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FORAMINIFERAL AND LITHOLOGIC INDICATORS OF DEPOSITIONAL PROCESSES IN WILMINGTON AND SOUTH HEYES SUBMARINE CANYONS, U.S. ATLANTIC CONTINENTAL SLOPE

JASON J. LUNDQUIST,[1] STEPHEN J. CULVER,[2] AND DANIEL JEAN STANLEY[3]

ABSTRACT

Foraminiferal and lithologic characteristics of sediments from 14 Deep Sea Research Vessel *Alvin* push cores have been used to investigate modern sedimentary processes in Wilmington and South Heyes submarine canyons. A nearly ubiquitous occurrence of abundant foraminiferal species is over-printed by depth-related variations in abundance. Most species are native to lower bathyal and abyssal depths and are in situ. The occurrence of neritic species is attributed to erosion of material from slump blocks of neritic origin which now comprise the steep and undercut walls of Wilmington Canyon.

In Wilmington Canyon, the consistent distribution of foraminifera contrasts with marked variations in lithologic characteristics observed at channel meanders. These variations are attributed to relatively minor mass-wasting processes and to effects of bottom (perhaps tidal) and/or low density current action, more active at constrictions and along the steep walls of meanders. These processes are less prevalent in South Heyes Canyon as indicated by markedly lower compositional variations, a low percent of clastic material, and a lower rate of sediment accumulation. This is, in part, a function of the linear morphology and less varied relief of South Heyes Canyon. There is no firm evidence for prevalent high energy downslope transportation events (i.e., erosive high-density turbidity currents) in either Wilmington and South Heyes Canyons during the past 200-400 years represented by the cored material.

INTRODUCTION

In this study, foraminiferal assemblages and quantitative lithologic data from short cores are used to investigate the mode and pattern of Recent sediment transport in Wilmington and South Heyes canyons off the coast of New Jersey, U.S.A. (Figs. 1, 2). South Heyes Canyon is a linear chute-like canyon confined to the continental slope. Wilmington Canyon is a larger feature that heads at a depth of approximately 90 m (Stanley and others, 1986) some 125 km from the Cape May shore (Uchupi, 1965), and from there sinuously traverses the shelf, slope and rise nearly to the Hatteras Abyssal Plain. Its meandering "fluvial-like" shape (McGregor and others, 1982; Stubblefield and others, 1982), with relatively steep walls and low gradient, contrasts with less steep walls and a gradient that approximates the regional slope in South Heyes Canyon (Fig. 2).

Stanley and others (1986) suggested that downslope sediment transport occurs in Wilmington Canyon via a "stop-and-go" mechanism, incorporating deep-water and shallower water foraminifera into sediments being moved down the slope. This idea, that gravity flow, bottom currents, and/or turbidity currents displaced material down the continental margin, was based on foraminiferal and lithologic variation in the hemipelagic cover observed in several 20–35 cm short cores collected by the Deep Sea Research Vessel (DSRV) *Alvin,* along a meandering part of the Wilmington Canyon. The cores were inferred to record Recent sedimentation based on rates of deposition >40 cm per 1,000 years (Stanley and others, 1984) for cores nearby on the upper rise.

The stop-and-go downslope transport mechanism is based on the supposition that foraminiferal assemblages were not transported by a single event from the shelf to lower reaches. Rather, the foraminiferal data indicate a mixing of assemblages via step-wise downslope transport, allowing autochthonous deeper water benthic foraminifera and planktic foraminifera to be incorporated into the sediment at each pause. In contrast, sediment transported by one major event generally would be dominated by a shallow water assemblage, with only minor additions of deeper water benthics and planktics (see Brunner and Culver, 1992). Sediment transported by the stop-and-go mechanism would have a mixture of several depth assemblages and a preponderance of planktics. Material moved down-canyon in this manner could incorporate material eroded from the canyon walls during its journey.

This study utilizes a greater number of cores, also collected during a series of *Alvin* dives, which allow for a wider physiographic and geographic coverage (i.e., from meanders along the length of Wilmington Canyon and from the nearby, morphologically distinct South Heyes Canyon). To aid comparison, the approach adopted here is the same as that in Stanley and others (1986), and the new data are evaluated in light of several other studies of currently active processes in the Wilmington Canyon area.

METHODS

Between 22 September and 2 October 1986, push-cores were collected during the course of six dives taken by the DSRV *Alvin* within Wilmington and South Heyes submarine canyons (Fig. 1). Sample locations were mapped on a SeaBEAM survey map (Fig. 2). Locations were determined using on-board sonar, depth, direction, and visual observation, and they were verified by coordinates determined by the triangulation of sonar buoys transmitted to the *Alvin* by the mother-ship *Atlantis II.*

Fourteen short cores containing 78 samples were ex-

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[1] Department of Geological Sciences, Old Dominion University, Norfolk, Virginia 23529. Now at Department of Geological Sciences, University of Texas at Austin, Austin, TX 78712, U.S.A.

[2] Department of Palaeontology, The Natural History Museum, Cromwell Road, London, SW7 5BD, U.K. England.

[3] Department of Paleobiology, National Museum of Natural History, Smithsonian Institution, Washington, DC 20560, U.S.A.

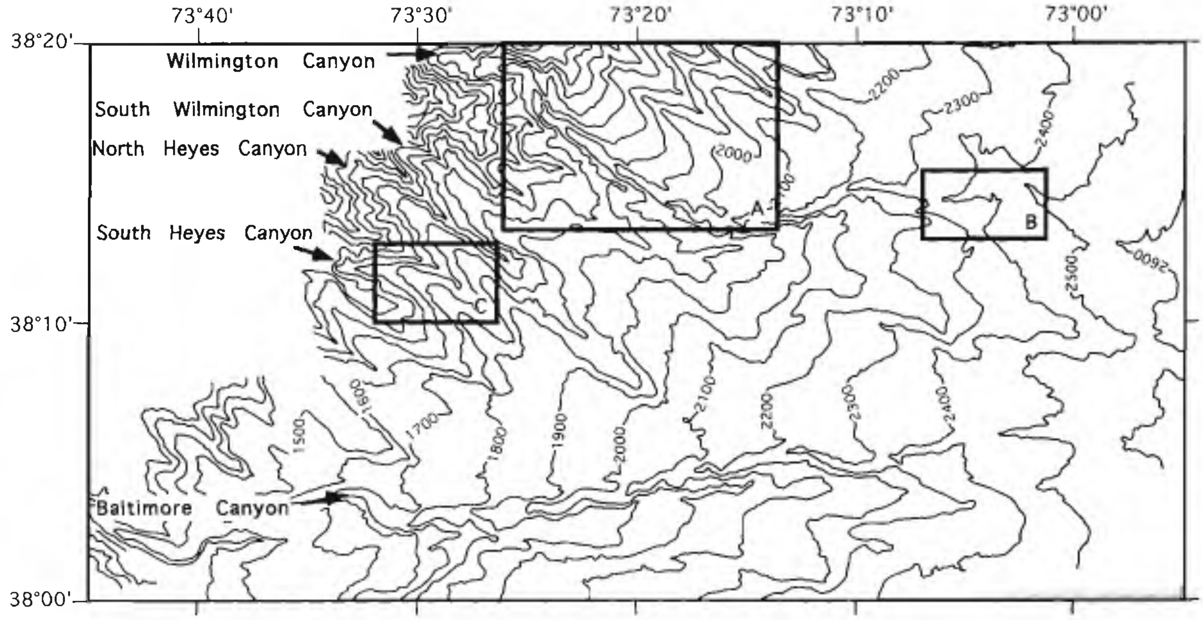

FIGURE 1. General bathymetry and location of Wilmington and South Heyes submarine canyons along the North American Atlantic continental margin. Boxes give the location of Figures 2A–C.

amined. For most of the push-cores, every other 2-cm downcore segment was available for study; for some push-cores contiguous 2-cm samples were available. Table 1 summarizes the depth and location of each of the cores collected from this study, as well as the sampled intervals from each core. Sediment accumulation rates determined using $^{210}Pb/^{137}Cs$ geochronology (Nittrouer and others, 1979) vary within the canyons from 22 to >500 mg/cm^2/yr (Sanford and others, 1990) dependent on local processes, but background rates indicate that the ~25-cm cores of this study represent approximately 200 to 400 years of sediment accumulation.

Approximately five grams of material were disaggregated for each sample and sieved on a 63 μm mesh to remove silt and clay. The residue was dried, weighed, and the sand to silt plus clay ratio was calculated. Split fractions of each sample were spread evenly over a gridded picking tray. Every particle within randomly selected squares was counted and assigned to one of several compositional categories. Counting of benthic vs. planktic foraminifera continued until more than 300 planktics were recognized. Picking then continued until 300 benthic specimens had been counted, after which the relative proportions of species categories were determined. Following picking, the weight of sediment containing 300 benthic foraminifera was estimated by multiplying the weight of the split by the proportion of squares picked to obtain 300 individuals.

Species were identified initially using published figures and descriptions and by comparison to material previously identified by Brunner and Culver (1992). Identifications were checked by examination of material in the Cushman Collection of foraminifera in the Smithsonian Institution, Washington, D.C. and in the collection in The Natural History Museum, London.

RESULTS

LITHOLOGIC DATA

The relative abundance of different grain types composing the sand-sized fraction of each sample, as calculated directly from grain counts, is shown in Table 2. Grain count data have been organized into three groups: clastic grains (quartz, mica, glauconite, heavy minerals, sponge spicules, echinoderm spines), planktic microfossils (planktic foraminifera, radiolaria, diatoms), and benthic foraminifera. Also given in Table 2 is weight percent of sand-sized material in each sample, calculated number of benthic foraminifera in one gram of unsieved sediment, and ratio of planktic to benthic foraminifera (P/B, given as percent planktics).

Examination of lithologic characteristics reveals little significant downcore variation (Table 2). Thus, values are summarized as averages for each core (Fig. 3). However, in samples from core 1739-1, one of the few marked downcore changes is seen with variation between the top half and lower half of the core (Table 2). The 2–4 cm and 6–8 cm intervals have low percent benthic foraminifera, comparatively low percent planktic microfossils, and a high sand fraction. The 10–12 cm and 14–16 cm intervals have approximately seven times greater percent benthic foraminifera, double the percent planktic microfossils (with a corresponding decrease in proportion of clastic material), and a diminution of the sand fraction by ~10%. An increase in clastic and sand-sized input in the upper core corresponds with a decrease in number of benthic foraminifera per gram, suggesting a higher rate of sediment accumulation. Notwithstanding this downcore variation, the generally high sand fraction in this core is unusual, from three to four times greater than any other sample in our study (Fig. 3). This is of interest because this core comes from a water depth of 2,483 m and its sand content contrasts with core 1739-5,

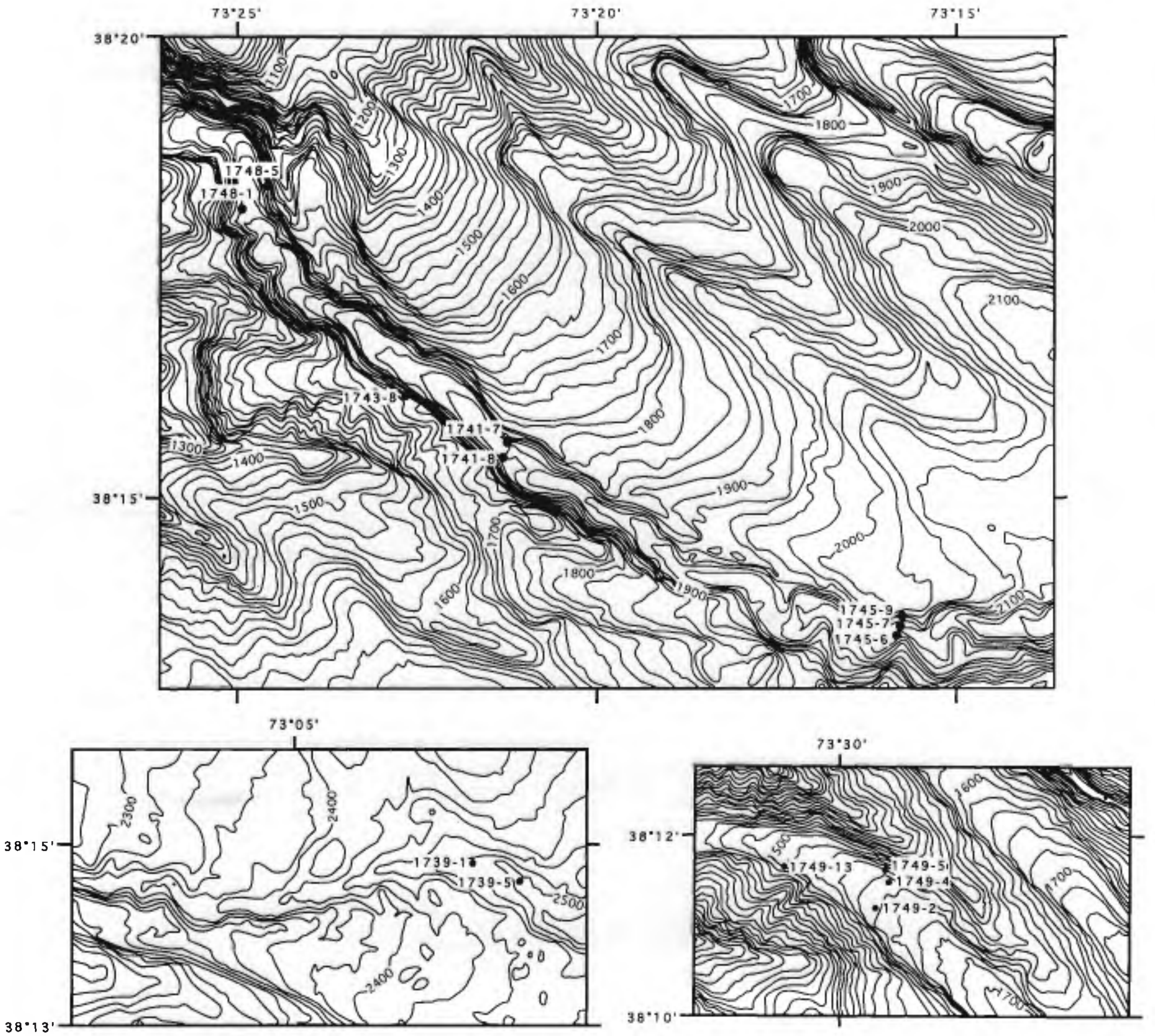

FIGURE 2. A—Location of sampling sites within a portion of Wilmington Canyon (map location given on Figure 1). B—Location of sampling sites within a portion of South Heyes Canyon (map location given on Figure 1). C—Location of sampling sites within a portion of Wilmington Canyon (map location given on Figure 1).

relatively nearby on the opposite side of the canyon. Samples from core 1739-5 are generally high in planktic microfossils and benthic foraminifera (relatively low in clastic material) and have a moderate percent sand fraction relative to other locations in Wilmington Canyon. Upcore variations include only a slightly decreased sand fraction. In core 1739-5 the percentage of planktic microfossils is high relative to all other samples in this study.

Three cores from location 1745 show an overall pattern in which cores 1745-6 and 1745-7 are quite similar, yet distinct from core 1745-9 (Table 2; Fig. 3). The percent sand-sized material in cores 1745-6 and 1745-7 varies little, with a slight decrease in values about mid-core. The percent planktic microfossil and benthic foraminifera also vary about similar values. Percentages of benthic foraminifera tend to be relatively low (Table 2). Samples from core 1745-9 record planktic microfossil values that vary little about the mean of ~34%. Values for percent benthic foraminifera are slightly higher than in other cores and one interval (4–6 cm) has a high value of 6.8% benthic foraminifera. The sand fraction in core 1745-9 varies little throughout, but decreases slightly upcore with a comparatively low mean of approximately 5%. Composition at location 1745 shows a clear but modest drop in sand fraction and an increase in benthic foraminifera and planktic microfossils (a decrease of clastic material) between the center to the outside of a meander.

The two cores on opposite sides of a meander at location 1741 also display modest between-core variation (Table 2; Fig. 3). The sand fraction in core 1741-7 along the outside

TABLE 1. Sampled intervals and location and depth of cores in Wilmington and South Heyes canyons.

Core	Sampled intervals	Depth	Location
Wilmington Canyon			
1739-1	2–4 cm, 6–8 cm, 10–12 cm, 14–16 cm	2,483 m	Base of near-vertical north wall on canyon floor, on outside of meander.
1739-5	2–4 cm, 4–6 cm, 6–8 cm, 8–10 cm, 10–12 cm, 12–14 cm, 14–16 cm, 16–18 cm, 18–20 cm, 20–22 cm	2,503 m	Base of sloping (~30°) south wall on canyon floor, on inside of meander.
1741-7	2–4 cm, 6–8 cm, 10–12 cm, 14–16 cm, 18–20 cm	1,898 m	Base of sloping (~30–50°) north wall on canyon floor, on outside of meander.
1741-8	2–4 cm, 6–8 cm, 10–12 cm	1,897 m	Base of sloping (~10–15°) south wall on canyon floor, on inside of meander..
1743-8	2–4 cm, 6–8 cm, 10–12 cm, 14–16 cm, 18–20 cm, 22–24 cm	1,703 m	High on steep (45°) gully wall, 120 m above axis of gully; trend orthogonal to canyon.
1745-6	2–4 cm, 6–8 cm, 10–12 cm, 14–16 cm	2,076 m	On floor of canyon, in middle of the channel.
1745-7	2–4 cm, 4–6 cm, 6–8 cm, 8–10 cm, 10–12 cm, 12–14 cm, 14–16 cm, 16–18 cm, 18–20 cm, 20–22 cm	2,080 m	Immediately below northern upslope (1–2°) on canyon floor, towards outside of meander.
1745-9	2–4 cm, 4–6 cm, 6–8 cm, 8–10 cm, 10–12 cm, 12–14 cm	2,080 m	Immediately below sloping (20°) north wall on canyon floor, on outside of meander.
1748-1	2–4 cm, 6–8 cm, 10–12 cm, 14–16 cm	1,600 m	Base of west wall on canyon floor.
1748-5	2–4 cm, 6–8 cm, 8–10 cm, 10–12 cm, 12–14 cm, 14–15 cm	1,540 m	On steep east wall.
South Heyes Canyon			
1749-2	2–4 cm, 6–8 cm, 10–12 cm, 14–16 cm, 18–20 cm	1,589 m	On canyon floor near south wall.
1749-4	2–4 cm, 6–8 cm, 10–12 cm, 14–16 cm, 18–20 cm, 22–24 cm	1,585 m	On gently sloping north side of canyon floor.
1749-5	2–4 cm, 6–8 cm, 10–12 cm, 14–16 cm, 18–20 cm	1,560 m	On sloping (15°) north wall.
1749-13	2–4 cm, 6–8 cm, 10–12 cm	1,501 m	Base of south wall, at canyon floor.

of the meander is relatively high, with values averaging ~12%. Other than extremely high values in core 1739-1, such proportions are consistently higher than at any other locations in this study. The percentage of planktic microfossils is nearly uniform, with values averaging ~7%. This, and a low percent benthic foraminifera, indicate a high clastic input. Samples from core 1741-8 are also fairly high for the sand fraction (averaging ~9%) but are notably lower than those across the canyon in core 1741-7. The percent contribution of planktic microfossils, benthic foraminifera and clastic material in core 1741-8 is similar to that in 1741-7.

Core 1743-8 from the gully in Wilmington Canyon's south wall has sand fraction percents that are similar (~9%) to values in locations nearby and down-canyon (cores 1741-8, 1745-6, and 1745-7). The clastic content in 1743-8 is also similar to that of location 1741 (Fig. 3).

The two cores from opposite sides of the canyon at site 1748 are located where the channel takes on a north-south trend. Core 1748-5 is located high on the canyon wall. The shipboard description noted 3 to 4 cm, sharp-edged "outcrop blocks" down to 6 cm, with "greenish hemipelagic material in between blocks." Also noted were burrows with a blackish sandy infilling in samples from 6–8 cm and 8–10 cm. The 14–15 cm interval was described as having a small burrow entering from the side filled with "wetter material" (S. J. Culver, field notes). However, during the course of sample preparation no obvious blocks of consolidated outcrop material were noted.

Samples from core 1748-5 record an extremely high percent of clastic material (~99%) with very low values of planktic microfossils and benthic foraminifera (Table 2). The top intervals (2–4 cm and 6–8 cm) have a slightly higher percent planktic microfossils, and percent benthic foraminifera three times that of the lower intervals (8–10 cm, 10–12 cm, 12–14 cm, and 14–15 cm). Values for the sand fraction show a trend of lessening values downcore from 9.4% to 2.6% with an average of 5.1% (Table 2).

Core 1748-1 did not encounter any similar consolidated outcrop material. The sand fraction percent is internally consistent, showing a rather low average of 2.6%. Percentages of planktic microfossils and benthic foraminifera are variable.

Samples from South Heyes Canyon cores show a striking consistency, and differ in composition from those in Wilmington Canyon (Table 2). Percentages of sand, clastics, planktic microfossils and benthic foraminifera vary slightly throughout the cores. Average values for the sand fraction in these cores (Fig. 3) are: 1.7% (1749-2), 2.4% (1749-4), 2.9% (1749-5), and 2.3% (1749-13). This demonstrates cross-canyon consistency not seen in Wilmington Canyon, but does resemble values in core 1748-1 (at a similar depth). Percentages of benthics are also consistent and high. With one exception (core 1749-4, 18–20 cm), benthic percentages are higher than in Wilmington Canyon, and the average percent from South Heyes (8.5%) is much higher than anywhere in Wilmington Canyon. Planktic microfossil percentages are also noticeably higher (average ~20.5%) than in most cores from Wilmington Canyon, with the exception of cores 1739-5 and 1745-9. High planktic microfossil and benthic percentages are inversely proportional to the generally low values of clastic material.

The number of benthic foraminifera occurring in one

TABLE 2. Lithologic and foraminiferal characteristics for the 78 samples (calculated number of benthics in 1 g rounded to nearest 100).

Core number	Core interval	% Sand sized material	% Clastic grains	% Planktic microfossils	% Benthic foraminifera	P/B (% planktics)	H(S)	No. benthics in 1g
1739-1	2-4cm	42.6	91.0	7.1	0.3	82.7	3.5	3,800
1739-1	6-8cm	46.4	91.5	7.6	0.3	87.6	3.6	3,300
1739-1	10-12cm	31.0	79.9	16.4	2.1	92.1	3.7	7,700
1739-1	14-16cm	35.0	81.3	14.4	2.2	89.1	3.7	8,700
1739-5	2-4cm	8.8	67.7	27.5	4.6	82.1	3.1	100,300
1739-5	4-6cm	4.4	56.9	39.4	3.1	86.0	2.8	362,100
1739-5	6-8cm	5.8	59.3	35.7	4.9	85.9	3.0	194,900
1739-5	8-10cm	6.3	43.6	50.4	6.0	87.4	2.9	321,000
1739-5	10-12cm	7.1	47.9	47.4	4.7	88.1	2.9	232,300
1739-5	12-14cm	6.3	59.8	35.7	4.4	90.4	3.1	305,600
1739-5	14-16cm	7.0	40.9	54.0	5.2	90.0	3.0	147,600
1739-5	16-18cm	8.5	39.1	57.5	3.4	94.1	3.0	111,400
1739-5	18-20cm	8.8	55.8	39.1	5.0	88.4	3.0	100,300
1739-5	20-22cm	7.9	69.6	25.5	4.9	86.3	3.0	139,900
1741-7	2-4cm	11.9	91.7	6.2	1.8	72.4	3.0	58,900
1741-7	6-8cm	11.8	91.3	6.9	1.9	73.6	3.1	57,600
1741-7	10-12cm	10.8	90.5	6.9	2.6	73.4	3.2	81,000
1741-7	14-16cm	13.1	90.2	8.1	1.7	71.5	3.2	102,100
1741-7	18-20cm	12.0	91.1	7.7	0.9	80.1	3.2	66,900
1741-8	2-4cm	9.5	91.7	6.5	1.8	72.2	3.1	129,300
1741-8	6-8cm	9.2	85.7	11.1	3.0	77.6	3.4	150,300
1741-8	10-12cm	8.6	89.6	9.6	0.8	78.7	3.1	130,800
1743-8	2-4cm	7.4	92.8	5.4	1.9	60.7	3.3	234,600
1743-8	6-8cm	9.9	85.3	10.9	3.8	76.8	3.5	110,100
1743-8	10-12cm	8.3	93.4	4.3	2.1	68.1	3.6	129,000
1743-8	14-16cm	8.2	89.9	7.8	2.2	74.1	3.6	186,600
1743-8	18-20cm	7.6	81.9	15.0	3.2	76.8	3.6	196,100
1743-8	22-24cm	9.8	85.3	12.5	2.0	81.4	3.7	111,300
1745-6	2-4cm	8.2	77.4	18.4	4.2	79.1	3.2	147,300
1745-6	6-8cm	6.5	81.2	16.0	2.8	81.3	3.0	261,500
1745-6	10-12cm	8.0	79.4	17.5	2.9	88.2	3.1	170,800
1745-6	14-16cm	8.9	82.0	16.7	1.3	80.1	3.2	143,500
1745-7	2-4cm	7.1	92.7	4.8	1.1	79.0	2.8	89,200
1745-7	4-6cm	10.3	81.4	14.8	3.3	78.7	3.0	76,800
1745-7	6-8cm	7.7	79.9	17.4	2.3	85.4	3.2	131,200
1745-7	8-10cm	7.2	81.0	15.2	2.3	80.4	3.2	247,900
1745-7	10-12cm	5.6	83.1	11.9	4.2	83.4	3.1	252,900
1745-7	12-14cm	7.0	77.0	20.8	2.2	85.1	3.1	138,500
1745-7	14-16cm	8.9	85.2	12.7	2.1	83.6	3.1	109700
1745-7	16-18cm	7.5	77.5	21.0	1.5	88.7	3.1	132,100
1745-7	18-20cm	7.9	76.3	20.6	3.0	87.2	3.2	159,000
1745-7	20-22cm	9.0	79.2	17.5	3.4	82.0	3.1	141,100
1745-7	22-24cm	9.2	85.6	11.5	1.8	84.8	3.3	93,700
1745-9	2-4cm	4.3	65.0	31.8	3.2	84.4	3.1	453,000
1745-9	4-6cm	4.0	54.9	38.4	6.8	86.3	3.1	539,700
1745-9	6-8cm	4.6	62.1	34.9	3.0	89.5	3.0	398,900
1745-9	8-10cm	5.6	60.8	35.6	3.3	86.4	3.1	413,200
1745-9	10-12cm	5.3	59.5	37.1	2.6	89.9	3.1	274,900
1745-9	12-14cm	5.7	68.0	27.5	4.2	87.4	3.1	282,300
1748-1	2-4cm	2.4	85.3	11.9	2.6	45.5	3.3	1,386,400
1748-1	6-8cm	2.7	85.0	11.4	3.6	46.1	3.1	1,207,900
1748-1	10-12cm	2.6	89.9	7.3	2.6	54.0	3.1	1,518,700
1748-1	14-16cm	2.5	79.8	14.2	6.0	54.6	3.1	1,360,500
1748-5	2-4cm	9.4	97.8	0.6	1.6	37.7	3.3	51,600
1748-5	6-8cm	5.6	97.6	1.1	1.3	44.9	3.4	106,700
1748-5	8-10cm	4.7	99.7	0.2	0.1	51.2	2.9	40,000
1748-5	10-12cm	4.0	98.8	0.6	0.5	59.8	2.8	54,500
1748-5	12-14cm	4.4	99.0	0.5	0.5	49.6	2.7	89,300
1748-5	14-15cm	2.6	99.2	0.4	0.4	52.2	2.7	111,300
1749-2	2-4cm	1.5	74.0	16.8	9.2	46.1	3.4	3,648,100
1749-2	6-8cm	1.2	70.4	21.8	7.7	52.6	3.2	5,145,800
1749-2	10-12cm	1.5	74.0	16.2	9.7	58.2	3.1	3,717,000
1749-2	14-16cm	1.5	73.4	20.2	6.4	60.3	3.2	3,752,400
1749-2	18-20cm	2.6	58.8	32.3	8.9	69.3	3.1	1,682,400
1749-4	2-4cm	2.2	75.5	16.0	8.5	47.9	3.3	1,626,400
1749-4	6-8cm	2.2	71.8	18.4	9.8	57.7	3.2	1,852,300
1749-4	10-12cm	2.4	70.8	17.3	11.9	58.8	3.2	2,110,700
1749-4	14-16cm	3.1	61.2	29.0	9.8	67.8	3.3	878,900
1749-4	18-20cm	2.1	73.7	20.8	5.5	61.0	3.3	2,151,600
1749-4	22-24cm	2.6	59.4	30.7	9.8	69.1	3.2	1,518,700
1749-5	2-4cm	3.0	76.9	15.5	7.0	48.0	3.3	1,432,800
1749-5	6-8cm	2.0	76.9	13.5	9.6	52.0	3.3	2,578,900
1749-5	10-12cm	2.9	72.8	20.5	6.3	62.5	3.4	1,895,300
1749-5	14-16cm	3.0	66.9	24.2	8.5	65.8	3.3	1,449,900
1749-5	18-20cm	3.7	70.0	20.9	9.1	67.2	3.1	1,210,600
1749-13	2-4cm	2.4	76.0	17.6	6.4	55.6	3.2	2,085,500
1749-13	6-8cm	2.3	75.3	14.6	10.2	55.0	3.2	2,275,600
1749-13	10-12cm	2.3	69.5	23.7	6.8	55.8	3.2	2,896,200

gram of the total weight of sediment (Fig. 3) can be roughly related to the rate of deposition (although this number must also be a function of food supply and other variables). A low number of benthic foraminifera per gram of sediment suggests that the sediment accumulation rate has been relatively rapid. For example, the number of benthic foraminifera in core 1739-1 is low (Table 2). There is substantial reduction (by half) between the lower intervals and top two intervals, suggesting an increase in sedimentation rate in this area.

Numbers of benthic foraminifera from core 1739-5 tend to be somewhat higher than in other cores from Wilmington Canyon (except cores 1745-9 and 1748-1), and there is a slight upcore increase that is the inverse of the sand fraction trend. The average number of benthic foraminifera present in core 1739-5 is 201,500 per gram (Fig. 3), suggesting a lower sedimentation rate than in most canyon locations, and, perhaps, many times lower than in samples across the canyon in core 1739-1.

Numbers of benthic foraminifera per gram of sediment in samples from location 1745 are inversely related to the percentage of the sand-sized fraction. The average number present from core 1745-6 is 180,800 and that from core 1745-7 is 142,900 (relatively low because of uncharacteristically low numbers in the top two intervals and in the lowest interval; Table 2). These two cores are similar to each other and distinctly different from samples that are nearby but on the outside of the meander. Core 1745-9 has higher values, with an average of 472,400 foraminifera per gram. These values increase to some degree up the core, reflecting the decrease in sand fraction there. The substantially greater number of benthics per gram of sediment along the outside of the meander at location 1745 suggests that the sedimentation rate may have been considerably less on the outside of this meander.

The two cores at location 1741 show a small but noticeable cross-canyon change. Numbers of benthic foraminifera in core 1741-7 do not vary greatly, and average 73,300. The relatively low numbers suggest fairly rapid sedimentation. In core 1741-8 the sedimentation rate is lower, with an average of 136,800 benthic foraminifera per gram of sediment. This value is similar to those in the middle of the canyon, at location 1745.

Number of benthic foraminifera in samples from the gully site (core 1743-8) show little variation (Table 2). The average number present (161,300) is intermediate between values in cores from the inside of the meander at location 1741 and the middle of the canyon at location 1745 (Fig. 3). Similar numbers of benthic foraminifera suggest comparable rates of deposition in these morphologically dissimilar areas.

The two cores from location 1748 show marked differences. Samples from 1748-1 exhibit high numbers of benthic foraminifera per gram (average of 1,368,400 and a low value of 1,200,900). This would suggest a substantially lower rate of sediment accumulation than at all other Wilmington Canyon core locations. The relatively low values at core 1748-5 indicate that benthic foraminifera make up an uncharacteristically low proportion of these sediments compared to other samples at similar depths (Fig. 3).

In South Heyes Canyon, the number of benthic foraminifera per gram is markedly higher than in Wilmington Can-

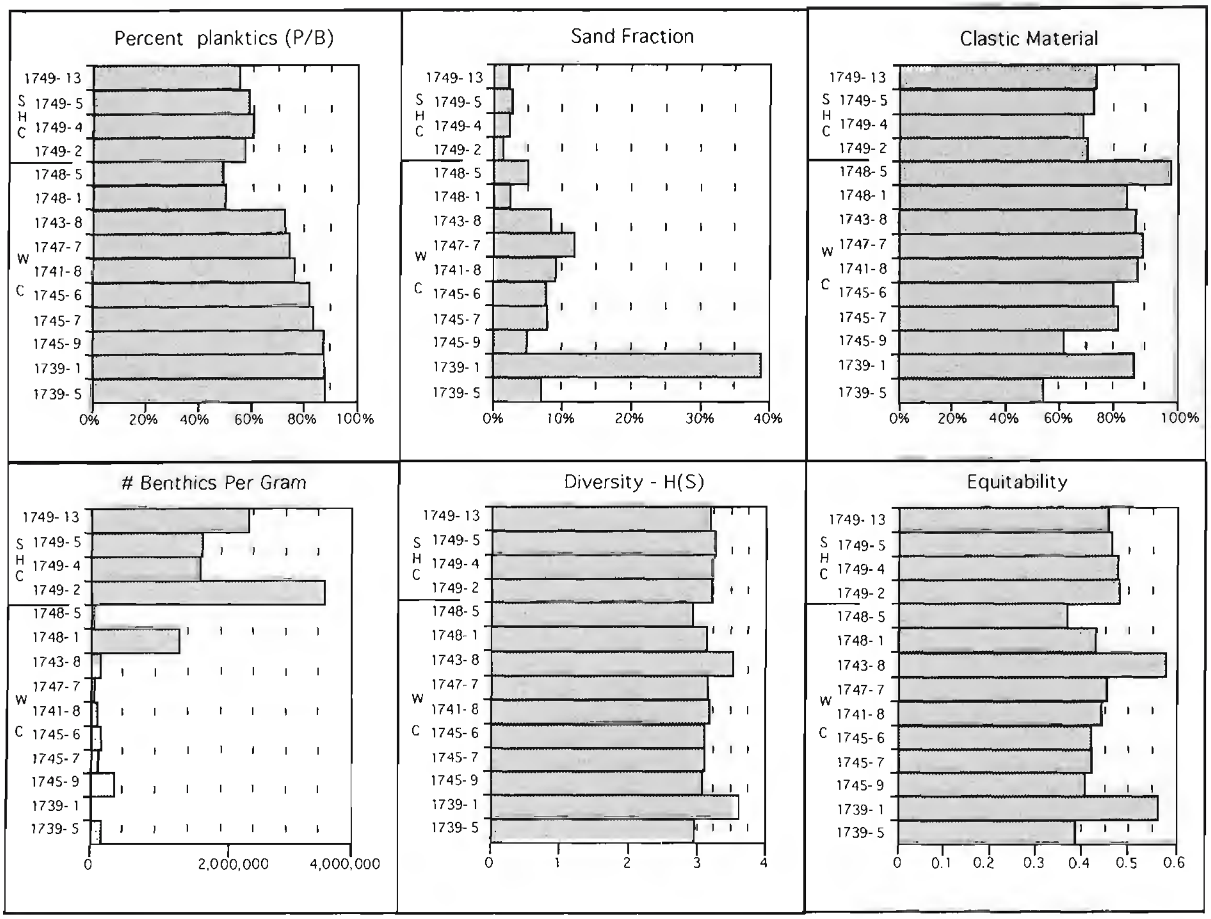

FIGURE 3. Percent planktics (P/B), percent sand sized material, percent clastic material, number of benthic foraminifera per gram of sediment, diversity, and equitability for each core. The top four cores in each plot are from South Heyes Canyon (SHC) and are listed by increasing depth. The lower ten cores are from Wilmington Canyon (WC) and are also listed by increasing depth.

yon. Except for core 1748-1, values in South Heyes Canyon are an order of magnitude greater than those in Wilmington Canyon. The average value for core 1749-2 is 3,589,100 with a high of 5,145,800 and a low of 1,682,400. Cores 1749-4 and 1749-5 have comparable averages (1,689,800 and 1,713,500, respectively) but exhibit considerable between-sample variability. Values in cores 1749-13 tend to be higher than in cores 1749-4 and 1749-5, with an average value of 2,419,000. This may indicate a slightly decreased sedimentation rate along the east side of South Heyes Canyon. Based on number of benthic foraminifera per gram of sediment (Fig. 3), we suggest that South Heyes Canyon is characterized by much lower sedimentation rates than Wilmington Canyon.

FORAMINIFERAL DATA

Planktic to Benthic Ratios

The ratio of planktic to benthic foraminifera (P/B, often expressed at percent planktics as in this study) can be used as an indicator of water depth and as a measure of distance from shore (cf. Murray, 1976; Douglas, 1979; Gibson, 1989). This relationship was first described by Grimsdale and Morkhoven (1955), who observed an increase in the abundance of planktic foraminifera beyond the outer shelf in the Gulf of Mexico. Samples from deep water with a low percentage of planktic foraminifera are thus suggestive of transport from shallower waters.

Percent planktic foraminifera (P/B) in Wilmington Canyon are generally high (P/B data in Table 2 and Fig. 3). At the deepest location (1739, at ~2,500 m depth), two cores show uniformly high values (average of 88%). There is no cross-canyon variation and values do not reflect the considerable lithologic variation between cores (Table 2, Fig. 3). Samples from cores taken at location 1745 (~2,080 m) show minor variation within and between cores. Values (average of 84%) are slightly less than those at location 1739 (Fig. 3).

Further up canyon (location 1741, at ~1,900 m), the value for percent planktics is lower than at location 1745. Cores 1741-7 and 1741-8 show a slight decrease in values upcore, and show average values of 74% and 76% respectively. Here, as at location 1739, no significant cross-canyon variation is recorded.

In slightly shallower water (~1,700 m), core 1743-8 has average values of percent planktics (73%) similar to those in cores from location 1741. This core also exhibits a trend toward lower values higher in the core.

Cores from location 1748 (~1,570 m), which show marked variations in lithologic characteristics (Fig. 3), show remarkably similar values of percent planktics (50% for core 1748-1, and 49% for core 1748-5). Both cores display the same slight trend toward decreased values upcore.

Within South Heyes Canyon (location 1749), several trends are recorded: consistent values within cores, increasing values with increasing water depth, and low values relative to Wilmington Canyon. Values of percent planktics are fairly consistent, and are somewhat higher than those of cores at similar depth in Wilmington Canyon (location 1748, 1,570 m).

The consistent increase in percent planktics (P/B) with increased water depths (Fig. 3) is in accordance with what would be expected in relatively undisturbed pelagic sediments. Accordingly, the absence of anomalously low percent planktic values indicates either that material transported to the study area arrived in amounts small enough such that values of percent planktics were not affected, or that the material was displaced from a location of similar depth characterized by comparable values.

Species Diversity and Equitability

Species diversity [H(S)] values (Table 2, Fig. 3) are slightly higher than values recorded at similar depths along the North Atlantic continental margin (Buzas and Gibson, 1969; Gibson and Buzas, 1973). These authors showed that diversity increases with depth in the North Atlantic and that it is generally the greatest in more stable deep-sea environments (Douglas, 1979).

Diversity values (Table 2) are generally consistent with expected trends, except for higher values recorded in cores 1739-1 and 1743-8 (Fig. 3). At location 1739 this results in a marked contrast between the high values in core 1739-1 (~3.5 in the upper core, and ~3.7 in the lower core), and lower values in core 1739-5 (~3.0).

Samples in core 1743-8, recovered in a gully off Wilmington Canyon, record a relatively diverse fauna (~3.5). Core 1748-5 is characterized by distinctly different upcore values as compared to other cores (Table 2). The top two samples (2–4 cm and 6–8 cm) have distinctly higher H(S) values (~3.4) than lower samples (8–10 cm, 10–12 cm, 12–14 cm, and 14–15 cm, H(S) = ~2.8). Indeed, the four lower samples record lower diversity than the majority of samples in this study (Fig. 3). Diversity values reveal no distinct water depth-related pattern in Wilmington Canyon.

Diversity values in South Heyes Canyon (location 1749) show considerable cross-canyon and upcore consistency. Average values are slightly higher than most Wilmington Canyon sample sites, but, nevertheless, are lower than the two areas of high diversity (cores 1739-1, 1743-8) in Wilmington Canyon.

Values of equitability (E of Gibson and Buzas, 1969) indicate the degree to which species abundances are evenly distributed. Basic relationships observed for diversity values are similar to those of equitability (Fig. 3). Most cores from Wilmington Canyon are similar, with high values for cores 1739-1 and 1743-8, and with low values in the lower portion of core 1748-5. Values from South Heyes Canyon are consistently higher than those of most samples from Wilmington Canyon.

Taxonomic Data

Two hundred and forty-six species of benthic foraminifera have been recognized in Wilmington and South Heyes Canyon cores. Of these, 145 species were identified to the species level (Appendix 1), 30 were closely related to known species, 66 could not be assigned specific names, and five species were of uncertain generic placement. Census data (relative proportions of taxa in each sample) are given in Appendix 2.

Several cluster analyses were conducted to determine the relationship between samples based on taxa within each sample. Results were similar, and thus we present here only the analysis (unweighted pair group, Q-mode analysis, average distance method) using the 45 taxa composing at least 2% of the assemblage in any one sample (Fig. 4).

Five major clusters were identified, with three divided into subclusters (Fig. 4). Location 1739 (Cluster 1) is clearly distinguished from any other location, and the cores from the opposite sides of the canyon (1739-1 and 1739-5) are clearly separated. Cores from the two locations midway down the canyon (1741 and 1745) form Cluster 2, which is composed of three subclusters. At location 1741 the two cores (1741-7 and 1741-8) on either side of the meander are distinguished; samples from core 1741-8 are similar to the samples at location 1745. Samples from the gully of Wilmington Canyon (location 1743) form a distinct group (Cluster 3), but show similarity to samples from locations 1748 and 1749 (Cluster 4). Samples from South Heyes Canyon (location 1749) cluster with one another and show similarity to core 1748-1. The top two intervals (2–4 cm and 6–8 cm) in 1748-5 are grouped with samples from location 1749 and core 1748-1 at a lower level of similarity. However, bottom samples from core 1748-5 (Cluster 5) are the most distinctive samples in the entire data set.

A relationship of foraminiferal assemblages to water depth appears evident. Location 1739, which does not show a close relationship to other clusters, contains samples from a depth of ~2,500 m, considerably deeper than any other samples. Locations 1741 and 1745, at water depths of approximately 1,900–2,100 m, are distinguished from each other but are related (Fig. 4). Location 1743, from a depth of ~1,700 m, shows a closer relation to samples from sites 1748 and 1749 (depths from ~1,500–1,600 m) than to samples from 1741 and 1745 (depths from 1,900–2,100 m). Samples from depths of ~1,500–1,600 m in South Heyes Canyon (location 1749) are similar to those of core 1748-1, a core from a similar depth in Wilmington Canyon. The top of core 1748-5 is also similar to samples from comparable depths in South Heyes Canyon.

To better understand which species contribute to the observed clusters, biofacies fidelity (BF) and constancy (C) (Hazel, 1977; Culver, 1988) have been calculated for each species within each subcluster depicted in Figure 4. Constancy is a measure of the relative contribution a particular species makes to a bioassociation. This value is given by a number from zero through ten representing the percentage of samples in a group in which a given species occurs. Biofacies fidelity is, in essence, the chance that an investigator, having randomly sampled an individual of a particular species, would be sampling a particular biofacies. Thus, it is a

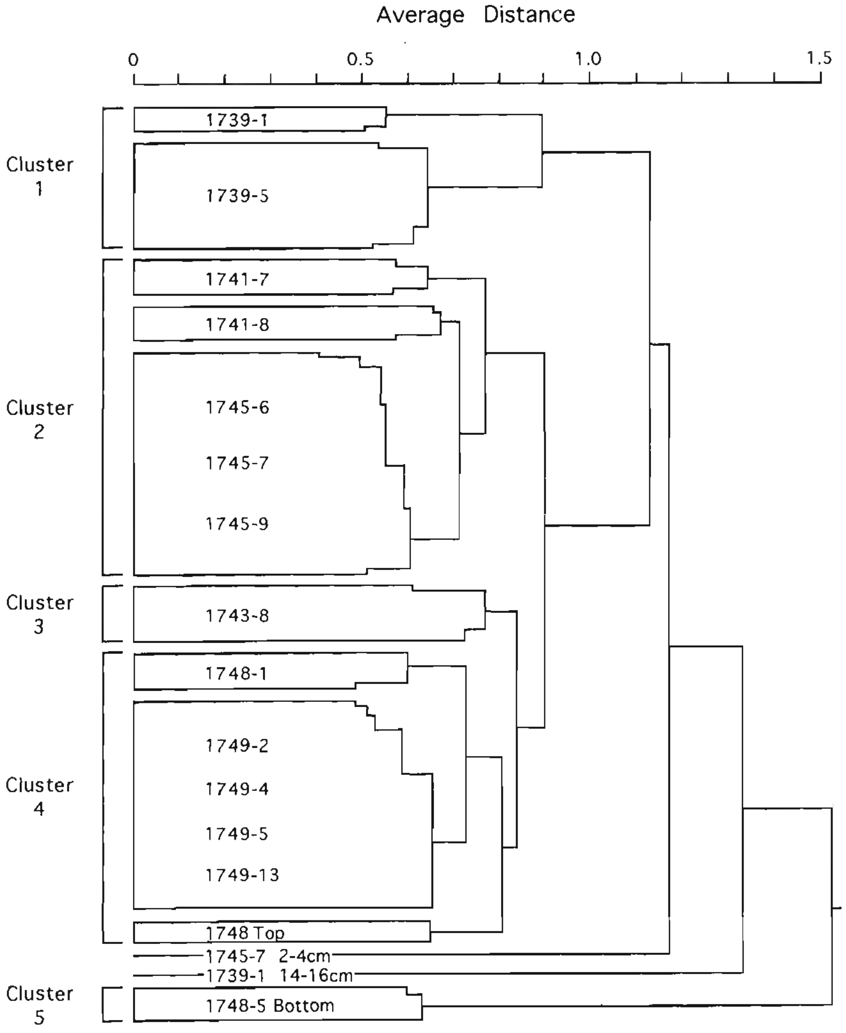

FIGURE 4. Dendrogram showing the results of a Q-mode, unweighted cluster analysis using the average distance method, for benthic foraminifera comprising >2% of the assemblage in any sample.

measure of how indicative a species is of a particular biofacies.

Biofacies fidelity values in Table 3 illustrate the rather homogeneous nature of species distributions in this study. For example, *Uvigerina peregrina,* with all its values equal to one, occurs in every subcluster and so is not particularly characteristic of any one site. The great dominance of values ranging from 1 to 2 shows that most species are widely distributed. The few slightly higher values are highlighted in Table 3.

Only 8 of the 45 most abundant species in this study have biofacies fidelity values of 3 or more. *Ammoglobigerina globigeriniformis, Cassidulina subcalifornica, Cibicides* sp. A, and *Eggerella bradyi* have values of 3. However, each of these species does not particularly characterize any one group of samples. The four species having values of biofacies fidelity >4 each show fidelity to particular locations. *Eoeponidella pulchella* is found almost exclusively in the bottom samples of core 1748-5. Location 1739 is characterized by *Hoeglundina elegans* and *Oridorsalis umbonatus. Cibicidoides kullenbergi* is characteristic of cores 1743-8 and 1748-1. Only these few species contribute to the outcome of the cluster analysis based on occurrence alone. Obviously, abundance variation of taxa helps to define discrete clusters.

Most species occur in many samples from each cluster, and thus notable variations in constancy are seen in only a few species. Of the species with the highest biofacies fidelity values, *Ammoglobigerina globigeriniformis* occurs in both samples from the top of core 1748-5, with greater persistence than elsewhere except South Heyes Canyon (location 1749). *Cibicides* sp. A is present in every sample from the two locations (cores 1739-1 and 1748-5) for which it demonstrates a relatively high biofacies fidelity. *Cibicidoides kullenbergi* occurs in many, but not all, samples from cores 1743-8 and 1748-1, and in only a few other samples. *Eggerella bradyi* occurs in nearly all samples from core 1743-8. *Eoeponidella pulchella* is present in all samples from the bottom section of core 1748-5 and is scarce elsewhere. *Hoeglundina elegans* and *Oridorsalis umbonatus* characterize location 1739, but have few occurrences elsewhere. Of the remaining species, *Valvulineria laevigata, Bulimina exilis, Bolivina subspinescens, Globobulimina pacifica* and *Gyroidina quinqueloba* are absent in the bot-

TABLE 3. Biofacies fidelity and constancy values for each subcluster in Figure 4. Notable biofacies fidelity values are highlighted by boxes.

	Ammoglobigerina globigeriniformis	*Anomalinoides* cf. *A. lankfordi*	*Anomalinoides* cf. *A. mexicana*	*Anomalinoides phlegeri*	*Anomalinoides* sp. C	*Bolivina ordinaria*	*Bolivina subspinescens*	*Bulimina aculeata*	*Bulimina exilis*	*Bulimina marginata*	*Bulimina mexicana*	*Cassidulina carinata*	*Cassidulina neocarinata*	*Cassidulina reniforme*	*Cassidulina* cf. *C. reniforme*	*Cassidulina subcalifornica*	*Cassidulina subglobosa*	*Cibicides* cf. *C. fletcheri*	*Cibicides* sp. A	*Cibicidoides kullenbergi*	*Eggerella bradyi*	*Elphidium excavatum*	*Eoeponidella pulchella*	*Epistominella exigua*	*Epistominella sandiegoensis*	*Epistominella* cf. *E. sandiegoensis*	?*Epistominella* sp. B	*Eponides turgidus*	?*Eponides* sp. C	*Fursenkoina fusiformis*	*Globobulimina pacifica*	*Gyroidina quinqueloba*	*Gyroidina umbonata*	*Hoeglundina elegans*	*Islandiella narcrossi*	*Nonionella* cf. *N. iridea*	*Nonionella turgida*	*Nuttallides umbonifera*	*Oridorsalis umbonatus*	*Rosalina squamata*	*Stainforthia complanata*	*Trifarina angulosa*	*Trifarina fluens*	*Uvigerina peregrina*	*Valvulineria laevigata*
Biofacies Fidelity																																													
1739-1	0	1	2	0	1	1	0	1	1	1	1	1	1	1	1	2	1	2	$\boxed{3}$	0	1	1	0	1	1	1	1	1	0	1	0	2	1	$\boxed{5}$	1	1	0	1	$\boxed{4}$	1	1	1	1	1	1
1739-5	0	1	2	1	1	1	0	0	1	1	0	1	1	1	0	2	1	1	1	0	0	1	0	1	1	1	1	1	1	1	1	2	1	$\boxed{4}$	1	1	0	0	$\boxed{4}$	1	1	1	1	1	1
1745	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	0	1	1	1	1	1	1	1	1	2	1	0	1	1	1	1	1	1	1	1	1	1	1
1741-7	0	1	1	1	1	1	2	1	1	1	1	1	1	1	1	0	1	1	1	0	0	1	0	1	1	1	1	1	1	1	1	2	1	0	1	1	2	2	0	1	1	1	1	1	1
1741-8	2	1	0	1	1	1	2	1	1	1	1	1	1	1	1	0	1	0	0	1	2	1	1	1	0	1	1	1	1	1	1	0	1	0	1	1	2	1	0	1	1	0	1	1	1
1743	0	1	1	1	1	1	2	1	1	1	1	1	2	1	1	1	1	2	1	$\boxed{5}$	$\boxed{3}$	1	1	1	1	1	1	1	1	1	0	2	1	1	1	1	1	1	0	2	1	1	1	1	1
1748-1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	$\boxed{4}$	0	1	0	1	1	1	1	1	1	1	1	0	1	0	1	1	2	1	0	2	1	1	1	1	1
1748-5 Top	$\boxed{3}$	1	1	1	1	1	2	1	1	1	1	1	1	1	1	0	1	0	$\boxed{3}$	0	0	1	0	1	1	1	1	1	1	1	1	0	1	0	1	1	2	2	0	1	1	1	1	1	1
1748-5 Bottom	1	1	2	0	1	1	0	1	0	1	0	1	0	1	1	$\boxed{3}$	1	2	0	0	0	1	$\boxed{7}$	1	1	1	1	1	1	1	0	0	1	0	1	1	1	1	0	2	1	1	1	1	0
1749	2	1	0	1	1	1	2	1	1	1	1	1	1	1	1	0	1	0	0	0	2	1	0	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	0	1	1	1	1	1	1
Constancy																																													
1739-1	0	10	10	3	10	10	0	10	10	10	10	10	3	7	10	3	10	3	10	0	3	10	0	7	10	10	10	10	3	10	3	10	10	10	10	10	0	3	10	3	10	10	10	10	10
1739-5	1	10	8	8	9	10	2	2	5	7	3	6	4	8	1	4	10	2	4	0	1	9	0	10	9	9	10	10	9	10	8	10	10	8	5	10	1	0	10	4	10	5	10	10	6
1745	3	10	2	10	10	10	7	4	7	10	10	8	5	9	8	2	10	2	2	0	3	9	0	9	10	10	10	10	9	10	10	9	10	0	4	10	6	3	2	7	10	7	10	10	10
1741-7	0	10	5	10	10	10	10	10	10	10	10	8	5	8	5	0	10	3	5	0	0	10	0	5	10	10	10	10	8	10	10	10	5	0	8	10	10	10	0	5	10	5	10	10	8
1741-8	8	10	0	10	10	10	10	9	10	10	10	10	6	9	10	0	6	0	0	1	6	10	1	10	4	10	10	10	10	10	10	3	8	0	4	10	10	9	0	5	10	3	10	10	10
1743	0	10	3	10	10	10	10	10	7	10	10	10	8	5	7	2	8	3	5	7	8	10	2	10	10	10	10	10	8	10	3	8	10	2	10	10	5	8	0	10	10	8	10	10	10
1748-1	5	10	3	10	10	10	8	8	10	10	10	10	8	8	10	3	8	3	3	5	0	10	0	10	10	10	10	10	10	10	5	3	5	0	5	10	10	5	0	10	10	10	10	10	8
1748-5 Top	10	10	5	10	10	10	10	10	10	10	5	10	5	10	10	0	10	0	10	0	0	10	0	5	10	10	10	10	10	10	10	0	5	0	10	5	10	10	0	5	10	10	10	10	10
1748-5 Bottom	3	5	8	3	10	10	0	10	0	10	3	8	3	10	8	5	8	5	0	0	0	10	10	5	10	10	10	10	10	10	0	0	8	0	8	10	5	5	0	10	5	8	5	8	0
1749	9	10	2	10	10	10	10	9	8	10	9	10	7	9	10	0	6	1	1	1	5	10	1	10	7	9	10	10	10	10	8	3	7	0	6	10	9	9	0	6	10	4	10	10	8

tom section of core 1748-5, the most distinct cluster. Clustering of samples from location 1743 can be related to low constancy values (compared to other cluster groups) for *Bolivina subspinescens, Nonionella turgida, Nuttallides umbonifera* and *Rosalina squamata*.

In summary, cluster analysis indicates that: (1) major groups of samples show a depth-related pattern; (2) nearly all abundant species are ubiquitous throughout both canyons; (3) species distributions are relatively constant upcore (the only exception being core 1748-5); and (4) depth-related patterns are primarily a result of variation in relative abundances of the most abundant species, and are only secondarily related to variation in the occurrence of several less abundant species.

Foraminiferal Depth Distribution

The cluster analysis distinguished sample sites on the basis of their depth below sea level. However, all sites, with the exception of the abyssal site 1739, are located in the lower bathyal (1,000–2,000 m) depth zone recognized by previous workers on the North American Atlantic continental margin (e.g., Berggren and Miller, 1989; Brunner and Culver, 1992). Hence, samples are discriminated by variation in abundance of species rather than by their presence or absence. In agreement with published depth zonations, abyssal site 1739 clustered separately from lower bathyal sites.

The depth distributions of abundant species were compared with the published record (e.g., Brady, 1884; Cushman, 1920, 1922b, 1923, 1930, 1931; Uchio, 1960; Barker, 1960; Culver and Buzas, 1980 and included sources, 1981b, 1983a, 1983b; Poag and others, 1980; Sejrup and Guilbault, 1980; Cole, 1981; Miller and Lohmann, 1982; Hermelin and Scott, 1985; Mead, 1985; Stanley and others, 1986; Hermelin, 1989; Berggren and Miller 1989; Corliss 1991; Brunner and Culver, 1992), and several significant bathymetric extensions of presence or high abundance were identified.

Trifarina fluens has been reported infrequently from the North American Atlantic continental margin but is present in all but two samples (core 1748-5, 10–12 cm and 12–14 cm). It occurs in considerable numbers at every location with the exception of the abyssal site 1739, where it is less abundant. Because of its high abundance, not only in Wilmington and South Heyes canyons but also in a gully shielded from downslope transport, the known depth range of *Trifarina fluens* can now be extended through the lower bathyal zone into the abyssal zone where it begins to become less abundant around 2,500 m. Similarly, *Bolivina ordinaria* occurs consistently and with a relatively high abundance in nearly all samples. It has been recorded previously in the lower bathyal zone, but in low abundance (Brunner and Culver, 1992). *Bolivina ordinaria* also occurs at the abyssal location 1739, but in low abundances. *Epistominella sandiegoensis* has a published depth range like that of *Bolivina ordinaria* and has been infrequently reported from the North American Atlantic continental margin (Brunner and Culver, 1992). It has a similar distribution in both canyons but is found in slightly higher abundances in core 1739-1 and in great abundance in core 1748-5 (10–15 cm, together with characteristically neritic forms) making up ~19–25% of the assemblage in the four samples. This form is identified as *Epistominella takayangii* Iwasa by D. B. Scott (personal communication, 1990), who has recorded it in Recent sediments in the Arctic from outer shelf to middle bathyal depths (Schröder-Adams and others, 1990), and from Pleistocene DSDP core material off New Jersey (Scott, 1987). *Bolivina marginata* has been recorded previously at lower bathyal depths, but normally in lower abundances than on the upper to mid-slope (although Cushman [1922] reported *B. marginata* as "common" at a station ~2,000 m deep). In this study it was abundant in South Heyes Canyon (location 1749), and in both the deepest (core 1739-1) and the shallowest (core 1748-1) locations in Wilmington Canyon.

Bulimina mexicana, Cassidulina carinata, Cassidulina neocarinata, and *Islandiella norcrossi* have been recorded with high abundance at middle bathyal depths. In this study, these species occur in many samples throughout Wilmington Canyon, the gully of Wilmington Canyon (location 1743), and South Heyes Canyon where it composes 3% of assemblages. The abyssal record of *Bulimina mexicana* is in accordance with Corliss' (1991) record of living specimens in the northwest Atlantic Ocean off the Nova Scotian continental margin.

Several species previously recorded at neritic depths were recovered in this study. Thirty of a total of 34 specimens of *Eoeponidella pulchella* are in the lower four samples of core 1748-5. One specimen is found in both cores 1749-4 and 1745-7, and two individuals occur in core 1743-8. *Rosalina squamata* is relatively common only in core 1743-8 (~1–2%) and the lower samples of core 1748-5 (~2–3%), occurrences at other localities being rare and scattered. *Bolivina pseudoplicata* has been considered a neritic species along the Atlantic coast of North America (Brunner and Culver, 1992). However, Hermelin and Scott (1985) described this species as quite common to a depth of 2,760 m in the central North Atlantic, and its widespread distribution in this study suggests that this species inhabits lower bathyal depths along the North Atlantic continental margin. Specimens of *Hanzawaia strattoni* in this study are smaller, less robust, and more fresh in appearence than specimens of this species identified by Brunner and Culver (1992) that were interpreted as neritic in origin. Although few in number, they display a wide distribution, and may represent in situ specimens. A widespread distribution for the supposed neritic species *Cibicides fletcheri* may be similarly interpreted. It was, in fact, reported at a depth of 650 fathoms by Uchio (1960).

Buliminella elegantissima and *Eggerella advena*, two classically neritic species, occur in small numbers in Wilmington Canyon. *Buliminella elegantissima* occurs in core 1748-5, 11 specimens throughout the lower four samples and one specimen in each of the top two samples. One specimen also occurs in core 1745-5 at 2–4 cm. Only three individuals of *Eggerella advena* were found, two from core 1748-1 at 2–4 cm and one from core 1748-5 at 2–4 cm.

In summary, the great majority of species in this study occupy their previously recorded depth ranges. Nearly all of those species that had not been recorded previously from the lower bathyal zone have a widespread distribution, similar to that of the known lower bathyal species that occur with them. Hence the dominant component of foraminiferal assemblages recorded in this study is lower bathyal in nature. Some downslope displacement of these specimens from outer neritic or upper to middle bathyal depths is not ruled out, but the data suggest such transport is not the dominant process. Exceptions include the lower part of core 1748-5, which contains an unusual assemblage with definite neritic input.

DISCUSSION

FORAMINIFERAL AND LITHOLOGIC DATA

The lithologic and foraminiferal data are a function of sedimentary processes in Wilmington and South Heyes canyons. Lithologic data show variation across all canyon meanders, significant differences throughout Wilmington Canyon, and consistent values in South Heyes Canyon which differ from those in Wilmington Canyon. In contrast, foraminiferal data indicate general consistency (with few exceptions) between and throughout the canyons, but demonstrate clear variations with water depth (Table 4).

This contrast between variability in lithologic characteristics in Wilmington Canyon and generally uniform lithologic attributes in South Heyes Canyon is shown in Figure 3. In locations 1739, 1745, and to a lesser degree at 1741, cross-canyon variability is recorded in clastic material, sand fraction, and number of benthic foraminifera per gram of sediment. In South Heyes Canyon, the lithology is less variable and, except for an increase along the south wall (core 1749-2), the number of benthic foraminifera per gram is generally uniform. Also notable at 1749 is the lower input of clastic material relative to a site at similar depth in Wilmington Canyon (1748), and the possibly lower rate of deposition indicated by the high number of benthic foraminifera per gram of sediment at 1749. The larger proportion of planktic foraminifera at similar depths in South Heyes than in Wilmington Canyon may suggest that there is an additional source of benthic foraminifera supplied to Wilmington Canyon (it is difficult to enivsage the alternative, a greater source of planktic foraminifera to South Heyes Canyon).

Figure 3 and Table 4 show the general similarity in foraminiferal characteristics in Wilmington and South Heyes canyons. Planktic to benthic foraminiferal ratios (expressed as percent planktics) do not vary significantly across-canyon, and values increase at greater depths. Species diversity values show no similar depth-related pattern, but exhibit great uniformity throughout nearly all cores. The only cross-canyon variability is seen at location 1739. The values for biofacies fidelity and constancy (Table 3) also show a lack of variability in the distribution of benthic foraminifera. Only a few species are characteristic of any one location (abyssal location 1739 is the exception); distinctions made by cluster analysis are based on variations in species abundance.

Disparity between lithologic and foraminiferal patterns indicate that, within a background of hemipelagic rain, the canyons experience sedimentary processes in addition to turbidity currents. Processes such as small scale slumping and other mass wasting processes (including creep), tidal currents, down-canyon low-density current flows (some perhaps triggered by storms), and bioerosion (as evidenced by direct observation from *Alvin* of the steep walls of South Wilmington Canyon) need also to be considered.

TABLE 4. Summary of important lithologic and foraminiferal characteristics throughout Wilmington and South Heyes canyons.

Core	Depth	% Clastic material	% Sand fraction	No. benthic foraminifera per gram	% Planktics (P/B)	Species diversity
Wilmington Canyon						
1739-1-3P	2,483 m	86%	39%	5,881	88%	3.6
1739-5-8P	2,503 m	54%	7%	201.500	88%	3.0
		Outside meander with significantly higher clastic input.	Outside of meander markedly sandier.	Marked variation; much more rapid deposition on outside of meander.	No variation	Cross-canyon variation; high values at outside of meander, low values on inside of meander.
1741-7-8P	1,898 m	91%	12%	73,300	74%	3.2
1741-8-11P	1,897 m	89%	9%	136,800	76%	3.2
		Very minor variation.	Slightly sandier on outside of meander.	Significant variation; more rapid deposition of outside of meander.	Insignificant variation.	No variation
1743-8-11P	1,703 m	88%	9%	161,300	73%	3.5
		Similar to values at location 1741.	Similar to values at location 1741 and channel at location 1745.	Similar to values in 1741 and in channel at location 1745.	Similar to values at location 1741.	High values
1745-6-9P	2,076 m	80%	8%	180,800	82%	3.1
1745-7-11P	2,080 m	82%	8%	142.900	84%	3.1
1745-9-13P	2,080 m	62%	5%	472,400	87%	3.1
		Much lower clastic input on outside of meander than middle of channel.	Less sandy on outside of meander than middle of channel.	Marked variation between middle and outside of channel.	Insignificant variation.	No variation
1748-1-1P	1,600 m	85%	2.6%	1,368,400	50%	3.2
1748-5-8P	1,540 m	99%	5% (8% upper, 4% lower)	3,800 (5,800 upper, 2,800 lower)	49% (41% upper, 53% lower)	3.3 (upper), 2.7 (lower).
		Material with extremely high clastic input in burrowed core.	Material in burrowed core low in sand.	1748-1-1P—Very high values, slow deposition. 1748-5-8P—Low values, rapid deposition.	1748-1-1P—Low values. 1748-5-8P—Burrowed material has similar values.	1748-1-1P—Similar to location 1749. 1748-5-8P—Upper samples similar to site across canyon, lower samples have lower values.
South Heyes Canyon						
1749-2-2P	1,589 m	70%	1.7%	3,599,100	57%	3.2
1749-4-4P	1,585 m	69%	2.4%	1,689,800	60%	3.3
1749-5-5P	1,560 m	73%	2.9%	1,713,500	59%	3.3
1749-13-13P	1,501 m	74%	2.3%	2,419,100	56%	3.2
		Consistent, comparatively low, clastic input.	Consistently low values.	Very high values, some cross channel variation.	Insignificant variation.	Insignificant variation.

Tidal currents, with velocities usually <50 cm/sec, have been recorded in some submarine canyons along the United States Atlantic continental margin (Shepard, 1979). A few measurements have recorded currents of slightly greater velocity (50 to 75 cm/s) occurring during storms (Shepard and others, 1977). Direct measurements of tidal currents in Wilmington Canyon collected at a maximum depth of 915 m (3 m above the canyon floor) during nineteen days of observation indicated a maximum velocity of 22 cm/sec, with a mean of 8 cm/sec (Keller and Shepard, 1978). The currents at this station varied up- and down-canyon and showed a slight trend toward up-canyon flow.

Currents generated by tides and density flow in submarine canyons have been known to stir silts and fine sands on canyon floors, and in some instances generate ripple marks (Shepard, 1979). Within Wilmington Canyon, at a location a short distance up-canyon from core 1739-1 and along the same bend in the canyon, ripple marks were observed (S. J. Culver, field notes; Sanford and others, 1990). The orientation of these ripple marks may indicate the presence of active tidal currents flowing up-canyon at this location.

Weak up-canyon, down-canyon, or bidirectional tidal currents, intensified at constrictions and the outside of meander bends, could gently but continuously winnow sediment on the canyon floor, and also disturb sediment along the canyon walls. Silt- and clay-sized material would be preferentially removed from these areas, leaving a sand-enriched lag and a correspondingly decreased sand-sized fraction in nearby less energetic areas (e.g., location 1739). The lower proportion of silt- and clay-sized material in Wilmington Canyon compared to South Heyes Canyon (Fig. 3) suggests that fines are being winnowed in Wilmington Canyon. The depth-related ratios of planktic to benthic foraminifera, and the generally uniform distribution of benthic foraminifera in Wilmington Canyon demonstrate that the main constituents of foraminiferal assemblages present in this canyon have been relatively unaffected by this process.

Segall and others (1989) and Sanford and others (1990) have suggested that the dominant recently active sedimentary process in Wilmington and South Heyes canyons is mass wasting. Sanford and others (1990) found substantially higher rates of deposition at location 1745 than in most samples throughout Wilmington Canyon. They attributed this, and other areas of high deposition, to extensive bioerosion (observed from DSRV *Alvin*; S. J. Culver, field notes) of canyon walls (steeper along the outside of meanders) and attendant redeposition at the base of walls.

The variations in sedimentary data observed across meanders in Wilmington Canyon may result in part from slumping of canyon walls. The consistency observed in foraminiferal data may be explained in part by movement of material down canyon walls by mass wasting and redeposition at only slightly greater depths in the nearby canyon. Subsequent transport of material somewhat farther down-canyon would not conspicuously alter foraminiferal assemblages.

Cross-canyon variations in lithologic characteristics in Wilmington Canyon are not evident in South Heyes Canyon. The low average gradient of the walls and the absence of steep walls in South Heyes Canyon help explain differences in sediment content of the two canyons. Steep canyon walls, such as those found at the outside of meander bends, would be more susceptible to sediment failure, slumping and bioerosion. In comparison, the relative homogeneity in lithologic attributes across South Heyes Canyon is largely a function of its morphology.

In summary, sediment failure along steep and undercut canyon walls and the observation of rare ripple-marks apparently generated by bottom currents (perhaps tidal) indicate that several processes are currently active in Wilmington Canyon. The lower rate of deposition and low percent clastic input in South Heyes Canyon suggest that mass wasting, bottom current action and/or low-density flows are currently less important, in terms of sediment displacement, than in Wilmington Canyon.

Foraminiferal Implications for Sediment Transport

Mass wasting, bottom current processes and low-density flows best explain the observed patterns of lithologic and foraminiferal data within Wilmington and South Heyes canyons. This allows for a modification of the model of recent sediment transport in Wilmington Canyon that involves erosive gravity flows or turbidity currents, as proposed by Stanley and others (1986). These denser currents were believed responsible for the differences observed downcore and between cores, and a discontinuous stop-and-go transport process was invoked. The basis for their model was observation of marked increases in "shallow" benthic foraminifera across-canyon and downcore in two cores along the steep walls of meanders, accompanied by marked discontinuities in sedimentary characteristics in the canyon sections. Sedimentary variations observed by Stanley and others (1986) correspond to variations attributed in the present study to a combination of mass-wasting, low-density and perhaps tidal current action. Documentation of benthic foraminifera in this study indicates that some "shallow" species that Stanley and others (1986) considered to have been actively transported down-canyon either lived and accumulated at lower bathyal depths or resulted from bioerosion and downslope failure of exposed canyon wall sections, including sections of slump blocks of neritic origin emplaced during a Pleistocene lowstand of sea-level (Brunner and Culver, 1992).

Some of the abundant species observed in Wilmington Canyon were previously considered native to shallower water, and were thus interpreted as evidence of downslope transport (Stanley and others, 1986). It is of note, however, that these species are also found in similar abundances in South Heyes Canyon where turbidity currents do not prevail (Farre and others, 1983), where there is no direct connection with the outer shelf, and where the recent dominant active process is small-scale mass and down-wall wasting of hemipelagic material (Sanford and others, 1990). This indicates that many species within South Heyes Canyon (and, by comparison, the same species in Wilmington Canyon) lived and accumulated at the lower bathyal depths where they were sampled. This is supported by samples from core 1743-8, taken from the hemipelagic drape high on the southeastern wall of a gully feeding into Wilmington Canyon (Fig. 2). This gully is orthogonal to the trend of the slope in this location and is directly downslope of another gully of the same orientation. This location is, therefore, well-shielded from downslope transport of material in the channel by bottom currents and density currents. Species found in this location likely live at lower bathyal depth. Forty-three of the 45 most abundant species in this study are found in this core, and nearly all are abundant.

Evidence for bioerosion of Wilmington Canyon walls are recorded by differences in lithologic and foraminiferal character between the top and bottom of core 1748-5. These three burrowed samples have low diversity and equitability values relative to other samples in this study (Fig. 3), cluster distinctly from all other samples (Fig. 4), and contain a few dominant species which are dominant nowhere else in Recent sediments in Wilmington Canyon but which are dominant in Pleistocene slump blocks of neritic origin that, in places, comprise the steep walls of Wilmington Canyon (Brunner and Culver, 1992). *Epistominella sandiegoensis* and *Elphidium excavatum* are very abundant. *Cassidulina reniforme* has greater abundance here than in other samples. *Rosalina squamata* is present in moderate numbers and there are occurrences of *Buliminella elegantissima*, *Elphidium subarcticum*, *Elphidium* sp. A and *Elphidium* sp. B. Most of these species have been used previously as shallow water indicators, although live specimens of *Elphidium excavatum* have been recovered from lower bathyal and abyssal depths (e.g., Miller and Lohmann, 1982; Corliss, 1991; see Brunner and Culver, 1992 for discussion). The occurrence of *E. excavatum* in moderate abundances throughout this study also suggests a natural occurrence at these depths. However, high abundance of *E. excavatum* in the lower part of 1748-5, together with other anomalously abundant species, is suggestive of shallow water, and probably indicative of an allochthonous fauna derived from a Pleistocene slump block of neritic origin (Brunner and Culver, 1992).

The presence in core 1739-1 of anomalously large numbers of the species that dominate the lower portion of core 1748-5 indicate that bioerosion may have contributed material to core 1739-1. This is supported by the high diversity observed and by evidence for increased sand fraction and clastic deposition, as well as the possible higher rate of deposition in this location relative to samples across canyon, as indicated by benthic foraminifera per gram of sediment (Fig. 3). Core 1739-1 was collected along the outside of a meander beneath a nearly vertical wall, a location similar to those where Stanley and others (1986) observed downcore differences that they inferred to result from downslope transport. In this core, *Epistominella sandiegoensis* and *Elphidium excavatum* occur with slightly higher abundances than in most samples in this study. Relatively large numbers of *Rosalina squamata* occur in one sample. Proportions of these species, which are widespread in the cores of this study, are augmented by additional material derived via bioerosion and downslope transport from the canyon walls at this location.

The action of gravity on downslope sediment transport cannot be discounted. Moreover, the scattered occurrences of neritic species within Wilmington Canyon indicate that some downslope transport is occurring. However, it appears from study of samples herein that gravity-driven transport is occurring at fairly low rates, and that high rates of foraminiferal production in situ tend to overprint this displacement signal.

Thus, only modest evidence for large-scale sediment transport has been recognized in this study; while clearly able to mold the surficial sediment drape, these processes cannot completely account for the gross morphology of the modern canyons. Major mass wasting and headward erosion in straight canyons and active scouring by major turbidity currents in meandering canyons have not been the major processes during the past 200–600-year period (cf. Sanford and others, 1990) represented by cores in this study.

CONCLUSIONS

Marked variations in lithologic characteristics observed across meanders throughout Wilmington Canyon contrast with the ubiquitous distribution of the abundant foraminifera, which vary almost exclusively in relative abundance (not occurrence) and show a clear depth-related pattern. This indicates that relatively minor mass-wasting processes (including creep) and bottom low-density and/or tidal current action are altering the lithologic characteristics, particularly along the outside of meanders, while leaving the overall distribution of foraminifera relatively unaffected. South Heyes Canyon is more quiescent, with minor mass wasting interpreted to be the only process recently active. Samples from this canyon exhibit striking uniformity in nearly all foraminiferal and lithologic attributes measured. Thus, this contrast with Wilmington Canyon is most likely related to marked morphologic differences and slope settings of the two canyons.

Several foraminiferal species in both canyons, previously considered to be characteristic of shallower waters, lived and accumulated at lower bathyal or abyssal depths. Some, if not most, species that Stanley and others (1986) inferred to be indicative of downslope transport (i.e., neritic species) were deposited in the Wilmington Canyon channel after being eroded from the slumped blocks of neritic origin that now constitute the steep canyon walls.

The observations of recent relative inactivity in South Heyes Canyon and of a moderately active Wilmington Canyon during the past 200–400 years indicate that the major processes responsible for canyon erosion are not currently active to any significant degree, and occur at time scales much greater than those represented by the core material in this study.

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APPENDIX 1

Original references to benthic foraminifera taxa identified to the species level.

Abditodentrix asketocomptella Patterson
  Abditodentrix asketocomptella Patterson, 1985, p. 140, pl. 1, figs. 1–9.
Alliatina cf. *A. primitiva* (Cushman and McCulloch)
  Cushmanella primitiva Cushman and McCulloch, 1940, p. 163, pl. 18, figs. 6–8, 10.
Ammodiscus cf. *A. tenuis* Brady
  Ammodiscus tenuis Brady, 1881, p. 51.—Brady, 1884, pl. 38, figs. 4–6.
Ammoglobigerina globigeriniformis (Parker and Jones)
  Lituola nautiloidea Lamarck var. *globigeriniformis* Parker and Jones, 1865, p. 407, pl. 17, fig. 96.
Anomalinoides cf. *A. lankfordi* (Uchio)
  Nonion lankfordi Uchio, 1960, p. 60, pl. 4, figs. 5–8.
Anomalinoides cf. *A. mexicana* Parker
  Anomalinoides mexicana Parker, 1954, p. 539, p. 11, figs. 21–23.
Anomalinoides phlegeri (Uchio)
  Cibicides phlegeri Uchio, 1960, p. 69, pl. 10, figs. 7–10.
Astrononion gallowayi Loeblich and Tappan
  Astrononion gallowayi Loeblich and Tappan, 1953, p. 90, pl. 17, figs. 4–7.

- *Bolivina* cf. *B. alata* Seguenza
  - *Vulvulina alata* Seguenza, 1862, p. 115, pl. 2, figs. 5, 5a.
- *Bolivina barbata* Phleger and Parker
  - *Bolivina barbata* Phleger and Parker, 1951, pt. 2, p. 13, pl. 6, figs. 12a, b, 13.
- *Bolivina* cf. *B. globulosa* Cushman
  - *Bolivina globulosa* Cushman, 1933, p. 80, pl. 8, fig. 9.
- *Bolivina lanceolata* Parker
  - *Bolivina lanceolata* Parker, 1954, p. 514, pl. 7, figs. 17–20.
- *Bolivina lowmani* Phleger and Parker
  - *Bolivina lowmani* Phleger and Parker, 1951, pt. 2, p. 13, pl. 6, figs. 20a, b.
- *Bolivina minima* Phleger and Parker
  - *Bolivina minima* Phleger and Parker, 1951, pt. 2, p. 14, pl. 6, figs. 22a, b, 25, pl. 7, figs. 1, 2.
- *Bolivina ordinaria* (Phleger and Parker)
  - *Bolivina simplex* Phleger and Parker, 1951, pt. 2, p. 14, pl. 7, figs. 4–6.
- *Bolivina pseudoplicata* Heron-Allen and Earland
  - *Bolivina pseudoplicata* Heron-Allen and Earland, 1930, p. 81, pl. 3, figs. 36–40.
- *Bolivina pseudopunctata* Höglund
  - *Bolivina pseudopunctata* Höglund, 1947, p. 273, pl. 24, fig. 5, pl. 32, figs. 23, 24.
- *Bolivina subaenariensis* Cushman
  - *Bolivina subaenariensis* Cushman, 1922b, p. 46, pl. 7, fig. 6.
- *Bolivina subspinescens* Cushman
  - *Bolivina subspinescens* Cushman, 1922b, p. 48, pl. 7, fig. 5.
- *Bolivina translucens* Phleger and Parker
  - *Bolivina translucens*, Phleger and Parker, 1951, p. 15, pl. 7, figs. 13, 14a, b.
- *Bolivina* cf. *B. variabilis* (Williamson)
  - *Textularia variabilis* Williamson, 1858, p. 76, pl. 6, figs. 162, 163.21.
- *Buccella frigida* (Cushman)
  - *Pulvinulina frigida* Cushman, 1922b, p. 12.
- *Buccella inusitata* Andersen
  - *Buccella inusitata* Andersen, 1952, p. 148, pl. 1, figs. 10a–c, 11a–c.
- *Bulimina aculeata* d'Orbigny
  - *Bulimina aculeata* d'Orbigny, 1826, p. 269, fig. 7.
- *Bulimina exilis* (Brady)
  - *Bulimina elegans* d'Orbigny var. *exilis* Brady, 1884, p. 339, pl. 50, figs. 5, 6.
- *Bulimina* cf. *B. glabra* (Cushman and Wickenden)
  - *Bulimina patagonia* d'Orbigny var. *glabra* Cushman and Wickenden, 1929, p. 9, pl. 4, fig. 1.
- *Bulimina marginata* d'Orbigny
  - *Bulimina marginata* d'Orbigny, 1826, p. 269, pl. 12, figs. 10–12.
- *Bulimina mexicana* Cushman
  - *Bulimina inflata* d'Orbigny var. *mexicana* Cushman in Cushman and Parker, 1940, p. 16, pl. 3, fig. 9.
- *Bulimina rostrata* Brady
  - *Bulimina rostrata* Brady, 1884, p. 408, pl. 51, figs. 14, 15.
- *Buliminella elegantissima* d'Orbigny
  - *Bulimina elegantissima* d'Orbigny, 1839b, p. 51, pl. 7, figs. 13, 14.
- *Cassidulina carinata* (Silvestri)
  - *Cassidulina laevigata* d'Orbigny var. *carinata* Silvestri, 1896, p. 104, pl. 2, fig. 10.
- *Cassidulina laevigata* d'Orbigny
  - *Cassidulina laevigata* d'Orbigny, 1826, p. 282, pl. 15, figs. 4, 5.
- *Cassidulina neocarinata* Thalmann
  - *Cassidulina laevigata* d'Orbigny var. *carinata* Cushman, 1922b, p. 124, pl. 25, figs. 6, 7.
- *Cassidulina obtusa* Williamson
  - *Cassidulina obtusa* Williamson, 1858, p. 69, pl. 6, figs. 143, 144.
- *Cassidulina* cf. *C. reniforme* (Nørvang)
  - *Cassidulina crassa* d'Orbigny *reniforme* Nørvang, 1945, p. 41, figs. 6c–h.
- *Cassidulina subcalifornica* Drooger
  - *Cassidulina subglobosa* Brady var. *subcalifornica* Drooger, 1953, p. 140, pl. 22, figs. 8, 9.
- *Cassidulina subglobosa* Brady
  - *Cassidulina subglobosa* Brady, 1881, p. 60.—Parker, 1948, pl. 6, figs. 3a, b.
- *Cassidulinoides bradyi* (Norman)
  - *Cassidulina bradyi* Norman, in Brady, 1881, p. 59.—Parker, 1948, pl. 3, fig. 12.
- *Cibicides* cf. *C. fletcheri* Galloway and Wissler
  - *Cibicides fletcheri* Galloway and Wissler, 1927, p. 64, pl. 10, figs. 8, 9.
- *Cibicides fletcheri* Galloway and Wissler
  - *Cibicides fletcheri* Galloway and Wissler, 1927, p. 64, pl. 10, figs. 8, 9.
- *Cibicides* aff. *C. lobatulus* (Walker and Jacob)
  - *Nautilus lobatula* Walker and Jacob, 1798, p. 642, pl. 14, fig. 36.
- *Cibicides lobatulus* (Walker and Jacob)
  - *Nautilus lobatula* Walker and Jacob, 1798, p. 642, pl. 14, fig. 36.
- *Cibicides refulgens* Montfort
  - *Cibicides refulgens* Montfort, 1808, p. 122.—Cushman, 1931, p. 116, pl. 21, figs. 2a–c.
- *Cibicides wuellerstorfi* (Schwager)
  - *Anomalina wuellerstorfi* Schwager, 1866, p. 258, pl. 7, fig. 105, 107.
- *Cibicides* cf. *C. wuellerstorfi* (Schwager)
  - *Anomalina wuellerstorfi* Schwager, 1866, p. 258, pl. 7, fig. 105, 107.
- *Cibicidoides kullenbergi* (Parker)
  - *Cibicides kullenbergi* Parker, in Phleger and others, 1953, p. 49, pl. 11, figs. 7, 8.
- *Cibicidoides mollis* (Phleger and Parker)
  - *Cibicides mollis* Phleger and Parker, 1951, p. 30, pl. 16, figs. 7a, b, 8a, b, 9a, b.
- *Cibicidoides mundulus* (Brady, Parker and Jones)
  - *Truncatulina mundula* Brady and others, 1888, p. 228, pl. 45, figs. 25a–c.
- *Cibicidoides robertsonianus* (Brady)
  - *Truncatulina robertsoniana* Brady, 1881, p. 65.—Brady, 1884, p. 664, pl. 95, figs. 4a–c.
- *Cibicidoides pseudoungerianus* (Cushman)
  - *Truncatulina pseudoungeriana* Cushman, 1922c, p. 97, pl. 20, fig. 9.
- *Conicospirillina atlantica* Cushman
  - *Conicospirillina atlantica* Cushman, 1947, p. 91, pl. 20, fig. 8.
- *Cribrostomoides subglobosum* (Sars)
  - *Lituola subglobosa* Sars, 1872, p. 253.
- *Cribrostomoides wiesneri* (Parr)
  - *Labrospira wiesneri* Parr, 1950, p. 272, pl. 4, fig. 25, 26.
- *Cystammina pauciloculata* (Brady)
  - *Trochammina pauciloculata* Brady, 1879, p. 58, pl. 5, figs. 13, 14.
- *Dentalina communis* (d'Orbigny)
  - *Nodosaria (Dentalina) communis* d'Orbigny, 1826, p. 254, no. 35.—Brady, 1884, p. 504–505, pl. 62, figs. 21, 22.
- *Dentalina flintii* Cushman
  - *Nodosaria flintii* Cushman, 1923, p. 85, pl. 14, fig. 1.
- *Eggerella advena* (Cushman)
  - *Verneuilina advena* Cushman, 1922a, p. 141.—Cushman, 1922b, p. 57, pl. 9, figs. 7–9.
- *Eggerella bradyi* (Cushman)
  - *Verneuilina pygmaea* Brady, 1884, p. 385, pl. 47, figs. 4–7.
- *Elphidium excavatum* (Terquem)
  - *Polystomella excavata* Terquem, 1876, p. 20, pl. 2, figs. 2a, b.
- *Elphidium subarcticum* Cushman
  - *Elphidium subarcticum* Cushman, 1944, p. 27, pl. 3, figs. 34a, b, 35.
- *Eoeponidella pulchella* (Parker)
  - *Pninaella (?) pulchella*, Parker, 1952, p. 420, pl. 6, figs. 18a, b, 19, 20.
- *Epistominella decorata* (Phleger and Parker)
  - *Pseudoparrella decorata* Phleger and Parker, 1951, p. 28, pl. 15, figs. 4a, b, 5a, b.
- *Epistominella exigua* (Brady)
  - *Pulvinulina exigua* Brady, 1884, p. 696, pl. 103, figs. 13, 14.
- *Epistominella* cf. *E. rugosa* (Phleger and Parker)
  - *Pseudoparrella rugosa* Phleger and Parker, 1951, p. 28, pl. 15, figs. 8a, b, 9a, b.
- *Epistominella sandiegoensis* Uchio
  - *Epistominella sandiegoensis* Uchio, 1960, p. 68, pl. 9, figs. 6, 7.
- *Epistominella* cf. *E. sandiegoensis* Uchio
  - *Epistominella sandiegoensis* Uchio, 1960, p. 68, pl. 9, figs. 6, 7.
- *Epistominella vitrea* Parker

- *Epistominella vitrea* Parker, in Parker, Phleger and Peirson, 1953, p. 9, pl. 4, figs. 34–36, 40, 41.
- *Eponides repandus* (Fichel and Moll)
  - *Nautilus repandus* Fichtel and Moll, 1798, p. 35, pl. 3, figs. a–d.
- *Eponides tumidulus* (Brady)
  - *Truncatulina tumidula* Brady, 1884, p. 666, pl. 95, figs. 8a–d.
- *Eponides turgidus* Phleger and Parker
  - *Eponides turgidus* Phleger and Parker, 1951, pt. 2, p. 22, pl. 11, figs. 9a, d.
- ?*Eponides* sp. A
  - *Eponides tumidulus* Schnitker, 1971, p. 196, pl. 9, figs. 1a–c (not *Truncatulina tumidula* Brady, 1884).
- *Fissurina agassizi* Todd and Brönniman
  - *Fissurina agassizi* Todd and Brönniman, 1957, p. 36, pl. 9, figs. 14a, b.
- *Fissurina* aff. *F. agassizi* Todd and Brönniman
  - *Fissurina agassizi* Todd and Brönniman, 1957, p. 36, pl. 9, figs. 14a, b.
- *Fissurina circularis* Todd
  - *Fissurina circularis* Todd, in Cushman and others, 1954, p. 351, pl. 87, fig. 27.22.
- *Fissurina fimbriata* (Brady)
  - *Lagena fimbriata* Brady, 1881, p. 61. -Brady, 1884, p. 486, pl. 60, figs. 26–28.
- *Fissurina kerguelenensis* Parr
  - *Fissurina kerguelenensis* Parr, 1950, p. 305, pl. 8, figs. 7a, b.
- *Fissurina laevigata* (Reuss)
  - *Fissurina laevigata* Reuss, 1850, p. 366, pl. 46, fig. 1.
- *Fissurina marginata* (Montagu)
  - *Vermiculum marginatum* Montagu, 1803, p. 524.
  - *Lagena marginata* (Montagu) Brady, 1884, p. 476, pl. 59, figs. 21.
- *Fissurina ovum* (Ehrenberg)
  - *Miliola ovum* Ehrenberg, 1843, p. 166.
  - *Lagena ovum* (Ehrenberg) Brady, 1884, p. 454, pl. 56, fig. 5.
- *Fissurina submarginata* (Boomgaart)
  - *Entosolenia submarginata* Boomgaart, 1949, p. 107, pl. 9, fig. 7.
- *Fissurina* cf. *F. truncata* (Brady)
  - *Lagena truncata* Brady, 1884, p. 457, pl. 56, figs. 31.
- *Frondicularia advena* (Cushman)
  - *Frondicularia advena* Cushman, 1923, p. 141, pl. 20, figs. 1, 2.
- *Fursenkoina fusiformis* (Williamson)
  - *Bulimina pupoides* d'Orbigny var. *fusiformis* Williamson, 1858, p. 63, pl. 5, figs. 129, 130.
- *Gavelinopsis lobatulus* (Parr)
  - *Discorbis lobatulus* Parr, 1950, p. 354, pl. 13, figs. 23–25.
- *Gavelinopsis translucens* (Phleger and Parker)
  - "*Rotalia*" *translucens* Phleger and Parker, 1951, p. 24, pl. 12, figs. 11A, B, 12a, b.
- *Globobulimina affinis* d'Orbigny
  - *Bulimina affinis* d'Orbigny, 1839a, p. 105 pl. 2, figs. 25, 26.
- *Globobulimina auriculata* (Bailey)
  - *Bulimina auriculata* Bailey, 1851, p. 12, fig. 25–27.
- *Globobulimina pacifica* Galloway and Wissler
  - *Globobulimina pacifica* Galloway and Wissler, 1927, p. 74.—Barker, 1960, p. 102, pl. 50, figs. 7–10.
- *Gyroidina altiformis* (Stewart and Stewart)
  - *Gyroidina soldanii* d'Orbigny var. *altiformis* Stewart and Stewart, 1930, p. 67, pl. 9, figs. 2a–c.
- *Gyroidina orbicularis* d'Orbigny
  - *Gyroidina orbicularis* d'Orbigny, 1826, p. 278, modèles, no. 13.—Cushman, 1931, p. 37, pl. 8, figs. 1, 2.
- *Gyroidina quinqueloba* Uchio
  - *Gyroidina quinqueloba* Uchio, 1960, p. 66, pl. 8, figs. 22–27.
- *Gyroidina umbonata* (Silvestri)
  - *Rotalia soldanii* d'Orbigny var. *umbonata* Silvestri, 1898, p. 329, pl. 6, fig. 14.
- *Hanzawaia strattoni* (Applin)
  - *Truncatulina americana* Cushman var. *strattoni* Applin, 1925, p. 99, pl. 3, fig. 3.
- *Haplophragmoides bradyi* (Robertson)
  - *Trochammina bradyi* Robertson, 1891, p. 388.—Cushman, 1920, p. 76, pl. 15, fig. 5.
- *Haplophragmoides canariensis* (d'Orbigny)
  - *Nonionina canariensis* d'Orbigny, 1839a, p. 128, pl. 2, figs. 33, 34.
- *Höeglundina elegans* (d'Orbigny)
  - *Rotalina (Turbulina) elegans* d'Orbigny, 1826, p. 276, no. 54.
- *Islandiella norcrossi* (Cushman)
  - *Cassidulina norcrossi* Cushman, 1933, p. 7, pl. 2, fig. 7.
- *Islandiella* cf. *I. norcrossi* (Cushman)
  - *Cassidulina norcrossi* Cushman, 1933, p. 7, pl. 2, fig. 7.
- *Karreriella bradyi* (Cushman)
  - *Gaudryina bradyi* Cushman, 1911, p. 67, figs. 107a–c.
- *Lagena acuticosta* Reuss
  - *Lagena acuticosta* Reuss, 1861, p. 305, pl. 1, fig. 4.
- *Lagena distoma* Parker and Jones
  - *Lagena distoma* Parker and Jones, 1865, P. 467, pl. 48, fig. 6.
- *Lagena elongata* (Ehrenberg)
  - *Miliola elongata* Ehrenberg, 1844, p. 274.
  - *Lagena elongata* (Ehrenberg) Brady, 1884, p. 457, pl. 56, fig. 29.
- *Lagena* aff. *L. favoso-punctata* Brady
  - *Lagena favoso-punctata* Brady, 1881, p. 62, Brady, 1884, p. 446, pl. 58, fig. 35, pl. 59, fig. 4, pl. 61, fig. 2.
- *Lagena feildeniana* Brady
  - *Lagena feildeniana* Brady, 1878, p. 434, pl. 20, fig. 4.
- *Lagena gracilis* Williamson
  - *Lagena gracilis* Williamson, 1848, p. 13, pl. 1, fig. 3, 4.
- *Lagena gracillima* (Sequenza)
  - *Amphorina gracillima* Sequenza, 1862, p. 51, pl. 1, fig. 37.
- *Lagena hispida* Reuss
  - *Lagena hispida* Reuss, 1863, p. 335, pl. 6, figs. 77–79.
- *Lagena hispidula* Cushman
  - *Lagena hispidula* Cushman, 1913, p. 14, pl. 5, figs. 2, 3.
- *Lagena laevis* (Montagu)
  - *Vermiculum laeve* Montagu, 1803, p. 524.
- *Lagena meridionalis* (Wiesner)
  - *Lagena gracilis* Williamson var. *meridionalis* Wiesner, 1931, p. 117, pl. 18, fig. 211.
- *Lagena nebulosa* (Cushman)
  - *Lagena laevis* Montagu var. *nebulosa* Cushman, 1923, p. 29, pl. 5, figs. 4, 5.
- *Lagena paradoxa* (Sidebottom)
  - *Lagena foleolata* Reuss var. *paradoxa* Sidebottom, 1912, p. 395, pl. 16, figs. 22–23.
- *Lagena* cf. *L. perlucida* (Montagu)
  - *Vermiculum perlucidum* Montagu, 1803, p. 525, pl. 14, fig. 3.
- *Lagena semistriata* (Williamson)
  - *Lagena striata* d'Orbigny var. *semistriata* Williamson, 1848, p. 14, pl. 1, figs. 9, 10.
- *Lagena* cf. *L. stelligera* Brady
  - *Lagena stelligera* Brady, 1881, p. 60.—Brady, 1884, p. 466, pl. 57, figs. 35, 36.
- *Lagena striata* (d'Orbigny)
  - *Oolina striata* d'Orbigny, 1839b, p. 21, pl. 5, fig. 12.
- *Lenticulina angulata* (Reuss)
  - *Robulina angulata* Reuss, 1851, p. 154, pl. 8, fig. 6.
- *Lenticulina atlantica* (Barker)
  - *Robulus atlantica* Barker, 1960, p. 144, pl. 69, figs. 10–12.
- *Lenticulina convergens* (Bornemann)
  - *Cristellaria convergens* Bornemann, 1855, p. 327, pl. 13, figs. 16, 17.
- *Loxostomum abruptum* (Phleger and Parker)
  - *Loxostomum truncatum* Phleger and Parker, 1951, p. 17, pl. 7, figs. 15–19.
- *Marginulina glabra* d'Orbigny
  - *Marginulina glabra* d'Orbigny 1826, p. 259.—Cushman, 1923, p. 127, pl. 36, figs. 5, 6.
- *Marginulina* cf. *M. obesa* (Cushman)
  - *Marginulina glabra* d'Orbigny var. *obesa* Cushman, 1923, p. 128, pl. 37, fig. 1.
- *Martinottiella nodulosa* (Cushman)
  - *Clavulina communis* d'Orbigny var. *nodulosa* Cushman, 1922b, p. 85, pl. 18, figs. 1–3.
- *Martinottiella occidentalis* (Cushman)
  - *Clavulina occidentalis* Cushman, 1922b, p. 87, pl. 17, figs. 1, 2.
- *Melonis pompilioides* (Fichtel and Moll)
  - *Nautilus pompilioides* Fichtel and Moll, 1798, p. 31, pl. 2, figs. A–C.
- *Nodogenerina* aff. *N. bradyi* Cushman

Nodogenerina bradyi Cushman, 1927, p. 79.—Loeblich and Tappan, 1987, p. 539, pl. 585, figs. 13, 15.

Nodosaria calomorpha Reuss

Nodosaria calomorpha Reuss, 1866, p. 129, pl. 1, figs. 15–19.

Nodosaria glanduliniformis Dervieux

Nodosaria radicula (Linnaeus) var. *glanduliniformis* Dervieux, 1894, p. 599, pl. 5, figs. 3–7.

Nonionella fragilis Uchio

Nonionella (?) fragilis Uchio, 1960, p. 62, pl. 4, figs. 19–21.

Nonionella grateloupi (d'Orbigny)

Nonionina grateloupi d'Orbigny, 1826, p. 294

Nonionella cf. *N. iridea* Heron-Allen and Earland

Nonionella iridea Heron-Allen and Earland, 1932, p. 438, pl. 16, figs. 14–16.

Nonionella opima Cushman

Nonionella opima Cushman, 1947, p. 90, pl. 20, figs. 1–3.

Nonionella turgida (Williamson)

Rotalina turgida Williamson, 1858, p. 50, pl. 4, figs. 95–97.

Nonionellina labradorica (Dawson)

Nonionina labradorica Dawson, 1860, p. 191, fig. 4.

Nuttallides umbonifera (Cushman)

Pulvinulina umbonifera Cushman, 1933, p. 90, pl. 9, figs. 9a–c.

Oolina apiculata (Reuss)

Oolina apiculata Reuss, 1850, p. 22, pl. 1, fig. 1.

Oolina globosa (Montagu)

Vermiculum globosum Montagu, 1803, p. 523.

Oolina hexagona (Williamson)

Entosolenia squamosa Montagu var. *hexagona* Williamson, 1848, p. 20, pl. 2, fig. 23.

Oolina laevigata d'Orbigny

Oolina laevigata d'Orbigny, 1839b, p. 19, pl. 5, fig. 3.

Oolina lineata (Williamson)

Entosolenia lineata Williamson, 1848, p. 18, pl. 2, fig. 18.

Oolina cf. *O. lineata* (Williamson)

Entosolenia lineata Williamson, 1848, p. 18, pl. 2, fig. 18.

Oridorsalis tener (Brady)

Truncatulina tenera Brady, 1884, p. 665, pl. 95, figs. 11a–c.

Oridorsalis umbonatus (Reuss)

Rotalina umbonata Reuss, 1851, p. 75, pl. 5, fig. 35a–c.

Osangularia culter (Parker and Jones)

Planorbulina farcta (Fichtel and Moll) var. *ungeriana* (d'Orbigny) subvar. *culter* Parker and Jones, 1865, p. 421, pl. 19, figs. 1a–c.

Parafissurina arctica Green

Parafissurina arctica Green, 1959, p. 76, pl. 1, figs. 2a, b. 14, figs. 17a–c.

Parafissurina fusuliformis Loeblich and Tappan

Parafissurina fusuliformis Loeblich and Tappan, 1953, p. 79, pl. 14, figs. 18, 19.

Parafissurina cf. *P. fusuliformis* Loeblich and Tappan

Parafissurina fusuliformis Loeblich and Tappan, 1953, p. 79, pl. 14, figs. 18, 19.

Parafissurina inornata Bergen

Parafissurina inornata Bergen and others, 1986, p. 266, pl. 10, figs. 27–29.

Parafissurina tectulostoma Loeblich and Tappan

Parafissurina tectulostoma Loeblich and Tappan, 1953, p. 81, pl.

Pseudotrochammina atlantica (Parker)

Trochamminella atlantica Parker, 1952, p. 409, pl. 4, figs. 17–19.

Pullenia bulloides (d'Orbigny)

Nonionina bulloides d'Orbigny, 1826, p. 293, model no. 2.—d'Orbigny, 1846, p. 107, pl. 5,

Pullenia subcarinata (d'Orbigny)

Nonionina subcarinata d'Orbigny, 1839a, p. 28, pl. 5, figs. 23, 24. figs. 9, 10.

Quinqueloculina aff. *Q. elongata* Natland

Quinqueloculina elongata Natland, 1938, p. 141, pl. 4, fig. 5.

Quinqueloculina venusta Karrer

Quinqueloculina venusta Karrer, 1868, p. 147, pl. 2, fig. 6.

Recurvoides scitulum (Brady)

Haplophragmium scitulum Brady, 1881, p. 50.—1884, p. 308, pl. 34, figs. 11–13.

Reophax nodulosus Brady

Reophax nodulosus Brady, 1879, p. 52, pl. 4, figs. 7, 8.

Rosalina squamata (Parker)

Discorbis squamata Parker, 1952, p. 418, pl. 6, figs. 10a, b, 11.

Rutherfordoides tenuis (Phleger and Parker)

Cassidulinoides tenuis Phleger and Parker, 1951, p. 27, pl. 14, fig. 14–17.

Saccorhiza cf. *S. ramosa* (Brady)

Hyperammina ramosa Brady, 1879, p. 33, pl. 3, figs. 14, 15.

Saracenaria latifrons (Brady)

Cristellaria latifrons Brady, 1884, p. 544, pl. 68, fig. 19, pl. 113, fig. 11a, b.

Spirillina cf. *S. denticulata* (Brady)

Spirillina limbata var. *denticulata* Brady, 1884, pl. 85, fig. 17.

Stainforthia complanata (Egger)

Virgulina schreibersiana Czjzek, var. *complanata* Egger, 1893, p. 292, pl. 8, figs. 91, 92.

Stetsonia minuta Parker

Stetsonia minuta Parker, 1954, p. 534, pl. 10, figs. 27–29.

Textularia cf. *T. parvula* Cushman

Textularia parvula Cushman, 1922b, p. 11, pl. 6, figs. 1, 2.

Textularia cf. *T. porrecta* (Brady)

Textularia agglutinans var. *porrecta,* Brady, 1884, p. 364, pl. 43, fig. 4.

Thurammina papillata Brady

Thurammina papillata Brady, 1879, p. 45, pl. 5, figs. 4–8.

Trifarina angulosa (Williamson)

Uvigerina angulosa Williamson, 1858, p. 67, pl. 5, fig. 140.

Trifarina fluens (Todd)

Angulogerina fluens Todd in Cushman and Todd, 1947, p. 67, pl. 16, figs. 6, 7.

Trochammina cf. *T. arctica* (Parker and Jones)

Trochammina squamata Parker and Jones, 1865, p. 407, pl. 15, figs. 30, 31.

Trochammina cf. *T. squamata* Jones and Parker

Trochammina squamata Jones and Parker, 1860, p. 304.—Hedley and others, 1964, p. 419, pl. 1, figs. 1a, b, pl. 3, figs. 1a, b, 3a–c.

Uvigerina asperula Cžjžek

Uvigerina asperula Cžjžek, 1848, p. 146, pl. 13, figs. 14, 15.13.

Uvigerina canariensis d'Orbigny

Uvigerina canariensis d'Orbigny, 1839c, p. 138, pl. 1, figs. 25–27.

Uvigerina flintii Cushman

Uvigerina flintii Cushman, 1923, p. 165, pl. 42, fig.

Uvigerina peregrina Cushman

Uvigerina peregrina Cushman, 1923, p. 166, pl. 42, figs. 7–10.

Valvulineria laevigata Phleger and Parker

Valvulineria laevigata Phleger and Parker, 1951, p. 25, pl. 13, figs. 11a, b, 12a, b.

Taxa No Longer Regarded as Foraminifera

Aschemonella scabra Brady

Aschemonella scabra Brady, 1879, p. 44, pl. 3, figs. 12, 13.

APPENDIX 2—Relative proportions (expressed as percents) for each species in each of the 78 samples in this study.

Sample	2-4cm	6-8cm	10-12cm	14-16cm	2-4cm	4-6cm	6-8cm	8-10cm	10-12cm	12-14cm	14-16cm	16-18cm	18-20cm	20-22cm	2-4cm	6-8cm	10-12cm	14-16cm	18-20cm	2-4cm	6-8cm	10-12cm	2-4cm	6-8cm	10-12cm	14-16cm	18-20cm	22-24cm	2-4cm	6-8cm	10-12cm	14-16cm	2-4cm	4-6cm	6-8cm	8-10cm	10-12cm	12-14cm	14-16cm
Taxa	1739-1	1739-1	1739-1	1739-1	1739-5	1739-5	1739-5	1739-5	1739-5	1739-5	1739-5	1739-5	1739-5	1739 5	1741-7	1741-7	1741-7	1741-7	1741-7	1741-8	1741-8	1741-8	1741-8	1741-8	1741-8	1741-8	1741-8	1741-8	1745-6	1745-6	1745-6	1745-6	1745-7	1745-7	1745-7	1745-7	1745-7	1745-7	1745-7
Abditodentrix asketocomptella	-	-	0.3	1.0	0.3	-	-	0.3	-	-	0.6	-	-	-	-	-	-	-	-	0.3	0.3	0.3	-	0.3	-	0.6	0.3	-	-	-	-	0.3	-	-	-	0.6	-	-	-
Alliatina primitiva	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.3	0.3	-	-	-	-	-	-	-
Ammodiscus cf. A. tenuis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ammoglobigerina globigeriniformis	-	-	-	-	-	-	0.3	-	-	-	-	-	-	-	-	-	-	-	-	1.4	0.3	0.5	-	-	-	-	-	-	-	-	0.6	0.3	-	-	-	-	-	-	-
Anomalinoides cf. A. lankfordi	3.9	3.3	2.7	2.6	4.4	6.0	5.0	6.0	6.6	5.5	6.8	4.0	6.4	5.5	2.5	1.2	2.4	1.2	2.2	2.7	3.1	1.4	3.7	1.5	0.9	2.9	2.9	2.3	3.0	4.1	3.8	2.8	1.5	2.6	4.5	3.2	4.7	3.2	3.9
Anomalinoides cf. A. mexicana	1.0	1.6	1.4	0.3	0.3	0.9	1.3	0.6	0.3	0.3	-	-	0.3	2.0	-	0.3	-	-	0.3	-	-	-	-	-	0.3	1.2	-	-	-	-	-	-	0.9	-	0.3	-	-	-	-
Anomalinoides phlegeri	0.3	-	-	-	0.3	0.6	-	1.6	1.0	1.0	0.9	0.7	0.3	-	2.5	1.2	0.6	1.8	1.6	1.1	0.6	0.8	2.8	1.5	3.2	3.5	2.9	1.5	1.6	0.8	1.7	1.1	1.2	1.6	0.6	1.5	1.2	0.3	2.1
Anomalinoides sp. A	-	-	-	-	-	-	-	-	-	-	-	-	-	0.3	-	0.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Anomalinoides sp. C	2.3	1.0	0.3	1.3	0.6	1.6	0.6	0.6	1.3	-	1.5	0.3	1.0	1.0	1.5	1.8	3.6	2.4	3.8	3.3	2.9	3.6	4.0	2.6	3.8	5.9	8.4	6.1	3.3	1.4	2.6	1.7	1.2	2.6	1.5	1.5	2.1	0.3	1.5
Anomalinoides sp. D	-	-	-	-	0.3	1.3	0.9	0.3	1.0	0.3	0.3	0.3	0.3	-	-	0.9	0.6	0.3	-	0.3	-	-	-	-	0.9	0.6	-	-	-	0.6	-	-	-	0.6	0.3	0.3	0.3	0.3	-
Anomalinoides sp. E	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.3	-	0.3	0.3	-	-	-	-	-	-	-	-	-	-	-	-
Archemonella scabra	-	-	0.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Astrononion gallowayi	-	-	0.3	0.3	-	-	-	-	-	0.3	-	-	-	-	-	0.3	0.3	0.3	-	-	-	-	-	-	0.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Astrononion sp.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bolivina cf. B. alata	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bolivina barbata	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bolivina cf. B. globra	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.3	0.3	-	-	-	0.3	-	-	-	0.3	-	0.3	0.6
Bolivina lanceolata	-	-	-	-	-	-	-	-	0.3	-	-	-	-	-	-	-	-	-	-	-	-	-	0.3	-	-	0.6	-	0.3	-	0.3	-	0.3	-	-	-	-	-	-	-
Bolivina lowmani	-	-	-	0.3	-	-	0.3	-	-	0.3	-	-	0.3	-	-	-	-	-	-	-	0.3	-	-	0.3	0.3	-	-	0.3	0.3	0.3	0.3	0.6	-	0.6	-	-	-	0.3	-
Bolivina minima	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.6	-	-	-	-	-	-	-	-	-	-	-	-
Bolivina ordinaria	2.6	1.6	3.7	4.8	1.9	1.6	1.3	0.9	1.3	0.3	1.2	1.0	1.7	1.7	1.8	3.7	3.6	2.1	1.9	2.5	5.7	1.9	4.9	4.7	6.1	5.0	6.3	5.0	2.7	1.1	2.3	4.7	1.5	3.8	2.1	0.6	3.2	2.9	3.9
Bolivina pseudoplicata	-	0.3	-	0.6	0.3	0.3	-	-	0.7	-	-	0.3	-	-	0.3	-	0.6	-	-	-	0.6	1.1	0.6	0.3	1.5	1.5	1.2	1.2	-	-	0.3	0.3	0.3	1.6	-	-	-	0.3	-
Bolivina pseudopunctata	-	0.3	-	-	0.6	-	-	-	-	-	-	0.3	-	-	-	-	0.3	-	-	-	-	0.3	-	-	-	-	-	0.9	0.3	-	-	-	-	0.6	0.3	0.3	-	0.3	-
Bolivina subaenariensis	-	-	0.3	1.3	-	-	-	0.3	0.3	-	0.3	-	-	-	0.3	-	0.3	-	-	-	-	-	0.3	0.3	-	0.3	0.3	1.2	-	-	-	-	-	-	0.6	-	-	-	-
Bolivina subspinescens	-	-	-	-	-	-	-	0.3	-	-	-	0.3	-	-	0.6	0.9	0.3	1.2	1.3	0.3	0.3	0.3	1.2	1.7	0.3	2.9	1.7	0.6	-	-	-	0.3	-	0.3	0.3	0.3	0.9	0.6	1.2
Bolivina translucens	-	-	-	-	-	0.3	-	-	-	-	-	-	-	-	0.6	-	0.6	0.6	1.0	-	0.3	0.3	-	-	-	-	-	0.3	-	0.3	-	-	0.3	-	-	-	0.6	-	-
Bolivina cf. B. variabilis	-	-	-	-	-	-	-	-	-	-	-	-	0.3	-	-	0.3	-	-	-	-	-	-	-	-	-	-	0.3	-	-	-	-	0.3	-	-	-	-	-	-	-
Bolivina sp.	-	-	-	-	-	-	-	0.3	-	-	-	-	-	-	-	-	-	-	-	0.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Buccella frigida	-	-	-	-	-	-	-	-	0.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.3	-	-	-	-	-	-	-	-	-	-	-	-
Buccella inusitata	0.3	-	0.3	1.9	-	-	-	-	-	-	-	0.3	0.3	-	-	-	0.3	-	-	0.3	0.6	-	-	0.9	-	-	0.3	0.9	-	-	-	0.3	0.6	0.3	0.3	-	0.3	0.3	-
Buccella sp. A	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bulimina aculeata	3.2	2.3	2.7	4.2	-	-	-	0.3	-	-	-	-	-	0.3	1.2	0.3	1.2	0.9	0.3	1.9	0.3	-	1.2	1.7	2.3	2.4	0.9	2.6	-	-	0.3	0.3	0.3	0.3	-	-	-	-	-
Bulimina exilis	0.6	0.3	0.3	-	-	0.6	0.3	0.3	-	-	0.3	0.3	-	-	7.4	2.8	5.1	1.5	7.3	2.5	2.3	3.0	0.6	-	0.6	0.9	0.9	-	0.3	0.8	-	0.6	-	0.3	0.3	0.6	0.3	0.3	0.3
Bulimina cf. B. glabra	0.3	0.3	-	0.6	-	-	-	-	-	-	-	-	-	-	-	0.3	-	-	0.3	-	-	-	-	-	-	-	0.3	0.6	-	-	-	-	-	-	-	-	-	0.3	0.3
Bulimina marginata	3.9	2.3	2.4	10.6	0.3	0.6	0.3	-	-	0.3	0.6	1.0	-	0.7	0.9	0.9	2.7	2.1	2.2	0.3	2.3	2.5	3.7	4.4	8.7	5.6	7.5	5.8	2.7	1.4	0.9	0.6	1.5	1.3	1.5	-	0.9	0.6	0.6
Bulimina mexicana	1.0	0.7	1.0	1.0	-	-	-	-	-	-	-	0.3	0.3	0.3	3.4	1.2	0.9	1.5	1.3	-	-	1.4	1.5	1.5	0.3	0.9	1.2	0.3	0.8	0.6	0.6	0.8	1.5	0.3	0.3	1.7	0.3	1.8	0.9
Bulimina rostrata	-	0.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.3	-	-	-	-	-	0.3
Buliminella elegantissima	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cassidulina carinata	1.6	0.3	1.0	2.3	0.6	-	1.3	0.6	0.7	-	-	1.3	-	1.0	-	2.1	2.4	1.8	1.0	0.8	2.9	1.6	1.2	3.5	2.0	4.4	2.3	2.6	-	-	1.7	-	1.2	1.0	0.9	0.9	-	0.9	1.5
Cassidulina laevigata	-	-	-	-	-	-	-	-	-	-	0.6	-	-	-	-	-	-	-	-	-	-	-	0.6	-	1.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cassidulina neocarinata	-	0.3	-	-	-	0.3	-	0.6	0.3	-	-	-	-	1.0	1.5	-	-	2.7	1.9	0.3	4.0	-	0.3	0.6	-	0.6	0.3	3.2	-	-	0.3	0.6	-	-	1.2	0.3	-	0.3	-
Cassidulina obtusa	-	-	-	1.3	-	-	-	-	-	-	-	-	-	-	-	-	0.3	-	-	0.3	0.3	-	-	-	0.3	0.6	-	-	0.5	0.3	0.3	-	-	-	-	0.3	-	-	-
Cassidulina reniforme	-	2.3	1.4	1.0	-	0.3	-	0.3	1.3	1.3	0.3	1.3	0.7	0.3	0.3	0.3	0.3	1.2	-	1.9	-	2.2	-	-	2.0	0.3	-	1.7	0.5	0.6	1.4	1.1	0.6	-	0.6	0.6	0.6	0.9	0.6
Cassidulina cf. C. reniforme	0.3	0.7	1.4	0.3	0.3	-	-	-	-	-	-	-	-	-	-	0.9	-	0.3	2.2	-	1.4	1.4	1.2	0.6	-	-	1.2	1.5	1.1	0.8	0.6	1.1	0.6	-	0.3	0.9	1.2	0.9	0.6
Cassidulina subcalifornica	-	-	1.0	-	-	-	0.3	-	-	-	0.3	-	0.3	0.7	-	-	-	-	-	-	0.9	0.3	2.8	-	-	-	-	-	-	-	-	0.3	-	-	-	-	-	-	-
Cassidulina subglobosa	3.6	3.6	3.0	7.1	2.8	3.1	2.8	2.5	2.3	3.3	2.2	2.7	3.7	2.7	0.9	0.9	1.2	-	1.0	1.4	1.4	2.2	-	0.9	2.3	2.4	1.4	2.6	1.1	0.8	0.6	3.0	-	1.0	3.0	1.7	0.9	0.6	1.8
Cassidulina sp.	1.0	-	1.0	-	-	-	-	-	-	-	-	-	-	-	0.9	0.6	0.6	0.3	0.3	1.9	2.3	1.1	-	-	-	-	-	-	1.1	0.3	-	-	-	-	-	-	-	-	-
Cassidulinoides bradyi	-	-	-	-	-	-	-	-	-	-	-	-	0.3	-	-	0.3	-	-	-	0.3	0.3	-	-	-	0.3	-	0.6	-	0.3	-	0.3	0.3	-	-	0.3	-	-	-	-
Cibicides fletcheri	1.6	-	0.7	0.6	1.3	-	0.3	0.6	0.3	1.0	-	0.7	0.3	0.3	-	-	0.9	0.6	0.6	-	-	-	-	0.3	0.6	-	0.6	-	0.8	0.6	-	1.4	-	-	1.2	0.3	-	-	1.5
Cibicides cf. C. fletcheri	-	-	0.3	-	-	-	-	-	-	2.9	-	1.7	-	-	-	0.3	-	-	-	-	-	-	-	-	-	0.3	-	0.3	-	-	-	-	0.6	-	-	0.3	-	-	-
Cibicides lobatulus	0.6	0.7	1.4	1.0	-	0.6	-	-	0.3	0.3	-	-	-	0.7	0.3	-	-	-	0.3	0.3	-	-	-	0.6	-	-	0.6	-	-	-	-	-	-	-	-	0.3	-	-	-
Cibicides aff. C. lobatulus	-	1.0	0.3	0.3	-	-	-	-	-	-	0.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.3	-
Cibicides refulgens	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.9	-	-	0.3	-	-	0.3	-	-	-	-	-	-	-	-	-	-	-	-
Cibicides wuellerstorfi	1.0	0.3	1.0	-	1.3	-	-	-	-	0.3	1.2	0.7	0.3	0.3	-	-	-	-	-	-	-	0.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cibicides cf. C. wuellerstorfi	0.6	1.0	1.0	0.3	0.3	-	-	0.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.3
Cibicides sp. A	1.0	1.0	2.4	0.6	0.3	-	0.3	0.3	0.3	-	-	-	-	-	0.3	0.6	-	0.3	-	0.3	0.3	-	-	0.3	0.3	-	-	1.2	0.3	0.3	-	-	-	-	-	-	0.3	-	-
Cibicides sp.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.3	0.3	-	-	-	-	-	-	-	-	-	0.3	-	-	-	-	-	-	-	-	-	-	-
Cibicidina? sp. A	0.3	-	-	-	-	-	-	-	-	-	-	0.7	0.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.3	0.3	-	-	-	-	-	-
Cibicidoides kullenbergi	-	-	-	2.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.3	1.2	0.3	-	0.6	-	-	-	-	-	-	-	-	-	-	-	-
Cibicidoides mollis	-	-	-	0.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cibicidoides mundulus	-	0.7	0.3	-	-	-	0.3	0.3	-	-	-	-	-	-	-	-	-	0.3	-	-	-	-	-	-	0.3	-	-	-	-	-	-	-	-	-	-	0.3	-	-	-
Cibicidoides pseudoungerianus	-	-	-	0.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.3	0.6	-	-	-	-	-	-	-	-	-	-	-	-	-
Cibicidoides robertsonianus	0.3	-	0.7	-	-	-	0.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.3	0.3	-	-	-	-	-	-	-	-	-	-	-	-	-
Cibicidoides sp. A	0.3	-	-	-	-	-	-	-	-	-	-	-	-	-	0.3	-	-	0.3	-	0.3	-	0.3	-	-	0.6	0.6	0.3	-	-	-	-	-	0.3	-	-	-	-	-	-
Cibicidoides sp. 0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.6	-	-	-	-	-	-	-	-	-	-	-	-	-
Cibicidoides sp.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Conicospirillina atlantica	-	-	-	-	-	-	-	-	-	-	-	-	-	0.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cribrostomoides subglobosum	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cribrostomoides wiesneri	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.3	-	-	-	-	0.3	-	0.3	-	-	-
Cystammina pauciloculata	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dentalina communis	-	-	-	0.3	-	-	-	-	-	-	-	-	-	-	-	0.3	-	-	-	-	-	-	-	-	-	-	-	-	0.3	-	-	-	-	-	-	-	-	-	-
Dentalina flintii	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dentalina sp. A	-	-	0.3	-	-	-	-	-	-	-	-	-	-	0.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dentalina sp. B	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dentalina sp. C	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dentalina sp. D	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dentalina sp.	-	-	-	-	-	-	-	-	-	0.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Eggerella advena	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Eggerella bradyi	0.3	-	-	0.3	0.3	-	-	-	-	-	-	-	-	-	-	-	-	0.3	-	-	-	-	0.3	-	0.3	2.1	0.6	0.9	-	-	0.3	0.6	-	-	0.3	0.3	-	-	-
Elphidium excavatum	2.9	2.9	3.4	4.5	1.6	0.6	3.1	-	1.0	1.3	0.3	0.3	0.3	2.0	1.8	1.2	1.8	1.2	0.6	-	1.4	0.3	1.2	2.3	3.5	1.2	2.0	1.7	0.3	1.1	1.4	2.5	3.0	1.6	1.2	1.7	2.3	1.5	1.5
Elphidium subarcticum	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.3	-	-	-	-	-	-	-	-	-	-	-
Elphidium sp. A	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.3	-	-	-	-	-
Elphidium sp. B	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.3	-	-	-	-	-	-	0.3	-	0.6	-	-	-	-	-	-	-	-	-	-	-	-
Elphidium sp.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Eoeponidella pulchella	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.6	-	-	-	-	-	-	-	0.3	-	-	-
Epistominella decorata	-	0.3	0.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.3	0.3	-	-	-	-	-	-	-	-	-	-	-
Epistominella exigua	0.3	-	0.3	0.3	0.3	1.6	0.3	1.9	0.3	0.7	0.3	1.7	1.7	1.0	0.9	-	-	1.5	1.9	1.4	0.6	0.3	2.1	0.9	0.9	1.2	3.5	2.9	0.5	1.1	1.2	1.7	-	-	0.3	0.6	0.6	0.6	0.6
Epistominella cf. E. rugosa	-	-	0.3	0.3	-	-	-	0.3	-	-	-	0.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.6	-	-	0.9	-
Epistominella sandiegoensis	4.9	6.2	2.7	2.3	-	0.3	1.6	1.6	1.3	0.3	1.5	1.0	0.3	1.4	0.6	1.8	0.9	0.3	0.6	0.3	2.3	0.8	1.2	0.3	4.4	2.1	1.7	0.3	1.1	1.7	1.2	1.7	3.0	1.0	0.9	1.7	0.9	2.1	0.6
Epistominella cf. E. sandiegoensis	0.3	1.6	0.7	1.0	0.6	0.3	2.2	3.4	1.0	-	0.3	0.3	0.3	1.7	2.5	2.4	2.4	2.1	2.9	1.6	2.3	2.2	2.1	2.0	1.7	2.4	3.5	3.8	1.9	1.4	1.4	2.2	0.6	3.2	2.7	2.6	3.2	1.8	1.8
Epistominella vitrea	-	-	0.3	-	-	-	-	-	-	-	-	-	-	0.3	-	-	-	-	-	0.3	0.3	-	-	-	-	-	-	0.3	-	-	-	-	-	-	-	-	-	-	-
Epistominella sp. A	-	-	-	-	-	-	0.3	-	0.3	-	0.3	0.3	-	-	-	-	0.9	-	-	-	-	-	-	-	-	0.6	0.3	-	-	-	-	-	0.3	-	-	0.3	-	-	0.6
?Epistominella sp. B	1.9	1.6	1.4	0.3	7.0	8.2	4.4	11.6	5.6	9.4	7.4	12.0	5.4	5.8	3.7	8.3	7.2	13.3	6.1	17.5	11.7	20.3	4.9	3.5	2.0	1.2	2.6	2.9	12.0	10.8	6.1	7.5	0.3	4.2	7.7	10.8	6.2	5.9	5.1
Eponides repandus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Eponides tumidulus	-	1.3	-	-	-	-	-	-	-	-	0.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Eponides turgidus	15.3	15.0	10.8	1.3	17.1	28.2	25.6	21.3	28.8	22.5	22.9	22.3	25.0	25.9	3.4	3.1	2.1	4.5	2.6	6.0	4.6	2.5	5.8	3.5	4.7	3.8	2.9	2.0	6.0	2.8	5.2	4.1	2.1	3.2	5.6	5.8	5.3	2.7	4.2
?Eponides sp. C	-	0.7	-	1.0	2.2	0.3	0.6	0.3	0.7	1.0	0.3	0.7	0.7	-	-	0.9	0.6	-	0.3	1.1	0.6	0.8	0.9	1.7	-	1.5	1.2	2.0	0.5	0.6	1.4	3.0	0.9	-	0.3	0.3	0.6	0.3	0.6
Fissurina agassizi	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fissurina aff. F. agassizi	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.3	-	-	-	-	-	-	-
Fissurina circularis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.3	0.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fissurina fimbriata	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fissurina kerguelenensis	-	1.0	0.3	-	0.3	-	-	0.3	-	-	-	-	0.3	0.3	0.3	-	-	-	-	-	-	-	-	-	-	-	-	-	0.3	-	-	-	-	-	0.3	0.3	-	-	0.3
Fissurina laevigata	-	-	-	0.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.6	0.3	0.3	-	-	-	-	-	-	-	-	-
Fissurina marginata	1.0	-	1.4	-	-	-	0.3	-	-	0.3	-	0.3	-	-	-	-	-	-	-	-	0.6	-	-	-	-	-	0.6	0.3	-	-	-	-	-	-	0.3	-	-	-	-
Fissurina ovum	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fissurina submarginata	0.3	0.7	-	-	-	-	-	-	0.3	-	-	-	-	-	-	0.3	-	-	-	-	0.3	-	-	-	-	-	-	-	-	-	-	0.3	0.6	-	0.3	-	-	0.3	-
Fissurina cf. F. truncata	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fissurina sp. A	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fissurina sp. B	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fissurina sp. C	-	1.0	0.3	0.6	-	-	-	-	-	-	-	-	-	-	-	-	0.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fissurina sp. D	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fissurina sp. E	-	-	-	-	-	-	-	-	-	-	-	-	0.3	-	-	-	-	-	0.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fissurina sp. F	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fissurina sp. G	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fissurina sp. H	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fissurina sp. I	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fissurina sp. J	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.3	-	-	-	-	-
Fissurina sp. K	0.3	0.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fissurina sp. L	0.3	-	-	-	0.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.3	0.3
Fissurina sp. M	-	-	-	-	0.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fissurina sp. N	-	-	-	0.3	-	-	0.3	-	-	-	-	0.3	-	-	-	-	-	-	-	-	-	-	-	-	-	0.3	-	-	-	-	-	-	-	-	-	-	-	-	-
Fissurina sp. O	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fissurina sp.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Frondicularia advena	-	-	-	-	-	0.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.3	-
Fursenkoina fusiformis	1.9	1.6	3.0	3.2	2.5	2.5	3.4	4.7	4.0	4.6	3.4	4.0	3.0	3.1	8.3	6.7	7.8	7.3	9.3	8.7	9.1	8.8	9.2	12.2	10.5	8.8	10.4	7.6	7.1	6.9	6.4	10.2	4.6	3.8	5.6	6.4	7.6	6.2	8.1
Gavelinopsis lobatulus	-	-	-	-	-	-	-	-	-	-	-	0.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Gavelinopsis translucens	-	-	-	-	-	-	0.3	-	-	-	0.6	0.3	-	-	-	0.6	-	-	-	0.3	0.9	0.3	-	-	-	-	-	-	0.3	0.3	0.3	0.3	-	-	-	0.3	-	-	0.3
Gavelinopsis sp. A	-	-	-	1.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.3	-	-
Globobulimina affinis	0.3	0.7	1.4	-	1.9	0.6	1.9	0.6	-	1.0	0.3	0.7	1.4	0.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.3	-	-	0.3	1.3	0.3	0.3	0.3	0.6	-
Globobulimina auriculata	1.6	0.3	-	-	-	0.6	-	-	-	1.6	0.9	0.3	0.3	0.3	0.3	-	-	-	0.3	-	-	-	-	-	-	-	-	-	-	0.3	-	0.6	1.5	-	0.6	0.3	-	-	-
Globobulimina pacifica	-	0.7	-	-	3.2	3.1	1.9	0.3	-	1.3	0.6	1.0	1.0	-	1.5	0.6	0.3	-	0.6	0.3	0.3	0.3	-	-	-	0.3	-	0.6	0.8	0.3	0.3	-	2.1	0.3	0.9	1.5	0.6	0.3	0.6
Gyroidina altiformis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Gyroidina orbicularis	0.6	1.0	0.3	0.6	-	-	0.6	0.6	0.3	0.3	0.3	0.7	1.4	0.7	-	-	-	-	-	-	-	-	0.3	-	-	-	0.3	1.2	-	-	-	-	-	0.3	0.3	0.3	0.6	-	0.6
Gyroidina quinqueloba	1.9	1.6	2.0	-	3.5	2.8	1.3	1.9	3.3	2.3	3.7	1.3	0.3	1.4	0.3	0.6	0.9	0.3	1.0	-	-	0.3	0.3	0.6	1.2	0.6	0.9	-	0.3	-	0.3	0.3	-	1.0	1.2	1.5	0.9	0.9	0.9
Gyroidina sp. A	-	-	-	-	-	-	-	-	0.3	-	0.3	-	-	-	-	-	-	-	0.3	-	-	-	-	0.3	0.3	-	-	-	-	-	-	-	-	0.3	-	0.3	-	0.3	-
Gyroidina umbonata	3.9	2.6	1.0	-	0.9	1.9	0.6	0.3	2.3	2.6	1.2	1.7	2.4	2.0	-	1.2	0.6	1.5	-	0.3	0.6	0.8	0.6	0.9	0.3	0.3	0.9	0.3	1.4	2.2	1.2	0.6	2.1	1.3	2.4	1.7	1.2	1.5	1.2
Hanzawaia strattoni	-	-	-	0.3	-	-	-	-	-	-	-	-	-	-	-	0.3	0.3	-	-	0.3	-	-	-	-	0.3	-	0.6	-	-	-	-	-	-	-	-	-	-	-	-
Haplophragmoides bradyi	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Haplophragmoides canariensis	-	-	-	-	-	-	-	0.3	-	-	-	-	-	-	-	-	-	-	0.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hoeglundina elegans	1.9	2.3	2.0	0.3	2.2	0.9	0.9	-	-	1.0	0.3	0.3	0.7	0.3	-	-	-	-	-	-	-	-	-	-	-	-	-	0.3	-	-	-	-	-	-	-	-	-	-	-
Islandiella norcrossi	0.6	0.7	1.7	3.2	-	0.3	0.3	0.6	-	-	-	0.3	-	0.3	0.6	-	0.9	0.3	0.6	-	0.3	0.5	0.9	0.9	1.2	0.6	0.9	0.6	0.3	0.3	-	0.3	-	-	0.3	0.3	-	0.3	0.3
Islandiella cf. I. norcrossi	-	-	-	1.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.3	0.9	0.6	-	-	-	-	-	-	-	-	-	-	-	-

APPENDIX 2—Continued.

Sample	2-4cm	6-8cm	10-12cm	14-16cm	2-4cm	4-6cm	6-8cm	8-10cm	10-12cm	12-14cm	14-16cm	16-18cm	18-20cm	20-22cm	2-4cm	6-8cm	10-12cm	14-16cm	18-20cm	2-4cm	6-8cm	10-12cm	2-4cm	6-8cm	10-12cm	14-16cm	18-20cm	22-24cm	2-4cm	6-8cm	10-12cm	14-16cm	2-4cm	4-6cm	6-8cm	8-10cm	10-12cm	12-14cm	14-16cm
Taxa	1739-1	1739-1	1739-1	1739-1	1739-5	1739-5	1739-5	1739-5	1739-5	1739-5	1739-5	1739-5	1739-5	1739-5	1741-7	1741-7	1741-7	1741-7	1741-7	1741-8	1741-8	1741-8	1741-8	1741-8	1741-8	1741-8	1741-8	1741-8	1745-6	1745-6	1745-6	1745-6	1745-7	1745-7	1745-7	1745-7	1745-7	1745-7	1745-7
Islandiella sp. A	.	.	.	.	.	.	.	.	0.3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Karreriella bradyi	.	0.3	0.7	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.3	.	.	.	0.3	.	.	.	.	0.3	.	.	.	.	.
Lagena acuticosta	.	.	.	.	.	.	.	.	.	.	.	0.3	.	.	.	.	0.3	.	.	.	.	0.3	.	.	.	.	.	.	.	.	.	.	.	.	0.3	.	.	.	.
Lagena distorta	.	.	0.3	.	.	.	0.3	.	.	.	0.3	.	.	.	0.3	0.3	.	.	.	.	.	.	.	.	0.6	0.3	.	.	0.3	0.3	0.3	.	0.6	.	.	.	0.3	0.6	.
Lagena elongata	.	.	.	.	.	.	0.3	.	.	.	.	.	.	.	.	.	.	0.3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Lagena aff. L. favoso-punctata	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.3	.	.
Lagena feildeniana	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Lagena gracilis	.	.	.	0.3	.	0.3	.	.	.	0.3	.	.	.	.	.	0.3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.3	.	0.3	.
Lagena gracillima	.	.	.	.	.	.	.	.	.	0.7	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.3	.	.	.	.	0.3	.	.	0.3	.	.	.	.	.	0.3
Lagena hispida	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.3	.	0.3	.	.	.	.	.	.	0.3	.	.	.	.	.	0.3	.	.	.	.	.	.	.	.
Lagena hispidula	.	0.3	.	.	0.3	.	0.3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.3	.	.	.	.	.	.	.	.	.
Lagena laevis	.	0.3	.	.	.	.	.	.	.	0.3	.	.	.	0.3	.	.	.	.	.	0.3	.	.	.	.	0.3	.	.	.	.	.	.	.	0.3	.	.	.	.	.	.
Lagena meridionalis	.	.	.	.	0.3	.	.	.	.	0.3	.	.	0.3	.	.	0.3	0.3	0.3	.	.	.	.	.	.	.	.	.	.	.	.	.	0.3	.	.	.	.	.	.	.
Lagena nebulosa	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.3	.	.	.	.	.	.	.	0.3	.	.	.	.	.	.	.	.	.	.
Lagena paradoxa	.	.	.	.	.	.	.	.	.	.	.	.	0.3	0.3	.	.	.	.	.	0.8	.	.	.	.	0.3	.	0.3	.	.	.	.	.	.	.	.	.	0.3	0.3	.
Lagena cf. L. perlucida	.	.	.	.	.	.	.	.	.	.	0.3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.3	.	.	.	.	.	.	.	.	0.3	.
Lagena semistriata	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Lagena cf. L. stelligera	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Lagena striata	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Lagena sp. A	.	0.3	0.3	.	0.6	.	.	.	.	.	.	0.3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.3	.	.	0.3	0.6	.	.	.	.	0.3
Lagena sp. B	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Lagena sp. C	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.3	.	.	.	0.3	.
Lagena sp. D	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Lagena sp.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Lenticulina angulata	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.3	0.6	.	.	.	.	.	.	0.3	.	.	.	.	.	.	.	.	.	0.3	0.3	0.3	.	0.6
Lenticulina atlantica	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.3	.	.	.	.	.	.	.	.	.	.	.	.	.	0.3	.	.	.	.	.	.	.	.	.	.
Lenticulina convergens	.	.	.	1.0	0.3	.	.	.	.	0.3	0.3	.	.	.	.	.	.	.	.	0.3	.	.	.	.	0.3	.	.	.	.	.	.	.	.	.	.	.	.	0.3	.
Loxostomum abruptum	.	0.3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.3	0.9	0.6	.	.	.	0.3	.	.	.	0.3	.	.	.	.
Marginulina glabra	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.3	.	.	.
Marginulina cf. M. obesa	.	.	.	.	.	.	0.3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Marginulina sp.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Martinottiella nodulosa	0.3	0.3	0.7	0.3	.	.	.	.	.	.	.	.	.	0.7	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Martinottiella occidentalis	.	.	.	.	.	.	.	.	0.7	0.7	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Melonis pompilioides	1.3	1.6	.	0.6	0.3	0.9	1.3	0.6	0.7	.	0.3	0.3	1.0	0.3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Nodogenerina aff. N. bradyi	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.3	.	.	.	.	.	.	.	.	.	.	.	.	.
Nodosaria calomorpha	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.3	.	.	.	.	.	.	.	.	.	.	.	.	.	0.3	.	.	0.3	.	0.3	0.3	.	.	.
Nodosaria glanduliniformis	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Nodosaria sp.	.	.	.	.	.	.	0.3	.	.	.	.	.	0.3	.	.	.	.	.	.	.	0.3	.	.	.	.	.	.	0.3	.	0.3	.	.	.	.	.	.	.	.	.
Nonionella fragilis	.	.	.	0.3	.	.	.	.	.	.	.	.	.	.	0.3	0.3	.	.	0.3	.	.	.	0.9	.	.	.	.	.	.	.	.	0.3	.	.	.	.	0.3	.	.
Nonionella grateloupi	.	.	.	.	.	.	.	.	.	.	.	0.3	0.7	.	.	.	.	.	.	.	0.9	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Nonionella cf. N. iridea	2.6	3.9	5.4	1.0	4.7	3.4	1.9	6.3	5.0	3.3	8.0	7.7	7.1	8.5	3.1	7.3	4.5	7.6	5.4	10.4	4.9	10.7	3.1	4.9	0.9	2.6	4.0	5.2	9.8	17.1	10.4	11.0	0.9	10.3	13.6	14.0	9.1	10.3	13.5
Nonionella opima	.	.	.	0.3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Nonionella turgida	.	.	.	0.3	.	.	.	.	.	.	0.3	.	.	.	0.9	1.8	1.2	1.8	1.0	0.5	0.3	0.5	.	0.6	0.6	.	.	0.3	0.3	.	0.3	.	.	.	0.6	.	.	0.3	.
Nonionella sp. A	.	.	.	.	0.3	.	.	.	.	.	.	.	.	.	.	.	0.3	.	.	.	.	0.8	.	0.3	.	.	.	.	0.3	.	.	.	.	.	.	.	.	0.3	.
Nonionella sp. B	0.3	.	0.3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.3	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Nonionella sp. C	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Nonionella sp. D	.	0.3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Nonionellina labradorica	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.3	.	0.3	.	0.3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Nuttallides umbonifera	.	.	0.3	0.3	.	.	.	.	.	.	.	.	.	.	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.9	.	0.9	1.4	2.3	.	.	.	0.3	.	.	.	.	.	0.3	.
Oolina apiculata	.	.	.	.	.	.	0.3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Oolina globosa	0.3	.	.	.	.	.	0.3	.	0.3	.	.	0.7	.	0.3	.	.	.	.	.	.	.	.	.	.	0.3	.	.	.	0.3	.	.	.	.	0.3	.	0.3	0.3	.	.
Oolina hexagona	.	.	.	.	.	.	.	.	.	.	.	0.3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.3	.
Oolina laevigata	.	.	.	.	.	0.3	.	.	.	.	.	.	.	.	.	.	.	.	0.3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Oolina lineata	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Oolina cf. O. lineata	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Oolina sp. A	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.3	.	.	.	.	.	.	.	.	.	0.3	.	.	.	.	.	.	.	.	.	.	.	.	.
Oolina sp. B	.	.	.	0.3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Oolina sp.	.	.	.	.	.	.	.	.	.	.	.	.	0.3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Oridorsalis tener	0.6	.	.	.	.	.	.	.	.	0.7	.	.	.	.	.	.	0.3	.	0.3	0.8	0.9	0.5	.	1.2	.	.	.	.	.	.	.	.	.	.	.	.	0.6	0.3	.
Oridorsalis umbonatus	1.6	2.0	0.7	0.3	0.6	0.6	0.9	0.6	0.3	1.6	0.6	0.3	2.4	0.3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.3	.	.	.	.	.	1.2	.	.
Osangularia culter	.	0.3	0.3	.	.	.	.	0.3	.	.	.	.	.	.	.	.	.	0.3	.	.	0.3	.	.	0.3	.	0.3	0.6	0.3	.	.	.	.	.	.	.	.	.	.	.
Parafissurina arctica	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.3	.	.	.
Parafissurina fusuliformis	.	.	0.7	.	.	0.3	.	.	.	.	.	.	.	.	0.3	.	.	.	.	0.3	.	0.3	.	.	.	.	.	0.3	.	0.6	.	.	.	.	.	.	.	.	.
Parafissurina cf. P. fusuliformis	.	.	.	0.3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.3
Parafissurina inornata	.	.	0.3	.	.	.	.	.	0.3	.	0.3	.	.	0.3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Parafissurina tectulostoma	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.3	0.3	.	.	.	.	0.3	.	.	.	0.3
Parafissurina sp. A	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Parafissurina sp. B	.	.	.	0.3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Parafissurina sp. C	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Parafissurina sp. D	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Parafissurina sp. E	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Parafissurina sp. F	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Parafissurina sp. G	.	.	.	0.6	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.3	.	0.3	.	.	.	.	.	.	.	.	.	.	.
Planulina sp. A	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.3	.	.	.	.	.	.	.	.	.	.	.	.
Pleurostomella sp. A	.	0.3	.	.	.	0.3	0.3	.	.	.	.	.	.	.	.	.	.	0.3	.	.	.	.	.	.	.	.	.	.	.	0.3	.	.	0.3	.	.	.	.	.	.
Pleurostomella sp. B	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.3	0.3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
?Pleurostomella sp. C	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.3	.	.	.	0.3	.	.	.
Polymorphina sp. A	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.3	.	.	.	.	.	.	.	.	.	.
Pseudotrochammina atlantica	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.3	.	.	.	.
Pullenia bulloides	0.3	1.6	0.3	0.3	.	.	0.3	0.6	0.3	0.3	1.2	0.7	0.7	0.3	.	.	.	.	0.6	.	.	.	.	0.3	.	.	.	0.3	.	0.3	0.6	0.3	0.6	.	.	.	.	.	0.6
Pullenia subcarinata	.	0.3	0.3	0.3	.	0.6	.	.	.	.	.	.	.	.	0.3	.	.	.	0.3	0.8	.	.	.	0.6	0.6	.	0.6	0.6	0.3	0.6	.	.	0.3	0.3	.	.	.	.	.
Pullenia sp.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Pyrgo sp. A	.	.	.	.	.	.	.	.	.	.	0.3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Pyrgo sp. B	.	.	.	.	.	.	.	.	.	.	.	.	0.3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.3	.
Pyrgo sp. C	.	.	.	.	.	.	.	.	.	.	.	.	0.3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Pyrgo sp.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
?Quadrimorphina sp. A	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.3	.	0.3	.	.	.	.	.	.	0.6	.	.	.	0.3	.	0.3	0.3	.	.	.	.
Quinqueloculina aff. Q. elongata	.	.	.	.	.	.	.	.	.	.	0.3	.	0.3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Quinqueloculina venusta	.	.	.	0.6	0.6	.	0.6	1.3	2.0	1.3	0.6	1.0	1.0	0.3	.	.	.	.	0.6	.	0.6	0.3	.	.	.	.	.	0.3	.	0.3	.	.	.	0.6	0.9	.	.	1.2	0.9
Quinqueloculina sp. A	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Quinqueloculina sp. B	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Quinqueloculina sp.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Recurvoides scitulum	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.3	.	.	.	.	0.3	.	.	.	0.3	.	.	.	.	.	.
Reophax nodulosus	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.3	.	.	.	.
Reophax sp. A	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.3	.	.	.	.	.	.
Reophax sp.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.3	.	.	.
Rhabdammina/Hyperammina sp.	1.6	.	0.3	.	1.3	.	.	.	.	.	.	.	.	.	.	.	0.3	.	.	.	.	0.3	.	0.6	.	.	.	.	.	0.3	.	.	1.2	1.3	.	0.9	0.3	1.8	.
Rosalina squamata	0.3	.	.	2.6	.	0.3	.	0.6	0.7	0.3	.	.	.	.	0.3	0.3	.	0.3	.	.	.	0.3	0.3	0.9	1.5	0.6	2.0	0.9	.	0.3	0.6	0.3	0.6	0.3	.	0.3	0.3	0.3	.
Rosalina sp. A	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.3	.	.	.	.	.	.	.	.
Rosalina sp. B	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.3	.	.	.	.	.	.	.	.
Rutherfordoides tenuis	0.3	.	.	.	.	.	.	.	.	.	.	0.3	.	.	.	.	.	0.6	.	.	0.3	.	0.3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Saccorhiza cf. S. ramosa	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Saracenaria latifrons	.	.	.	0.3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Spirillina cf. S. denticulata	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Stainforthia complanata	7.1	9.4	10.1	3.9	17.1	16.6	13.8	14.4	11.6	10.1	13.3	12.3	12.8	11.9	5.5	6.7	2.7	7.6	6.7	5.2	4.9	4.4	5.2	5.5	4.1	4.4	3.2	3.8	9.3	11.0	10.1	8.8	18.2	10.3	10.7	9.6	10.3	11.5	10.2
Stetsonia minuta	.	.	0.3	0.3	0.3	.	0.3	.	0.3	0.3	0.3	0.3	0.3	0.7	.	.	.	.	.	.	.	.	.	0.6	0.3	0.3	.	.	0.3	.	.	.	.	.	.	0.3	0.6	.	.
Textularia cf. T. parvula	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.3	.	.	.	.	.	0.3	.	.	.	.	.	0.5	0.3	.	.	.	.	.	.	.	.	.
Textularia cf. T. porrecta	.	.	.	.	.	.	.	.	.	.	0.3	.	.	.	.	.	.	.	.	0.3	.	.	.	0.6	.	.	.	.	0.3	0.3	0.9	.	.	.	0.3	0.9	.	.	0.3
Textularia sp. A	.	.	.	.	.	.	.	0.6	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Textularia sp.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.3	.	.	.	.
Thurammina papillata	.	.	.	.	.	.	.	.	.	0.3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.3	.	.	.	.	.
Trifarina angulosa	1.3	1.6	3.0	6.4	.	.	0.6	0.9	.	.	0.3	0.3	0.3	.	0.3	.	0.6	0.9	.	0.3	0.6	.	.	2.0	2.9	2.9	2.0	0.9	0.5	0.6	1.7	.	.	0.3	.	.	0.6	.	0.3
Trifarina fluens	0.3	2.0	1.7	1.6	1.9	2.5	2.5	1.6	1.3	3.3	2.8	1.0	1.7	2.0	4.0	4.6	7.2	4.2	6.7	3.6	5.4	5.5	8.0	4.7	5.8	3.8	2.3	2.0	6.0	4.7	5.8	3.0	5.5	6.7	5.3	5.2	7.3	6.5	4.8
Trochammina cf. T. squamata	.	.	.	.	0.3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.3	.	.	.	.	.	.	.	.	.
Trochammina sp. A	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Trochammina sp. B	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.3	.
Trochammina sp.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.3	.	.	.	.	.	.	.	.	.	.	.	1.2	.	.	.	.	0.3	.	.	.
Uvigerina asperula	.	.	0.3	.	.	.	.	.	0.3	0.3	.	.	.	.	.	.	.	.	.	.	.	.	.	0.3	.	.	.	0.3	.	.	.	.	.	.	.	.	.	.	.
Uvigerina canariensis	.	.	0.3	1.0	.	.	.	.	.	.	.	.	.	0.3	.	.	.	.	.	.	.	0.3	0.3	.	0.6	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Uvigerina flintii	.	.	0.3	0.3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.3	.	.	.	.	.	.	.	.	.	.	.	.	.
Uvigerina peregrina	5.5	1.6	3.0	0.6	7.3	2.5	7.5	3.4	4.3	5.5	5.3	4.0	3.7	2.4	26.8	24.5	19.3	15.1	15.7	10.7	7.4	9.6	13.8	11.3	2.6	3.2	0.9	4.1	12.3	14.4	16.5	11.6	29.8	23.4	12.5	10.2	17.3	19.5	16.2
Valvulineria laevigata	0.3	0.3	1.0	.	0.6	.	0.3	.	0.3	0.3	.	.	0.7	0.3	1.5	.	2.1	0.3	0.6	0.3	0.6	0.5	2.1	1.5	2.9	2.6	1.7	1.2	0.5	.	0.3	0.6	1.5	0.6	0.6	0.9	1.5	1.8	0.9
Indeterminate Calcareous Hyaline	2.9	2.6	1.4	3.2	2.2	0.3	1.6	0.9	2.6	1.6	1.2	0.3	2.7	3.1	3.1	0.6	3.0	1.5	1.0	1.1	0.9	.	2.5	2.9	1.7	2.6	1.4	3.2	2.7	1.7	4.6	3.3	2.1	2.2	0.6	0.9	1.2	0.6	0.9
Indeterminate Agglutinated	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.3	.	.	.	.	.	.	.

APPENDIX 2—Continued.

Sample / Taxa	1745-7 16-18cm	1745-7 18-20cm	1745-7 20-22cm	1745-7 22-24cm	1745-9 2-4cm	1745-9 4-6cm	1745-9 6-8cm	1745-9 8-10cm	1745-9 10-12cm	1745-9 12-14cm	1748-1 2-4cm	1748-1 6-8cm	1748-1 10-12cm	1748-1 14-16cm	1748-5 2-4cm	1748-5 6-8cm	1748-5 8-10cm	1748-5 10-12cm	1748-5 12-14cm	1748-5 14-15cm	1749-2 2-4cm	1749-2 6-8cm	1749-2 10-12cm	1749-2 14-16cm	1749-2 18-20cm	1749-4 2-4cm	1749-4 6-8cm	1749-4 10-12cm	1749-4 14-16cm	1749-4 18-20cm	1749-4 22-24cm	1749-5 2-4cm	1749-5 6-8cm	1749-5 10-12cm	1749-5 14-16cm	1749-5 18-20cm	1749-13 2-4cm	1749-13 6-8cm	1749-13 10-12cm
Abditodentrix asketocomptella	0.3	-	-	-	0.3	0.5	0.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.3	-	-	-	-	-	-	-	-	-	0.3	0.3	-	-	0.3	-
Alliatina primitiva	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ammodiscus cf. A. tenuis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ammoglobigerina globigeriniformis	-	-	-	-	-	1.0	0.5	0.3	0.3	-	2.0	0.6	-	-	1.8	1.5	-	-	-	0.3	2.5	1.1	0.3	-	-	1.1	0.3	0.8	0.8	0.6	0.3	4.0	1.9	3.7	2.0	0.3	2.2	1.4	0.3
Anomalinoides cf. A. lankfordi	3.6	2.7	4.1	3.3	3.7	1.8	3.8	2.3	3.3	4.2	3.4	1.4	0.9	1.2	0.9	0.3	0.6	0.3	-	-	2.2	3.1	2.7	3.3	2.5	3.3	2.9	0.8	2.2	5.3	2.0	1.1	1.9	2.5	2.0	1.7	0.6	0.6	1.1
Anomalinoides cf. A. mexicana	-	-	-	0.6	-	-	0.8	-	-	0.5	-	-	0.3	-	0.3	-	-	1.2	1.5	0.3	-	-	-	-	-	-	-	-	-	0.3	-	-	0.3	-	0.3	-	-	-	-
Anomalinoides phlegeri	1.7	1.2	0.3	0.9	1.3	0.5	3.0	1.0	1.7	0.8	1.1	1.4	1.8	1.2	1.2	3.3	-	-	-	0.3	2.7	2.6	3.0	2.2	1.9	3.1	4.0	2.7	3.4	3.3	3.1	2.9	3.3	2.8	0.9	2.8	1.4	1.7	1.1
Anomalinoides sp. A	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.5	-	-	-	-	0.3	-	0.3	-	-	-	-	-	-	-	-	-	-	-
Anomalinoides sp. C	1.4	0.9	0.9	2.1	2.4	1.8	1.3	1.0	2.2	2.1	8.0	4.6	8.2	7.7	4.1	5.7	1.5	0.3	1.2	1.8	6.0	13.6	9.1	9.2	9.8	7.8	5.1	10.5	5.6	6.9	8.2	7.5	6.4	9.0	6.3	9.2	10.9	11.6	13.2
Anomalinoides sp. D	0.3	0.6	0.6	-	-	0.3	-	-	0.3	0.3	-	0.3	0.9	0.6	-	0.3	1.2	0.3	-	-	0.3	-	-	-	-	-	0.3	0.3	0.3	-	-	0.3	0.3	0.3	0.3	-	0.3	-	-
Anomalinoides sp. E	-	-	-	-	-	0.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.3	0.3	-	0.3	-	-	-
Aschemonella scabra	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Astrononion gallowayi	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Astrononion sp.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bolivina cf. B. alata	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bolivina barbata	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bolivina cf. B. globra	-	-	-	-	0.3	0.3	0.3	-	-	-	-	0.3	-	-	0.3	-	-	0.6	-	0.6	-	-	0.3	-	-	-	0.3	0.3	-	-	-	-	-	-	-	-	-	-	-
Bolivina lanceolata	0.3	0.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.6	-	-	-	-	-	-	-	-	0.5	-	-	-	-	-	-	-	-	-	-	-	-
Bolivina lowmani	-	-	0.3	-	-	-	0.3	0.3	-	-	-	-	-	0.3	-	0.3	-	0.3	0.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.3	-	-	-	-	-
Bolivina minima	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.3	-	-	0.3	-	-	-	-	-	-	-	-	-	-	-	-	0.3	-	-	-	-	-	-
Bolivina ordinaria	2.2	2.1	2.4	3.3	2.6	2.5	0.8	1.0	1.4	1.8	4.0	7.4	3.8	5.0	5.9	4.2	1.9	0.6	0.6	1.2	5.4	4.0	2.7	3.3	3.3	4.7	4.0	1.6	1.7	2.2	2.8	3.7	3.6	2.5	7.2	3.1	2.2	4.2	3.7
Bolivina pseudoplicata	0.3	0.6	-	0.3	0.3	0.5	-	-	-	-	0.6	0.9	0.6	-	0.3	0.3	0.3	0.6	0.3	0.3	-	0.6	-	-	-	0.3	0.3	-	0.8	0.6	-	0.3	0.3	-	-	0.3	0.6	0.3	-
Bolivina pseudopunctata	0.6	0.3	0.3	0.6	-	-	-	0.5	0.3	-	0.3	0.3	0.3	-	-	-	-	0.6	-	0.6	-	-	-	-	-	-	0.8	0.3	-	0.3	0.6	-	-	-	-	-	0.6	0.6	0.8
Bolivina subaenariensis	-	0.3	-	-	-	0.5	0.3	-	-	-	0.6	0.3	-	0.3	-	0.3	0.3	-	-	-	-	0.3	0.5	-	0.3	-	0.3	-	-	0.3	-	-	-	-	0.3	-	0.3	-	-
Bolivina subspinescens	0.6	0.9	0.6	0.6	-	-	-	0.5	0.6	0.5	0.3	0.3	-	0.9	0.9	0.3	-	-	-	-	0.5	1.1	0.5	1.1	1.1	0.8	1.1	1.6	2.0	0.3	0.6	0.5	0.8	1.7	0.3	0.6	0.3	0.6	0.6
Bolivina translucens	-	-	-	-	-	0.5	0.3	0.3	0.3	0.3	0.3	0.3	-	-	0.3	0.3	0.3	-	1.2	0.6	0.5	0.3	0.3	0.3	1.1	0.8	-	-	0.3	-	0.3	-	-	-	-	0.3	-	0.3	0.3
Bolivina cf. B. variabilis	-	-	-	0.3	-	-	-	-	-	-	-	-	0.3	-	0.3	-	0.3	-	-	-	-	0.3	0.8	-	-	-	-	-	-	0.3	0.8	-	0.3	-	-	-	-	-	0.3
Bolivina sp.	-	-	-	-	-	-	0.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Buccella frigida	-	-	-	-	-	-	-	-	-	-	-	0.3	-	-	-	-	1.2	0.3	0.3	-	-	-	-	-	-	-	-	-	-	-	-	0.3	-	-	-	-	-	-	-
Buccella inusitata	0.3	-	0.3	0.3	-	-	-	-	-	-	0.3	0.3	0.3	-	0.6	-	0.6	0.6	0.9	-	-	0.3	0.3	-	0.3	-	0.5	0.3	-	-	-	-	0.6	0.3	-	-	-	-	-
Buccella sp. A	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.3	-	0.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bulimina aculeata	-	0.9	0.9	0.6	-	0.3	-	-	-	0.3	1.4	-	0.3	0.3	1.5	1.2	0.6	0.3	0.6	0.9	0.5	0.9	-	3.1	1.1	1.1	0.5	0.8	0.6	0.6	1.7	1.1	1.4	1.1	1.1	0.3	0.8	1.1	0.3
Bulimina exilis	0.6	-	-	0.3	0.5	-	-	0.3	-	0.5	6.0	4.6	2.9	3.3	0.6	0.6	-	-	-	-	2.7	2.3	1.3	1.1	2.5	3.3	1.3	1.6	2.0	1.1	2.8	0.3	-	-	0.6	-	2.5	2.5	3.7
Bulimina cf. B. glabra	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.3	-	-	0.3	-	-	-	-	-
Bulimina marginata	0.3	1.8	2.4	0.9	1.8	1.0	1.0	1.5	1.7	1.6	3.4	4.3	4.7	5.3	5.3	5.4	1.2	0.9	1.2	1.2	3.3	3.7	1.1	3.1	1.4	1.1	2.9	2.7	1.1	2.8	1.1	2.7	5.0	5.6	2.3	2.5	2.0	3.0	2.2
Bulimina mexicana	0.8	1.8	0.3	0.3	0.3	0.5	0.5	1.3	0.8	0.5	0.6	0.9	0.6	0.9	-	0.3	0.3	-	-	-	0.5	1.1	0.3	1.1	0.8	0.8	0.5	0.8	1.1	0.8	0.3	0.5	1.4	0.6	0.6	-	1.7	0.6	-
Bulimina rostrata	0.3	-	-	-	0.3	-	-	-	-	0.3	-	-	-	-	-	0.3	-	-	-	-	-	-	-	-	-	0.3	-	-	-	-	-	-	-	-	-	-	-	-	-
Buliminella elegantissima	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.3	0.3	0.3	1.2	1.2	0.6	-	-	-	-	-	-	-	-	-	-	-	0.3	-	-	-	-	-	-	-
Cassidulina carinata	0.8	1.8	2.1	2.1	0.3	2.8	1.3	0.3	1.1	1.3	1.4	1.7	1.2	0.9	1.5	1.5	1.2	-	0.6	0.9	1.4	1.4	3.5	3.6	4.1	1.9	1.9	2.4	1.4	2.2	2.0	1.1	0.8	2.5	2.0	2.8	2.5	1.9	1.4
Cassidulina laevigata	-	-	-	-	-	-	-	-	-	-	0.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cassidulina neocarinata	-	-	0.3	0.3	0.3	-	0.3	-	0.8	-	-	0.6	0.9	0.9	0.6	-	-	-	0.6	-	1.1	-	0.5	0.8	-	0.6	-	0.3	0.6	0.3	-	-	0.8	0.6	0.3	0.3	0.6	0.6	-
Cassidulina obtusa	-	-	-	-	-	-	-	-	-	-	-	0.6	-	-	0.3	-	0.3	0.3	0.3	-	-	-	-	-	-	0.6	-	-	-	0.3	-	0.3	0.3	-	-	-	-	-	0.3
Cassidulina reniforme	0.8	-	0.3	0.3	1.1	-	0.3	1.0	0.3	0.8	-	0.6	0.3	0.9	0.6	1.8	3.7	6.3	5.3	11.6	0.3	0.9	0.8	0.6	1.9	0.3	-	1.9	1.7	0.6	2.3	1.3	0.6	1.1	0.6	0.8	0.6	1.1	0.6
Cassidulina cf. C. reniforme	0.6	0.3	-	-	0.8	1.5	0.3	-	1.4	1.0	1.1	1.1	0.9	0.6	0.3	1.5	0.9	0.9	0.3	-	1.1	2.0	1.3	1.1	0.5	0.6	1.9	2.2	0.6	0.6	1.4	0.3	1.9	0.8	1.1	1.4	1.7	0.8	1.1
Cassidulina subcalifornica	-	-	-	-	-	0.3	0.5	0.3	-	-	-	-	0.9	-	-	-	-	0.3	-	0.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cassidulina subglobosa	2.2	1.2	3.3	0.9	1.6	2.8	3.0	1.3	2.8	2.1	-	0.3	1.2	0.6	0.6	1.8	3.1	1.5	2.0	-	-	-	-	1.1	1.6	0.6	1.3	-	0.3	0.3	-	-	0.6	-	0.3	-	1.1	0.8	0.3
Cassidulina sp.	-	-	-	-	1.1	-	-	0.8	-	-	-	-	-	-	-	1.2	-	-	-	-	-	-	-	-	-	-	1.3	-	-	-	-	-	-	-	-	-	-	-	-
Cassidulinoides bradyi	-	-	-	-	0.3	-	-	0.3	-	-	-	-	-	0.3	-	-	-	-	-	-	-	-	-	-	0.3	-	0.5	0.5	-	-	-	-	0.3	-	0.3	-	1.1	-	-
Cibicides fletcheri	0.6	0.6	1.2	0.3	-	0.8	0.3	1.0	-	-	-	-	-	0.3	0.3	-	-	0.3	-	-	0.5	0.6	-	-	-	0.3	-	-	-	0.3	-	-	-	-	-	-	-	0.6	-
Cibicides cf. C. fletcheri	-	0.3	-	-	-	-	-	-	-	0.3	-	-	0.3	-	-	-	-	-	0.9	0.9	-	0.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cibicides lobatulus	-	-	-	-	-	-	-	-	0.3	-	-	0.9	-	-	-	-	-	-	-	-	-	0.3	-	-	-	-	-	-	-	-	-	-	-	0.6	0.6	-	-	-	-
Cibicides aff. C. lobatulus	-	-	-	-	-	-	-	-	0.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cibicides refulgens	-	-	-	-	-	-	-	-	-	-	-	0.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cibicides wuellerstorfi	-	-	-	-	-	-	-	0.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cibicides cf. C. wuellerstorfi	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cibicides sp. A	-	-	-	-	0.5	0.3	-	-	-	-	-	-	-	0.6	0.3	0.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.5	-	-	-	-	-	-	-
Cibicides sp.	0.3	-	-	-	-	-	-	-	-	-	-	-	-	-	0.3	0.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cibicidina? sp. A	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cibicidoides kullenbergi	-	-	-	-	-	-	-	-	-	-	-	0.3	-	0.3	-	-	-	-	-	-	-	-	-	-	-	0.6	-	-	-	-	-	-	-	-	-	-	-	-	-
Cibicidoides mollis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cibicidoides mundulus	-	-	-	-	-	-	-	-	-	-	0.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.3	-	-	-	-	-
Cibicidoides pseudoungerianus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.3	-	-	-	-	0.3	-	0.3	-	-	-	-	-	0.8	-	0.3	-	-	-	-	-	-	-	-
Cibicidoides robertsonianus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cibicidoides sp. A	-	-	-	0.3	-	-	-	-	0.3	-	0.9	-	-	-	0.3	0.3	-	-	-	0.3	-	0.3	-	-	-	-	-	0.5	0.6	0.6	-	0.5	0.3	0.3	-	-	-	0.3	0.3
Cibicidoides sp. B	-	-	-	-	-	-	-	-	-	-	-	-	-	0.3	-	-	-	-	-	-	-	-	-	-	-	-	-	0.3	-	-	-	-	-	-	-	-	-	-	-
Cibicidoides sp.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.3	-	-	-	-	-	-	-	-	-	-	-
Conicospirillina atlantica	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cribrostomoides subglobosum	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.9	-	-	-	-	-	0.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cribrostomoides wiesneri	-	-	-	-	0.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.8	-	-	-	-	-	-	-
Cystammina pauciloculata	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dentalina communis	-	-	-	-	-	-	-	-	0.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dentalina flintii	0.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dentalina sp. A	-	-	0.3	-	-	-	-	-	-	-	-	0.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.3	-	-	-	-	-	-	-	-	-	-	-
Dentalina sp. B	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.3	-	0.3	0.3
Dentalina sp. C	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.3	0.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dentalina sp. D	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dentalina sp.	-	-	-	0.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.3	-	-	-	-	-	-
Eggerella advena	-	-	-	-	-	-	-	-	-	-	0.6	-	-	-	0.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Eggerella bradyi	-	-	-	-	-	0.3	0.5	0.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.5	0.3	-	0.3	-	-	0.3	-	0.6	0.3	-	-	0.9	0.3	-	-	0.3
Elphidium excavatum	1.7	2.1	0.6	1.2	0.8	0.8	-	1.3	-	-	3.2	2.3	2.3	0.9	6.2	3.0	13.0	13.8	13.7	9.2	0.8	0.9	0.5	0.6	0.5	0.8	0.3	0.3	0.3	2.2	0.8	0.3	0.6	1.4	0.9	0.6	0.6	0.6	3.1
Elphidium subarcticum	-	-	-	-	-	-	-	-	-	-	0.3	-	-	-	-	-	0.3	0.6	-	0.3	-	-	-	-	-	-	-	-	-	-	-	0.3	-	-	-	-	-	-	-
Elphidium sp. A	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Elphidium sp. B	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.3	-	-	-	-
Elphidium sp.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Eoeponidella pulchella	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.5	2.4	2.0	3.0	-	-	-	-	-	-	-	-	0.3	-	-	-	-	-	-	-	-	-	-
Epistominella decorata	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.3	-	-	-	-	-	-	-	-	-
Epistominella exigua	0.8	1.5	0.6	0.6	0.8	0.5	0.5	-	0.3	1.0	1.1	0.3	0.6	1.2	-	1.5	-	-	0.3	0.3	0.5	0.3	0.5	1.7	0.5	0.6	0.8	0.8	0.8	1.4	0.8	0.3	0.8	1.1	1.4	0.8	0.6	0.6	0.6
Epistominella cf. E. rugosa	-	-	-	0.3	0.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Epistominella sandiegoensis	1.7	1.8	1.5	3.0	0.5	0.8	0.8	0.3	0.6	0.5	0.9	0.6	0.9	0.9	3.2	7.2	18.9	18.9	23.9	23.2	1.1	0.6	1.1	-	-	-	0.8	-	-	4.2	0.8	0.5	0.6	0.3	1.1	0.6	-	0.8	0.3
Epistominella cf. E. sandiegoensis	1.4	1.5	1.2	2.4	3.7	2.3	2.3	1.3	1.1	2.6	2.9	4.9	4.7	6.2	2.1	2.4	1.2	2.4	2.3	0.6	4.4	2.6	2.7	3.3	3.0	2.2	3.5	4.3	2.5	-	2.0	2.7	0.8	3.1	4.3	3.9	4.8	4.7	2.5
Epistominella vitrea	-	-	-	-	-	-	-	-	0.3	-	-	-	0.3	0.3	-	-	-	-	-	0.3	-	-	-	-	-	-	-	-	0.6	-	-	-	-	-	-	-	-	-	-
Epistominella sp. A	-	0.3	-	0.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
?Epistominella sp. B	6.1	7.8	6.8	10.0	13.2	12.7	15.9	13.1	9.7	13.9	3.4	5.1	6.4	4.2	2.1	4.2	0.6	0.3	0.9	0.3	7.6	4.8	8.9	8.1	13.1	11.4	12.5	14.3	12.3	10.5	10.2	10.7	3.6	7.1	7.8	10.8	9.5	9.4	7.3
Eponides repandus	-	-	-	-	-	0.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Eponides tumidulus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Eponides turgidus	4.2	3.6	5.0	3.4	4.2	7.9	4.0	3.3	6.4	5.2	3.4	7.4	5.8	3.9	6.2	3.3	0.6	3.9	0.6	0.3	7.1	10.5	6.2	7.5	7.9	6.4	5.3	6.5	7.8	6.9	6.2	5.3	10.9	7.1	6.3	5.8	6.7	6.9	6.7
?Eponides sp. C	0.8	1.2	1.5	0.6	-	0.8	0.8	0.5	0.6	0.8	1.1	1.4	2.3	2.4	0.9	0.9	1.2	0.6	0.3	0.6	1.4	1.7	1.9	0.8	1.4	0.6	1.1	0.5	1.4	0.8	1.7	1.1	1.1	2.0	0.9	1.7	2.2	1.7	2.2
Fissurina agassizi	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.3	-	-	-	-	-	-	0.6	-	-	-	-	0.3	0.3	-	0.3	-	-	-	0.3	-
Fissurina aff. F. agassizi	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.3	-	0.3	-	0.3	0.3	-
Fissurina circularis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.3
Fissurina fimbriata	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fissurina kerguelenensis	0.3	0.3	0.6	-	-	-	-	-	-	-	-	0.3	-	-	0.3	-	-	-	-	-	-	-	-	0.3	0.3	-	-	-	-	-	-	-	0.6	-	0.3	0.3	-	-	0.6
Fissurina laevigata	-	-	-	0.3	-	-	-	-	0.3	-	0.3	-	-	-	-	0.3	-	0.3	0.3	0.3	-	-	0.3	-	0.3	0.6	-	-	-	-	-	-	-	-	-	-	-	-	-
Fissurina marginata	-	0.3	-	-	-	-	-	-	-	-	-	-	-	-	-	0.6	-	-	-	-	-	-	-	-	-	0.3	-	-	0.3	-	0.3	-	-	-	-	-	-	-	-
Fissurina ovum	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.3	-	-	-	-	-	-	-	-	-	0.3	-	-	-	-	-	-	-	-
Fissurina submarginata	0.3	0.3	-	-	-	-	-	-	-	-	0.3	-	-	-	-	0.3	-	-	0.3	0.3	-	-	-	-	-	-	-	0.3	0.6	0.3	-	-	-	0.3	-	-	-	-	-
Fissurina cf. F. truncata	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fissurina sp. A	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fissurina sp. B	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fissurina sp. C	0.3	-	-	-	-	-	-	-	-	0.3	-	-	-	-	0.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fissurina sp. D	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.3	-	-	0.3	-	-	-	-	-	-	-	-	-	-	-	-
Fissurina sp. E	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fissurina sp. F	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fissurina sp. G	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.3	-	-	-	-	-	-	-	-	-
Fissurina sp. H	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fissurina sp. I	-	-	-	-	-	-	-	-	-	-	-	-	0.3	-	-	-	0.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fissurina sp. J	-	-	-	-	0.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.3	-	-	-	-	-	-
Fissurina sp. K	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.3	0.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fissurina sp. L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fissurina sp. M	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fissurina sp. N	0.3	-	-	0.3	-	-	-	-	-	-	0.3	0.3	-	-	-	-	-	0.3	0.6	-	-	-	0.3	-	-	-	-	-	-	-	-	-	-	-	-	0.3	-	-	-
Fissurina sp. O	-	-	-	-	-	-	-	-	0.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fissurina sp.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.3	-	-	-	-	-	-	-	0.3	-	-	-	-	-	-	-	-	-	-	-	-	-
Frondicularia advena	-	-	-	0.3	-	0.3	0.3	-	-	-	0.3	-	-	-	-	-	-	-	-	-	-	-	-	0.3	-	-	-	-	-	0.3	-	-	-	-	-	-	-	-	-
Fursenkoina fusiformis	8.1	6.9	12.1	7.3	7.4	6.9	3.3	6.9	8.6	8.1	23.9	23.7	23.4	24.6	12.9	13.5	23.2	23.4	22.2	23.8	13.1	13.4	16.1	13.1	12.0	10.3	12.8	10.2	12.0	11.9	15.0	16.3	12.8	10.2	13.2	17.2	16.0	14.7	17.1
Gavelinopsis lobatulus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Gavelinopsis translucens	-	-	0.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Gavelinopsis sp. A	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.9	-	1.2	0.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Globobulimina affinis	-	-	-	-	-	-	-	-	-	0.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Globobulimina auriculata	-	-	-	-	1.1	0.3	0.8	0.3	-	0.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Globobulimina pacifica	0.8	0.3	0.3	0.6	0.8	1.3	0.3	1.3	0.6	1.3	0.3	-	-	0.3	0.6	0.3	-	-	-	-	0.5	0.3	0.3	0.6	0.3	1.4	0.8	0.3	0.3	0.8	1.4	1.3	0.8	0.3	0.6	-	-	0.6	-
Gyroidina altiformis	-	-	-	-	0.3	-	-	-	-	-	0.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Gyroidina orbicularis	-	-	0.3	0.3	-	-	-	0.5	-	-	0.3	-	-	-	0.6	-	-	0.3	-	-	-	-	-	-	0.3	-	-	0.3	-	0.6	0.3	-	-	-	0.3	-	-	-	-
Gyroidina quinqueloba	1.4	3.0	1.2	0.6	1.3	3.0	2.0	1.0	1.1	0.3	0.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.3	-	-	0.3	0.3	-	-	-	-	-	0.3	-	0.3	0.6
Gyroidina sp. A	0.3	-	-	-	-	-	0.3	-	-	-	-	0.3	0.3	-	-	0.3	-	-	-	-	-	0.6	-	-	-	-	-	-	-	-	-	-	0.3	-	-	0.3	-	-	-
Gyroidina umbonata	1.4	0.9	1.5	2.4	-	0.5	0.8	1.3	1.1	1.8	-	0.6	-	0.6	0.3	-	-	0.3	0.6	0.9	0.3	0.6	1.1	-	0.5	1.7	1.1	1.3	-	1.1	0.3	0.5	1.1	0.6	1.1	-	-	0.3	-
Hanzawaia strattoni	-	-	0.3	0.3	-	-	-	-	-	-	0.3	0.3	0.3	0.9	-	-	0.6	0.9	0.9	0.3	0.3	0.6	0.3	-	-	-	-	0.3	-	0.6	0.3	0.5	-	0.3	0.3	0.6	0.8	-	0.3
Haplophragmoides bradyi	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.6	-	-	-	-	-	1.4	-	-	-	-	-	-	-	-	-	-	0.8	-	-	-	-	-	-	-
Haplophragmoides canariensis	-	-	-	-	0.3	-	-	-	-	-	-	-	-	-	0.3	0.3	-	-	-	-	1.4	-	-	-	-	0.3	-	-	-	-	-	-	-	-	-	-	-	-	-
Hoeglundina elegans	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Islandiella norcrossi	-	-	-	0.6	0.5	-	-	-	-	-	0.3	-	-	0.6	1.2	2.4	1.2	0.3	-	0.9	0.3	0.3	-	0.6	0.3	-	-	0.3	-	0.3	-	0.3	0.3	0.8	0.6	0.3	-	-	0.3
Islandiella cf. I. norcrossi	-	-	-	-	-	-	-	-	-	-	-	-	-	0.3	-	0.3	1.2	0.3	0.9	0.6	-	-	-	-	-	-	-	-	-	-	-	0.3	-	-	-	-	-	-	-

APPENDIX 2—Continued.

Sample	1745-7 16-18cm	1745-7 18-20cm	1745-7 20-22cm	1745-7 22-24cm	1745-9 2-4cm	1745-9 4-6cm	1745-9 6-8cm	1745-9 8-10cm	1745-9 10-12cm	1745-9 12-14cm	1748-1 2-4cm	1748-1 6-8cm	1748-1 10-12cm	1748-1 14-16cm	1748-5 2-4cm	1748-5 6-8cm	1748-5 8-10cm	1748-5 10-12cm	1748-5 12-14cm	1748-5 14-15cm	1749-2 2-4cm	1749-2 6-8cm	1749-2 10-12cm	1749-2 14-16cm	1749-2 18-20cm	1749-4 2-4cm	1749-4 6-8cm	1749-4 10-12cm	1749-4 14-16cm	1749-4 18-20cm	1749-4 22-24cm	1749-5 2-4cm	1749-5 6-8cm	1749-5 10-12cm	1749-5 14-16cm	1749-5 18-20cm	1749-13 2-4cm	1749-13 6-8cm	1749-13 10-12cm
Taxa																																							
Islandiella sp. A	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Karreriella bradyi	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Lagena acuticosta	.	.	.	.	.	.	.	.	.	.	.	.	0.3	.	.	.	.	.	.	0.3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.3
Lagena distoma	0.3	-	0.3	0.3	0.5	.	0.3	0.3	0.3	-	-	0.6	.	.	.	.	.	.	.	.	0.3	0.3	0.8	-	0.3	.	.	0.3	0.6	0.3	0.3	0.3	0.3	-	0.3	0.3	.	.	0.3
Lagena elongata	.	.	.	.	.	.	.	.	.	.	0.3	.	.	0.3	.	.	.	.	.	.	0.3	.	.	0.3	.	0.3	0.3	.	.	.	.	.	.	.	.	.	.	.	.
Lagena aff. L. favoso-punctata	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Lagena feildeniana	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.3	.	.	.	.	.	.	.
Lagena gracilis	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Lagena gracillima	0.3	.	.	.	.	.	.	.	.	.	.	.	.	0.6	.	0.3	.	.	.	.	.	.	0.3	.	.	.	.	.	0.3	.	.	.	.	.	0.3	0.3	.	.	0.3
Lagena hispida	0.3	.	.	0.3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Lagena hispidula	.	.	.	.	0.3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.3	.	.	.	.	.	.	.	.	.	.	.	.	0.3	.	.
Lagena laevis	.	.	0.3	0.3	.	.	0.3	0.5	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.3	0.3	.	.	.	.	.
Lagena meridionalis	.	.	.	.	0.3	0.3	.	.	.	.	.	0.3	.	.	.	.	.	.	.	.	.	.	.	0.3	0.5	0.3	0.3	0.5	.	0.6	0.3	.	0.3	.	.	.	.	.	0.3
Lagena nebulosa	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Lagena paradoxa	0.3	.	.	.	.	.	0.3	.	.	0.3	0.6	.	.	.	.	.	.	.	.	.	0.5	0.3	0.3	.	.	0.6	0.3	0.3	0.3	.	.	.	0.3	.	.	0.3	.	0.3	.
Lagena cf. L. perlucida	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.3	.	.	.	.	0.3	.	.	.	0.3	.	0.3	0.3	0.3	0.3	0.3	.	.	.	0.3	0.3	.	0.3
Lagena semistriata	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Lagena cf. L. stelligera	.	.	.	.	0.5	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.3	.	.	.	.	.	.	.	.	.	0.3	.	0.3	.	.	.	0.3	.
Lagena striata	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.3	.	.	.	.	.	.	.	.	.	.	.	.	.	0.3	.	.	.	.	.	.	.
Lagena sp. A	.	.	.	.	.	.	.	0.3	.	.	.	.	.	.	.	0.3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Lagena sp. B	.	.	.	.	.	.	.	0.3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Lagena sp. C	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Lagena sp. D	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.3	.	.	.	.	.	0.3	.	.	.
Lagena sp.	.	.	.	.	.	.	.	.	.	0.3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.3	0.3	.	0.3	.	.	0.3
Lenticulina angulata	.	.	0.3	.	.	.	0.3	.	0.3	0.5	.	.	.	.	.	.	.	.	.	.	.	0.6	.	0.3	.	0.6	0.3	.	.	0.3	.	.	.	.	0.6	0.6	0.3	.	0.8
Lenticulina atlantica	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.3	.	.	0.3	0.3	.	.	.	.	.	.
Lenticulina convergens	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.6	.	.	.	.	.	.	.	.	.	.	.	.	0.3	.	.	.	.	.	.
Loxostomum abruptum	.	.	.	.	.	.	.	.	.	.	.	.	.	0.9	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Marginulina glabra	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Marginulina cf. M. obesa	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Marginulina sp.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Martinottiella nodulosa	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Martinottiella occidentalis	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Melonis pompilioides	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Nodogenerina aff. N. bradyi	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Nodosaria calomorpha	.	.	.	.	.	.	.	0.3	.	0.3	.	.	.	.	.	.	.	.	.	.	0.3	.	0.3	.	.	.	0.3	.	0.3	.	.	.	.	.	.	.	.	.	.
Nodosaria glanduliniformis	.	.	.	.	.	.	0.3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Nodosaria sp.	.	.	0.3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.3	.	.	.	.	0.3	.	.	.	.	.	.	.	0.3	0.3	.	.	.	.	.	.	.
Nonionella fragilis	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Nonionella grateloupi	.	.	.	0.3	.	.	.	.	.	.	.	.	.	.	.	.	0.6	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Nonionella cf. N. iridea	8.4	11.1	13.0	10.9	10.3	12.7	14.1	11.8	12.2	10.5	0.6	1.4	3.5	3.0	-	3.6	1.2	3.3	2.6	1.2	1.9	2.3	5.6	3.1	4.1	3.1	4.3	4.3	5.6	6.4	5.9	4.0	1.7	4.2	8.0	7.2	6.2	5.3	3.4
Nonionella opima	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.6	0.3	-
Nonionella turgida	0.3	0.9	0.3	0.3	0.3	-	0.3	0.3	0.3	.	1.4	2.0	1.5	0.9	0.3	0.6	0.3	0.6	.	.	-	1.4	0.8	1.1	0.5	1.1	0.5	1.1	2.5	2.2	1.7	0.8	0.8	0.3	0.6	0.6	0.6	1.1	0.6
Nonionella sp. A	0.3	.	.	.	.	.	.	.	0.6	0.5	0.3	.	.	.	.	.	0.9	.	.	1.2	.	.	.	.	0.5	0.6	0.8	-	0.8	-	1.4	0.5	-	0.8	0.3	0.3	0.3	0.6	0.6
Nonionella sp. B	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1.1	.	.	.	.	.	.	.	.	0.3	.	.	.	.	.	.	.	0.3	0.3
Nonionella sp. C	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.6	.	.	.	.	.	.	.	.	.	.	.	.	0.3	.	.	.	.	.	.	.
Nonionella sp. D	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.3	.	.	.	.	.	0.3	.	.	.	0.3
Nonionellina labradorica	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Nuttallides umbonifera	0.3	.	0.3	0.6	0.5	-	0.8	.	.	.	.	.	0.6	0.3	0.6	0.3	.	0.3	.	0.3	0.3	0.6	-	2.5	1.6	0.6	1.1	1.1	0.8	0.3	0.6	1.3	0.3	.	0.9	1.1	0.6	0.8	1.1
Oolina apiculata	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.3	.	.	0.3	.	.	.	.	.	0.3	.	.	.	.	.	.	.	.	.
Oolina globosa	.	.	.	.	0.5	.	.	0.3	0.3	.	.	0.3	.	.	.	.	.	.	.	.	.	.	.	0.3	.	.	.	.	.	.	.	.	.	0.3	.	.	.	.	.
Oolina hexagona	.	.	.	.	.	.	.	.	.	0.3	.	.	0.3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.3	.	.	0.3	.	.	.	.	0.3
Oolina laevigata	.	.	.	.	.	.	.	.	.	.	0.3	.	0.3	.	.	.	.	.	.	.	.	.	0.5	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Oolina lineata	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Oolina cf. O. lineata	.	.	.	.	.	0.3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Oolina sp. A	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Oolina sp. B	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Oolina sp.	.	.	.	.	.	.	.	.	.	0.3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Oridorsalis tener	.	0.9	0.6	-	0.5	.	.	.	0.8	0.5	0.6	0.3	1.2	.	0.6	0.3	.	.	.	0.3	0.3	0.3	.	.	.	.	0.5	0.3	.	0.6	.	.	.	.	.	.	.	.	.
Oridorsalis umbonatus	0.3	0.3	.	.	.	0.3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Osangularia culter	.	.	.	.	0.3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Parafissurina arctica	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.3	.	0.3
Parafissurina fusuliformis	0.3	.	.	.	.	.	.	.	.	.	.	.	.	.	0.6	.	.	.	.	.	0.5	0.3	.	.	.	.	.	0.5	.	.	.	.	0.3	.	0.3	.	0.3	.	.
Parafissurina cf. P. fusuliformis	.	.	.	.	.	.	.	.	0.3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.3	.	.
Parafissurina inornata	.	.	.	.	.	.	.	.	.	0.3	0.3	.	.	.	.	.	.	.	.	.	0.3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.8
Parafissurina tectulostoma	.	.	.	.	.	.	0.3	.	.	.	.	.	.	0.3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Parafissurina sp. A	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.3	.	.	.	.	.	.	.	.	.	.	0.3	0.3	.
Parafissurina sp. B	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Parafissurina sp. C	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Parafissurina sp. D	.	.	.	.	0.3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Parafissurina sp. E	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Parafissurina sp. F	.	0.6	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.3	0.3	.	.	.	0.3	0.3	.	.	.	.	.
Parafissurina sp. G	.	.	.	.	.	.	.	.	.	.	0.3	0.3	.	.	.	.	.	.	.	.	.	.	.	.	.	0.3	.	.	0.3	.	.	.	.	.	.	.	.	.	.
Planulina sp. A	.	.	.	.	.	.	.	.	0.3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.3	.	.	.	.	.	.	.
Pleurostomella sp. A	.	.	.	.	.	.	.	.	.	.	.	.	0.3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.3	.	.	.	.	.
Pleurostomella sp. B	.	.	.	.	.	.	.	.	.	.	0.3	.	.	.	.	.	.	.	0.3	.	.	.	.	.	.	.	0.3	.	.	0.3	.	.	.	.	.	.	.	.	.
?Pleurostomella sp. C	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Polymorphina sp. A	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Pseudotrochammina atlantica	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Pullenia bulloides	0.3	.	1.2	0.6	.	.	0.8	0.3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.3	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Pullenia subcarinata	.	.	.	0.3	.	0.3	.	0.3	.	.	.	.	.	0.3	0.3	0.6	.	.	.	.	.	.	.	0.3	.	.	.	.	.	.	.	0.3	.	0.3	0.6	.	.	.	.
Pullenia sp.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Pyrgo sp. A	.	.	.	.	.	.	.	0.3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Pyrgo sp. B	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
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Pyrgo sp.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.3	.	.	.	.	.	.	.	.	.	.
?Quadrimorphina sp. A	.	.	.	.	0.3	.	.	.	0.3	.	.	.	.	.	.	.	.	0.3	.	.	.	.	0.3	.	.	.	.	.	.	0.3	.	.	.	.	.	.	.	0.3	.
Quinqueloculina aff. Q. elongata	.	.	0.3	.	.	.	.	.	0.3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Quinqueloculina venusta	.	0.3	0.3	0.6	0.3	0.3	0.8	1.5	0.6	0.5	.	.	.	.	.	.	.	.	.	0.9	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Quinqueloculina sp. A	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Quinqueloculina sp. B	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Quinqueloculina sp.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Recurvoides scitulum	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Reophax nodulosus	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Reophax sp. A	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Reophax sp.	.	.	.	.	.	.	.	.	.	.	0.3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Rhabdammina/Hyperammina sp	0.6	.	.	0.3	.	.	.	1.0	.	.	0.3	.	.	.	0.3	.	.	.	.	.	0.3	.	.	.	.	0.3	.	.	0.6	-	0.3	0.8	0.3	.	.	.	0.6	.	.
Rosalina squamata	0.3	0.6	-	0.3	-	0.3	-	0.3	0.3	0.3	0.3	0.6	0.3	0.3	-	0.6	2.8	3.0	2.3	1.8	0.5	0.3	-	0.6	0.3	.	.	.	0.3	-	0.3	0.3	0.6	0.3	.	.	0.3	-	0.3
Rosalina sp. A	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Rosalina sp. B	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Rutherfordoides tenuis	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.3	.	.	.	.	.	.	.	.	0.3	.	.	.	.	.	.	.	.
Saccorhiza cf. S. ramosa	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Saracenaria latifrons	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Spirillina cf. S. denticulata	.	.	.	0.6	.	.	.	0.3	0.3	0.3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Stainforthia complanata	13.1	9.3	8.6	10.9	8.4	10.7	11.4	11.6	11.0	12.8	1.4	2.0	1.2	3.9	2.9	3.3	1.9	0.6	.	.	2.2	3.1	1.9	2.5	2.5	2.5	4.0	2.2	0.8	2.5	1.4	1.9	4.2	2.8	2.3	2.5	1.7	1.7	3.4
Stetsonia minuta	.	.	0.3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.3	.	.	.	.	0.3	.	.	.	.	.	.	.	.	.	.	0.3	.	.	.	.	.
Textularia cf. T. parvula	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.3	.	.	.	.	.	.	.
Textularia cf. T. porrecta	.	0.3	0.6	0.6	0.3	0.5	0.8	0.3	0.3	0.8	0.3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Textularia sp. A	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Textularia sp.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Thurammina papillata	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Trifarina angulosa	0.8	0.3	-	0.3	.	0.3	0.3	1.5	0.3	0.3	0.9	0.3	1.2	0.3	0.3	0.9	0.3	0.3	-	0.3	-	0.3	0.5	-	0.5	.	.	.	.	.	.	1.1	.	.	.	0.6	0.6	0.8	0.3
Trifarina fluens	4.2	3.6	5.3	3.9	4.2	4.1	2.8	5.7	5.0	4.7	3.2	3.4	4.7	2.1	5.9	2.4	0.6	.	.	0.9	2.7	2.6	4.0	3.9	2.2	4.7	3.7	2.7	3.1	2.5	3.1	2.7	2.5	4.0	3.4	3.9	5.3	4.7	3.7
Trochammina cf. T. squamata	.	.	.	.	.	.	0.3	.	.	.	1.1	0.3	-	0.3	.	.	.	.	.	.	0.5	.	.	.	.	0.3	.	.	.	.	.	1.1	-	0.6	-	0.3	0.3	.	.
Trochammina sp. A	.	0.3	.	.	.	.	.	.	.	.	.	0.3	0.9	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.3	0.3	.	.	.	.	.	0.6	1.1
Trochammina sp. B	.	0.3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.3	.	.	.	.	.	.	.	0.3	.	.	.	.	.	.	.	.	.	.
Trochammina sp.	.	.	.	.	.	.	0.3	0.3	.	.	0.3	.	.	0.3	.	0.3	0.3	.	.	.	.	.	.	0.3	0.3	.	.	.	0.3	.	.	.	.	.	.	.	.	.	.
Uvigerina asperula	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.3	.	.	.	.	.	0.3	.	.	.	.	.	.	.	.	0.3	.	.	.	.	.
Uvigerina canariensis	.	0.3	.	.	.	.	.	.	.	.	.	.	.	0.3	.	.	.	.	.	0.3	.	.	.	0.3	.	.	0.3	0.3	.	.	0.3	0.5	0.3	-	0.3	1.1	.	0.6	0.6
Uvigerina flintii	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Uvigerina peregrina	18.7	17.5	11.2	9.7	14.8	9.1	11.1	13.1	13.3	8.9	1.7	2.6	2.9	1.5	15.3	9.9	2.8	.	0.9	0.3	9.5	7.1	10.8	9.2	8.7	9.2	8.8	10.0	12.0	7.2	8.8	6.7	9.5	8.5	9.2	5.3	4.8	4.2	4.8
Valvulineria laevigata	0.3	1.5	1.5	0.9	0.8	0.3	0.5	1.3	1.1	0.8	1.4	-	0.6	0.9	1.8	0.6	.	.	.	.	1.9	-	1.1	0.8	1.1	0.8	0.8	0.8	0.6	0.6	1.1	0.5	1.1	1.1	0.9	0.3	-	-	0.6
Indeterminate Calcareous Hyaline	2.0	1.2	0.9	2.1	1.3	2.0	1.0	1.0	1.4	1.6	2.6	1.1	1.5	1.8	1.2	0.9	0.9	1.5	1.5	2.1	2.2	1.1	1.3	0.8	0.8	2.5	1.9	1.6	2.0	2.2	0.6	2.7	3.9	1.7	1.4	4.4	0.8	2.2	1.1
Indeterminate Agglutinated	.	.	.	.	0.3	.	0.3	.	.	.	.	.	.	.	.	.	.	.	.	.	0.3	.	.	.	.	.	.	.	.	.	.	.	1.7	0.6	0.3	-	0.3	-	0.3