0.00	0.05	0.00	0.00	0.00	0.00	0.04	0.00	0.00	0.05	0.00

	Siphonaperta	Siphonina	Sorites	Spirillina	Spiroloculina	Spirosigmoilina	Stainforthia	Textularia	Trifarina	Tretomphalus	Triloculina	Triloculinella
PRI (T2I-50)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00
PRI (T2I-51)	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PRI (T2I-52)	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PRI (T2I-53)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PRO (T1O-34)	0.01	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.01	0.00	0.00	0.00
PRO (T1O-33)	0.00	0.00	0.00	0.01	0.03	0.00	0.00	0.00	0.02	0.00	0.00	0.00
PRO (T1O-32)	0.00	0.00	0.00	0.00	0.05	0.00	0.00	0.00	0.00	0.00	0.02	0.00
PRO (T1O-31)	0.00	0.00	0.00	0.01	0.05	0.00	0.00	0.00	0.01	0.00	0.00	0.00
PRO (T1O-30)	0.01	0.00	0.00	0.00	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PRO (T2O-40)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PRO (T2O-39)	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.02	0.00	0.00	0.00
PRO (T2O-38)	0.01	0.00	0.00	0.02	0.03	0.00	0.00	0.00	0.01	0.00	0.00	0.00
PRO (T2O-37)	0.00	0.00	0.00	0.00	0.06	0.00	0.00	0.00	0.02	0.00	0.01	0.00
PRO (T2O-36)	0.00	0.00	0.00	0.01	0.02	0.00	0.00	0.00	0.01	0.00	0.00	0.00

	Affinetrina	Acervulina	Ammobaculites	Ammonia	Amphisorus	Amphistegina	Anomalinoidea	Androsina	Angulogerina
APAC 5	0	0	0	25	0	14	0	0	0
APAC 4	0	0	4	102	0	6	0	0	0
APAC 7a	0	0	0	23	0	14	0	0	0
SMR 85A	0	0	0	270	0	0	0	0	0
SMR 85B	0	0	0	270	0	0	0	0	0
SMR 82B	0	0	0	231	0	6	0	0	0
APAC 3	0	0	0	29	0	5	0	0	0
APAC 7b	0	0	5	0	0	15	0	0	0

	Archaías	Arenoparella	Articulina	Asterigerina	Astrononion	Bigenerina	Bolivina	Borelis	Brizalina
APAC 5	0	0	1	0	1	0	2	0	0
APAC 4	0	0	0	1	0	0	0	0	0
APAC 7a	0	0	0	8	0	0	0	0	0
SMR 85A	0	0	0	0	0	0	0	0	0
SMR 85B	0	0	0	0	0	0	0	0	0
SMR 82B	0	0	0	2	0	0	0	0	0
APAC 3	0	0	0	2	3	0	2	0	0
APAC 7b	0	0	0	3	7	2	12	0	2

	Broeckina	Bulimina	Buliminella	Cancris	Cassidulina	Cibicides	Clavulina	Cornuloculina	Criboelphidium
APAC 5	0	2	1	0	0	0	0	0	0
APAC 4	0	0	3	0	1	5	0	0	0
APAC 7a	0	0	0	0	0	0	0	0	0
SMR 85A	0	0	0	0	0	0	0	0	0
SMR 85B	0	0	0	0	0	0	0	0	0
SMR 82B	0	0	0	0	0	0	0	0	0
APAC 3	0	0	0	0	0	3	0	0	0
APAC 7b	0	1	1	0	2	30	0	0	0

	Cribrostomoides	Cyclobiculina	Cornuspira	Cymbaloporetta	Discorbis	Elphidium	Oolina	Eponides	Fissurina
APAC 5	0	0	0	0	4	76	0	4	0
APAC 4	0	0	0	0	2	67	0	0	0
APAC 7a	0	0	0	0	5	70	0	5	0
SMR 85A	0	0	0	0	0	32	0	0	0
SMR 85B	0	0	0	0	0	43	0	0	0
SMR 82B	0	0	0	0	0	58	0	0	0
APAC 3	0	0	0	0	1	99	0	3	0
APAC 7b	0	0	0	0	10	45	0	0	0

	Fursenkoina	Gaudryina	Glabratella	Globigerina	Globigerinella	Globigerinoides	Globocassidulina	Globorotalia	Glomospira
APAC 5	0	0	0	0	0	0	0	0	0
APAC 4	0	3	0	0	0	0	0	0	0
APAC 7a	0	0	0	0	0	1	0	0	0
SMR 85A	0	0	0	0	0	0	0	0	0
SMR 85B	0	0	0	0	0	0	0	0	0
SMR 82B	0	0	0	0	0	0	0	0	0
APAC 3	0	0	0	0	0	0	0	0	0
APAC 7b	0	0	0	5	0	0	0	0	0

	Guttulina	Gypsina	Hanzawaia	Haplophragmoides	Helenina	Hopkinsina	Hauerina	Haynesina	Jsbm
APAC 5	0	0	0	0	0	0	0	7	0
APAC 4	0	0	1	0	0	0	0	1	0
APAC 7a	1	0	0	0	0	0	25	0	0
SMR 85A	0	0	11	0	0	0	0	0	0
SMR 85B	1	0	6	0	0	0	0	0	0
SMR 82B	1	0	21	0	0	0	0	0	0
APAC 3	0	0	0	0	0	0	0	3	0
APAC 7b	0	0	4	0	0	0	0	12	0

	Laevipeneroplis	Lagena	Lenticulina	Miliammina	Miliolinella	Misc. Miliolids	Miscellaneous	Mychostomina	Neoconorbina
APAC 5	0	0	1	0	0	0	31	0	1
APAC 4	0	0	0	1	0	0	13	0	0
APAC 7a	0	1	0	0	0	0	5	0	0
SMR 85A	0	0	0	0	0	0	0	0	0
SMR 85B	0	0	0	0	0	0	0	0	0
SMR 82B	0	0	0	0	0	0	0	0	0
APAC 3	0	0	2	0	0	0	31	0	0
APAC 7b	0	0	2	0	0	0	29	0	1

	Neoeponides	Nodobaculariella	Nonion	Nonionella	Nubecularia	Pateoris	Patellina	Peneroplis	Planispirinella
APAC 5	0	0	7	0	0	0	0	2	0
APAC 4	0	0	0	11	0	0	0	0	0
APAC 7a	0	0	0	0	0	0	0	2	0
SMR 85A	0	0	0	0	0	0	0	0	0
SMR 85B	0	0	0	0	0	0	0	0	0
SMR 82B	0	0	0	0	0	0	0	0	0
APAC 3	0	0	0	6	0	0	0	0	0
APAC 7b	0	0	5	5	0	0	0	0	0

	Planktonic	Planorbulina	Planulina	Pseudoclavulina	Pulleniatina	Pyrgo	Quinqueloculina	Rectobolivina	Recurvoides
APAC 5	0	0	69	0	0	0	21	0	0
APAC 4	0	0	14	0	0	2	47	0	0
APAC 7a	0	0	54	0	0	2	44	0	0
SMR 85A	0	0	0	0	0	0	0	0	0
SMR 85B	0	0	0	0	0	0	0	0	0
SMR 82B	0	0	0	0	0	0	1	0	0
APAC 3	0	0	36	0	0	1	19	0	0
APAC 7b	0	4	14	0	0	2	33	0	0

	Reophax	Reussella	Rosalina	Rotalia	Saccamina	Sagrina	Scutularis	Sigmavirgulina	Siphonochammina
APAC 5	0	0	15	1	0	0	0	0	0
APAC 4	0	1	8	0	0	0	0	0	0
APAC 7a	0	0	27	0	0	0	0	0	0
SMR 85A	0	0	0	0	0	0	0	0	0
SMR 85B	0	0	0	0	0	0	0	0	0
SMR 82B	0	0	1	0	0	0	0	0	0
APAC 3	0	3	26	5	0	0	0	0	0
APAC 7b	0	1	33	0	0	0	0	0	0

	Siphonaperta	Siphonina	Sorites	Spirillina	Spiroloculina	Spirosigmoilina	Stainforthia	Textularia	Trifarina
APAC 5	0	0	0	0	0	0	0	0	0
APAC 4	0	0	0	0	0	0	0	1	0
APAC 7a	0	0	0	0	2	0	0	0	0
SMR 85A	0	0	0	0	0	0	0	0	0
SMR 85B	0	0	0	2	1	0	0	0	0
SMR 82B	0	0	0	0	0	0	0	0	0
APAC 3	0	0	0	0	1	0	0	7	0
APAC 7b	0	0	0	0	1	0	0	0	0

	Tretomphalus	Triloculina	Triloculinella	Trochammina	Turrispirillina	Uvigerina	Vulvulina	Valvulineria	Wiesnerella
APAC 5	0	10	0	5	0	0	0	0	0
APAC 4	0	5	0	4	0	0	0	0	0
APAC 7a	0	18	0	0	0	0	0	0	0
SMR 85A	0	4	0	0	0	0	0	0	0
SMR 85B	0	0	0	0	0	0	0	0	0
SMR 82B	0	0	0	0	0	0	0	0	0
APAC 3	0	4	0	8	0	0	0	1	0
APAC 7b	0	3	0	4	0	3	1	3	0

	Int Textulariid	Int Rotaliid
APAC 5	0	0
APAC 4	0	0
APAC 7a	0	0
SMR 85A	0	0
SMR 85B	0	0
SMR 82B	0	0
APAC 3	0	0
APAC 7b	0	0